Attachment: A (part 1 of 3)

Project plans and specifications

RAVATT ALBRECHT
& ASSOCIATES INC.
ARCHITECTURE ENGINEERING

COUNTY OF SANTA BARBARA

SANTA MARIA JUVENILE JUSTICE CENTER
UNIT 1, 2 & 3 REMODEL
PROJECT # 21055
BSCC#83-7574.06

SPECIFICATIONS
Bid Documents

OCTOBER 15, 2025

Prepared for:

County of Santa Barbara
General Services Department
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CERTIFICATION

NAME OF PROJECT:
COUNTY OF SANTA BARBARA
PROBATION – SANTA MARIA JUVENILE JUSTICE CENTER
UNITS 1, 2 & 3 REMODEL, PROJECT #21055

BIDDING DOCUMENTS PREPARED BY:

Ravatt Albrecht & Associates
125 Union Avenue, #201
Orcutt, CA 93456

Signed: _____ Date: 10/15/25
(Signature of an Officer of the Firm Named Above) (Date)



TYPED NAME: Gregory Ravatt

TITLE: Principal Architect

Certification:

(Affix professional registration stamp of the person named above with signature and expiration date.)

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SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Predemolition Photographs or Video: Submit before Work begins.

C. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician.

1.5 CLOSEOUT SUBMITTALS

A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

   1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

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

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

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

D. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

E. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs.

1. Contractor to submit photo documentation to County for GSA.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

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

3.4 SELECTIVE DEMOLITION, GENERAL

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

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
5. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal."

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

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

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable,

protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
5. Comply with County Standard forms and procedures

B. Burning: Do not burn demolished materials.

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

3.6 CLEANING

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

END OF SECTION 024119

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Sections:

1. Division 31 Section "Earth Moving" for drainage & fill under slabs-on-grade.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated on the Plans.

B. Design Mixtures: For each concrete mixture, for review by the Project Engineer.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Material certificates.

C. Material test reports.

D. Floor surface flatness and levelness measurements.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

E. Preinstallation Conference: Conduct conference at Project site

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed, or as indicated on the plans.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II:

2. See notes on the Structural Drawings.

3. Provide integral color in mix from batch plant for all interior concrete slab on grade areas. Refer to Architectural Drawings - Finish Schedule for color and color pattern/configuration.

B. Normal-Weight Aggregates: ASTM C 33, graded.

1. Maximum Coarse Aggregate Size: 3/4”.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.4 ADMIXTURES

A. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

2.5 VAPOR RETARDERS

A. Vapor barrier must have all of the following qualities:

1. Permeance of less than 0.01 Perms as tested in accordance with ASTM E 1745 Section 7.

2. Other performance criteria:

a. Strength: ASTM E 1745 Class A.

b. Thickness: 15 mils minimum

B. Vapor barrier products::

1. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com, ASTM E1745 Class A, and seam, tape, and mastic.

2. Other acceptable products:

a. Or equal products that meet all of the specified performance criteria in paragraph A.

2.6 CURING MATERIALS

A. See notes on the Plans.

2.7 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use vapor inhibiting admixture in concrete for foundations and retaining walls that are intergral to the building, and floor slabs on grade.

C. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: Per the plans.
2. Maximum Water-Cementitious Materials Ratio: 0.50 per the plans.
3. Slump Limit: 4 inches (100 mm).
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.8 WATERSTOPS

A. Flexible Rubber Waterstops: CE CRD-C 513, **with factory-installed metal eyelets,**] for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, **available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

   a. Greenstreak.
   b. Williams Products, Inc.

2. Profile: **Flat, dumbbell without center bulb**.
3. Dimensions: **6 inches by 3/8 inch thick**; nontapered.

B. Flexible PVC Waterstops: CE CRD-C 572, **with factory-installed metal eyelets,** for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, **available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

   a. BoMetals, Inc.
   b. Greenstreak.
   c. Paul Murphy Plastics Company.
   d. Vinylex Corp.

2. Profile: **Flat, dumbbell without center bulb**.
3. Dimensions: **6 inches by 3/8 inch thick (150 mm by 10 mm thick)**.

2.9 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions and as shown on the plans.

1. Lap joints per manufacturer’s instructions and seal with manufacturer's recommended tape and mastic.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

2. See the notes on the Plans.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.6 CONCRETE PLACEMENT

A. See notes on the drawings.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

   1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

   1. Apply to concrete surfaces exposed to public view.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

   1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

3.8 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.

1. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces to be covered with resilient flooring, carpet, or ceramic tile.
2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch (3.2 mm).

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

3.9 CONCRETE PROTECTING AND CURING

A. Cure concrete per the notes on the drawings.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 033000

SECTION 033053 - MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes cast-in-place concrete for use where not otherwise specified, including reinforcement, concrete materials, mixture design, placement procedures and finishes.

B. Related Sections:

1. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
2. Division 32 Section "Concrete Paving" for concrete pavement and walks.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Other Action Submittal:

1. Design Mixtures: For each concrete mixture.

1.4 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.

B. Comply with the following sections of ACI 301, unless modified by requirements in the Contract Documents:

1. "General Requirements."
2. "Formwork and Formwork Accessories."
3. "Reinforcement and Reinforcement Supports."
4. "Concrete Mixtures."
5. "Handling, Placing, and Constructing."
6. "Lightweight Concrete."

C. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS

2.1 FORMWORK

A. Furnish formwork and formwork accessories according to ACI 301.

2.2 STEEL REINFORCEMENT

A. Recycled Content: Provide steel reinforcement with an average recycled content of steel products so that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

C. Plain-Steel Wire: ASTM A 82, as drawn.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/, fabricated from as-drawn steel wire into flat sheets.

E. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150, Type II. Supplement with the following:

a. Fly Ash: ASTM C 618, Class C or F.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregate: ASTM C 33, graded, 1-1/2-inch nominal maximum aggregate size.

C. Lightweight Aggregate: ASTM C 330, 1-inch nominal maximum aggregate size.

D. Water: ASTM C 94/C 94M.

2.4 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.

3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.5 RELATED MATERIALS

A. Vapor Retarder: Plastic sheet, ASTM E 1745, Class A or B.

B. Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick; or plastic sheet, ASTM E 1745, Class C.

C. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth or cotton mats.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.7 CONCRETE MIXTURES

A. Comply with ACI 301 requirements for concrete mixtures.

B. Normal-Weight Concrete: Prepare design mixes, proportioned according to ACI 301, as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
4. Slump Limit: 5 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture] , plus or minus 1 inch.
5. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of trowel-finished floor slabs to exceed 3 percent.

C. Structural Lightweight Concrete Mix: ASTM C 330, proportioned to produce concrete with a minimum compressive strength of 3000 psi at 28 days and a calculated equilibrium unit weight of 110 lb/cu. ft. plus or minus 3 lb/cu. ft., as determined by ASTM C 567. Concrete slump at point of placement shall be the minimum necessary for efficient mixing, placing, and finishing.

1. Limit slump to 5 inches for troweled slabs and 4 inches for other slabs.

D. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate but not less than a rate of 1.5 lb/cu. yd..

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116, and furnish batch ticket information.

1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, construct, erect, brace, and maintain formwork according to ACI 301 (ACI 301M).

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

A. Install, protect, and repair vapor retarders according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.

1. Lap joints 6 inches and seal with manufacturer's recommended adhesive or joint tape.

3.4 STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Locate and install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least [one-forth] of concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint fillers full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

3.6 CONCRETE PLACEMENT

A. Comply with ACI 301 for placing concrete.

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

C. Do not add water to concrete during delivery, at Project site, or during placement.

D. Consolidate concrete with mechanical vibrating equipment.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding 1/2 inch.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete .

C. Rubbed Finish: Apply the following rubbed finish, defined in ACI 301, to smooth-formed finished as-cast concrete where indicated:

1. Smooth-rubbed finish.
2. Grout-cleaned finish.
3. Cork-floated finish.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.8 FINISHING UNFORMED SURFACES

A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.

1. Do not further disturb surfaces before starting finishing operations.

C. Scratch Finish: Apply scratch finish to surfaces indicated and surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes, unless otherwise indicated.

D. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, fluid-applied or direct-to-deck-applied membrane roofing, or sand-bed terrazzo.

E. Trowel Finish: Apply a hard trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

F. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set methods. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

G. Nonslip Broom Finish: Apply a nonslip broom finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 (ACI 301M) for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Tests: Perform according to ACI 301.

1. Testing Frequency: One composite sample shall be obtained for each day's pour of each concrete mix exceeding 5 cu. yd. but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Testing Frequency: One composite sample shall be obtained for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.

3.11 REPAIRS

A. Remove and replace concrete that does not comply with requirements in this Section.

END OF SECTION 033053

SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Decorative concrete masonry units.
3. Mortar and grout.
4. Steel reinforcing bars.
5. Ties and anchors.
6. Miscellaneous masonry accessories.

B. Related Sections:
1. Division 051200 Structural Steel Framing for installing anchor sections of adjustable masonry anchors for connecting to structural-steel frame.
2. Division 07 for water repellents applied to concrete unit masonry.
3. Division 07 Section "Sheet Metal Flashing and Trim" for **exposed** sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

1. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.
2. Mortar Test (Property Specification): For each mix required, according to ASTM C 109/C 109M for compressive strength**, A**STM C 1506 for water retention, and ASTM C 91 for air content.
3. Mortar Test (Property Specification): For each mix required, according to ASTM C 780 for compressive strength.
4. Grout Test (Compressive Strength): For each mix required, according to ASTM C 1019.
5. Prism Test: For each type of construction required, according to ASTM C 1314.

1.6 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement.".
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Initial Selection:

1. CMUs, in the form of small-scale units.
2. Colored mortar.
3. Weep holes/vents.

D. Samples for Verification: For each type and color of the following:

1. Exposed CMUs.
2. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.
3. Accessories embedded in masonry.

E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

F. Qualification Data: For testing agency.

G. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include material test reports substantiating compliance with requirements.
b. For masonry units, include data and calculations establishing average net-area compressive strength of units.

2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.

H. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

I. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

J. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

E. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Division 01 Section 013300 Submittal Procedures for mockups.

1. Build sample panels for typical wall/window infill in sizes approximately 60 inches long by 48 inches high.
2. Where masonry is to match existing, erect panels adjacent and parallel to existing surface.
3. Protect approved sample panels from the elements with weather-resistant membrane.
4. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section General Conditions.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, 2007 Edition, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Regional Materials: Provide CMUs that have been manufactured within 100 miles of Project site from aggregates that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.

B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

2. Provide square-edged units for outside corners unless otherwise indicated.

C. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength per Structural Drawings.
2. Density Classification: Medium weight.
3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

4. Exposed Faces: Provide color and texture matching the range represented by Architectural Drawings.
5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.3 MASONRY LINTELS

A. General: Provide one of the following:

B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

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

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91.

E. Mortar Cement: ASTM C 1329.

F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Davis Colors; True Tone Mortar Colors.
b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
c. Solomon Colors, Inc.; SGS Mortar Colors.

G. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

H. Aggregate for Grout: ASTM C 404.

I. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

J. Water: Potable.

2.5 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60

2.6 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.

1. Mill-Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 641/A 641M, Class 1 coating.
2. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 zinc coating.
3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
4. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

C. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.

2.7 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

B. Dovetail Slots in Concrete: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from 0.034-inch, galvanized steel sheet.

C. Anchor Bolts: Headed or L shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

D. Postinstalled Anchors: Torque-controlled expansion anchors or chemical anchors per Structural Drawings.

1. Load Capacity: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 unless otherwise indicated.
3. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 or Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from **neoprene**.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated. Finish with Epoxy Grout at interior.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

2.9 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

2. Refer to Structural Drawings, General Structural Notes,

B. Mortar for Unit Masonry: Comply with ASTM C 270, and Structural Drawings, General Structural Notes

C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Mix to match Architectural Drawings.
3. Application: Use pigmented mortar for exposed mortar joints with the following units:

a. All exposed CMUs.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

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

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:

1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.7 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

3.8 LINTELS

A. Provide masonry lintels where shown and where openings of more than 18 inches are shown without structural steel or other supporting lintels.

B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.9 FLASHING

A. General: Install embedded flashing in masonry at lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
4. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
6. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

7. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.10 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 48 inches.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: **Level 2** special inspections according to the "International Building Code."

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

I. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

3.12 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.13 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.14 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Interior non-load-bearing wall framing.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

   1. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
      a. Interior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height.

1.3 SUBMITTALS

A. Product Data: For each type of product and accessory indicated.

B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners.

1.4 QUALITY ASSURANCE

A. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements.

B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code--Sheet Steel."

C. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

D. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

2.2 INTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Flange Width: 1-5/8 inches

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and same minimum base-metal thickness as steel studs.

C. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads.

D. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

2.3 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members, unless otherwise indicated.

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

C. Anchor Bolts: ASTM F 1554

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

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

F. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

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

2.4 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.2 INSTALLATION, GENERAL

A. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

B. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

C. Install framing members in one-piece lengths.

D. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

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

F. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

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

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

3.3 INTERIOR NON-LOAD-BEARING WALL INSTALLATION

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

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

1. Stud Spacing: 16 inches

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

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deflection tracks and anchor to building structure.
2. Install double deflection tracks and anchor outer track to building structure.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

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

3.4 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

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

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

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

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

END OF SECTION 054000

SECTION 055963 - DETENTION ENCLOSURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes Mesh Security Screen Assemblies.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, and attachment details.

C. Samples: For factory-applied color finishes.

D. Samples for Verification:

1. Include 12-by-12-inch cut-away corner section of mesh assembly.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Field quality-control reports.

1. Field quality-control certification signed by Contractor.

C. Shop Drawings, showing details of attachment to surrounding materials and elevations showing scope of the project.

D. Samples of materials as may be requested without cost to owner: frame sections, woven rod panel, fasteners, mullion section, corner section, etc.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Security Fasteners: Furnish not less than one box for every 50 boxes or fraction thereof, of each type and size of security fastener installed.

B. Tools: Provide **two** sets of tools for installing and removing security fasteners.

1.7 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

PART 2 - PRODUCTS

2.1 MESH SECURITY SCREEN ASSEMBLIES

A. Basis of Design: Kane Innovations, 2250 Powell Ave. Erie, PA 16506. Vantage Wall Barrier – 12 GA. Galv. Steel Model:3 Contact: Southern Folger Contracting Inc. Michael Thornton (210) 846-5573

B. Main Framing: The main frame shall be built-up tubular type, measuring 1 3/4” x 2 1/2”, with fixed concealment plates. The corners of the main frame shall be notched for self-aligning and robotically welded.

1. Open Channel: The open channel frame members shall be formed of not less than 12 ga. A60 galvannealed sheet steel and have individual slots along the inner edges to support the woven rod panel.
2. Concealment Plates: Concealment plates of 12 ga. A60 galvannealed steel shall be welded to the back of the main frame approximately 8” on center to complete the tubular shape.

C. Braces: Braces shall be built-up tubular type, measuring 1 ¼” x 2 ½”, with fixed concealment plates. Braces shall be formed of not less than 12 ga. A60 galvannealed sheet steel and furnished when required.

D. Perimeter Channel: Perimeter channel shall be a formed channel 1 3/4” x 2 1/16” x 1 3/4” of not less than 12 ga. A60 galvannealed sheet steel. Channel provided in stock lengths with factory punched 7/16” diameter holes approximately 16” on center for attachment to structure.

E. Woven Rod Panels: Fabricated from double crimped, low carbon, ASTM A641, pre galvanized steel 3/8” diameter rods, woven with 2” open space. Woven rod panels shall be installed symmetrically into the slotted main frame. Every rod shall be welded into the slot at both ends where it penetrates the main frame.

F. Wall Anchors: See Drawings.

G. Finishes: All exterior surfaces of the main frame, concealment plates and rod shall be thoroughly cleaned in a 5-step bonderizing process. The surfaces shall receive an electrostatically applied thermoplastic, polyester powder coating (2.5 mil min. thickness) which shall be applied and baked to a hard mar-resistant finish in one of Kane’s standard colors.

1. Color: Architect to select from manufacturer’s full range of colors.

2.2 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly.

B. Coordinate dimensions and attachment methods of detention enclosures with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.

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

D. Form and grind edges and corners to be free of sharp edges or rough areas.

E. Form metal in maximum lengths to minimize joints. Form sheet-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.

F. Weld corners and seams continuously to comply with referenced AWS standard.

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

H. Cut, reinforce, drill, and tap detention enclosures as indicated to receive hardware, security fasteners, and similar items.

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

J. Form exposed connections with hairline joints flush and smooth using concealed fasteners where possible.

2.3 FABRICATION OF MESH SECURITY BARRIER ASSEMBLIES

A. Fabricate Security Barrier assemblies with materials and to sizes and configurations indicated, complete with mounting flanges. Anchors to be provided by installer.

B. Main Framing: Before inserting Mesh Security Screen, weld and grind smooth corners of open channel elements.

C. Mesh Security Screen Panels: Insert panels symmetrically in main framing. Extend end of each panel at least 1 inch into main framing and, from inside of channel, weld into each slot where it contacts main framing.

D. Concealment Plates: Weld plates to main framing with minimum 1 inch welds at minimum 10 inches o.c., staggered side to side and ground smooth, to form a fully enclosed tubular steel frame.

2.4 SECURITY FASTENERS

A. Operable only by tools produced by fastener manufacturer or other licensed fabricator for use on specific type of fastener.

1. Drive-System Type: Manufacturer's standard as approved by Owner.

2.5 ACCESSORIES

A. Concealed Bolts: ASTM A 307, Grade A unless otherwise indicated.

B. Embedded Plate Anchors: Fabricated from mild-steel shapes and plates, minimum 3/16 inch thick; with minimum 1/2-inch- diameter, headed studs welded to back of plate.

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of detention enclosures.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations of detention enclosure connections before installation.

C. Inspect built-in and cast-in anchor installations, before installing detention enclosures, to verify that anchor installations comply with requirements. Prepare inspection reports.

3.2 INSTALLATION, GENERAL

A. Install detention enclosures plumb, rigid, properly aligned, and securely fastened in place, complying with manufacturer's written recommendations.

B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing detention enclosures to in-place construction. Include threaded fasteners for inserts, security fasteners, and other connectors.

C. Cutting, Fitting, and Placement: Obtain architect's written approval for cutting, drilling, and fitting required for installing detention enclosures. Set detention enclosures accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack.

D. Provide temporary bracing or anchors for items that are to be welded to adjacent construction.

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

F. Field Welding: Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

3.3 INSTALLATION OF MESH SECURITY SCREEN ASSEMBLIES

A. Anchor Angles Anchorage: Fasten anchor angles/channels to wall with 3/8-inch-diameter bolts with double-expansion shields.

B. Panel Anchorage: Weld main framing to floor anchors, existing guardrails, and supplementary angles and channels per Drawings or, where not shown, with 1-inch welds at 12 inches o.c.

C. Provide supplementary framing plates at panel-to-panel connections and multiple-panel-height partitions. Weld supplementary framing to main framing per Drawings.

D. Provide additional field bracing as shown or as necessary for rigid, secure installation.

3.4 FIELD QUALITY CONTROL

A. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.

END OF SECTION 055963

SECTION 064023 – INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Plastic-laminate-faced wood cabinets of stock design.
   2. Solid-surfacing-material countertops.
   3. Wall shelving.

1.2 REFERENCES

A. Refer to Section 066116 Solid Surfacing Fabrications.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For cabinet finishes and for each type of top material indicated.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Forest Certification: Fabricate cabinets and countertops with wood and wood-based products produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

C. Quality Standard: Unless otherwise indicated, comply with WIC's "Manual of Millwork" for Custom grade over plywood throughout. No Medium Density Fiberboard (MDF) to be used.

   1. Provide WI-certified compliance certificate indicating that manufactured wood casework complies with requirements of grades specified.
   2. Product Designations: Drawings indicate manufactured wood casework configurations by referencing WI design series numbering system as defined in WI's "Manual of Millwork."
   3. Products with claims to have been built to WI standards but without certification will be rejected.

D. Product Designations: Drawings indicate sizes, configurations, and finish material of manufactured wood casework by referencing designated manufacturer's catalog numbers. Other

manufacturers' casework of similar sizes and door and drawer configurations, of same finish material, and complying with the Specifications may be considered. Refer to Division 01 Section "Product Requirements."

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of manufactured wood casework that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Delamination of components or other failures of glue bond.
b. Warping of components.
c. Failure of operating hardware.
d. Deterioration of finishes.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Plastic-Laminate-Faced Manufactured Casework:

a. Architectural Cabinet Systems; a division of Windham Millwork, Inc.
b. Cal-Dak Cabinets.
c. CampbellRhea; a Sagas International company.
d. Case Systems Inc.
e. CIF Furniture Ltd.
f. Diversified Fixture.
g. Fisher Hamilton L.L.C.
h. Goelst USA, LLC.
i. Hausmann Industries, Inc.
j. International Office Products Cooperative.
k. LSI Corporation of America; a Sagas International company.
l. Mid Canada Millwork Ltd.
m. R. C. Smith Company.
n. Sidney Millwork Company.
o. Stevens Industries, Inc.
p. Techline USA, LLC.

q. Terrill Manufacturing Company.
r. TMI Systems Design Corporation.
s. UCMI.
t. Other manufacturers meeting the drawings and specifications requirements.

2.2 MATERIALS, GENERAL

A. Low-Emitting Materials: Provide manufactured wood casework, including countertops, made with adhesives and composite wood products containing no urea formaldehyde.

B. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.

C. Hardwood Plywood: HPVA HP-1, either veneer core or particleboard core unless otherwise indicated.

D. Softwood Plywood: DOC PS 1.

E. Particleboard: ANSI A208.1, Grade M-2.

F. MDF: ANSI A208.2, Grade 130.

G. Hardboard: AHA A135.4, Class 1 Tempered.

H. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.

I. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

J. Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, 1 mm thick elsewhere.

K. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2. Refer to Specification 066116 Solid Surfacing Fabrications.

2.3 CABINET MATERIALS

A. Exposed Cabinet Materials:
1. Plastic Laminate: Grade HGS. over plywood only, no MDF.

B. Semiexposed Cabinet Materials:

1. Thermoset Decorative Panels: Provide thermoset decorative panels for semiexposed surfaces unless otherwise indicated.

2.4 DESIGN, COLOR, AND FINISH

A. Design: Provide manufactured wood casework of the following design:
1. Flush overlay with wire pulls.

B. Thermoset Decorative Panel Colors, Patterns, and Finishes: As indicated by manufacturer's designations.

C. Plastic-Laminate Colors, Patterns, and Finishes: As indicated by manufacturer's designations.

D. PVC Edgebanding Color: Casework manufacturer's standard.

E. Solid-Surfacing Material Colors and Patterns: As indicated by manufacturer's designations.

2.5 CASEWORK HARDWARE

A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware.

1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.

B. Frameless Concealed Hinges (European Type): BHMA A156.9, Type B01602, self-closing.

C. Pulls: Solid stainless-steel wire pulls.

D. Door Catches: dual, self-aligning, permanent magnet catch.

E. Drawer Slides: BHMA A156.9, Type B05091.

1. Box Drawer Slides: Grade 1HD-100.
2. File Drawer Slides: Grade 1HD-200.
3. Pencil Drawer Slides: Grade 1.

F. Drawer and Hinged Door Locks: Cylindrical (cam) type, 5-pin tumbler, complying with BHMA A156.11, Grade 1. Typical for all drawers and doors throughout.

G. Secure Drawer Locks at locations shown: keypunch electric combination lock. (2) locations at Housing Staff Desk Area

2.6 COUNTERTOPS

A. Countertops, General: All countertops to be Solid Surface Materials. See Specification 066116 Solid Surfacing Fabrications.

2.7 WALL SHELVING

A. Plastic-Laminate Shelving: Plastic-laminate sheet, Grade HGL or HGP, shop bonded to both sides of plywood. Sand surfaces to which plastic laminate is to be bonded.

1. Shelf Thickness: 3/4 inch (19 mm).
2. Edge Treatment: Finish both edges with plastic laminate that matches faces.

B. Adjustable Shelf Supports: Zinc-plated steel standards and shelf brackets, complying with BHMA A156.9, Types B04102 and B04112, surface mounted.

PART 3 - EXECUTION

3.1 CASEWORK INSTALLATION

A. Install level, plumb, and true; shim as required, using concealed shims. Where manufactured wood casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

B. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch (1.5 mm) of a single plane. Fasten cabinets to masonry or framing, wood blocking, or reinforcements in walls and partitions with fasteners spaced 24 inches (600 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch (1.5 mm).

C. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch (1.5 mm) of a single plane. Fasten to hanging strips, masonry, or framing, blocking, or reinforcements in walls or partitions. Align similar adjoining doors to a tolerance of 1/16 inch (1.5 mm).

D. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.2 INSTALLATION OF TOPS

A. Field Jointing: Where possible make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

1. Secure field joints in countertops with concealed clamping devices located within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

B. Secure tops to cabinets with Z- or L-type fasteners or equivalent, using two or more fasteners at each front, end, and back.

C. Secure backsplashes and end splashes to walls with adhesive.

D. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 INSTALLATION OF SHELVING

A. Securely fasten shelf standards to masonry, partition framing, wood blocking, or reinforcements in partitions.

B. Install shelf standards plumb and at heights to align shelf brackets for level shelves.

C. Install shelving level and straight, closely fitted to other work where indicated.

3.4 CLEANING AND PROTECTING

A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

B. Protection: Provide 6-mil (0.15-mm) plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches (1220 mm) o.c. Remove protection at Substantial Completion.

END OF SECTION 064023

SECTION 066116 SOLID SURFACING FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Provide solid surfacing fabrications including but not limited to following:

1. Millwork counter tops – Unit 1, 2 & 3
2. Low wall cap top – Unit 1 &3
3. Interior window sill- Unit 3

B. Related Sections: Following description of work is included for reference only and shall not be presumed complete:

1. Provision of finish carpentry and architectural woodwork: Section 064023, Interior Architectural Woodwork.

1.2 QUALITY ASSURANCE

A. American Society of Testing and Materials:
1. ASTM C 501; Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.
2. ASTM D 256; Impact Resistance of Plastics and Electrical Insulating Materials.
3. ASTM D 570; Water Absorption of Plastics.
4. ASTM D 638; Tensile Properties of Plastics.
5. ASTM D 696; Coefficient of Linear Thermal Expansion of Plastics.

1.3 WARRANTY

A. Ten year warranty covering colorfastness and material defects.

1.4 SUBMITTALS

A. Shop drawings:
1. Fabricated items.

B. Samples:
1. Manufacturer's standard and custom line of finishes for selection.

C. Contract closeout information:
1. Maintenance data.
2. Warranty (10 year).

1.5 JOB CONDITIONS

A. Site verify dimensions.

B. Coordinate installation with work of all trades.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Solid Surface Materials:
   1. Non-porous, homogeneous material maintaining the same composition throughout the part with a composition of polyester or acrylic polymer, aluminum trihydrate filler and pigment.
   2. Thickness: 1/2” unless otherwise noted.

B. Acceptable manufacturers:
   1. Solid polymer fabrications:
      a. Base:
         1) Avonite; specific product per the finish schedules on the plans.
      b. Optional:
         1) DuPont de Nemours; Corian
         2) Wilsonart International; Gibralter.
   2. Other manufacturers desiring approval complying with requirements.

C. Solid Polymer Material (SPM) fabrications:
   1. Homogeneous uncoated filled acrylic composite fabrications.
   2. Tensile strength not less than 6,000 psi when tested in accord with ASTM-D638.
   3. Flexural strength not less than 8,500 psi when tested in accord with ASTM-D790.
   4. Color stability exhibiting no change at 200 hours when tested in accord with NEMA LD 3-3.10.
   5. Comply with ASTM-E84:
      a. Class A material.
      b. Flame spread: 0 to 25.
      c. Smoke Developed: 0 to 450.

2.2 ACCESSORIES

A. Silicone Sealant: Mildew-resistant, FDA-compliant sealant recommended by manufacturer, in color to match solid surface.

2.3 FABRICATIONS

A. As shown on the plans.

B. Solid surface shall be factory fabricated by an authorized fabricator.

C. Fabricate countertops, sinks, and splash of ½ inch (12.7mm) thick material unless otherwise indicated.

D. Solid surface shall be fabricated to field measurements.

E. Cut and finish component edges with clean, sharp returns.

F. Finished edges shall have a 1/16 inch radius

G. Integral Sinks shall be selected from manufacturer’s standard sink designs and colors, and shall be formed integrally with countertops.

H. Cutouts for sinks and other accessories shall be smooth and uniform without saw marks. The top and bottom of openings shall be finished smooth.

I. Maintain minimum ¼ inch radius for sink cutouts.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify measurements, dimensions and drawing details before proceeding.

B. Coordinate location of furring, nailers, blocking, grounds and similar supports for attached work.

C. Examine conditions under which work is to be installed.

D. Correct unsatisfactory conditions.

E. Installation constitutes acceptance of responsibility for performance.

3.2 INSTALLATION

A. Install components plumb and level in accordance with approved shop drawings and manufacturer's recommendations.

B. Form field joints using manufacturer's recommended adhesive with joints inconspicuous in finished work.

C. Caulk units to walls.

3.3 ADJUST AND CLEAN

A. Protect finished surfaces from damage.

B. Remove adhesives, sealants and other stains.

C. Protect installed wall cladding from damage. Repair or replace damaged work, to Architects satisfaction

D. Repair or replace damaged work.

END OF SECTION

SECTION 071700 - BENTONITE WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bentonite waterproofing.
2. Molded-sheet drainage panels.
3. Insulation.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show installation details for interface with other work.

C. Material certificates.

D. Product test reports.

E. Sample warranty.

1.3 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree(s) to repair or replace components of bentonite waterproofing system that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BENTONITE PANELS

A. Coated Panels: 3/16-inch- (5-mm-) thick, corrugated kraft-paper panels specially coated to resist premature hydration due to incidental moisture; filled with a minimum of 1.0 lb/sq. ft. (5 kg/sq. m) of bentonite.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. CETCO; Volclay Type 1-C.

2.2 INSTALLATION ACCESSORIES

A. General: Manufacturer's standard accessories recommended for intended use and compatible with bentonite waterproofing.

B. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners, and as follows:
1. Thickness: 1/8 inch (3 mm), nominal, for vertical applications; 1/4 inch (6 mm), nominal, elsewhere.

C. Geotextile Protection Course: As recommended by waterproofing manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Prepare substrates to be waterproofed, install waterproofing and accessories, and protect waterproofing from damage and wetting according to manufacturer's written instructions.

B. Install protection course before backfilling or placing overburden when recommended by waterproofing manufacturer.

3.2 BENTONITE PANEL INSTALLATION

A. Install a continuous layer of bentonite waterproofing panels with ends and edges lapped a minimum of 1-1/2 inches (38 mm) unless otherwise indicated. Stagger joints in adjoining panel rows.

1. Install a double layer of waterproofing panels, with ends and edges butted instead of lapped and with second layer of joints staggered over first. Staple panels together to hold them in place.

END OF SECTION 071700

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Cellular-glass insulation.
2. Glass-fiber board insulation.
3. Glass-fiber blanket insulation.

B. Related Sections:

1. Division 07 Section “Polyvinyl-Chloride (PVC) Roofing" for insulation specified as part of roofing construction.
2. Division 07 Section "Fire-Resistive Joint Systems" for insulation installed as part of a perimeter fire-resistive joint system.
3. Division 09 Section(s) "Gypsum Board Shaft Wall Assemblies, Gypsum Plastering . Gypsum Veneer Plastering" for installation in metal-framed assemblies of insulation specified by referencing this Section.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

C. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BOARD INSULATION

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. CertainTeed Corporation.
2. Johns Manville.
3. Knauf Insulation.
4. Owens Corning.

B. Unfaced, Flexible Glass-Fiber Board Insulation: ASTM C 612, Type IA; ASTM C 553, Types I, II, and III; or ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84, passing ASTM E 136 for combustion characteristics.
1. Nominal density of not less than 1.5 lb/cu. ft. or more than 1.7 lb/cu. ft., thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.

C. Foil-Faced, Flexible Glass-Fiber Board Insulation: ASTM C 612, Type IA or ASTM C 553, Types I, II, and III; faced on one side with foil-scrim-kraft vapor retarder; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84.
1. Nominal density of not less than 1.5 lb/cu. ft. or more than 1.7 lb/cu. ft., thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.

D. Unfaced, Glass-Fiber Board Insulation: ASTM C 612, Type IA; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84, passing ASTM E 136 for combustion characteristics.
1. Nominal density of 6 lb/cu. ft., thermal resistivity of 4.4 deg F x h x sq. ft./Btu x in. at 75 deg F.

2.2 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Knauf Insulation.
5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Reinforced-Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

D. Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class B (faced surface with a flame-propagation resistance of 0.12 W/sq. cm); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

2.3 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
b. Gemco; Spindle Type.

2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.

B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.

1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:

a. Gemco; 90-Degree Insulation Hangers.

2. Angle: Formed from 0.030-inch- (0.762-mm-) thick, perforated, galvanized carbon-steel sheet with each leg 2 inches (50 mm) square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.

C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. AGM Industries, Inc.; RC150.
b. Gemco; R-150.

2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:

a. Crawl spaces.
b. Ceiling plenums.
c. Attic spaces.

D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. AGM Industries, Inc.; TACTOO Adhesive.
b. Gemco; Tuff Bond Hanger Adhesive.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

A. On vertical footing and foundation wall surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

3.4 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Glass-Fiber Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

6. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.

a. Exterior Walls: Set units with facing placed toward exterior of construction.
b. Interior Walls: Set units with facing placed toward areas of high humidity.

C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..

2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.5 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

A. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thicknesses indicated. Extend insulation 48 inches up either side of partitions.

3.6 INSTALLATION OF RADIANT BARRIERS

A. Install interior radiation control coating system according to ASTM C 1321.

B. Install sheet radiant barriers according to ASTM C 1158.

3.7 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.8 INSTALLATION OF CURTAIN-WALL INSULATION

A. Install board insulation in curtain-wall construction where indicated on Drawings according to curtain-wall manufacturer's written instructions.

1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated between insulation and glass.
2. Install insulation where it contacts perimeter fire-containment system to prevent insulation from bowing under pressure from perimeter fire-containment system.

3.9 INSTALLATION OF VAPOR RETARDERS

A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.

1. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c or as recommended by manufacturer.
2. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
3. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.

C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.10 PROTECTION

A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

B. Related Sections:

1. Division 07 for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1. Provide Shop Drawings of proposed systems for penetration, with rating by a qualified testing and inspection agency. Provide drawing specific to each condition present.

2. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Qualification Data: For qualified Installer.

D. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

B. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

C. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:

    a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
    b. Classification markings on penetration firestopping correspond to designations listed by the following:

        1) UL in its "Fire Resistance Directory."
        2) Intertek ETL SEMKO in its "Directory of Listed Building Products."
        3) FM Global in its "Building Materials Approval Guide."

D. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. A/D Fire Protection Systems Inc.
2. Grace Construction Products.
3. Hilti, Inc.
4. Johns Manville.
5. Nelson Firestop Products.
6. NUCO Inc.
7. Passive Fire Protection Partners.
8. RectorSeal Corporation.
9. Specified Technologies Inc.
10. 3M Fire Protection Products.
11. Tremco, Inc.; Tremco Fire Protection Systems Group.
12. USG Corporation.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. Fire-resistance-rated walls include fire walls fire-barrier walls and fire partitions.
2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. Horizontal assemblies include floors floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.

2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.

D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at 0.30-inch wg (74.7 Pa) at both ambient and elevated temperatures.

E. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.

F. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

G. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

H. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

1. Permanent forming/damming/backing materials, including the following:

a. Slag-wool-fiber or rock-wool-fiber insulation.
b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
c. Fire-rated form board.
d. Fillers for sealants.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.4 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

C. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes joint sealants for:

1. Exterior joints in the following vertical surfaces and horizontal nontraffic surfaces:
   a. Perimeter joints between materials listed above and frames of doors, windows, and louvers.Other joints as indicated in working drawings.

2. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
   a. Perimeter joints of exterior openings where indicated.
   b. Tile control and expansion joints.
   c. Perimeter joints between interior wall surfaces and frames of interior doors, windows.
   d. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   e. Other joints as indicated in working drawings

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.

B. PROJECT CONDITIONS

C. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

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

C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As indicated by manufacturer's designations

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Immersion in Liquids. Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.

2.4 SOLVENT-RELEASE JOINT SEALANTS

A. Acrylic-Based Solvent-Release Joint Sealant: Comply with ASTM C 1311 or FS TT-S-00230.

B. Butyl-Rubber-Based Solvent-Release Joint Sealant: Comply with ASTM C 1085.

C. Pigmented Narrow-Joint Sealant : Manufacturer's standard, solvent-release-curing, pigmented, synthetic-rubber sealant complying with AAMA 803.3 and formulated for sealing joints 3/16 inch (5 mm) or smaller in width.

2.5 LATEX JOINT SEALANTS

A. Latex Sealant: Comply with ASTM C 834, Type P, Grade NF.

2.6 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:

1. 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.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

2.7 PREFORMED JOINT SEALANTS

A. Preformed Silicone-Sealant System: Manufacturer's standard system consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.

1. Properties: Permanently elastic, mildew resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.

a. Density: Manufacturer's standard

2.8 PREFORMED TAPE SEALANTS

A. Back-Bedding Mastic Tape Sealant: Preformed, butyl-based elastomeric tape sealant with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.

2.9 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.10 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended in writing by joint-sealant manufacturer based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.

2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

H. Installation of Preformed Tapes: Install according to manufacturer's written instructions.

I. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:

1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch (10 mm). Hold edge of sealant bead 1/4 inch (6 mm) inside masking tape.
3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
2. Inspect tested joints and report on the following:

    a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
    b. Whether sealants filled joint cavities and are free of voids.
    c. Whether sealant dimensions and configurations comply with specified requirements.

3. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
4. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard hollow metal doors and frames.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
3. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.
4. Division 11 for hollow metal doors and frames for detention facilities.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UBC Standard 7-2.

C. Preinstallation Conference: Conduct conference at Project site**.**

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- (102-mm-) high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Steelcraft; an Ingersoll-Rand company (Basis of Design – Steelcraft "L" series doors 16 ga. w/ honeycomb core and 14 ga. Frames) "Or Equal" must match Steelcraft hinge and lock layout.
2. Ceco Door Products; an Assa Abloy Group company.
3. Kewanee Corporation (The)
4. Pioneer Industries, Inc.
5. Or equal.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 metallic coating.

D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches,as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

I. Glazing: Comply with requirements in Division 08 Section "Security Glazing."

J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: Flush panel
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.

    a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

3. Vertical Edges for Single-Acting Doors: Beveled edge

    a. Beveled Edge: 1/8 inch in 2 inches.
4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets.
5. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless), minimum 16 ga. thickness.

C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless), 16 ga. thickness.

    a. Width: 1-3/4 inches (44.5 mm).

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Steel Doors: 16 ga. (0.065") thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as profile welded unless otherwise indicated.
3. Fabricate knocked-down, drywall slip-on frames for in-place gypsum board partitions.
4. Frames for Steel Doors: 16 ga. (0.065") thick steel sheet.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches (50 mm) wide by 10 inches long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.7 LOUVERS

A. Provide louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch- thick, cold-rolled steel sheet set into 0.032-inch- thick steel frame.

1. Sightproof Louver: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch wide steel.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.9 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.
3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Two anchors per jamb up to 60 inches high.
2) Three anchors per jamb from 60 to 90 inches high.
3) Four anchors per jamb from 90 to 120 inches high.

b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches high.
2) Four anchors per jamb from 60 to 90 inches high.

6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.10 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-protection-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable glazing stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that are filled with grout containing anti freezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post installed expansion anchors.

    a. Floor anchors may be set with powder-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
7. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.

d. Plumbness: Plus or minus 1/16 inch measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch
b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.

B. Related Requirements:

1. Section 088853 "Security Glazing" for glass view panels in flush doors.
2. Section 081213 "Hollow Metal Frames" for metal door frames.

C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Requirements for veneer matching.
6. Doors to be factory finished and finish requirements.
7. Fire-protection ratings for fire-rated doors.

D. Samples for Initial Selection: For factory-finished doors.

E. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish**.** For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
   1. Dimensions and locations of blocking.
   2. Dimensions and locations of mortises and holes for hardware.
   3. Dimensions and locations of cutouts.
   4. Undercuts.
   5. Requirements for veneer matching.
   6. Doors to be factory finished and finish requirements.
   7. Fire-protection ratings for fire-rated doors.

C. Samples for Initial Selection: For factory-finished doors.

D. Samples for Verification:
   1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish**.**
   2. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
      a. Provide Samples for each species of veneer and solid lumber required.
      b. Provide Samples for each color, texture, and pattern of plastic laminate required.
      c. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.
   3. Louver blade and frame sections, 6 inches (150 mm) long, for each material and finish specified.
   4. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

1.4 INFORMATIONAL SUBMITTALS

A. Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and

maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during remainder of construction period.

1.7 WARRANTY

A. A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

1.8 MANUFACTURERS

A. Basis of Design: Haley Bros. Architectural Lumber Core (ALS).

B. Source Limitations: Obtain flush wood doors from single manufacturer.

1.9 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

1. Provide WI Certified Compliance Labels indicating that doors comply with requirements of grades specified.

B. WDMA I.S.1-A Performance Grade:

1. Extra Heavy Duty: Throughout, as scheduled.

A. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.

B. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL 10C.

C. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

1.10 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors Per door schedule:

1. Grade: Premium, with Grade AA faces.
2. Species: All commercially available hardwood species and high density fiberboard.
3. Cut: Quarter sliced.
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 10 feet or more.
8. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
9. Core: One specie of edge glued, low density, kiln dried wood blocks of random lengths and staggered joints; bonded to stiles and rails.
10. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.
11. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

1.11 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.

D. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
3. Louvers: Factory install louvers in prepared openings.

1.12 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: AWI's system TR-6, AWMAC's, and WI's "Architectural Woodwork Standards" System 10, UV curable, water based. EPA and California Air Resources Board (CARB) approved.
3. Staining: As selected by Architect from manufacturer's full range.
4. Sheen: Satin.

PART 2 - EXECUTION

2.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

2.2 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

1. Install fire-rated doors according to NFPA 80.
2. Install smoke- and draft-control doors according to NFPA 105.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 in chat heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide1/4 inch from bottom of door to top of threshold unless otherwise indicated.

    a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

2.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Access doors and frames for walls and ceilings.

B. Related Requirements:
1. Division 08 Section "Security Access Doors and Frames" for access doors and frames for security applications.
2. Division 23 Section "Air Duct Accessories" for heating and air-conditioning duct access doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.
2. Detail fabrication and installation of access doors and frames for each type of substrate.

C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.

D. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the

following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Access Panel Solutions.
2. Acudor Products, Inc.
3. Alfab, Inc.
4. Babcock-Davis.
5. Cendrex Inc.
6. Elmdor/Stoneman Manufacturing Co.; Div. of Acorn Engineering Co.
7. Jensen Industries; Div. of Broan-Nutone, LLC.
8. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
9. Karp Associates, Inc.
10. Larsen's Manufacturing Company.
11. Maxam Metal Products Limited.
12. Metropolitan Door Industries Corp.
13. MIFAB, Inc.
14. Milcor Inc.
15. Nystrom, Inc.
16. Williams Bros. Corporation of America (The).
17. Or equal

B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

C. Flush Access Doors with Exposed Flanges:

1. Basis-of-Design Product: Indicated on Drawings.
2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: Ceiling
4. Door Size: 18” x 18” minimum
5. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage

    a. Finish: Factory finish.

6. Frame Material: Same material, thickness, and finish as door
7. Hinges: Manufacturer's standard
8. Hardware: Lock.

D. Hardware:

1. Latch: Cam latch operated by flush key with interior release.

2. Lock: Cylinder

a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware."

2.3 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

E. Rolled-Stainless-Steel Floor Plate: ASTM A 793, manufacturer's standard finish.

F. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, **Type 316**. Remove tool and die marks and stretch lines or blend into finish.

G. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

H. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

I. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H15; with minimum sheet thickness according to ANSI H35.2 (ANSI H35.2M).

J. Frame Anchors: Same type as door face.

K. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
1. Provide mounting holes in frames for attachment of units to metal or wood framing.

2. Provide mounting holes in frame for attachment of masonry anchors.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder locks, furnish two keys per lock and key all locks alike.
2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel and Metallic-Coated-Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
2. Factory Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry-film thickness of 1 mil (0.025 mm) for topcoat.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

SECTION 085113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes fixed aluminum windows for exterior locations.

B. Related Requirements:

1. Section 088000 Glazing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchorage, flashing, sealing perimeters, and protecting finishes.
2. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
3. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.

B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.

D. Samples for Verification: For aluminum windows and components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:

1. Exposed Finishes: 2 by 4 inches Exposed Hardware: Full-size units.

E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For manufacturer's warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.

B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
c. Faulty operation of movable sash and hardware.
d. Deterioration of materials and finishes beyond normal weathering.
e. Failure of insulating glass.

2. Warranty Period:

a. Window: 10 years from date of Substantial Completion.
b. Glazing Units: 10 years from date of Substantial Completion.
c. Aluminum Finish: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: EFCO FX45 series, or approved equal.

B. Source imitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: AMMA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

1. Minimum Performance Class: AW.
2. Minimum Performance Grade: AW-PG150.

C. Forced Entry: Comply with ASTMF588 or F842 Grade 40.

D. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.26 Btu/sq. ft. x h x deg F calculated using 1 7/16” insulating glazing units per Section 088000 “Glazing”.

E. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.38 calculated using insulated glass per Section 088000 “Glazing”.

F. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 80.

G. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F ambient; 180 deg F material surfaces.

2.3 ALUMINUM WINDOWS

A. Types: Provide the following types in locations indicated on Drawings:

1. Fixed.

B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.

1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.

C. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

A. Subsills: Thermally broken, extruded-aluminum subsills in configurations indicated on Drawings.

B. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

C. Panning Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

D. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.

2.5 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Glaze aluminum windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations

in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

1. Color: to be selected by Architect from manufacturer's full range of colors.
2. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

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

B. Remove and replace noncomplying windows and retest as specified above.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

1. Keep protective films and coverings in place until final cleaning.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 085113

SECTION 085663 - DETENTION WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Fixed detention windows.

B. Related Sections:

   1. Division 03 Section "Cast-in-Place Concrete" for building anchors into concrete construction.
   2. Division 04 Section "Unit Masonry" for building anchors into and grouting detention windows installed in masonry construction.
   3. Division 08 Section "Security Glazing" for glazing incorporated into detention windows.
   4. Division 09 Section "Exterior Painting" for field painting exterior detention windows.
   5. Division 09 Section "Interior Painting" for field painting interior detention windows.
   6. Division 11 Section "Detention Equipment" for detention-grade hollow-metal sidelights and borrowed lights.

1.3 PERFORMANCE REQUIREMENTS

A. Forced-Entry-Resistance Performance: Provide detention windows that comply with ASTM F 1592, **Grade 3**

   1. Glazing Forced-Entry Resistance: Security **Grade 3** when tested according to ASTM F 1915.

B. Forced-Entry Resistance: **Class III** when tested according to ASTM F 1233.

C. Forced-Entry Resistance: **Level III** when tested according to HPW-TP-0500.03.

D. Delegated Design: Design detention windows, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

E. Structural Performance: Detention windows shall withstand the effects of wind loads determined as follows, with no permanent deformation or breakage of components within window assembly when tested according to ASTM E 330.

1. Deflection: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 inch (19 mm), whichever is less design pressure based on structural computations.
2. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to SEI/ASCE 7, Section 6.5, "Method 2 - Analytical Procedure," based on mean roof heights above grade indicated on Drawings.

    a. Basic Wind Speed: 85 mph

F. Air Infiltration for Fixed Windows: Not more than 0.150 cfm/ft. at an inward test pressure of 1.56 lbf/sq. ft. (75 Pa) when tested according to ASTM E 283.

G. Water Penetration: No water penetration as defined in test method at an inward test pressure of 6.24 lbf/sq. ft. (300 Pa) when tested according to ASTM E 331.
1. Thermal Transmittance: Maximum whole-window U-factor of <**Insert value in Btu/sq. ft. x h x deg F (W/sq. m x K)**> at 15-mph exterior wind velocity and winter condition temperatures when **tested according to ASTM E 1423.**

H. Windborne-Debris-Impact-Resistance Performance: Provide detention window systems that pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and ASTM E 1996.

1. Large-Missile Impact: For detention windows located within 30 feet (9.1 m) of grade.
2. Small-Missile Impact: For detention windows located more than 30 feet (9.1 m) above grade.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for detention windows.

B. Shop Drawings: For detention windows. Include plans, elevations, sections, details, and attachments to other work.

1. Full-size section details of framing members, including **detention bars,** reinforcement and stiffeners.
2. Location of weep holes.
3. Hardware, including operators.
4. Glazing details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Main Framing Member: 12-inch long, full-size sections with factory-applied color finish.
2. Window Corner Fabrication: 8-by-12-inch long, full-size window corner including full-size sections with factory-applied color finish, weather stripping, and glazing.
3. Weather Stripping: 12-inch long sections.

E. Delegated-Design Submittal: For detention windows indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

F. Qualification Data: For qualified Installer and testing agency.

G. Welding certificates.

H. Material Certificates: For homogeneous tool-resisting steel indicating compliance with performance requirements for complete test sequence according to applicable ASTM standard.

I. Material Test Reports: For homogeneous tool-resisting steel.

J. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of detention window.

K. Thermal-Performance Reports: Calculations based on referenced standard, performed by a qualified professional engineer or testing agency.

L. Configuration Disclosure Drawing: For each type of forced-entry-resistant detention window, complying with ASTM F 1233.

M. Warranty: Sample of special warranty.

N. Other Informational Submittals:

1. Examination reports documenting inspections of substrates, areas, and conditions.
2. Anchor inspection reports documenting inspections of built-in and cast-in anchors.
3. Field quality-control reports documenting inspections of installed products.
4. Field quality-control certification signed by Contractor and Detention Specialist.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation and maintenance of units required for this Project.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing homogeneous tool-resisting steel.

C. Source Limitations: Obtain detention windows from single source from single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of detention windows and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

1. Do not modify intended security performance or aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.3, "Structural Welding Code - Sheet Steel."
4. AWS D1.6, "Structural Welding Code - Stainless Steel."

F. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

A. Coordinate installation of anchorages for detention windows. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in masonry. Deliver such items to Project site in time for installation.

1.8 SEQUENCING

A. Field Painting: Except where detention windows have been preglazed before installation, complete field painting of window units before glazing installation.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace detention windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including deflections exceeding 1/4 inch (6 mm).
b. Failure of welds.
c. Lateral deflection of glass lite edges in excess of 1/175.
d. Excessive air leakage.

e. Excessive water penetration.
f. Faulty operation of ventilators and hardware.
g. Deterioration of metals, metal finishes, and other materials beyond normal weathering and detention use.

2. Warranty Period: Three years from date of Substantial Completion.

1.10 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Security Fasteners: Furnish not less than one box for every 50 boxes or fraction thereof, of each type and size of security fastener installed.
2. Tools: Provide two sets of tools for installing and removing security fasteners.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M). Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength and not less than 0.125 inch (3.2 mm) thick at any location for main frame and sash members.

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

C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS (Commercial Steel), Type B; free of scale, pitting, or surface defects; pickled and oiled.

D. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS (Commercial Steel), Type B.

E. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, CS (Commercial Steel), Type B; with G60 (Z180) zinc (galvanized) or A60 (ZF180) zinc-iron-alloy (galvannealed) coating designation.

F. Tool-Resisting Steel Bars: ASTM A 627.

G. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 240/A 240M or ASTM A 666, austenitic stainless steel, Type 304.

H. Security Fasteners: Operable only by tools produced for use on specific type of fastener by fastener manufacturer or other licensed fabricator. Drive system type, head style, material, and protective coating as required for assembly, installation, and strength, and as follows:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Holo-Krome; a Danaher corporation.
    b. Safety Socket LLC.
    c. Tamper-Pruf Screws, Inc.
    d. Textron Fastening Systems; Textron Inc.
    e. Or equal

2. Drive-System Types: Pinned Torx-Plus
3. Fastener Strength: 120,000 psi (827 MPa).
4. Socket Button Head Fasteners:

    a. Heat-treated alloy steel, ASTM F 835 (ASTM F 835M).
    b. Stainless steel, ASTM F 879 (ASTM F 879M), Group 1 CW.

5. Socket Flat Countersunk Head Fasteners:

    a. Heat-treated alloy steel, ASTM F 835 (ASTM F 835M).
    b. Stainless steel, ASTM F 879 (ASTM F 879M), Group 1 CW.

6. Socket Head Cap Fasteners:

    a. Heat-treated alloy steel, ASTM A 574 (ASTM A 574M).
    b. Stainless steel, ASTM F 837 (ASTM F 837M), Group 1 CW.

7. Protective Coatings for Heat-Treated Alloy Steel:

    a. Zinc and clear trivalent chromium where indicated.
    b. Zinc phosphate with oil, ASTM F 1137, Grade I, or black oxide unless otherwise indicated.

I. Concealed Bolts: ASTM A 307, Grade A unless otherwise indicated.

J. Cast-in-Place Anchors in Concrete: Fabricated from corrosion-resistant materials capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing per ASTM E 488, conducted by a qualified testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 27/A 27M cast steel or ASTM A 47/A 47M malleable iron. Provide bolts, washers, and shims as required; hot-dip galvanized per ASTM A 153/A 153M or ASTM F 2329.

K. Embedded Plate Anchors: Fabricated from mild steel shapes and plates, minimum 3/16 inch (4.8 mm) thick; with minimum 1/2-inch- (12.7-mm-) diameter, headed studs welded to back of plate.

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

M. Detention Window Glazing and Glazing Materials: Comply with Division 08 Section "Security Glazing."

N. Grout: ASTM C 476.

O. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

P. Sealants: For sealants required within fabricated window units, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating.

2.2 WINDOW COMPONENTS

A. Weather Stripping: Unless otherwise indicated, provide weather stripping such as molded EPDM or neoprene gaskets complying with ASTM D 2000, Designations 2BC415 to 3BC620, or molded PVC gaskets complying with ASTM D 2287; or molded, expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

B. Anchors, Clips, and Window Accessories: Stainless steel; hot-dip, zinc-coated steel or iron, complying with ASTM B 633; provide sufficient strength to withstand design pressures indicated.

2.3 FIXED DETENTION WINDOWS

A. Steel Framing: Fabricate perimeter framing, removable covers, and mullions from 0.105-inch (2.66-mm) nominal-thickness, cold-rolled steel sheet. Provide-thermally improved construction.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Trussbilt LLC
   b. Or equal

2.4 FABRICATION

A. General: Fabricate detention windows to provide a complete system for assembly of components and anchorage of window units.

1. Provide units that are reglazable from the exterior without dismantling ventilator framing.
2. Prepare window ventilators for glazing unless preglazing at the factory is indicated.
3. Fabricate detention window frames of one-piece construction.
4. Form removable covers to profiles indicated on Drawings.

B. Anchors for Built-in Installation: 1/2-inch- (13-mm-) diameter headed studs welded to back side of frames as required to secure detention windows to adjacent construction.

1. Provide two anchors per side of window plus one additional anchor for every 18 inches (457 mm) or fraction thereof more than 36 inches (914 mm) in height or width.

C. Thermally Improved Construction: Fabricate framing with an integral, concealed, low-conductance thermal barrier, located between exterior materials and members exposed on interior in a manner that eliminates direct metal-to-metal contact.

D. Welding: Weld components to comply with referenced AWS standard. To greatest extent possible, weld before finishing and in concealed locations to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

E. Metal Protection: Separate dissimilar metals to protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

F. Preglazed Fabrication: Preglaze window units at factory, where required for applications indicated. Comply with requirements in Division 08 Section "Security Glazing."

G. Glazing Stops: Provide glazing stops applied with security fasteners or rivets and coordinated with glazing indicated. Finish glazing stops to match window units.

H. Weather Stripping: Factory applied.

I. Security Fasteners: Fabricate detention windows using security fasteners with head style appropriate for fabrication requirements, strength, and finish of adjacent materials, except that a maximum of two different sets of tools shall be required to operate security fasteners for Project.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" After cleaning, apply a conversion coating suited to the organic coating to be applied over it.

B. Galvanizing: After fabrication, galvanize window components by chemical cleaning complying with SSPC-SP 1, "Solvent Cleaning," and pickling treatment complying with SSPC-SP 8, "Pickling," followed by hot-dip galvanizing complying with ASTM A 123/A 123M.

C. Factory Prime Finish: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

D. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

1. Color and Gloss: As selected by Architect from manufacturer's full range

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer and Detention Specialist present, for compliance with requirements for installation tolerances and other conditions affecting performance of detention windows.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations of detention window connections before detention window installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of detention windows.

D. Inspect built-in and cast-in anchor installations, before installing detention windows, to verify that anchor installations comply with requirements. Prepare inspection reports.

1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Reinspect after repairs or replacements are made.
2. Perform additional inspections to determine compliance of replaced or additional work. Prepare anchor inspection reports.

E. For glazing materials whose orientation is critical for performance, verify installation orientation.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other detention window anchors whose installation is specified in other Sections.

1. Furnish cast-in-place anchors and similar devices to other trades for installation well in advance of time needed for coordinating other work.

3.3 INSTALLATION

A. General: Install detention windows level, plumb, rigid, properly aligned, and securely fastened in place, complying with Drawings, Coordination Drawings, and manufacturer's written instructions.

1. Provide anchorage devices and fasteners as required to secure detention windows to wall construction. Include threaded fasteners for inserts, security fasteners, and other connectors.

B. In-Place-Construction Anchor Installation: Weld wall angle anchors to embedded anchors to match locations of detention window frame anchors. Detach removable covers from detention window frames and set frames into opening until detention window frame anchors contact and match embedded anchors. Weld detention window frame anchors to embedded anchors with minimum 1-inch- (25-mm-) long welds at 18 inches (457 mm) o.c. Reinstall removable covers.

C. Built-in Frame Installation: Build-in or cast-in detention window frames or subframes integral with construction of walls. Fully engage detention window frame anchors with wall reinforcement.

D. Grout: Where indicated, fill spaces between detention windows and adjacent substrate with grout. Install grout in lifts and take other precautions, including bracing detention windows, to ensure that detention windows are not deformed or damaged by grout forces.

E. Removable Covers, Glazing Stops, and Trim: Fasten components with security fasteners.

1. Install detention windows with glazing stops located on secure (noninmate) side of openings.

F. Security Fasteners: Install detention windows using security fasteners with head style appropriate for installation requirements, strength, and finish of adjacent materials, except that a maximum of two different sets of tools shall be required to operate security fasteners for Project

G. Sealants: Comply with requirements in Division 07 Section "Joint Sealants" for installing sealants, fillers, and gaskets.

1. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction unless otherwise indicated.
2. Seal frame perimeter with sealant to provide weathertight construction unless otherwise indicated.

H. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended in writing by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

I. Glazing: Comply with installation requirements in Division 08 Section "Security Glazing" unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

A. Detention Specialist shall inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.

B. Remove and replace detention work where inspections indicate that work does not comply with specified requirements.

C. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.

D. Prepare field quality-control certification endorsed by Detention Specialist that states installed products and their installation comply with requirements in the Contract Documents.

3.5 ADJUSTING

A. Adjust operating ventilators and hardware to provide a tight fit at contact points and weather stripping, for smooth operation and a weathertight enclosure.

B. Remove and replace defective work, including detention windows that are warped, bowed, or otherwise unacceptable.

3.6 CLEANING AND PROTECTION

A. Clean surfaces promptly after installation of detention windows. Take care to avoid damaging the finish. Remove excess glazing and sealant compounds, dirt, and other substances.

B. Clean glass of preglazed detention windows promptly after installation. Comply with requirements in Division 08 Section "Security Glazing" for cleaning and maintenance.

C. Provide temporary protection to ensure that detention windows are without damage at time of Substantial Completion.

END OF SECTION 085663

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Door Hardware

B. Related Sections:

1. Section 079200 - Joint Sealers
2. Section 081113 – Hollow Metal Doors and Frames
3. Division 11- Detention Equipment (includes Detention Door Hardware)
4. Division 16 - Electrical

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.

1. Windows.
2. Cabinets, including open wall shelving and locks.
3. Signs, except where scheduled.
4. Toilet accessories, including grab bars.
5. Installation.
6. Rough hardware.
7. Conduit, junction boxes & wiring.
8. Access doors and panels, except cylinders where detailed.

1.2 REFERENCES:

Use date of standard in effect as of Bid date.

A. American National Standards Institute – ANSI 156.18 – Materials and Finishes.

B. BHMA – Builders Hardware Manufacturers Association

C. DHI – Door and Hardware Institute

D. NFPA – National Fire Protection Association

1. NFPA 80 – Fire Doors and Windows
2. NFPA 105 – Smoke and Draft Control Door Assemblies
3. NFPA 252 – Fire Tests of Door Assemblies

E. UL – Underwriters Laboratories

1. UL10C – Positive Pressure Fire Tests of Door Assemblies.

2. UL 305 – Panic Hardware

F. WHI – Warnock Hersey Incorporated

G. 2010 State of California Building Code

H. Local applicable codes

I. SDI – Steel Door Institute

J. WI – Woodwork Institute

K. AWI – Architectural Woodwork Institute

L. NAAMM – National Association of Architectural Metal Manufacturers

1.3 SUBMITTALS & SUBSTITUTIONS

A. SUBMITTALS: Submit six copies of schedule per Section 01330. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:

1. Type, style, function, size, quantity and finish of hardware items.
2. Use BHMA Finish codes per ANSI A156.18.
3. Name, part number and manufacturer of each item. Note where submitted material differs from material in appended schedule.
4. Fastenings and other pertinent information.
5. Description of door location using space names and numbers as published in the drawings.
6. Explanation of abbreviations, symbols, and codes contained in schedule.
7. Mounting locations for hardware.
8. Door and frame sizes, handing, materials, fire-rating and degrees of swing.
9. List of manufacturers used and their nearest representative with address and phone number.
10. Catalog cuts.

B. Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.

C. Deviations: Highlight, encircle or otherwise identify deviations from "Schedule of Finish Hardware" on submittal with notations clearly designating those portions as deviating from this section.

D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.

E. Substitutions per Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.

F. Items listed with no substitute manufacturers have been requested by Owner to meet existing standard.

G. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, wiring diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

1.4 QUALITY ASSURANCE:

A. Qualifications:

1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to Owner, Architect and Contractor.

a) Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.

B. Hardware: Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.

C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

D. Fire-Rated Openings: NFPA 80 compliant. Hardware UL10C / California State Fire Marshal Standard 12-7-4 (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.

1. Note: scheduled resilient seals may exceed selected door manufacturer's requirements.

2. See 2.6.E for added information regarding resilient and intumescent seals.

E. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions.

1.5 DELIVERY, STORAGE AND HANDLING:

A. Delivery: coordinate delivery to appropriate locations (shop or field).

1. Permanent keys and cores: furnished and installed by County.

B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.

C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.6 PROJECT CONDITIONS AND COORDINATION:

A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Architect's approval.

B. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information:

1. Location of embedded and attached items to concrete.
2. Location of wall-mounted hardware, including wall stops.
3. Location of finish floor materials and floor-mounted hardware.
4. Locations for conduit and raceways as needed for electrical, electronic and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.
5. Manufacturer templates to door and frame fabricators.

C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation. Do not order hardware until the submittal has been reviewed by the frame and door suppliers for compatibility with their products.

1.7 WARRANTY:

A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties:

1.	Locksets:	Three years
2.	Extra Heavy Duty Cylindrical Lock:	Seven Years
3.	Exit Devices:	Three years mechanical One year electrical
4.	Closers:	Ten years mechanical Two years electrical
5.	Hinges:	One year
6.	Other Hardware	Two years

1.8 COMMISSIONING:

A. Conduct these tests prior to request for certificate of substantial completion:

1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
2. With installer, access control contractor and electrical contractor present, test electrical, electronic and electro-pneumatic hardware systems for satisfactory operation.

3. With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. Listed acceptable alternate manufacturers: submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE SUB:
Hinges	(IVE) Ives	Bommer, Hager
Levers/Locks	(BE) Best	
Key System/Core	(SA) Schlage	
Cylinder Housing	(BE) Best	
Closers	(LCN) LCN	
Push & Pull Plates	(IVE) Ives	Hiawatha, Trimco
Kickplates	(IVE) Ives	Hiawatha, Trimco
Stops & Holders	(TRI) Trimco	Hiawatha, Ives
Thresholds	(PE) Pemko	National Guard Products, Reese Enterprises
Seals & Bottoms	(PE) Pemko	National Guard Products, Reese Enterprises

2.2 HINGING METHODS:

A. Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.

B. Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Architect of deviation from scheduled hardware.

C. Conventional Hinges: Steel or stainless steel pins and concealed bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.

1. Outswinging exterior doors: non-ferrous with non-removable (NRP) pins and security studs.

2. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.

2.3 LOCKSETS, LATCHSETS, DEADBOLTS:

A. Mortise Locksets and Latchsets: as scheduled.

1. Chassis: cold-rolled steel, handing field-changeable without disassembly.

2. Latchbolts: 3/4 inch throw stainless steel anti-friction type.

3. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.

a) Spindles: security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.

4. Strikes: 16 gage curved stainless steel with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.

5. Scheduled Lock Series and Design: Schlage L series, 06N design.

6. Certifications:

a) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.

b) ANSI/ASTM F476-84 Grade 31 UL Listed.

2.4 EXIT DEVICES / PANIC HARDWARE

A. General features:

1. Independent lab-tested 1,000,000 cycles.

2. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.

3. 0.75-inch throw deadlocking latchbolts.

4. End caps: impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.

5. No exposed screws to show through glass doors.

6. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.
7. Releasable in normal operation with 15-lb. maximum operating force per California State Fire Marshal Standard 12-10-3, and with 32 lb. maximum pressure under 250-lb. load to the door.
8. XP-series devices: Static load force resistance of at least 2000 pounds.
9. Where devices span over door lite frame and the face of the selected lite manufacturer's frame is raised from the face of the door, furnish panic hardware manufacturer's fitted shims or glass-bead kits at no additional cost to the project.
10. Comply with CBC Section 1003.3.1.9.

B. Specific features:

1. Fire-Labeled Devices: UL label indicating "Fire Exit Hardware".

2.5 CLOSERS

A. Surface Closers:

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
2. ISO 2000 certified. Units stamped with date-of-manufacture code.
3. Independent lab-tested 10,000,000 cycles.
4. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.
5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
6. Adjustable to open with not more than 5.0lbs pressure to open at exterior doors and 5.0lbs at interior doors. As allowed per California Building Code, Section 1133B.2.5, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15lbs.
7. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
8. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
9. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
10. Non-flaming fluid, will not fuel door or floor covering fires.
11. Pressure Relief Valves (PRV) not permitted.

2.6 OTHER HARDWARE

A. Kick Plates: Four beveled edges (B4E), .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.

B. Door Stops: Provide stops to protect walls, casework or other hardware.

1. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.

C. Seals**:** Four-fingered type at head & jambs. Inelastic, rigid back, not subject to stretching. Self-compensating for warp, thermal bow, door settling, and out-of-plumb. Adhesive warranted for life of installation.

1. Proposed substitutions: submit for approval.

D. Thresholds: As scheduled and per details. Comply with CBC Section 1133B.2.4.1. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.

1. Fire-rated openings, 90min or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, request direction from Architect.

2. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.

3. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL or COMBO) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.

E. Exposed Through-Bolts: Do not use SNB, grommet nuts, sleeve nuts or other such clamping type fasteners, intent is for minimal exposed hardware. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.

F. Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Omit where adhesive mounted seal occurs. Leave no unfilled/uncovered pre-punched silencer holes.

2.7 FINISH:

A. Generally BHMA 630 Brushed Stainless Steel.

B. Use manufacturer's anti-microbial treatment for pull plates and push plates at restrooms. .Door closers: factory powder coated to match other hardware, unless otherwise noted.

2.8 KEYING REQUIREMENTS:

A. Key System: Schlage Classic keyway "1111111" bitted for temporary cylinders.

1. Owner will furnish and install permanent cores.
2. Furnish 10 construction keys.
3. Furnish 2 construction control keys.
4. Key Cylinders: furnish 7-pin solid brass construction.

B. Cores: keyed at factory of lock manufacturer where permanent records are maintained. Locksets and cylinders are different manufacturer.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS:

A. Can read and understand manufacturers' templates, suppliers' hardware schedules and printed installation instructions. Can readily distinguish drywall screws from manufacturers' furnished fasteners. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

3.2 PREPARATION:

A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation.

B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.

1. Notify Architect of code conflicts before ordering material.
2. Locate levers, key cylinders, t-turn pieces, touchbars and other operable portions of latching hardware between 30 inches to 44 inches above the finished floor, per CBC Section 1133B.2.5.1.

3.3 INSTALLATION

A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.

1. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Architect.
2. Replace fasteners damaged by power-driven tools.

B. Locate floor stops no more that 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Architect for direction.

3.4. ADJUSTING

A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.

1. Hardware damaged by improper installation or adjustment methods: repair or replace to Owner's satisfaction.

2. Adjust doors to fully latch with no more than 1 pound of pressure.

3. Adjust delayed-action closers on fire-rated doors to fully close from fully-opened position in no more than 10 seconds.

4. Adjust door closer sweep periods so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door, per California Building Code Section 1133B.2.5.1.

B. Inspection: Use hardware supplier's consultant or consultant's agent. Include supplier's report with closeout documents. Certify that fire doors and egress doors have zero deficiencies.

C. Final inspection: Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following:

1. Re-adjust hardware.

2. Evaluate maintenance procedures and recommend changes or additions, and instruct Owner's personnel.

3. Identify items that have deteriorated or failed.

4. Submit written report identifying problems

3.5 DEMONSTRATION:

A. Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.6 PROTECTION/CLEANING:

A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.

B. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.7 SCHEDULE OF FINISH HARDWARE

A. See door schedule in drawings for hardware set assignments.

B. No hardware shall be ordered until Finished Hardware has been reviewed and approved by Architect's hardware consultant.

C. Miscellaneous Material. Product scheduled here reflects design standard and establishes level of performance; while a high level of detail is given here, the hardware list itself is not to be regarded as a bill of material. See 1.4.A. of this section.

HwSet DHW-4 Multi-purpose Room, Laundry Room

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HT 4.5 X 4.5 NRP	600	IVE
1	EA	CLASSROOM LOCK	SPSL -ML-R-16F	630	BE
1	EA	CYLINDER HOUSING	1E74-C4-RP3-626	626	BE
1	EA	SFIC CORE	80-037	626	SCH
1	EA	HD WALL STOP	1270CXPV	630	TRI
1	EA	KICKPLATE	8400 12" X 1 1/2" LDW B4E	630	IVE

NOTE: permanent core furnished & installed by SB County, wall stop at door 336 only

HwSet DHW-5 Staff Office

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HT 4.5 X 4.5 NRP	630	IVE
1	EA	OFFICE/PRIVACY LOCK	SPSL-ML-A-16F	630	BE
1	EA	CYLINDER HOUSING	1E74-C4-RP3-626	626	BE
1	EA	SFIC CORE	80-037	626	SCH
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E	630	IVE

NOTE: permanent core furnished & installed by SB County

HwSet DHW-6 Sleeping Rooms

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HT 4.5 X 4.5 NRP	630	IVE
1	EA	PASSAGE SET	SPSL-ML-ON-16F	630	BE
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E	630	IVE
1	EA	CNCLD BTM SWEEP	211	A	PEM
1	EA	THRESHOLD	271	A	PEM

HwSet DHW-7 Plumbing Closets, Plumbing Chase, Janitor Room

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HT 4.5 X 4.5 NRP	600	IVE
1	EA	STOREROOM LOCK	SPSL-ML-D-16F	630	BE
1	EA	CYLINDER HOUSING	1E74-C4-RP3-626	626	BE
1	EA	SFIC CORE	80-037	626	SCH
1	EA	HD WALL STOP	1270CXPV	630	TRI

NOTE: permanent core furnished & installed by SB County, wall stop at Door 324 only

HwSet DHW-08 Youth Restrooms

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HT 4.5 X 4.5 NRP	600	IVE
1	EA	BATHROOM/PRIVACY LOCK	SPSL-ML-LT-16F	630	BE
1	EA	CYLINDER HOUSING	1E74-C4-RP3-626	626	BE
1	EA	SFIC CORE	80-037	626	SCH
1	EA	KICKPLATE	8400 12" X 1 1/2" LDW B4E	630	IVE
1	EA	THRESHOLD	256	A	PEM

NOTE: permanent core furnished & installed by SB County. Seal sill plate to the floor to help contain spills.

HwSet DHW-09 Staff Restroom (Unit 3)

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1Ht 4.5 X 4.5 NRP	630	IVE
1	EA	OFFICE/PRIVACY LOCK	SPSL-ML-A-16F	630	BE
1	EA	CYLINDER HOUSING	1E74-C4-RP3-626	626	BE
1	EA	SFIC CORE	80-037	626	SCH
1	EA	KICKPLATE	8400 12" X 1 1/2" LDW B4E	630	IVE
1	EA	THRESHOLD	256	A	PEM

NOTE: permanent core furnished & installed by SB County. Seal threshold to the floor to help contain spills.

HwSet DHW-10 Staff Restroom (Unit 1 & 2)

Qty		Description	Catalog Number	Finish	Mfr
1	EA	OFFICE/PRIVACY LOCK	SPSL-ML-A-16F	630	BE
1	EA	CYLINDER HOUSING	1E74-C4-RP3-626	626	BE
1	EA	SFIC CORE	80-037	626	SCH

NOTE: permanent core furnished & installed by SB County.

END OF SECTION

SECTION 088853 - SECURITY GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes glazing for the following products and applications and of the following types:

1. Products and applications specified in other Sections where glazing requirements are specified by reference to this Section:

    a. Steel detention doors.
    b. Interior borrowed lites.
    c. Hollow metal framed windows.
    d. Aluminum windows

2. Security Glazing Types:
    a. Glass-clad polycarbonate.

1.3 DEFINITIONS

A. Glazing Manufacturers: Firms that produce primary glass, monolithic plastic glazing, or fabricated security glazing, as defined in referenced glazing publications.

B. Interspace: Space between lites of air-gap security glazing or insulating security glazing.

1.4 PERFORMANCE REQUIREMENTS

A. General:

1. Installed security glazing shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing; or other defects in construction.
2. Installed security glazing shall withstand security-related loads and forces without damage to the glazing beyond that allowed by referenced standards.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each security glazing type, tape sealant, gasket, glazing accessory, and glazing-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to security glazing, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than eight samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.6 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Security Glazing Samples: For each type of security glazing; 12 inches (300 mm) square.

C. Glazing Accessory Samples: For sealants in 12-inch (300-mm) lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

D. Security Glazing Schedule: List security glazing types and thicknesses for each size opening and location. Use same designations indicated on Drawings. Indicate coordinated dimensions of security glazing and construction that receives security glazing, including clearances and glazing channel dimensions.

E. Delegated-Design Submittal: For security glazing indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

F. Product Certificates: For each type of product indicated, from manufacturer.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of security glazing, glazing sealant and glazing gasket.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

H. Preconstruction adhesion and compatibility test reports.

I. Warranties: Sample of special warranties.

1.7 EXTRA MATERIAL

A. When quantity of any individual size and type is 20 or more, provide 5% extra stock for replacement use.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating Security Glazing Units with Sputter-Coated, Low-E Coatings: A qualified insulating glazing manufacturer who is approved by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glazing installers for this Project who are certified under the National Glass Association Glazier Certification Program.

C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

D. Source Limitations for Security Glazing: Obtain security glazing from single source from single manufacturer using the same type of lites, plies, interlayers, and spacers for each security glazing type indicated.

E. Source Limitations for Glazing Sealants and Gaskets: Obtain from single source from single manufacturer for each product and installation method.

F. Glazing Publications: Comply with published recommendations of security glazing and glazing material manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."

G. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glazing, thickness, and safety glazing standard with which glazing complies.

H. Preinstallation Conference: Conduct conference at Project site.

I. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.

J. Glass Standards:
1. Flat glass ASTM-C1036.
2. Flat glass, heat treated ASTM-C1048.
3. NFPA-80 Standard for Fire Doors and Windows.
4. Test Method for Strength of Glass by Flexure, ASTM-C158.

K. Standard for Flat Glass-Clad Polycarbonate, ASTM-C1349. Meet or exceed following:

1. American National Standards Institute Z97.1-1984 performance specifications and methods of test for safety.
2. Other performance requirements and tests as specified herein.

L. Experience criteria:
   1. Manufacturers:
      a. Minimum 5 years experience manufacturing specified item.
      b. Minimum 5 year successful installation on correctional facility of like size.
   2. Installers:
      a. Approved by manufacturer for installation of specified items.
      b. Minimum 3 years experience installing specified items.
   3. If items 1 or 2 are not complied with, Architect reserves right to require:
      a. Minimum 3 year extension of base warranty.
   4. When required by Architect, provide list of institutions where product has been used successfully.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect security glazing and glazing materials according to manufacturer's written instructions. Prevent damage from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating security glazing and with air-gap security glazing manufacturers' written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

   1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

1.11 COORDINATION

A. Coordinate dimensions, including thickness, of security glazing with dimensions of construction that receives security glazing.

1.12 WARRANTY

A. Manufacturer's Special Warranty for Coated Glass: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated glass that deteriorates within specified warranty period. Deterioration is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to

manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: Five years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Glass-Clad Polycarbonate: Manufacturer's standard form in which glass-clad polycarbonate manufacturer agrees to replace glass-clad polycarbonate that deteriorates within specified warranty period. Deterioration is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning glass-clad polycarbonate contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glazing, blemishes exceeding those allowed by referenced glass-clad polycarbonate standard, yellowing, and loss of light transmission.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SECURITY GLAZING, GENERAL

A. Thickness: Where thickness is indicated, it is a minimum. Provide security glazing in thicknesses as needed to comply with requirements indicated.

B. Fire-Test-Response Characteristics of Plastic Sheets: As determined by testing plastic sheets identical to those used in security glazing products by a qualified testing agency acceptable to authorities having jurisdiction.

1. Self-ignition temperature of 650 deg F (343 deg C) or more when tested per ASTM D 1929 on plastic sheets in thicknesses indicated for the Work.
2. Smoke-developed index of 450 or less when tested according to ASTM E 84, or smoke density of 75 or less when tested per ASTM D 2843 on plastic sheets in thicknesses indicated for the Work.
3. Burning [extent of 1 inch (25 mm)] [rate of 2.5 in./min. (1.06 mm/s)] or less when tested per ASTM D 635 at a nominal thickness of 0.060 inch (1.52 mm) or thickness indicated for the Work.

C. Windborne-Debris-Impact Resistance: Provide exterior security glazing that passes basic-protection testing requirements in ASTM E 1996 for Wind Zone 1 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than security glazing indicated for use on the Project and shall be installed in same manner as indicated for use on the Project.

1. Large-Missile Test: For security glazing located within 30 feet (9.1 m) of grade.
2. Small-Missile Test: For security glazing located more than 30 feet (9.1 m) above grade.
3. Large-Missile Test: For all security glazing, regardless of height above grade.

D. Thermal and Optical Performance Properties: Provide security glazing with performance properties specified, as indicated in manufacturer's published test data, based on products of construction indicated and on procedures indicated below:

1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
2. Solar-Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For heat-strengthened float glass, comply with requirements for Kind HS.
3. For fully tempered float glass, comply with requirements for Kind FT.
4. For uncoated glass, comply with requirements for Condition A.
5. For coated vision glass, comply with requirements for Condition C (other coated glass).

2.3 POLYCARBONATE SECURITY GLAZING

A. Polycarbonate Sheet: ASTM C 1349, Appendix X1, Type II, coated, mar-resistant, UV-stabilized polycarbonate with coating on exposed surfaces and Type I, standard, UV-stabilized polycarbonate where no surfaces are exposed.

B. Laminated Polycarbonate: Polycarbonate sheets laminated with clear urethane interlayer that complies with ASTM C 1349, Appendix X2, and has a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation. Provide laminated units that comply with requirements of ASTM C 1349 for maximum allowable laminating process blemishes and haze.

C. Glass-Clad Polycarbonate: ASTM C 1349, and other requirements specified.

1. Provide glass-clad polycarbonate that complies with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified.

D. Laminated Glass and Polycarbonate: ASTM C 1349, and other requirements specified.

1. Provide laminated glass and polycarbonate that complies with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified.

2.4 SPALL-RESISTANT FILM

A. Spall-Resistant Film: Composite of clear polyvinyl butyral film and clear abrasion-resistant polyester film.

1. Products: Pre-approved products that may be incorporated into the Work:

a. Global Security Glazing, Isoclima Specialty Glass, LLC

B. Laminating Process: Laminate spall-resistant film to glazing assemblies in factory to produce laminated lites free of foreign substances, air, and glass pockets.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including security glazing, seals of insulating security glazing and air-gap security glazing, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and security glazing manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Non-sag silicone glazing sealant complying with FS TT-S-001543A

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 795 & 999
b. GE Advanced Materials - Silicones; Silicones; Construction SCS1200
c. Tremco Incorporated; Spectrem II
d. Or equal.

2.6 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and security glazing manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of security glazing and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:

1. Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
2. Verify compatibility with all glazing material and frame.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by security glazing manufacturer to maintain security glazing lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit security glazing lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Glazing Tape:

1. Preshimmed.

2. Verify compatibility with all glazing material and frame.

2.8 FABRICATION OF SECURITY GLAZING

A. Fabricate security glazing in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.9 SECURITY GLAZING TYPES

B. Glass Type SG-1:
1. Glass-clad Insulated Polycarbonate, clear.
2. Nominal 1 7/16 IN thickness.

3. Two clear polished glass sheets, laminated together with bonding interlayers to nominal 5/16 IN, two-ply urethane and one -ply polycarbonate core with 1/2" airspace and 1/4" SB60VT #2 on clear tempered glass sheet at exterior side.
4. UL listed to 45 MIN.
   a. Maximum viewing area in SideLites/Window Frames is 1156 square inches (horizontal maximum 34 IN and vertical maximum 34 IN).
5. Comply with HP White Laboratory Inc., HPW-TP-0500.02, Forced Entry Level II .
6. Acceptable Manufacturers:
   a. Base: Global Security Glazing 1 7/16" SB60VT (#2) Clear Tempered Insulated Secur-Tem + Poly 2116.

C. Glass Type SG-2:
1. Fire Resistant Glass-clad Polycarbonate, clear.
2. Nominal 1-9/16 IN thickness.
3. Proprietary multi-layer construction comprised of glass clad polycarbonate and fire-resistant glass laminate.
4. UL listed to 45 MIN.
   a. Maximum viewing area in SideLites/Window Frames is 4,952 square inches.
5. Comply with ASTM F-1915 Grade 3 (20 Min.). containment rated and ASTM F 1233-08 Class 2.7.
6. Comply with HP White Laboratory, Inc., HPW-TP-0500.02, Forced Entry Level II
7. Acceptable Manufacturers:
   a. Base: Global Security Glazing INFERNOGARD 45-2116.

D. Glass Type SG-3:
1. Glass-clad Polycarbonate, clear.
2. Nominal 1 1/4 IN thickness.
3. Two heat or chemically strengthened clear glass sheets, laminated together with bonding interlayers to nominal 3/4 IN, four-ply urethane and three-ply polycarbonate core.
4. Comply with HP White Laboratory, Inc., HPW-TP-0500.02, Forced Entry Level I.
5. Acceptable Manufacturers:
   a. Base: Global Security Glazing 1 1/4" Clear Secur-Tem + Poly SP035.

F. Glass Type SG-4:
1. Glass-clad Polycarbonate, clear.
2. Nominal 11/16 IN thickness.
3. Two heat or chemically strengthened clear glass sheets, laminated together with bonding interlayers to nominal 7/16 IN, two-ply urethane and one-ply polycarbonate core.
4. Comply with HP White Laboratory, Inc., HPW-TP-0500.02, Forced Entry Level II.
5. Acceptable Manufacturers:
   a. Base: Global Security Glazing 11/16" Clear Secur-Tem + Poly 2116.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing for security glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving security glazing immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of security glazing, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect edges of security glazing from damage during handling and installation. Remove damaged security glazing from Project site and legally dispose of off Project site. Damaged security glazing includes units with edge or face damage or other imperfections that, when installed, could weaken security glazing, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glazing unit manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by security glazing manufacturers for installing lites.

F. Provide spacers for security glazing lites where the length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of security glazing. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glazing lites and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent security glazing from moving sideways in glazing channel, as recommended in writing by security glazing manufacturer and according to requirements in referenced glazing publications.

H. Set security glazing in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set coated security glazing with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by security glazing, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center security glazing in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket securely in place between glazing unit and frame or fixed stop, with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center security glazing in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in security glazing. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center security glazing in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in security glazing. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between security glazing and glazing stops to maintain face clearances and to prevent sealant from extruding into glazing channel and blocking weep systems. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to security glazing and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from security glazing.

3.7 PROTECTION AND CLEANING

A. Protect exterior security glazing from damage immediately after installation by attaching crossed streamers to framing held away from glazing unit. Do not apply markers to security glazing surfaces. Remove nonpermanent labels, and clean surfaces.

B. Protect security glazing from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with security glazing, remove substances immediately as recommended in writing by security glazing manufacturer.

C. Examine security glazing surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by security glazing manufacturer.

D. Remove and replace security glazing that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, or vandalism during construction period.

E. Wash security glazing on exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash security glazing as recommended in writing by security glazing manufacturer.

END OF SECTION 088853

SECTION 092216 – NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

1.3 SUBMITTALS

A. Product Data; For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

B. Products shall meet CBC Section 703.6 requiring marking of fire and smoke walls.

2.2 FRAMING SYSTEMS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 20 percent.

B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.

C. Studs and Runners: ASTM C 645.

1. Steel Studs and Runners:

a. Minimum Base-Metal Thickness: As indicated on Drawings.
b. Depth: As indicated on Drawings.

D. Slip-Type Head Joints: Where indicated, provide the following:
1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
2) Steel Network Inc. (The); VerttiTrack VTD Series.
3) Telling Industries; True-Action Slotted Track.
4) Or equal.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.027 inch.

F. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2 –inch- wide flanges.

1. Depth: 1-1/2 inches.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.018 inch.
2. Depth: As indicated on Drawings.

H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.

1. Depth: As indicated on Drawings.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch- diameter wire.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch- diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.

a. Type: Post-installed, expansion anchor.

2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

D. Carrying Channels: Cold-rolled, commercial-steel with a base-metal thickness of 0.053 inch and minimum ½-inch- wide flanges.

1. Depth: As indicated on Drawings.

E. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
2. Steel Studs and Runners: ASTM C 645.

a. Minimum Base-Metal Thickness: 0.027 inch (0.68 mm).
b. Depth: As indicated on Drawings

F. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Armstrong World Industries, Inc.; Drywall Grid Systems.
b. Chicago Metallic Corporation: Drywall Grid System.
c. USG Corporation; Drywall Suspension System and Wall-To-Wall System (Basis of Design)

d. Or Equal.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacing indicated, but not greater than spacing required by referenced installation standards for assembly types.

1. Hangers: 48 inches (1219 mm) o.c.
2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.

B. Isolate suspension system from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstruction and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacing that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspensions systems with hangers used for support.

F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces.

G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092613 - GYPSUM VENEER PLASTERING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Gypsum veneer plaster and gypsum base for veneer plaster.
2. Gypsum veneer plaster over masonry surfaces.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations, fabrication, and installation of control joints, and reveals and trim; include plans, elevations, sections, details of components, and attachments to other work.

C. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch (300-mm) length for each trim accessory.
2. Textured Finishes: Manufacturer's standard size for each textured finish and on rigid backing.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain gypsum veneer plaster products, including gypsum base for veneer plaster, joint reinforcing tape, and embedding material, from a single manufacturer.

B. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 119, 2007 Edition by a testing and inspecting agency.

C. Mockups: Provide a full-thickness finish mockup for each type and finish of gypsum veneer plaster and substrate to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select representative surfaces and conditions for application of each type of gypsum veneer plaster and substrate.
2. Provide mockups of ceilings and partitions in sizes of at least 100 sq. ft. (9 sq. m).
3. Apply gypsum veneer plaster, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated.

4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 GYPSUM VENEER PLASTER MATERIALS

A. High-Strength, One-Component Gypsum Veneer Plaster: ASTM C 587, ready-mixed, smooth, finish-coat veneer plaster containing mill-mixed, fine silica sand; with a compressive strength of 3000 psi (20 MPa) when tested according to ASTM C 472; and formulated for application directly over substrate without use of separate base-coat material.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. USG Corporation; Imperial Finish Plaster, or approved equal.

2.2 PANEL PRODUCTS

A. Recycled Content: Provide gypsum panel products with recycled content.

B. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

C. Gypsum Base for Veneer Plaster: ASTM C 588/C 588M.
1. Abuse-Resistant Base: With specially reinforced core for greater resistance to surface indentation, 5/8-inch (16-mm) thick, Type X core

2. Moisture- and Mold-Resistant Base: With moisture- and mold-resistant core, glass-mat facing on both sides of panel, and 5/8-inch (16-mm) thick, Type X core.

a. Mold Resistance: ASTM D 3273; no mold growth after four weeks' exposure.

D. Backing Panels for Multilayer Applications: ASTM C 588/C 588M gypsum base or ASTM C 36/C 36M gypsum board, as recommended by gypsum veneer plaster manufacturer, for application method and thicknesses indicated.

1. Core: Matching face layer, unless otherwise indicated.
2. Thickness: Matching face layer, unless otherwise indicated.

2.3 TRIM ACCESSORIES

A. Standard Trim: ASTM C 1047, provided or approved by manufacturer for use in gypsum veneer plaster applications indicated.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc

2. Shapes:

a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
f. Curved-Edge Cornerbead: With notched or flexible flanges.
g. Control joints.

2.4 JOINT REINFORCING MATERIALS

A. General: Comply with joint strength requirements in ASTM C 587 and with gypsum veneer plaster manufacturer's written recommendations for each application indicated.

B. Joint Tape:

1. Gypsum Base for Veneer Plaster: As recommended by gypsum veneer plaster manufacturer for applications indicated.

C. Embedding Material for Joint Tape:

1. Gypsum Base for Veneer Plaster: As recommended by gypsum veneer plaster manufacturer for use with joint-tape material and gypsum veneer plaster applications indicated.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced product standards and manufacturer's written recommendations.

B. Bonding Agent: ASTM C 631, polyvinyl acetate.

C. Laminating Adhesive: Adhesive or joint compound recommended by manufacturer for directly adhering gypsum base face-layer panels to backing-layer panels in multilayer construction.

1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

E. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing), produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
2. Recycled Content: Provide blankets with recycled content.

F. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

1. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

G. Patching Mortar: Dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

2.6 GYPSUM VENEER PLASTER MIXES

A. Mechanically mix gypsum veneer plaster materials to comply with ASTM C 843 and with gypsum veneer plaster manufacturer's written recommendations.

PART 3 - EXECUTION

3.1 PREPARATION

A. Masonry Substrates: Prepare according to gypsum veneer plaster manufacturer's written recommendations and as follows:

1. Clean surfaces to remove dirt, grease, oil, and other foreign matter and deposits that could impair bond with gypsum veneer plaster.
2. Apply bonding agent on dry masonry substrates.

3.2 INSTALLING PANELS, GENERAL

A. Gypsum Base for Veneer Plaster: Apply according to ASTM C 844, 2004 Edition unless manufacturer's written recommendations are more stringent.

1. Do not allow gypsum base to degrade from exposure to sunlight as evidenced by fading of paper facing.
2. Erection Tolerance: No more than 1/16-inch (1.6-mm) offsets between planes of gypsum base panels, and 1/8 inch in 8 feet (3 mm in 2.4 m) noncumulative, for level, plumb, warp, and bow.

B. Install sound attenuation blankets before installing gypsum base for veneer plaster unless blankets are readily installed after panels have been installed on one side.

C. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

D. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.6 mm) of open space between panels. Do not force into place.

E. Locate edge and end joints over supports except in ceiling applications where intermediate supports or back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints, other than control joints, at corners of framed openings.

F. Attach panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. Attach panels to framing provided at openings and cutouts.

H. Form control joints with space between edges of adjoining panels.

I. Cover both sides of steel stud partition framing with panels in concealed spaces, including above ceilings, except in internally braced chases.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.74 sq. m) in area.
2. Fit panels around ducts, pipes, and conduits.
3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints; seal joints with acoustical sealant.

J. Fastener Spacing: Comply with ASTM C 844, 2004 Edition manufacturer's written recommendations, and fire-resistance-rating requirements.

1. Space screws a maximum of 12 inches (305 mm) o.c. along framing members for wall or ceiling application.

3.3 INSTALLING PANELS

A. Install gypsum base panels for veneer plaster in the following locations:
1. Ceiling Type: As indicated on Drawings.
2. Type X: As indicated on Drawings
3. Abuse-Resistant Base: As indicated on Drawings
4. Moisture- and Mold-Resistant Base: As indicated on Drawings

B. Single-Layer Application:

1. On ceilings, apply gypsum base panels before wall panels, to the greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On walls, apply gypsum base panels vertically and parallel to framing, unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

b. At stairwells and other walls higher than 30 feet (9.0 m), install gypsum base panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-furring, apply gypsum base panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

C. Multilayer Application on Partitions: Apply backing panels indicated and gypsum-base face layers vertically (parallel to framing) with joints of backing panels located over stud or furring members and gypsum-base face-layer joints offset at least one stud or furring member from backing-panel joints, unless otherwise required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

1. Z-Furring: Apply backing panels vertically (parallel to framing) and gypsum-base face layer either vertically or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of backing panels over furring members.

D. Single-Layer Fastening Methods: Apply gypsum base panels to supports with steel drill screws.

E. Multilayer Fastening Methods: Fasten backing panels and gypsum-base face layers separately to supports with screws

F. Curved Partitions: Comply with gypsum base manufacturer's written installation recommendations.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install according to ASTM C 844, 2004 Edition and in specific locations approved by Architect.

C. Trim: Install in the following locations:

1. Cornerbead: Use at outside corners, unless otherwise indicated.
2. Bullnose Bead: Use at outside corners.
3. LC-Bead: Use at exposed panel edges.
4. L-Bead: Use where indicated.
5. U-Bead: Use at exposed panel edges
6. Curved-Edge Cornerbead: Use at curved openings.

3.5 INSTALLING JOINT REINFORCEMENT

A. Gypsum Base for Veneer Plaster: Reinforce interior angles and flat joints with joint tape and embedding material to comply with ASTM C 843 and with gypsum veneer plaster manufacturer's written recommendations.

B. Abuse-Resistant Base: Reinforce joints between abuse-resistant panels with joint tape and embedding material according to panel manufacturer's written recommendations.

C. Impact-Resistant Base: Reinforce joints between impact-resistant panels with joint tape and embedding material according to panel manufacturer's written recommendations.

D. Moisture- and Mold-Resistant Base: Reinforce joints between moisture- and mold-resistant panels with joint tape and embedding material according to panel manufacturer's written recommendations.

3.6 GYPSUM VENEER PLASTERING

A. Bonding Agent: Apply bonding agent on dry masonry, abuse-resistant base panels according to gypsum veneer plaster manufacturer's written recommendations.

B. Gypsum Veneer Plaster Application: Comply with ASTM C 843 and with veneer plaster manufacturer's written recommendations.

1. One-Component Gypsum Veneer Plaster: Trowel apply base coat over substrate to uniform thickness of 1/16 to 3/32 inch (1.6 to 2.4 mm). Fill all voids and imperfections. Allow plaster to set, then scratch and immediately double back with gypsum veneer plaster to uniform total thickness of 3/16 inch (4.8 mm).

2. Where gypsum veneer plaster abuts only metal door frames, windows, and other units, groove finish coat to eliminate spalling.
3. Do not apply veneer plaster to gypsum base if paper facing has degraded from exposure to sunlight. Before applying veneer plaster, use remedial methods to restore bonding capability to degraded paper facing according to manufacturer's written recommendations.

C. Concealed Surfaces: Do not omit gypsum veneer plaster behind cabinets, furniture, furnishings, and similar removable items. Omit veneer plaster in the following areas where it will be concealed from view in the completed Work unless otherwise indicated or required to maintain fire-resistance and STC ratings:

1. Above suspended ceilings.
2. Behind wood paneling.

D. Gypsum Veneer Plaster Finish: Smooth-troweled finish, unless otherwise indicated

3.7 PROTECTION

A. Protect installed gypsum veneer plaster from damage from weather, condensation, construction, and other causes during remainder of the construction period.

B. Remove and replace gypsum veneer plaster and gypsum base panels that are wet, moisture damaged, or mold damaged.

1. Indications that gypsum base panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
2. Indications that gypsum base panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092613

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.

B. Related Requirements:

1. Division 05 for gypsum sheathing for exterior walls.
2. Division 05 for structural and non-structural framing that support gypsum board panels.
3. Division 09 Section 093000 "Tiling" for cementitious backer units installed as substrates for ceramic tile.
4. Division 9 Section 092613 “Gypsum Veneer Plastering” for gypsum board finish.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch long length for each trim accessory indicated.

1.4 QUALITY ASSURANCE

A. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:

a. Each level of gypsum board finish indicated for use in exposed locations.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

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.

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.

2.2 GYPSUM BOARD, GENERAL

A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.

B. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

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

1. Georgia-Pacific Gypsum LLC.
2. National Gypsum Company
3. USG Corporation.

B. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M, Level 2.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

C. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

D. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10.

A. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.

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

a. American Gypsum.
b. CertainTeed Corporation.
c. Georgia-Pacific Building Products.
d. Temple-Inland Building Products by Georgia-Pacific.
e. United States Gypsum Company.

2. Core: 5/8 inch, Type X or as indicated on Drawings.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes: Fry Reglet, per drawings.

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. Chamfered corners.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints 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 drying-type, all-purpose compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Exterior Applications:
1. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. 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.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
1. Type X: Except where indicated otherwise on Drawings.
2. Moisture- and Mold-Resistant Type: As indicated on Drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:
1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
2. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.

1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.

C. Exterior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

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

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 5: All gypsum board locations unless otherwise indicated.

    a. Primer and its application to surfaces are specified in other Division 09 Sections.

E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions.

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and 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.

END OF SECTION 092900

SECTION 093013 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Ceramic mosaic tile.
2. Quarry tile.
3. Pressed floor tile.
4. Porcelain tile.
5. Glazed wall tile.
6. Stone thresholds.
7. Tile backing panels.
8. Waterproof membrane for thinset applications.
9. Crack isolation membrane.
10. Metal edge strips.

B. Related Requirements:
1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Section 092900 "Gypsum Board" for cementitious backer units
3. CA Building Code 2022;
    a. 11B-302.1 General. Floor and ground surfaces shall be stable, firm, and slip resistant and shall comply with Section IIB-302.
    b. 11B-303.2 Vertical. Changes in level of 1/4 inch (6.4 mm) high maximum shall be permitted to be vertical and without edge treatment. 3. 11B-303.3 Beveled. Changes in level between 1/4 inch (6.4 mm) high minimum and 1/2 inch (12.7 mm) high maximum shall be beveled with a slope not steeper than 1 :2. 3. 11B-303.3 Beveled. Changes in level between 1/4 inch (6.4 mm) high minimum and 1/2 inch (12.7 mm) high maximum shall be beveled with a slope not steeper than 1 :2.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9,

ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.

D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 36 inches square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
3. Full-size units of each type of trim and accessory for each color and finish required.
4. Stone thresholds in 6-inch lengths.
5. Metal edge strips in 6-inch lengths.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

C. Product Certificates: For each type of product.

D. Product Test Reports: For tile-setting and -grouting products and certified porcelain tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer is a five-star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.
2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.

B. 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 installation.
2. Build mockup of each type of wall tile installation.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

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.

1.10 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.

1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:

1. Stone thresholds.
2. Waterproof membrane.
3. Crack isolation membrane.
4. Cementitious backer units.
5. Metal edge strips.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. All floor surfaces and installations shall be slip-resistant.

E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE PRODUCTS

A. Ceramic Tile Type: Unglazed square-edged quarry tile.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Daltile.
   b. Interceramic.
   c. Fire Clay Tile Co.

2. Face Size: 6 by 6 inches

3. Thickness: 1/2 inch.
4. Wearing Surface: Abrasive aggregate embedded in surface.
5. Dynamic Coefficient of Friction: Not less than 0.42.
6. Finish: Mat, opaque.
7. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
8. Grout Color: As selected by Architect from manufacturer's full range
9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

   a. Base: Coved with surface bullnose top edge, face size 6 by 6 inches.

B. Ceramic Tile Type: Glazed wall tile.

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

   a. American Marazzi Tile, Inc.
   b. Daltile.
   c. Seneca Tiles, Inc.

2. Module Size: 4 by 4 inches nominal.
3. Face Size Variation: Rectified.
4. Thickness: 5/16 inch.
5. Face: Plain with modified square edges.
6. Finish: Bright, opaque glaze.
7. Tile Color and Pattern: As selected by Architect from manufacturer's full range
8. Grout Color: As selected by Architect from manufacturer's full range Mounting: Factory, back mounted.
9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

a. Wainscot Cap for Portland Cement Mortar Installations: Bullnose cap, module size 6 by 2 inches.
b. Wainscot Cap for Thinset Mortar Installations: Surface bullnose, module size 6 by 2 inches.
c. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
d. External Corners for Portland Cement Mortar Installations: Bullnose shape with radius of at least 3/4 inch unless otherwise indicated.
e. External Corners for Thinset Mortar Installations: Surface bullnose, same size as adjoining flat tile.
f. Internal Corners: Field-butted square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

2.4 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

B. Granite Thresholds: ASTM C 615/C 615M, with honed finish.

1. Description: Uniform, medium-grained, gray stone without veining.
2. Description: Match Architect's sample.

2.5 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A, in maximum lengths available to minimize end-to-end butt joints.

1. Thickness: 5/8 inch.

2.6 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

2.7 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

2.8 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

1. Cleavage Membrane: Asphalt felt, ASTM D 226/D 226M, Type I (No. 15); or polyethylene sheeting, ASTM D 4397, 4.0 mils thick.
2. Reinforcing Wire Fabric: Galvanized, welded-wire fabric, 2 by 2 inches by 0.062-inch diameter; comply with ASTM A 185/A 185M and ASTM A 82/A 82M, except for minimum wire size.
3. Expanded Metal Lath: Diamond-mesh lath complying with ASTM C 847.

    a. Base Metal and Finish for Interior Applications: Uncoated or zinc-coated (galvanized) steel sheet, with uncoated steel sheet painted after fabrication into lath.
    b. Base Metal and Finish for Exterior Applications: Zinc-coated (galvanized) steel sheet.
    c. Configuration over Studs and Furring: Flat.
    d. Configuration over Solid Surfaces: Self-furring.
    e. Weight: 3.4 lb/sq. yd..

4. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.

B. Dry-Set Portland Cement Mortar (Thinset): ANSI A118.1.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Bonsal American, an Oldcastle company.
    b. Laticrete International, Inc.
    c. MAPEI Corporation.
    d. Summitville Tiles, Inc.

2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.

C. Latex-Portland Cement Mortar (Thinset): ANSI A118.4.

1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
2. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.9 GROUT MATERIALS

A. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Bonsal American, an Oldcastle company.
    b. Jamo Inc.
    c. MAPEI Corporation.
    d. Summitville Tiles, Inc.

2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F, respectively, and certified by manufacturer for intended use.

2.10 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D 4397, 4.0 mils thick.

C. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.

D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

E. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

1. Grout sealers shall comply with requirements of FloorScore certification.
2. Grout sealers shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Small-Scale Environmental Chambers."

2.11 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 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 the Work.

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 concrete substrates for tile floors installed with adhesives bonded mortar bed comply with surface finish requirements in ANSI A108.01 for installations indicated.

    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

    a. Exterior tile floors.
    b. Tile floors in wet areas.
    c. Tile swimming pool decks.
    d. Tile floors in laundries.
    e. Tile floors consisting of tiles 8 by 8 inches or larger.
    f. Tile floors consisting of rib-backed tiles.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.

F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Ceramic Mosaic Tile: 1/8 inch.
2. Quarry Tile: 1/4 inch.
3. Glazed Wall Tile: 1/8 inch.

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thinset).
2. Do not extend cleavage membrane, waterproofing or crack isolation membrane under thresholds set in dry-set portland cement or latex-portland cement mortar. Fill joints between such thresholds and adjoining tile with elastomeric sealant.

K. Grout Sealer: Apply grout sealer to grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 TILE BACKING PANEL INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

B. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.6 CRACK ISOLATION MEMBRANE INSTALLATION

A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.7 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and

plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.8 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.9 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Ceramic Floor Tile Installation: TCNA F114-02 and ANSI A108.1A ANSI A108.1B, ANSI A108.1C; cement mortar bed (thickset) with cleavage membrane; epoxy grout.

    a. Ceramic Tile Type: Quarry Tile.
    b. Bond Coat for Cured-Bed Method: Medium-bed, latex- portland cement mortar.
    c. Grout: Water-cleanable epoxy grout, ANSI A118.3.
    d. Mortar Bed, reinforcing and cleavage ANSI A108.1A.

2. Grout: Water-cleanable epoxy grout.

3. Ceramic Tile Installation: TCNA F115; thinset mortar; epoxy grout.

    a. Ceramic Tile Type: Quarry Tile.
    b. Thinset Mortar: Latex- portland cement mortar.
    c. Grout: Water-cleanable epoxy grout.

B. Interior Wall Installations, Well-braced Metal or Wood Studs or Furring:

1. Ceramic Tile Installation: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board over vapor-retarder membrane.

    a. Ceramic Tile Type: Glazed ceramic tile.
    b. Thinset Mortar: Latex portland cement mortar.
    c. Grout: Water-cleanable epoxy grout.

END OF SECTION 093013

SECTION 096513 - RESILIENT TOPSET BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Resilient topset base.
2. Resilient stair accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

E. Product Schedule: For topset resilient base and accessory products.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Coordinate mockups in this Section with mockups specified in other Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:

1. Burke Mercer Flooring Products.
2. Flexco.
3. Johnsonite, Inc.
4. Roppe Corporation.
5. For substitutions, see Division-1 section, Product Substitutions.

2.2 VULANCIZED THERMOSET RUBBER BASE (TOPSET)

A. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).

1. Style B, Cove.
2. Thickness: 0.125 inch.
3. Height: As indicated on Drawings.
4. Lengths: Coils in manufacturer's standard length. Cut lengths 48 inches long are not acceptable.
5. Outside Corners: Preformed.
6. Inside Corners: Job formed.

B. Colors: As selected by Architect from full range of manufacturer's colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.

D. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

E. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to manufacturer's written recommendations, but not less stringent than the following:

    a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 16 inches in length.

    a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 12 inches in length.

    a. Miter corners to minimize open joints.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. At stairs, sweep and vacuum horizontal surfaces thoroughly.
3. At stairs, damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.

1. Apply two coat(s).

E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096516 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes vinyl sheet flooring.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified in manufacturer's standard size, but not less than 6-by-9-inch sections.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of resilient sheet flooring to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Resilient Sheet Flooring: Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, in roll form and in full roll width for each type, color, and pattern of flooring installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for resilient sheet flooring installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by resilient sheet flooring manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store resilient sheet flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store rolls upright.

1.9 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive resilient sheet flooring during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during resilient sheet flooring installation.

D. Close spaces to traffic for 48 hours after resilient sheet flooring installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient sheet flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. FloorScore Compliance: Resilient sheet flooring shall comply with requirements of FloorScore certification.

C. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 VINYL SHEET FLOORING WITH BACKING

A. Manufacturer: Mannington Commercial.

B. Product Standard: ASTM F 1303.

1. Type (Binder Content): Type I, minimum binder content of 90 percent.
2. Wear-Layer Thickness: Grade 1.
3. Overall Thickness: As standard with manufacturer.
4. Backing Class: Class A (fibrous).

C. Sheet Width: As standard with manufacturer.

D. Seamless-Installation Method: Heat welded.

E. Colors and Patterns: Mannington Commercial, Terrene, Sandstone.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient sheet flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit resilient sheet flooring and substrate conditions indicated.
1. Mannington V-81Full Spread Adhesive

C. Seamless-Installation Accessories:

1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.

a. Color: Match flooring.

D. Integral-Flash-Cove-Base Accessories:

1. Cove Strip: 1-inch radius provided or approved by resilient sheet flooring manufacturer.
2. Cap Strip: Mannington Round Cap 1/8” 040 provided or approved by resilient sheet flooring manufacturer.
3. Corners: Metal inside and outside corners and end stops provided or approved by resilient sheet flooring manufacturer.

E. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient sheet flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient sheet flooring.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to resilient sheet flooring manufacturer's written instructions to ensure adhesion of resilient sheet flooring.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient sheet flooring manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient sheet flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to resilient sheet flooring manufacturer's written recommendations, but not less stringent than the following:

    a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient sheet flooring until it is the same temperature as the space where it is to be installed.

1. At least 48 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient sheet flooring.

3.3 RESILIENT SHEET FLOORING INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient sheet flooring.

B. Unroll resilient sheet flooring and allow it to stabilize before cutting and fitting.

C. Lay out resilient sheet flooring as follows:

1. Maintain uniformity of flooring direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
3. Match edges of flooring for color shading at seams.
4. Avoid cross seams.

D. Scribe and cut resilient sheet flooring to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.

E. Extend resilient sheet flooring into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on resilient sheet flooring as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install resilient sheet flooring on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of flooring installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut covers and to cover perimeters.

H. Adhere resilient sheet flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Seamless Installation:

1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with welding bead to permanently fuse sections into a seamless flooring. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.

J. Integral-Flash-Cove Base: Cove resilient sheet flooring 6 inches up vertical surfaces. Support flooring at horizontal and vertical junction with cove strip. Butt at top against cap strip.

1. Install metal corners at inside and outside corners.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient sheet flooring.

B. Floor Polish: Remove soil, adhesive, and blemishes from flooring surfaces before applying liquid floor polish.

1. Apply two coat(s).

C. Cover resilient sheet flooring until Substantial Completion.

END OF SECTION 096516

0SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Luxury Vinyl Tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: Full-size units of each color and pattern of floor tile required.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Planks: Furnish one box for every **50** boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Static Load (ASTM F970 mod.): Passes 2,000 PSI; Residual indent $\leq$ 0.005”

C. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore certification.

D. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

E. Meets Green Label Plus Certification.

2.2 SOLID VINYL FLOOR TILE

A. Products: Subject to compliance with requirements, provide the following:

1. Mannington Commercial; Amtico Signature Collection
2. Or equal

B. Tile Standard: ASTM F 1700.

1. Class: Class III, printed film vinyl tile.
2. Type: B, embossed surface.

C. Thickness: 0.098 inch.

D. Wearlayer thickness: 40 mil

E. Finish Layer: Urethane with aggregate suspended within wear layer

F. Size: 6 x 36 inches.

G. Edge Treatment: Micro Bevel

H. Manufacturing Country of Origin - USA

I. Colors and Patterns: As selected by Architect from full range of industry colors.

J. Warranty: Limited 25 year Commercial & 25 year Finish Coat Warranty

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

1. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Seamless-Installation Accessories:

1. Adhesive-Bonding Compound: Manufacturer’s product, V-88/ Amtico PSA.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:

a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

E. Do not install floor tiles until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

C. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following exterior substrates:

1. Concrete.
2. Galvanized metal.
3. Exterior portland cement plaster (stucco).

B. Related Requirements:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 08 Sections for factory priming of hollow metal steel doors and frames.
3. Division 09 Section "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.

4. Label each Sample for location and application area.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Sherwin-Williams Company (The).

2. Dunn-Edwards Corporation.

B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: As indicated in a color schedule.

2.3 PRIMERS/SEALERS

A. Primer, Alkali Resistant, Water Based: MPI #3.

1. Dunn-Edwards Corporation; W709 Eff-Stop Acrylic Masonry Primer/Sealer.

2.4 METAL PRIMERS

A. Primer, Galvanized, Water Based: MPI #134.

1. Dunn-Edwards Corporation; W715 Ultra-Grip Acrylic Multi-Purpose Primer.

2.5 WATER-BASED PAINTS

A. Latex, Exterior, Flat (Gloss Level 1): MPI #10.

1. Dunn-Edwards Corporation; W701V Evershield Acrylic Wood & Masonry Flat Paint.

B. Latex, Exterior Low Sheen (Gloss Level 3): MPI #15.

1. Dunn-Edwards Corporation; W705V Enduracryl Exterior Acrylic Low Sheen Paint.

C. Latex, Exterior, Semi-Gloss (Gloss Level 5): MPI #11.

1. Dunn-Edwards Corporation; W9601V Permasheen Acrylic Semi-Gloss Paint.

2.6 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Portland Cement Plaster: 12 percent.

C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:
   a. Uninsulated metal piping.
   b. Pipe hangers and supports.
   c. Metal conduit.
   d. Tanks that do not have factory-applied final finishes.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Latex, exterior, matching topcoat.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4), MPI #15.

B. Hollow-Metal Steel Doors and Frames (Shop-Primed) – Semi Gloss Sheen:

1. Water-Based Light Industrial Coating System:

a. Prime Coat: Rust-Preventative Primer.

b. Intermediate Coat: Latex, exterior, matching topcoat.

c. Topcoat: Latex, exterior, semi-gloss (Gloss Level 5)

C. Galvanized-Metal Substrates:

1. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, galvanized, water based, MPI #134.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, semi-gloss (Gloss Level 5), MPI #11.

D. Portland Cement Plaster Substrates:

1. Latex over Alkali-Resistant Primer System:

a. Prime Coat: Primer, alkali resistant, water based, MPI #3.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior flat (Gloss Level 1), MPI #10.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates.

B. Related Requirements:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 08 Sections for factory priming windows and doors with primers specified in this Section.
3. Division 09 Section "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Sherwin-Williams Company (The).

2. Dunn-Edwards Corporation.

B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

D. Colors: As indicated in a color schedule

2.3 PRIMERS/SEALERS

A. Primer Sealer, Interior, Institutional Low Odor/VOC: MPI #149.

1. Dunn-Edwards Corporation; W101V Vinylastic Pigmented Sealer.

2.4 METAL PRIMERS

A. Primer, Anti-Corrosive, for Metal: MPI #79.

1. Dunn-Edwards Corporation; W715 Ultra-Grip Acrylic Multi-Purpose Primer

2.5 WATER-BASED PAINTS

A. Latex, Interior, Institutional Low Odor/VOC, Eggshell (Satin) (Gloss Level 3): MPI #145.

1. Dunn-Edwards Corporation; W440V Decosheen Acrylic Eggshell Paint.

B. Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss (Gloss Level 5): MPI #147.

1. Dunn-Edwards Corporation; W450V Decoglo Acrylic Semi-Gloss Paint.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.
5. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured.

E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

G. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:

1. SSPC-SP 2, "Hand Tool Cleaning."

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

a. Equipment, including panelboards.

2. Paint the following work where exposed in occupied spaces:

a. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Steel Substrates:

1. Latex over Alkyd Primer System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal, MPI #79.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.

B. Gypsum Board Substrates:

1. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, eggshell (Gloss Level 3), MPI #145.
d. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.

END OF SECTION 099123

SECTION 10 14 00 - SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Panel signs.

1.3 DEFINITIONS

A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines".
B. Comply with CBC 2010 and California Title 24.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for signs.

1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign. County to review/finailize room ID Text and Room Number prior to fabrication.

C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for the following:

1. Acrylic sheet.
2. Polycarbonate sheet

D. Maintenance Data: For signs to include in maintenance manuals.

E. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

B. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.

C. Regulatory Requirements: Comply with applicable provisions in Accessibility Guidelines, CBC Section 1114B, 1115B.5, and 1117B.5 and California Title 24.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

A. Coordinate placement of anchorage devices with templates for installing signs.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of metal and polymer finishes beyond normal weathering.
b. Deterioration of embedded graphic image colors and sign lamination.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

B. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:

1. Impact Resistance: 16 ft-lbf/in. per ASTM D 256, Method A.
2. Tensile Strength: 9000 lbf/sq. in. per ASTM D 638.
3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. per ASTM D 790.
4. Heat Deflection: 265 deg F at 264 lbf/sq. in. per ASTM D 648.
5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.

2.2 PANEL SIGNS

A. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:

1. Laminated, Polycarbonate-Faced Sheet: 1/16” thick, polycarbonate face sheet laminated to each side of phenolic backing.
2. Acrylic Sheet: 1/16” thick.
3. Edge Condition: Square cut, Beveled or Bullnose.
4. Corner Condition: Square
5. Mounting: Unframed.
   a. Wall mounted with concealed mechanical anchors.
   b. Do not use adhesive mounting.

6. Color: Characters and Field shall be Contrasting Colors. Colors shall be selected by the Architect and shall be approved by the Building Official.
7. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors.

B. Laminated Exterior Signs: Solid phenolic panel core with graphic image covered with thermosetting resin face layer.

1. Surface Finish: Mat UV resistant, outdoor.
2. Edge Condition: Beveled.
3. Corner Condition: Square.
4. Thickness: 1/4 inch.

C. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Contracted Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape per CBC 1117B.5.6.

1. Panel Material: Opaque acrylic sheet.
2. Raised-Copy Thickness: Not less than 1/32 inch .

D. Colored Coatings for Acrylic Sheet: For copy colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are UV and water resistant for five years for application intended.

1. Color: As selected by Architect from manufacturer's full range.

E. Illuminated Signs for Areas of Refuge; Sign must have the words “Area of Refuge” and the International Symbol of Accessibility. Signs shall comply with CBC 2007 1117B.5.2, 1117B.5.3, 1117B.5.4 and 1117B.5.8

2.3 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.4 FABRICATION

A. General: Provide manufacturer's standard signs of configurations indicated.

1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
3. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.5 FINISHES, GENERAL

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ACRYLIC SHEET FINISHES

A. Colored Coatings for Acrylic Sheet: For copy and background and frame colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Verify that items, including anchor inserts, are sized and located to accommodate signs.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.

1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.

B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.

1. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.

3.3 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 101400

SECTION 10 28 00 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Restroom accessories.

B. Related Sections include the following:

1. Division 9 Section "Tiling"

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Features that will be included for Project.
5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated on Drawings.
2. Identify products using designations indicated on Drawings.

C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.5 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.

B. Brass: ASTM B 19 flat products; ASTM B 16 , rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.

C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch minimum nominal thickness.

D. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.

E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 RESTROOM ACCESSORIES

A. Grab Bar for Youth Restroom

1. Basis-of-Design Product: Bradley

2. Description: Heavy duty anti-ligature grab bar with 11 ga. closure plate.
2. Mounting: Flanges with exposed fasteners.
3. Material: Stainless steel, 11 gauge.

    a. Finish: Smooth, No. 4, satin finish.

4. Outside Diameter: 1-1/2 inches .
5. Configuration and Length: 24”, 36” 42” and 60” as indicated on Drawings.

A. Grab Bar for Staff Restroom

1 Basis-of-Design Product: Bobrick B-6806
2. Description: 18-8 S, type 304, 18 gauge stainless steel tubing with satin finish, 1-1/2” outside diameter. Ends are heliarc welded to flanges.
3. Mounting: Concealed mounting flanges with snap flange covers.
4. Outside Diameter: 1-1/2 inches .
5. Configuration and Length: 36”, 42” as indicated on Drawings.

B. Mirrors for Staff Restroom.

1. Basis-of-Design Product: Bobrick
2. Frame: Stainless-steel angle, 0.05 inch thick.
    a. Corners: Welded and ground smooth.

3. Surface: tempered glass.
4. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
    a. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
    b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
5. Size: 24"w x 36"h.

C. Mirror Unit Mirrors for Youth Restroom.

1. Basis-of-Design Product: Whitehall WH1862
2. Frame: Corterra solid surface polymer Resin.

    a. Corners: Sloping edges and rounded corners with concealed fasteners .

3. Surface: Type 400 series stainless steel polished to a mirror finish.
4. Size: 19.5”"w x 25.5"h.

D. Robe Hook

1. Basis-of-Design Product: Bobrick B-9884

2. Install at maximum height of 48” above the finished floor in accessible stalls. In all stalls including accessible stalls install a hook at 60” (2 hangers in accessible stall).
3. Description: Single or double prong.
4. Material and Finish: Stainless steel, No. 7 finish (polished).

E. Drinking Fountain Barrier Rail

1. Basis-of-Design Product: Bobrick B-81928
2. Material and Finish: 18-8 S, type 304, 18 gauge stainless steel tubing with satin finish, 1-1/2” outside diameter. Ends are heliarc welded to flanges.

F. Toilet Privacy Panel

1. Basis-of-Design Product: Britex model US-PPP
2. Material and Finish: Type 304, 14 gauge stainless steel tubing with satin finish, fully welded with a radiused front edge and anti-ligature design.
3. Size: 35 7/8” wide x 47 ¼” high

2.5 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf , when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10 28 00

SECTION 11 19 00 - DETENTION EQUIPMENT

PART 1 - GENERAL

1.1 DETENTION EQUIPMENT CONTRACTOR

A. Work specified in this section is intended to be performed under one subcontract by a Detention Equipment Contractor.
   1. Contractor responsible for:
      a. Coordination of items specified herein and with related work.
      b. Coordination of Detention Equipment with Electrical Systems equipment.
      c. Detailing.
      d. Fabrication and manufacturing.
      e. Installation.
      f. Operation and adjustments.
      g. Training.
      h. Warranty.
   2. Contractor's normal Contractual obligations remain.

1.2 QUALITY ASSURANCE - DETENTION EQUIPMENT CONTRACTOR

A. Experience criteria:
   1. Minimum 5 years' experience manufacturing specified items.
   2. Minimum 5 years successful installation of specified items on existing correctional facilities.
   3. If items 1 or 2 are not complied with, Architect reserves right to require:
      a. Owner approval.
      b. Minimum 3-year warranty.
   4. When required by Architect, provide list of institutions where product has been installed and used successfully.
      a. Provide telephone number and contact person.
      b. Provide product type and quantity used in project.

B. Product suppliers:
   1. Supply products of 1 manufacturer for each type of item required.

C. Installer/erector qualifications:
   1. Installation by manufacturer or authorized representative under manufacturer's direct supervision.
      a. Manufacturer or the authorized representatives Project Superintendent shall have minimum 3 years experience installing manufacturers products.
      b. Upon request, submit qualifications to Architect for review.
   2. Provide manufacturer's letter stating the authorized representative is qualified to install manufacturer's products.

D. On-Site Project Superintendent:
   1. For continuity of the project, the superintendent shall remain on site for the duration of the Project, including Punch and Closeout, and shall not be changed by the Detention Equipment Contractor without prior written consent of the Owner and Architect.

E. Pre-Approved Detention Equipment Contractors:

1. The following Detention Equipment Contractors are pre-approved to bid this section.
   a. Southern Folger Contracting Inc.; **New Castle, CA Michael Thornton (210 846-5573). No substitution.**

1.3 QUALITY ASSURANCE- MATERIALS AND METHODS

A. Numbers listed are base numbers. Reference latest edition for most current information.

B. Materials:
   1. Tool-Resisting Steel: ASTM-A627 Standard Test Methods for Tool-Resisting Steel Bars, Flats, and Shapes for Detention and Correctional Facilities
   2. Cold rolled mild steel bar: AISI C1018.
   3. Hot rolled mild steel bar: AISI C1010-C1020.
   4. Hot rolled low carbon steel sheet: ASTM-A1011/A1011M Standard Specification for Steel, Sheet and Strip, Hot Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
   5. Cold rolled low carbon steel sheet: ASTM-A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable .
   6. Galvanized/Galvannealed Steel: ASTM-A653/A653M Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process .
   7. Structural Steel: ASTM A36/A36M Standard Specification for Carbon Structural Steel.
   8. Steel surface preparation for prime coat: FS TT-C-490.
   9. Prime coat for steel surfaces: FS TT-P-664.
   10. ANSI/NAAMM Standard, HMMA 863 “Guide Specification for Detention Security Hollow Metal Doors and Frames”.
   11. ASTM F1450 “Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention Facilities”.
   12. ASTM F1577 “Standard Test Methods for Detention Locks for Swinging Doors”.
   13. ASTM F1592 “Standard Test Methods for Detention Hollow Metal Vision Systems”.
   14. ASTM F1643 “Standard Test Methods for Detention Sliding Door Locking Device Assemblies”.
   15. ASTM F1758 “Standard Test Methods for Detention Hinges used on Detention-Grade Swinging Doors”.
   16. ANSI A 250.10 ”Standard Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames”.
   17. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 240/A 240M or ASTM A 666, Austenitic stainless steel, type 304.
   18. As noted elsewhere in these specifications.

1.4 WARRANTY AND REPAIR/REPLACEMENT PARTS

A. Warrant all items provided for a minimum period of 2 years from Substantial Completion of project.

B. Repair/replacement parts must be available for all equipment within 48 hours**.**

C. Spares/Attic Stock - Provide three of each door closers, door position switch, raised and recessed door pulls, hinges, right hand and left hand electro-mechanical locks.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Acceptable manufacturers:
   1. As indicated for individual items.
   2. Where no manufacturers are indicated, manufacture to comply with all requirements of specification.
   3. Other manufacturers desiring approval comply with Section 00 26 00.

2.2 FABRICATION - GENERAL

A. Factory assemble items where practical, true to line and free of distortion or defects.

B. Welding:
   1. Comply with American Welding Society standards.
   2. Certify each welder as qualified by American Welding Society.
   3. Remove burrs and rough edges.
   4. Where welding is required but no spacing indicated, provide minimum 1/8 IN weld, 2 IN long, 12 IN on center.
   5. Provide welder's certifications when requested by Architect.

C. Fastening devices:
   1. Tamper resistant.
      a. Provide Torx head tamper-resistant fasteners at all devices in detention areas.
   2. Exposed screws, nuts, security type: ASTM-A307, Grade-A.
   3. Removable screws:
      a. Provide Torx head tamper-resistant fasteners, 5-lobe with center reject pin, unless indicated otherwise.
      b. Provide 6 tool kits of each size to the Owner for use after project completion.

D. Anchoring devices:
   1. Provide stud-type anchoring devices with two independent expansion wedges.
   2. Zinc-plate in accordance with ASTM-B633, SC1, Type III.
   3. Comply with Requirements of Federal Specification FF-S-325, Group II, Type 4, Class I for concrete expansion anchors.
   4. Provide anchors with minimum tension working load of 2000 LBS in 4000 PSI concrete.
   5. Acceptable manufacturers:
      a. Hilti Kwik-Bolt.
      b. Rawl.
      c. Dewalt.
      d. Tanner Bolt.

2.3 FACTORY PRIMING

A. Factory apply rust inhibiting primer on all detention equipment and Detention Security Hollow Metal, except finish hardware, aluminum, brass, bronze, stainless steel, enameled steel and plated steel.
   1. Comply with FS TT-C-490: Steel Surface Preparation for Prime Coat.

2. Comply with FS TT-P-664: Prime Coat for Steel Surfaces.
3. Comply with ANSI A 250.10: Standard Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

B. Minimum thickness 1.5 mils.

C. Coordinate primer with finish coating specified.
1. Verify compatibility.
2. Reference section 09 91 23 for finish coatings.

2.4 DETENTION SECURITY HOLLOW METAL DOORS AND FRAMES- GENERAL

A. Pre-Approved Detention Security Hollow Metal Door and Frame Manufacturers:
1. The following Detention Equipment Contractors are pre-approved to bid this section.
a. Southern Folger Contracting Inc.; Southern Folger Contracting Inc. New Castle, CA Michael Thornton (210 846-5573). No substitutions.

A. Quality Assurance:
1. Submit current testing reports certifying compliance with the following Standards and Test Methods
a. Testing must have been performed for the named company submitting the information within the last 10 years.
2. Comply with all test requirements of Guide Specification NAAMM/HMMA 863 and Test Method ASTM F1450
a. Door Static Load Test. (ASTM F1450)
b. Door Rack Test. (ASTM F1450)
c. Door Assembly Impact Load Test. (ASTM F1450)
d. Door Edge Crush Test (ASTM F1450)
e. Sidelight and Multi-Light Assembly Impact Test (ASTM F1592)
3. Comply with ANSI A 250.10 Standard Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
4. Grades as indicated:
a. Provide Grades as indicated on DOOR SCHEDULE. Where conflicts occur, provide most stringent grade.
5. Field door examination:
a. At direction of Architect, Contractor shall cut a randomly selected Detention Hollow Metal door or panel in half.
b. If examination reveals construction does not comply with details or specifications, manufacturer shall replace all doors shipped to project.
c. Construct replacement doors in conformance with details and specifications.
d. Door manufacturer will bear cost of destroyed door, related labor and replacement cost.
e. If examination reveals construction does comply with details and specifications, Owner will bear cost of replacement of cut door and related labor.
6. Field primer examination:
a. At direction of architect, Contractor shall provide independent testing of 3 doors and frames and verify compliance with ANSI A 250.10 Standard Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
b. Certify compliance by independent testing laboratory.
c. Submit reports

d. If examination reveals primer does not comply with tests, contractor shall strip and re-prime all doors and frames shipped to project
e. Extend warranty by 2 years

B. Materials:
1. Fabricate from commercial quality leveled face sheets.
2. Exterior, food preparation areas and shower doors and frames:
a. Galvanized steel, ASTM-A653, G60 coated or Galvannealed steel, ASTM-A653, A60 coated.
3. Interior doors and frames:
a. Cold rolled steel, ASTM-A1008/ A1008M or hot rolled, pickled and oiled steel, ASTM-A1011/ A1011M.

C. Fire rated door and frame assemblies.
1. Where indicated: Provide assemblies with UL labels.
a. Reference Door Schedule for rating information.
2. Where frame assembly is indicated to be fire-rated, but cannot for any reason, make it known to architect before fabrication.
3. Provide anchorage as necessary to comply with UL labeling requirements

2.5 DETENTION SECURITY HOLLOW METAL DOORS

A. Construction:
1. All doors shall be of the types and sizes indicated and constructed in accordance with these specifications and shall meet the performance requirements outlined herein.
2. Minimum Door thickness shall be 2 1/16” IN.
3. Provide full flush design.

B. Face Sheets
1. Metal Gauges for Face Sheets.
a. Provide minimum 0.093 IN (2.3MM) 12 GA for Grades 1 or 2
2. Door Face sheets shall be joined at their vertical edges by a continuous weld extending the full height of the door.
a. Factory grind and finish weld to completely conceal seam.

2.6 DETENTION SECURITY HOLLOW METAL FRAMES AND LITES

A. Construction:
1. All frames shall be of the types and sizes indicated and constructed in accordance with these specifications and shall meet the performance requirements outlined herein.

B. Materials:
1. Metal Gauges.
a. Provide minimum 0.093 IN (2.3MM) 12 GA for Grades 1 or 2

2.7 DETENTION DOOR HARDWARE-GENERAL REQUIREMENTS

A. Acceptable manufacturers:
1. As noted for individual items.
2. Product numbers listed are base. Provide all functions, standard or optional, to comply with specifications

B. Hardware finishes:
   1. Provide US26D finish unless noted otherwise.

C. Quality Assurance:
   1. Submit current test reports certifying compliance with ASTM Guidelines and Specifications for all hardware as indicated.
      Testing must have been performed for the named company submitting the information within the last 10 years.

2.8 JAMB MOUNTED FOLGER ADAM 120 SERIES ELECTRO-MECHANICAL (SOLENOID) DEADLATCH. CELL DOORS ARE KEYED ON ONE SIDE; ENTRANCE DOORS ARE KEYED BOTH SIDES.

2.9 HARDWARE FOR SWINGING DOORS

A. Reference DETENTION DOOR HARDWARE - GENERAL REQUIREMENTS for additional information.

B. Lock:
   1. Product numbers listed are base and may not include all options. Provide all indicated and specified herein.
   2. Provide indication/auxiliary switch to monitor the deadlock lever indicating a deadlocked latchbolt. The auxiliary switch monitors the roller bolt for extended or retracted position.
   3. Provide G90 galvanized bodies at all locks.
   4. Provide appropriate lock mounting for locks in hollow metal frames
   5. Provide appropriate stainless-steel strike for mounting in hollow metal detention doors.
   6. Provide key cylinder extension where required.

C. Molex connectors:
   1. Provide pre-wired Molex connectors at all electrical locks.

D. Lock voltages:
   1. Provide 120 VAC lock unless indicated otherwise.

E. Normal Operation:
   1. Lock unlocks when the solenoid is energized by a momentary contact switch. Once unlocked, the latchbolt is held mechanically retracted until the door is opened. It then extends automatically.

F. Manual Emergency Operation:
   1. By manually operated key at door.

G. Coordinate with Electrical Security Systems Contractor

H. Surface Mounted Lock
   1. Maxi -Mogul Keyed, one or both sides as indicated
   2. Quality Assurance:
      a. Comply with ASTM F1577, Grade 1 Impact
   3. Acceptable Manufacturers:
      a. Folger Adam 120E Series Deadlatch w/ CAVLOK Housing

I. 8 IN. Motorized Wide Jamb Mounted Lock
   1. Maxi-Mogul Cylinders and keys. Locks are keyed, one or both sides as indicated
   2. Quality Assurance:

a. Comply with ASTM F1577, Grade 1 Impact
3. Acceptable Manufacturers:
a. Southern Folger

2.10 MISCELLANEOUS HARDWARE FOR SWINGING DOORS

A. Institutional Grade Full Mortise Hinges:
1. Full mortise, stainless steel leaves, 4 1/2 x 4 1/2 x 3/16 IN thick.
2. UL Listed for rated door applications
3. Hospital tip with non-removable, stainless steel hinge pin
4. Ball Bearing Hinges with hardened tool steel ball races.
5. Provide 1/4-20 stainless steel, tamper resistant screws.
6. Provide minimum 3 hinges for doors up to 85 IN high or up to 37 IN wide.
7. Provide minimum 4 hinges for doors 85 IN high and higher and for doors 37 IN wide and wider.
8. Provide ½ IN diameter Security Studs on the back side of both leaves of all hinges.
9. Acceptable manufacturers:
a. Southern Folger 204FMSS or equal.
b. Certify compliance with ASTM-F1758, Grade 1.

B. Door Stop:
1. Provide wall mounted stop at all swing doors, except at doors with closers, and where conditions prevent wall mounting.
2. Provide floor stops where wall mounting is not possible.
3. Mount stops where door is held a minimum of 6 IN from wall when fully opened.
4. Install using two-part epoxy intended for fixing rebar and/or threaded rod into concrete or filled CMU substrates
a. Acceptable Product: Powers T308+ two-part epoxy
5. Acceptable Manufacturers
a. Wall Stops:
1) Stanley 3002
2) No known equal
b. Floor Stops:
1) Stanley 3001
2) Southern Folger 420 Detention Door/Floor Stop

C. Weatherproofing Package:
1. Provide at all exterior doors and where indicated.
2. ADA Compliant
3. Acceptable Manufacturers:
a. Rigid Jamb Weatherstripping
1) Reese DS70C.
2) Pemko 305CR.
3) Zero No.50A.
4) National Guard Products 127NA
b. Offset Threshold (confirm offset condition at door location).
1) Pemko 2727A
c. Rain drip
1) Reese R201A.
2) Pemko 346C.
3) Zero series 148.

4) National Guard Products 16AD.

d. Sill Sweep
   1) Reese R362C
   2) Pemko 211
   3) Zero 39A
   4) National Guard Products 200NA

D. Threshold:
   1. Provide where indicated on door schedule.
   2. ADA Compliant
   3. Acceptable manufacturers:
      a. Pemko 256 at Shower Room doors.

E. Smoke gaskets:
   1. Provide at all smoke/fire labeled doors:
   2. U.L. listed.
   3. Acceptable manufacturers:
      a. Pemko S88D.
      b. Reese F-897B.
      c. National Guard Products 5050B.

F. Concealed Door Closer with integral DPS:
   1. Provide closers on all smoke/fire labeled doors and as scheduled.
   2. Integral Door Position Switch, adjustable without removing the body closer.
   3. Full rack and pinion hydraulic closer with adjustable spring.
   4. Provide detention grade arm and track.
   5. U.L. listed for fire door applications.
   6. Size closer to width of door.
   7. Acceptable manufacturers:
      a. LCN 2210 DPS.
      b. No known equal

G. Closer (surface mounted):
   1. Provide closers on all smoke/fire labeled doors and as scheduled.
   2. Full rack and pinion hydraulic closer with adjustable spring.
   3. Provide detention grade arm and track.
   4. U.L. listed.
   5. Size closer to width of door.
   6. Acceptable manufacturers:
      a. LCN 4210
      b. No known equal

H. Door position switch (recessed magnetic).
   1. Provide at all swinging doors with electric locks and where scheduled or indicated.
   2. Magnetic reed switch, triple biased to prevent tampering
   3. Adjustable in the X and Y axis.
   4. Acceptable manufacturers.
      a. Southern Folger 220MRS.

I. Silencers:
   1. Provide at all doors.
   2. Locate and size holes in accord with UL 63.

3. Use plastic plugs to keep holes clear during construction.
4. Single frames: 3 on strike jamb stop.
5. Double frames: 2 on head stop.
6. Acceptable manufacturers:
   a. Quality 1337-A.
   b. Ives No.20.

J. Recessed Pulls:
1. Provide where scheduled or indicated on hinge side of door.
2. Surface Mounted.
3. 3/8 x 16 Tamper resistant machine screws
4. Provide US26D finish.
5. Acceptable Manufacturers
   a. Southern Folger 214S.

K. Raised Loop Pulls:
1. Provide where scheduled or indicated on hinge side of door.
2. Surface Mounted.
3. 3/8 x 16 Tamper resistant machine screws
4. Provide US26D finish.
5. Acceptable Manufacturers
   a. Southern Folger 212C.

L. Strikes/keepers:
1. Provide appropriate strikes/keepers at all swinging door locks.
2. Provide US26D or US32D finish.
3. Provide investment-cast stainless steel keepers attached with screws-in two directions.

2.11 HARDWARE SETS: ELECTRO-MECHANICAL REMOTELY CONTROLLED SWINGING DOORS- SURFACE MOUNTED JAMB LOCKS

A. Hardware Set numbers are fixed.
1. Missing numbers indicate not used.

   a. **DHW-1**
      1) (3) 4 ½” Institutional Grade Full Mortise Hinges 204FMSS or equal.
      2) Folger Adam 120E Series electro-mechanical dead latch w/ CAVLOK surface mount lock and strike housing and integral door pull. No substitutions.
      3) Keyed one side
      4) Recessed Flush Pull, inside
      5) CAVLOK w/ integral door pull
      6) Door Position Monitor 200MRS

   b. **DHW-2**
      1) (3) 4 ½” Institutional Grade Full Mortise Hinges 204FMSS or equal.
      2) Folger Adam 120E Series electro-mechanical dead latch w/ CAVLOK surface mount lock and strike housing and integral door pull. No substitutions.
      3) Keyed both sides

4) 212C Raised Pull, inside
5) Surface Mounted Door Closer LCN 4210
6) Door Position Monitor 200MRS

c. **DHW-2 EXT**
1) (3) 4 ½" Institutional Grade Full Mortise Hinges 204FMSS or equal.
2) Folger Adam 120E Series electro-mechanical deadlatch w/ CAVLOK surface mount lock and strike housing and integral door pull.
3) Keyed both sides
4) Surface Mounted Door Closer LCN 4210
5) Door Position Monitor 200MRS
6) Weatherstripping Package
7) Sill Sweep
8) Door Threshold

2.12 HARDWARE SETS: ELECTRO-MECHANICAL REMOTELY CONTROLLED SWINGING DOORS- 8 IN. WIDE JAMB LOCKS (300 SERIES)

a. **DHW-3**
1) Institutional Grade Full Mortise Hinges
2) Folger Adam 120E Series electro-mechanical dead latch.
3) 8 IN Motorized Wide Jamb Mounted Lock
4) Keyed both sides
5) Concealed Door Closer with integral DPS
6) Raised pull, inside
7) Raised pull, outside

2.13 KEYS AND KEYING – FOLGER ADAM MAXI-MOGUL KEY CYLINDERS AND KEYS FOR DETENTION AREAS.

A. Keys and keying for detention areas:
1. Establish separate master key system for security hardware.
2. Keying, master keying and grand master keying will be determined at joint meeting of Architect/Owner and Detention Equipment Contractor.
3. Following meeting, Detention Equipment Contractor will submit complete keying schedule for Architect/Owner review and approval.
4. Provide 3 master keys for each master key set.
5. Provide 6-day keys for each change key identified in Keying Schedule.
6. Detention Equipment Contractor will deliver keys for all security type locks directly to Owner at Substantial Completion.

2.14 HINGED DETENTION ACCESS DOORS/PANELS (FORMED STEEL PLATE)
1. Fabricate from 7-gauge formed steel frame and 10-gauge door.
2. Fabricate from 7-gauge formed galvanized or Galvannealed steel frame and 10-gauge door in exterior or shower applications.
3. Size: 24 IN x 48 IN unless indicated otherwise.
4. Doors hung on two full surface weld-on hinges.
5. Provide Folger Adam 10 series paracentric lever tumbler locks keyed to owners' specification.

6. Provide five new paracentric cut keys.
7. Prime painted.
8. Acceptable manufacturers:
   a. Southern Folger 590 (custom).
   b. Viking Products (custom)

DETENTION EQUIPMENT TRAINING

1. Detention Equipment Contractor to provide operation and maintenance training on the detention equipment installed. Training must take place while contractor is still on-site.

END OF SECTION

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. Mechanical sleeve seals.
5. Sleeves.
6. Escutcheons.
7. Grout.
8. Plumbing demolition.
9. Equipment installation requirements common to equipment sections.
10. Painting and finishing.
11. Concrete bases.
12. Supports and anchorages.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CPVC: Chlorinated polyvinyl chloride plastic.
3. PE: Polyethylene plastic.
4. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Transition fittings.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Escutcheons.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

I. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.4 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

1. Underground Piping NPS 1-1/2 (DN 40) and Smaller: Manufactured fitting or coupling.
2. Underground Piping NPS 2 (DN 50) and Larger: AWWA C219, metal sleeve-type coupling.
3. Aboveground Pressure Piping: Pipe fitting.

B. Plastic-to-Metal Transition Fittings: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

C. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

D. Flexible Transition Couplings for Underground Nonpressure Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

2.5 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig (1035- or 2070-kPa) minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

2.6 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel. Include two for each sealing element.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.7 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.

F. PVC Pipe: ASTM D 1785, Schedule 40.

G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.8 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated and rough brass.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated and rough brass.

2.9 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PLUMBING DEMOLITION

A. Refer to Division 1 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.

4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

    a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
    b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
    c. Insulated Piping: One-piece, stamped-steel type with spring clips.

d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
g. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
h. Bare Piping in Equipment Rooms: One-piece, cast-brass type.

M. Sleeves are not required for core-drilled holes.

N. Permanent sleeves are not required for holes formed by removable PE sleeves.

O. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
3. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

a. Steel Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating gypsum-board partitions.
c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Refer to Division 7 Section "Sheet Metal Flashing and Trim" for flashing.

1) Seal space outside of sleeve fittings with grout.

P. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section "Through-Penetration Firestop Systems" for materials.

R. Verify final equipment locations for roughing-in.

S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.

4. PVC Nonpressure Piping: Join according to ASTM D 2855.
5. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.6 PAINTING

A. Painting of plumbing systems, equipment, and components is specified in Division 9 Sections "Interior Painting" and "Exterior Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.7 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section.

3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 Section for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.9 GROUTING

A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 220500

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated and rough-brass finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

C. Split-Casting Brass Type: With polished, chrome-plated nd rough-brass finish and with concealed hinge and setscrew.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
g. Bare Piping in Equipment Rooms: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: One-piece, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 220518

SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Bronze angle valves.
2. Brass ball valves.
3. Bronze ball valves.
4. Iron ball valves.
5. Iron, single-flange butterfly valves.
6. Iron, grooved-end butterfly valves.
7. Bronze lift check valves.
8. Bronze swing check valves.
9. Iron swing check valves.
10. Iron swing check valves with closure control.
11. Iron, grooved-end swing check valves.
12. Iron, center-guided check valves.
13. Iron, plate-type check valves.
14. Bronze gate valves.
15. Iron gate valves.
16. Bronze globe valves.
17. Iron globe valves.
18. Lubricated plug valves.
19. Chainwheels.

B. Related Sections:

1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
2. Division 22 for valve tags and schedules.
3. Division 22 water distribution piping Sections for general-duty and specialty valves for site construction piping.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.4 SUBMITTALS

A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:

1. Handwheel: For valves other than quarter-turn types.
2. Handlever: For quarter-turn valves NPS 6 (DN 150) and smaller.

E. Valves in Insulated Piping: With 2-inch (50-mm) stem extensions and the following features:

1. Gate Valves: With rising stem.
2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: With extended neck.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1.
2. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE ANGLE VALVES

A. Class 125, Bronze Angle Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Hammond Valve.
b. Milwaukee Valve Company.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.

d. Ends: Threaded.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.

B. Class 125, Bronze Angle Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Valve, Inc.
b. NIBCO INC.

2. Description:

a. Standard: MSS SP-80, Type 2.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded.
e. Stem: Bronze.
f. Disc: PTFE or TFE.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.

C. Class 150, Bronze Angle Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Crane Co.; Crane Valve Group; Stockham Division.
b. Kitz Corporation.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 300 psig (2070 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
d. Ends: Threaded.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.

D. Class 150, Bronze Angle Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. NIBCO INC.

2. Description:

a. Standard: MSS SP-80, Type 2.
b. CWP Rating: 300 psig (2070 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
d. Ends: Threaded.
e. Stem: Bronze.
f. Disc: PTFE or TFE.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.

2.3 BRASS BALL VALVES

A. Three-Piece, Full-Port, Brass Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Jomar International, LTD.
b. Kitz Corporation.
c. Marwin Valve; a division of Richards Industries.
d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig (1035 kPa).
c. CWP Rating: 600 psig (4140 kPa).
d. Body Design: Three piece.
e. Body Material: Forged brass.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Stainless steel.
i. Ball: Stainless steel, vented.
j. Port: Full.

2.4 BRONZE BALL VALVES

A. Three-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Conbraco Industries, Inc.; Apollo Valves.
    b. Hammond Valve.
    c. Milwaukee Valve Company.
    d. NIBCO INC.

2. Description:

    a. Standard: MSS SP-110.
    b. SWP Rating: 150 psig (1035 kPa).
    c. CWP Rating: 600 psig (4140 kPa).
    d. Body Design: Three piece.
    e. Body Material: Bronze.
    f. Ends: Threaded.
    g. Seats: PTFE or TFE.
    h. Stem: Stainless steel.
    i. Ball: Stainless steel, vented.
    j. Port: Full.

2.5 BRONZE, SINGLE-FLANGE BUTTERFLY VALVES

A. 200 CWP, Bronze, Single-Flange Butterfly Valves with EPDM Seat and Stainless-Steel Disc:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Crane Co.; Crane Valve Group; Jenkins Valves.
    b. Crane Co.; Crane Valve Group; Stockham Division.
    c. NIBCO INC.
    d. Red-White Valve Corporation.

2. Description:

    a. Standard: MSS SP-67, Type I.
    b. CWP Rating: 200 psig (1380 kPa).
    c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
    d. Body Material: Bronze.
    e. Seat: EPDM.
    f. Stem: One- or two-piece stainless steel.
    g. Disc: Stainless Steel.

2.6 BRONZE, GROOVED-END BUTTERFLY VALVES

A. 175 CWP, Iron, Grooved-End Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Kennedy Valve; a division of McWane, Inc.
   b. Globesprinkler.
   c. Victaulic Company.

2. Description:

   a. Standard: MSS SP-67, Type I.
   b. CWP Rating: 175 psig (1200 kPa).
   c. Body Material: Bronze.
   d. Stem: Two-piece stainless steel.
   e. Disc: Coated, Bronze.
   f. Seal: EPDM.

2.7 BRONZE LIFT CHECK VALVES

A. Class 125, Lift Check Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Jenkins Valves.
   c. Crane Co.; Crane Valve Group; Stockham Division.

2. Description:

   a. Standard: MSS SP-80, Type 1.
   b. CWP Rating: 200 psig (1380 kPa).
   c. Body Design: Vertical flow.
   d. Body Material: ASTM B 61 or ASTM B 62, bronze.
   e. Ends: Threaded.
   f. Disc: Bronze.

2.8 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. American Valve, Inc.
    b. Crane Co.; Crane Valve Group; Crane Valves.
    c. Crane Co.; Crane Valve Group; Jenkins Valves.
    d. Crane Co.; Crane Valve Group; Stockham Division.
    e. NIBCO INC.
    f. Red-White Valve Corporation.

2. Description:

    a. Standard: MSS SP-80, Type 3.
    b. CWP Rating: 200 psig (1380 kPa).
    c. Body Design: Horizontal flow.
    d. Body Material: ASTM B 62, bronze.
    e. Ends: Threaded.
    f. Disc: Bronze.

2.9 BRONZE SWING CHECK VALVES WITH CLOSURE CONTROL

A. Class 125, Iron Swing Check Valves with Lever- and Spring-Closure Control:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. NIBCO INC.

2. Description:

    a. Standard: MSS SP-71, Type I.
    b. CWP Rating: 200 psig (1380 kPa).
    c. Body Design: Clear or full waterway.
    d. Body Material: BRONZE.
    e. Ends: Flanged.
    f. Trim: Bronze.
    g. Gasket: Asbestos free.
    h. Closure Control: Factory-installed, exterior lever and spring.

2.10 BRONZE GATE VALVES

A. Class 125, NRS Bronze Gate Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Valve, Inc.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Crane Co.; Crane Valve Group; Jenkins Valves.
d. Crane Co.; Crane Valve Group; Stockham Division.
e. NIBCO INC.
f. Red-White Valve Corporation.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.

2.11 BRONZE GLOBE VALVES

A. Class 125, Bronze Globe Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Stockham Division.
c. NIBCO INC.
d. Red-White Valve Corporation.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.
2. Lift Check Valves: With stem upright and plumb.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly, or gate valves.
2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
3. Throttling Service: Globe or angle valves.

4. Pump-Discharge Check Valves:

   a. NPS 2 (DN 50) and Smaller: Bronze swing check valves with bronze or nonmetallic disc.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Grooved-End Copper Tubing: Valve ends may be grooved.

3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
2. Bronze Angle Valves: Class 125, bronze or nonmetallic disc.
3. Ball Valves: Three piece, full port, brass or bronze with stainless-steel trim.
4. Bronze Swing Check Valves: Class 125 Class 150, bronze or nonmetallic disc.
5. Bronze Gate Valves: Class 125.
6. Bronze Globe Valves: Class 125, bronze or nonmetallic disc.

B. Pipe NPS 2-1/2 (DN 65) and Larger:

1. Bronze Ball Valves: Class 150.
2. Bronze, Single-Flange Butterfly Valves: 200 CWP, EPDM seat, stainless-steel disc.
3. Bronze, Grooved-End Butterfly Valves: 175 CWP.
4. Bronze Swing Check Valves: Class 125 nonmetallic-to-metal seats.
5. Bronze Swing Check Valves with Closure Control: Class 125, lever and spring.
6. Bronze, Grooved-End Swing Check Valves: 300 CWP.
7. Bronze, Plate-Type Check Valves: Class 125; single plate; resilient seat.
8. Bronze Gate Valves: Class 125.
9. Bronze Globe Valves: Class 125.

END OF SECTION 220523

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SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe positioning systems.
7. Equipment supports.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Division 21 fire-suppression piping Sections for pipe hangers for fire-suppression piping.
3. Division 22 pipe guides and anchors.
4. Division 22 for Plumbing Piping and Equipment for vibration isolation devices.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Pipe stands.
4. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

D. Welding certificates.

1.6 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.

5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.
c. Flex-Strut Inc.
d. GS Metals Corp.
e. Thomas & Betts Corporation.
f. Unistrut Corporation; Tyco International, Ltd.
g. Wesanco, Inc.

2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
3. Standard: MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.
7. Metallic Coating: Hot-dipped galvanized.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Carpenter & Paterson, Inc.
2. Clement Support Services.
3. ERICO International Corporation.

4. National Pipe Hanger Corporation.
5. PHS Industries, Inc.
6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig (688-kPa) or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig (688-kPa) ASTM C 552, Type II cellular glass with 100-psig (688-kPa) or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.7 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.8 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. See Division 22 plumbing fixture Sections for requirements for pipe positioning systems for plumbing fixtures.

G. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

N. Insulated Piping:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
    b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.

c. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.

5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm) .

3.5 PAINTING

A. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

F. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F (566 deg C), pipes NPS 4 to NPS 24 (DN 100 to DN 600), requiring up to 4 inches (100 mm) of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 (DN 15 to DN 600) if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8 (DN 20 to DN 200).
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8 (DN 10 to DN 200).

11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3 (DN 10 to DN 80).
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 (DN 65 to DN 900) if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30 (DN 25 to DN 750), from two rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24 (DN 65 to DN 600), from single rod if horizontal movement caused by expansion and contraction might occur.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 (DN 50 to DN 1050) if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 (DN 50 to DN 600) if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 (DN 50 to DN 750) if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.

5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb (340 kg).
    b. Medium (MSS Type 32): 1500 lb (680 kg).
    c. Heavy (MSS Type 33): 3000 lb (1360 kg).

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.

2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

Q. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

R. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

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SECTION 220548 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Restraining braces and cables.

1.3 DEFINITIONS

A. IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:

   1. Site Class as Defined in the IBC D.
   2. Assigned Seismic Use Group or Building Category as Defined in the IBC: III.

      a. Component Importance Factor: 1.25.
      b. Component Response Modification Factor: 5.0.
      c. Component Amplification Factor: 2.5.

   3. Design Spectral Response Acceleration at Short Periods (0.2 Second): 1.23g.
   4. Design Spectral Response Acceleration at 1-Second Period: .493g.

1.5 SUBMITTALS

A. Product Data: For the following:

   1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
   2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.

a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
b. Annotate to indicate application of each product submitted and compliance with requirements.

B. Delegated-Design Submittal: For seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Seismic-Restraint Details:

a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

C. Coordination Drawings: Show coordination of seismic bracing for plumbing piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.

D. Welding certificates.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For air-mounting systems to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproved by ICC-ES, or preapproved by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing

are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 SEISMIC-RESTRAINT DEVICES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amber/Booth Company, Inc.
2. California Dynamics Corporation.
3. Cooper B-Line, Inc.; a division of Cooper Industries.
4. Hilti, Inc.
5. Kinetics Noise Control.
6. Loos & Co.; Cableware Division.
7. Mason Industries.
8. TOLCO Incorporated; a brand of NIBCO INC.
9. Unistrut; Tyco International, Ltd.

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

D. Restraint Cables: ASTM A 603 galvanized or ASTM A 492 stainless-steel cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.

E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or Reinforcing steel angle clamped to hanger rod.

F. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

G. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.

H. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with

strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

I. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.2 FACTORY FINISHES

A. Finish: Manufacturer's standard prime-coat finish ready for field painting.

B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
1. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.

B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment Restraints:

1. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.

B. Piping Restraints:

1. Comply with requirements in MSS SP-127.
2. Space lateral supports a maximum of 40 feet (12 m) o.c., and longitudinal supports a maximum of 80 feet (24 m) o.c.
3. Brace a change of direction longer than 12 feet (3.7 m).

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

E. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Division 22 Section "Domestic Water Piping" for piping flexible connections.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through County Representative, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain County Representative's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

END OF SECTION 220548

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Stencils.
5. Valve tags.
6. Warning tags.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Stainless steel, 0.025-inch (0.64-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
3. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, and having predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
6. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, and having predrilled holes for attachment hardware.

B. Letter Color: White.

C. Background Color: Red.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

F. Minimum Letter Size: 1/4 inch (6.4 mm) if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches (38 mm) high.

2.4 STENCILS

A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; and minimum letter height of 3/4 inch (19 mm) for access panel and door labels, equipment labels, and similar operational instructions.

1. Stencil Paint: Exterior, gloss, acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
2. Identification Paint: Exterior, acrylic enamel] in colors according to ASME A13.1 unless otherwise indicated.

2.5 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

1. Tag Material: Stainless steel, 0.025-inch (0.64-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link or beaded chain; or S-hook

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches (75 by 133 mm) minimum.
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

C. Use metal labels on outdoor equipment and plastic or metal labels on indoor equipment.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Interior Painting."

B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels with painted, color-coded bands or rectangles , complying with ASME A13.1, on each piping system.

1. Identification Paint: Use for contrasting background.
2. Stencil Paint: Use for pipe marking.

C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet (15 m)] along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Pipe Label Color Schedule:

1. complying with ASME A13.1

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

1-1/2 inches (38 mm), round.

2. Valve-Tag Color:

a. complying with ASME A13.1.

3.5 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 220553

SECTION 220599 – WATER MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Complete Water Management system including but not limited to

1. Solenoid Water Valves.
2. Solenoid Flush Valves.
3. Electronic Valve Controllers.
4. Interface cables.
5. Stainless Steel Piezo Pushbuttons
6. Computer servers
7. CPT Palmtop Computer
8. Touch-Screen Monitor
9. Software
10. Power Transformers

1.3 PERFORMANCE REQUIREMENTS

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A. Water management system is able to monitor and precisely control up to 3,072 solenoid valves.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
3. Wiring Diagrams: For power, signal, and control wiring.

B. Operation and Maintenance Data: For water management system and components to include in emergency, operation, and maintenance manuals.

C. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, 2008 Edition by a qualified testing agency, and marked for intended application.

1.6 COORDINATION

A. Coordinate sizes and locations of solenoid operated valves flush valves with actual security plumbing fixtures provided.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of water softeners that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
    1. Faulty operation of controls.
    2. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period: 2 years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of water management system Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, programming changes as required for proper water management system operation. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.

B. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.9 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Solenoid Valves: 10% of quantity installed.

2. Solenoid Flush Valves: 10% of quantity installed

3. Replacement diaphragms / rebuild kits: 3 for each type of valve installed.

4. Piezo Pushbuttons: 10% of quantity installed, minimum of 3.

5. Transformer: 10% of quantity installed, minimum of 3.

6. Electronic Valve Controllers: 1 of each type installed.

7. Electronic Adapters, cables, wiring devices, interfaces: 3 of each type installed.

PART 2 - PRODUCTS

2.1 WATER MANAGEMENT SYSTEM

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Acorn Engineering Company.

2. I-CON Systems

3. Willoughby Industries, Inc.

B. Description: Complete water management system as provided by a single source manufacturer regularly engaged in the design, integration and supply of similar systems for use in detention occupancy facilities.

1. System shall include electronic valve controllers that are microprocessor driven and powered by 24VAC 50 VA Class 2 UL/CSA listed transformer. Programmed setting shall be retained in the controller regardless of power or communication loss.

2. Electronic valve controller is able to simultaneously direct multiple solenoid valves and flush valves.

3. Desktop Servers shall be interfaced with the electronic valve controllers capable of monitoring and controlling solenoid valves for a total of 3,072 valves per system

4. Wiring and connectors from desktop servers to electronic valve controllers shall be in dedicated raceways per division 26 sections. Station cables for connecting electronic valve controllers to valve assemblies shall be provide and installed exposed within plumbing chases. All connectors to be quick release plug type. All components must be installed per California Electrical Code (CEC) and state codes.

5. Controls: For fully automatic operation.

6. Slow closing anti water-hammer solenoid operated valves and electronic flush valves shall be operated by means of vandal resistant stainless steel piezo pushbuttons.

2.2 SOFTWARE AND FEATURES

A. Provide standard software application with all appropriate licensing for each programmable device, server, work station, palmtop and display. Provide appropriate passwords for access to all levels of security afforded by all installed applications.

B. Custom programming for all facility specific functions shall be completed and submitted prior to implementation of the system, Programming shall include graphic representations of the facility including all controlled devices and implementation of all feature and functions as selected by the County and conveyed to the contractor by the County's Representative.

C. Available systems features shall include at a minimum:
   1. Adjustable valve runtimes (Factory or Field Adjustable)
   2. Adjustable valve lockout Times (Factory or Field Adjustable)
   3. Ability to enable/disable single or multiple valves (Factory or Field Adjustable)
   4. Multiple valve options to tailor the function of the valve to the type of fixture it services (Factory or Field Adjustable)
   5. Remote operation allows user to activate a valve with the click of a button (Factory or Field Adjustable)
   6. Password protected (Factory or Field Adjustable)

D. Programmable features that shall be available and may be included as requested by the County include :
   1. User interface with a "Windows Explorer" view of the facility
   2. Ability to make global changes by valve groups or valve types
   3. Ability to assign multiple level user passwords that can limit access to functions or areas of the facility
   4. Ability to customize 24 hour limitations on water usage or activations. This allows the facility to set a time limit on how long a valve can operate or how many activations are allowed in a 24 hour period. At the end of each 24 hour period, limits are reset. The user can also set up to three timed windows of access which allows access to the valves only during specified times of the day
   5. Variable lockout which allows the facility to set a specified number of activations a valve can perform within a specified period of time before it imposes a specified lockout time
   6. Ability to assign valves to queued activation or random activation to prevent simultaneous activations
   7. Ability to set the valve to "Auto Cycle" which will automatically cycle a valve after a specified period of nonuse
   8. Ability to cycle a valve from the computer using its programmed parameters
   9. Password tracking abilities has been added to allow the user to view when changes have been made, what functions have been performed, and by whom
   10. Ability to track and chart the amount of water usage and activations over specified periods of time
   11. Security that prevents unauthorized access to the system even if the intruder has illegally acquired a copy of the client software

2.3 PIEZO PUSHBUTTONS

A. Stainless Steel Piezo Pushbuttons shall be provided for all manual valve control functions for the specified fixtures.
   1. Piezo Pushbuttons shall be touch activated, fixture mounted and include no moving parts. The piezo pushbutton housing is completely insulated from the fixture and once actuated, the piezoelectric element in the switch provides an electronic signal through the branch box to the controller.

2.4 SOLENOID WATER VALVES

A. Brass Valve body & checkstop assembly, provides the lead free requirements of NSF61, Section 9, 1997; and CHSC 116875

2.5 PALMTOP COMPUTER

A. One CPT Palm Top Computer shall be provided to access and program controllers individually.

2.6 COMPUTER SERVERS

A. Computer servers shall able to program, monitor and display valve data from each individual controller. Valve data from can be displayed simultaneously, allowing a quick overview and programming of solenoid valves. Servers may be connected to an existing LAN (Local Area Network) and accessed by other computer clients on the same LAN using the provided client software

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation compliant to the manufacturer’s installation instructions complete with all communication and power wiring shall be provided.

3.2 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.3 ELECTRICAL POWER

A. Provide electrical 120 volt A.C. power for the valve controllers, transformers, etc. per division 26 specification sections and in full conformance to the California Electrical Code and any local regulations. Power source shall be the branch circuits providing power to the duplex convenience receptacles located within the plumbing chases. Connection of the water

management system electrical components shall not utilize the duplex convenience receptacles but shall provide hard wired connections or dedicated receptacles as required. Submit electrical connection and wiring diagram shop drawings per article SUBMITTALS.

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections:
   1. Operational Test: After electrical circuitry has been energized, start system to confirm proper unit operation.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

   1. Complete installation and startup checks according to manufacturer's written instructions.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train owner's operations and maintenance personnel to adjust, operate, and maintain.

END OF SECTION 220599

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Domestic recirculating hot-water piping.
4. Roof drains and rainwater leaders.
5. Supplies and drains for handicap-accessible lavatories and sinks.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at pipe expansion joints for each type of insulation.
3. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
4. Detail removable insulation at piping specialties, equipment connections, and access panels.
5. Detail application of field-applied jackets.
6. Detail application at linkages of control devices.

C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Preformed Pipe Insulation Materials: 12 inches (300 mm) long by NPS 2 (DN 50).
2. Jacket Materials for Pipe: 12 inches (300 mm) long by NPS 2 (DN 50).
3. Sheet Jacket Materials: 12 inches (300 mm) square.
4. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

D. Qualification Data: For qualified Installer.

E. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

F. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, 2007 Edition by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Mockups: Before installing insulation, build mockups for each type of insulation and finish listed below to demonstrate quality of insulation application and finishes. Build mockups in the location indicated or, if not indicated, as directed by County Representative. Use materials indicated for the completed Work.

1. Piping Mockups:

   a. One 10-foot (3-m) section of NPS 2 (DN 50) straight pipe.
   b. One each of a 90-degree threaded and flanged elbow.
   c. One each of a threaded and flanged tee fitting.
   d. One NPS 2 (DN 50) or smaller valve, and one NPS 2-1/2 (DN 65) or larger valve.
   e. Four support hangers including hanger shield and insert.
   f. One threaded strainer and one flanged strainer with removable portion of insulation.
   g. One threaded reducer.
   h. One pressure temperature tap.
   i. One mechanical coupling.

2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
3. Notify County Representative seven days in advance of dates and times when mockups will be constructed.
4. Obtain County Representative's approval of mockups before starting insulation application.

5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless County Representative specifically approves such deviations in writing.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed.

D. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Pittsburgh Corning Corporation; Foamglas.

2. Block Insulation: ASTM C 552, Type I.
3. Special-Shaped Insulation: ASTM C 552, Type III.
4. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
5. Preformed Pipe Insulation with Factory-Applied ASJ-SSL: Comply with ASTM C 552, Type II, Class 2.
6. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

G. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Aeroflex USA, Inc.; Aerocel.
    b. Armacell LLC; AP Armaflex.
    c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.

H. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. CertainTeed Corp.; SoftTouch Duct Wrap.
    b. Johns Manville; Microlite.
    c. Knauf Insulation; Friendly Feel Duct Wrap.
    d. Manson Insulation Inc.; Alley Wrap.
    e. Owens Corning; SOFTR All-Service Duct Wrap.

I. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Fibrex Insulations Inc.; Coreplus 1200.
    b. Johns Manville; Micro-Lok.
    c. Knauf Insulation; 1000-Degree Pipe Insulation.
    d. Manson Insulation Inc.; Alley-K.
    e. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 Deg F (454 Deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

J. Phenolic:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Kingspan Tarec Industrial Insulation NV; Koolphen K.
    b. Resolco International BV; Insul-phen.

2. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.
3. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.
4. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
5. Factory-Applied Jacket: ASJ. Requirements are specified in "Factory-Applied Jackets" Article.

K. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Armacell LLC; Tubolit.
    b. Nomaco Insulation; IMCOLOCK and NOMALOCK.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Ramco Insulation, Inc.; Super-Stik.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Ramco Insulation, Inc.; Thermokote V.

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Ramco Insulation, Inc.; Ramcote 1200 and Quik-Cote.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F (minus 73 to plus 93 deg C).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-84.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Use adhesive that complies 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," including 2004 Addenda.

C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Aeroflex USA, Inc.; Aeroseal.
    b. Armacell LLC; Armaflex 520 Adhesive.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
    d. K-Flex USA; R-373 Contact Adhesive.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Use adhesive that complies 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," including 2004 Addenda.

D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
   b. Eagle Bridges - Marathon Industries; 225.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
   d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Use adhesive that complies 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," including 2004 Addenda.

E. Phenolic Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F (minus 59 to plus 149 deg C).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-96.
   b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-33.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Use adhesive that complies 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," including 2004 Addenda.

F. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
   b. Eagle Bridges - Marathon Industries; 225.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-20.

d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Use adhesive that complies 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," including 2004 Addenda.

G. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 739, Dow Silicone.
b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
c. P.I.C. Plastics, Inc.; Welding Adhesive.
d. Speedline Corporation; Polyco VP Adhesive.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Use adhesive that complies 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," including 2004 Addenda.

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, 2005 Edition. Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-30.
    b. Eagle Bridges - Marathon Industries; 501.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-35.
    d. Mon-Eco Industries, Inc.; 55-10.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm (0.03 metric perm) at 35-mil (0.9-mm) dry film thickness.
3. Service Temperature Range: 0 to 180 deg F (Minus 18 to plus 82 deg C).
4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
5. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
    b. Eagle Bridges - Marathon Industries; 570.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm (0.033 metric perm) at 30-mil (0.8-mm) dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F (Minus 46 to plus 104 deg C).
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Products: Subject to compliance with requirements,available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
    b. Eagle Bridges - Marathon Industries; 550.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
    d. Mon-Eco Industries, Inc.; 55-50.
    e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms (1.2 metric perms) at 0.0625-inch (1.6-mm) dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
    b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
    c. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
4. Service Temperature Range: 0 to plus 180 deg F (Minus 18 to plus 82 deg C).
5. Color: White.

2.6 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass and Phenolic Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    b. Eagle Bridges - Marathon Industries; 405.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.
    d. Mon-Eco Industries, Inc.; 44-05.
    e. Pittsburgh Corning Corporation; Pittseal 444.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).
5. Color: White or gray.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Use sealants that 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," including 2004 Addenda.

B. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements,available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    b. Eagle Bridges - Marathon Industries; 405.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
    d. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
5. Color: Aluminum.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Use sealants that 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," including 2004 Addenda.

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
5. Color: White.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Use sealants that 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," including 2004 Addenda.

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. (68 g/sq. m) with a thread count of 10 strands by 10 strands/sq. in. (4 strands by 4 strands/sq. mm) for covering pipe and pipe fittings.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Chil-Glas Number 10.

B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. (34 g/sq. m) with a thread count of 10 strands by 10 strands/sq. in. (4 strands by 4 strands/sq. mm), in a Leno weave, for pipe.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Mast-A-Fab.
b. Vimasco Corporation; Elastafab 894.

2.9 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd. (271 g/sq. m).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Alpha Associates, Inc.; Alpha-Maritex 84215 and 84217/9485RW, Luben 59.

2.10 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Johns Manville; Zeston.
b. P.I.C. Plastics, Inc.; FG Series.
c. Proto Corporation; LoSmoke.
d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: Color-code jackets based on system. Color as selected by County Representative.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

    a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

C. Metal Jacket:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.
    b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
    c. RPR Products, Inc.; Insul-Mate.

2. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005, Temper H-14.

    a. Factory cut and rolled to size.
    b. Finish and thickness are indicated in field-applied jacket schedules.
    c. Moisture Barrier for Indoor Applications: 3-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.
    d. Factory-Fabricated Fitting Covers:

        1) Same material, finish, and thickness as jacket.
        2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
        3) Tee covers.
        4) Flange and union covers.
        5) End caps.
        6) Beveled collars.
        7) Valve covers.
        8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

3. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.

    a. Factory cut and rolled to size.
    b. Material, finish, and thickness are indicated in field-applied jacket schedules.
    c. Moisture Barrier for Indoor Applications: 3-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.
    d. Factory-Fabricated Fitting Covers:

        1) Same material, finish, and thickness as jacket.
        2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
        3) Tee covers.
        4) Flange and union covers.

5) End caps.
6) Beveled collars.
7) Valve covers.
8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.11 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ABI, Ideal Tape Division; 428 AWF ASJ.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
c. Compac Corporation; 104 and 105.
d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches (75 mm).
3. Thickness: 11.5 mils (0.29 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ABI, Ideal Tape Division; 491 AWF FSK.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
c. Compac Corporation; 110 and 111.
d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches (75 mm).
3. Thickness: 6.5 mils (0.16 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ABI, Ideal Tape Division; 370 White PVC tape.
b. Compac Corporation; 130.
c. Venture Tape; 1506 CW NS.

2. Width: 2 inches (50 mm).
3. Thickness: 6 mils (0.15 mm).
4. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ABI, Ideal Tape Division; 488 AWF.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
c. Compac Corporation; 120.
d. Venture Tape; 3520 CW.

2. Width: 2 inches (50 mm).
3. Thickness: 3.7 mils (0.093 mm).
4. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

2.12 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ITW Insulation Systems; Gerrard Strapping and Seals.
b. RPR Products, Inc.; Insul-Mate Strapping and Seals.

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch (0.38 mm) thick, 1/2 inch (13 mm) 3/4 inch (19 mm) wide with wing seal or closed seal.
3. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 1/2 inch (13 mm) 3/4 inch (19 mm) wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.

C. Wire: 0.080-inch (2.0-mm) nickel-copper alloy 0.062-inch (1.6-mm) soft-annealed, stainless steel 0.062-inch (1.6-mm) soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. C & F Wire.

2.13 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Engineered Brass Company.
    b. Insul-Tect Products Co.; a subsidiary of MVG Molded Products.
    c. McGuire Manufacturing.
    d. Plumberex.
    e. Truebro; a brand of IPS Corporation.
    f. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.

2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Truebro; a brand of IPS Corporation.
    b. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.

2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at [2 inches (50 mm)] [4 inches (100 mm)] o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe

insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.9 INSTALLATION OF PHENOLIC INSULATION

A. General Installation Requirements:

1. Secure single-layer insulation with stainless-steel bands at 12-inch (300-mm) intervals and tighten bands without deforming insulation materials.
2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches (75 mm). Secure inner layer with 0.062-inch (1.6-mm) wire spaced at 12-inch (300-mm) intervals. Secure outer layer with stainless-steel bands at 12-inch (300-mm) intervals.

B. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets with vapor retarders on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

C. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.

D. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

E. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.10 INSTALLATION OF POLYOLEFIN INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of polyolefin pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install cut sections of polyolefin pipe and sheet insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.11 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

3.12 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by County Representative. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.13 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by County Representative, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.14 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.15 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. NPS 1 (DN 25) and Smaller: Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches (38 mm) thick.
b. Flexible Elastomeric: 1 inch (25 mm) thick.
c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
d. Phenolic: 1 inch (25 mm) thick.
e. Polyolefin: 1 inch (25 mm) thick.

2. NPS 1-1/4 (DN 32) and Larger: Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches (38 mm) thick.
b. Flexible Elastomeric: 1 inch (25 mm) thick.
c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.

d. Phenolic: 1 inch (25 mm) thick.
e. Polyolefin: 1 inch (25 mm) thick.

B. Domestic Hot and Recirculated Hot Water:

1. NPS 1-1/4 (DN 32) and Smaller: Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches (38 mm) thick.
b. Flexible Elastomeric: 1 inch (25 mm) thick.
c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
d. Phenolic: 1 inch (25 mm) thick.
e. Polyolefin: 1 inch (25 mm) thick.

2. NPS 1-1/2 (DN 40) and Larger: Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches (38 mm) thick.
b. Flexible Elastomeric: 1 inch (25 mm) thick.
c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
d. Phenolic: 1 inch (25 mm) thick.
e. Polyolefin: 1 inch (25 mm) thick.

C. Stormwater and Overflow:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches (38 mm) thick.
b. Flexible Elastomeric: 1 inch (25 mm) thick.
c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
d. Phenolic: 1 inch (25 mm) thick.
e. Polyolefin: 1 inch (25 mm) thick.

D. Roof Drain and Overflow Drain Bodies:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches (38 mm) thick.
b. Flexible Elastomeric: 1 inch (25 mm) thick.
c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
d. Phenolic: 1 inch (25 mm) thick.
e. Polyolefin: 1 inch (25 mm) thick.

E. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Flexible Elastomeric 1 inch (25 mm) thick.
b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
c. Polyolefin: 1 inch (25 mm) thick.

F. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet (3 m) of Drain Receiving Condensate and Equipment Drain Water:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches (38 mm) thick.
b. Flexible Elastomeric: 1 inch (25 mm) thick.
c. Mineral-Fiber, Preformed Pipe Insulation, Type I1 inch (25 mm) thick.
d. Phenolic: 1 inch (25 mm) thick.
e. Polyolefin: 1 inch (25 mm) thick.

3.16 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:
1. PVC: 30 mils (0.8 mm) thick.
2. Aluminum, Smooth: 0.024 inch (0.61 mm) thick.
3. Stainless Steel, Type 304, Smooth 2B Finish: 0.020 inch (0.51 mm) thick.

END OF SECTION 220719

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
2. Encasement for piping.
3. Specialty valves.
4. Flexible connectors.

B. Related Section:

1. Division 22 Section "Facility Water Distribution Piping" for water-service piping outside the building..

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to ASCE/SEI 7.

1.4 SUBMITTALS

A. Product Data: For the following products:

1. Specialty valves.
2. Dielectric fittings.
3. Flexible connectors.
4. Backflow preventers.

B. Water Samples: Specified in "Cleaning" Article.

C. Coordination Drawings: For piping in equipment rooms and other congested areas, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Fire-suppression-water piping.
2. Domestic water piping.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.

C. Comply with NSF 61 for potable domestic water piping and components.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of water service.
2. Do not proceed with interruption of water service without Construction Manager's written permission.

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) water tube, drawn temper.

1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
3. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
4. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
5. Copper Pressure-Seal-Joint Fittings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Elkhart Products Corporation; Industrial Division.
2) NIBCO INC.
3) Viega; Plumbing and Heating Systems.

b. NPS 2 (DN 50) and Smaller: Wrought-copper fitting with EPDM-rubber O-ring seal in each end.
c. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Cast-bronze or wrought-copper fitting with EPDM-rubber O-ring seal in each end.

6. Grooved-Joint Copper-Tube Appurtenances:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Anvil International.
2) Shurjoint Piping Products.
3) Victaulic Company.

b. Copper Grooved-End Fittings: ASTM B 75 (ASTM B 75M) copper tube or ASTM B 584 bronze castings.
c. Grooved-End-Tube Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, EPDM-rubber gaskets suitable for hot and cold water, and bolts and nuts.

B. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) water tube, annealed temper.

1. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
2. Copper Pressure-Seal-Joint Fittings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Elkhart Products Corporation; Industrial Division.
2) NIBCO INC.
3) Viega; Plumbing and Heating Systems.

b. NPS 2 (DN 50) and Smaller: Wrought-copper fitting with EPDM-rubber O-ring seal in each end.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105.

B. Form: Sheet or Tube.

C. Material: LLDPE film of 0.008-inch (0.20-mm) minimum thickness or high-density, cross-laminated PE film of 0.004-inch (0.10-mm) minimum thickness.

D. Color: Black or Natural .

2.5 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Capitol Manufacturing Company.
    b. Central Plastics Company.
    c. Hart Industries International, Inc.
    d. Jomar International Ltd.
    e. Matco-Norca, Inc.
    f. McDonald, A. Y. Mfg. Co.
    g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    h. Wilkins; a Zurn company.

2. Description:

    a. Standard: ASSE 1079.
    b. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C).
    c. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Capitol Manufacturing Company.
    b. Central Plastics Company.
    c. Matco-Norca, Inc.
    d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    e. Wilkins; a Zurn company.

2. Description:

    a. Standard: ASSE 1079.
    b. Factory-fabricated, bolted, companion-flange assembly.
    c. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C
    d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Advance Products & Systems, Inc.
    b. Calpico, Inc.
    c. Central Plastics Company.
    d. Pipeline Seal and Insulator, Inc.

2. Description:

    a. Nonconducting materials for field assembly of companion flanges.
    b. Pressure Rating: 150 psig (1035 kPa).
    c. Gasket: Neoprene or phenolic.
    d. Bolt Sleeves: Phenolic or polyethylene.
    e. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Elster Perfection.
    b. Grinnell Mechanical Products.
    c. Matco-Norca, Inc.
    d. Precision Plumbing Products, Inc.
    e. Victaulic Company.

2. Description:

a. Standard: IAPMO PS 66
b. Electroplated steel nipple. complying with ASTM F 1545.
c. Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C).
d. End Connections: Male threaded or grooved.
e. Lining: Inert and noncorrosive, propylene.

2.6 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Flex-Hose Co., Inc.
2. Flexicraft Industries.
3. Flex Pression, Ltd.
4. Flex-Weld, Inc.
5. Hyspan Precision Products, Inc.
6. Mercer Rubber Co.
7. Metraflex, Inc.
8. Proco Products, Inc.
9. Tozen Corporation.
10. Unaflex, Inc.
11. Universal Metal Hose; a Hyspan company

B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

1. Working-Pressure Rating: Minimum 250 psig (1725 kPa).
2. End Connections NPS 2 (DN 50) and Smaller: Threaded copper pipe or plain-end copper tube.
3. End Connections NPS 2-1/2 (DN 65) and Larger: Flanged copper alloy.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install underground copper tube in PE encasement according to ASTM A 674 or AWWA C105.

E. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages and Division 22 Section "Domestic Water Piping Specialties" for drain valves and strainers.

F. Install shutoff valve immediately upstream of each dielectric fitting.

G. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for pressure-reducing valves.

H. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

I. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

J. Install seismic restraints on piping. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.

K. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

L. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

M. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

N. Install piping adjacent to equipment and specialties to allow service and maintenance.

O. Install piping to permit valve servicing.

P. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.

Q. Install piping free of sags and bends.

R. Install fittings for changes in direction and branch connections.

S. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

T. Install pressure gages on suction and discharge piping from each plumbing pump. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages.

U. Install thermostats in hot-water circulation piping. Comply with requirements in Division 22 Section "Domestic Water Pumps" for thermostats.

V. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers.

W. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

X. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

Y. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.

E. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Pressure-Sealed Joints: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.

G. Copper-Tubing Grooved Joints: Roll groove end of tube. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for roll-grooved joints.

3.4 VALVE INSTALLATION

A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.

B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 (DN 50) and smaller. Use butterfly or gate valves for piping NPS 2-1/2 (DN 65) and larger.

C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."

1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.

D. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Set balancing valves partly open to restrict but not stop flow. Use ball valves for piping NPS 2 (DN 50) and smaller and butterfly valves for piping NPS 2-1/2 (DN 65) and larger. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves.

E. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for calibrated balancing valves.

3.5 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric couplings or nipples or unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flange kits.

3.6 FLEXIBLE CONNECTOR INSTALLATION

A. Install flexible connectors in suction and discharge piping connections to each domestic water pump .

B. Install bronze-hose flexible connectors in copper domestic water tubing.

3.7 WATER METER INSTALLATION

A. Rough-in domestic water piping for water meter installation according to utility company's requirements.

3.8 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.

B. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

    a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet (30 m) If Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch (10 mm).

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
4. NPS 2-1/2 (DN 65): 108 inches (2700 mm) with 1/2-inch (13-mm) rod.
5. NPS 3 to NPS 5 (DN 80 to DN 125): 10 feet (3 m) with 1/2-inch (13-mm) rod.
6. NPS 6 (DN 150): 10 feet (3 m) with 5/8-inch (16-mm) rod.
7. NPS 8 (DN 200): 10 feet (3 m) with 3/4-inch (19-mm) rod.

F. Install supports for vertical copper tubing every 10 feet (3 m).

G. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.9 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
   1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
   2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.
   3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 (DN 65) and larger.

3.10 IDENTIFICATION

A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.

B. Label pressure piping with system operating pressure.

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Piping Inspections:

   1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
   2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

      a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
      b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

   3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
   4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Piping Tests:

   1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
   2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.

3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and for corrective action required.

D. Domestic water piping will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.12 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

    a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
    b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.13 CLEANING

A. Clean and disinfect domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.

c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.14 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing NPS 1 ½" and smaller.

D. Under-building-slab, domestic water, building service piping, NPS 3 (DN 80) and smaller , shall be one of the following:

1. Soft copper tube, ASTM B 88, Type K (ASTM B 88M, Type A) no joints.

E. Aboveground domestic water piping, NPS 2 (DN 50) and smaller, shall be one of the following:
1. Hard copper tube, ASTM B 88, Type K (ASTM B 88M, Type A; cast- or wrought-copper solder-joint fittings; and brazed or soldered joints.
2. Hard copper tube, ASTM B 88, Type K (ASTM B 88M, Type A); copper pressure-seal-joint fittings; and pressure-sealed joints.

F. Aboveground domestic water piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100, shall be one of the following:

1. Hard copper tube, ASTM B 88, Type K (ASTM B 88M, Type A); cast- or wrought-copper solder-joint fittings; and brazed orsoldered joints.
2. Hard copper tube, ASTM B 88, Type K (ASTM B 88M, Type A); grooved-joint copper-tube appurtenances; and grooved joints.

3.15 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball or gate valves for piping NPS 2 (DN 50) and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
2. Throttling Duty: Use ball or globe valves for piping NPS 2 (DN 50) and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
3. Hot-Water Circulation Piping, Balancing Duty: Calibrated balancing valves.
4. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following domestic water piping specialties:

1. Vacuum breakers.
2. Backflow preventers.
3. Balancing valves.
4. Temperature-actuated water mixing valves.
5. Strainers.
6. Outlet boxes.
7. Hose bibbs.
8. Wall hydrants.
9. Drain valves.
10. Water hammer arresters.
11. Trap-seal primer valves.

B. Related Sections include the following:

1. Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
2. Division 22 Section "Domestic Water Piping".

1.3 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa), unless otherwise indicated.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

C. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. NSF Compliance:

1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.
2. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.1 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Standard: ASSE 1001.
2. Size: NPS 1/4 to NPS 3 (DN 8 to DN 80), as required to match connected piping.
3. Body: Bronze.
4. Inlet and Outlet Connections: Threaded.
5. Finish: Chrome plated.

B. Hose-Connection Vacuum Breakers <Insert drawing designation if any>:

1. 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. MIFAB, Inc.
   b. Watts Industries, Inc.; Water Products Div.
   c. Woodford Manufacturing Company.

2. Standard: ASSE 1011.
3. Body: Bronze, nonremovable, with manual drain.
4. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
5. Finish: Chrome or nickel plated or Rough bronze to match faucet.

2.2 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers <Insert drawing designation if any>:

1. 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. FEBCO; SPX Valves & Controls.
   b. Watts Industries, Inc.; Water Products Div.
   c. Zurn Plumbing Products Group; Wilkins Div.
   d. <Insert manufacturer's name.>

2. Standard: ASSE 1013.

3. Operation: Continuous-pressure applications.
4. Pressure Loss: 10 psig (83 kPa maximum, through middle 1/3 of flow range.
5. Size: 3”
6. Design Flow Rate: 220 gpm.
7. Body: steel with interior lining complying with AWWA C550 or that is FDA approved.
8. End Connections: flanged.
9. Configuration: Designed for horizontal, straight through flow.
10. Accessories:

    a. Valves: outside screw and yoke gate-type with flanged ends on inlet and outlet.

2.3 BALANCING VALVES

A. Copper-Alloy Calibrated Balancing Valves:

1. 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. Armstrong International, Inc.
    b.
    c. Bell & Gossett
    d. NIBCO INC.
    e. Watts Industries, Inc.; Water Products Div.

2. Type: Ball or Y-pattern globe valve with two readout ports and memory setting indicator.
3. Body: Brass or bronze,
4. Size: Same as connected piping, but not larger than NPS 2 (DN 50).
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

2.4 TEMPERATURE-ACTUATED WATER MIXING VALVES

A. Manifold, Thermostatic, Water-Mixing-Valve Assemblies:

1. 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. Bradley.
    b. Powers; a Watts Industries Co.
    c. Symmons Industries, Inc.

2. Description: Factory-fabricated, exposed-mounting, thermostatically controlled, water-mixing-valve assembly.
3. Component Pressure Ratings: 125 psig (860 kPa) minimum, unless otherwise indicated.

2.5 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers :

1. Pressure Rating: 125 psig (860 kPa) minimum, unless otherwise indicated.
2. Body: cast iron with interior lining complying with AWWA C550 or FDA-approved, epoxy coating.
3. End Connections: flanged.
4. Screen: Stainless steel with round perforations, unless otherwise indicated.
5. Perforation Size:
   a. 0.062 inch (1.57 mm.
6. Drain: Factory-installed, hose-end drain valve.

2.6 OUTLET BOXES

A. Icemaker Outlet Boxes:

1. 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. Acorn Engineering Company.
   b. IPS Corporation.
   c. Oatey.
2. Mounting: Recessed.
3. Material and Finish: Stainless-steel box and faceplate.
4. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 (DN 15) or smaller copper tube outlet.
5. Supply Shutoff Fitting: NPS 1/2 (DN 15) gate, globe, or ball valve and NPS 1/2 (DN 15) copper, water tubing.

2.7 HOSE BIBBS

A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or NPS 3/4 (DN 15 or DN 20) threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig (860 kPa).
7. Vacuum Breaker: Integral or field-installation, nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Finished Rooms: Chrome or nickel plated.
10. Operation for Equipment Rooms: Wheel handle or operating key.

11. Operation for Finished Rooms: Operating key.
12. Include operating key with each operating-key hose bibb.
13. Include integral wall flange with each chrome- or nickel-plated hose bibb.

2.8 WALL HYDRANTS

A. Moderate-Climate Wall Hydrants

1. 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. Josam Company.
    b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    c. Woodford Manufacturing Company.

2. Standard: ASME A112.21.3M for concealed outlet, self-draining wall hydrants.
3. Pressure Rating: 125 psig (860 kPa).
4. Operation: wheel handle.
5. Inlet: NPS 3/4 or NPS 1 (DN 20 or DN 25).
6. Outlet: Concealed, with integral vacuum breaker or nonremovable hose-connection vacuum breaker; and garden-hose thread complying with ASME B1.20.7.
7. Box: Deep, flush mounting with cover.
8. Box and Cover Finish: Polished nickel bronze.

2.9 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves :

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig (2760-kPa) minimum CWP.
3. Size: NPS 3/4 (DN 20).
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

B. Gate-Valve-Type, Hose-End Drain Valves :

1. Standard: MSS SP-80 for gate valves.
2. Pressure Rating: Class 125.
3. Size: NPS 3/4 (DN 20).
4. Body: ASTM B 62 bronze.
5. Inlet: NPS 3/4 (DN 20) threaded or solder joint.
6. Outlet: Garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.10 WATER HAMMER ARRESTERS

A. Water Hammer Arresters :

1. 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. MIFAB, Inc.
   b. PPP Inc.
   c. Sioux Chief Manufacturing Company, Inc.

2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Copper tube with piston.
4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.11 TRAP-SEAL PRIMER VALVES

A. Supply-Type, Trap-Seal Primer Valves:

1. 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:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. MIFAB, Inc.
   b. PPP Inc.
   c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.

3. Standard: ASSE 1018.
4. Pressure Rating: 125 psig (860 kPa) minimum.
5. Body: Bronze.
6. Inlet and Outlet Connections: NPS 1/2 (DN 15) threaded, union, or solder joint.
7. Gravity Drain Outlet Connection: NPS 1/2 (DN 15) threaded or solder joint.
8. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install backflow preventers in each water supply. Comply with authorities having jurisdiction.
   1. Do not install bypass piping around backflow preventers.

C. Install balancing valves in locations where they can easily be adjusted.

D. Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

1. Install thermometers.
2. Install surface mounted on wall as specified.

E. Install Y-pattern strainers for water on supply side of each backflow preventer.

F. Install outlet boxes recessed in wall. Install 2-by-4-inch (38-by-89-mm) fire-retardant-treated-wood blocking wall reinforcement between studs.

G. Install water hammer arresters in water piping according to PDI-WH 201.

H. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and prepare test reports:

1. Test each backflow preventer according to authorities having jurisdiction and the device's reference standard.

B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.4 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

END OF SECTION 221119

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SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

B. Related Sections:

1. Division 22 Section "Facility Sanitary Sewers" for sanitary sewerage piping and structures outside the building.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa).

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify County Project Manager no fewer than two days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without County Project Manager's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Heavy-Duty, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ANACO-Husky.
b. Clamp-All Corp.
c. Dallas Specialty & Mfg. Co.
d. MIFAB, Inc.
e. Mission Rubber Company; a division of MCP Industries, Inc.
f. Stant.
g. Tyler Pipe.

2. Standards: ASTM C 1277 and ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.3 GALVANIZED-STEEL PIPE AND FITTINGS

A. Galvanized-Steel Pipe: ASTM A 53/A 53M, Type E, Standard Weight class. Include square-cut-grooved or threaded ends matching joining method.

B. Galvanized-Cast-Iron Drainage Fittings: ASME B16.12, threaded.

C. Steel Pipe Pressure Fittings:

1. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M, Schedule 40, seamless steel pipe. Include ends matching joining method.
2. Malleable-Iron Unions: ASME B16.39; Class 150; hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.
3. Galvanized-Gray-Iron, Threaded Fittings: ASME B16.4, Class 125, standard pattern.

D. Grooved-Joint, Galvanized-Steel-Pipe Appurtenances:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Anvil International; a subsidiary of Mueller Water Products, Inc.
b. Grinnell Mechanical Products.
c. Shurjoint Piping Products.
d. Victaulic Company.

2. Galvanized, Grooved-End Fittings for Galvanized-Steel Piping: ASTM A 536 ductile-iron castings, ASTM A 47/A 47M malleable-iron castings, ASTM A 234/A 234M forged steel fittings, or ASTM A 106/A 106M steel pipes with dimensions matching ASTM A 53/A 53M steel pipe, and complying with AWWA C606 for grooved ends.

2.4 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

C. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive primer shall 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. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Solvent cement shall 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"

2.5 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

3. Shielded, Nonpressure Transition Couplings:

   a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      1) Cascade Waterworks Mfg. Co.
      2) Mission Rubber Company; a division of MCP Industries, Inc.

   b. Standard: ASTM C 1460.
   c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

2.6 ENCASEMENT FOR UNDERGROUND METAL PIPING

A. Standard: ASTM A 674 or AWWA C105/A 21.5.

B. Material: high-density, cross-laminated polyethylene film of 0.004-inch (0.10-mm) minimum thickness.

C. Form: Sheet or tube.

D. Color: Black.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 4 (DN 100) and smaller; 1 percent downward in direction of flow for piping larger than NPS 4 (DN 100).

2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

O. Install underground PVC piping according to ASTM D 2321.

P. Plumbing Specialties:
1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Comply with requirements for cleanouts specified in Division 22 Section "Sanitary Waste Piping Specialties."
2. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Division 22 Section "Sanitary Waste Piping Specialties."

Q. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

R. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

B. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.

2. In Drainage Piping: Shielded, nonpressure transition couplings.

B. Transition Coupling Locations:

1. Install transition couplings at transition from underground to above ground piping below finish grade, slab, floor, pad or paving. Install encasement for underground metal piping to protect metal pipe, couplings and components.
2. Install transitions couplings at transition from under building sanitary waste piping to facility sanitary sewer piping not less than 3 feet and not more than 5 feet from the perimeter of the building foundation.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping.
2. Install carbon-steel pipe support clamps for vertical piping.
3. Vertical Piping: MSS Type 8 or Type 42, clamps.
4. Install individual, straight, horizontal piping runs:

a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.

C. Support horizontal piping and tubing within 12 inches (300 mm) of each fitting and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8-inch (16-mm) rod.

G. Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).

H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Install horizontal backwater valves with cleanout cover flush with floor.
6. Comply with requirements cleanouts and drains specified in Division 22 Section "Sanitary Waste Piping Specialties."

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

3.7 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.9 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.10 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 (DN 100) and smaller shall be of the following:
1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

C. Aboveground, vent piping NPS 4 (DN 100) and smaller shall be of the following:
1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
2. Galvanized-steel pipe, drainage fittings, and threaded joints.

D. Underground, soil, waste, and vent piping NPS 4 (DN 100) and smaller shall be the following:

1. Solid wall (not Cellular-core) PVC pipe, PVC socket fittings, and solvent-cemented joints.
2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

E. Underground, soil and waste piping NPS 5 (DN 125) and larger shall be of the following:
   1. Solid-wall (not Cellular-core) PVC pipe; PVC socket fittings; and solvent-cemented joints.
   2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

END OF SECTION 221316

SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following sanitary drainage piping specialties:
   1. Cleanouts.
   2. Floor drains.
   3. Miscellaneous sanitary drainage piping specialties.
   4. Flashing materials.

B. Related Sections include the following:

   1. Division 22 Section "Storm Drainage Piping Specialties" for trench drains for storm water, channel drainage systems for storm water, roof drains, and catch basins.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. FRP: Fiberglass-reinforced plastic.

C. HDPE: High-density polyethylene plastic.

D. PE: Polyethylene plastic.

E. PP: Polypropylene plastic.

F. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

A. Field quality-control test reports.

B. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

1.6 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Metal Cleanouts

1. 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. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   b. Tyler Pipe; Wade Div.
   c. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
3. Size: Same as connected drainage piping
4. Body Material: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: Raised-head, brass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Metal Floor Cleanouts:

1. 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. Sioux Chief Manufacturing Company, Inc.
   b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   c. Zurn Plumbing Products Group.
   d.

2. Standard: ASME A112.36.2M.
3. Size: Same as connected branch.
4. Body or Ferrule: Cast iron .

5. Clamping Device: Required.
6. Closure: Brass plug with straight threads and gasket.
7. Adjustable Housing Material: Cast iron .
8. Frame and Cover Material and Finish: Nickel-bronze, copper alloy Vandal resistant with tamper proof hardware.
9. Frame and Cover Shape: Round.
10. Top Loading Classification: Heavy Duty.

C. Cast-Iron Wall Cleanouts:

1. 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. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   b. Tyler Pipe; Wade Div.
   c. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: Countersunkbrass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round nickel-bronze, copper-alloy, or stainless-steel wall-installation vandal resistant frame and cover with tamper proof hardware.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains :

1. 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. MIFAB, Inc.
   b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   c. Zurn Plumbing Products Group.

2. Standard: ASME A112.6.3 with backwater valve where installed in slab on grade.
3. Body Material: Gray iron .
4. Clamping Device: Required.
5. Outlet: Bottom.
6. Backwater Valve: Ball type.
7. Top or Strainer Material: Stainless steel , vandal resistant with tamper proof hardware for detention areas.
8. Top of Body and Strainer Finish: Stainless steel .
9. Top Shape: square where locatd in ceramic tile floors, round all other areas.
10. Top Loading Classification: Heavy Duty.

2.3 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Floor-Drain, Trap-Seal Primer Fittings :

1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
2. Size: Same as floor drain outlet with NPS 1/2 (DN 15) side inlet.

B. Air-Gap Fittings :

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze or cast iron.
3. Inlet: Opening in top of body.
4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

C. Sleeve Flashing Device

1. Description: Manufactured, cast-iron fitting, with clamping device, that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 1 inch (25 mm above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
2. Size: As required for close fit to riser or stack piping.

D. Stack Flashing Fittings

1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
2. Size: Same as connected stack vent or vent stack.

2.4 FLASHING MATERIALS

A. Copper Sheet: ASTM B 152/B 152M, of the following minimum weights and thicknesses, unless otherwise indicated:

1. General Applications: 12 oz./sq. ft. (3.7 kg/sq. m or 0.41-mm) thickness.
2. Vent Pipe Flashing: 8 oz./sq. ft. (2.5 kg/sq. m or 0.27-mm) thickness.

B. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch (1.01-mm) minimum thickness, unless otherwise indicated. Include G90 (Z275) hot-dip galvanized, mill-phosphatized finish for painting if indicated.

C. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil (1.01-mm) minimum thickness.

D. Fasteners: Metal compatible with material and substrate being fastened.

E. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

F. Solder: ASTM B 32, lead-free alloy.

G. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
4. Locate at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

a. Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.
b. Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope.
c. Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

F. Install deep-seal traps on floor drains and other waste outlets, if indicated.

G. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
2. Size: Same as floor drain inlet.

H. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

I. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
1. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches (250 mm), and skirt or flange extending at least 8 inches (200 mm) around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Division 07 Section "Sheet Metal Flashing and Trim."

F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

3.5 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319

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SECTION 224223 - COMMERCIAL SHOWERS AND BASINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Individual shower basins.
2. Showers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for showers.
2. Include rated capacities, operating characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For shower faucets to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 4 of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 4 of each type and size installed.

PART 2 - PRODUCTS

2.1 SHOWER BASINS

A. Shower Basins SH-1 and SH-2: Precast-terrazzo shower basin.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Acorn Engineering Company.
   b. AS America, Inc., d/b/a American Standard Brands ("American Standard") Fiat Products
   c. Florestone Products Co., Inc.

2. General: Precast-terrazzo base for built-up-type shower fixture.
3. Standard: IAPMO PS 99 for precast-terrazzo material.

4. Standards: ANSI Z124.1.2 and ICC/ANSI A117.1 for roll-in shower compartments.

5. Type: Standard or ADA Handicapped/wheelchair accessible per plan.
6. Nominal Size, accessible: 60 by 36 inches minimum clear (1525 by 915 mm).
7. Nominal Size and Shape, standard: 36 by 36 inches (915 by 915 mm) square.
8. Color: per architectural drawings.
9. Bathing Surface: Slip resistant according to ASTM F 462.
10. Outlet: Drain with NPS 2 (DN 50) outlet.

2.2 SHOWERS

A. Wall-Mounted Showers SH-1 and SH-2:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Acorn Engineering Company.
   b. Bradley Corporation.
   c. Willoughby Industries, Inc.

2. Description: Stainless-steel, wall-mounted, surface-enclosure shower fixture with showerhead.
3. Standards: ASME A112.18.1/CSA B125.1 and ASSE 1016.
4. Metal Nominal Thickness: 0.063 inch (1.6 mm).
5. Height to showerhead: 72 inches (1830 mm) .
6. Control: Pressure-balance valve with individual hot- and cold-water mixing-valve operation.
7. Flow Control: 2 gpm (7.6 L/min.) for each shower head.
8. Soap Dish: RequiredMounting: Wall bracket.
9. Supplies: NPS 3/4 (DN 20) copper tubing with valves.
10. Standard Shower Head, provide:

    a. Type: Ball joint.
    b. Shower Head Material: Combined, metallic and nonmetallic with chrome-plated finish.
    c. Spray Pattern: Adjustable.
11. ADA Accessible Shower Head, in addition to standard shower head provide:

a. Type: Hand-held, slide-bar mounted.
b. Shower Head Material: Combined, metallic and nonmetallic with chrome-plated finish.
c. Spray Pattern: Fixed.

d. Backflow-Prevention Device for Hand-Held Shower: Required.
e. Selector Valve to direct flow to either standard or hand held head: Required.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before shower installation.

B. Examine walls and floors for suitable conditions where showers will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Assemble shower components according to manufacturers' written instructions.

B. Install showers level and plumb according to roughing-in drawings.

C. Install water-supply piping with stop on each supply to each shower faucet.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with shower. Comply with valve requirements specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
2. Install stops in locations where they can be easily reached for operation.

D. Install shower flow-control fittings with specified maximum flow rates in shower arms.

E. Set shower basins in leveling bed of cement grout.

F. Seal joints between showers and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."

C. Comply with traps and soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust showers and controls. Replace damaged and malfunctioning showers, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of showers and basins, inspect and repair damaged finishes.

B. Clean showers and basins, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed fixtures and fittings.

D. Do not allow use of showers and basins for temporary facilities unless approved in writing by Owner.

END OF SECTION 224223

SECTION 224600 - SECURITY PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following security plumbing fixtures and related components:

1. Combination units.
2. Drinking fountains.
3. Service sinks.
4. Showers.

1.3 DEFINITIONS

A. Accessible Fixture: Security plumbing fixture that can be approached and used by people with disabilities.

B. Back-Mounting-Type Fixture: Security plumbing fixture designed to mount on wall sleeve built into wall so installation and removal of fixture and piping and other components are only accessible from service space behind wall.

C. Front-Mounting-Type Fixture: Security plumbing fixture designed to mount on fixture support with installation and removal from fixture side of wall, and piping and other components are accessible from access panels in fixture or wall.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include furnished specialties and accessories.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For security plumbing fixtures to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, 2008 Edition Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; about security plumbing fixtures for people with disabilities. Comply with requirements in "Energy Policy Act" about water flow and consumption rates for plumbing fixtures.

C. NSF Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects," for fixture materials that will be in contact with potable water.

D. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushometer Valves: Equal to 10 percent of amount installed for each type indicated, but no fewer than <two> units.
2. Mechanical and Air-Operated Valves: Equal to 15 percent of amount installed for each type indicated, but no fewer than <two> units.

PART 2 - PRODUCTS

2.1 COMBINATION UNITS

A. Security Combination Units, WC-1, WC-2 in Units 1 and 2:

1. 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. Acorn Engineering Company.
   b. I-CON Systems
   c. Willoughby Industries, Inc.

2. Description: Back or front-mounting per plans, cabinet, anti-ligature security plumbing fixture with integral water closet and lavatory; fabricated from 0.109-inch (2.8-mm) thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.

a. Water Closet: Comply with IAPMO PS 61 for water-closet component.

1) Bowl: Elongated, with back inlet, integral trap, siphon-jet design with back outlet and contoured seat.

a) Seat Surface: SSINA No. 7 polished finish.
b) Punching: Provide two holes for installation of separate toilet seat.
c) Drain: NPS 3 (DN 80), horizontal with cleanout and slip joint. Cleanout plug with hook.

2) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button mechanism, and 1.6-gal./flush (6.0-L/flush) consumption. Refer to "Flushometer Valves" Article.

b. Lavatory: In top of cabinet.

1) Receptor: Oval or rectangular bowl with integral soap depression.
2) Hot- and Cold-Water Bubbler Supply Valves: Pneumatic type with push-button actuation and individual check stop.
3) Filler Spout: Backsplash or deck mounted.
4) Drain: Integral punched grid with NPS 1-1/4 (DN 32) minimum horizontal waste and trap complying with ASME A112.18.2.
5) Bubbler : hemispherical, anti-suicide, penal.

c. Cabinet Configuration: Per plan and with backsplash.

1) Water-Closet Bowl Location: Straight or angled on left side or right side of apron.
2) Toilet Paper Holder: Recessed, 0.063-inch (1.6-mm) minimum thickness, stainless steel complying with ASTM A 666, Type 304 and located in right side or in left side of apron.

d. Wall Sleeve: Galvanized-steel frame of dimensions required to match and support entire fixture for back mounting fixture. Include steel bars or other design that will prevent escape if fixture is removed.

2.2 WATER CLOSETS

A. Security Units, WC-1, WC-2, in Unit 3 and WC-4 in Unit 1 and 2:

1. 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. Acorn Engineering Company.
b. I-CON Systems
c. Whitehall Industries
d. Willoughby Industries, Inc.

2. Description: Back or front-mounting per plans, cabinet, anti-ligature water closet security plumbing fixture; fabricated from 0.109-inch (2.8-mm) thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.

   a. Water Closet: Comply with IAPMO PS 61 for water-closet component.

      1) Bowl: Elongated, with back inlet, integral trap, siphon-jet design with back outlet and contoured seat.

         a) Seat Surface: SSINA No. 7 polished finish.
         b) Punching: Provide two holes for installation of separate toilet seat.
         c) Drain: NPS 3 (DN 80), horizontal with cleanout and slip joint. Cleanout plug with hook.

      2) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button mechanism, and 1.6-gal./flush (6.0-L/flush) consumption. Refer to "Flushometer Valves" Article.

   b. Cabinet Configuration: Per plan and with backsplash.

      1) Water-Closet Bowl Location: Straight.
      2) Toilet Paper Holder: Recessed, 0.063-inch (1.6-mm) minimum thickness, stainless steel complying with ASTM A 666, Type 304 and located in right side or in left side of apron.

   c. Wall Sleeve: Galvanized-steel frame of dimensions required to match and support entire fixture for back mounting fixture. Include steel bars or other design that will prevent escape if fixture is removed.

2.3 DRINKING FOUNTAINS

A. Security Drinking Fountains, DF-1 and DF-2:

1. 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. Acorn Engineering Company.
   b. I-CON Systems.
   c. Whitehall Manufacturing
   d. Willoughby Industries, Inc.

2. Description: Front-mounting, security plumbing fixture; fabricated from 0.109-inch (2.8-mm) thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.

   a. Receptor: Bowl or depression in top and with backsplash.
   b. Bubbler Location: On deck.
   c. Bubbler Water-Supply Valve: Pneumatic type with push-button actuation.

d. Drain: Integral punched grid with NPS 1-1/4 (DN 32) minimum horizontal waste and trap complying with ASME A112.18.2.
e. Wall Sleeve: Galvanized-steel frame of dimensions required to match and support fixture.

2.4 SHOWERS

A. Security Showers, SH1:

1. 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. Acorn Engineering Company.
b. I-COM Systems
c. Willoughby Industries, Inc.

2. Description: Back-mounting recessed security plumbing fixture made with wall plate for flush installation; fabricated from 0.109-inch (2.8-mm) thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.

a. Configuration: Wall type with shower head and soap dish.
b. Tempered -Water-Supply Valves: Pneumatic type with individual check stop.
c. Shower: Vandal-resistant, fixed-type head.
d. Soap Dish: Recessed, stainless steel.
e. Wall Sleeve: Galvanized-steel frame of dimensions required to match and support fixture.

B. Security Showers, SH-2:

1. 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. Acorn Engineering Company.
b. I-COM Systems
c. Willoughby Industries, Inc.

2. Description: Back-mounting, accessible, recessed, security plumbing fixture; fabricated from 0.109-inch (2.8-mm) thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.

a. Configuration: Wall type with shower head and soap dish.
b. Tempered -Water-Supply Valves: Pneumatic type with individual check stops.
c. Shower: Vandal-resistant, fixed-type head and removeable Hose with vandal-resistant, hand-held head.

d. Wall Sleeve: Galvanized-steel frame of dimensions required to match and support fixture.

2.5 FIXTURE SUPPORTS

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before security plumbing fixture installation.

B. Examine floors and walls for suitable conditions where security plumbing fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SECURITY PLUMBING FIXTURE INSTALLATION

A. Install back-mounting-type, stainless-steel security plumbing fixtures as follows:

1. Install wall sleeve in wall.
2. Install fixture on wall sleeve; mount components on or attached to wall sleeve with access from accessible service space.
3. Extend supply piping from service space to fixture.
4. Install soil and waste piping from fixture and extend into service space.
5. Install fixture trap in service space instead of below fixture drain.

B. Install front-mounting-type, stainless-steel security plumbing fixtures as follows:

1. Install fixture support or mounting bracket.
2. Install fixture on support; mount components inside of or attached to fixture.
3. Extend supply piping from pipe space to fixture.
4. Install trap below fixture and extend soil and waste piping into pipe space.

C. Install security plumbing fixture outlets with gasket seals.

D. Install fixtures designated "accessible" according to California Building Code for heights, dimensions, and clearances.

E. Install fixtures level and plumb.

F. Install shutoff valves in water-supply piping to fixtures. Use ball, gate, or globe valve if specific type valve is not indicated. Install valves in locations where they can be easily reached for operation. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

G. Install dielectric fittings in water-supply piping to fixtures if piping and fixture connections are made of different metals. See Division 22 Section "Common Work Results for Plumbing" for dielectric fittings.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect hot- and cold-water supply piping to security plumbing fixtures. Include supply stops, if specified, or ball valve on each supply. Ball valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

C. Connect soil and waste piping to security plumbing fixtures.

3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Testing: After installing security plumbing fixtures, test for compliance with requirements.
2. Remove and replace malfunctioning security plumbing fixtures. Retest as specified above after repairs or replacements are made.

3.5 ADJUSTING

A. Operate and adjust water-supply flushometers and flow-control valves on security plumbing fixtures.

3.6 CLEANING

A. Clean security plumbing fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall spouts and strainers.
2. Remove sediment and debris from drains.

B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.7 PROTECTION

A. Provide protective covering for installed security plumbing fixtures and fittings.

B. Do not allow use of security plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224600

SECTION 224213.13 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Water closets.
2. Flushometer valves.
3. Toilet seats.

B. Related Requirements:
1. Division 22 Section "Security Plumbing Fixtures" for security water closets.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water closets.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than sixof each type.

PART 2 - PRODUCTS

2.1 WALL-MOUNTED WATER CLOSETS

A. Water Closets WC-3: Wall mounted, top spud.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Standard America.
b. Briggs Plumbing Products, Inc.
c. Capizzi.
d. Crane Plumbing, L.L.C.
e. Ferguson Enterprises, Inc.; ProFlo Brand.
f. ProFlo Brand.
g. Gerber Plumbing Fixtures LLC.
h. Kohler Co.
i. Mansfield Plumbing Products LLC.
j. Peerless Pottery Sales, Inc.
k. TOTO USA, INC.
l. Zurn Industries, LLC; Commercial Brass and Fixtures.

2. Bowl:

a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
b. Material: Vitreous china.
c. Type: Siphon jet.
d. Style: Flushometer valve.
e. Height: Standard.
f. Rim Contour: Elongated.
g. Water Consumption: 1.28gal. (4.8 L) per flush.
h. Spud Size and Location: NPS 1-1/2 (DN 40); top.

3. Flushometer Valve: see below .
4. Toilet Seat: see below.
5. Support:

a. Standard: ASME A112.6.1M.
b. Description: Waste-fitting assembly as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.
c. Water-Closet Mounting Height: Standard.

B. Water Closets W-5A: Wall mounted, top spud**, accessible**.

1. Manufacturers: Subject to compliance with requirements, **available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

a. American Standard America.
b. Crane Plumbing, L.L.C.
c. Ferguson Enterprises, Inc.; ProFlo Brand.
d. Gerber Plumbing Fixtures LLC.
e. Kohler Co.
f. TOTO USA, INC.
g. Zurn Industries, LLC; Commercial Brass and Fixtures.

2. Bowl:

a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
b. Material: Vitreous china.
c. Type: Siphon jet.
d. Style: Flushometer valve.
e. Height: Standard.
f. Rim Contour: Elongated.
g. Water Consumption: **1.6 gal. (6 L)** per flush.
h. Spud Size and Location: NPS 1-1/2 (DN 40); back.

3. Flushometer Valve: .
4. Toilet Seat: .
5. Support:

a. Standard: ASME A112.6.1M.
b. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.
c. Water-Closet Mounting Height: handicapped/elderlyAccessible height according to ICC/ANSI A117.1California Building Code.
d. Style: Flushometer valve.

2.2 FLUSHOMETER VALVES

A. Lever-Handle, Diaphragm Flushometer Valves :

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Coyne & Delany Co.
b. Gerber Plumbing Fixtures LLC.
c. Sloan Valve Company.
d. Zurn Industries, LLC; Commercial Brass and Fixtures.

2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig (860 kPa).
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.

7. Panel Finish: Chrome plated or stainless steel.
8. Style: Exposed.
9. Consumption: 1.6 gal. (6 L) per flush.
10. Minimum Inlet: NPS 1 (DN 25).
11. Minimum Outlet: NPS 1-1/4 (DN 32).

2.3 TOILET SEATS

A. Toilet Seats :

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. American Standard America.
    b. Bemis Manufacturing Company.
    c. Centoco Manufacturing Corporation.
    d. Church Seats.
    e. Jones Stephens Corp.; Comfort Seat Brand.
    f. Kohler Co.
    g. Olsonite Seat Co.
    h. Sanderson Plumbing Products, Inc.
    i. Sperzel of Lexington.
    j. TOTO USA, INC.
    k. Zurn Industries, LLC; Commercial Brass and Fixtures.

2. Standard: IAPMO/ANSI Z124.5.
3. Material: Plastic.
4. Type: Commercial (Standard).
5. Shape: Elongated rim, open front.
6. Hinge: Self-sustaining, check.
7. Hinge Material: Noncorroding metal.
8. Seat Cover: Not required.
9. Color: White.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before water-closet installation.

B. Examine walls and floors for suitable conditions where water closets will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

B. Support Installation:

1. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.
2. Use carrier supports with waste-fitting assembly and seal.
3. Install floor-mounted, back-outlet water closets attached to building floor substrate, onto waste-fitting seals; and attach to support.
4. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals; and affix to building substrate.

C. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.
4. Install actuators in locations that are easy for people with disabilities to reach.

D. Install toilet seats on water closets.

E. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."

F. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."

3.3 CONNECTIONS

A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed water closets and fittings.

C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.13

SECTION 224216.13 - COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Lavatories.
2. Faucets.

B. Related Requirements:
1. Division 22 Section "Security Plumbing Fixtures" for security lavatories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring of automatic faucets.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

1. In addition to items specified in Division 01 Section 17000 "Contract Closeout" include the following:

a. Servicing and adjustments of automatic faucets.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 WALL MOUNTED LAVATORIES

A. Lavatory LV-3: Wheelchair, vitreous china, wall mounted.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Standard America.
b. Crane Plumbing, L.L.C.
c. Kohler Co.

2. Fixture:

a. Standard: ASME A112.19.2/CSA B45.1.
b. Nominal Size: Rectangular, 20 by 18 1/2 inches .
c. Faucet-Hole Punching: Three holes, 2-inch (51-mm) centers.
d. Faucet-Hole Location: Top.
e. Color: White.
f. Mounting: For concealed-arm carrier.

3. Faucet: See below.
4. Support: ASME A112.6.1M, Type II, concealed-arm lavatory carrier with rectangular, steel uprights.

2.2 SOLID-BRASS, MANUALLY OPERATED FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Lavatory Faucets : Manual-type, single-control mixing, commercial, solid-brass valve.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Standard America.
b. Chicago Faucets.
c. Delta Faucet Company.

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
4. Body Type: Centerset.
5. Body Material: Commercial, solid brass.
6. Finish: Polished chrome plate.
7. Maximum Flow Rate: 0.5 gpm (1.5 L/min.).
8. Mounting Type: top exposed.
9. Valve Handle(s): Single lever Wrist blade, 4 inches (102 mm).
10. Spout: sazt f.
11. Spout Outlet: Laminar flow.
12. Operation: Noncompression, manual.
13. Drain: strainer.

2.3 LAMINAR-FLOW, FAUCET-SPOUT OUTLETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet-spout-outlet materials that will be in contact with potable water.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AM Conservation Group, Inc.
2. Chronomite Laboratories, Inc.; a division of Acorn Engineering Company.
3. NEOPERL, Inc.

C. Description: Chrome-plated-brass, faucet-spout outlet that produces non-aerating, laminar stream. Include external or internal thread that mates with faucet outlet for attachment to faucets where indicated and flow-rate range that includes flow of faucet.

2.4 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Wheel handle.

F. Risers:

1. NPS 1/2 (DN 15).
2. ASME A112.18.6, braided- or corrugated-stainless-steel, flexible hose riser.

2.5 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/4 (DN 32) offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2 by NPS 1-1/4 (DN 40 by DN 32).
2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch- (0.83-mm-) thick brass tube and chrome-plated, brass or steel wall flange.
3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- (0.30-mm-) thick stainless-steel tube to wall; and stainless-steel wall flange.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.

B. Examine counters and walls for suitable conditions where lavatories will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install lavatories level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-mounted lavatories.

C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."

E. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Division 22 Section "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.13

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SECTION 224216.16 - COMMERCIAL SINKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Counter mounted sinks
   2. Sink faucets.
   3. Laminar-flow, faucet-spout outlets.
   4. Supply fittings.
   5. Waste fittings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for sinks.
   2. Include rated capacities, operating characteristicsand furnished specialties and accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sinks to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   1. Faucet Washers and O-Rings: Equal to 2 of each type and size installed.
   2. Faucet Cartridges and O-Rings: Equal to 2 of each type and size installed.

PART 2 - PRODUCTS

2.1 COUNTER MOUNTED KITCHEN SINK

A. Counter Mounted Kitchen Sink KS-1: Two bowl, counter mounted, solid surface, ADA Compliant Accessible.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Aristech Surfaces; a product group of Aristech Acrylics LLC.
   b. DuPont; DuPont Surfaces.
   c. Formica Corporation; a Fletcher Building Limited company.
   d. Franke Consumer Products, Inc.
   e. InPro Corporation.
   f. Rynone Manufacturing Corp.
   g. Swan Corporation (The).
   h. Wilsonart International.

2. Fixture:

   a. Standard: ANSI Z124.3 and ANSI/ICPA SS-1 for solid-surface kitchen sinks.
   b. Overall Dimensions: per architecture.

   c. Left Bowl:

      1) Dimensions: length and width per architecture, maximum 6 ½” deep.
      2) Drain: 3-1/2-inch (89-mm) outlet for disposer.

         a) Location: Near back of bowl.

   d. Right Bowl:

      1) Dimensions: length and width per architecture, maximum 6 ½” deep.
      2) Drain: 3-1/2-inch (89-mm) crumb cup.

         a) Location: Near back of bowl.

3. Faucet: SF-1 .
4. Supply Fittings: Comply with requirements in "Supply Fittings" Article.
5. Waste Fittings: Comply with requirements in "Waste Fittings" Article, except include continuous waste for multibowl sinks.

   a. Disposer: as scheduled on drawings or equal.

2.2 SINK FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet-spout materials that will be in contact with potable water.

A. Sink Faucets SF-1: Solid brass, kitchen sink.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Chicago Faucets.
   b. Delta Faucet Company.
   c. GROHE America, Inc.

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
4. Kitchen Sink Option: Separate hand spray complying with ASSE 1025.
5. Finish: Satin chrome plate.
6. Maximum Flow Rate: 2.5 gpm (9.5 L/min.) unless otherwise indicated.
7. Mixing Valve: Single control.
8. Backflow-Prevention Device for Hand Spray: Not required.
9. Centers: Single hole.
10. Mounting: Deck, exposed.
11. Handle(s): Lever.
12. Spout Type: Swing, solid brass.
13. Spout Outlet: Laminar flow.

B. Sink Faucets SF-2: Manual type, two-lever-handle mixing valve.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Chicago Faucets.
   b. Delta Faucet Company.
   c. GROHE America, Inc.
2. Body Type: Widespread.
3. Body Material: Commercial, solid brass.
4. Finish: Chrome plated, brushed .
5. Maximum Flow Rate: 4.0 gpm (15 L/min.) .
6. Handle(s): Lever.
7. Mounting TypeDeck, exposed.
8. Spout Type: Swing, round tubular.
9. .

2.3 LAMINAR-FLOW, FAUCET-SPOUT OUTLETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet-spout-outlet materials that will be in contact with potable water.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AM Conservation Group, Inc.
2. Chronomite Laboratories, Inc.
3. NEOPERL, Inc.

C. Description: Chrome-plated brass, faucet-spout outlet that produces non-aerating, laminar stream. Include external or internal thread that mates with faucet outlet for attachment to faucets where indicated and flow-rate range that includes flow of faucet.

2.4 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Wheel handle .

F. Risers:

1. NPS 1/2 (DN 15) ASME A112.18.6, braided or corrugated stainless-steel flexible hose.

2.5 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/2 (DN 40) offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2 (DN 40).
2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-(0.83-mm-) thick brass tube to wall; and chrome-plated brass or steel wall flange.

2.6 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.

B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sinks level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-hung sinks.

C. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.

D. Set floor-mounted sinks in leveling bed of cement grout.

E. Install water-supply piping with stop on each supply to each sink faucet.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with sink. Comply with valve requirements specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
2. Install stops in locations where they can be easily reached for operation.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Division 22 Section "Escutcheons for Plumbing Piping."

G. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."

H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Division 22 Section "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Division 22 Section "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Division 22 Section "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of sinks, inspect and repair damaged finishes.

B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed sinks and fittings.

D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.16

SECTION 230548 - VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Isolation pads.
2. Isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Restrained spring isolators.
5. Restrained vibration isolation roof-curb rails.
6. Seismic snubbers.
7. Restraining braces and cables.

1.3 DEFINITIONS

A. IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

1.4 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC: D.
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: III.

a. Component Importance Factor: 1.25.
b. Component Response Modification Factor: 5.0.
c. Component Amplification Factor: 2.5.

3. Design Spectral Response Acceleration at Short Periods (0.2 Second): 1.32.
4. Design Spectral Response Acceleration at 1-Second Period: .493.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.

    a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
    b. Annotate to indicate application of each product submitted and compliance with requirements.

3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators, seismic restraints, and for designing vibration isolation bases.

    a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Division 22 Sections for equipment mounted outdoors.

2. Vibration Isolation Base Details: Detail overall dimensions, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, base weights, equipment static loads, power transmission, component misalignment, and cantilever loads.
3. Seismic-Restraint Details:

    a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
    b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
    c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Division 22 Sections for equipment mounted outdoors.
    d. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

C. Coordination Drawings: Show coordination of seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.

D. Welding certificates.

E. Field quality-control test reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ace Mountings Co., Inc.
2. Amber/Booth Company, Inc.
3. California Dynamics Corporation.
4. Isolation Technology, Inc.
5. Kinetics Noise Control.
6. Mason Industries.
7. Vibration Eliminator Co., Inc.
8. Vibration Isolation.
9. Vibration Mountings & Controls, Inc.
10. Vibrex vibration & control systems.

B. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.

1. Resilient Material: Oil- and water-resistant neoprene.

C. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.

1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

D. Restrained Mounts: All-directional mountings with seismic restraint.

1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

E. Spring Isolators: Freestanding, laterally stable, open-spring isolators.

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- (6-mm-) thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig (3447 kPa).
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

F. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.

1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
2. Restraint: Seismic or limit stop as required for equipment and authorities having jurisdiction.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.

4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

G. Housed Spring Mounts: Housed spring isolator with integral seismic snubbers.

1. Housing: Ductile-iron or steel housing to provide all-directional seismic restraint.
2. Base: Factory drilled for bolting to structure.
3. Snubbers: Vertically adjustable to allow a maximum of 1/4-inch (6-mm) travel up or down before contacting a resilient collar.

H. Elastomeric Hangers: Single or double-deflection type, fitted with molded, oil-resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.

I. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.

1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
7. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

J. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.

1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
8. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

2.2 RESTRAINED VIBRATION ISOLATION ROOF-CURB RAILS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amber/Booth Company, Inc.
2. California Dynamics Corporation.
3. Isolation Technology, Inc.
4. Kinetics Noise Control.
5. Mason Industries.
6. Thybar Corporation.
7. Vibration Eliminator Co., Inc.
8. Vibration Isolation.
9. Vibration Mountings & Controls, Inc.
10. Vibrex vibration & control systems.

B. General Requirements for Restrained Vibration Isolation Roof-Curb Rails: Factory-assembled, fully enclosed, insulated, air- and watertight curb rail designed to resiliently support equipment and to withstand seismic forces.

C. Lower Support Assembly: Formed sheet-metal section containing adjustable and removable steel springs that support upper frame. Upper frame shall provide continuous support for equipment and shall be captive to resiliently resist seismic forces. Lower support assembly shall have a means for attaching to building structure and a wood nailer for attaching roof materials, and shall be insulated with a minimum of 2 inches (50 mm) of rigid, glass-fiber insulation on inside of assembly.

D. Spring Isolators: Adjustable, restrained spring isolators shall be mounted on 1/4-inch- (6-mm-) thick, elastomeric vibration isolation pads and shall have access ports, for level adjustment, with removable waterproof covers at all isolator locations. Isolators shall be located so they are accessible for adjustment at any time during the life of the installation without interfering with the integrity of the roof.

1. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.

   a. Housing: Steel with resilient vertical-limit stops and adjustable equipment mounting and leveling bolt.
   b. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   c. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
   e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.

   a. Resilient Material: Oil- and water-resistant neoprene.

E. Snubber Bushings: All-directional, elastomeric snubber bushings at least 1/4 inch (6 mm) thick.

F. Water Seal: Galvanized sheet metal with EPDM seals at corners, attached to upper support frame, extending down past wood nailer of lower support assembly, and counterflashed over roof materials.

2.3 VIBRATION ISOLATION EQUIPMENT BASES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amber/Booth Company, Inc.
2. California Dynamics Corporation.
3. Isolation Technology, Inc.
4. Kinetics Noise Control.
5. Mason Industries.
6. Vibration Eliminator Co., Inc.
7. Vibration Isolation.
8. Vibration Mountings & Controls, Inc.
9. Vibrex vibration & control systems.

B. Steel Base: Factory-fabricated, welded, structural-steel bases and rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch (25-mm) clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.

   a. Include supports for suction and discharge elbows for pumps.

2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

C. Inertia Base: Factory-fabricated, welded, structural-steel bases and rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch (25-mm) clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.

   a. Include supports for suction and discharge elbows for pumps.

2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
4. Fabrication: Fabricate steel templates to hold equipment anchor-bolt sleeves and anchors in place during placement of concrete. Obtain anchor-bolt templates from supported equipment manufacturer.

2.4 SEISMIC-RESTRAINT DEVICES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amber/Booth Company, Inc.
2. California Dynamics Corporation.
3. Cooper B-Line, Inc.; a division of Cooper Industries.
4. Hilti, Inc.
5. Kinetics Noise Control.
6. Loos & Co.; Cableware Division.
7. Mason Industries.
8. TOLCO Incorporated; a brand of NIBCO INC.
9. Unistrut; Tyco International, Ltd.

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Snubbers: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.

1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
3. Maximum 1/4-inch (6-mm) air gap, and minimum 1/4-inch- (6-mm-) thick resilient cushion.

D. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

E. Restraint Cables: ASTM A 492 stainless-steel cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.

F. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.

G. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

H. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.

I. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

J. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

K. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.5 FACTORY FINISHES

A. Finish: Manufacturer's standard prime-coat finish ready for field painting.

B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.

1. Powder coating on springs and housings.
2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
3. Baked enamel or powder coat for metal components on isolators for interior use.
4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.

B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Comply with requirements in Division 07 Section "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.

B. Equipment Restraints:

1. Install seismic snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch (3.2 mm).
3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.

C. Piping Restraints:

1. Comply with requirements in MSS SP-127.
2. Space lateral supports a maximum of 40 feet (12 m) o.c., and longitudinal supports a maximum of 80 feet (24 m) o.c.
3. Brace a change of direction longer than 12 feet (3.7 m).

D. Install cables so they do not bend across edges of adjacent equipment or building structure.

E. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.

F. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

G. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

H. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

I. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are

encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.

2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. .

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through County representative, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain County Representative's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.
6. Measure isolator restraint clearance.
7. Measure isolator deflection.
8. Verify snubber minimum clearances.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.6 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of spring isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air-mounting systems. Refer to Division 01 Section "Demonstration And Training."

END OF SECTION 230548

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Duct labels.
5. Valve tags.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Aluminum, 0.032-inch (0.8-mm) or anodized aluminum, 0.032-inch (0.8-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
3. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch (1.6 mm) thick, and having predrilled holes for attachment hardware.

2. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
3. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
4. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
5. Fasteners: Stainless-steel rivets or self-tapping screws.
6. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch ((1.6 mm)) thick, and having predrilled holes for attachment hardware.

B. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).

C. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

D. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

E. Fasteners: Stainless-steel rivets or self-tapping screws.

F. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

G. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches ((38 mm) high).

2.4 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch ((1.6 mm)) thick, and having predrilled holes for attachment hardware.

B. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).

C. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

D. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

E. Fasteners: Stainless-steel rivets or self-tapping screws.

F. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

G. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches ((38 mm) high).

2.5 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

1. Tag Material: Brass, 0.032-inch (0.8-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

3.4 DUCT LABEL INSTALLATION

A. Install plastic-laminated or self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For cold-air supply ducts.
2. Yellow: For hot-air supply ducts.
3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
4. ASME A13.1 Colors and Designs: For hazardous material exhaust.

B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet (15 m) in each space where ducts are exposed or concealed by removable ceiling system.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Constant-volume air systems.
b. Variable-air-volume systems.
c. Multizone systems.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 SUBMITTALS

A. LEED Submittal:

1. Air-Balance Report for LEED Prerequisite EQ 1: Documentation of work performed for ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."

B. Qualification Data: Within 45 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

C. Contract Documents Examination Report: Within 45 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

D. Strategies and Procedures Plan: Within 90 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

E. Certified TAB reports.

F. Sample report forms.

G. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.5 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC NEBB or TABB.

1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC NEBB or TABB.
2. TAB Technician: Employee of the TAB contractor and who is certified by AABC NEBB or TABB as a TAB technician.

B. TAB Conference: Meet with Construction Manager or Commissioning Authority on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.

1. Agenda Items:

a. The Contract Documents examination report.
b. The TAB plan.
c. Coordination and cooperation of trades and subcontractors.
d. Coordination of documentation and communication flow.

C. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

D. TAB Report Forms: Use standard TAB contractor's forms approved by Commissioning Authority.

E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.6 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on air distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Division 23 Section "Metal Ducts " and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.

L. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.

M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

N. Examine system pumps to ensure absence of entrained air in the suction piping.

O. Examine operating safety interlocks and controls on HVAC equipment.

P. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system-readiness checks and prepare reports. Verify the following:

1. Permanent electrical-power wiring is complete.
2. Automatic temperature-control systems are operational.
3. Equipment and duct access doors are securely closed.
4. Balance, smoke, and fire dampers are open.
5. Isolating and balancing valves are open and control valves are operational.
6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
7. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Division 23 Section "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

    a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.

2. Measure fan static pressures as follows to determine actual static pressure:

    a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
    b. Measure static pressure directly at the fan outlet or through the flexible connection.
    c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
    d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.

    a. Report the cleanliness status of filters and the time static pressures are measured.

4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
6. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Division 23 Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.

1. Measure airflow of submain and branch ducts.

a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.

C. Measure air outlets and inlets without making adjustments.

1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.

D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.

1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.

B. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.
2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
3. Measure total system airflow. Adjust to within indicated airflow.
4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.

a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.

6. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
8. Record final fan-performance data.

C. Pressure-Dependent, Variable-Air-Volume Systems without Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Balance variable-air-volume systems the same as described for constant-volume air systems.
2. Set terminal units and supply fan at full-airflow condition.
3. Adjust inlet dampers of each terminal unit to indicated airflow and verify operation of the static-pressure controller. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
4. Readjust fan airflow for final maximum readings.
5. Measure operating static pressure at the sensor that controls the supply fan if one is installed, and verify operation of the static-pressure controller.
6. Set supply fan at minimum airflow if minimum airflow is indicated. Measure static pressure to verify that it is being maintained by the controller.
7. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.

a. If air outlets are out of balance at minimum airflow, report the condition but leave the outlets balanced for maximum airflow.

8. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

D. Pressure-Dependent, Variable-Air-Volume Systems with Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set system at maximum indicated airflow by setting the required number of terminal units at minimum airflow. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
2. Adjust supply fan to maximum indicated airflow with the variable-airflow controller set at maximum airflow.
3. Set terminal units at full-airflow condition.

4. Adjust terminal units starting at the supply-fan end of the system and continuing progressively to the end of the system. Adjust inlet dampers of each terminal unit to indicated airflow. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
5. Adjust terminal units for minimum airflow.
6. Measure static pressure at the sensor.
7. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

3.7 PROCEDURES FOR MULTIZONE SYSTEMS

A. Set unit at maximum airflow through the cooling coil.

B. Adjust each zone's balancing damper to achieve indicated airflow within the zone.

3.8 PROCEDURES FOR HEAT EXCHANGERS

A. Measure water flow through all circuits.

B. Adjust water flow to within specified tolerances.

C. Measure inlet and outlet water temperatures.

D. Measure inlet steam pressure.

E. Check settings and operation of safety and relief valves. Record settings.

3.9 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.10 PROCEDURES FOR CONDENSING UNITS

A. Verify proper rotation of fans.

B. Measure entering- and leaving-air temperatures.

C. Record compressor data.

3.11 PROCEDURES FOR HEAT-TRANSFER COILS

A. Measure, adjust, and record the following data for each refrigerant coil:

1. Dry-bulb temperature of entering and leaving air.
2. Wet-bulb temperature of entering and leaving air.
3. Airflow.
4. Air pressure drop.
5. Refrigerant suction pressure and temperature.

3.12 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.
3. Heating-Water Flow Rate: Plus or minus 10 percent.
4. Cooling-Water Flow Rate: Plus or minus 10 percent.

3.13 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Status Reports: Prepare weekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.14 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Fan drive settings including settings and percentage of maximum pitch diameter.
    e. Inlet vane settings for variable-air-volume systems.
    f. Settings for supply-air, static-pressure controller.
    g. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Duct, outlet, and inlet sizes.
3. Pipe and valve sizes and locations.
4. Terminal units.
5. Balancing stations.
6. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

    a. Unit identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Unit arrangement and class.
    g. Discharge arrangement.
    h. Sheave make, size in inches (mm), and bore.
    i. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
    j. Number, make, and size of belts.
    k. Number, type, and size of filters.

2. Motor Data:

    a. Motor make, and frame type and size.
    b. Horsepower and rpm.
    c. Volts, phase, and hertz.
    d. Full-load amperage and service factor.
    e. Sheave make, size in inches (mm), and bore.
    f. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).

3. Test Data (Indicated and Actual Values):

    a. Total air flow rate in cfm (L/s).
    b. Total system static pressure in inches wg (Pa).
    c. Fan rpm.
    d. Discharge static pressure in inches wg (Pa).
    e. Filter static-pressure differential in inches wg (Pa).
    f. Preheat-coil static-pressure differential in inches wg (Pa).
    g. Cooling-coil static-pressure differential in inches wg (Pa).
    h. Heating-coil static-pressure differential in inches wg (Pa).
    i. Outdoor airflow in cfm (L/s).
    j. Return airflow in cfm (L/s).
    k. Outdoor-air damper position.
    l. Return-air damper position.
    m. Vortex damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:

    a. System identification.
    b. Location.
    c. Coil type.
    d. Number of rows.
    e. Fin spacing in fins per inch (mm) o.c.
    f. Make and model number.
    g. Face area in sq. ft. (sq. m).
    h. Tube size in NPS (DN).

i. Tube and fin materials.
j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm (L/s).
b. Average face velocity in fpm (m/s).
c. Air pressure drop in inches wg (Pa).
d. Outdoor-air, wet- and dry-bulb temperatures in deg F (deg C).
e. Return-air, wet- and dry-bulb temperatures in deg F (deg C).
f. Entering-air, wet- and dry-bulb temperatures in deg F (deg C).
g. Leaving-air, wet- and dry-bulb temperatures in deg F (deg C).
h. Refrigerant expansion valve and refrigerant types.
i. Refrigerant suction pressure in psig (kPa).
j. Refrigerant suction temperature in deg F (deg C).
k. Inlet steam pressure in psig (kPa).

G. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Fuel type in input data.
g. Output capacity in Btu/h (kW).
h. Ignition type.
i. Burner-control types.
j. Motor horsepower and rpm.
k. Motor volts, phase, and hertz.
l. Motor full-load amperage and service factor.
m. Sheave make, size in inches (mm), and bore.
n. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).

2. Test Data (Indicated and Actual Values):

a. Total air flow rate in cfm (L/s).
b. Entering-air temperature in deg F (deg C).
c. Leaving-air temperature in deg F (deg C).
d. Air temperature differential in deg F (deg C).
e. Entering-air static pressure in inches wg (Pa).
f. Leaving-air static pressure in inches wg (Pa).
g. Air static-pressure differential in inches wg (Pa).
h. Low-fire fuel input in Btu/h (kW).
i. High-fire fuel input in Btu/h (kW).
j. Manifold pressure in psig (kPa).
k. High-temperature-limit setting in deg F (deg C).
l. Operating set point in Btu/h (kW).

m. Motor voltage at each connection.
n. Motor amperage for each phase.
o. Heating value of fuel in Btu/h (kW).

H. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches (mm), and bore.
h. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches (mm), and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm (L/s).
b. Total system static pressure in inches wg (Pa).
c. Fan rpm.
d. Discharge static pressure in inches wg (Pa).
e. Suction static pressure in inches wg (Pa).

I. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F (deg C).
d. Duct static pressure in inches wg (Pa).
e. Duct size in inches (mm).
f. Duct area in sq. ft. (sq. m).
g. Indicated air flow rate in cfm (L/s).
h. Indicated velocity in fpm (m/s).
i. Actual air flow rate in cfm (L/s).
j. Actual average velocity in fpm (m/s).
k. Barometric pressure in psig (Pa).

J. Air-Terminal-Device Reports:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft. (sq. m).

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm (L/s).
b. Air velocity in fpm (m/s).
c. Preliminary air flow rate as needed in cfm (L/s).
d. Preliminary velocity as needed in fpm (m/s).
e. Final air flow rate in cfm (L/s).
f. Final velocity in fpm (m/s).
g. Space temperature in deg F (deg C).

K. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.15 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:

a. Measure airflow of at least 10 percent of air outlets.
b. Measure water flow of at least 5 percent of terminals.
c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
d. Verify that balancing devices are marked with final balance position.
e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect. Authority having jurisdiction will be contacted for inspection and approval.
2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Commissioning Authority.
3. Architect shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

3.16 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230713 - DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following duct services:

1. Indoor, concealed supply and outdoor air.
2. Indoor, concealed return located in unconditioned space.

B. Related Sections:

1. Division 23 Section "Metal Ducts" for duct liners.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, 2007 Edition by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.5 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.6 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type II for sheet materials.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Aeroflex USA, Inc.; Aerocel.
b. Armacell LLC; AP Armaflex.
c. K-Flex USA; Insul-Sheet, K-Flex Gray Duct Liner, and K-FLEX LS.

G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I or Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Johns Manville; Microlite.
b. Knauf Insulation; Friendly Feel Duct Wrap.
c. Manson Insulation Inc.; Alley Wrap.

d. Owens Corning; SOFTR All-Service Duct Wrap.

H. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Fibrex Insulations Inc.; FBX.
b. Johns Manville; 800 Series Spin-Glas.
c. Knauf Insulation; Insulation Board.
d. Manson Insulation Inc.; AK Board.
e. Owens Corning; Fiberglas 700 Series.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Aeroflex USA, Inc.; Aeroseal.
b. Armacell LLC; Armaflex 520 Adhesive.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
d. K-Flex USA; R-373 Contact Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
    b. Eagle Bridges - Marathon Industries; 225.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.
    d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Dow Corning Corporation; 739, Dow Silicone.
    b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
    c. P.I.C. Plastics, Inc.; Welding Adhesive.
    d. Speedline Corporation; Polyco VP Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
    b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
b. Eagle Bridges - Marathon Industries; 550.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
d. Mon-Eco Industries, Inc.; 55-50.
e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms (1.2 metric perms) at 0.0625-inch (1.6-mm) dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.4 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
c. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
4. Service Temperature Range: 0 to plus 180 deg F (Minus 18 to plus 82 deg C).
5. Color: White.

2.5 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
b. Eagle Bridges - Marathon Industries; 405.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
d. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
5. Color: Aluminum.

6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
5. Color: White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
4. Vinyl Jacket: White vinyl with a permeance of 1.3 perms (0.86 metric perm) when tested according to ASTM E 96/E 96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

2.7 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Johns Manville; Zeston.
b. P.I.C. Plastics, Inc.; FG Series.
c. Proto Corporation; LoSmoke.
d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.

D. Metal Jacket:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.
    b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
    c. RPR Products, Inc.; Insul-Mate.

2. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005, Temper H-14.

    a. Sheet and roll stock ready for shop or field sizing or factory cut and rolled to size.
    b. Finish and thickness are indicated in field-applied jacket schedules.
    c. Moisture Barrier for Indoor Applications: 1-mil- (0.025-mm-) thick, heat-bonded polyethylene and kraft paper or 2.5-mil- (0.063-mm-) thick polysurlyn.
    d. Moisture Barrier for Outdoor Applications: 3-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper or 2.5-mil- (0.063-mm-) thick polysurlyn.

E. Self-Adhesive Outdoor Jacket: 60-mil- (1.5-mm-) thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a crosslaminated polyethylene film covered with aluminum-foil facing.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Polyguard Products, Inc.; Alumaguard 60.

2.8 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. ABI, Ideal Tape Division; 428 AWF ASJ.
    b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
    c. Compac Corporation; 104 and 105.
    d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches (75 mm).
3. Thickness: 11.5 mils (0.29 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. ABI, Ideal Tape Division; 491 AWF FSK.

b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
c. Compac Corporation; 110 and 111.
d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches (75 mm).
3. Thickness: 6.5 mils (0.16 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ABI, Ideal Tape Division; 370 White PVC tape.
b. Compac Corporation; 130.
c. Venture Tape; 1506 CW NS.

2. Width: 2 inches (50 mm).
3. Thickness: 6 mils (0.15 mm).
4. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ABI, Ideal Tape Division; 488 AWF.
b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
c. Compac Corporation; 120.
d. Venture Tape; 3520 CW.

2. Width: 2 inches (50 mm).
3. Thickness: 3.7 mils (0.093 mm).
4. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

2.9 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. ITW Insulation Systems; Gerrard Strapping and Seals.
b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch (0.38 mm) thick, 3/4 inch (19 mm) wide with wing seal or closed seal.
3. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 3/4 inch (19 mm) wide with wing seal or closed seal.
4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated.

   a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

      1) AGM Industries, Inc.; CWP-1.
      2) GEMCO; CD.
      3) Midwest Fasteners, Inc.; CD.
      4) Nelson Stud Welding; TPA, TPC, and TPS.

2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch (38-mm) galvanized carbon-steel washer.

   a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

      1) AGM Industries, Inc.; CHP-1.
      2) GEMCO; Cupped Head Weld Pin.
      3) Midwest Fasteners, Inc.; Cupped Head.
      4) Nelson Stud Welding; CHP.

3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

   a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

      1) AGM Industries, Inc.; Tactoo Perforated Base Insul-Hangers.
      2) GEMCO; Perforated Base.
      3) Midwest Fasteners, Inc.; Spindle.

   b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.76 mm) thick by 2 inches (50 mm) square.
   c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated.
   d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

4. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) GEMCO; Nylon Hangers.
2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.

b. Baseplate: Perforated, nylon sheet, 0.030 inch (0.76 mm) thick by 1-1/2 inches (38 mm) in diameter.
c. Spindle: Nylon, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches (63 mm).
d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

5. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) AGM Industries, Inc.; Tactoo Self-Adhering Insul-Hangers.
2) GEMCO; Peel & Press.
3) Midwest Fasteners, Inc.; Self Stick.

b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch (0.76 mm) thick by 2 inches (50 mm) square.
c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated.
d. Adhesive-backed base with a peel-off protective cover.

6. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick, galvanized-steel or aluminum sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) AGM Industries, Inc.; RC-150.
2) GEMCO; R-150.
3) Midwest Fasteners, Inc.; WA-150.
4) Nelson Stud Welding; Speed Clips.

b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

7. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) GEMCO.

2) Midwest Fasteners, Inc.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.

D. Wire: 0.062-inch (1.6-mm) soft-annealed, stainless steel.

2.10 CORNER ANGLES

A. PVC Corner Angles: 30 mils (0.8 mm) thick, minimum 1 by 1 inch (25 by 25 mm), PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

B. Aluminum Corner Angles: 0.040 inch (1.0 mm) thick, minimum 1 by 1 inch (25 by 25 mm), aluminum according to ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches (100 mm) o.c.

    a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.5 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for duct and plenum surfaces.

2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
    b. On duct sides with dimensions larger than 18 inches (450 mm), place pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Impale insulation over pins and attach speed washers.
    f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches (75 mm).

5. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches (450 mm) o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-(150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
    b. On duct sides with dimensions larger than 18 inches (450 mm), space pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.

e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

   a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
   b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches (75 mm).

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant

recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

3.7 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, concealed return located in unconditioned space.

B. Items Not Insulated:

1. Fibrous-glass ducts.
2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums and casings.
5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.10 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, round and flat-oval, supply-air and return-air duct insulation shall be one of the following:

1. Flexible Elastomeric: 1 inch (25 mm) thick.
2. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) thick and 0.75-lb/cu. ft. (12-kg/cu. m) nominal density.

B. Concealed, rectangular, supply-air and return-air duct insulation shall be one of the following:

1. Flexible Elastomeric: 1 inch (25 mm) thick.
2. Mineral-Fiber Board: 1-1/2 inches (38 mm) thick and 2-lb/cu. ft. (32-kg/cu. m) nominal density.

C. Concealed, supply-air and return-air plenum insulation shall be one of the following:

1. Flexible Elastomeric: 1 inch (25 mm) thick.
2. Mineral-Fiber Board: 1-1/2 inches (38 mm) thick and 2-lb/cu. ft. (32-kg/cu. m) nominal density.

3.11 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Ducts and Plenums, Concealed:

1. PVC: 20 mils (0.5 mm) thick.
2. Aluminum,: 0.024 inch (0.61 mm) thick.
3. Painted Aluminum,: 0.024 inch (0.61 mm) thick.

D. Ducts and Plenums, Exposed:

1. None.

END OF SECTION 230713

SECTION 230800 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.

B. Related Sections:

1. Division 01 for general commissioning process requirements.

1.3 DEFINITIONS

A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

B. CxA: Commissioning Authority.

C. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.

D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.4 CONTRACTORS RESPONSIBILITIES

A. Perform commissioning tests at the direction of the CxA.

B. Attend construction phase controls coordination meeting.

C. Attend testing, adjusting, and balancing review and coordination meeting.

D. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

E. Provide information requested by the CxA for final commissioning documentation.

F. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.5 CxA'S RESPONSIBILITIES

A. Provide Project-specific construction checklists and commissioning process test procedures for actual HVAC&R systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.

B. Direct commissioning testing.

C. Verify testing, adjusting, and balancing of Work are complete.

D. Provide test data, inspection reports, and certificates in Systems Manual.

1.6 COMMISSIONING DOCUMENTATION

A. Provide the following information to the CxA for inclusion in the commissioning plan:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC&R systems, assemblies, equipment, and components to be verified and tested.
4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
5. Certificate of readiness certifying that HVAC&R systems, subsystems, equipment, and associated controls are ready for testing.
6. Test and inspection reports and certificates.
7. Corrective action documents.
8. Verification of testing, adjusting, and balancing reports.

1.7 SUBMITTALS

A. Certificates of readiness.

B. Certificates of completion of installation, prestart, and startup activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TESTING PREPARATION

A. Certify that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.

D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

E. Inspect and verify the position of each device and interlock identified on checklists.

F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.2 Testing AND BALANCING VERIFICATION

A. Prior to performance of testing and balancing Work, provide copies of reports, sample forms, checklists, and certificates to the CxA.

B. Notify the CxA at least 10 days in advance of testing and balancing Work, and provide access for the CxA to witness testing and balancing Work.

C. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC&R systems at the direction of the CxA.

1. The CxA will notify testing and balancing Contractor 10 days in advance of the date of field verification. Notice will not include data points to be verified.
2. The testing and balancing Contractor shall use the same instruments (by model and serial number) that were used when original data were collected.
3. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3 dB shall result in rejection of final testing. Variations in background noise must be considered.
4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.3 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space.

Testing shall include measuring capacities and effectiveness of operational and control functions.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. The CxA along with the HVAC&R Contractor, testing and balancing Contractor, and HVAC&R Instrumentation and Control Contractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct that set points be altered when simulating conditions is not practical.

H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

I. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.

J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.4 HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. Boiler Testing and Acceptance Procedures: Testing requirements are specified in Division 23 boiler Sections. Provide submittals, test data, inspector record, and boiler certification to the CxA.

B. HVAC&R Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls." Assist the CxA with preparation of testing plans.

C. Pipe system cleaning, flushing, hydrostatic tests, and chemical treatment requirements are specified in Division 23 piping Sections. HVAC&R [**Contractor**] [**Subcontractor**] shall prepare a pipe system cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA. Plan shall include the following:

1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for

each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.

2. Description of equipment for flushing operations.
3. Minimum flushing water velocity.
4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

D. Energy Supply System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of gas systems and equipment at the direction of the CxA. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.

E. Refrigeration System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of chillers, cooling towers, refrigerant compressors and condensers, heat pumps, and other refrigeration systems. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.

F. HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air, steam, and hydronic distribution systems; special exhaust; and other distribution systems, including HVAC&R terminal equipment and unitary equipment.

G. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls. Authority having jurisdiction will be contacted for inspection and approval.

END OF SECTION 230800

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INSTRUMENTATION AND CONTROL FOR HVAC

Section 230900

Part 1: General

1.0 SECTION INCLUDES

1. Related Sections
2. Description
3. Approved Control System Contractors and Manufacturers
4. Quality Assurance
5. Codes and Standards
6. System Performance
7. Submittals
8. Warranty
9. Ownership of Proprietary Material

1.1 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of this specification and shall be used in conjunction with this section as a part of the contract documents. Consult them for further instructions pertaining to this work. The Contractor is bound by the provisions of Division 0 and Division 1.

B. The following sections constitute related work:
   1. Section 230593 Testing, Adjusting & Balancing
   2. Section 230800 Commissioning of HVAC
   3. Section 233300 Air Duct Accessories
   4. Section 238126 Split-system Air Conditioners
   5. Division 26 sections as applicable

1.2 DESCRIPTION

A. General: The control system shall be as shown and consist of a high-speed, peer-to-peer network of DDC controllers and an operator workstation residing and communicating on a BACnet internet work. The operator workstation shall be existing Each mechanical system, building floor plan, and control device will be depicted by point-and-click graphics. Systems using gateways to route proprietary devices and objects to BACnet, other than proprietary controls for Variable Refrigerant volume systems, are not acceptable.

B. For Local Area Network installations provide access to the control system via the internet. The owner shall provide a connection to the internet via high speed cable modem, ADSL, ISDN, T1 or through the facility ISP. The owner shall pay for all monthly internet access fees and connection charges.

C. The control system shall be supplied with a complete web enabled package. The system shall support unlimited users using standard web browsers such as Internet Explorer and Netscape. The web server software shall operate on standard industry PC servers. Proprietary servers or “black boxes” are not

acceptable. Web browser software shall be manufactured by the control system manufacturer and shall have the same look and feel as the operating system. Third party web software is not acceptable.

D. The system will provide for future expansion to include monitoring of the card access, fire alarm, lighting control systems, and CCTV

1.3 APPROVED CONTROL SYSTEM CONTRACTORS AND MANUFACTURERS

A. The following is the pre-approved County Control System Contractor:

COMPANY NAME	MANUFACTURER	PRODUCT LINE	ADDRESS/LOCATION	CONTACT
Environmental Systems Inc.	Delta Controls	BACnet	4219 South Market Suite H Sacramento, CA. 95834	T.J. Kay 916-344-1711 fax-916-344-3168

Note: Delta Controls only

1. The Contractor shall use only products from the corresponding manufacturer and product line listed.
2. The above list of manufacturers applies to operator workstation software, controller software, the custom application programming language, Building Controllers, Custom Application Controllers, and Application Specific Controllers. All other products specified herein (e.g., sensors, valves, dampers, and actuators) need not be manufactured by the above manufacturers.

1.4 QUALITY ASSURANCE

A. Contractor/Manufacturer Qualifications
   1. The Installer shall have an established working relationship with the Control System Manufacturer.
   2. The Installer shall have successfully completed Control System Manufacturer's classes on the control system. The Installer shall present for review the certification of completed training, including the hours of instruction and course outlines upon request.
   3. All products used in this installation shall be new, currently under manufacture, and shall be applied in standard off the shelf products. This installation shall not be used as a test site for any new products unless explicitly approved by the Engineer in writing. Spare parts shall be available for at least 5 years after completion of this contract.

1.5 CODES AND STANDARDS

A. All work, materials, and equipment shall comply with the rules and regulations of all codes and ordinances of the local, state, and federal authorities. Such codes, when more restrictive, shall take precedence over these plans and specifications. As a minimum, the installation shall comply with the current editions in effect 30 days prior to receipt of bids of the following codes:

1. 2010 California Electric Code (CEC)
2. 2010 California Building Code (CBC)
   a) Section 608, Shutoff for Smoke Control
   b) Section 403.3, Smoke Detection Group B Office Buildings and Group R, Division 1 Occupancies
   c) Section 710.5, Wiring in Plenums
   d) Section 713.10, Smoke Dampers
   e) Section 1106 Refrigeration Machinery Rooms
   f) Section 1107, Refrigeration Machinery Room Ventilation
   g) Section 1108, Refrigeration Machinery Room Equipment and Controls
   h) Section 1120, Detection and Alarm Systems
3. 2010 California Mechanical Code (CMC)
4. ASHRAE 135-1995
5. FCC Regulation, Part 15- Governing Frequency Electromagnetic Interference
6. Underwriters Laboratories UL916

1.6 SYSTEM PERFORMANCE

A. Performance Standards. The system shall conform to the following:
   1. Graphic Display. The system shall display a graphic with 20 dynamic points/objects with all current data within 10 seconds.
   2. Graphic Refresh. The system shall update a graphic with 20 dynamic points/objects with all current data within 8 seconds
   3. Object Command. The maximum time between the command of a binary object by the operator and the reaction by the device shall be less than 2 seconds. Analog objects should start to adjust within 2 seconds
   4. Object Scan. All changes of state and change of analog values will be transmitted over the high-speed Ethernet network such that any data used or displayed at a controller or workstation will have been current within the previous 2 seconds
   5. Alarm Response Time. The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed 45 seconds
   6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 1 second. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control
   7. Performance. Programmable controllers shall be able to execute DDC PID control loops at a frequency of at least once per second. The controller shall scan and update the process value and output generated by this calculation at this same frequency
   8. Multiple Alarm Annunciations. All workstations on the network must receive alarms within 5 seconds of each other
   9. Reporting Accuracy. The system shall report all values with an end-to-end accuracy as listed or better than those listed in Table 1
   10. Stability of Control. Control loops shall maintain measured variable at setpoint within the tolerances listed in Table 2

TABLE 1: Reporting Accuracy

Measured Variable	Reported Accuracy
Space Temperature	±0.5ºC [±1ºF]
Ducted Air	±0.5ºC [±1ºF
Outside Air	±1.0ºC [±2ºF]
Dewpoint	±1.5ºC [±3ºF]
Water Temperature	±0.5ºC [±1ºF]
Delta-T	±0.15ºC[±0.25ºF]
Relative Humidity	±5% RH
Water Flow	±5% of full scale
Airflow (terminal)	±10% of full scale *(see Note 1)*
Airflow (measuring stations)	±5% of full scale
Air Pressure (ducts)	±25 Pa [±0.1 "W.G.]
Air Pressure (space)	±3 Pa [±0.01 "W.G.]
Water Pressure	±2% of full scale *(see Note 2)*
Electrical (A, V, W, Power factor)	5% of reading *(see Note 3)*
Carbon Monoxide (CO)	±5% of reading
Carbon Dioxide (CO_2)	±50 ppm

Note 1: 10%-100% of scale
Note 2: For both absolute and differential pressure
Note 3: Not including utility-supplied meters

TABLE 2: Control Stability and Accuracy

Controlled Variable	Control Accuracy	Range of Medium
Air Pressure	±50 Pa [±0.2" w.g.]	0-1.5 kPa [0-6" w.g.]
	±3 Pa [±0.01" w.g.]	-25 to 25 Pa [-0.1 to 0.1" w.g.]
Airflow	±100 cfm	
Temperature	±0.5ºC [±1.0ºF]	
Humidity	±5% RH	
Fluid Pressure	±10 kPa [±1.5 psi]	0-1 kPa [1-150 psi]
	±250 Pa [±1.0" w.g.]	0-12.5 kPa [0-50"w.g.] differential

1.10 SUBMITTALS

A. Product Data and Shop Drawings: Meet requirements of Section 01 on Shop Drawings, Product Data, and Samples. In addition, Contractor shall provide shop drawings or other submittals on all hardware, software, and installation to be provided. No work may begin on any segment of this project until submittals have been reviewed and approved for conformity with the design intent. Six copies are required. All drawings shall be done in DXF/PDF format and provided on magnetic/optical disk and as full-size Mylar drawings. When manufacturer's cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawings shall

clearly reference the specification and/or drawing that the submittal is to cover. General catalogs shall not be accepted as cut sheets to fulfill submittal requirements. Submittals shall be provided within 12 weeks of contract award. Submittals shall include:

1. Direct Digital Control System Hardware:
   a) A complete bill of materials of equipment to be used shall be listed indicating quantity, manufacturer, model number, and other relevant technical data.
   b) Manufacturer's description and technical data, such as performance curves, product specification sheets, and installation/maintenance instructions for the items listed below and other relevant items not listed below:
      i. Direct Digital Controller (controller panels)
      ii. Transducers/Transmitters
      iii. Sensors (including accuracy data)
      iv. Actuators
      v. Valves
      vi. Relays/Switches
      vii. Control Panels
      viii. Power Supply
      ix. Batteries
      x. Operator Interface Equipment
      xi. Wiring
   c) Wiring diagrams and layouts for each control panel. Show all termination numbers
   d) Schematic diagrams for all field sensors and controllers. Provide floor plans of all sensor locations and control hardware

2. Central System Hardware and Software
   a) A complete bill of material of equipment used indicating quantity, manufacturer, model number, and other relevant technical data.
   b) Manufacturer's description and technical data, such as product specification sheets and installation/maintenance instructions for the items listed below and other relevant items not listed below:
      i. Central Processing Unit
      ii. Monitors
      iii. Printers
      iv. Keyboard
      v. Power Supply
      vi. Battery Backup
      vii. Interface Equipment Between CPU and Control Panels
      viii. Operating System Software
      ix. Operator Interface Software
      x. Color Graphic Software
      xi. Third-party Software
   c) A schematic diagram for all control wiring, communication wiring and power wiring shall be provided. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers' model numbers, function and data link protocol(s). Show all interface wiring to the control system
   d) Provide detailed riser diagrams of wiring between central control unit, operator workstation(s), routers, gateways and all control panels
   e) A list of the color graphic screens shall be provided. For each screen, provide a conceptual layout of pictures and data, and show or explain which other screens can be directly accessed

3. Controlled Systems:
   a) A schematic diagram of each controlled system. The schematics shall have all control points/objects labeled and with point/object names shown or listed. The schematics shall graphically show the location of all control elements in the system
   b) A schematic wiring diagram for each controlled system. Each schematic shall have all elements labeled. Where a control element is the same as that shown on the control system schematic, it shall be labeled with the same name. All terminals shall be labeled
   c) An instrumentation list for each controlled system. Each element of the controlled system shall be listed in table format. The table shall show element name, type of device, manufacturer, model number, and product data sheet number
   d) A mounting, wiring, and routing plan view drawing. The drawing shall be done in ¼" scale. The design shall take into account HVAC, electrical and other systems' design and elevation requirements. The drawing shall show the specific location of all concrete pads and bases and any special wall bracing for panels to accommodate this work
   e) A complete description of the operation of the control system, including sequences of operation. The description shall include and reference a schematic diagram of the controlled system
   f) A point/object list for each system controller including both inputs and outputs (I/O), point/object number, the controlled device associated with the I/O point/object, and the location of the I/O device. Software flag points/objects, alarm points/objects, etc

4. Quantities of items submitted shall be reviewed, but are the responsibility of the Contractor
5. A description of the proposed process along with all report formats and checklists to be used in Part 3: "Control System Demonstration and Acceptance."
6. A BACnet Protocol Implementation Conformance Statement (PICS) for each type of controller and operator interface included in the submittal. PICS to include for each product, as a minimum, a list of BACnet functional groups supported, BACnet services supported, BACnet data link options available and BACnet objects provided

B. Schedules:

1. Within one month of contract award, provide a schedule of the work indicating the following
   a) Intended sequence of work items
   b) Start dates of individual work items.
   c) Duration of individual work items
   d) Planned delivery dates for major material and equipment, and expected lead times
   e) Milestones indicating possible restraints on work by other trades or situations.

2. Provide monthly written status reports indicating work completed, revisions to expected delivery dates, etc. An updated project schedule shall be included.

C. Project Record Documents: Upon completion of installation, submit three copies of record (as-built) documents. The documents shall be submitted for approval prior to final completion and shall include:
   1. Project Record Drawings. These shall be as-built versions of the submittal shop drawings. One set of magnetic media including DXF drawing files also shall be provided
   2. Testing and Commissioning Reports and Checklists. Completed versions of all reports and checklists, along with all trend logs, used to meet the requirements of Part 3: "Control System Demonstration and Acceptance."
   3. Certification of the pressure test required in Part 3: "Control Air Tubing."

4. Operation and Maintenance (O & M) Manual. This shall include as-built versions of the submittal product data. In addition to the information required for submittals, the O & M manual shall include:
   a) Names, addresses, and 24-hour telephone numbers of Contractors installing equipment, and the control systems and service representatives of each
   b) Operators Manual with procedures for operating the control systems, including logging on/off, alarm handling, producing point/object reports, trending data, overriding computer control, and changing setpoints and other variables
   c) One set of Programming Manuals with a description of the programming language (including syntax), statement descriptions (including algorithms and calculations used), point/object database creation and modification, program creation and modification, and use of the editor
   d) Engineering, Installation, and Maintenance Manual(s) that explain how to design and install new points/objects, panels, and other hardware; preventive maintenance and calibration procedures; how to debug hardware problems; and how to repair or replace hardware
   e) A listing and documentation of all custom software created using the programming language, including the setpoints, tuning parameters, and object database. One set of magnetic/optical media containing files of the software and database also shall be provided
   f) One set of magnetic/optical media containing files of all color graphic screens created for the project
   g) A list of recommended spare parts with part numbers and suppliers
   h) Complete original issue documentation, installation, and maintenance information for all third-party hardware provided, including computer equipment and sensors
   i) Complete original issue diskettes for all software provided, including operating systems, programming language, operator workstation software, and graphics software
   j) Licenses, guarantee, and warranty documents for all equipment and systems
   k) Recommended preventive maintenance procedures for all system components, including a schedule of tasks (inspection, cleaning, calibration, etc.), time between tasks, and task descriptions

D. Training Manuals: The Contractor shall provide a course outline and training manuals for all training classes at least six weeks prior to the first class. The Engineer may modify any or all of the training course outline and training materials to meet the needs of the Owner. Review and approval by the Engineer shall be completed at least three weeks prior to the first class

1.11 WARRANTY

A. Warrant all work as follows:
   1. Labor and materials for the control system specified shall be warranted free from defects for a period of 24 months after final completion and acceptance. Control system failures during the warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to the Owner. The Contractor shall respond to the Owner's request for warranty service within 24 hours during normal business hours.
   2. All work shall have a single warranty date, even when the Owner has received beneficial use due to an early system start-up. If the work specified is split into multiple contracts or a multi-phase contract, then each contract or phase shall have a separate warranty start date and period
   3. At the end of the final start-up, testing, and commissioning phase, if equipment and systems are operating satisfactorily to the Engineer, the Engineer shall sign certificates certifying that the control system's operation has been tested and accepted in accordance with the terms of this specification. The date of acceptance shall be the start of warranty.
   4. Operator workstation software, project-specific software, graphic software, database software, and firmware updates which resolve known software deficiencies as identified by the Contractor

shall be provided at no charge during the warranty period. Any upgrades or functional enhancements associated with the above mentioned items also can be provided during the warranty period for an additional charge to the Owner by purchasing an in-warranty service agreement from the Contractor. Written authorization by the Owner must, however, be granted prior to the installation of any of the above mentioned items.

5. Exception: The Contractor shall not be required to warrant reused devices, except for those that have been rebuilt and/or repaired. The Contractor shall warrant all installation labor and materials, however, and shall demonstrate that all reused devices are in operable condition at the time of Engineer's acceptance.

1.12 OWNERSHIP OF PROPRIETARY MATERIAL

A. All project-developed software and documentation shall become the property of the Owner. These include, but are not limited to:
   1. Project graphic images
   2. Record drawings
   3. Project database
   4. Project-specific application programming code
   5. All documentation

Part 2: Products

2.0 SECTION INCLUDES

1. Materials
2. Communication
3. Operator Interface
4. Controller Software
5. Building Controllers
6. Custom Application Controllers
7. Application Specific Controllers
8. Input/ Output Interface
9. Power Supplies and Line Filtering
10. Auxiliary Control Devices
11. Wiring and Raceways
12. Fiber Optic Cable System
13. Compressed Air Supply – Pneumatic

2.1 MATERIALS

A. All products used in this project installation shall be new, currently under manufacture, and shall be applied in similar installations for a minimum of two years. This installation shall not be used as a test site for any new products unless explicitly approved by the Owner's Representative in writing. Spare parts shall be available for at least five years after completion of this contract.

2.2 COMMUNICATION

A. All control products provided for this project shall comprise a BACnet internet work. Communication involving control components (i.e., all types of controllers and operator interfaces) shall conform to ANSI/ASHRAE Standard 135-1995, BACnet.

B. Each BACnet device shall operate on the BACnet Data Link/Physical layer protocol specified for that device as defined in this section.

C. The Contractor shall provide all communication media, connectors, repeaters, bridges, hubs, and routers necessary for the internet work.

D. All controllers shall have a communication port for connections with the operator interfaces using the BACnet Data Link/ Physical layer protocol.

E. A device on the internet work shall be provided with a 56k-baud modem that will allow for remote operator interface using the BACnet PTP Data Link/ Physical layer protocol. Remote operator interface via this modem shall allow for communication with any and all controllers on this network as described in Paragraph F below.

F. Communication services over the internet work shall result in operator interface and value passing that is transparent to the internet work architecture as follows:

1 Connection of an operator interface device to any one controller on the internet work will allow the operator to interface with all other controllers as if that interface were directly connected to the other controllers. Data, status information, reports, system software, custom programs, etc., for all controllers shall be available for viewing and editing from any one controller on the internet work.
2 All database values (e.g., objects, software variables, custom program variables) of any one controller shall be readable by any other controller on the internet work. This value passing shall be automatically performed by a controller when a reference to an object name not located in that controller is entered into the controller's database. An operator/installer shall not be required to set up any communication services to perform internet work value passing.

G. The time clocks in all controllers shall be automatically synchronized daily. An operator change to the time clock in any controller shall be automatically broadcast to all controllers on the network.

H. The network shall have the following minimum capacity for future expansion:

1. Each Building Controller shall have routing capacity for 99 controllers.
2. The Building Controller network shall have capacity for 1000 Building Controllers.
3. The system shall have an overall capacity for 12,500 Building Controller, Custom Application Controller, and Application Specific Controller input/output objects.

2.3 OPERATOR INTERFACE

System must Interface with existing Delta OWS orca view software, modify graphics, database, and system documentation to match new building to interface with the existing graphics and controllers. Existing system is maintained by ESI, contact T.J. Kay (916) 344-1711

2.4 CONTROLLER SOFTWARE

A. Furnish the following applications software for building and energy management. All software applications shall reside and operate in the system controllers. Editing of applications shall occur at the operator workstation

B. System Security

1. User access shall be secured using individual security passwords and user names.

2. Passwords shall restrict the user to the objects, applications, and system functions as assigned by the system manager.

3. User Log On/Log Off attempts shall be recorded.

C. Scheduling. Provide the capability to schedule each object or group of objects in the system. Each schedule shall consist of the following:

1. Weekly Schedule. Provide separate schedules for each day of the week. Each of these schedules should include the capability for start, stop and optimal start. Each schedule may consist of up to 10 events. When a group of objects are scheduled together, provide the capability to adjust the start and stop times for each member.

2. Holiday Schedules. Provide the capability for the operator to define up to 99 special or holiday schedules. These schedules may be placed on the scheduling calendar and will be repeated each year. The operator shall be able to define the length of each holiday period.

D. Alarm Reporting. The operator shall be able to determine the action to be taken in the event of an alarm. Alarms shall be routed to the appropriate workstations based on time and other conditions.

E. Remote Communication. The system shall have the ability to dial out in the event of an alarm using BACnet Point-To-Point at a minimum of 56K baud. Receivers shall be BACnet workstations.

F. Maintenance Management. The system shall monitor equipment status and generate maintenance messages based upon user-designated run-time, starts, and/or calendar date limits.

G. Sequencing. Provide application software to properly sequence the start and stop of chillers, boilers, and pumps to minimize energy usage in the facility.

H. PID Control. A PID (proportional-integral-derivative) algorithm with direct or reverse action and anti-windup shall be supplied. The algorithm shall calculate a time-varying analog value that is used to position an output or stage a series of outputs. The controlled variable, setpoint, and PID gains shall be user-selectable.

I. Staggered Start. This application shall prevent all controlled equipment from simultaneously restarting after a power outage.

J. Energy Calculations. Provide software to allow instantaneous power (e.g., kW) or flow rates (e.g., L/s [GPM]) to be accumulated and converted to energy usage data. Provide an algorithm that calculates a sliding-window kW demand value.

K. Anti-Short Cycling. All binary output objects shall be protected from short cycling. This feature shall allow minimum on-time and off-time to be selected.

L. On/Off Control with Differential. Provide an algorithm that allows a binary output to be cycled based on a controlled variable and setpoint. The algorithm shall be direct-acting or reverse-acting, and incorporate an adjustable differential.

M. Run-time Totalization. Provide software to totalize run-times for all binary input objects. A high run-time alarm shall be assigned, if required, by the operator.

2.5 BUILDING CONTROLLERS

A. General. Provide an adequate number of Building Controllers to achieve the performance specified in the Part 1 Article on "System Performance." Each of these panels shall meet the following requirements.

1. The Building Automation System shall be comprised of one or more independent, standalone, microprocessor-based Building Controllers to manage the global strategies described in the System Software section.

2. The Building Controller shall have sufficient memory to support its operating system, database, and programming requirements.

3. Data shall be shared between networked Building Controllers.

4. The operating system of the Building Controller shall manage the input and output communication signals to allow distributed controllers to share real and virtual object information, and allow central monitoring and alarms.

5. Controllers that perform scheduling shall have a real-time clock.

6. The Building Controller shall communicate with other BACnet objects on the internet work using the Read (Execute and Initiate) and Write (Execute and Initiate) Property services as defined in Clauses 15.5 and 15.8, respectively, of ASHRAE Standard 135-95.

Building Controller BACnet Services	*Initiate*	*Execute*
Acknowledge Alarms	--	x
Confirmed COV Notification	x	x
Confirmed Event Notification	x	x
Get Alarm Summary	x	x
Get Enrollment Summary	x	x
Subscribe COV	x	x
Unconfirmed COV Notification	x	x
Unconfirmed Event Notification	x	x
Atomic Read File	--	x
Atomic Write File	--	x
Add List Element	--	x
Remove List Element	--	x
Create Object	--	x
Delete Object	--	x
Read Property	x	x
Read Property Multiple	x	x
Write Property	x	x
Read Range	--	x
Write Property Multiple	x	x
Device Communication Control	--	x
Confirmed Private Transfer	x	x
Unconfirmed Private Transfer	x	x

Reinitialize Device	--	x
Time Synchronization	x	x
Who-Has	--	x
I-Have	x	x
Who-Is	x	x
I-Am	x	x

7. BACnet Functional Groups. The Building Controller shall support the following BACnet functional groups: Clock, Event Initiation, COV Event Response, Files, Device Communication and Time Master.

B. Communication

1. Each Building Controller shall support direct Ethernet or a communications card. The communications card shall be connected to the Building Controller by a PC-104 bus connection. The Building Controller shall be connected to the BACnet network using the ISO 8802-3 (Ethernet) Data Link/ Physical layer protocol.

2. Each Building Controller with a communications card shall perform BACnet routing if connected to a network of Custom Application and Application Specific Controllers.

3. The controller shall provide a service communication port using BACnet Data Link/ Physical layer protocol P-T-P for connection to a hand-held workstation/ and/or modem.

4. The Building Controller secondary communication network shall support BACnet MS/TP.

C. Environment. Controller hardware shall be suitable for the anticipated ambient conditions.

1. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures, and shall be rated for operation at 0°C to 40°C [32°F to 100°F] and 10 to 90% RH.

2. Controllers used in conditioned space shall be mounted in dust-proof enclosures, and shall be rated for operation at 0°C to 50°C [32°F to 120°F].

D. Building Controllers shall be fully peer to peer.

E. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field- removable, modular terminal strips — or to a termination card connected by a ribbon cable.

F. Memory. The Building Controller shall have as a minimum standard SRAM of 256 KB, standard DRAM of 1MB and standard non-volatile 1 MB of flash memory in lieu of EPROM. Memory shall be user extendible through RAM chip sockets and SIMMs for future memory expansion.

G. Immunity to power and noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. The Building Controller shall maintain all database information including BIOS and programming information in the event of a power loss for at least 72 hours. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m [3 ft].

H. Inputs/Outputs.

1. Inputs. Controller input/output board shall support dry contact, 0-5 VDC and 0-10 VDC- voltage, 4-20 MA- current and thermistor-resistive signal types on an individual basis for connecting any status or sensing device. Analog resolution shall be 10-bit A to D.

2. Outputs. Controller input/output board shall support plug-and-play I/O modules or built in HOA modules configured with manual-auto-off override switch, potentiometer and input channel for feedback status or and unrelated analog or digital input. Output supported shall be 0-10 VDC. All HOA's shall be supervised.

3. Diagnostics. Controller input/output board shall have red LEDs providing input status indication.

4. External Power. Controller input/output board shall have one on-board 24 VDC terminal for directly connected active transducers.

5. Building Controller shall have the capability to create, delete and support the following BACnet Objects:
   a. ANALOG INPUT, ANALOG OUTPUT AND ANALOG VALUE: These objects shall have the following writeable properties: Object Name; Object Value; Description; COV Increment; Out of Service and Units. In addition, these objects shall support the properties: Device type; Reliability; Min. /Max. Values; Update Interval and Resolution.
   b. BINARY INPUT, BINARY OUTPUT AND BINARY VALUE: These objects shall have the following writeable properties: Object Name; Object Value; Description; Polarity; Default Value; Min On/Off and Out of Service. In addition, these objects shall support the properties: Device Type; Reliability; Active/Inactive Texts; Update Interval; Resolution; Change-of-State Time; Count Times and Time Reset.
   c. CALENDAR: This object shall have the following writeable properties: Object Name; Object Value; Description; and Date List.
   d. DEVICE: This object shall have the following writeable properties: Object Name; Description; Location; and UTC Offset.
   e. EVENT ENROLMENT: This object shall have the following writeable properties: Object Name; Object Value; Description; Out-of-Service; Event & Notify Types; Parameters; Property Ref; Enable; and Notification Class.
   f. FILE: This object shall have the following writeable properties: Object Name; Description; File Type; and File Access.
   g. LOOP (PID): This object shall have the following writeable properties: Object Name; Object Value; Description; Polarity; Output and Input Refs.; Input Value & Units; Setpoint Value; PID Values; Bias; Write Priority and COV Increment. In addition, this object shall support the properties: Reliability; Update Interval; Proportional Constant & Units; Derivatives Constant & Units.
   h. NOTIFICATION CLASS: This object shall have the following writeable properties: Object Name; Object Value; Description; Priority and Ack Required.
   i. PROGRAM: This object shall have the following writeable properties: Object Name; Object Value and Description. In addition, this object shall support the property Reliability.
   j. SCHEDULE: This object shall have the following writeable properties: Object Name; Object Value and Description; Effective period; Schedule; Exception; Controlled Properties and Write Properties.
   k. TREND LOG: This object shall have the following writeable properties: Object Name; Description; Log Enable; Start/stop Times; Log Device Object Property; Log Interval; Stop When Full; Buffer Size; and Record Count.

2.6 CUSTOM APPLICATION CONTROLLERS

A. General. Provide an adequate number of Programmable Application Controllers to achieve the performance specified in the Part 1 Article on "System Performance." Each of these panels shall meet the following requirements.

1. The Custom Application Controller shall have sufficient memory to support its operating system, database, and programming requirements.

2. Custom Application Controllers shall be fully peer to peer.

3. The operating system of the Controller shall manage the input and output communication signals to allow distributed controllers to share real and virtual object information, and allow central monitoring and alarms.

4. All equipment that requires scheduling shall be scheduled in that equipments controller.

5. The Custom Application Controller shall communicate with other BACnet objects on the internet work using the Read (Execute and Initiate) and Write (Execute and Initiate) Property services as defined in Clauses 15.5 and 15.8, respectively, of ASHRAE Standard 135-95.

6. Both firmware and controller database shall be loadable over the network.

B. Communication.

1. Each Custom Application Controller shall reside on a BACnet network using the MS/TP or Ethernet Data Link/ Physical layer protocol.

2. The controller shall provide a service communication port using BACnet Data Link/ Physical layer protocol for connection to portable operator's workstation and allow access to the entire network.

C. Environment. Controller hardware shall be suitable for the anticipated ambient conditions.

1. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures, and shall be rated for operation at 0°C to 40°C [32°F to 100°F].

2. Controllers used in conditioned space shall be mounted in dust-proof enclosures, and shall be rated for operation at 0°C to 50°C [32°F to 120°F].

D. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips — or to a termination card connected by a ribbon cable.

E. Memory. The Custom Application Controller shall be non-volatile FLASH memory.

F. Immunity to power and noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to120 Hz and from keyed radios up to 5 W at 1 m [3 ft].

2.7 APPLICATION SPECIFIC CONTROLLERS

A. General. Application Specific Controllers (ASCs) are microprocessor-based DDC controllers which through hardware or firmware design are able to control a wide variety of equipment. They are fully user-programmable, and are not restricted to any one type of equipment. Application Specific Controllers shall communicate with other BACnet objects on the internet work using the Read (Execute) Property service as defined in Clause 15.5 of ASHRAE Standard 135-95.

1. Each ASC shall be capable of standalone operation and shall continue to provide control functions without being connected to the network

2. Each ASC will contain sufficient I/O capacity to control the target system.

3. Both firmware and controller database shall be loadable over the network

4. Application Specific Controllers shall be fully peer to peer

5. ASC's shall come with an integrated housing to allow for easy mounting and protection of the circuit board. Only wiring terminals shall be exposed.

B. Communication

1. The controller shall reside on a BACnet network using the MS/TP Data Link/ Physical layer protocol.

2. Each controller shall have a BACnet Data Link/ Physical layer compatible connection for a laptop computer or a portable operator's tool. This connection shall be extended to a space temperature sensor port where shown and allow access to the entire network.

3. Each controller shall have a secondary sub network for communicating sensors or I/O expansion modules

C. Environment. The hardware shall be suitable for the anticipated ambient conditions.

1. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures, and shall be rated for operation at -40°C to 65°C [-40°F to 150°F] and/or suitably installed in a heated or fan cooled enclosure

2. Controllers used in conditioned space shall be mounted in dust-proof enclosures, and shall be rated for operation at 0°C to 50°C [32°F to 120°F].

D. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips.

E. Memory. The Application Specific Controller shall use non-volatile memory and maintain all BIOS and programming information in the event of a power loss.

F. Immunity to power and noise. ASC shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80%. Operation shall be protected against electrical noise of 5-120 Hz and from keyed radios up to 5 W at 1 m [3 ft].

G. Transformer. Power supply for the ASC must be rated at minimum of 125% of ASC power consumption, and shall be fused or current limiting type.

H. Input/Output. ASC shall support as a minimum, directly connected, a combination of analog outputs and binary outputs and universal software selectable analog or digital inputs. ASC inputs shall support 0-5 VDC-voltage, 4-20mA-current, thermistor-resistance and dry contacts. ASC outputs shall support 0-10 VDC-voltage, digital triac rated at 0.5 amps at 24 VAC

I. System Object Capacity. The system size shall be expandable to at least twice the number of input/output objects required for this project. Additional controllers (along with associated devices and wiring) shall be all that is necessary to achieve this capacity requirement. The operator interfaces installed for this project shall not require any hardware additions or software revisions in order to expand the system.

2.8 INPUT/OUTPUT INTERFERENCE

A. Hardwired inputs and output points/objects may be wired into the system through Building, Custom Application, or Application Specific Controllers.

B. All input and output points shall be protected such that shorting of the point to itself, to another point, or to ground, will cause no damage to the controller. All input and output points shall be protected from voltage up to 24 volts of any duration, such that contact with this voltage will cause no damage to the controller.

C. Digital inputs shall allow the monitoring of ON/OFF signals from remote devices. The digital inputs shall provide a current of at least 12 MA to be compatible with commonly available control devices, and shall be protected against the effects of contact bounce and noise. Digital inputs shall sense “dry contact” closure without external power (other than that provided by the controller) being applied.

D. Analog inputs shall allow the monitoring of 0-5 VDC, 0-10 VDC-voltage, 4-20 MA-current, or thermistors. Analog inputs shall be compatible, and be field configurable to commonly available sensing devices.

E. Digital outputs shall provide for ON/OFF operation. Digital outputs on Building and Custom Application Controllers shall have three-position override switches, Hand-Off-Auto with status lights. Outputs shall be selectable for either normally open or normally closed operation.

F. Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide a 0 to 10 VDC signal as required to provide proper control of the output device. Analog outputs on Building or Custom Application Controllers shall have status lights and a two-position (AUTO/MANUAL) switch and manually adjustable potentiometer for manual override. Analog outputs shall not exhibit a drift of greater than 0.4% of range per year.

G. Tri-State Outputs. Provide tri-state outputs (two coordinated binary outputs) for control of three-point floating type electronic actuators without feedback. Use of three-point floating devices shall be limited to zone control and terminal unit control applications (VAV terminal units, duct mounted heating coils, zone dampers, radiation, etc.)

H. Input/Output points/objects shall be universal type, i.e., controller input or output may be designated (in software) as either a binary or analog type point/object with appropriate properties. Application Specific Controllers are exempted from this requirement.

I. System Object Capacity. The system size shall be expandable to at least twice the number of input/output objects required for this project. Additional controllers (along with associated devices

and wiring) shall be all that is necessary to achieve this capacity requirement. The operator interfaces installed for this project shall not require any hardware additions or software revisions in order to expand the system.

2.9 POWER SUPPLIES AND LINE FILTERING

A. Control transformers shall be UL Listed. Furnish Class 2 current-limiting type, or furnish over-current protection in both primary and secondary circuits for Class 2 service per NEC requirements. Limit connected loads to 80% of rated capacity.

1. DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100 microsecond response time for 50% load changes. Unit shall have built-in over-voltage and over-current protection, and shall be able to withstand a 150% current overload for at least 3 seconds without trip-out or failure.
   a. Unit shall operate between 0°C and 50°C [32°F and 120°F]. EM/RF shall meet FCC Class B and VDE 0871 for Class B, and MIL-STD 810C for shock and vibration.
   b. Line voltage units shall be UL Recognized and CSA Approved.

B. Power line filtering.

1. Provide transient voltage and surge suppression for all workstations and controllers either internally or as an external component. Surge protection shall have the following at a minimum:
   a. dielectric strength of 1,000 volts minimum
   b. response time of 10 nanoseconds or less
   c. transverse mode noise attenuation of 65 dB or greater
   d. Common mode noise attenuation of 150 dB or better at 40 Hz to 100 Hz.

2.10 AUXILIARY CONTROL DEVICES

A. Motorized control dampers, unless otherwise specified elsewhere, shall be as follows:

1. Control dampers shall be parallel or opposed blade type as below or as scheduled on drawings.
   a. Outdoor and/or return air mixing dampers and face and bypass (F&BP) dampers shall be parallel blade, arranged to direct air-streams toward each other.
   b. Other modulating dampers shall be opposed blade type.
   c. Two-position shutoff dampers may be parallel or opposed blade type with blade and side seals.

2. Damper frames shall be 13 gauge galvanized steel channel or 1/8" extruded aluminum with reinforced corner bracing.

3. Damper blades shall not exceed 20 cm [8"] in width or 125 cm [48"] in length. Blades are to be suitable for medium velocity performance (10 m/s [2,000 fpm]). Blades shall be not less than 16 gauge.

4. Damper shaft bearings shall be as recommended by manufacturer for application, Oilite or better.

5. All blade edges and top and bottom of the frame shall be provided with replaceable butyl rubber or neoprene seals. Side seals shall be spring-loaded stainless steel. The blade seals shall provide for a maximum leakage rate of 50 L/s·m² [10 cfm per sq. ft.] at 1000 Pa [4" W.C.] differential pressure. Provide air foil blades suitable for a wide-open face velocity of 7.5 m/s [1,500 fpm].

6. Individual damper sections shall not be larger than 125 cm x 150 cm [48" x 60”]. Provide a minimum of one damper actuator per section.

7. Modulating dampers shall provide a linear flow characteristic where possible.

8. Dampers shall have exposed linkages.

B. Electric damper actuators.

1. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator.

2. Where shown, for power-failure/safety applications, an internal mechanical, spring-return mechanism shall be built into the actuator housing.

3. All rotary spring-return actuators shall be capable of either clockwise or counter-clockwise spring-return operation. Linear actuators shall spring-return to the retracted position.

4. Proportional actuators shall accept a 0 to 10 VDC or 2 to 10vdc operating range.

5. All 24 VAC/VDC actuators shall operate on Class 2 wiring and shall not require more than 10 VA for AC or more than 8 W for DC applications. Actuators operating on 120 VAC or 230 VAC shall not require more than 11 VA.

6. All non-spring-return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring-return actuators with more than 7 N·m [60 in-lb] torque capacity shall have a manual crank for this purpose.

7. Actuators shall be provided with a raceway fitting and a minimum 1m electrical cable and shall be pre-wired to eliminate the necessity of opening the actuator housing to make electrical connections

8. Actuators shall be UL Standard 873 Listed and CSA Class 4813 02 Certified as meeting correct safety requirements and recognized industry standards.

9. Actuators shall be designed for a minimum of 60,000 full-stroke cycles at the actuator's rated torque.

E. Binary Temperature Devices

1 Low-voltage space thermostat shall be 24 V, bimetal-operated, mercury-switch type, with either adjustable or fixed anticipation heater, concealed setpoint adjustment, 13°C to 30°C [55°F to 85°F] setpoint range, 1°C [2°F] maximum differential, and vented ABS plastic cover.

2 Line-voltage space thermostat shall be bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch type, or equivalent solid-state type, with heat anticipator, UL listed for

electrical rating, concealed setpoint adjustment, 13°C to 30°C [55°F to 85°F] setpoint range, 1°C [2°F] maximum differential, and vented ABS plastic cover.

3 Low-limit thermostats. Low-limit thermostats shall be vapor pressure type with an element 6 m [20 ft] minimum length. Element shall respond to the lowest temperature sensed by any 30 cm [1 ft] section. The low-limit thermostat shall be manual reset only and be supplied as DPST.

F. Temperature sensors.

1. Temperature sensors shall be thermistors.

2. Duct sensors shall be rigid or averaging as shown. Averaging sensors shall be a minimum of 1.5 m [5 feet] in length.

3. Immersion sensors shall be provided with a separable brass well. Pressure rating of well is to be consistent with the system pressure in which it is to be installed.

4. Space sensors shall be equipped with the following:

a. programmable buttons for setpoint adjustment and override

b. 3-value, 96-segement LCD display

c. communication port connected to entire network

5. Provide matched temperature sensors for differential temperature measurement.

G. Humidity sensors.

1. Duct and room sensors shall have a sensing range of 20% to 80%.

2. Duct sensors shall be provided with a sampling chamber.

3. Outdoor air humidity sensors shall have a sensing range of 20% to 95% RH. They shall be suitable for ambient conditions of -40°C to 75°C [-40°F to 170°F].

4. Humidity sensor's drift shall not exceed 3% of full scale per year.

H. Flow switches.

1 Flow-proving switches shall be either paddle or differential pressure type, as shown.

2 Paddle type switches (water service only) shall be UL Listed, SPDT snap-acting with pilot duty rating (125 VA minimum). Adjustable sensitivity with NEMA 1 enclosure unless otherwise specified.

3 Differential pressure type switches (air or water service) shall be UL Listed, SPDT snap-acting, pilot duty rated (125 VA minimum), NEMA 1 enclosure, with scale range and differential suitable for intended application, or as specified.

I. Relays.

1. Control relays shall be UL Listed plug-in type with dust cover. Contact rating, configuration, and coil voltage suitable for application

2. Time delay relays shall be UL Listed solid-state plug-in type with adjustable time delay. Delay shall be adjustable ±200% (minimum) from setpoint shown on plans. Contact rating, configuration, and coil voltage suitable for application. Provide NEMA 1 enclosure when not installed in local control panel.

J. Override timers.

1. Override timers shall be spring-wound line voltage UL Listed, contact rating and configuration as required by application. Provide 0-to-6-hour calibrated dial unless otherwise specified; suitable for flush mounting on control panel face, located on local control panels or where shown.

K. Current transmitters

1. AC current transmitters shall be self-powered combination split-core current transformer type with built-in rectifier and high-gain servo amplifier with 0 – 5vdc two-wire output. Unit ranges shall be 10 A, 20 A, 50 A, 100 A, 150 A, and 200 A full scale, internal zero and span adjustment, and ±1% full scale accuracy at 500 ohm maximum burden

2. Transmitter shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized.

3. Unit shall be split-core type for clamp-on installation.

L. Current transformers

1. AC current transformers shall be UL/CSA recognized and completely encased (except for terminals) in approved plastic material.

2. Transformers shall be available in various current ratios and shall be selected for ±1% accuracy at 5 A full scale output.

3. Transformers shall be split-core type for installation on new or existing wiring,

M. Voltage transmitters

1. AC voltage transmitters shall be self-powered single loop (two-wire) type, 4 to 20 MA output with zero and span adjustment.

2. Ranges shall include 100 to 130 VAC, 200 to 250 VAC, 250 to 330 VAC, and 400 to 600 VAC full-scale, adjustable, with ±1% full-scale accuracy with 500 ohm maximum burden.

3. Transmitters shall be UL/CSA recognized at 600 VAC rating and meet or exceed ANSI/ISA S50.1 requirements.

N. Voltage transformers.

1. AC voltage transformers shall be UL/CSA recognized, 600 VAC rated, complete with built-in fuse protection.

2. Transformers shall be suitable for ambient temperatures of 4 to 55°C [40 to 130°F] and shall provide ±0.5% accuracy at 24 VAC and a 5 VA load.

3. Windings (except for terminals) shall be completely enclosed with metal or plastic material.

O. Power monitors.

1. Power monitors shall be three-phase type furnished with three-phase disconnect/shorting switch assembly, UL Listed voltage transformers and UL Listed split-core current transformers

2. Shall provide a selectable rate pulse output for kWh reading and a 1 –5vdc or 4 to 20 MA output for kW reading. Shall operate with 5 A current inputs with a maximum error of ±2% at 1.0 power factor or ±2.5% at 0.5 power factor.

P. Current switches

1. Current-operated switches shall be self-powered, solid-state with adjustable trip current. The switches shall be selected to match the current of the application and output requirements of the DDC system.

Q. Pressure transducers

1. Transducer shall have linear output signal. Zero and span shall be field-adjustable.

2. Transducer sensing elements shall withstand continuous operating conditions of positive or negative pressure 50% greater than calibrated span without damage

3. Water pressure transducer shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Transducer shall be complete with 1 - 5vdc or 4 to 20 MA output, required mounting brackets, and block and bleed valves.

4. Water differential pressure transducer shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Over-range limit (differential pressure) and maximum static pressure shall be 300 psi. Transducer shall be complete with 1 – 5vdc or 4 to 20 MA output, required mounting brackets, and five-valve manifold.

R. Differential pressure type switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum), NEMA 1 enclosure, with scale range and differential suitable for intended application, or as shown.

U. Local control panels

1. All indoor control cabinets shall be fully enclosed NEMA 1 construction with [hinged door], key-lock latch, and removable sub-panels. A single key shall be common to all field panels and sub-panels

2. Interconnections between internal and face-mounted devices pre-wired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL Listed for 600 volt service, individually identified per control/interlock drawings,

with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings

3. Provide 120v receptacle at each local panel location.

2.11 WIRING AND RACEWAYS

A. General: Provide copper wiring, plenum cable, and raceways as specified in the applicable sections of Division 26.

B. All insulated wire to be copper conductors, UL labeled for 90C minimum service.

C. Tubing.

1. Polyethylene. Provide type FR plenum rated polyethylene tubing. Tubing shall be rated for a maximum operating pressure of 200 kPa [30 psi] at 80°C [175°F], with an ambient operating temperature range of -13°C [-10°F] to 65°C [150°F]. Plastic tubing shall have the burning characteristics of linear low-density polyethylene tubing, shall be self-extinguishing when tested in accordance with ASTM D 635, shall have UL 94 V-2 flammability classification, and shall withstand stress cracking when tested in accordance with ASTM D 1693. Plastic-tubing bundles shall be provided with Mylar barrier and flame-retardant polyethylene jacket.

Part 3: Execution

3.0 SECTION INCLUDES

1. Examination
2. Protection
3. Coordination
4. General Workmanship
5. Field Quality Control
6. Existing Equipment
7. Wiring
8. Communication Wiring
9. Fiber Optic Cable
10. Control Air Tubing
11. Installation of Sensors
12. Flow Switch Installation
13. Actuators
14. Warning Labels
15. Identification of Hardware and Wiring
16. Controllers
17. Programming
18. Control System Checkout and Testing
19. Control System Demonstration and Acceptance
20. Cleaning
21. Training
22. Sequences of Operation
23. Point List (Object List)

3.1 EXAMINATION

A. The project plans shall be thoroughly examined for control device and equipment locations. Any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started

B. The Contractor shall inspect the site to verify that equipment may be installed as shown. Any discrepancies, conflicts, or omissions shall be reported to the Engineer for resolution before rough-in work is started

C. The Contractor shall examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequate — or if any discrepancies occur between the plans and the Contractor's work, and the plans and the work of others — the Contractor shall report these discrepancies to the Engineer and shall obtain written instructions for any changes necessary to accommodate the Contractor's work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect of the Contractor to report such discrepancies shall be made by — and at the expense of — this Contractor.

3.2 PROTECTION

A. The Contractor shall protect all work and material from damage by its work or employees, and shall be liable for all damage thus caused

B. The Contractor shall be responsible for its work and equipment until finally inspected, tested, and accepted. The Contractor shall protect any material that is not immediately installed. The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects

3.3 COORDINATION

A. Site

1. Where the mechanical work will be installed in close proximity to, or will interfere with work of other trades, the Contractor shall assist in working out space conditions to make a satisfactory adjustment. If the Contractor installs its work before coordinating with other trades, so as to cause any interference with work of other trades, the Contractor shall make the necessary changes in its work to correct the condition without extra charge

2. Coordinate and schedule work with all other work in the same area, or with work which is dependent upon other work, to facilitate mutual progress.

B. Submittals. Refer to the “Submittals” Article in Part 1 of this specification for requirements

C. Test and Balance

1. The Contractor shall furnish all tools necessary to interface to the control system for test and balance purposes

2. The Contractor shall provide training in the use of these tools. This training will be planned for a minimum of 4 hours

3. In addition, the Contractor shall provide a qualified technician to assist in the test and balance process, until the first 20 terminal units are balanced.

4. The tools used during the test and balance process will be returned at the completion of the testing and balancing

D. Life Safety

1. Duct smoke detectors required for air handler shutdown are supplied and installed under Division 26. The Division 26 Contractor shall interlock smoke detectors to air handlers for shutdown as described in Part 3: “Sequences of Operation”.

2. Smoke dampers and actuators required for duct smoke isolation are provided under another Division 23 Section

3. Fire/smoke dampers and actuators required for fire rated walls are provided under another Division 23 Section. Control of these dampers shall be by Division 16.

E. Coordination with controls specified in other sections or divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated by the Contractor as follows:

1. All communication media and equipment shall be provided as specified in Part 2: "Communication" of this specification.

2. Each supplier of controls product is responsible for the configuration, programming, start-up, and testing of that product to meet the sequences of operation described in this section.

3. The Contractor shall coordinate and resolve any incompatibility issues that arise between the control products provided under this Section and those provided under other sections or divisions of this specification.

3.4 GENERAL WORKMANSHIP

A. Install equipment, piping, and wiring/raceway parallel to building lines (i.e., horizontal, vertical, and parallel to walls) wherever possible.

B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment

C. Install all equipment in readily accessible locations as defined by Part 3, Chapter 1, Article 100, of the 2010 California Electrical Code (CEC).

D. All wiring shall be verified for its integrity to ensure continuity and freedom from shorts and grounds

E. All equipment, installation, and wiring shall comply with acceptable industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

3.5 FIELD QUALITY CONTROL

A. All work, materials, and equipment shall comply with the rules and regulations of applicable local, state, and federal codes and ordinances as identified in Part 1 of this specification

B. Contractor shall continually monitor the field installation for code compliance and quality of workmanship

C. Contractor shall have work inspected by local and/or state/provincial authorities having jurisdiction over the work

3.7 WIRING

A. All control and interlock wiring shall comply with national and local electrical codes and Division 16 of this specification. Where the requirements of this section differ with those in Division 16, the requirements of this section shall take precedence

B. All NEC Class 1 (line voltage) wiring shall be UL Listed in approved raceway per CEC and Division 26 requirement

C. All low-voltage wiring shall meet NEC Class 2 requirements. (Low-voltage power circuits shall be sub-fused when required to meet Class 2 current-limit.)

D. Where NEC Class 2 (current-limited) wires are in concealed and accessible locations including ceiling return air plenum, approved cables not in raceway may be used, provided that cables are UL

Listed for the intended application. For example, cables used in ceiling plenum shall be UL Listed specifically for that purpose.

E. All wiring in mechanical, electrical, or service rooms — or where subject to mechanical damage — shall be installed in raceway at levels below 3m [10ft].

F. Do not install Class 2 wiring in raceway containing Class 1 wiring. Boxes and panels containing high-voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two (e.g., relays and transformers).

G. Do not install wiring in raceway containing tubing

H. Where Class 2 wiring is run exposed, wiring is to be run parallel along a surface or perpendicular to it, and *neatly* tied at 2m [6ft] intervals

I. Where plenum cables are used without raceway, they shall be supported from or anchored to structural members. Cables shall not be supported by or anchored to ductwork, electrical raceways, piping, or ceiling suspension systems

J. All wire-to-device connections shall be made at a terminal block or terminal strip. All wire-to-wire connections shall be at a terminal block.

K. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals

L. Maximum allowable voltage for control wiring shall be 120 V. If only higher voltages are available, the Contractor shall provide step-down transformers.

M. All wiring shall be installed as continuous lengths, with no splices permitted between termination points/objects

N. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations

O. Size of raceway and size and type of wire shall be the responsibility of the Contractor, in keeping with the manufacturer's recommendation and NEC requirements, except as noted elsewhere.

P. Include one pull string in each raceway 2.5 cm [1"] or larger

Q. Use coded conductors throughout with different colored conductors

R. Control and status relays are to be located in designated enclosures only. These enclosures include packaged equipment control panel enclosures unless they also contain Class 1 starters.

S. Conceal all raceways, except within mechanical, electrical, or service rooms. Install raceway to maintain a minimum clearance of 15cm [6”] from high-temperature equipment (e.g., steam pipes or flues).

T. Secure raceways with raceway clamps fastened to the structure and spaced according to code requirements. Raceways and pull boxes may not be hung on flexible duct strap or tie rods. Raceways may not be run on or attached to ductwork.

U. Adhere to Division 16 requirements where raceway crosses building expansion joints

V. Install insulated bushings on all raceway ends and openings to enclosures. Seal top end of all vertical raceways.

W. The Contractor shall terminate all control and/or interlock wiring, and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site

X. Flexible metal raceways and liquid-tight, flexible metal raceways shall not exceed 1 m [3 ft] in length and shall be supported at each end. Flexible metal raceway less than ½ "electrical trade size shall not be used. In areas exposed to moisture — including chiller and boiler rooms — liquid-tight, flexible metal raceways shall be used.

Y. Raceway must be rigidly installed, adequately supported, properly reamed at both ends, and left clean and free of obstructions. Raceway sections shall be joined with couplings (per code). Terminations must be made with fittings at boxes, and ends not terminating in boxes shall have bushings installed

3.8 COMMUNICATION WIRING

A. The Contractor shall adhere to the items listed in the "Wiring" Article in Part 3 of the specification

B. All cabling shall be installed in a neat and workmanlike manner. Follow manufacturer's installation recommendations for all communication cabling.

C. Do not install communication wiring in raceway and enclosures containing Class 1 or other Class 2 wiring

D. Maximum pulling, tension, and bend radius for cable installation as specified by the cable manufacturer shall not be exceeded during installation.

E. Contractor shall verify the integrity of the entire network following the cable installation. Use appropriate test measures for each particular cable.

F. When a cable enters or exits a building, a lightning arrestor must be installed between the lines and ground. The lighting arrestor shall be installed according to the manufacturer's instructions

G. All runs of communication wiring shall be unspliced length when that length is commercially available

H. All communication wiring shall be labeled to indicate origination and destination data.

I. Grounding of coaxial cable shall be in accordance with NEC regulations Article on Communications Circuits, Cable and Protector Grounding

3.10 INSTALLATION OF SENSORS

A. Install all sensors in accordance with the manufacturer's recommendations.

B. Mount sensors rigidly and adequately for the environment within which the sensor operates

C. Room temperature sensors shall be installed on concealed junction boxes properly supported by the wall framing

D. All wires attached to sensors shall be air sealed in their raceways or in the wall to stop air transmitted from other areas affecting sensor readings

E. Sensors used in mixing plenums, and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner vertically across duct. Each bend shall be supported with a capillary clip

F. Low limit sensors used in mixing plenums shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip. Provide 3 m of sensing element for each 1 m^2 [1 ft of sensing element for each 1 ft^2] of coil area

G. All pipe-mounted temperature sensors shall be installed in wells. Install all liquid temperature sensors with heat-conducting fluid in thermal wells.

H. Install outdoor air temperature sensors on north wall complete with sun shield at designated location.

I. Differential air static pressure

1. Supply Duct Static Pressure: Pipe the high-pressure tap to the duct using a pitot tube. Pipe the low-pressure port to a tee in the high-pressure tap tubing of the corresponding building static pressure sensor (if applicable), or to the location of the duct high-pressure tap and leave open to the plenum.

2. Return Duct Static Pressure: Pipe the low-pressure tap to the duct using a pitot tube. Pipe the low-pressure port to a tee in the high-pressure tap tubing of the corresponding building static pressure sensor

3. Building Static Pressure: Pipe the low-pressure port of the pressure sensor to the static pressure port located on the outside of the building through a high-volume accumulator. Pipe the high-pressure port to a location behind a thermostat cover at the specified location

4. The piping to the pressure ports on all pressure transducers shall contain a capped test port located adjacent to the transducer

5. All pressure transducers, other than those controlling VAV boxes, shall be located in field device panels, not on the equipment monitored or on ductwork. Mount transducers in a location accessible for service without use of ladders or special equipment

6. All air and water differential pressure sensors shall have gauge tees mounted adjacent to the taps. Water gauges shall also have shutoff valves installed before the tee

3.11 FLOW SWITCH INSTALLATION

A. .Use correct paddle for pipe diameter.

B. Adjust flow switch in accordance with manufacturer’s instructions

3.12 ACTUATORS

A. Mount and link control damper actuators per manufacturer's instructions.

1. To compress seals when spring-return actuators are used on normally closed dampers, power actuator to approximately 5° open position, manually close the damper, and then tighten the linkage

2. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.

3. Provide all mounting hardware and linkages for actuator installation.

B. Electric/Electronic

1. Dampers: Actuators shall be direct-mounted on damper shaft or jackshaft unless shown as a linkage installation. For low-leakage dampers with seals, the actuator shall be mounted with a minimum 5° available for tightening the damper seals. Actuators shall be mounted following manufacturer's recommendations

3.13 WARNING LABELS

A. Permanent warning labels shall be affixed to all equipment which can be automatically started by the DDC system

1. Labels shall use white lettering (12-point type or larger) on a red background.

2. Warning labels shall read as follows:

C A U T I O N
This equipment is operating under automatic control
and may start or stop at any time without warning.
Switch disconnects to “Off” position before servicing.

B. Permanent warning labels shall be affixed to all motor starters and all control panels which are connected to multiple power sources utilizing separate disconnects.

1. Labels shall use white lettering (12-point type or larger) on a red background.

2. Warning labels shall read as follows

C A U T I O N
This equipment is fed from more than one
power source with separate disconnects.
Disconnect all power sources before servicing.

3.14 IDENTIFICATION OF HARDWARE AND WIRING

A. All wiring and cabling, including that within factory-fabricated panels, shall be labeled at each end within 5 cm [2"] of termination with the DDC address or termination number.

B. All pneumatic tubing shall be labeled at each end within 5 cm [2"] of termination with a descriptive identifier.

C. Permanently label or code each point/object of field terminal strips to show the instrument or item served.

D. Identify control panels with minimum 1 cm [½"] letters on laminated plastic nameplates.

E. Identify all other control components with permanent labels. All plug-in components shall be labeled such that removal of the component does not remove the label.

F. Identify room sensors relating to terminal box or valves with nameplates.

G. Manufacturers' nameplates

H. Identifiers shall match record documents

3.15 CONTROLLERS

A. Provide a separate controller for each AHU or other HVAC system. A DDC controller may control more than one system provided that all points/objects associated with the system are assigned to the same DDC controller. Points/objects used for control loop reset such as outside air or space temperature are exempt from this requirement.

B. Building Controllers and Custom Application Controllers shall be selected to provide a minimum of 15% spare I/O point/object capacity for each point/object type found at each location. If input /objects are not universal, 15% of each type is required. If outputs are not universal, 15% of each type is required. A minimum of one spare is required for each type of point/object used.

1. Future use of spare capacity shall require providing the field device, field wiring, point/object database definition, and custom software. No additional controller boards or point/object modules shall be required to implement use of these spare points

3.16 PROGRAMMING

A. Provide sufficient internal memory for the specified sequences of operation and trend logging. There shall be a minimum of 25% of available memory free for future use.

B. Point/object Naming: System point/object names shall be modular in design, allowing easy operator interface without the use of a written point/object index. Use the following naming convention:

AAABBBCCCDDDEEE where:

AAA is used to designate the location of the point/object within the building such as mechanical room, wing, or level, or the building itself in a multi-building environment.

BBB is used to designate the mechanical system with which the point/object is associated (e.g., A01, HTG, CLG, and LTG).

*CC*C represents the equipment or material referenced (e.g., SAF for supply air fan, EXF for exhaust fan, RAF for return air fan).

D or *DD* or *DDD* may be used for clarification or for identification if more than one of CCC exists (e.g., SAF10, EXF121).

EE represents the action or state of the equipment or medium (e.g., T for temperature, RH for humidity, CO for control, S for status, and D for damper control, I for current).

C. Software Programming

1. Provide programming for the system and adhere to the sequences of operation provided. All other system programming necessary for the operation of the system, but not specified in this document, also shall be provided by the Contractor. Imbed into the control program sufficient comment statements to clearly describe each section of the program. The comment statements shall reflect the language used in the sequences of operation. Use the appropriate technique based on the following programming types:
   a. Text-based:
      i. must provide actions for all possible situations
      ii. must be modular and structured
      iii. must be commented
   b. Graphic-based
      i. must provide actions for all possible situations
      ii. must be documented
   c. Parameter-based
      i. must provide actions for all possible situations
      ii. must be documented

D. Operator Interface

1 Standard Graphics. Provide graphics for all mechanical systems and floor plans of the building. This includes each chilled water system, hot water system, chiller, boiler, air handler, and all terminal equipment. Point/object information on the graphic displays shall dynamically update. Show on each graphic all input and output points/objects for the system. Also show relevant calculated points/objects such as setpoints

2 Show terminal equipment information on a “graphic” summary table. Provide dynamic information for each point/object show

3 The Contractor shall provide all the labor necessary to install, initialize, start up, and troubleshoot all operator interface software and their functions as described in this section. This includes any operating system software, the operator interface database, and any third-party software installation and integration required for successful operation of the operator interface

3.17 CONTROL SYSTEM CHECKOUT AND TESTING

A. Start-up Testing: All testing listed in this article shall be performed by the Contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the Owner’s Representative is notified of the system demonstration.

1. The Contractor shall furnish all labor and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification

2. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight

3. Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures per manufacturers' recommendations

4. Verify that all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starters, etc.) operate properly and that the normal positions are correct

5. Verify that all analog output devices (I/Ps, actuators, etc.) are functional, that start and span are correct, and that direction and normal positions are correct. The Contractor shall check all control valves and automatic dampers to ensure proper action and closure. The Contractor shall make any necessary adjustments to valve stem and damper blade travel

6. Verify that the system operation adheres to the Sequences of Operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops and optimum Start/Stop routines.

7. Alarms and Interlocks

    a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm

    b. Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.

    c. Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action

3.18 CONTROL SYSTEM DEMONSTRATION AND ACCEPTANCE

A. Demonstration

1. Prior to acceptance, the control system shall undergo a series of performance tests to verify operation and compliance with this specification. These tests shall occur after the Contractor has completed the installation, started up the system, and performed its own tests

2. The tests described in this section are to be performed in addition to the tests that the Contractor performs as a necessary part of the installation, startup, and debugging process and as specified in the "Control System Checkout and Testing" Article in Part 3 of this specification. The Engineer will be present to observe and review these tests. The Engineer shall be notified at least 10 days in advance of the start of the testing procedures.

3. The demonstration process shall follow that approved in Part 1: "Submittals." The approved checklists and forms shall be completed for all systems as part of the demonstration

4. The Contractor shall provide at least two persons equipped with two-way communication, and shall demonstrate actual field operation of each control and sensing point for all modes of operation including day, night, occupied, unoccupied, fire/smoke alarm, seasonal changeover, and power failure modes. The purpose is to demonstrate the calibration, response, and action of every point/object and system. Any test equipment required to prove the proper operation shall be provided by and operated by the Contractor.

5. As each control input and output is checked, a log shall be completed showing the date, technician's initials, and any corrective action taken or needed.

6. Demonstrate compliance with Part 1: “System Performance

7. Demonstrate compliance with Sequences of Operation through all modes of operation

8. Demonstrate complete operation of Operator Interface

9. Additionally, the following items shall be demonstrated:

    a. DDC Loop Response. The Contractor shall supply trend data output in a graphical form showing the step response of each DDC loop. The test shall show the loop's response to a change in setpoint, which represents a change of actuator position of at least 25% of its full range. The sampling rate of the trend shall be from 10 seconds to 3 minutes, depending on the speed of the loop. The trend data shall show for each sample the setpoint, actuator position, and controlled variable values. Any loop that yields unreasonably under-damped or over-damped control shall require further tuning by the Contractor.

    b. Demand limiting. The Contractor shall supply a trend data output showing the action of the demand-limiting algorithm. The data shall document the action on a minute-by-minute basis over at least a 30-minute period. Included in the trend shall be building kW, demand limiting setpoint, and the status of sheddable equipment outputs

    c. Optimum Start/Stop. The Contractor shall supply a trend data output showing the capability of the algorithm. The hour-by-hour trends shall include the output status of all optimally started and stopped equipment, as well as temperature sensor inputs of affected areas

    d. Interface to the building fire alarm system

    e. Operational logs for each system that indicate all setpoints, operating points, valve positions, mode, and equipment status shall be submitted to the Architect/Engineer. These logs shall cover three 48-hour periods and have a sample frequency of not more than 10 minutes. The logs shall be provided in both printed and disk formats.

10. Any tests that fail to demonstrate the operation of the system shall be repeated at a later date. The Contractor shall be responsible for any necessary repairs or revisions to the hardware or software to successfully complete all tests.

B. Acceptance

1. All tests described in this specification shall have been performed to the satisfaction of both the Engineer and Owner prior to the acceptance of the control system as meeting the requirements of Completion. Any tests that cannot be performed due to circumstances beyond the control of the Contractor may be exempt from the Completion requirements if stated as such in writing by the Engineer. Such tests shall then be performed as part of the warranty.

2. The system shall not be accepted until all forms and checklists completed as part of the demonstration are submitted and approved as required in Part 1: “Submittals

3.19 CLEANING

A. The Contractor shall clean up all debris resulting from its activities daily. The Contractor shall remove all cartons, containers, crates, etc., under its control as soon as their contents have been removed. Waste shall be collected and placed in a designated location

B. At the completion of work in any area, the Contractor shall clean all of its work, equipment, etc., keeping it free from dust, dirt, and debris, etc.

C. At the completion of work, all equipment furnished under this section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas

3.20 TRAINING

A. Provide a minimum of one onsite training class 8 hours in length during the construction period for personnel designated by the owner.

B. Provide two additional training sessions at 6 and 12 months following building's turnover. Each session shall be 8 hrs in length and must be coordinated with the building Owner

C. Train the designated staff of Owner's Representative and Owner to enable them to:

1. Day-to-day Operators:
   a. Proficiently operate the system
   b. Understand control system architecture and configuration
   c. Understand DDC system components
   d. Understand system operation, including DDC system control and optimizing routines (algorithms)
   e. Operate the workstation and peripherals
   f. Log on and off the system
   g. Access graphics, point/object reports, and logs
   h. Adjust and change system setpoints, time schedules, and holiday schedules
   i. Recognize malfunctions of the system by observation of the printed copy and graphical visual signals
   j. Understand system drawings, and Operation and Maintenance manual
   k. Understand the job layout and location of control components
   l. Access data from DDC controllers and ASC
   m. Operate portable operator's terminals

2. Advanced Operators:
   a. Make and change graphics on the workstation
   b. Create, delete, and modify alarms, including annunciation and routing of these
   c. Create, delete, and modify point/object trend logs, and graph or print these
   d. Create, delete, and modify reports
   e. Add, remove, and modify system's physical points/objects
   f. Create, modify, and delete programming
   g. Add panels when required
   h. Add operator interface stations
   i. Create, delete, and modify system displays — both graphical and otherwise
   j. Perform DDC system field checkout procedures
   k. Perform DDC controller unit operation and maintenance procedures
   l. Perform workstation and peripheral operation and maintenance procedures
   m. Perform DDC system diagnostic procedures
   n. Configure hardware including PC boards, switches, communication, and I/O points/objects
   o. Maintain, calibrate, troubleshoot, diagnose, and repair hardware

p. Adjust, calibrate, and replace system components

3. System Managers/Administrators:
   a. Maintain software and prepare backups
   b. Interface with job-specific, third-party operator software
   c. Add new users and understand password security procedures

E. Provide course outline and materials as per “Submittals” Article in Part 1 of this specification. The instructor(s) shall provide one copy of training material per student.

F. The instructor(s) shall be factory-trained instructors experienced in presenting this material.

G. Classroom training shall be done using a network of working controllers representative of the installed hardware

SEQUENCES OF OPERATION
As noted on Plans

Instructions to Other Contractors

CONTROL DAMPER INSTALLATION

A. Damper submittals shall be coordinated for type, quantity, and size to ensure compatibility with sheet metal design

B. Duct openings shall be free of any obstruction or irregularities that might interfere with blade or linkage rotation or actuator mounting. Duct openings shall measure ¼ ” larger than damper dimensions and shall be square, straight, and level

C. Individual damper sections, as well as entire multiple section assemblies, must be completely square and free from racking, twisting, or bending. Measure diagonally from upper corners to opposite lower corners of each damper section. Both dimensions must be within 0.3 cm [1/8"] of each other

D. Follow manufacturer's instructions for field installation of control dampers. Unless specifically designed for vertical blade application, dampers must be mounted with blade axis horizontal

E. Install extended shaft or jackshaft per manufacturer's instructions. (Typically, a sticker on the damper face shows recommended extended shaft location. Attach shaft on labeled side of damper to that blade.)

F. Damper blades, axles, and linkage must operate without binding. Before system operation, cycle damper after installation to assure proper operation. On multiple section assemblies, all sections must open and close simultaneously.

G. Provide a visible and accessible indication of damper position on the drive shaft end.

H. Support ductwork in area of damper when required to prevent sagging due to damper weight

I. After installation of low-leakage dampers with seals, caulk between frame and duct or opening to prevent leakage around perimeter of damper.

CONTROLS COMMUNICATION PROTOCOL

A. General. The electronic controls packaged with this equipment shall communicate with the building direct digital control (DDC) system. The DDC system shall communicate with these controls to read the information and change the control setpoints as shown in the points/object list, sequences of operation, and control schematics. The information to be communicated between the DDC system and these controls shall be in the standard object format as defined in ASHRAE Standard 135-1995 (BACnet). Controllers shall communicate with other BACnet objects on the internet work using the Read (Execute) Property service as defined in Clause 15.5 of ASHRAE Standard 135-95.

B. Distributed Processing. The Controller shall be capable of standalone operation and shall continue to provide control functions without being connected to the network

C. I/O Capacity. The Controller shall contain sufficient I/O capacity to control and monitor the target system

D. Communication. The Controller shall reside on a BACnet network using the MS/TP Data Link/ Physical layer protocol. Each network of controllers shall be connected to one Building Controller

E. The Controller shall have a BACnet Data Link/ Physical layer compatible connection for a laptop computer or a portable operator's tool.

F. Environment. The hardware shall be suitable for the anticipated ambient conditions.

G. Controllers used in conditioned space shall be mounted in dust-proof enclosures, and shall be rated for operation at 0°C to 50°C [32°F to 120°F].

H. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable

I. Memory. The Controller shall maintain all BIOS and programming information in the event of a power loss for at least 3 days

J. Immunity to Power and Noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80%. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m [3 ft].

K. Transformer. Power supply for the Controller must be rated at minimum of 125% of ASC power consumption, and shall be fused or current limiting type

L. Protocol Implementation Conformance Statement (PICS). Supplier of the electronic controls packaged with this equipment shall provide to the controls contractor a PICS list, complete with object list and wiring diagrams for proper and complete interface

STARTUP AND CHECKOUT PROCEDURES

A. Start up, check out, and test all hardware and software, and verify communication between all components

1. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.

2. Verify that all analog and binary input/output points/objects read properly.

3. Verify alarms and interlocks

4. Verify operation of the integrated system

END OF SECTION 230900

SECTION 232300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

1.3 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air-Conditioning Applications: 300 psig (2068 kPa).
2. Suction Lines for Heat-Pump Applications: 535 psig (3689 kPa).
3. Hot-Gas and Liquid Lines: 535 psig (3689 kPa).

1.4 SUBMITTALS

A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:

1. Thermostatic expansion valves.
2. Solenoid valves.
3. Hot-gas bypass valves.
4. Filter dryers.
5. Strainers.
6. Pressure-regulating valves.

B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.

1. Shop Drawing Scale: 1/8 inch equals 1 foot (1:25).
2. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

C. Welding certificates.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.6 PRODUCT STORAGE AND HANDLING

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

1.7 COORDINATION

A. Coordinate size and location of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 88, Type K or L (ASTM B 88M, Type A or B).

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

E. Brazing Filler Metals: AWS A5.8.

F. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).

5. Maximum Operating Temperature: 250 deg F (121 deg C).

2.2 VALVES AND SPECIALTIES

A. Service Valves:

1. Body: Forged brass with brass cap including key end to remove core.
2. Core: Removable ball-type check valve with stainless-steel spring.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Copper spring.
5. Working Pressure Rating: 500 psig (3450 kPa).

B. Thermostatic Expansion Valves: Comply with ARI 750.

1. Body, Bonnet, and Seal Cap: Forged brass or steel.
2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Packing and Gaskets: Non-asbestos.
4. Capillary and Bulb: Copper tubing filled with refrigerant charge.
5. Suction Temperature: 40 deg F (4.4 deg C).
6. Reverse-flow option (for heat-pump applications).
7. End Connections: Socket, flare, or threaded union.
8. Working Pressure Rating: 450 psig (3100 kPa).

C. Moisture/Liquid Indicators:

1. Body: Forged brass.
2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
3. Indicator: Color coded to show moisture content in ppm.
4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
5. End Connections: Socket or flare.
6. Working Pressure Rating: 500 psig (3450 kPa).
7. Maximum Operating Temperature: 240 deg F (116 deg C).

D. Permanent Filter Dryers: Comply with ARI 730.

1. Body and Cover: Painted-steel shell.
2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
3. Desiccant Media: Activated alumina.
4. Designed for reverse flow (for heat-pump applications).
5. End Connections: Socket.
6. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.
7. Maximum Pressure Loss: 2 psig (14 kPa).
8. Working Pressure Rating: 500 psig (3450 kPa).
9. Maximum Operating Temperature: 240 deg F (116 deg C).

2.3 REFRIGERANTS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Atofina Chemicals, Inc.
2. DuPont Company; Fluorochemicals Div.
3. Honeywell, Inc.; Genetron Refrigerants.
4. INEOS Fluor Americas LLC.

B. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

A. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with brazed joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

A. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.

B. Install thermostatic expansion valves as close as possible to distributors on evaporators.

1. Install valve so diaphragm case is warmer than bulb.
2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

C. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.

D. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor.

E. Install receivers sized to accommodate pump-down charge.

F. Install flexible connectors at compressors.

3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Refer to Division 230900 Sections "Instrumentation and Control for HVAC" and for solenoid valve controllers, control wiring, and sequence of operation.

K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Division 08 Section "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

M. Install refrigerant piping in protective conduit where installed belowground.

N. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

O. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps and double risers to entrain oil in vertical runs.
4. Liquid lines may be installed level.

P. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

Q. Before installation of steel refrigerant piping, clean pipe and fittings using the following procedures:

1. Shot blast the interior of piping.
2. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through tubing by means of a wire or electrician's tape.
3. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
4. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
5. Finally, draw a clean, dry, lintless cloth through the tube or pipe.
6. Safety-relief-valve discharge piping is not required to be cleaned but is required to be open to allow unrestricted flow.

R. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

S. Identify refrigerant piping and valves according to Division 22 Section "Identification for HVAC Piping and Equipment."

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 23 Section "Sleeves and Sleeve Seals for HVAC Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.4 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.

D. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

3.5 HANGERS AND SUPPORTS

A. Hanger, support, and anchor products are specified in Division 23 Section 230548 Vibration and Seismic Controls for HVAC.

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6 m) long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet (6 m) or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2 (DN 15): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
2. NPS 5/8 (DN 18): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
3. NPS 1 (DN 25): Maximum span, 72 inches (1800 mm); minimum rod size, 1/4 inch (6.4 mm).
4. NPS 1-1/4 (DN 32): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
5. NPS 1-1/2 (DN 40): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
6. NPS 2 (DN 50): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
7. NPS 2-1/2 (DN 65): Maximum span, 108 inches (2700 mm); minimum rod size, 3/8 inch (9.5 mm).
8. NPS 3 (DN 80): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (9.5 mm).
9. NPS 4 (DN 100): Maximum span, 12 feet (3.7 m); minimum rod size, 1/2 inch (13 mm).

D. Support multifloor vertical runs at least at each floor.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.

    a. Fill system with nitrogen to the required test pressure.

b. System shall maintain test pressure at the manifold gage throughout duration of test.
c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.7 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers (67 Pa). If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig (14 kPa).
4. Charge system with a new filter-dryer core in charging line.

3.8 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open shutoff valves in condenser water circuit.
2. Verify that compressor oil level is correct.
3. Open compressor suction and discharge valves.
4. Open refrigerant valves except bypass valves that are used for other purposes.
5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 232300

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rectangular ducts and fittings.
2. Round ducts and fittings.
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.
6. Seismic-restraint devices.

B. Related Sections:

1. Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."

1. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
2. Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
3. Seismic Hazard Level C: Seismic force to weight ratio, 0.15.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals:

1. Product Data for Prerequisite EQ 1: Documentation indicating that duct systems comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
2. Product Data for Prerequisite EA 2: Documentation indicating that duct systems comply with ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."
3. Duct-Cleaning Test Report for Prerequisite EQ 1: Documentation of work performed for compliance with ASHRAE 62.1, Section 7.2.4 - "Ventilation System Start-Up."
4. Product Data for Credit EQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.
5. Laboratory Test Reports for Credit EQ 4: For adhesives 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."

C. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

D. Welding certificates.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Lindab Inc.
    b. McGill AirFlow LLC.
    c. SEMCO Incorporated.
    d. Sheet Metal Connectors, Inc.
    e. Spiral Manufacturing Co., Inc.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Transverse Joints in Ducts Larger Than 60 Inches (1524 mm) in Diameter: Flanged.

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger Than 90 inches (2286 mm) in diameter with butt-welded longitudinal seams.

D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60 (Z180).
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.

D. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

E. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.4 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 3 inches (76 mm).
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
11. Sealant shall 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."

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealant shall 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."

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg (0.14 L/s per sq. m at 250 Pa) and shall be rated for 10-inch wg (2500-Pa) static-pressure class, positive or negative.

2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.5 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.6 SEISMIC-RESTRAINT DEVICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper B-Line, Inc.; a division of Cooper Industries.
2. Ductmate Industries, Inc.
3. Hilti Corp.
4. Kinetics Noise Control.
5. Loos & Co.; Cableware Division.
6. Mason Industries.
7. TOLCO; a brand of NIBCO INC.
8. Unistrut Corporation; Tyco International, Ltd.

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of the ICC Evaluation Service or an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.

D. Restraint Cables: ASTM A 603, galvanized or ASTM A 492, stainless-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.

E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.

F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches (38 mm).

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials.

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 ADDITIONAL INSTALLATION REQUIREMENTS FOR COMMERCIAL KITCHEN HOOD EXHAUST DUCT

A. Install commercial kitchen hood exhaust ducts without dips and traps that may hold grease, and sloped a minimum of 2 percent to drain grease back to the hood.

B. Install fire-rated access panel assemblies at each change in direction and at maximum intervals of 20 feet (6 m) in horizontal ducts, and at every floor for vertical ducts, or as indicated on Drawings. Locate access panel on top or sides of duct a minimum of 1-1/2 inches (38 mm) from bottom of duct.

C. Do not penetrate fire-rated assemblies except as allowed by applicable building codes and authorities having jurisdiction.

3.4 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class C.
4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg (500 Pa) and Lower: Seal Class B.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg (500 Pa): Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg (500 Pa) and Lower: Seal Class C.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg (500 Pa): Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.
5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches (610 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet (5 m).

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.6 SEISMIC-RESTRAINT-DEVICE INSTALLATION

A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."

1. Space lateral supports a maximum of 40 feet (12 m) o.c., and longitudinal supports a maximum of 80 feet (24 m) o.c.
2. Brace a change of direction longer than 12 feet (3.7 m).

B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install cable restraints on ducts that are suspended with vibration isolators.

E. Install seismic-restraint devices using methods approved by an evaluation service member of the ICC Evaluation Service or an agency acceptable to authorities having jurisdiction.

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.

G. Drilling for and Setting Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.7 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.8 START UP

A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

3.9 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated.

B. Supply Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

a. Pressure Class: Positive 2-inch wg (500 Pa).
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Constant-Volume Air-Handling Units:

a. Pressure Class: Positive 2-inch wg (500 Pa).
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

3. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive 2-inch wg (500 Pa).
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

C. Return Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

a. Pressure Class: Positive 2-inch wg (500 Pa).
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Constant-Volume Air-Handling Units:

a. Pressure Class: Positive 2-inch wg (500 Pa).
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

3. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive 2-inch wg (500 Pa).
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

a. Pressure Class: Negative 2-inch wg (500 Pa).
b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Air-Handling Units:

a. Pressure Class: Positive or negative 2-inch wg (500 Pa).
b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

3. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive or negative 2-inch wg (500 Pa).
b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

a. Pressure Class: Positive or negative 2-inch wg (500 Pa).
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Air-Handling Units:

a. Pressure Class: Positive or negative 2-inch wg (500 Pa).
b. Minimum SMACNA Seal Class: B.

c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

3. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive or negative 2-inch wg (500 Pa).
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 12.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

F. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.

G. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Velocity 1000 fpm (5 m/s) or Lower:

1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
2) Mitered Type RE 4 without vanes.

b. Velocity 1000 to 1500 fpm (5 to 7.6 m/s):

1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

c. Velocity 1500 fpm (7.6 m/s) or Higher:

1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

    a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

        1) Velocity 1000 fpm (5 m/s) or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
        2) Velocity 1000 to 1500 fpm (5 to 7.6 m/s): 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
        3) Velocity 1500 fpm (7.6 m/s) or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
        4) Radius-to Diameter Ratio: 1.5.

    b. Round Elbows, 12 Inches (305 mm) and Smaller in Diameter: Stamped or pleated.
    c. Round Elbows, 14 Inches (356 mm) and Larger in Diameter: Standing seam or welded.

H. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

    a. Rectangular Main to Rectangular Branch: 45-degree entry.
    b. Rectangular Main to Round Branch: Spin in.

2. Round: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

    a. Velocity 1000 fpm (5 m/s) or Lower: 90-degree tap.
    b. Velocity 1000 to 1500 fpm (5 to 7.6 m/s): Conical tap.
    c. Velocity 1500 fpm (7.6 m/s) or Higher: 45-degree lateral.

END OF SECTION 233113

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Barometric relief dampers.
3. Manual volume dampers.
4. Control dampers.
5. Combination fire and smoke dampers.
6. Corridor dampers.
7. Flange connectors.
8. Duct silencers.
9. Turning vanes.
10. Remote damper operators.
11. Duct-mounted access doors.
12. Flexible connectors.
13. Flexible ducts.
14. Duct security bars.
15. Duct accessory hardware.

B. Related Sections:

1. Division 28 Section "Fire Alarm" for duct-mounted fire and smoke detectors.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.

B. LEED Submittals:

1. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."

2. Product Data for Prerequisite EA 2: Documentation indicating that duct insulation R-values comply with tables in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air Conditioning."

C. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

a. Special fittings.
b. Manual volume damper installations.
c. Control damper installations.
d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
e. Duct security bars.
f. Wiring Diagrams: For power, signal, and control wiring.

D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

E. Source quality-control reports.

F. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with AMCA 500-D testing for damper rating.

1.5 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60 (Z180).
2. Exposed-Surface Finish: Mill phosphatized.

C. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

D. Extruded Aluminum: Comply with ASTM B 221 (ASTM B 221M), Alloy 6063, Temper T6.

E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

F. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.2 BACKDRAFT AND PRESSURE RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. American Warming and Ventilating; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Duro Dyne Inc.
5. Greenheck Fan Corporation.
6. Lloyd Industries, Inc.
7. Nailor Industries Inc.
8. NCA Manufacturing, Inc.
9. Pottorff; a division of PCI Industries, Inc.
10. Ruskin Company.
11. SEMCO Incorporated.
12. Vent Products Company, Inc.

B. Description: Gravity balanced.

C. Maximum Air Velocity: 2000 fpm (10 m/s).

D. Maximum System Pressure: 2-inch wg (0.5 kPa).

E. Frame: 0.052-inch- (1.3-mm-) thick, galvanized sheet steel or 0.063-inch- (1.6-mm-) thick extruded aluminum, with welded corners and mounting flange.

F. Blades: Multiple single-piece blades, maximum 6-inch (150-mm) width, 0.025-inch- (0.6-mm-) thick, roll-formed aluminum with sealed edges.

G. Blade Action: Parallel.

H. Blade Seals: Extruded vinyl, mechanically locked or Neoprene, mechanically locked.

I. Blade Axles:

1. Material: Galvanized steel or Stainless steel.
2. Diameter: 0.20 inch (5 mm).

J. Tie Bars and Brackets: Aluminum.

K. Return Spring: Adjustable tension.

L. Bearings: Steel ball or synthetic pivot bushings.

M. Accessories:

1. Adjustment device to permit setting for varying differential static pressure.
2. Counterweights and spring-assist kits for vertical airflow installations.
3. Electric actuators.
4. Chain pulls.
5. Screen Mounting: Front mounted in sleeve.
    a. Sleeve Thickness: 20-gage (1.0-mm) minimum.
    b. Sleeve Length: 6 inches (152 mm) minimum.
6. Screen Mounting: Rear mounted.
7. Screen Material: Galvanized steel or Aluminum.
8. Screen Type: Bird.
9. 90-degree stops.

2.3 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Air Balance Inc.; a division of Mestek, Inc.
    b. American Warming and Ventilating; a division of Mestek, Inc.
    c. Flexmaster U.S.A., Inc.
    d. McGill AirFlow LLC.
    e. METALAIRE, Inc.

f. Nailor Industries Inc.
g. Pottorff; a division of PCI Industries, Inc.
h. Ruskin Company.
i. Trox USA Inc.
j. Vent Products Company, Inc.

2. Standard leakage rating, with linkage outside airstream.
3. Suitable for horizontal or vertical applications.
4. Frames:

a. Hat-shaped, galvanized-steel channels, 0.064-inch (1.62-mm) minimum thickness.
b. Mitered and welded corners.
c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

a. Multiple or single blade.
b. Parallel- or opposed-blade design.
c. Stiffen damper blades for stability.
d. Galvanized-steel, 0.064 inch (1.62 mm) thick.

6. Blade Axles: Galvanized steel.
7. Bearings:

a. Oil-impregnated bronze or Molded synthetic.
b. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Galvanized steel.

B. Jackshaft:

1. Size: 1-inch (25-mm) diameter.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

C. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- (2.4-mm-) thick zinc-plated steel, and a 3/4-inch (19-mm) hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.4 COMBINATION FIRE AND SMOKE DAMPERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. Greenheck Fan Corporation.
4. Nailor Industries Inc.
5. Ruskin Company.

B. Type: Dynamic; rated and labeled according to UL 555 and UL 555S by an NRTL.

C. Closing rating in ducts up to 4-inch wg (1-kPa) static pressure class and minimum 4000-fpm (20-m/s) velocity.

D. Fire Rating: 1-1/2 hours.

E. Frame: Multiple-blade type; fabricated with roll-formed, 0.034-inch- (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.

F. Heat-Responsive Device: Electric resettable link and switch package, factory installed, rated.

G. Smoke Detector: Actuation by interconnection to fire alarm and smoke control systems.

H. Blades: Roll-formed, horizontal, interlocking, 0.034-inch- (0.85-mm-) thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized-steel blade connectors.

I. Leakage: Class II.

J. Rated pressure and velocity to exceed design airflow conditions.

K. Mounting Sleeve: Factory-installed, 0.052-inch- (1.3-mm-) thick, galvanized sheet steel; length to suit wall or floor application.

L. Master control panel for use in dynamic smoke-management systems.

M. Damper Motors: two-position action.

N. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.
3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 150 in. x lbf (17 N x m).

5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F (minus 40 deg C).
6. Nonspring-Return Motors: For dampers larger than 25 sq. ft. (2.3 sq. m), size motor for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 300 in. x lbf (34 N x m).
7. Electrical Connection: 115 V, single phase, 60 Hz.

O. Accessories:

1. Auxiliary switches for fan control or position indication.
2. Test and reset switches, remote mounted.

2.5 FLANGE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ductmate Industries, Inc.
2. Nexus PDQ; Division of Shilco Holdings Inc.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gage and Shape: Match connecting ductwork.

2.6 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. METALAIRE, Inc.
4. SEMCO Incorporated.
5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

E. Vane Construction: Single wall for ducts up to 48 inches (1200 mm) wide and double wall for larger dimensions.

2.7 REMOTE DAMPER OPERATORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Pottorff; a division of PCI Industries, Inc.
2. Ventfabrics, Inc.
3. Young Regulator Company.

B. Description: Cable system designed for remote manual damper adjustment.

C. Tubing: Brass.

D. Cable: Stainless steel.

2.8 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Warming and Ventilating; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. Ductmate Industries, Inc.
4. Flexmaster U.S.A., Inc.
5. Greenheck Fan Corporation.
6. McGill AirFlow LLC.
7. Nailor Industries Inc.
8. Pottorff; a division of PCI Industries, Inc.
9. Ventfabrics, Inc.
10. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2 (7-2M), "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:

a. Double wall, rectangular.
b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
c. Vision panel.
d. Hinges and Latches: 1-by-1-inch (25-by-25-mm) butt or piano hinge and cam latches.

e. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:

a. Access Doors Less Than 12 Inches (300 mm) Square: No hinges and two sash locks.
b. Access Doors up to 18 Inches (460 mm) Square: Two hinges and two sash locks.
c. Access Doors up to 24 by 48 Inches (600 by 1200 mm): Three hinges and two compression latches.
d. Access Doors Larger Than 24 by 48 Inches (600 by 1200 mm): Four hinges and two compression latches with outside and inside handles.

C. Pressure Relief Access Door:

1. Door and Frame Material: Galvanized sheet steel.
2. Door: Double wall with insulation fill with metal thickness applicable for duct pressure class.
3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
4. Factory set at 10-inch wg (2500 Pa).
5. Doors close when pressures are within set-point range.
6. Hinge: Continuous piano.
7. Latches: Cam.
8. Seal: Neoprene or foam rubber.
9. Insulation Fill: 1-inch- (25-mm-) thick, fibrous-glass or polystyrene-foam board.

2.9 DUCT ACCESS PANEL ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ductmate Industries, Inc.
2. Flame Gard, Inc.
3. 3M.

B. Labeled according to UL 1978 by an NRTL.

C. Panel and Frame: Minimum thickness 0.0528-inch (1.3-mm) carbon steel.

D. Fasteners: Carbon steel. Panel fasteners shall not penetrate duct wall.

E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F (1093 deg C).

F. Minimum Pressure Rating: 10-inch wg (2500 Pa), positive or negative.

2.10 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Ventfabrics, Inc.
4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches (89 mm) wide attached to 2 strips of 2-3/4-inch- (70-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized sheet steel or 0.032-inch- (0.8-mm-) thick aluminum sheets. Provide metal compatible with connected ducts.

E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).
2. Tensile Strength: 480 lbf/inch (84 N/mm) in the warp and 360 lbf/inch (63 N/mm) in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).

F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd. (810 g/sq. m).
2. Tensile Strength: 530 lbf/inch (93 N/mm) in the warp and 440 lbf/inch (77 N/mm) in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F (Minus 45 to plus 121 deg C).

G. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.

1. Minimum Weight: 16 oz./sq. yd. (542 g/sq. m).
2. Tensile Strength: 285 lbf/inch (50 N/mm) in the warp and 185 lbf/inch (32 N/mm) in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F (Minus 55 to plus 260 deg C).

H. High-Corrosive-Environment System, Flexible Connectors: Glass fabric with chemical-resistant coating.

1. Minimum Weight: 14 oz./sq. yd. (474 g/sq. m).
2. Tensile Strength: 450 lbf/inch (79 N/mm) in the warp and 340 lbf/inch (60 N/mm) in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F (Minus 55 to plus 260 deg C).

I. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.

1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch (6-mm) movement at start and stop.

2.11 FLEXIBLE DUCTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Noninsulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire.

1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
2. Maximum Air Velocity: 4000 fpm (20 m/s).
3. Temperature Range: Minus 10 to plus 160 deg F (Minus 23 to plus 71 deg C).

C. Noninsulated, Flexible Duct: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire.

1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
2. Maximum Air Velocity: 4000 fpm (20 m/s).
3. Temperature Range: Minus 20 to plus 210 deg F (Minus 29 to plus 99 deg C).

D. Noninsulated, Flexible Duct: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound, spring-steel wire.

1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
2. Maximum Air Velocity: 4000 fpm (20 m/s).
3. Temperature Range: Minus 20 to plus 210 deg F (Minus 29 to plus 99 deg C).

E. Noninsulated, Flexible Duct: UL 181, Class 0, interlocking spiral of aluminum foil.

1. Pressure Rating: 8-inch wg (2280 Pa) positive or negative.
2. Maximum Air Velocity: 5000 fpm (25 m/s).

3. Temperature Range: Minus 100 to plus 435 deg F (Minus 73 to plus 224 deg C).

F. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene or aluminized vapor-barrier film.

1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
2. Maximum Air Velocity: 4000 fpm (20 m/s).
3. Temperature Range: Minus 10 to plus 160 deg F (Minus 23 to plus 71 deg C).
4. Insulation R-value: R-6.

G. Insulated, Flexible Duct: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene or aluminized vapor-barrier film.

1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
2. Maximum Air Velocity: 4000 fpm (20 m/s).
3. Temperature Range: Minus 20 to plus 210 deg F (Minus 29 to plus 99 deg C).
4. Insulation R-value: R-6.

H. Insulated, Flexible Duct: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene or aluminized vapor-barrier film.

1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
2. Maximum Air Velocity: 4000 fpm (20 m/s).
3. Temperature Range: Minus 20 to plus 210 deg F (Minus 29 to plus 99 deg C).
4. Insulation R-value: R-6.

I. Insulated, Flexible Duct: UL 181, Class 0, interlocking spiral of aluminum foil; fibrous-glass insulation; polyethylene or aluminized vapor-barrier film.

1. Pressure Rating: 8-inch wg (2280 Pa) positive or negative.
2. Maximum Air Velocity: 5000 fpm (25 m/s).
3. Temperature Range: Minus 20 to plus 250 deg F (Minus 29 to plus 121 deg C).
4. Insulation R-value: R-6.

J. Flexible Duct Connectors:

1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches (75 through 460 mm), to suit duct size.
2. Non-Clamp Connectors: Liquid adhesive plus tape.

2.12 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated.

G. Install fire and smoke dampers according to UL listing.

H. Install duct security bars. Construct duct security bars from 0.164-inch (4.18-mm) steel sleeve, continuously welded at all joints and 1/2-inch- (13-mm-) diameter steel bars, 6 inches (150 mm) o.c. in each direction in center of sleeve. Weld each bar to steel sleeve and each crossing bar. Weld 2-1/2-by-2-1/2-by-1/4-inch (63-by-63-by-6-mm) steel angle to 4 sides and both ends of sleeve. Connect duct security bars to ducts with flexible connections. Provide 12-by-12-inch (300-by-300-mm) hinged access panel with cam lock in duct in each side of sleeve.

I. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.
2. At outdoor-air intakes and mixed-air plenums.
3. At drain pans and seals.
4. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
5. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
6. At each change in direction and at maximum 50-foot (15-m) spacing.
7. Upstream from turning vanes.
8. Upstream or downstream from duct silencers.

9. Control devices requiring inspection.
10. Elsewhere as indicated.

J. Install access doors with swing against duct static pressure.

K. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches (200 by 125 mm).
2. Two-Hand Access: 12 by 6 inches (300 by 150 mm).
3. Head and Hand Access: 18 by 10 inches (460 by 250 mm).
4. Head and Shoulders Access: 21 by 14 inches (530 by 355 mm).
5. Body Access: 25 by 14 inches (635 by 355 mm).
6. Body plus Ladder Access: 25 by 17 inches (635 by 430 mm).

L. Label access doors according to Division 23 Section HVAC Identification to indicate the purpose of access door.

M. Install flexible connectors to connect ducts to equipment.

N. For fans developing static pressures of 5-inch wg (1250 Pa) and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

O. Connect diffusers or light troffer boots to ducts directly or with maximum 60-inch (1500-mm) lengths of flexible duct clamped or strapped in place.

P. Connect flexible ducts to metal ducts with draw bands.

Q. Install duct test holes where required for testing and balancing purposes.

R. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch (6-mm) movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 233300

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Rectangular and square ceiling diffusers.
2. Louver face diffusers.
3. Louver face security grilles.
4. Perforated face security grilles.
5. Perforated face grilles.
6. Fixed face grilles.
7. Duct mounted registers.

B. Related Sections:

1. Division 11 for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.
2. Division 23 Section "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

B. Samples for Initial Selection: For diffusers, registers, and grilles with factory-applied color finishes.

C. Samples for Verification: For diffusers, registers, and grilles, in manufacturer's standard sizes to verify color selected.

D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

E. Source quality-control reports.

PART 2 - PRODUCTS

2.1 CEILING DIFFUSERS

A. Rectangular and Square Ceiling Diffusers:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. A-J Manufacturing Co., Inc.
    b. Anemostat Products; a Mestek company.
    c. Carnes.
    d. Hart & Cooley Inc.
    e. Krueger.
    f. METALAIRE, Inc.
    g. Nailor Industries Inc.
    h. Price Industries.
    i. Titus.
    j. Tuttle & Bailey.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel.
4. Finish: Baked enamel, white.
5. Face Size: Per Plan.
6. Face Style: Four cone.
7. Mounting: Surface or T-bar.
8. Pattern: Fixed.
9. Dampers: Radial opposed blade.

B. Louver Face Diffuser:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. A-J Manufacturing Co., Inc.
    b. Anemostat Products; a Mestek company.
    c. Carnes.
    d. METALAIRE, Inc.
    e. Nailor Industries Inc.

f. Price Industries.
g. Titus.
h. Tuttle & Bailey.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Steel or Aluminum.
4. Finish: Baked enamel, white.
5. Face Size: Per Plan.
6. Mounting: Surface or T-bar.
7. Pattern: One-way, Two-way, Two-way corner, Three-way, or Four-way core style as indicated on drawings.
8. Dampers: Radial opposed blade.
9. Accessories:

a. Square to round neck adaptor.

2.2 REGISTERS AND GRILLES

A. Louver Faced Security Grille:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. A-J Manufacturing Co., Inc.
b. Anemostat Products; a Mestek company.
c. Carnes.
d. Hart & Cooley Inc.
e. Krueger.
f. Nailor Industries Inc.
g. Price Industries.
h. Titus.
i. Tuttle & Bailey.

2. Security Level: Maximum.
3. Application: Ducted supply & return, Air transfer.
4. Material: Steel.
5. Finish: Baked enamel, white.
6. Face Arrangement:

a. Shape: Square.
b. Frame: Yes.
c. Deflection: 50 degrees.
d. Core: Louvered.
e. Face Blade Arrangement: Vertical spaced 3/8 inch (10 mm) apart.
f. Pattern: One-way, Two-way, Two-way corner, Three-way, or Four-way core style as indicated on drawings.

7. Mounting: 1-1/4-by-1-1/4-by-3/16-inch (32-by-32-by-5-mm) retaining angle frame and tamperproof machine screws.

B. Perforated Face Security Grille:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. A-J Manufacturing Co., Inc.
    b. Anemostat Products; a Mestek company.
    c. Carnes.
    d. Hart & Cooley Inc.
    e. Krueger.
    f. Nailor Industries Inc.
    g. Price Industries.
    h. Titus.
    i. Tuttle & Bailey.

2. Security Level: Maximum and suicide deterrent.
3. Application: Ducted supply & return, Air transfer.
4. Material: Steel or Stainless Steel (Per Schedule).
5. Finish: Baked enamel, white.
6. Face Arrangement:

    a. Shape: Square.
    b. Design: Perforated.
    c. Frame: Yes.
    d. 3/16-inch- (5-mm-) thick perforated faceplate with 5/32-inch- (4-mm-) diameter holes spaced 7/32 inch (5 mm) o.c., staggered at 60 degrees.

7. Wall Sleeve: 3/16 inch (5 mm) welded to face.
8. Mounting: 1-by-1-by-3/16-inch (25-by-25-by-5-mm) retaining angle frame.

C. Perforated Face Grilles:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. A-J Manufacturing Co., Inc.
    b. Anemostat Products; a Mestek company.
    c. Carnes.
    d. Dayus Register & Grille Inc.
    e. Hart & Cooley Inc.
    f. Krueger.
    g. Nailor Industries Inc.
    h. Price Industries.
    i. Titus.
    j. Tuttle & Bailey.

2. Material: Steel or Aluminum.
3. Finish: Baked enamel, white.
4. Face Arrangement: Perforated core.
5. Core Construction: Integral.

6. Pattern: 3/16 inch diameter holes on 1/4 inch centers.
7. Frame: 1 inch (25 mm) wide.
8. Mounting Frame: Filter (Per Schedule).
9. Mounting: Countersunk screw or Lay in T-bar.
10. Accessory: Filter.

D. Fixed Face Grilles:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. A-J Manufacturing Co., Inc.
    b. Anemostat Products; a Mestek company.
    c. Carnes.
    d. Dayus Register & Grille Inc.
    e. Hart & Cooley Inc.
    f. Krueger.
    g. Nailor Industries Inc.
    h. Price Industries.
    i. Titus.
    j. Tuttle & Bailey.

2. Material: Steel or Aluminum.
3. Finish: Baked enamel, white.
4. Face Blade Arrangement: Vertical spaced 1/2 inch (13 mm) apart.
5. Core Construction: Integral.
6. Frame: 1 inch (25 mm) wide.
7. Mounting: Countersunk screw.

E. Duct mounted Registers:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. A-J Manufacturing Co., Inc.
    b. Anemostat Products; a Mestek company.
    c. Carnes.
    d. Dayus Register & Grille Inc.
    e. Hart & Cooley Inc.
    f. Krueger.
    g. METALAIRE, Inc.
    h. Nailor Industries Inc.
    i. Price Industries.
    j. Titus.
    k. Tuttle & Bailey.

2. Material: Steel or Aluminum.
3. Finish: Baked enamel, color selected by Architect.
4. Face Blade Arrangement: Vertical spaced 3/4 inch (19 mm) apart.
5. Core Construction: Integral.

6. Rear-Blade Arrangement: Horizontal spaced 3/4 inch (19 mm) apart.
7. Frame: 1 inch (25 mm) wide.
8. Mounting Frame: Radius endcap for mounting to spiral metal duct.
9. Mounting: Countersunk screw.
10. Accessories:

    a. Damper/volume extractor.

2.3 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713

SECTION 238126 - SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. LEED Submittals:

1. Product Data for Credit EA 4: For refrigerants, documentation including printed statement that refrigerants are free of HCFCs.

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Field quality-control reports.

F. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

G. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, 2008 Edition by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance:

1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - " Procedures," and Section 7 - "Construction and System Start-Up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004.

1.5 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-Place Concrete."

B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: Five year(s) from date of Substantial Completion.
b. For Parts: One year(s) from date of Substantial Completion.
c. For Labor: One year(s) from date of Substantial Completion.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set(s) for each air-handling unit.
2. Gaskets: One set(s) for each access door.
3. Fan Belts: One set(s) for each air-handling unit fan.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Carrier Corporation; Home Comfort and HVAC Building & Industrial Systems.
2. First Operations LP.
3. Friedrich Air Conditioning Company.
4. Koldwave, Inc.; a Mestek company.
5. Lennox International Inc.
6. Mitsubishi Electric & Electronics USA, Inc.; HVAC Advanced Products Division.
7. Mitsubishi Electric Sales Canada Inc.
8. Mitsubishi Heavy Industries America, Inc.
9. SANYO North America Corporation; SANYO Fisher Company.
10. Trane; a business of American Standard companies.

2.2 INDOOR UNITS 5 TONS (18 kW) OR LESS

A. Wall-Mounted, Evaporator-Fan Components:

1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 210/240.
3. Fan: Direct drive, centrifugal.
4. Fan Motors:

    a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."
    b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
    c. Enclosure Type: Totally enclosed, fan cooled.
    d. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
    e. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.
    f. Mount unit-mounted disconnect switches on exterior of unit.

5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
6. Condensate Drain Pans:

    a. Fabricated with one percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

        1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1-2004.
        2) Depth: A minimum of 1 inch (25 mm) deep.

    b. Single-wall, galvanized -steel sheet.
    c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.

        1) Minimum Connection Size: NPS 3/4 (DN 19).

d. Pan-Top Surface Coating: Asphaltic waterproofing compound.

7. Air Filtration Section:

a. General Requirements for Air Filtration Section:

1) Comply with NFPA 90A.
2) Minimum Arrestance: According to ASHRAE 52.1 and MERV according to ASHRAE 52.2.
3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.

b. Extended-Surface, Disposable Panel Filters:

1) Factory-fabricated, dry, extended-surface type.
2) Thickness: 1 inch (25 mm).
3) Arrestance according to ASHRAE 52.1: 90.
4) Merv according to ASHRAE 52.2: 7.
5) Media: Fibrous material formed into deep-V-shaped pleats and held by self-supporting wire grid.
6) Media-Grid Frame: Nonflammable cardboard.
7) Mounting Frames: Welded, galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.

2.3 OUTDOOR UNITS (5 TONS (18 kW) OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

a. Compressor Type: Scroll.
b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
c. Refrigerant Charge: R-410A.
d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 210/240.

3. Fan: Aluminum-propeller type, directly connected to motor.
4. Motor: Permanently lubricated, with integral thermal-overload protection.
5. Low Ambient Kit: Permits operation down to 45 deg F (7 deg C).
6. Mounting Base: Polyethylene.

2.4 ACCESSORIES

A. Control equipment and sequence of operation are specified in Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls."

B. Thermostat: Low voltage with subbase to control compressor and evaporator fan.

C. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:

1. Compressor time delay.
2. 24-hour time control of system stop and start.
3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
4. Fan-speed selection including auto setting.

D. Automatic-reset timer to prevent rapid cycling of compressor.

E. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

F. Drain Hose: For condensate.

G. Additional Monitoring:

1. Monitor constant and variable motor loads.
2. Monitor variable-frequency-drive operation.
3. Monitor economizer cycle.
4. Monitor cooling load.
5. Monitor air distribution static pressure and ventilation air volumes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install ground-mounted, compressor-condenser components on 4-inch- (100-mm-) thick, reinforced concrete base that is 4 inches (100 mm) larger, on each side, than unit. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-Place Concrete." Coordinate anchor installation with concrete base.

D. Install ground-mounted, compressor-condenser components on polyethylene mounting base.

E. Install roof-mounted, compressor-condenser components on equipment supports specified in Division 07 Section "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.

F. Install seismic restraints.

G. Install compressor-condenser components on restrained, spring isolators with a minimum static deflection of 1 inch (25 mm). See Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

H. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

C. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts" Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Air Duct Accessories."

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 238126

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SECTION 260000

ELECTRICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

Work in general includes, but is not limited to, the following:

A. Existing Service - 120/208 volt, three phase, four wire.

B. Complete lighting and power system as shown on Drawings and specified herein, including conduit, wiring, panelboards, circuit breakers, relays, switches, receptacles, and other items necessary for complete and operable systems.

C. Electrical connection of equipment furnished by others as shown on the Drawings.

D. Control wiring and installation and connections of control devices as specified herein.

1.03 SITE VISITS, COORDINATION OF CONTRACT DOCUMENTS, VERIFICATION OF DIMENSIONS

A. Examine existing conditions as applicable. Become acquainted with Specifications and Drawings for all portions of the Project. Notify Project Manager of apparent discrepancies and of inconsistency between the Specifications and the existing conditions. Secure and follow Project Manager's instructions. The Drawings serve as working drawings only, indicating diagrammatically the general layout of the systems and their various components and equipment.

B. Scaled and figured dimensions are approximate and are given for estimate purposes only. Carefully check and verify dimensions and sizes in order to determine if equipment and materials will fit together and if the dimensions of the assembly are compatible with the space provided. Where equipment is furnished by others, verify that dimensions and requirements for assembly are compatible with the space provided before proceeding with the roughing-in connections. Field verifications of locations shown on Drawings are necessary since actual locations, distances, mounting heights, etc., may be affected by field conditions. The right is reserved to make reasonable changes in locations of equipment or other features shown on Drawings prior to rough-in without additional cost to the Owner.

C. Where apparatus and equipment have been indicated on the Drawings, dimensions have been taken from typical equipment of the class indicated. Carefully check the Drawings to see that the contemplated equipment will fit into the spaces provided, regardless of whether or not it may have been approved for quality and utility as an equal.

D. Rough in all equipment, fixtures, etc., as designated on the Drawings and as specified herein. The Drawings indicate only the approximate location of rough-ins. The exact rough-in locations must be determined from large-scale certified Drawings. The Contractor shall obtain all certified rough-in information before progressing with any Work for rough-in connections.

E. Be responsible for providing outlets and services of proper size at the required locations.

F. Coordinate requirements of equipment furnished by others, prior to ordering and installation.

G. No allowance will be made for extra expense due to failure or neglect to follow foregoing directives.

1.04 RULES AND REGULATIONS

A. Materials and installation shall be in accordance with current rules and requirements of California Code of Regulations and local codes and ordinances including, but not necessarily limited to, the current editions of the following:

1. The California Electrical Code (CEC).
2. Title 8, Chapter 4, California Code of Regulations (Low Voltage Electrical Safety Orders).
3. Local Building Codes.
4. California State Fire Marshal.
5. California Statewide Qualified Product List (QPL), Title 20.
6. Design Lights Consortium (DLC).
7. NEMA (National Electrical Manufacturers Assoc.).
8. IEEE (Institute of Electrical and Electronic Engineers).
9. California Green Building Code.
10. ANSI (American National Standards Institute).
11. ASTM (American Society for Testing and Materials).
12. UL (Underwriters Laboratories).
13. OSHA (Occupational Safety & Health Act) Federal.
14. Title 24, California Code of Regulations, California Building Code.
15. NFPA (National Fire Protection Association).
16. NESC (National Electrical Safety Code).
17. NECA Standards of Installation.
    a. NECA 400-2018, Standard for Installing and Maintaining Switchboards (ANSI).
    b. NECA 402-2018, Standard for Installing and Maintaining Motor Control Centers (ANSI).
    c. NECA 408-2002, Recommended Practice for Installing and Maintaining Busways (ANSI).
    d. NECA 409-2018, Recommended Practice for Installing and Maintaining Dry-Type Transformers (ANSI).
    e. NECA 410-2005 Standard for Installing and Maintaining Liquid-Filled Transformers (ANSI).
    f. NECA 411-2006 Standard for Installing and Maintaining Uninterruptible Power Supplies (UPS) (ANSI).
    g. NECA 420-2018 Standard for Fuse Applications (ANSI).
    h. NECA 430-2006, Standard for Installing Medium-Voltage Metal-Clad Switchgear (ANSI).
    i. NECA/EGSA 404-2007 Standard for Installing Generator Sets (ANSI).

j. NECA/IESNA 500-2006, Standard for Installing Indoor Lighting Systems.
k. NECA/IESNA 501-2006 Standard for Installing Exterior Lighting Systems.
l. NECA 331-2018, Standard for Building and Service Entrance Grounding and Bonding

B. Where these Specifications call for a higher standard than the above-mentioned rules, the Specifications shall govern.

C. Should there be any direct conflict between the above-mentioned rules and these Specifications, the rules shall govern.

D. Nothing in the Drawings or Specifications is to be construed to permit Work not conforming to the rules, codes, and regulations.

E. All materials utilized shall be new and the best of their respective grades or kinds.

1.05 DEFINITIONS

A. Article 100 of the California Electrical Code shall serve as a guide for definitions.

B. Industry standard definitions.

C. Specific Definitions:

1. Concealed: Hidden from sight, as in trenches, chases, hollow construction, above furred spaces, suspended ceilings (acoustical or plastic type), or exposed to view only in tunnels, attics, shafts, crawl spaces, unfinished spaces, or other areas solely for maintenance and repair.

2. Exposed: Not concealed.

3. Unfinished Space: A room or space that is ordinarily accessible only to building maintenance personnel, a room noted on the "Finish Schedule" with exposed and unpainted construction for walls, floor or ceilings, or specifically mentioned as "unfinished".

4. Finished Spaces: Any space ordinarily visible to the visiting public, including exterior areas.

1.06 RECOGNIZED TEST LAB

A. All equipment specified or installed under this project shall be listed by a recognized test lab and bear that label of approval.

1.07 PERMITS AND FEES

A. Procure licenses and permits necessary for the completion of the Work, and inspection and other applicable fees. Before final payment, deliver to the Owner certificates and permits, approved and signed by the authorities having jurisdiction.

1.08 RECORD DRAWINGS

A. Include under this Work complete and accurate record information both during construction and before final acceptance by the Owner, and costs associated therewith shall be included under this Work.

B. Obtain from the Project Manager, at cost, a complete, full size set of prints. On these prints, systematically and accurately keep an up-to-date and legible dimensional record of Work installed differently from the location or manner indicated by the Drawings, as well as exact locations of stub-outs and hidden or underground features. Have these Drawings readily available for reference and review. When job status permits, submit them to the Project Manager and amend or correct and re-submit if requested.

C. When the above information is complete and acceptable, deliver Record Drawings to the Project Manager.

1.09 SUBMITTALS - SUBSTITUTIONS

A. Bids shall be based on Drawings and Specifications and references exactly as shown except as substitutions are permitted under terms of the Instructions to Bidders. Acceptance by the Project Manager of a variation or alternate shall not of itself waive other requirements of the Drawings and Specifications.

B. Before a substitute is used, it shall be equal in quality and utility to the material or make of equipment specified, and furthermore, shall be suitable for the particular application. The decision of the Project Manager as to the quality and utility of the substitute offered shall be final.

C. When submitting a substitute to a specified item, provide complete data for both the specified item and the substitute. Complete data includes:

1. Catalog cuts with complete dimensions, characteristics, electrical properties, Underwriter's Laboratory listing, harmonics, light output, mounting and support requirements.

2. Calculations, photometrics, system load data, energy effect on system, etc.

If the substitute is not deemed equal in both utility and quality to the specified item, the specified item will be approved and it shall be provided by the Contractor.

D. Submit in one package complete systematized lists of equipment and Drawings, catalog cuts, brochures, capacity tables and curves, descriptive information, performance data and guarantees and warranties referenced either to applicable Specification paragraphs or to item numbers as shown on the Drawings, or both. Submit six (6) copies.

E. Do not order or install equipment until submittals have been reviewed and approved.

F. Where accepted materials or equipment other than is specified or shown on the Drawings require redesign of structural, architectural, electrical or mechanical features or layouts, such changes shall be made by, or at the expense of the Contractor - all subject to complete review by the Project Manager.

G. Because of the contingencies involved, review and general acceptance of proposed substitutes shall not relieve the Contractor's responsibility under this Work for ensuring in all respects the suitability of such materials and equipment for the particular Project requirements.

1.10 SHOP DRAWINGS

A. Prepare shop Drawings of items as required by the Project Manager or by Drawings and Specifications; submit six (6) copies of each to the Project Manager as part of the submittal package, sufficiently in advance of construction, if necessary.

B. The shop drawings shall be submitted sufficiently in advance of construction to allow time for review and for resubmission, if necessary.

C. Submit all shop drawings and data at one time for equipment provided under this Section. The complete electrical shop drawings shall be bound in one pamphlet or binder indexed to this Section.

D. Shop drawing submittals processed are not change orders. The purpose of shop drawing submittals by the Contractor is to demonstrate that the Contractor understands the design concept; he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. If deviations, discrepancies or conflicts between shop Drawings and Specifications are discovered, either prior to or after shop drawing submittals are processed, the design Drawings and Specifications shall control and shall be followed.

E. Manufacturers' data and dimension sheets shall be submitted giving all pertinent physical and engineering data including weights, cross-sections and maintenance instructions. Standard items of equipment such as receptacles, switches, plates, etc., which are cataloged items, shall be listed by manufacturer.

F. Index all submittals and reference to these Specifications.

1.11 COMPLETION DATA

A. Submit completion data to the Project Manager in acceptable quantity and form before requesting a final inspection. Such submittal shall be corrected, amended, or completed before final acceptance of the Work.

B. Include Record Drawings, maintenance manuals, and data; test results; control and wiring diagrams.

1.12 CUTTING, PATCHING, AND REPAIRING

A. Cutting, patching, and framing of wood members to accommodate this Work shall be done by the Contractor and shall be in conformance with Sections 613 and 617 (F) and (K), Title 24, California Code of Regulations. All such cutting, patching and framing shall be approved by the Project Manager.

B. Do minor miscellaneous cutting, drilling, and patching necessary and normally required at the time of actually installing this Work. Patching shall be of the same materials, workmanship, and finish as the original or surrounding Work to the complete satisfaction of the Project Manager. Comply with Division-1 CUTTING AND PATCHING Section.

C. Adequately inform other trades of openings and framing requirements for this Work and provide suitable instructions for establishing locations and sizes of openings or sleeves so that these may be provided in the proper location at the proper time. Concrete shall not be cut, except where approved by the Project Manager.

1.13 SIMILARITY OF MATERIALS

A. Unless specified otherwise, fixtures, fittings, hangers, and respective type features and equipment, of a similar type or having similar operative or functional features, shall be of the same manufacturer throughout the Project.

1.14 MANUFACTURERS' DIRECTIONS

A. Follow manufacturers' directions and recommendations in all cases where the manufacturers' equipment or articles are used for this Work. Compliance with the manufacturer's direction is a requirement for that product's listing with a recognized test lab.

1.15 VERIFICATION OF DIMENSIONS

A. Scaled and figured dimensions are approximate only. Before proceeding with Work, carefully check and verify dimensions, etc., on architectural Drawings, and be responsible for properly fitting equipment and materials together and to the structure in spaces provided.

B. Drawings are essentially diagrammatic, and many offsets, bends, pull boxes, special fittings, and exact locations are not indicated. Carefully study Drawings and premises in order to determine best methods, exact locations, routes, building obstructions, etc., and install apparatus and equipment in available locations. Install apparatus and equipment in manner and locations to avoid obstructions, preserve headroom, and keep openings and passageways clear.

1.16 IDENTIFICATION OF EQUIPMENT

A. All electrical equipment shall be labeled, tagged, stamped, or otherwise identified in accordance with the following schedule:

1. Branch Circuit Panelboards:

a. Panel identification shall be P-Touch ¾” label.

b. Circuit directory shall be a two-column, 8-1/2 x 11” sheet attached to the inside of the door. Each odd numbered circuit shall be in sequence in the left column and the even numbered circuit in the right column (e.g., 1, 3, 5..., 2, 4, 6...). Each circuit shall be identified as to the use and room name(s) or area(s). Confirm room names and/or room numbers with the Project Manager prior to project completion. Circuit breaker identification shall be by permanently installed metal numbers or plastic

numbers under acrylic plastic. "Paste-on" numbers will not be accepted. Refer to "Panelboards" section for additional requirements.

2. Distribution Panelboards: Identification shall be with 1" x 4" laminated, white on black, micarta nameplates on each major component, each with name and/or number of unit and other pertinent data as required. Emergency power distribution panels shall be identified with white on red micarta nameplates. Letters shall be no less than 3/8" high.

3. Circuit breakers shall be identified by number and name with 3/4" x 1-1/2" laminated micarta nameplates with 3/16" high letters mounted adjacent to circuit breaker or switch.

4. Miscellaneous equipment (electrical), such as individually mounted safety switches, starters, step-down transformers, pull boxes, junction boxes, etc., shall be identified by the use of such equipment with P-Touch labels as required.

5. In general, the installed nameplates, as herein called for shall also clearly indicate its use, area served, circuit identification, voltage and any other useful data.

6. All auxiliary systems, including communications, shall be labeled to indicate function.

7. Motor control and motor control centers shall be labeled with the identification given on drawing schedules.

1.17 ARC FLASH LABELING

A. All panels, circuit breaker enclosures, switchboards and motor control centers shall be labeled with Arc Flash Warning Stickers.

B. These labels shall contain the following:

1. Arc Flash Boundary
2. Minimum arc rating
3. Personal Protective Equipment Level, PPE
4. Shock Hazard Level
5. Available Fault Current
6. Date

1.18 CLOSING IN OF UNREVIEWED WORK

A. Do not allow or cause any of this Work to be covered up or enclosed until it has been reviewed by the Project Manager. Should any of this Work be enclosed or covered up before such review, uncover the Work and make repairs with such materials as may be necessary to restore the Work and that of the other trades to its original and proper condition at no additional cost to the Owner.

1.19 SAFETY PRECAUTIONS

A. It is intended that within the scope of this Work during construction and until final acceptance, strict attention be given to matters pertaining to public safety and to safety of the construction workers and complementing personnel; and to other health and building safety requirements as specified and indicated including, but not limited to: Protection of openings in fire-rated

construction; clearances from and/or protection of combustibles; proper securement for fixtures, equipment materials; method of performing the Work, operational and safety check of electrical devices, etc.; erection and maintenance of suitable barriers, protective devices, lights and warning signs and adequate provisions for storage and protection of Work, materials and equipment.

B. It is understood that the responsibility for the proper attention to the above stipulations is included under this Work.

1.20 WIRING OF EQUIPMENT FURNISHED UNDER OTHER SECTIONS

A. All electrical wiring including power wiring and control wiring (except as specified under Automatic Temperature Control), including raceways, wiring, outlet and junction boxes, and labor for installation of the wiring and equipment shall be included in this section of the Specifications.

B. All control devices, and starters not in motor control centers, for equipment furnished under the Air Conditioning section (except as specified under Automatic Temperature Control paragraph), Plumbing section, Fire Sprinkler or Lawn Sprinkler section are to be furnished under that particular section and installed under this section.

C. Wiring diagrams complete with all connection details shall be furnished under each respective section.

D. Coordinate requirements and locations for all equipment prior to ordering and installation.

E. Comply with requirements of Article 430 of the California Electrical Code.

1.21 PROTECTION OF EXISTING LINES

A. Exercise special care to avoid damaging and to maintain in operation, all existing utility runs during the construction period. Also avoid damaging existing piping, conduits, or equipment that is to remain, whether or not specifically indicated on the Drawings. Existing utilities, piping, conduits, and equipment may or may not be shown on the Drawings. The Drawings only reflect information intended to suggest the probable extent and possible location of indicated runs and equipment. There may be other runs. There may be other locations. Neither the Owner nor the Project Manager represents that either has any precise knowledge as to either the full extent or exact location of equipment and runs that may fall within the building or Project Site.

B. Execute excavation and demolition on the Site and in the building with extreme care (by hand or small tools wherever appropriate) and at the sole risk of the Contractor and the workers involved.

C. Locate all known existing installations before proceeding with construction operations which may cause damage to such installations. The existing installations shall be kept in service where possible and damage to them shall be repaired at no increases in Contract Sum.

D. If other structures or utilities are encountered, request Project Manager to provide direction on how to proceed with the Work.

1.22 MOUNTING

A. Provide materials and accessories necessary to properly mount and secure equipment furnished and/or installed under the electrical Work. This includes but is not limited to such items as conduit, outlets, junction boxes, switches, relays, disconnect switches, lighting fixtures, cabinets, and transformers.

B. Inserts and Anchors shall be:

1. Furnished and installed for support of Work under this Division.

2. Adjustable concrete hanger inserts installed in new concrete work as manufactured by Hilti or as approved.

3. Installed in locations as approved by Project Manager.

4. Expandable lead type anchors installed in existing concrete with minimum surface damage, as manufactured by Hilti.

5. Toggle bolts, or "molly anchors", where installed in concrete block walls.

6. Complete with 3/16" or heavier steel backup plate where used to support heavy items. Through-bolts or backup plate shall be concealed from view, except as otherwise indicated.

C. Mounting of equipment that is of such size as to be freestanding and that equipment which cannot conveniently be located on walls, such as motor starters, etc., shall be rigidly supported on a framework of galvanized steel angle, Unistrut or as approved.

D. Furnish and install sleeves for the installation of Work under all sections of this Division. Sleeves through floors, roof and walls shall be as described in conduit section.

1.23 MOUNTING HEIGHTS

A. Receptacles shall be mounted no lower than 15” to the bottom of the device.

B. Switches and lighting control stations shall be mounted no higher than 48” to the top of the device.

C. Overcurrent devices and circuit breakers or disconnect switches shall be mounted no higher than 6 feet-7 inches.

D. Refer to the Drawings for specific mounting heights.

1.24 ACCESSIBILITY

A. Install all control devices or other specialties requiring reading, adjustment, inspection, repairs, removal or replacement conveniently and accessibly throughout the project.

B. All required access doors or panels in walls and ceilings are to be furnished and installed as part of the Work under this Division.

C. Provide doors which pierce a fire separation with the same fire rating as the separation.

D. Refer to "Finish Schedule" for types of walls and ceiling in each area and architectural Drawings for rated wall construction.

E. Coordinate Work of the various sections to locate specialties requiring accessibility with others to avoid unnecessary duplication of access doors.

1.25 FIRE-RATED PENETRATIONS

A. All penetrations in fire-rated assemblies shall be accomplished using a UL listed method and materials.

B. Fire-rated assembly penetrations shall be accomplished per details on the Drawings.

1.26 FLASHING

A. Flash and counterflash all conduits penetrating roofing membrane.

1.27 TESTS

A. Perform electrical tests as required or directed. Provide materials, labor, and equipment necessary for performances of these tests, and at completion of the Work perform a complete "in-service" operation of the entire electrical and power system to show compliance with the Drawings and Specifications. Replace Work showing faults under tests without additional cost to the Owner. Test system voltage at switchboards at completion of Work and provide a written report to the Project Manager.

1.28 EQUIPMENT LISTS AND MAINTENANCE MANUALS

A. Prior to completion of job, Contractor shall compile a complete equipment list and maintenance manual. The equipment list shall include the following items for every piece of material and equipment supplied under this section of the Specifications.

1. Name, model and manufacturer.

2. Complete parts Drawings and list.

3. Local supply for parts and replacement and telephone number.

4. All tags, inspection slips, instruction packages, etc. removed from equipment as shipped from the factory, properly identified as to the piece of equipment it was taken from.

B. Maintenance manuals shall be furnished for each applicable section of the Specifications, shall be suitably bound with hard covers, and shall include all available manufacturers' operation and maintenance instructions, together with as-built Drawings and lists hereinbefore specified and other diagrams and instructions necessary to properly operate and maintain the equipment. The equipment lists and maintenance manuals shall be submitted in duplicate to Architect for approval not less than 10 days prior to the completion of the job. The maintenance manuals shall

also include the name, address and phone number of the General Contractor and all subcontractors involved in any of the Work specified herein. The maintenance manuals shall be finally provided in four copies.

1.29 CLEANING

A. During construction on a daily basis, and upon completion of the Work, remove from the site all debris and excess materials, tools, and removed items, resulting from this Work. Clean equipment, including lighting fixtures, free of dust, dirt, grease, paint, etc.

1.30 SALVAGE

A. Deliver salvaged equipment and material deemed salvageable by Project Manager to location designated by Project Manager. Remove other removed material and equipment from site.

1.31 GUARANTEE

A. Leave the entire installation in complete working order, free from defects in materials, workmanship or finish. Guarantee to repair or replace parts that may develop defects due to faulty materials, equipment, or workmanship within a period of one year after the Work is accepted by the Owner. Also, guarantee to repair or replace with like materials, other existing Work in the building damaged from or during the repair of any such defective equipment, materials, or workmanship.

1.32 INSTALLERS QUALIFICATIONS

A. Installer must have electrical certification per California Labor Code Section 3099.2.

B. All work described in the Electrical Specifications and shown on Electrical Drawings shall be performed by California State Certified Electricians.

C. All electrical foremen shall have a minimum of 500 hours of documented classroom training.

D. All electrical foremen shall have a minimum of 3,000 hours of documented on-the-job training.

E. At the time equipment submittals are made, provide copies of State Certification and training documents for electricians working on this project

PART 2 – PRODUCTS AND EXECUTION

2.01 GROUNDING

A. Grounding shall be executed in accordance with applicable codes and regulations of the State of California, California Electrical Code and local authorities having jurisdiction as well as any additional provisions specified or shown on Drawings.

B. Grounding bushings shall be used wherever conduits are grounded. Feeder conduits to panels and air conditioners shall have grounding bushings.

C. Grounding conductors should be located to permit, the shortest and most direct path to ground. Connections shall be readily accessible for inspection and connections shall not be permanently concealed in floors or walls.

D. Non-current carrying metallic parts of electrical equipment and raceways shall be securely grounded to the common system ground. In all locations, ground conductors shall be run through conduits and shall be securely bonded to the conduit at the entrance and exit. The conduit for the grounding conductors shall be continuous from the point of attachment to cabinets or equipment to the grounding electrode, and shall be securely fastened to the ground clamp fittings.

E. Ground connections to equipment shall be made with an approved type of exothermic weld or shall be bolted or clamped to equipment or conduit. Sheet metal strap types of ground clamps shall not be used. Contact surfaces shall be thoroughly cleaned and bright before connection is made so as to ensure a good metal to metal contact.

F. Where nonmetallic conduit is used, ground shall be achieved through use of a separate, green-insulated, copper, code-size, ground conductor included in the conduit.

G. Bonding of cold water piping system shall be achieved at the service entrance. A copper saddle shall be installed over the copper pipe at the location of the clamp to avoid damage to the pipe.

2.02 CONDUIT

A. Rigid Steel Conduit:

1. Rigid steel conduit shall have zinc coated exterior, zinc or enamel interior, standard weight, zinc coated couplings, locknuts and bushings and shall bear the U.L. label. Rigid conduit shall not be installed underground.

2. Use rigid conduit only for exposed exterior conduit runs, wherever subject to physical damage, or where specifically called for on the Drawings or required by a serving utility.

3. Intermediate metallic conduit (I.M.C.) may be used in lieu of rigid steel conduit.

B. Electrical Metallic Tubing:

1. Electrical metallic tubing (E.M.T.) shall bear the U.L. label and shall be zinc coated thinwall conduit with zinc-coated couplings and connections. "Indent" type fittings shall not be used.

2. E.M.T. may be used where rigid, flexible or non-metallic conduit is not required.

3. E.M.T. shall be used for interior dry locations. EMT shall be used where no specified conduit type is called for on the Drawings.

C. Flexible Metallic Conduit:

1. Flexible metallic conduit shall be galvanized steel and bear the U.L. label. Fittings for flexible conduit shall be squeeze type. Screw-in connectors and other connectors that

decrease the interior diameter of the conduit shall not be used unless specifically approved by the Project Manager.

2. Liquid-tight flexible conduit shall bear the U.L. label and be plastic jacketed moisture and oil resistant with oil and vapor tight connectors.

3. Use flexible conduit for final connection to equipment where vibration may injure direct conduit connection. It may be used for indoor dry locations, for fixture whips not to exceed 72 inches and in other locations where structural conditions will not permit the use of EMT not to exceed six feet, only if approved by the Project Manager.

4. Use liquid-tight flexible conduit in lieu of flexible conduit for wet, damp, or outdoor areas or where weatherproof flexible conduit is called for on the Drawings or by code.

D. Plastic Conduit:

1. Plastic conduit shall be rigid polyvinyl chloride (PVC) Underwriter's approval, Schedule 40. Connections and fittings shall be "outside" type assembled in accordance with the recommended methods of the manufacturer.

2. Underground PVC conduit shall be buried a minimum of 24 inches below grade. Where more than two conduits are installed adjacently underground, use factory made conduit spacers.

3. PVC conduit shall be used for underground conduit runs in lieu of wrapped rigid conduit except as noted otherwise on the Drawings or required by the serving utility.

4. Provide a code size ground conductor in each conduit.

5. Only braided polyethylene or similar pull rope shall be used.

E. Installation of Conduit:

1. Underground conduit.

a. Keep interior of conduit clean and clear. Clean underground conduits by pulling a mandrel through conduit run followed with a swab before pulling wire.

b. Reroute conduit from locations shown on the Drawings where it is necessary to clear obstructions.

c. Provide junction or pull boxes where required for pulling conductors due to excessive number of bends or length of conduit runs.

d. Bury underground conduit, except those under buildings, a minimum of 24 inches below finished grade. Conduits under roadways shall be a minimum of 36 inches below finished grade. Conduit runs ¾ inch and smaller in slabs shall be located above vapor barriers. Bury conduit runs larger than ¾ inch to a minimum depth of 12 inches below floor slabs.

e. Standard factory ells shall not be used in underground service conduits or other long underground runs. Field bends shall not be flattened or kinked and shall not materially reduce the internal diameter of the conduit. Bends in long underground runs shall be made in long sweeping bends. Do not bend at couplings. Approved conduit bending methods shall be used.

f. All conduit runs shall have a code size insulated grounding conductor.

g. Properly separate two or more conduits installed underground in a common concrete envelope with approved factory made conduit spacers.

h. Locate conduit stub-outs dimensionally from building or curb lines on Record Drawings.

i. Pull wires shall be installed in empty conduits including telephone conduits and stub-outs, No. 12 AWG, type "THWN" insulated copper wire or 1/8-inch polyethylene rope shall be used.

j. Spare underground conduits shall be sealed with duct plugs that have pull tabs. Duct tape shall not be used to seal unused conduits.

2. Exposed/Concealed Conduit:

a. Provide secure mounting facilities for conduits. Wire or plumbers tape shall not be used for hanging conduit. Strap shall be factory made of the one hole malleable iron or two-hole galvanized clamp type.

b. Provide expansion couplings wherever conduits cross expansion joints.

c. Run conduit at right angles or parallel to structural members, walls, floors and ceilings. Where several conduits are run together or suspended, they shall be hung on Unistrut trapezes with minimum 3/8-inch rod hangers.

d. Cut ends of conduit square and ream to remove burrs or sharp edges. Terminate conduits properly with bushings, locknuts, etc. Terminate one (1) inch and larger conduits with insulated bushings.

e. Render conduits projecting through the roofing watertight by proper flashings. Securely fasten a sheet metal cap and tighten bank or storm collar to the conduits. Extend flashing a minimum of six (6) inches in all directions. Coordinate and install roof flashing for conduits to the satisfaction of the Project Manager.

f. All conduit runs shall have a code size insulated grounding conductor.

g. Pull wires shall be installed in empty conduits including telephone conduits and stub-outs, No. 12 AWG, type "THWN" insulated copper wire or 1/8-inch polyethylene rope shall be used.

h. Flexible conduit connections shall comply with NEC Section 350-22.

i. Provide Dura Block or similar support for roof-mounted conduits.

2.03 OUTLET, JUNCTION AND PULL BOXES

A. Outlet boxes and junction boxes shall be galvanized one-piece pressed steel, knockout type. The size of each box shall be determined by the number of wires or conduits or size of conduits entering the box, but shall not be less than 4" square and 1-1/2" deep unless otherwise noted. All boxes shall be UL listed.

B. Minimum box size for data and telephone outlets shall be 4" square and 2-1/8" deep.

C. Single gang boxes in concrete, for fixture outlets, shall be 4-3/8" octagonal concrete boxes, 2-1/2" deep minimum.

D. Single gang boxes in concrete, for wiring devices, shall be 3-1/2" deep, 3-3/4" long and 1-7/8" wide.

E. Single gang outlet boxes installed in concrete or masonry walls shall be a minimum of 3-1/2" deep, 4" long and 2" wide, set flush with the wall and provided with a single gang wall plate.

F. Install wood blocking for outlet boxes in a rigid, workmanlike manner using new material where wood studs are used. Provide rigid support to avoid twisting of outlet boxes where steel studs are used. Boxes shall be secured such that they are level and plumb.

G. Locknuts shall be used on both sides of conduit connections to box or panel, in addition to bushing. Where a larger size opening occurs than size of conduit, use reducing washers.

H. Exposed boxes shall be weatherproof, threaded or hub condulet with gasketed condulet cover suitable for device installed or with blank cover plate when condulet is used as a junction box. Condulet wire fill capacity shall not be exceeded.

I. Recessed weatherproof outlets or junction boxes shall be equipped with neoprene gasketed covers.

J. Large size junction or pull boxes shall be fabricated from code gauge sheet steel. Where located indoors, finish shall be gray enamel and covers shall be secured with screws. Where exposed to weather, they shall be weatherproof, NEMA 3R, and rain-tight and hot-dip galvanized after fabrication; also, they shall have weatherproof gaskets, flat covers and galvanized iron screws. Provide knockouts and/or threaded hubs as required for the conduit used. Boxes in finished areas shall be prime painted.

K. Any unused, removed knockouts shall be filled with a K.O. cover.

L. Provide bonding or grounding from metal conduit terminating in junction with concentric KO’s.

M. Install boxes and rings such that finished installation is flush with finished surface.

2.04 PLATES AND DEVICE COVERS

A. Plates for switches, receptacles, telephone and blank outlets shall be stainless steel, Hubbell 302/304 alloy or Legrand "S" line, unless otherwise noted. Plates shall be engraved per Drawings or as covered under the Article of this Specification titled “Identification of Equipment”.

2.05 FLOOR BOXES

A. Floor boxes shall be suited for the type of flooring they are installed on.

B. Floor boxes shall be fully adjustable or adaptable/trimmable to accommodate finished floor elevation.

C. Covers for floor boxes shall be brass.

D. Acceptable manufacturers: Manufacturers shall be one of the following, but not limited to:

1. Wiremold/Legrand.
2. Hubbell.

E. Components in floor boxes shall be as specified on the Drawings.

2.06 RECEPTACLES

A. Duplex convenience outlets shall be specification grade, backwire, three wire, NEMA #5-20R, self-grounding type, 20 ampere, 125 volt parallel slots, polarized, in white. Additional receptacles shall be as indicated on the Drawings. Receptacles shall be Hubbell #5253W.

B. Receptacles indicated weatherproof shall have lift cover plates that are weatherproof "while in use" Hubbell/Taymac expandable flat ML450W or equal.

C. Ground fault current interrupter receptacles shall be self-testing, Hubbell # GFR5352WST.

D. Outdoor ground fault circuit interrupter receptacles shall be Hubbell #GFW RST 20W or equal.

E. USB receptacles shall be Hubbell #USB8200W or equal.

2.07 LIGHTING SWITCHES

A. Line voltage lighting switches shall be specification grade, quiet type, 20 amp. 120/277 volt A.C. white handled, unless otherwise noted. Switches shall be Hubbell #CS1221W.

B. Dimmers shall be specification grade 20 amp, 120/277 volt, white. Specific attributes of dimmers: types, loads, configuration, shall be as shown on the drawings. Dimmers shall match the drivers in the light fixtures that they feed.

C. A neutral conductor shall be routed to each switch and dimmer location.

2.08 WIRE AND CABLE

A. 600 Volt Conductors:

1. Conductors shall be copper and delivered to the site in their original, unbroken packages plainly marked or tagged with U.L. label, size, kind, insulation, name of manufacturer and trade name of the wire.

2. Type "THWN/THHN", 600-volt insulation shall be used for all locations.

3. Minimum size conductor shall be #12.

4. Conductors shall be stranded.

5. Ground conductors shall be bare copper or have green insulation.

6. 120 volt and 277 volt circuits shall have separate neutrals.

B. MC Luminary Cable:

1. MC Luminary cable may be used for line voltage and 0-10 volt wiring between light fixtures and dimmers.
2. MC Luminary cable shall be UL listed.
3. MC Luminary cable shall be properly supported along its route between fixtures and dimmers.
4. Acceptable manufacturers: Manufacturers shall be one of the following, but not limited to:
   a. AFC
   b. Southwire
   c. General Cable
5. MC Cable sizes shall be as shown on the Drawings.

C. Installation:

1. Conductors shall be continuous between outlets or junction boxes and no splices shall be made except in outlet boxes, pull boxes, panelboard gutters or handholes.

2. Joints, splices and taps No. l0 or smaller (including fixture pigtails) shall be connected with "floating spring" type connectors. No. 8 and larger shall be connected with solderless connectors of 100% electrolytic copper. Split-bolt connectors are not acceptable.

3. Tighten pressure type lugs on panels and equipment, and then retighten 24 hours or more later after energizing. Provide written report of torque values on lugs.

4. Oil or grease shall not be used when pulling conductors. Use U.L. approved cable lubrication only.

5. Lace or train conductors neatly in panels, cabinets and equipment. Use plastic wire ties to route conductors at edge of enclosure away from overcurrent devices.

6. Branch circuits shall be color coded in compliance with Section 210-5 of the California Electrical Code. Colored tape is not acceptable.

7. All wiring, both line and low voltage, shall be installed in conduit unless otherwise noted.

8. Conductors from different panels or from different power sources shall not be installed in the same conduit, junction box, gutter, or raceway.

D. Tag:

1. Branch circuits shall be left tagged with circuit numbers in gutters and junction boxes where unused circuits terminate.

2. Feeder conductors shall be tagged as phase "A" or "B" or "C".

3. The method of tagging shall be with adhesive preprinted tape numbered or lettered wrap around tags. Colored tape is not acceptable.

4. Tagging shall be applied after wire is installed in conduit.

5. Feeders in panel or equipment shall be tagged by phase letter in each panel or equipment.

6. Where it is impractical to use printed markers on certain wires or cables, use blank tape with identification marked thereon with indelible pen or pencil.

E. Color Coding for Phase Identification: Color code secondary service, feeder, and branch circuit conductors with factory applied color as follows:

208y/120Volts	Phase
Black	A
Red	B
Blue	C
White	Neutral
Green	Ground

2.09 DISCONNECT SWITCHES

A. Non-fusible or fusible as shown on the Drawings, heavy duty, 250 or 600 volts as required, NEMA Type 1 enclosure, except where WP is indicated or required by code, use NEMA Type 3R enclosure.

2.10 LIGHTING FIXTURES

A. Lighting fixtures shall be of manufacture and type as specified in the Fixture Schedule, and shall have all parts and fittings necessary to completely and properly install the fixture. Fixtures of the same type shall be of one manufacturer and of identical finish and material.

B. Lighting fixtures shall bear Underwriter's Laboratories labels. Interior light fixtures shall be on the California Energy Commission approved list. Exterior light fixtures shall be on the DLC list.

C. Fixtures shall be furnished and installed as indicated on the Drawings, including hangers, glassware, auxiliary equipment, drivers, adapters, connectors for continuous installation, etc.

D. Each fixture shall be wired with conductors suitable for the voltage, current and temperature to which the conductors will be subjected.

E. If excessive driver flicker develops within 12 months after installation, the condition shall be corrected at no charge to the Owner. Flickering of the LED or failure of an LED array within 12 months of substantial completion shall also be corrected at no charge to the Owner.

F. Proper LEDs of type, size, color temperature and wattage indicated shall be furnished and installed in each fixture and shall be manufactured by Phillips, Sylvania, Cree, Soraa or Bridgelux. The Contractor shall replace LED arrays which have been burned out prior to final completion. Clean dust, dirt, fingerprints and grease from fixtures before final completion.

G. Install trims, reflectors, lenses and diffusers with care. Wear cloth or surgical gloves when installing these to avoid leaving fingerprints.

H. Follow manufacturer's installation instructions when installing light fixtures.

2.11 LED LAMPS

A. Any LED lamps used shall be JA8 compliant.

B. LED lamps shall be UL listed.

C. LED lamps shall be tested for use in the fixtures they will be installed in.

D. LED lamps shall not cause fixtures to overheat or lamps to prematurely fail.

2.12 PANELBOARDS

A. Section Includes:

1. Power Distribution Panelboard: Furnish and install distribution panelboard(s) as specified herein and where shown on the associated schedules on Drawings.

2. Lighting and Appliance Panelboard: Furnish and install lighting and appliance panelboard(s) as specified herein and where shown on the associated schedules on Drawings.

B. References: The panelboard(s) and circuit breaker(s) referenced herein are designed and manufactured according to the latest revision of the following Specifications.

1. NEMA PB-1 - Panelboards.

2. NEMA PB-1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

3. NEMA AB 1 - Molded Case Circuit Breakers.

4. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

5. UL 50 - Enclosures for Electrical Equipment.

6. UL 67 - Panelboards.

7. UL 489 - Molded-Case Circuit Breakers and Circuit Breaker Enclosures.

D. Lighting and Appliance Panelboard: (Square D NQOD, no equal)

1. Interior:

a. Shall be rated for 240 VAC/48 VDC maximum. Continuous main current ratings, as indicated on associated schedules, not to exceed 600 amperes maximum.

b. Minimum short circuit current rating: As indicated on schedules in rms symmetrical amperes at 240 VAC.

c. Provide one (1) continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors suitable for plug-on or bolt-on branch circuit breakers. The bussing shall be fully rated. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67. Bussing rated 100-400 amperes shall be copper. Bussing rated for 600 amperes shall be copper as standard construction. Panelboards shall be suitable for use as Service Equipment when application requirements comply with UL 67 and NEC Articles 230-F and G.

d. All current-carrying parts shall be insulated from ground and phase-to-phase by Noryl high dielectric strength thermoplastic or equivalent.

e. Split solid neutral shall be plated and located in the mains compartment up to 225 amperes so all incoming neutral cable may be of the same length.

f. Interior trim shall be of dead-front construction to shield user from energized parts. Dead-front trim shall have pre-formed twistouts covering unused mounting space.

g. Nameplates shall contain system information and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label and short circuit current rating shall be displayed on the interior or in a booklet format.

h. Interiors shall be field converted for top or bottom incoming feed. Main and sub-feed circuit breakers shall be vertically mounted. Main lug interiors up to 400 amperes shall be field convertible to main breaker. Interior leveling provisions shall be provided for flush mounted applications.

i. Panelboard lugs shall be tightened with a torque wrench to values listed on the equipment.

j. Arc Flash labeling shall be provided in accordance with Section 1.18 of these specifications.

2. Main Circuit Breaker:

a. Main circuit breakers shall have an overcenter, trip-free, toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have a permanent trip unit with thermal and magnetic trip elements in each pole. Each thermal element shall be true rms sensing and be factory calibrated to operate in a 40º C ambient environment. Thermal elements shall be ambient compensating above 40º C.

b. Two- and three-pole circuit breakers shall have common tripping of all poles. Circuit breakers frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker, which allows the user to simultaneously select the desired trip level of all poles. Circuit breakers shall have a push-to-trip button for maintenance and testing purposes.

c. Breaker handle and faceplate shall indicate rated ampacity. Standard construction circuit breakers shall be UL Listed for reverse connection without restrictive line or load markings.

d. Circuit breaker escutcheon shall have international I/O markings, in addition to standard ON/OFF markings. Circuit breaker handle accessories shall provide provisions for locking handle in the ON or OFF position.

e. Lugs shall be UL Listed to accept solid or stranded copper conductors only. Lugs shall be suitable for 90º C rated wire, sized according to the 75º C temperature rating per NEC Table 310-16. Lug body shall be bolted in place; snap-in designs are not acceptable. Lugs shall be torqued with a torque wrench to the value listed on the main circuit breaker.

3. Branch Circuit Breakers:

a. Circuit breakers shall be UL Listed with amperage ratings, interrupting ratings, and number of poles as indicated on the panelboard schedules.

b. Molded case branch circuit breakers shall have bolt-on type bus connectors.

c. Circuit breakers shall have an overcenter toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have thermal and magnetic trip elements in each pole. Two- and three-pole circuit breakers shall have common tripping of all poles.

d. There shall be two forms of visible trip indication. The breaker handle shall reside in a position between ON and OFF.

e. The exposed faceplates of all branch circuit breakers shall be flush with one another.

f. Lugs shall be UL Listed to accept solid or stranded copper conductors only. Lugs shall be suitable for 90º C rated wire, sized according to the 75º C temperature rating per NEC Table 310-16. Lugs shall be torqued with a torque wrench to the value listed on the main circuit breaker.

4. Enclosures:

a. Type 1 Boxes:
   1) Boxes shall be galvanized steel constructed in accordance with UL 50 requirements. Galvanized steel will not be acceptable.

   2) Boxes shall have removable endwalls with knockouts located on one end. Boxes shall have welded interior mounting studs. Interior mounting brackets are not required.

   3) Box width shall be [20 in wide] [14 in wide] [8.625 in wide - NQOB column width only].

b. Type 1 Fronts:
   1) Front shall meet strength and rigidity requirements per UL 50 standards. Fronts shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.

   2) Fronts shall be hinged 1-piece with door. Mounting shall be as indicated on associated schedules.

c. Type 3R, 3S, 5, and 12:
   1) Enclosures shall be constructed in accordance with UL 50 requirements. Enclosures shall be painted with ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.

   2) All doors shall be gasketed and equipped with a tumbler type vault lock and two (2) additional trunk type latches. All lock assemblies shall be keyed alike. Two (2) keys shall be provided with each lock. A clear plastic directory cardholder shall be mounted on the inside of door.

   3) Maximum enclosure dimensions shall not exceed 20 in. wide and 6.5 in. deep.

2.13 SURGE PROTECTIVE DEVICES (SPD) (TVSS)

A. Surge protective devices shall be panel integrated.

B. SPDs shall be provided and installed in the panel by the manufacturer.

C. SPD size/rating shall be as shown on the Drawings.

D. SPDs shall be UL listed.

E. Where independent SPDs are used, they shall be installed adjacent to the equipment they serve. The conductor length from the circuit breaker to the SPD shall be minimized.

END OF SECTION

PROBATION SANTA MARIA JJC UNIT 1, 2 & 3 REMODEL

SANTA MARIA JUVENILE JUSTICE CENTER

GENERAL NOTES:

1. THE FIRE ALARM SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH CALIFORNIA BUILDING CODE, CFC, NEC, CEC AND NFPA 72.
2. ALL CABLE SHALL BE INSTALLED PER APPLICABLE CODES. IF INSTALLED IN CONDUIT, THE RACEWAY SHALL BE NO LESS THAN 3/4" IN DIAMETER AND BE PROVIDED AND INSTALLED BY THE ELECTRICAL CONTRACTOR.
3. ALL DEVICES IN THE FIRE ALARM SYSTEM WILL BE LISTED FOR THE INTENDED USE AND INSTALLED PER MANUFACTURE'S SPECIFICATIONS.
4. FIRE ALARM DRAWINGS ARE SCHEMATIC IN NATURE AND SHALL BE ADJUSTED AS NEEDED TO ALLOW FOR IN-FIELD CONDITIONS.
5. WALL MOUNT AUDIO/VISUAL DEVICES SHALL BE MOUNTED 80" AFF TO BOTTOM OF LENS.
6. DETECTORS SHALL NOT BE PLACED WITHIN 3'-0" OF ANY SUPPLY AIR REGISTER OR WHERE THE AIR MOVEMENT EXCEEDS THE MANUFACTURES LISTING REQUIREMENTS.
7. FIRE ALARM STROBE DEVICES TO BE RED W/CLEAR LENS.
8. UPON THE COMPLETION OF INSTALLATION OF THE ENTIRE SYSTEM A SATISFACTORY TEST OF THE ENTIRE SYSTEM SHALL BE MADE IN THE PRESENCE OF THE AUTHORITY HAVING JURISDICTION (AHJ).
9. A STAMPED SET OF APPROVED FIRE ALARM PLANS SHALL BE AT THE JOBSITE USED FOR INSTALLATION.

APPLICABLE CODES:

2025 NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 72
2025 CALIFORNIA FIRE CODE (CFC) - TITLE 24, PART 9
2025 CALIFORNIA BUILDING CODE (CBC) - TITLE 24, PART 12
2025 CALIFORNIA ELECTRICAL CODE (CEC) - TITLE 24, PART 3
2025 CALIFORNIA MECHANICAL CODE (CMC) - TITLE 24, PART 4
2025 CALIFORNIA PLUMBING CODE (CPC) - TITLE 24, PART 5

SCOPE OF WORK:

BUILDING INFO:
SANTA BARBARA COUNTY JUVENILE HALL. EXISTING 1-STORY BUILDING.
- APN: 111-230-69
- OCCUPANCY TYPE: I-3
- CONSTRUCTION TYPE: TYPE I
- CONSTRUCTION DATE: 1977 (UNIT 1 & UNIT 2), 1999 (UNIT 3)
- PROJECT AREA: APPROX. 11,700 SF (UNIT 1 & UNIT 2), APPROX. 5,325 SF (UNIT 3)
- FIRE SPRINKLERS: NO (UNIT 1 & UNIT 2), YES (UNIT 3),
- FIRE ALARM: YES
- PERFORMANCE CLASS (SLC, NAC): CLASS B

SCOPE OF WORK:
DEEP BLUE INTEGRATION INC. SHALL MAKE THE REQUIRED CHANGES TO THE EXISTING FIRE ALARM SYSTEM REQUIRED IN UNITS #1, #2, & #3. THE NEW SILENT KNIGHT FACU SHALL REPLACE THE EXISTING RADIONICS 7412 (NODE 2) AND SHALL REPORT ALARM, SUPERVISORY AND TROUBLE SIGNALS TO EXISTING SIMPLEX 4100 PANEL MAIN FACU (NODE 1) IN ADJACENT BUILDING. THE OTHER EXISTING SIMPLEX 4100 FACU (NODE 3) IN COURTHOUSE SHALL REMAIN TO PROTECT EXINTGIN AREAS NOT IN CONTRACT.

- FIRE ALARM ANNUNCIATOR SHALL BE INSTALLED IN EACH CONSTANTLY ATTENDED LOCATION IN EACH CELL COMPLEX. ANNUNCIATORS IN INMATE SHALL HAVE KEY-LOCKED PROTECTIVE COVERS. ADDITIONAL ANNUNCIATORS SHALL BE INSTALLED IN THE INTAKE AREA OF ADJOINING BUILDING. ALL ANNUNCIATORS SHALL REPORT THE LOCATION OF ANY DEVICES THAT GO INTO ALARM.
- SMOKE/HEAT DETECTORS SHALL BE INSTALLED TO REPLACE EXISTING DETECTORS IN AREAS OF WORK. PROTECTIVE GUARDS SHALL BE INSTALLED OVER DETECTORS IN SLEEPING AREAS AND INMATE COMMON AREAS.
- MANUAL ALARM STATIONS SHALL BE INSTALLED IN EACH CONSTANTLY ATTENDED LOCATION IN EACH CELL COMPLEX. EXISTING MANUAL ALARM STATIONS IN AREA OF WORK SHALL BE REPLACED. MANUAL ALARM STATIONS IN INMATE AREAS SHALL BE KEY-ACTIVATED TO PREVENT TAMPERING.
- MONITOR MODULES SHALL BE INSTALLED TO REPLACE EXISTING MODULES FOR SPRINKLER SUPERVISORY, AND MONITOR MANUAL ALARM STATIONS
- FPLP WIRING

SHEET INDEX:

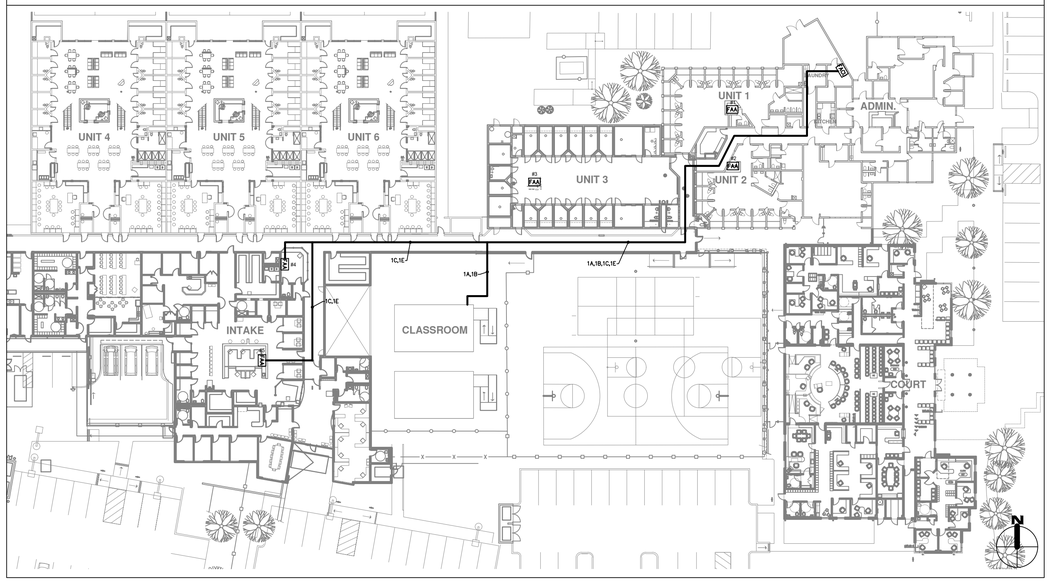
FA0.00	FIRE ALARM NOTES, BILL OF MATERIALS, AND SITE MAP
FA1.00	FIRE ALARM RISER DIAGRAM & SEQUENCE OF OPERATIONS MATRIX
FA2.00	FIRE ALARM FLOOR PLAN
FA3.00	FIRE ALARM CALCULATIONS
FA4.00	FIRE ALARM DEVICE DETAILS

FIRE ALARM SYMBOLS LEGEND / BILL OF MATERIAL

(N) QTY	SYMBOL	DESCRIPTION	MANUFACTURER & MODEL#	CSFM#
1	FACU	FIRE ALARM CONTROL UNIT	SILENT KNIGHT 6808	7165-0559:0502
5 2	FAA	FIRE ALARM REMOTE ANNUNCIATOR PROTECTIVE COVER, KEY LOCK	SILENT KNIGHT 5860R STI 7530	7165-0559:0502 N/A
79 79 40		SMOKE DETECTOR W/ DETECTOR BASE W/ PROTECTIVE GUARD	SILENT KNIGHT SK-PHOTO-W SYSTEM SENSOR B-300 STI 9601	7150-0559:0161 7300-1653:0109 N/A
5 5		HEAT DETECTOR W/ DETECTOR BASE	SILENT KNIGHT HEAT-W SYSTEM SENSOR B-300	7270-0559:0147 7300-1653:0109
5	AIM	MONITOR MODULE	SILENT KNIGHT SK-MINIMON	7300-0559:0155
2	AIM D	DUAL MONITOR MODULE	SILENT KNIGHT SK-MONITOR-2	7300-0559:0155
5	F	MANUAL PULL STATION, KEY OPERATED	POTTER RMS-1T-KO	7150-0328:0551
3	C	HORN/STROBE, CEILING MOUNT	SYSTEMS SENSOR P2CWLED	7135-1653:0503

WIRE	DESCRIPTION	
A	#16/2 FPLP UNSHIELDED TWISTED SIGNALING LINE CIRCUIT (SLC) CABLE	WCW 761360
B	#14/2 FPLP UNSHIELDED TWISTED NOTIFICATION APPLIANCE CIRCUIT (NAC) CABLE	WCW 7679620
C	#16/4 FPLP SHIELDED TWISTED FIRE ALARM ANNUNCIATOR (FAA) CIRCUIT CABLE	WCW 761347
E	#14/2 FPLP UNSHIELDED TWISTED 24V POWER CIRCUIT CABLE	WCW 7679630

SITE MAP



RA ARCHITECTS & ENGINEERS

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REVISIONS

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PROJECT

PROBATION
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UNIT 1, 2 & 3
REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
1105 Santa Barbara Street
Santa Barbara, CA 93101

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
FIRE ALARM NOTES, BILL OF MATERIALS, AND SITE MAP

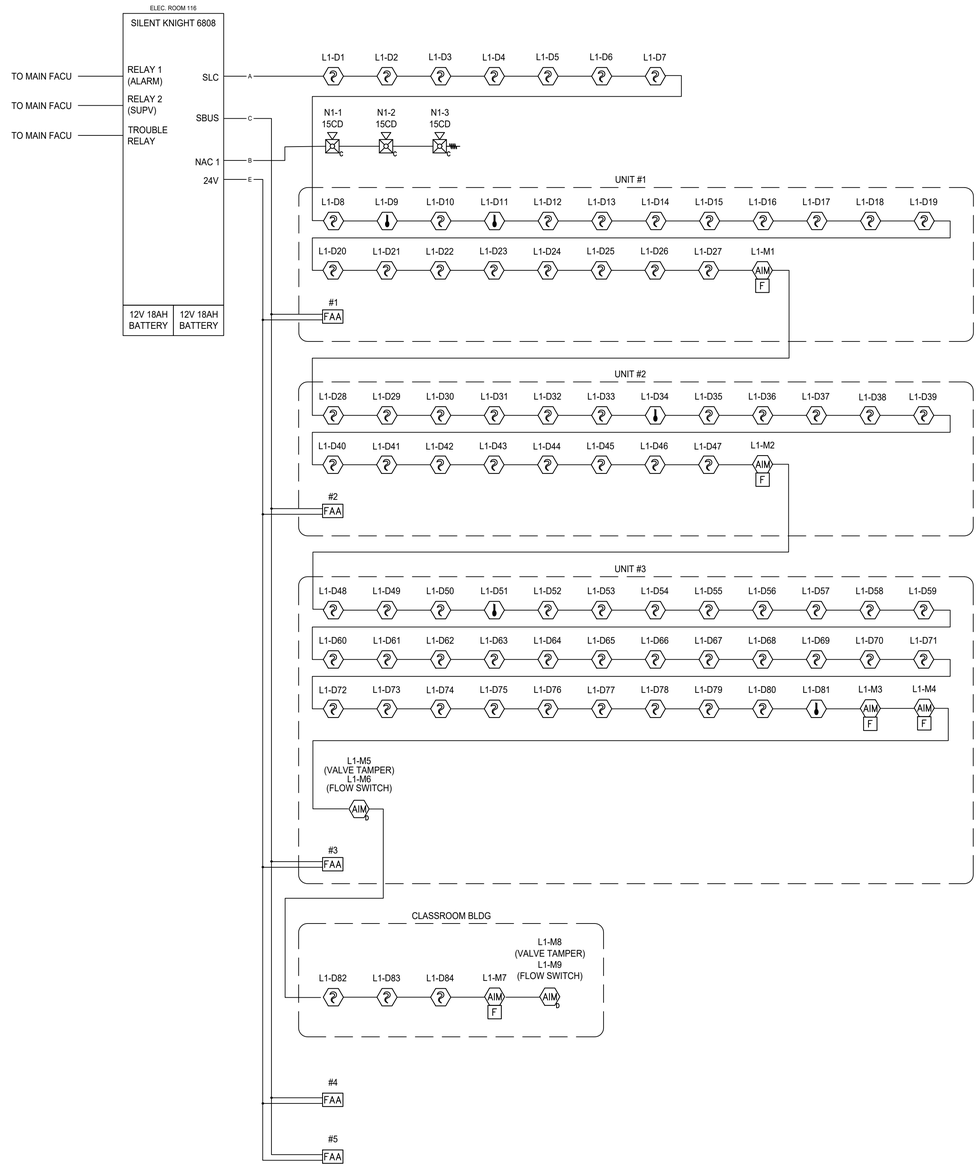
DATE: 05/20/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
FA0.00



FIRE ALARM SYSTEM RISER DIAGRAM

	SYSTEM INPUTS	A: FACU/ANNUNCIATOR – DISPLAY ALARM CONDITION	B: FACU/ANNUNCIATOR – DISPLAY TROUBLE CONDITION	C: FACU/ANNUNCIATOR – DISPLAY SUPERVISORY CONDITION	D: TRANSMIT FIRE ALARM SIGNAL TO MAIN FACU	E: TRANSMIT TROUBLE SIGNAL TO MAIN FACU	F: TRANSMIT SUPERVISORY SIGNAL TO MAIN FACU	G: ACTUATE AUDIBLE/VISUAL FIRE ALARM SIGNAL	H	I
	SYSTEM OUTPUTS									
1	MANUAL PULL STATION	●				●				●
2	SMOKE DETECTOR	●				●				●
3	HEAT DETECTOR	●				●				●
4										
5	TAMPER SWITCH			●				●		
6	WATERFLOW SENSOR	●				●				●
7										
8	FIRE ALARM SYSTEM AC POWER FAILURE		●				●			
9	FIRE ALARM SYSTEM LOW BATTERY		●				●			
10	OPEN CIRCUIT		●				●			
11	GROUND FAULT		●				●			
12	NOTIFICATION APPLIANCE SHORT CIRCUIT		●				●			
13	NOTIFICATION BYPASS SWITCH			●				●		
		A	B	C	D	E	F	G	H	I

FIRE ALARM SEQUENCE OF OPERATIONS MATRIX

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BSCC PLAN REVIEW NUMBER
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SHEET TITLE
FIRE ALARM RISER DIAGRAM AND SEQUENCE OF OPERATIONS MATRIX

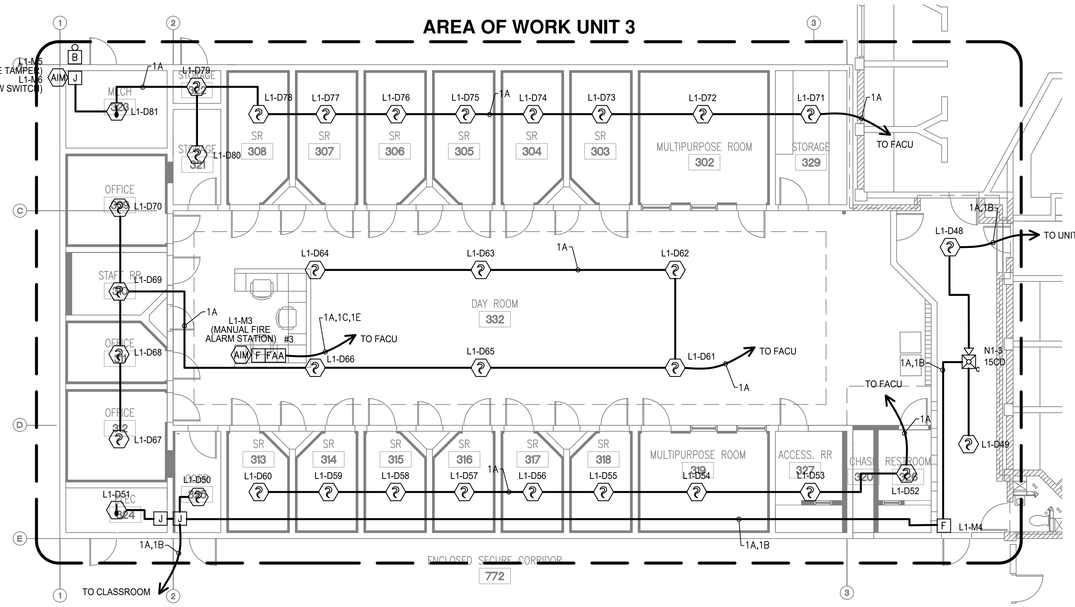
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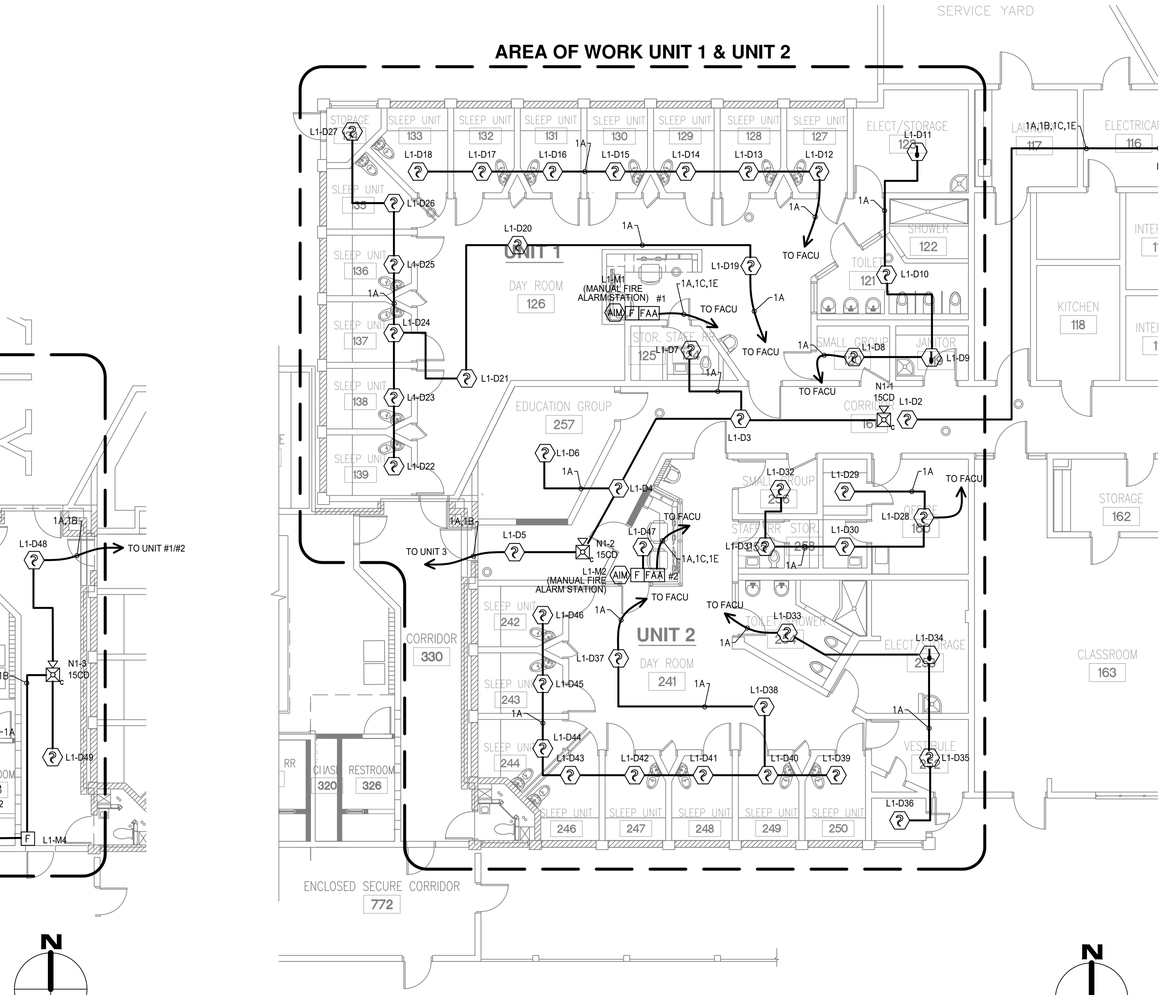
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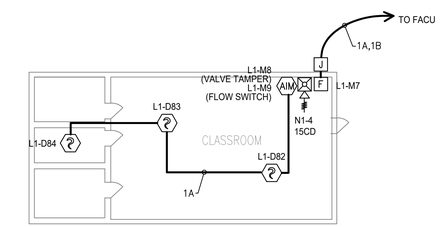
UNIT 3 - FLOOR PLAN

SCALE: 1/8"= 1'–0"



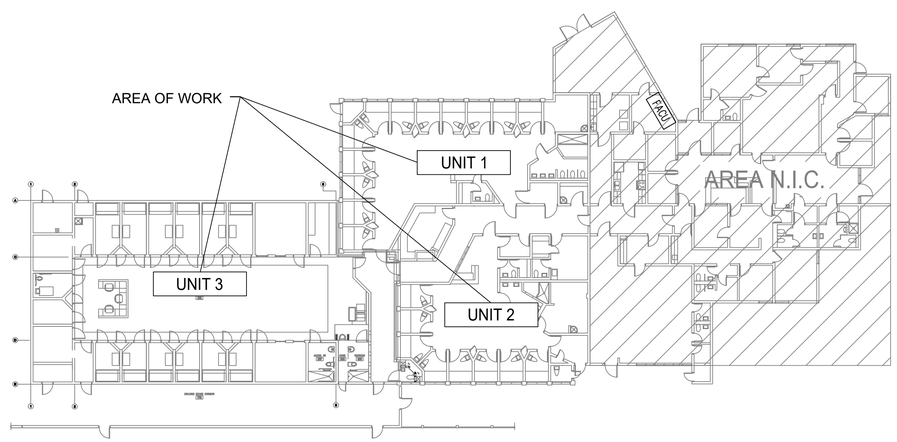
UNIT 1 & 2 - FLOOR PLAN

SCALE: 1/8"= 1'–0"



CLASSROOM BLDG - FLOOR PLAN

SCALE: 1/8"= 1'–0"



SITE KEY

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#21055

BSCC PLAN REVIEW NUMBER
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SHEET TITLE
FIRE ALARM FLOOR PLAN

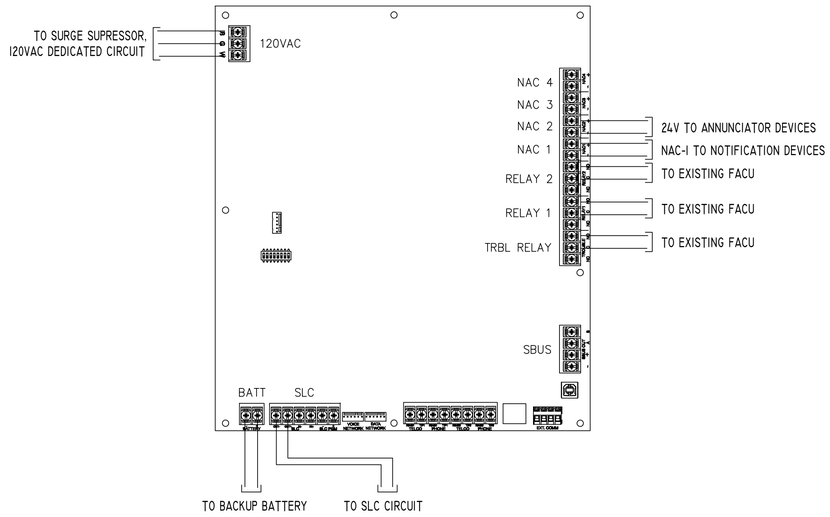
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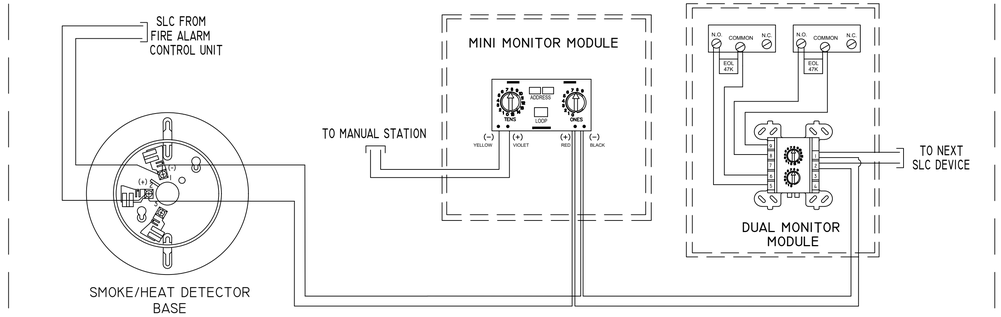
PROJECT MANAGER: MS

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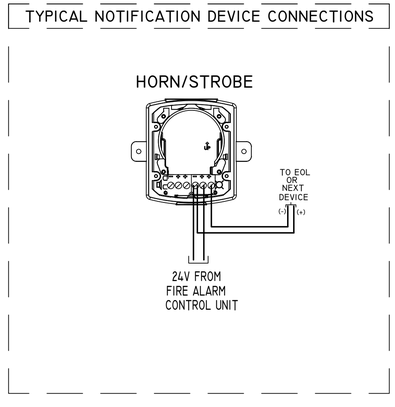
SHEET NUMBER
FA2.00



TYPICAL INITIATING DEVICE CONNECTIONS



TYPICAL NOTIFICATION DEVICE CONNECTIONS



POINT-TO-POINT WIRING DIAGRAM

Honeywell SILENT KNIGHT

IntelliKnight 6808 Battery Calculation

Secondary Power Source Requirements

Device Type	Qty	Standby Current (amps)			Qty	Secondary Alarm Current (amps)		
		Current Draw		Total		Current Draw		Total
1. Control Panel								
6808 Control Panel	1	x 0.190000	=	0.190000	1	x 0.250000	=	0.250000
2. Addressable SLC Devices								
SK-PHOTO (-T)		x 0.000300	=			x 0.000300	=	
SK-PHOTO-W(-T)	79	x 0.000200	=	0.015800	79	x 0.000450	=	0.035550
SK-HEAT(-HT) (-ROR)	5	x 0.000300	=	0.001500	5	x 0.000300	=	0.001500
SK-HEAT-W(HT) (ROR)		x 0.000200	=			x 0.000450	=	
SK-BEAM		x 0.002000	=			x 0.002000	=	
SK-BEAM-T		x 0.002000	=			x 0.002000	=	
SK-DUCT		x 0.000300	=			x 0.000300	=	
SK-ACCLIMATE		x 0.000300	=			x 0.000300	=	
SK-CONTROL		x 0.000375	=			x 0.000375	=	
SK-MONITOR		x 0.000375	=			x 0.000375	=	
SK-MINIMON	5	x 0.000375	=	0.001875	5	x 0.000375	=	0.001875
SK-PULL-SA		x 0.000375	=			x 0.000375	=	
SK-PULL-DA		x 0.000375	=			x 0.000375	=	
SK-MONITOR-2		x 0.000750	=			x 0.000750	=	
SK-MON-10		x 0.003500	=			x 0.003500	=	
SK-RELAY-6		x 0.001450	=			x 0.001450	=	
SK-CONTROL-6		x 0.002250	=			x 0.002250	=	
SK-RELAY		x 0.000255	=			x 0.000255	=	
SK-RELAYMON-2		x 0.001300	=			x 0.024000	=	
SK-ZONE		x 0.000270	=			x 0.000270	=	
SK-ZONE-6		x 0.002000	=			x 0.002000	=	
SK-FIRE-CO		x 0.000300	=			x 0.007200	=	
3. SLC Accessory Bases								
B200S		x 0.000300	=			x 0.000300	=	
B200S-LF		x 0.000300	=			x 0.000300	=	
B200SR		x 0.000300	=			x 0.000300	=	
B200SR-LF		x 0.000300	=			x 0.000300	=	
B224RB		x 0.000500	=			x 0.000500	=	
RTS151		x 0.000000	=			x 0.007500	=	
RTS151KEY		x 0.000000	=			x 0.007500	=	
RA100Z		x 0.000000	=			x 0.010000	=	
4. SLC Isolator Devices								
SK-ISO		x 0.000450	=			x 0.000450	=	
ISO-6		x 0.002700	=			x 0.102000	=	
B224BI		x 0.000500	=			x 0.000500	=	
5. Auxiliary Power Draw - SLC Devices								
SK-CONTROL (Aux Power)		x 0.001700	=			x 0.007000	=	
SK-CONTROL-6 (Aux Power)		x 0.008000	=			x 0.020000	=	
SK-ZONE (Aux Power)		x 0.012000	=			x 0.060000	=	
SK-ZONE-6 (Aux Power)		x 0.050000	=			x 0.270000	=	
B200S (Aux Power)		x 0.000500	=			x 0.035000	=	
B200S-LF (Aux Power)		x 0.000550	=			x 0.140000	=	
B200SR (Aux Power)		x 0.000500	=			x 0.035000	=	
B200SR-LF (Aux Power)		x 0.001000	=			x 0.125000	=	
6. Accessory Modules								
5860	5	x 0.058000	=	0.290000	5	x 0.068000	=	0.340000
5824		x 0.045000	=			x 0.045000	=	
5496		x 0.010000	=			x 0.010000	=	
5895XL		x 0.010000	=			x 0.010000	=	
6855		x 0.020000	=			x 0.025000	=	
6860		x 0.025000	=			x 0.050000	=	
5865-4		x 0.035000	=			x 0.145000	=	
5865-3		x 0.035000	=			x 0.145000	=	
5880		x 0.035000	=			x 0.200000	=	
5883		x 0.000000	=			x 0.220000	=	
SK-IP-2		x 0.093000	=			x 0.136000	=	
SK-IP-2UD		x 0.098000	=			x 0.155000	=	
CELL-MOD		x 0.055000	=			x 0.100000	=	
CELL-CAB-SK		x 0.055000	=			x 0.100000	=	
WSK-WGI Aux Power		x 0.040000	=			x 0.040000	=	
SLC Power		x 0.024000	=			x 0.024000	=	
SK-NIC		x 0.021000	=			x 0.021000	=	
SK-NIC-KIT		x 0.021000	=			x 0.021000	=	
SK-FSL		x 0.079000	=			x 0.079000	=	
SK-FML		x 0.053000	=			x 0.053000	=	
SK-FFT		x 0.120000	=			x 0.230000	=	
Miscellaneous Device 3		x 0.000000	=			x 0.000000	=	
Miscellaneous Device 4		x 0.000000	=			x 0.000000	=	
Miscellaneous Device 5		x 0.000000	=			x 0.000000	=	
8. Notification Appliance Circuits								
24V			0.000000	=			0.261000	= 0.261000
SPARE			0.000000	=			0.000000	=
SPARE			0.000000	=			0.000000	=
SPARE			0.000000	=			0.000000	=
		Total Standby Load		**0.499175**		**Total Alarm Load**		**0.889925**

Honeywell SILENT KNIGHT

IntelliKnight 6808 Circuit Detail

24V

Device	Qty	Non-Alarm Draw		Total	Qty	Alarm Draw		Total
P2WLED-15CD	3	x 0.000000	=	0.000000	3	x 0.087000	=	0.261000
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		Total Standby Load	**0.000000**			**Total Alarm Load**		**0.261000**

SPARE

Device	Qty	Non-Alarm Draw		Total	Qty	Alarm Draw		Total
		x 0.000000	=			x 1.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		Total Standby Load	**0.000000**			**Total Alarm Load**		**0.000000**

SPARE

Device	Qty	Non-Alarm Draw		Total	Qty	Alarm Draw		Total
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		Total Standby Load	**0.000000**			**Total Alarm Load**		**0.000000**

SPARE

Device	Qty	Non-Alarm Draw		Total	Qty	Alarm Draw		Total
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		x 0.000000	=			x 0.000000	=	
		Total Standby Load	**0.000000**			**Total Alarm Load**		**0.000000**

Honeywell SILENT KNIGHT

IntelliKnight 6808 Battery Calculation

Note 1: You are fully responsible for verifying these calculations.
Note 2: Use the dropdowns in the **yellow** cells to enter values.

Calculation in Total Sheet

		Required Standby Time in Hours		
		24 Hours		
Standby Load Current	**0.49918 Amps**	x	24	= 11.980 AH
		Required Alarm Time in Minutes		
		5 Minutes		
Alarm Load Current (Amps)	**0.88993 Amps**	x	0.084	= 0.075 AH
			Total Current Load	**12.055 AH**
			Multiply by the Derating Factor	= x 1.25
			Total Ampere Hours Required	**15.07 AH**
	Recommended Batteries:		**BAT12180 - 18AH Batteries**	

Battery Check	
The batteries can be charged by the 6808 Charger.	
The batteries can be housed in the 6808 Cabinet.	
Current Draw Check	
Circuit#1 current is within the limitations of the circuit.	
Circuit#2 current is within the limitations of the circuit.	
Circuit#3 current is within the limitations of the circuit.	
Circuit#4 current is within the limitations of the circuit.	
6808 Control Panel:	
The output current is within the panel's limitations.	

FIRE ALARM CALCULATIONS

RA ARCHITECTS & ENGINEERS

ARCHITECTURE
GREG RAVATT, AIA

MECHANICAL ELECTRICAL
JIM ALBRECHT, PE

SANTA MARIA OFFICE
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REVISIONS

SEAL

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1, 2 & 3
REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
1105 Santa Barbara Street
Santa Barbara, CA 93101

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
FIRE ALARM CALCULATIONS AND POINT-TO-POINT WIRING DIAGRAM

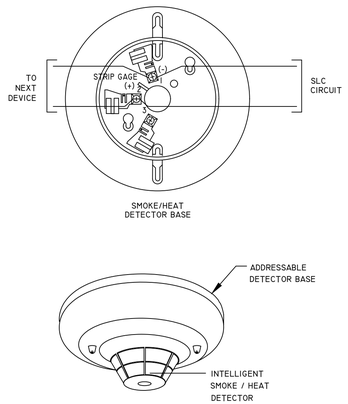
DATE: 05/20/25

TECHNICIAN: MS

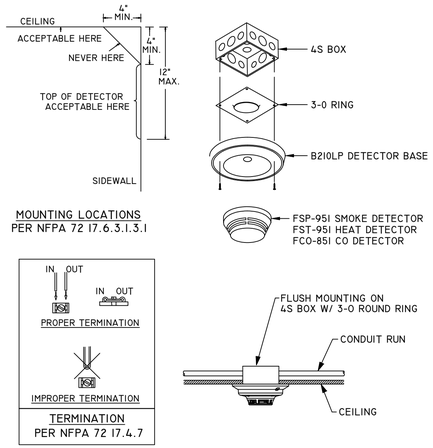
PROJECT MANAGER: MS

JOB NUMBER: RA # 22868

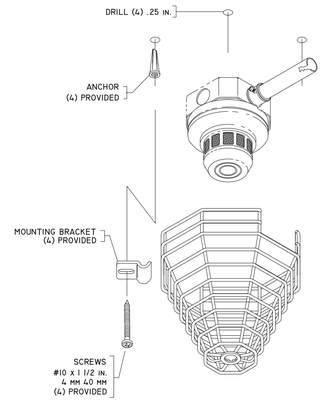
SHEET NUMBER
FA3.00



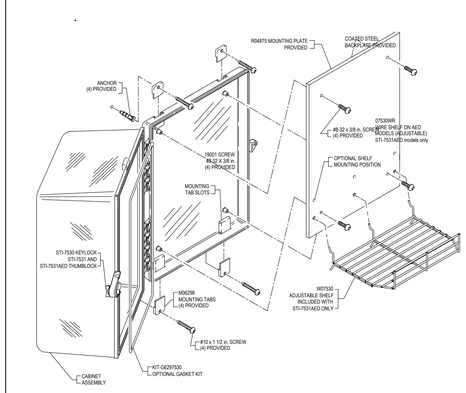
1 B300-6 6" DETECTOR BASE — NOT TO SCALE
TYPICAL INSTALLATION DETAIL



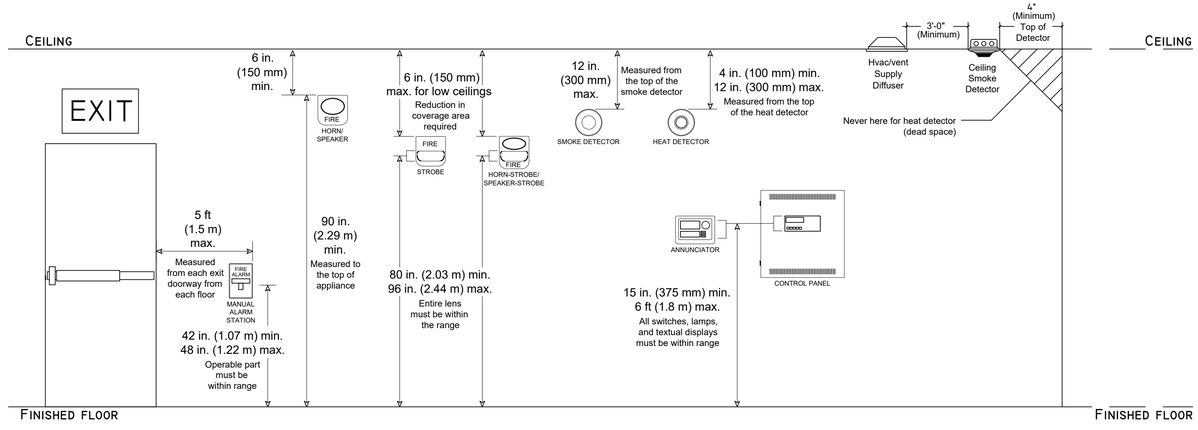
2 ADDRESSABLE DETECTOR MOUNTING — NOT TO SCALE
TYPICAL INSTALLATION DETAIL



3 SMOKE DETECTOR GUARD INSTALLATION — NOT TO SCALE
TYPICAL INSTALLATION DETAIL

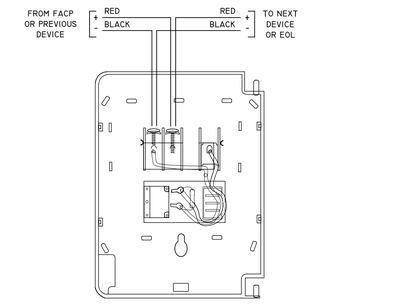


4 ANNUNCIATOR GUARD INSTALLATION — NOT TO SCALE
TYPICAL INSTALLATION DETAIL

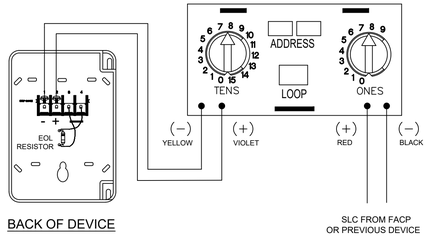


(PER NFPA 72 2022)

5 DEVICE MOUNTING ELEVATIONS DETAILS — NOT TO SCALE



6 ADDRESSABLE MANUAL ALARM STATION — NOT TO SCALE
TYPICAL INSTALLATION DETAIL



7 CONVENTIONAL MANUAL ALARM STATION — NOT TO SCALE
TYPICAL INSTALLATION DETAIL

RA ARCHITECTS & ENGINEERS

AR CHITECTURE
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SANTA MARIA JJC
UNIT 1, 2 & 3
REMODEL

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SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
1105 Santa Barbara Street
Santa Barbara, CA 93101

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
FIRE ALARM DEVICE DETAILS

DATE: 05/20/25
TECHNICIAN: MS
PROJECT MANAGER: MS
JOB NUMBER: RA # 22.868

SHEET NUMBER
FA4.00

Attachment: A (part 2 of 3)

Project plans and specifications

COUNTY OF SANTA BARBARA, GENERAL SERVICES DEPARTMENT

PROBATION SANTA MARIA JUVENILE JUSTICE CENTER

UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD. SANTA MARIA, CALIFORNIA 93455

SYMBOLS

BUILDING SECTION — SECTION NUMBER; SHEET NUMBER WHERE SECTION IS DRAWN

WALL SECTION — SECTION NUMBER; SHEET NUMBER WHERE SECTION IS DRAWN

DETAIL — DETAIL NUMBER; SHEET NUMBER WHERE DETAIL IS DRAWN

INTERIOR ELEVATION — 1 ELEVATION NUMBER; 4 2 DETAIL NUMBER; 3 SHEET FOUND

WALL TYPE — WALL TYPE SEE A10.50

DOOR NUMBER — DOOR NUMBER SEE A5.11

WINDOW NUMBER — WINDOW LETTER SEE A5.11

KEYNOTE — NUMBER OR LETTER

REVISION NUMBER — REVISION NUMBER

ACCESSORY OR EQUIPMENT — ACCESSORY NUMBER OR LETTER

CEILING IDENTIFICATION — 8'-0" CEILING HEIGHT; GYP CEILING MATERIAL

BSCC REVIEW INFORMATION

BSCC PLAN REVIEW NUMBER: 83-7574.06

SCOPE OF WORK

REMODEL/REFURBISH UNIT 1 & 2 IS TO INCLUDE BUT NOT LIMITED TO, AN INTERCOM/CALL BUTTON IN SLEEPING ROOMS TO NEW STAFF STATION, NEW DOORS AND FRAMES IN SLEEPING ROOMS TO SWING IN THE DIRECTION OF EGRESS, NEW PLUMBING FIXTURES IN STAFF RESTROOM, NEW VANDAL RESISTANT LIGHT FIXTURES, NEW STAFF CONTROL DESK WITH NEW SECURITY/MONITORING FEATURES, NEW CAMERA SYSTEM, NEW SMOKE DETECTORS, NEW EXTERIOR CLERESTORY WINDOWS, NEW ANTI-LIGATURE PLUMBING FIXTURES IN SLEEPING ROOMS AND SHOWER ROOMS. REFER TO DRAWINGS FOR FULL SCOPE OF WORK.

PROJECT TEAM

ARCHITECT:
CONTACT: MICHELLE STOKES, ARCHITECT
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949-735-8111

CLIENT CONTACT:
RICHARD M. WHIRTY
PROJECT MANAGER, CAPITAL PROJECTS
COUNTY OF SANTA BARBARA
GENERAL SERVICES DEPARTMENT
1105 SANTA BARBARA STREET
EAST WING, 2ND FLOOR
SANTA BARBARA, CA 93101
805-866-1516

GENERAL NOTES

(Use wherever applicable, unless noted otherwise in the plans, California Buidling Code and specifications.)

1. Do not scale plans.
2. This project and all construction shall conform with the California Code of Regulations, Title 24, 2022 California Building Code (CBC), 2022 California Historical Building Code (CHBC), 2022 California Existing Building Code (CEBC), 2022 California Green Building Standards Code (CGBSC), 2022 California Mechanical Code (CMC), 2022 California Plumbing Code (CPC), 2022 California Electrical Code (CEC), 2022 California Energy Code (CEC Part 6), 2022 California Fire Code (CFC), current (2022) California and (2010) Federal ADA Standards for Accessible Design.
3. All dimensions are to be verified in the field. Any discrepancies are to be immediately brought to the attention of the architect. Do not proceed with work without resolving discrepancies.
4. Dimensions shown shall take precedence over drawings scale or proportion. Larger scale drawings take precedence over smaller scale drawings.
5. Required sanitary facilities to be provided on the job.
6. Omissions and/or conflicts in the drawings shall not relieve the contractor from completing work which is necessary to carry out the intent of the drawing and/or complete work to standards required by code.
7. These notes indicate construction for BUILDING AND SITE unless otherwise noted or shown. Features of construction shown are typical and shall apply to all drawings unless otherwise noted or shown. Features of construction shown are typical and shall apply generally throughout to similar conditions. Unless noted otherwise all vestibules, closets, columns projections, recesses, or other adjacent areas within scheduled areas shall have finishes as scheduled for the respective spaces in which they occur. All omissions or conflicts between the various elements of the Working Drawings and/or General Notes shall be brought to the attention of the architect before proceeding with any work so involved.
8. All work, and all construction methods and materials shall comply with all provisions of the Building Codes and other rules, regulations and ordinances governing the place of the building. Building Code requirements in all cases take precedence over the drawing. It shall be the responsibility of anyone supplying labor or materials or both to bring to the attention of the architect any discrepancies or conflicts between the requirements of the code and the drawings.
9. Unless noted otherwise, all dimensions are to face of studs, concrete, or masonry.
10. Contractor shall arrange and pay for all temporary utility services and connections during construction.
11. Any changes in construction shall be accompanied by a Change Order issued by the General Contractor and approved by the owner and architect.
12. The contract drawings and specifications represent the finished improvements. Unless otherwise shown, they do not indicate method of construction. Contractor shall supervise and direct work and shall be solely responsible for all construction means, methods, techniques, sequences and procedures. Observation visits to the site shall not include inspections of the protective measures or the construction procedures required for same, which are the sole responsibility of the contractor.
13. Contractor hereby guarantees to the owner that all materials, fixtures, and equipment furnished to the project are new unless otherwise specified. Contractor also warrants that all work will be of good quality and free from any faults and defects for a period of one year after the date of substantial completion, unless a greater warranty or guarantee is required by the project specifications.
14. Anyone supplying labor and/or materials to the project shall carefully examine all subsurfaces to receive work. Any conditions detrimental to work shall be reported to the architect. Commencement of work shall imply acceptance of all subsurfaces.
15. Any material stored at the site shall be completely supported free of the ground, covered and otherwise protected to avoid damage.
16. Building contractor shall submit shop drawings for all fabricated structural components to the architect for review and approval.
17. No hazardous materials will be stored/used within the building which exceed quantities listed in 2022 CBC tables 307.1(1) and 307.1(2).
18. Approved numbers/addresses should be provided so as to be plainly visible from the street.
19. At the time of final inspection, a Building Operations and Maintenance Manual shall be placed in the building. The manual shall contain the information listed in CGBSC Section 4.410.1.
20. A separate grading permit is not required for this project.
21. All contractors performing work on this project shall comply with the requirements of the 2022 CFC Ch. 11 and 33, and NFPA 241 fire-prevention program throughout all phases of demolition and construction.
22. All finishes, furnishings, and materials shall meet the minimum requirements of 2022 CFC Chapter 8 for flame spread and smoke development.

SHEET INDEX

A0.01	TITLE SHEET
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A1.10	OVERALL FLOOR PLAN – SCOPE OF WORK AREAS
A2.11D	DEMOLITION FLOOR PLAN – UNIT 1 & 2
A2.11	FLOOR PLAN
A3.11	ENLARGED FLOOR PLANS – CONTROL DESK UNIT 1 & 2
A5.11	DOOR SCHEDULE
A5.12	FINISH SCHEDULE
A7.11	BUILDING SECTION
A8.11D	DEMOLITION REFLECTED CEILING PLAN
A8.11	REFLECTED CEILING PLAN
A9.11	INTERIOR ELEVATIONS
A9.12	INTERIOR ELEVATIONS
A9.13	INTERIOR ELEVATIONS
A9.14	INTERIOR ELEVATIONS
A10.50	DETAILS
A10.60	DETAILS
A10.70	DETAILS
A10.90	DETAILS
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S0.2	GENERAL NOTES
S1.0	FOUNDATION AND FIRST FLOOR PLAN
S1.1	MAIN FLAT ROOF FRAMING PARTIAL PLAN
S2.0	STRUCTURAL DETAILS
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M0.01	MECHANICAL NOTES & SYMBOLS
M2.11	MECHANICAL FLOOR PLAN
M3.11	ENLARGED FLOOR PLANS
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P0.1	PLUMBING NOTES & SCHEDULES
P2.11D	PLUMBING DEMOLITION FLOOR PLAN
P2.11	PLUMBING FLOOR PLAN
P5.0	PLUMBING DETAILS
P5.1	PLUMBING DETAILS
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E0.1	GENERAL NOTES, SYMBOLS, & SINGLE LINE DIAGRAM
E0.2	FIXTURE SCHEDULE & PANEL SCHEDULES
E0.3	DETAILS
E1.1	OVERALL FLOOR POWER PLAN
E2.1	POWER PLANS
E3.1	LIGHTING PLANS
E4.1	CAMERA PLANS

CONCEALMENT OF SYSTEM DISTRIBUTION

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE ROUTING OF ALL WIRED SYSTEMS CABLING, RACEWAYS, CONDUIT, JUNCTION BOXES, BACK BOXES AND ENCLOSURES, ENSURING IT IS CONCEALED AT ALL YOUTH OCCUPIED SPACES.

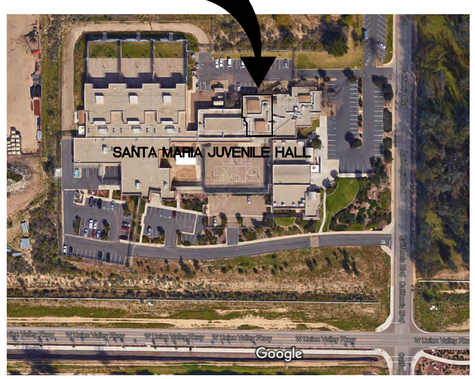
THE CONTRACTOR IS ALSO FULLY RESPONSIBLE FOR RESTORING TO ORIGINAL CONDITION, ANY AND ALL AREAS OPENED (CEILINGS, SOFFITS, ETC.) TO PROVIDE CONCEALMENT OF THESE AFOREMENTIONED SYSTEMS.

ABBREVIATIONS

(E)/EXIST.	(E)/EXISTING
@ AT	
A.B.	ANCHOR BOLT
A.C.	ACOUSTIC
A.F.F.	ABOVE FINISHED FLOOR
ADDT.	ADDITIVE
ADJ.	ADJUSTABLE/ADJACENT
ALUM.	ALUMINUM
BD.	BOARD
BLK'G	BLOCKING
C.J.	CONTROL JOINT
C.M.U.	CONCRETE MASONRY UNIT
C.T.	CERAMIC TILE
C.T.FLR.	CERAMIC TILE FLOOR
C.T.I.	CERAMIC TILE INSTITUTE
CAB.	CABINET
CLG.	CEILING
CLR.	CLEAR
COL.	COLOR
CONC.	CONCRETE
CONT.	CONTINUOUS
CONT'D.	CONTINUED
CT.	COAT
DET.	DETAIL
DIA.	DIAMETER
DIM.	DIMENSION
DISP.	DISPENSER
DWG	DRAWING
E.J.	EXPANSION JOINT
ELEC.	ELECTRICAL
ENT	ENTRANCE
F.D.	FLOOR DRAIN
FIN.	EL. FINISHED ELEVATION
FIN.	FLR. FINISHED FLOOR
FLR.	FLOOR
FT.	FEET
FTG.	FOOTING
G.W.B.	GYPSUM WALL BOARD
GYP. BD.	GYPSUM BOARD
HT.	HEIGHT
INFO.	INFORMATION
INSUL.	INSULATION
L	LONG
M.R.	MOISTURE RESISTANCE
MAX.	MAXIMUM
MFR.	MANUFACTURER
MIN.	MINIMUM
MTL.	METAL
N.I.C.	NOT IN CONTRACT
NO./#	NUMBER
O/	OVER
O.C.	ON CENTER
OPEN'G	OPENING
P.T.D.F.	PRESSURE TREATED DOUGLAS FIR
PART'NS	PARTITIONS
PL.	PLATE
PLAS.LAM.	PLASTIC LAMINATE
PLYWD.	PLYWOOD
PREP.	PREPARE
PT.	PAINT
REF.	REFERENCE
REQ.	REQUIRED
S.F.	SQUARE FEET
S.S.	STAINLESS STEEL
SCHED.	SCHEDULE
SHT.	SHEET
SIM.	SIMILAR
SL.	SLIDING
SOFF.	SOFFIT
STL.	STEEL
STRUCT.	STRUCTURAL
SUSP.	SUSPENDED
THK.	THICK
TOIL.	TOILET
TYP.	TYPICAL
V.C.T.	VINYL COMPOSITION TILE
VFY.	VERIFY
W/	WITH
W.C.	WATER CLOSET
W.P.	WATER PROOF
W.W.M.	WELDED WIRE MESH

AREA OF WORK

UNIT 1 + 2 REMODEL



LEGAL

EXISTING USE	JUVENILE HALL
LOCATION	4623 CALIFORNIA BLVD. SANTA MARIA, CA 93454
ASSESSOR PARCEL NO.	111-230-69
SITE AREA	80 ACRES
ZONING	PF – PUBLIC FACILITIES
DISTRICT	FRONT: 15'
SETBACKS	SIDE: 10'
	REAR: 10'
MAXIMUM HEIGHT	(3) STORIES OR 35'

REVIEW AGENCY PERMIT NUMBERS

CEQA/NEPA ENVIRONMENTAL	MITIGATED NEGATIVE DEC. 01-ND-15, SEPT. 2001
STATE BOC GRANT PROJ. NO.	013-99
FEDERAL OJP/CPO PROJ NO.	CA-22
BOC PLAN REVIEW NO.(HALL)	083-7574-04
BOC PLAN REVIEW NO.(COURT)	083-7574-01
CSFM PLAN REVIEW NO.(HALL)	43-42-45-0004-000-040-0
CSFM PLAN REVIEW NO.(COURT)	43-42-45-0021-000-040-0
SB COUNTY BLDG PERMIT NO.	02-00470
CITY OF SANTA MARIA PLAN CHECK	GOV 02-0002

EXISTING JUVENILE HALL INFORMATION

PROJECT INFORMATION

20 BED JUVENILE HALL-UNIT 1 & 2 (1977)	11,700 SF	I-3 OCCUPANCY	TYPE I, NON-SPRINKLERED BLDG WITH 4 HOUR FIRE AREA SEP WALL
30 BED JUV HALL ADDTN – UNIT 3 (1999)	5,325 SF	I-3 OCCUPANCY	TYPE I, FULLY SPRINKLERED BLDG
90 BED ADDIITON TO JUVENILE HALL-			
UNITS 4, 5, & 6 (2005)	26,950 SF	I-3 OCCUPANCY	TYPE I, FULLY SPRINKLERED BLDG
(3) 30 BED HOUSING UNITS (TWO TIER)	18,000 SF	I-3/B OCCUPANCY	TYPE I, FULLY SPRINKLERED BLDG
INTAKE / ADMIN FACILITY	44,950 SF SUBTOTAL		
JUVENILE COURT ADDITION (2005)	12,000 SF	A-3/B/I-3 OCCUPANCY	TYPE V, NON-RATED THROUGHOUT EXCEPT FOR I-3 OCCUPANCY AREA BEING TYPE V-1HR; FULLY SPRINKLERED BUILDING
	56,950 SF TOTAL ADDITION		

SEE DRAWINGS FOR FIRE RATINGS OF BUILDING ELEMENTS AND REQUIRED SEPARATIONS, ETC.

RA ARCHITECTS & ENGINEERS

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MECHANICAL ELECTRICAL
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REVISIONS

SEAL

REGISTERED ARCHITECT GREGORY ALLEN RAVATT LICENSED ARCHITECT EXP. 9-30-27 STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

COUNTY OF SANTA BARBARA CALIFORNIA

SHEET TITLE

TITLE SHEET

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

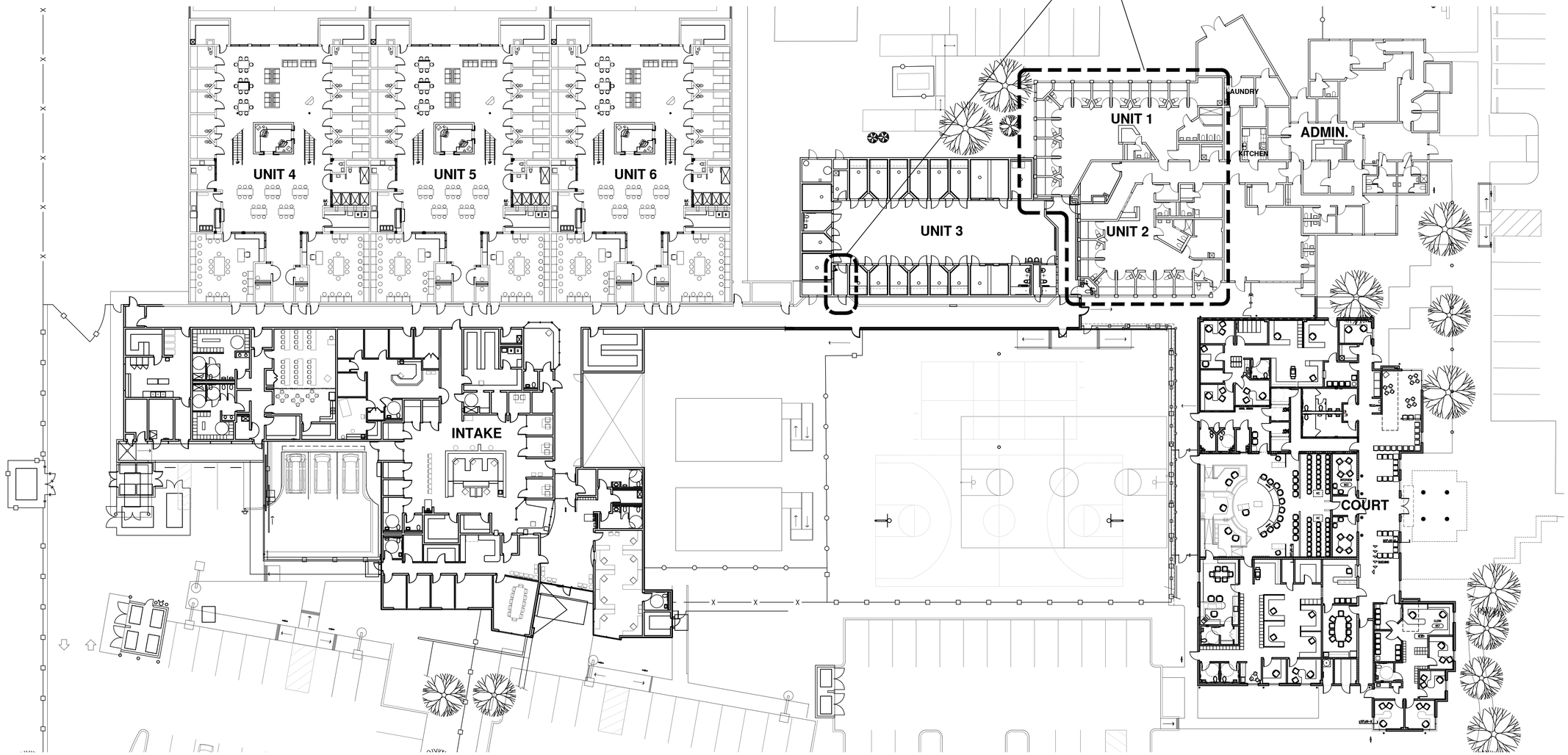
JOB NUMBER: RA # 22.868

SHEET NUMBER

A0.01

SCOPE OF WORK UNIT 1 & 2

SEE A2.11D & A2.11 FOR SCOPE OF WORK



N

0 10' 20' 40'

SCALE: 1"= 20'-0"

OVERALL FLOOR PLAN - SCOPE OF WORK AREA

RA ARCHITECTS & ENGINEERS

ARCHITECTURE
GREG RAVATT, AIA

MECHANICAL ELECTRICAL
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REVISIONS

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No. M26555
EXP. 9-30-26
MECHANICAL
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
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BSCC PLAN REVIEW NUMBER
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SHEET TITLE
OVERALL FLOOR PLAN
SCOPE OF WORK AREA

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

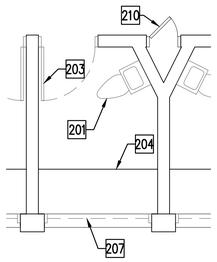
SHEET NUMBER
A1.10

GENERAL NOTES

1. THE DEMOLITION PLAN INDICATES THE APPROXIMATE EXTENT OF DEMOLITION REQUIREMENTS. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE EXTENT OF DEMOLITION REQUIRED TO INSTALL ALL NEW CONSTRUCTION.
2. REFER TO OTHER ARCHITECTURAL DEMOLITION PLANS FOR ADDITIONAL DEMOLITION SCOPE OF WORK.
3. REFER TO PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION REQUIREMENTS.
4. CONTRACTOR SHALL PROTECT PORTIONS OF EXISTING CONSTRUCTION NOT INDICATED TO BE DEMOLISHED. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPLACEMENT AND REPAIR OF ITEMS TO REMAIN.
5. CONTRACTOR SHALL REMOVE AND STORE ALL MISCELLANEOUS ITEMS TO INCLUDE: MARKERBOARDS, TACKBOARDS, FIRE EXTINGUISHERS, NAME PLATES, SIGNAGE, CLOCKS, WALL-HUNG PICTURES/MAPS, ETC. THAT HAS NOT BEEN PREVIOUSLY REMOVED BY THE OWNER.
6. CONTRACTOR MUST MAINTAIN ACCESS TO AREAS ADJACENT TO DEMOLISHED AND IMPROVEMENT AREAS. SEE SPECIFICATIONS FOR REQUIREMENTS.

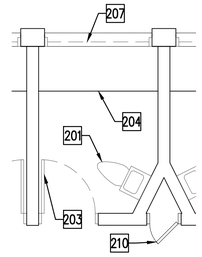
KEYNOTES

201 REMOVE PLUMBING FIXTURE IN SLEEPING ROOM, PREP FOR REPLACEMENT WITH ANTI-LIGATURE PLUMBING FIXTURE
202 REMOVE ALL PLUMBING FIXTURES, PREP FOR NEW FIXTURES
203 REMOVE DOOR AND FRAME, PREP FOR NEW DOORS AT WALLS TO REMAIN
204 (E) CONCRETE BUNK TO REMAIN
205 REMOVE (E) CERAMIC FLOOR & WALL TILE
206 REMOVE CONTROL STATION CASEWORK
207 REMOVE (E) STEEL FRAMED WINDOWS & PREP FOR CMU WALL INFILL
208 REMOVE DRINKING FOUNTAIN, PREP FOR NEW DRINKING FOUNTAIN
209 (E) CONDUIT FROM UNDER SLAB TO REMAIN, PROTECT-IN-PLACE
210 (E) DOOR, FRAME AND HARDWARE TO REMAIN
211 REMOVE ALL PLUMBING FIXTURES, PREP FOR REPLACEMENT WITH ANTI-LIGATURE PLUMBING FIXTURES
212 REMOVE (E) TOILET PARTITION
213 NOT IN SCOPE OF WORK
214 (E) WINDOW TO REMAIN
215 REMOVE (E) VINYL FLOOR TILE AND ADHESIVE, PREP FOR CONCRETE SEALER
216 REMOVE (E) CERAMIC WALL TILE, PREP FOR NEW FINISH
217 REMOVE (E) METAL FRAMED ALCOVE WALLS
218 REMOVE DRINKING FOUNTAIN, CAP PLUMBING AND PATCH CMU WALL
219 REMOVE (E) DOOR AND FRAME, PREP FOR NEW CMU INFILL WALL
220 REMOVE (E) MOP SINK & PREP FOR FLOOR DRAIN, REUSE (E) DRAIN PIPING
221 REMOVE PART OF CMU WALL AND PREP FOR NEW DOOR, SEE STRUCTURAL DRAWINGS FOR REINFORCING AND SEQUENCE OF DEMOLITION
222 REMOVE PLUMBING WALL AND CAP OVERHEAD WATER LINE BACK TO ENTRY POINT INTO THE ROOM
223 REMOVE PART OF SHELVING IF NEEDED FOR HVAC INSTALLATION, SEE MECHANICAL DRAWINGS



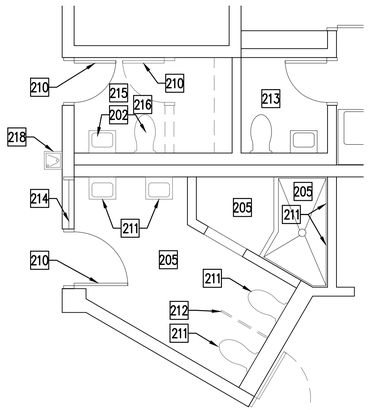
32 – **TYP. SLEEPING ROOM DEMOLITION - UNIT 2**

0 2' 4' 8'
SCALE: 1/4"= 1'-0"



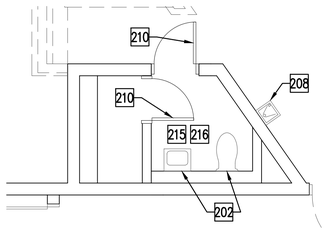
22 – **TYP. SLEEPING ROOM DEMOLITION - UNIT 1**

0 2' 4' 8'
SCALE: 1/4"= 1'-0"



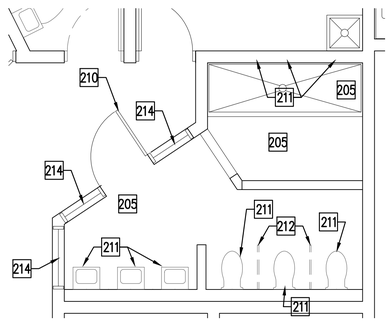
33 – **STAFF R.R. & YOUTH SHOWER DEMOLITION - UNIT 2**

0 2' 4' 8'
SCALE: 1/4"= 1'-0"



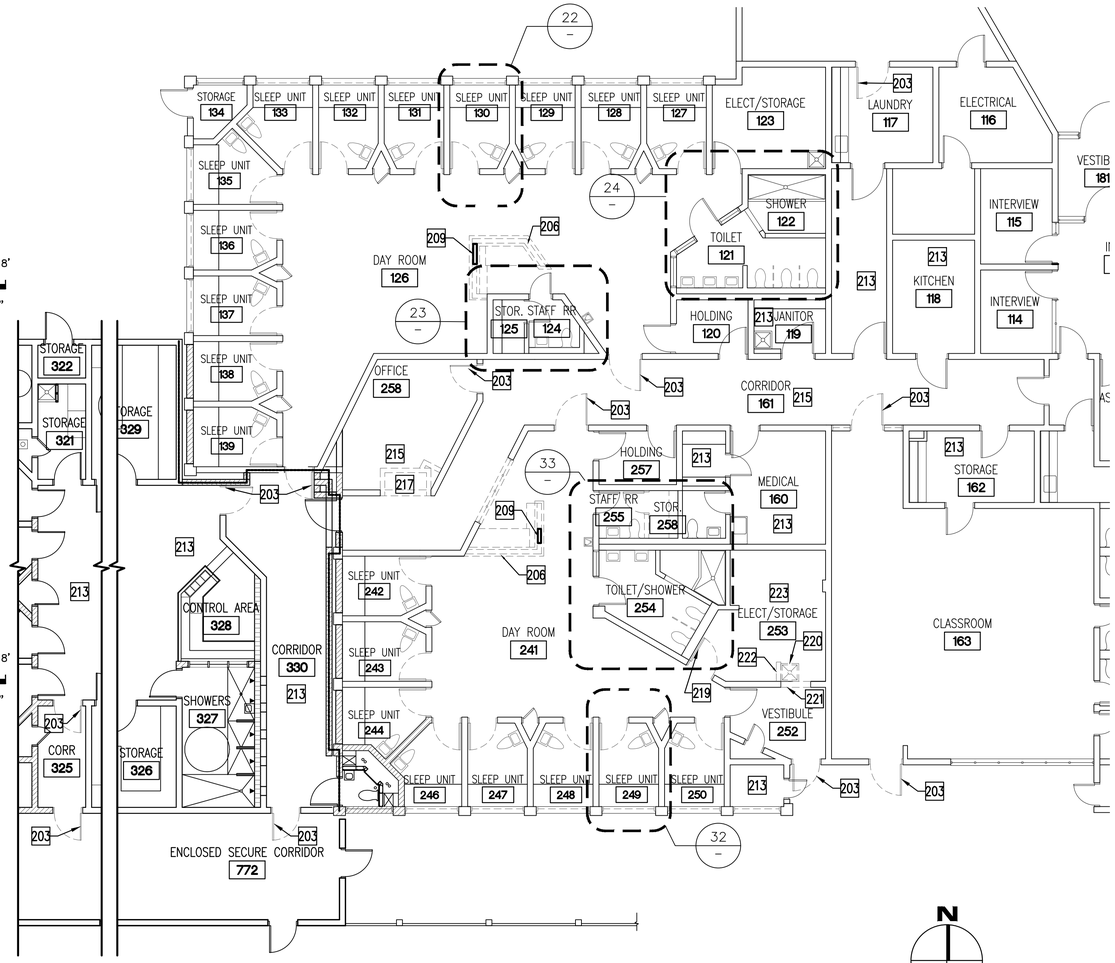
23 – **STAFF RESTROOM DEMOLITION - UNIT 1**

0 2' 4' 8'
SCALE: 1/4"= 1'-0"



24 – **YOUTH SHOWER ROOM DEMOLITION - UNIT 1**

0 2' 4' 8'
SCALE: 1/4"= 1'-0"



UNIT 1 & 2 - DEMOLITION FLOOR PLAN

0 4' 8' 16'
SCALE: 1/8"= 1'-0"

N

RA ARCHITECTS & ENGINEERS

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REVISIONS

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REGISTERED ARCHITECT GREGORY ALLEN RAVATT LICENSED 33808 EXP. 9-30-27 STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

DEMOLITION FLOOR PLAN

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
A2.11D

TITLE 24 SUICIDE HAZARD NOTES

THE ARCHITECTURAL PLANS SHALL BE REVIEWED BY THE BOARD (BSCC) FOR THE PURPOSE OF REDUCING HAZARDS POSED BY FIXTURES AND EQUIPMENT WHICH COULD BE USED FOR AN ACT OF SUICIDE BY A YOUTH. THE FACILITY HAS BEEN DESIGNED TO AVOID ANY SURFACES, EDGES, FIXTURES, OR FITTINGS THAT CAN PROVIDE AN ATTACHMENT FOR HANGING OR OTHER OPPORTUNITY FOR SELF-INFLICTED INJURY. THE FOLLOWING FEATURES HAVE BEEN INCORPORATED IN THE DESIGN OF SLEEPING ROOMS, BATHROOMS AND ANY OTHER AREA WHERE A JUVENILE MAY BE LEFT WITHOUT DIRECT VISUAL SUPERVISION.

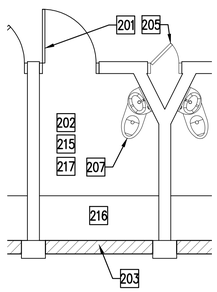
A. PLUMBING SHALL NOT BE EXPOSED. OPERATION OF CONTROL VALVES USE FLUSH BUTTONS OR SIMILAR. DRINKING FOUNTAIN WATER SPOUT IS WITHOUT CURVED PROJECTIONS.
B. TOWEL HOLDERS SHALL BE BALL-IN-SOCKET OR INDENTED CLASP, NOT PULL-DOWN HOOKS OR BARS.
C. SUPPLY AND RETURN GRILLES AND ANY OTHER VENT OR SECURITY COVER SHALL HAVE OPENINGS NO GREATER THAN 3/16 INCH OR HAVE 16 MESH PER SQUARE INCH.
D. LIGHT FIXTURES SHALL BE TAMPER RESISTANT.
E. FIXTURES SUCH AS MIRRORS SHALL BE MOUNTED USING TAMPER-RESISTANT FASTENERS.

GENERAL NOTES

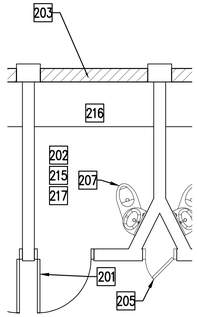
1. DIMENSIONS ARE TO INSIDE FACE OF WALL AT EXTERIOR WALLS AND FACE OF EXISTING WALLS AS INDICATED TO FACE OF STUDS AT (N) INTERIOR WALLS U.O.N.
2. ALL OPENINGS ARE DIMENSIONED TO CENTERLINE OF OPENING U.O.N.
3. REFER TO SHEET A10.50 FOR SIZE AND SPACING OF STUDS.
4. ALL OPENINGS NOT DIMENSION ARE 3" FROM INSIDE CORNER OF ADJACENT INTERSECTING WALL OR CENTERED IN THE WALL IN WHICH THEY OCCUR.
5. REFER TO ELECTRICAL DRAWINGS FOR NEW LOW VOLTAGE/ DATA/ PHONE LOCATIONS.
6. REFER TO ELECTRICAL DRAWINGS FOR SCOPE OF WORK FOR EXISTING AND NEW ELECTRICAL DISTRIBUTION.
7. REFER TO MECHANICAL DRAWINGS FOR SCOPE OF WORK TO HVAC SYSTEMS.
8. PATCH AND REPAIR ALL EXPOSED HOLES PRIOR TO PAINTING.
9. PROVIDE BLOCKING PER DETAIL 44/A10.50 AT ALL WALLS WHERE ITEMS ARE BEING INSTALLED THAT REQUIRE BLOCKING INCLUDING ACCESSORIES THAT ARE NOT IN CONTRACT.
10. ALL JOINTS, PENETRATIONS AND OTHER OPENINGS IN THE BUILDING ENVELOPE THAT ARE POTENTIAL SOURCES OF AIR LEAKAGE SHALL BE CAULKED, GASKETED, WEATHER STRIPPED, OR OTHERWISE SEALED TO LIMIT INFILTRATION AND EXFILTRATION.
11. ALL WALL FRAMING AND GYP. BD. SHALL GO TO UNDERSIDE OF ROOF STRUCTURE.
12. CLEAN ALL (E) MECHANICAL DUCTS AND (E) GRILLES. PAINT ALL GRILLES LOCATED IN CEILINGS, SOFFIT AND WALLS TO MATCH ADJACENT SURFACES.
13. EXTEND THE EXISTING CAMERA SYSTEM FOR THE COMPLEX TO INCLUDE NEW SECURITY CAMERAS TO VIEW ENTRANCES TO ALL SLEEPING ROOMS, YOUTH RESTROOMS AND GROUP ROOMS. REFER TO A8.11 FOR ALL NEW AND EXISTING CAMERAS
14. PROVIDE NEW SMOKE DETECTORS IN ALL SLEEPING UNITS, TYP.
15. PRIOR TO THE INSTALLATION OF MECHANICAL, PLUMBING, ELECTRICAL AND ARCHITECTURAL EQUIPMENT AND COMPONENTS, ALL TRADES SHALL COORDINATE WITH OTHER TRADES USING THE SAME SPACE TO ENSURE THAT ALL COMPONENTS FIT WITHIN THE SPACE AVAILABLE.
16. PROVIDE AN INTERCOM IN ALL SLEEPING UNITS FOR COMMUNICATION WITH STAFF AT CONTROL DESK.

KEYNOTES

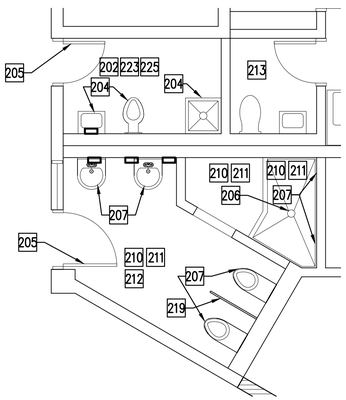
201 PROVIDE NEW DOOR, FRAME AND ANTI-LIGATURE HARDWARE, SEE DOOR SCHEDULE A5.11
202 PREP FLOOR AND PROVIDE NEW CONCRETE SEALER
203 PROVIDE NEW CMU WALL INFILL TO MATCH EXISTING AT REMOVED WINDOW IN CMU WALL, SEE DET. 34/A10.50
204 PROVIDE NEW PLUMBING FIXTURE
205 EXISTING DOOR, FRAME AND HARDWARE TO REMAIN (EXCEPT NEW LEVERSET AT DOOR 125 & 205)
206 PROVIDE NEW FLOOR DRAIN
207 PROVIDE NEW ANTI-LIGATURE PLUMBING FIXTURE(S)
208 PROVIDE NEW STAFF DESK WITH AN EMERGENCY SUMMONS ASSIST BUTTON, POWER, DATA, AND COMPUTER/HARDWARE/SOFTWARE REQUIRED FOR STAFF CONTROL OF MULTIPLE SYSTEMS
209 EXISTING 4 HR FIRE RATED SEPARATION WALL
210 PROVIDE THIN SET CERAMIC TILE FLOORING, SEE FINISH SCHEDULE A5.11
211 PROVIDE FULL HT. THIN SET CERAMIC TILE WALL FINISH, SEE INTERIOR ELEVATIONS
212 PROVIDE NEW ANTI-LIGATURE TOILET ROOM ACCESSORIES
213 NOT IN SCOPE OF WORK
214 (E) CONDUITS PENETRATING CONCRETE SLAB TO REMAIN, PROTECT IN PLACE
215 EXTEND EXISTING COMPLEX TWO-WAY SOUND ACTIVATED AUDIO MONITORING SYSTEM AND PROVIDE EQUIPMENT FOR COMMUNICATION DIRECTLY BETWEEN THE DAYROOM STAFF DESK AND OCCUPANTS OF EACH SLEEPING ROOM, GROUP ROOM AND YOUTH RESTROOM
216 EXISTING CONCRETE BUNK TO REMAIN, PAINT
217 PAINT ALL WALLS
218 PROVIDE NEW ANTI-LIGATURE DRINKING FOUNTAIN WITH BOTTLE FILLER
219 PROVIDE NEW STAINLESS STEEL ANTI-LIGATURE TOILET PARTITIONS, BRITEX MODEL US-PPP
220 (E) TERRAZZO MOP SINK TO REMAIN, CLEAN/REFURBISH MOP SINK & SERVICE THE DRAIN IF NEEDED
221 PROVIDE NEW PAINT AT ALL WALLS, EXPOSED CONDUIT, DOORS AND FRAMES IN CORRIDOR 116
222 PROVIDE NEW DOOR, FRAME, HARDWARE & INTERCOM, SEE DOOR SCHEDULE A5.11
223 PAINT WALLS AND PROVIDE NEW 4" TOP SET BASE
224 PROVIDE NEW METAL STUD WALL, TYP., SEE WALL TYPE 'A' ON A10.60
225 PROVIDE NEW 4'-0" HIGH FIBERGLASS REINFORCED PANEL WAINSCOT.
226 PAINT SHELVING
227 PROVIDE NEW CMU WALL INFILL TO MATCH EXISTING AT REMOVED DOOR & FRAME IN CMU WALL, SEE STRUCTURAL DRAWINGS



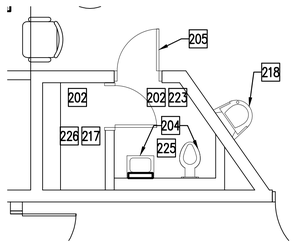
31 – **TYP. SLEEPING ROOM UNIT 2**
SCALE: 1/4"= 1'-0"



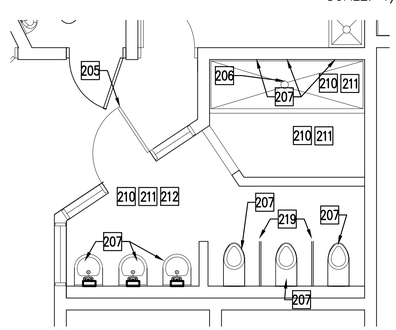
21 – **TYPICAL SLEEPING ROOM UNIT 1**
SCALE: 1/4"= 1'-0"



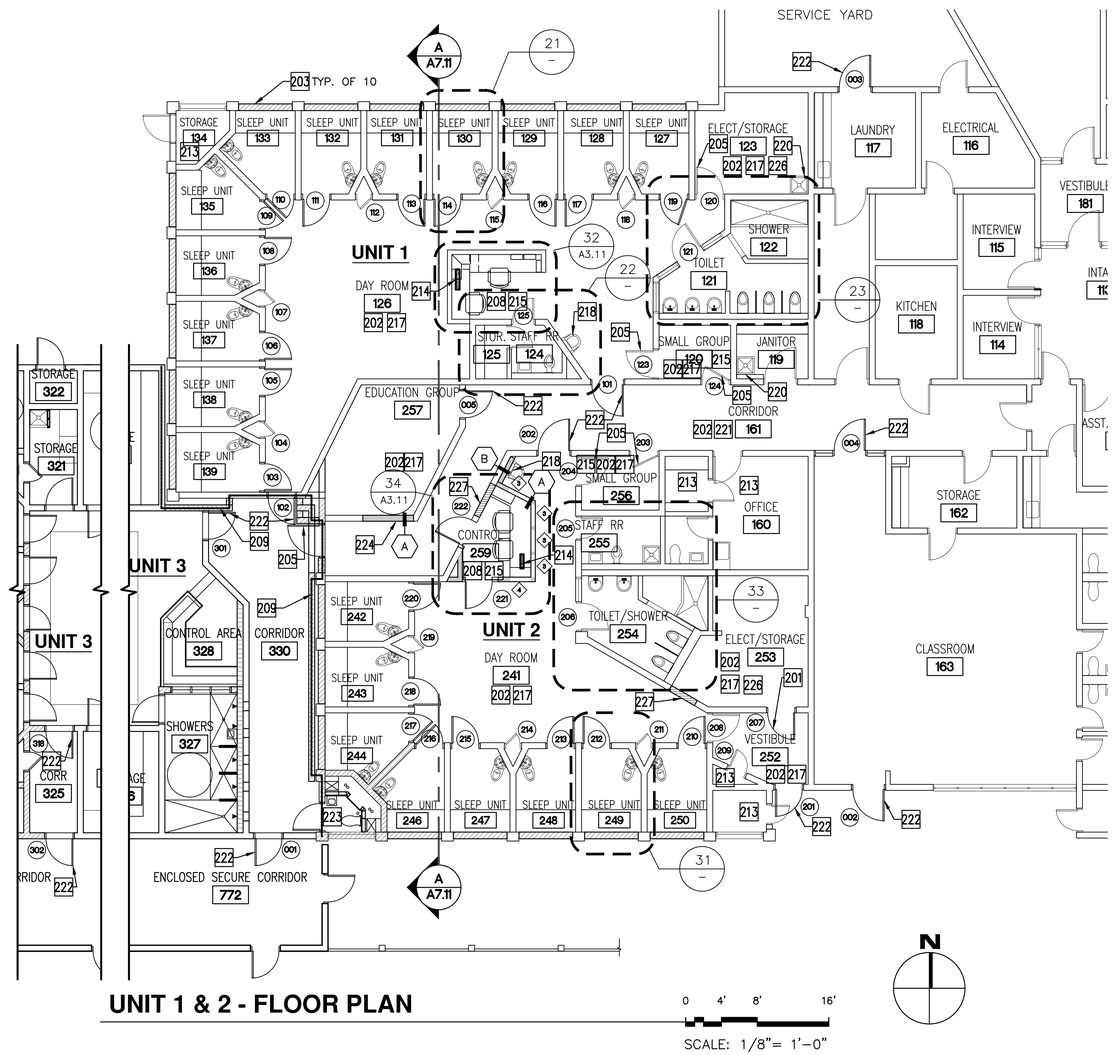
33 – **STAFF R.R. & YOUTH SHOWER UNIT 2**
SCALE: 1/4"= 1'-0"



22 – **STAFF TOILET ROOM UNIT 1**
SCALE: 1/4"= 1'-0"



23 – **YOUTH SHOWER ROOM UNIT 1**
SCALE: 1/4"= 1'-0"



UNIT 1 & 2 - FLOOR PLAN
SCALE: 1/8"= 1'-0"

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REGISTERED ARCHITECT GREGORY ALLEN RAVATT LICENSED ARCHITECT EXP. 9-30-27 STATE OF CALIFORNIA

PROJECT

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UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
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260 N. San Antonio Road
Santa Barbara, CA 93110

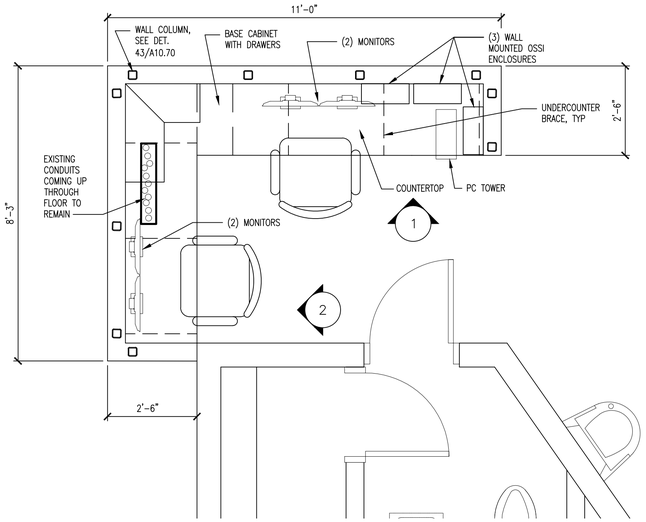
COUNTY PROJECT
#21055

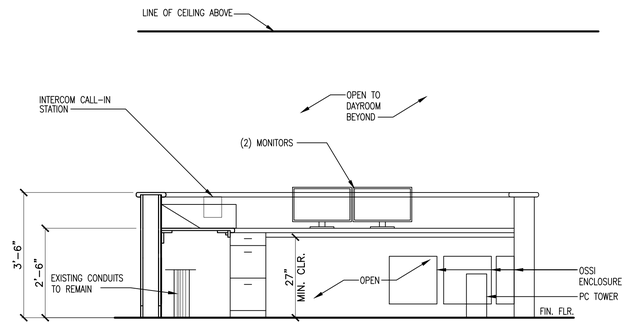
BSCC PLAN REVIEW NUMBER
83-7574.06

COUNTY OF SANTA BARBARA CALIFORNIA

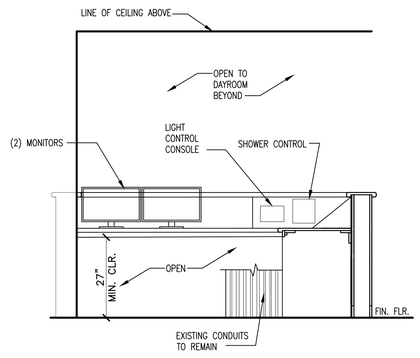
SHEET TITLE
FLOOR PLAN

DATE: 10/15/25
TECHNICIAN: MS
PROJECT MANAGER: MS
JOB NUMBER: RA # 22.868
SHEET NUMBER
A2.11





1

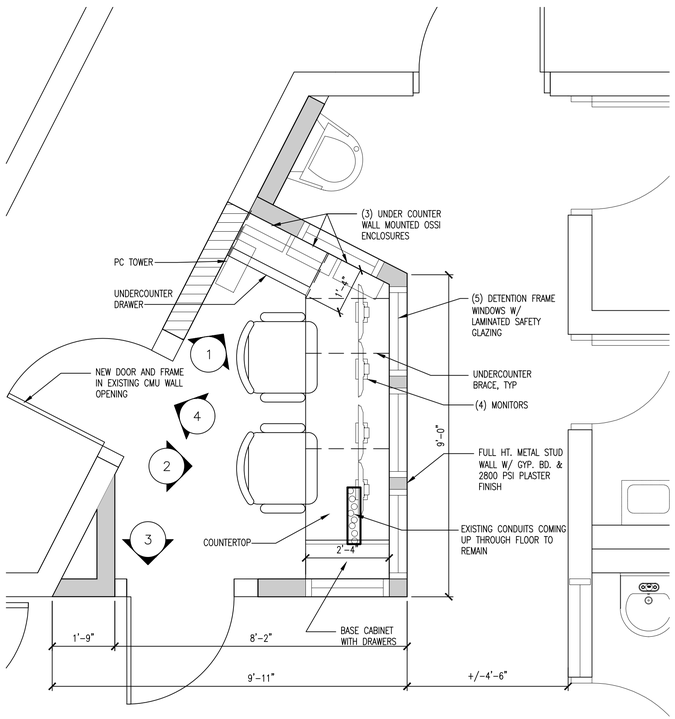


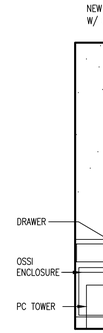
2

32 STAFF CONTROL DESK UNIT 1

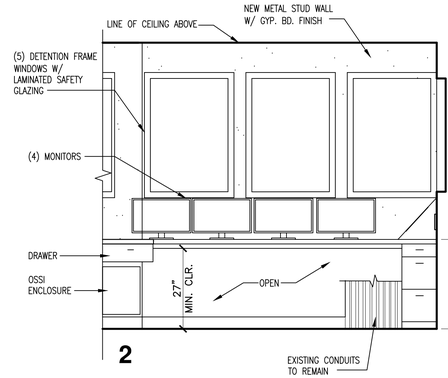
0 2' 4' 8'

SCALE: 1/2"= 1'-0"

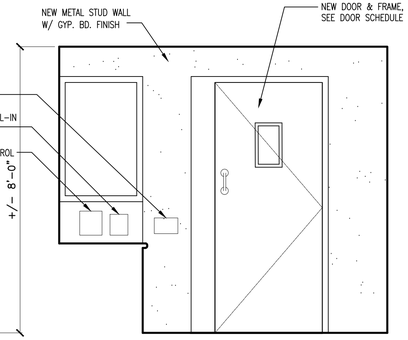




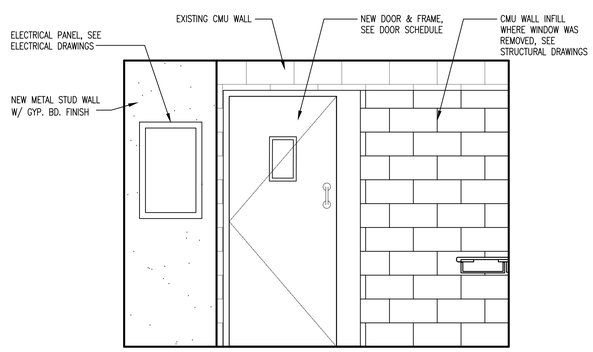
1



2



3



4

34 STAFF CONTROL DESK - CONTROL 259 UNIT 2

0 2' 4' 8'

SCALE: 1/2"= 1'-0"

RA ARCHITECTS & ENGINEERS

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UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
ENLARGED FLOOR PLANS CONTROL DESK UNIT 1&2

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
A3.11

GENERAL NOTES

1. ALL DOOR HARDWARE IN UNIT WHERE JUVENILE MAY BE LEFT ALONE SHALL BE ANTI–LIGATURE.
2. UNLESS OTHERWISE NOTED, ALL DOORS ARE 2 1⁄16" THICK.
3. ALL HOLLOW METAL FRAMES SHALL BE 12 GAUGE UNLESS OTHERWISE NOTED.
4. VERIFY IN FIELD, HEIGHT AND WIDTH OF EXISTING DOORS AND/OR FRAMES TO BE REPLACED.
5. REFER TO DOOR HARDWARE INFORMATION THIS SHEET AND DOOR HARDWARE SPECIFICATION SECTION 111900 FOR ADDITIONAL HARDWARE GROUP INFORMATION.
6. UNLESS OTHERWISE NOTED, ALL DOOR FRAMES ARE 2" IN WIDTH.
7. CONTRACTOR SHALL VERIFY ALL DOOR AND WINDOW OPENINGS PRIOR TO FABRICATION.
8. HOLLOW METAL SLEEPING ROOM, CONTROL ROOM & UNIT ENTRY DOORS ARE TO TRUSSBILT 12 GA. TYPE 200 WITH 3 HINGES AND GLAZING DETAIL 22R.
9. ALL VISION PANELS SHALL HAVE FULLY TEMPERED SAFETY LAMINATED GLAZING, SEE DOOR TYPES FOR ADDITIONAL INFORMATION.
10. PAINT UNIT 1 AND UNIT 2 DOORS, TWO DIFFERENT COLORS FOR QUICKER IDENTIFICATION FOR CAMERA SECURITY PERSONNEL.
11. PROVIDE SMOKE GASKETS AT ALL FIRE RATED DOORS, SEE SPECIFICATION 111900 FOR ADDITIONAL INFORMATION.
12. SEE SPECIFICATION 111900 FOR HOLLOW METAL DOOR, HOLLOW METAL DOOR FRAME, HOLLOW METAL WINDOW FRAME AND DETENTION DOOR HARDWARE INFORMATION.

REMARKS

1. THIS ELECTRIC DOOR LOCK IS TO BE CONTROLLED BY UNIT CONTROL ROOM 259 AS WELL AS HAVING A MANUAL LOCK FUNCTION.
2. THIS ELECTRIC DOOR LOCK IS CONTROLLED BY MASTER CONTROL ROOM.
3. THIS ELECTRIC DOOR LOCK IS CONTROLLED BY MASTER CONTROL ROOM AND UNIT CONTROL DESK FOR THE UNIT IT ACCESSES.
4. PROVIDE A WALL STOP FOR THIS DOOR.

DOOR HARDWARE

DHW–1

DOOR HINGES	(3) 204FMSS 4 ½" FULL MORTISED HINGE
DOOR PULL	214S RECESSED PULL (INSIDE)
DOOR POSITION MONITOR	200MRS MAGNETIC SWITCH
DOOR LOCK	FOLGER ADAM 120E ELECTRIC LOCK W/ MAXI–MOGUL KEY CYLINDER OWNER TO CONFIRM KEY CODE (TO EXISTING OR NEW)
DOOR LOCK/STRIKE HOUSING ASSEMBLY	MSI_CAVLOK–1 W/ DOOR PULL

DHW–2

DOOR HINGES	(3) 204FMSS 4 ½" FULL MORTISED HINGE
DOOR PULL	212C RAISED PULL (INSIDE)
DOOR POSITION MONITOR	200MRS MAGNETIC SWITCH
DOOR LOCK	FOLGER ADAM 120E ELECTRIC LOCK W/ MAXI–MOGUL KEY CYLINDER OWNER TO CONFIRM KEY CODE (TO EXISTING OR NEW)
DOOR LOCK/STRIKE HOUSING ASSEMBLY	MSI_CAVLOK–1 W/ DOOR PULL
DOOR CLOSER	LCN 4210 SERIES SURFACE MOUNTED CLOSER

DHW–2EXT

DOOR HINGES	(3) 204FMSS 4 ½" FULL MORTISED HINGE
DOOR PULL	212C RAISED PULL (INSIDE)
DOOR POSITION MONITOR	200MRS MAGNETIC SWITCH
DOOR LOCK	FOLGER ADAM 120E ELECTRIC LOCK W/ MAXI–MOGUL KEY CYLINDER OWNER TO CONFIRM KEY CODE (TO EXISTING OR NEW)
DOOR LOCK/STRIKE HOUSING ASSEMBLY	MSI_CAVLOK–1 W/ DOOR PULL
DOOR CLOSER	LCN 4210 SERIES SURFACE MOUNTED CLOSER
WEATHERSTRIPPING	PEMKO 303_PK STANDARD PERIMETER GASKET W/ PEMKOPRENE INSERT
1 THRESHOLD	PEMKO 2727A & PEMKO 211 W/ TORX FASTENERS

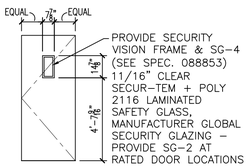
DHW–3

DOOR HINGES	(3) 204FMSS 4 ½" FULL MORTISED HINGE
DOOR PULL	212C RAISED PULL (OUTSIDE)
DOOR PULL	212C RAISED PULL (INSIDE)
DOOR LOCK	FOLGER ADAM 120E ELECTRIC LOCK W/ MAXI–MOGUL KEY CYLINDER OWNER TO CONFIRM KEY CODE (TO EXISTING OR NEW)
DOOR CLOSER	LCN 2210 SERIES CONCEALED CLOSER W/ DPS

DHW–10

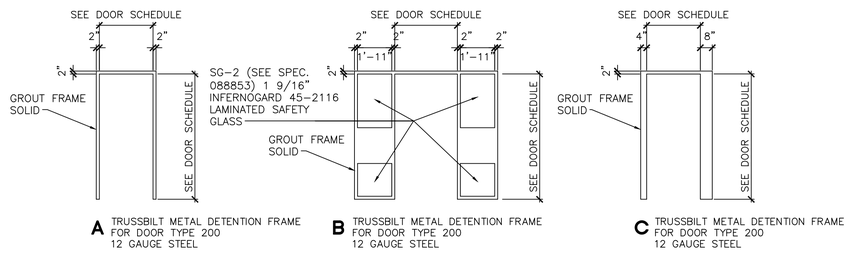
1 OFFICE/PRIVACY LOCK	BEST SPSL–ML–A–16F
1 MORTISE CYLINDER	BEST 1E74–C4–RP3–626 HOUSING W/ SCHLAGE SFIC CORE (VERIFY SYSTEM)

DOOR TYPES



A TRUSSBILT METAL DETENTION DOOR DOOR TYPE 200 12 GAUGE STEEL

FRAME TYPES



A TRUSSBILT METAL DETENTION FRAME FOR DOOR TYPE 200 12 GAUGE STEEL

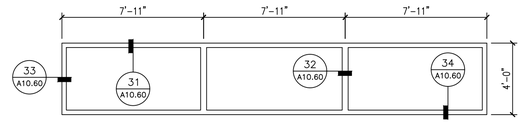
B TRUSSBILT METAL DETENTION FRAME FOR DOOR TYPE 200 12 GAUGE STEEL

C TRUSSBILT METAL DETENTION FRAME FOR DOOR TYPE 200 12 GAUGE STEEL

DOOR AND FRAME SCHEDULE

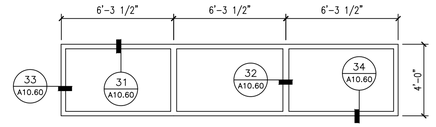
TAG	DOOR TYPE	DOOR SIZE WD	DOOR SIZE HGT	DOOR SIZE THK	DOOR MATL	FRAME DETAIL TYPE	FRAME MATL	HINGE	HEAD	STRIKE	THRESHOLD	RATING	HARDWARE GROUP	REMARKS
001	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–	20 MIN	DHW–2	
002	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–2	SEE REMARKS NOTE 2
003	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	24/A10.50		DHW–2EXT	SEE REMARKS NOTE 2
004	A	3'–0"	7'–0"	2 1⁄16"	HM	B	HM	12/A10.50	11/A10.50	12/A10.50	–	20 MIN	DHW–2	SEE REMARKS NOTE 2
005	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	22/A10.50	21/A10.50	22/A10.50	–	20 MIN	DHW–2	SEE REMARKS NOTE 2
101	A	3'–6"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–	20 MIN	DHW–2	
102	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–	180 MIN	DHW–2	
103	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	
104	EXISTING	1'–8"	7'–0"			EXISTING		–	–	–	–			
105	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	
106	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	
107	EXISTING	1'–8"	7'–0"			EXISTING		–	–	–	–			
108	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	
109	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	
110	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	
111	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	
112	EXISTING	1'–8"	7'–0"			EXISTING		–	–	–	–			
113	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	
114	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	
115	EXISTING	1'–8"	7'–0"		HM	EXISTING	HM	–	–	–	–			
116	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	
117	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	
118	EXISTING	1'–8"	7'–0"			EXISTING		–	–	–	–			
119	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	
120	EXISTING	3'–0"	7'–0"			EXISTING		–	–	–	–			
121	EXISTING	3'–0"	7'–0"			EXISTING		–	–	–	41/A10.50			
122	EXISTING	2'–4"	7'–0"			EXISTING		–	–	–				
123	EXISTING	3'–0"	7'–0"			EXISTING		–	–	–	–			
124	EXISTING	3'–0"	7'–0"			EXISTING		–	–	–	–			
125	EXISTING	3'–0"	7'–0"			EXISTING		–	–	–	–		DHW–10	
											–			
201	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–2	SEE REMARKS NOTE 3
202	A	3'–6"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–	20 MIN	DHW–2	SEE REMARKS NOTE 3
203	EXISTING	3'–0"	7'–0"			EXISTING		–	–	–	–			
204	EXISTING	2'–6"	7'–0"			EXISTING		–	–	–	–			
205	EXISTING	2'–6"	7'–0"			EXISTING		–	–	–	–		DHW–10	
206	EXISTING	3'–0"	7'–0"			EXISTING		–	–	–	41/A10.50			
207	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–2	SEE REMARKS NOTE 2
208	EXISTING	3'–0"	7'–0"			EXISTING		–	–	–	–			
209	EXISTING	2'–4"	7'–0"			EXISTING		–	–	–	–			
210	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	SEE REMARKS NOTE 1
211	EXISTING	1'–8"	7'–0"			EXISTING		–	–	–	–			
212	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	SEE REMARKS NOTE 1
213	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	SEE REMARKS NOTE 1
214	EXISTING	1'–8"	7'–0"			EXISTING		–	–	–	–			
215	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	SEE REMARKS NOTE 1
216	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	SEE REMARKS NOTE 1
217	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	SEE REMARKS NOTE 1
218	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	SEE REMARKS NOTE 1
219	EXISTING	3'–0"	7'–0"			EXISTING		–	–	–	–			
220	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–1	SEE REMARKS NOTE 1, 4
221	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	22/A10.50	21/A10.50	22/A10.50	–		DHW–3	SEE REMARKS NOTE 3
222	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	22/A10.50	21/A10.50	22/A10.50	–	20 MIN	DHW–3	SEE REMARKS NOTE 3
											–			
301	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–	20 MIN	DHW–2	SEE REMARKS NOTE 3
302	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–	20 MIN	DHW–2	SEE REMARKS NOTE 3
318	A	3'–0"	7'–0"	2 1⁄16"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW–2	SEE REMARKS NOTE 3

WINDOW TYPES



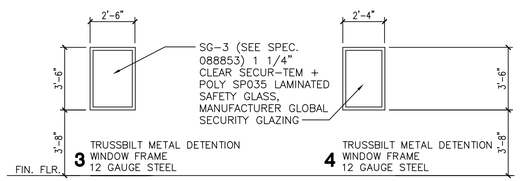
1 EFCO FX45 6063–T6 ALUMINUM ALLOY EXTERIOR WINDOW FRAME W/ SG–1 (SEE SPEC. 088853) 1 7/16" SB60VT (#2) ON CLEAR TEMPERED INSULATED SECUR–TEM + POLY 2116 LAMINATED SAFETY GLASS, LOW E, MANUFACTURER GLOBAL SECURITY GLAZING

SHGC .38
SHADING COEFFICIENT .43
U–VALUE .26
LIGHT TRANSMITTANCE .59



2 EFCO FX45 6063–T6 ALUMINUM ALLOY EXTERIOR WINDOW FRAME W/ SG–1 (SEE SPEC. 088853) 1 7/16" SB60VT (#2) ON CLEAR TEMPERED INSULATED SECUR–TEM + POLY 2116 LAMINATED SAFETY GLASS, LOW E, MANUFACTURER GLOBAL SECURITY GLAZING

SHGC .38
SHADING COEFFICIENT .43
U–VALUE .26
LIGHT TRANSMITTANCE .59



3 TRUSSBILT METAL DETENTION WINDOW FRAME 12 GAUGE STEEL

4 TRUSSBILT METAL DETENTION WINDOW FRAME 12 GAUGE STEEL

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Written dimensions take precedence over scaled dimensions. Do not scale plans. Contractor shall verify all dimensions and conditions in the field. Any discrepancies shall be called to the attention of RA & Associates.

REVISIONS

SEAL

REGISTERED ARCHITECT
GREGORY ALLEN RAVATT
LIC. NO. C-26808
EXP. 9-30-27
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

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SHEET TITLE
DOOR SCHEDULE

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
A5.11

GENERAL NOTES- FINISHES

1. ALL INTERIOR FINISHES SHALL COMPLY WITH CBC CHAPTER 8 & TABLE 803.9.

   CLASSIFICATIONS PER CBC 803.1.1 ARE AS FOLLOWS:

   CLASS A: FLAME SPREAD INDEX 0–25; SMOKE DEVELOPED INDEX 0–450.
   CLASS B: FLAME SPREAD INDEX 26–75; SMOKE DEVELOPED INDEX 0–450.
   CLASS C: FLAME SPREAD INDEX 76–200; SMOKE DEVELOPED INDEX 0–450.

2. CONTENTS AND FURNISHINGS SHALL COMPLY WITH NFPA 101 LIFE SAFETY CODE, SECTION 10.3.

REMARKS NOTES - FINISH SCHEDULE

1. REMOVE VINYL TILE FLOORING AND ADHESIVE. PREPARE EXISTING CONCRETE FLOOR FOR CLEAR SEALER.

ROOM FINISH SCHEDULE

ROOM		FLOOR				BASE				WALLS														CEILING								REMARKS	NO
										NORTH				EAST				SOUTH				WEST												
NO	NAME	M1	F1	M2	F2	M1	F1	M2	F2	M1	F1	M2	F2	M1	F1	M2	F2	M1	F1	M2	F2	M1	F1	M2	F2	M1	F1	M2	F2	M3	F3	M4	F4		
119	JANITOR	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								119
120	SMALL GROUP	ECONC	CS							GB	E			GB	E			GB	E			GB	E			EC	E								120
121	TOILET	CT	INT							CT	INT			CT	INT			CT	INT			CT	INT			EC	E								121
122	SHOWER	CT	INT							CT	INT			CT	INT			CT	INT			CT	INT			EC	E								122
123	ELECT./STORAGE	ECONC	CS							ECMU	E			ECMU	E			EP	E			ECMU	E			EC	E								123
124	STAFF RESTROOM	ECONC	CS							ECMU	E			GB	E	FRP	INT	GB	E	FRP	INT	GB	E	FRP	INT	EC	E							NOTE 1	124
125	STORAGE	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								125
126	DAY ROOM	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EAT	P								126
127	SLEEPING UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								127
128	SLEEPING UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								128
129	SLEEPING UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								129
130	SLEEPING UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								130
131	SLEEPING UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								131
132	SLEEPING UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								132
133	SLEEPING UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								133
134	SLEEPING UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								134
135	SLEEPING UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								135
136	SLEEPING UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								136
137	SLEEPING UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								137
138	SLEEPING UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								138
139	SLEEPING UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								139
161	CORRIDOR	CONC	CS			TSB	INT			ECMU	E			ECMU	E			ECMU	E			ECMU	E			EAT	P							NOTE 1	161
241	DAY ROOM	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EAT	P								241
242	SLEEP UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								242
243	SLEEP UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								243
244	SLEEP UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								244
246	SLEEP UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								246
247	SLEEP UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								247
248	SLEEP UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								248
249	SLEEP UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								249
250	SLEEP UNIT	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								250
252	VESTIBULE	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EAT	P								252
253	ELECT./STORAGE	ECONC	CS			ETSB	INT			ECMU	E			ECMU	E			ECMU	E			EP	E			EC	E								253
254	TOILET/SHOWER	CT	INT							CT	INT			CT	INT			CT	INT			CT	INT			EC	E								254
255	STAFF RESTROOM	ECONC	CS							ECMU	E			GB	E	FRP	INT	GB	E	FRP	INT	ECMU	E	FRP	INT	EC	E							NOTE 1	255
256	SMALL GROUP	ECONC	CS							ECMU	E			ECMU	E			ECMU	E			ECMU	E			EC	E								256
257	EDUCATION GROUP	ECONC	CS			TSB	INT			ECMU	E			EP	E			EP	E			ECMU	E			EAT	P	GYP	NAT					NOTE 1	257
259	CONTROL ROOM	ECONC	CS							GB	E			GB	E			GB	E			ECMU	E	CMU	E	EAT	P	GYP	NAT						259

MATERIAL DESIGNATIONS

NOTE: NOT ALL DESIGNATIONS MAY OCCUR ON THIS SHEET.

FLOOR MATERIAL DESIGNATIONS

CONC – EXPOSED CONCRETE
CT – CERAMIC TILE
VPF – VINYL PLANK FLOORING
EPXY – EPOXY FLOORING
RT – RUBBER TILE
C – CARPET TILE
LIN – LINOLEUM
ECONC – EXISTING CONCRETE
EC – EXISTING CARPET
SVT – SHEET VINYL FLOORING

BASE MATERIAL DESIGNATIONS

TSB – TOP SET BASE
LCB – LINOLEUM COVE BASE
CTB – CERAMIC TILE BASE
EPXY – COVED EPOXY BASE
EW – EXISTING WOOD BASE
CPB – CARPET BASE
ETSB – EXISTING TOP SET BASE
ECTB – EXISTING CERAMIC TILE BASE

WALL MATERIAL DESIGNATIONS

GB – GYPSUM BOARD
MGYP – MOISTURE RESISTANT GYPSUM BOARD
CT – CERAMIC TILE
FRP – FIBERGLASS REINFORCED POLYESTER PANELS
EP – EXISTING PLASTER FINISH
NP – NEW SMOOTH PLASTER FINISH
ES – EXISTING STEEL
EW – EXISTING PAINTED WOOD
VCW – VINYL COVERED TACKABLE WALLBOARD
ETW – EXISTING TACKABLE WALL SYSTEM
AT – 12 X 12 ACOUSTIC TILE
EPLY – EXISTING PLYWOOD
EAT – EXISTING 12 X 12 ACOUSTIC TILE
EGYP – EXISTING GYPSUM BOARD
PSC – PLASTER SKIM COAT
ECMU– EXISTING CMU WALL
FAP – FABRIC WRAPPED ACOUSTICAL PANELS
WWP – WOOD WALL PANELS
CMU – CMU INFILL

CEILING MATERIAL DESIGNATIONS

EXP – EXPOSED STRUCTURE
ACT – SUSPENDED ACOUSTICAL CEILING
WGB – WATER RESISTANT GYP. BOARD
GYP – GYPSUM BOARD
EC – EXISTING CONCRETE
EWT – EXISTING PAINTED EXPOSED WOOD TRUSSES
EAT – EXISTING 12 X 12 ACOUSTIC TILE
EACT – EXISTING SUSPENDED ACOUSTIC TILE
EGYP – EXISTING GYP. BD.
EEWJ – EXISTING EXPOSED WOOD JOISTS
NAT – NEW 12 X 12 ACOUSTIC TILE

FINISH DESIGNATIONS

HS – HARDENER SEALER
E – ENAMEL PAINT
P – PAINT
INT – INTEGRAL FINISH
CS – CONCRETE SEALER
ST – STAIN

MISCELLANEOUS DESIGNATIONS

MIR – MIRROR
GRT – GROUT
GB – GYPSUM BOARD

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REVISIONS

SEAL

REGISTERED ARCHITECT
GREGORY ALLEN RAVATT
LICENSED
EXP. 9-30-27
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

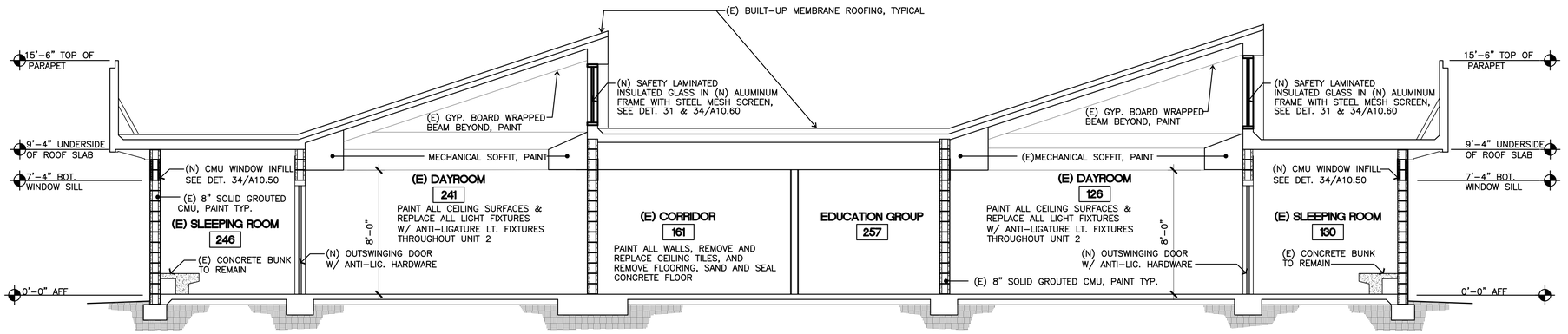
County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
FINISH SCHEDULE

DATE: 10/15/25
TECHNICIAN: MS
PROJECT MANAGER: MS
JOB NUMBER: RA # 22868
SHEET NUMBER
A5.12



BUILDING SECTION A

0 2' 4' 8'

SCALE: 1/4"= 1'-0"

RA ARCHITECTS & ENGINEERS

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EXP. 9-30-27
STATE OF CALIFORNIA

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UNIT 1 & 2 REMODEL

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County of Santa Barbara
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BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

BUILDING SECTION

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

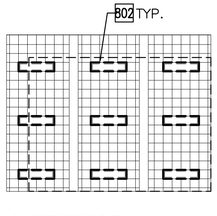
SHEET NUMBER
A7.11

GENERAL NOTES

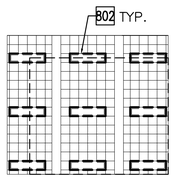
1. THE DEMOLITION PLAN INDICATES THE APPROXIMATE EXTENT OF DEMOLITION REQUIREMENTS. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE EXTENT OF DEMOLITION REQUIRED TO INSTALL ALL NEW CONSTRUCTION.
2. REFER TO OTHER ARCHITECTURAL DEMOLITION PLANS FOR ADDITIONAL DEMOLITION SCOPE OF WORK.
3. REFER TO PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION REQUIREMENTS.
4. CONTRACTOR SHALL PROTECT PORTIONS OF EXISTING CONSTRUCTION NOT INDICATED TO BE DEMOLISHED. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPLACEMENT AND REPAIR OF ITEMS TO REMAIN.
5. CONTRACTOR SHALL REMOVE AND STORE ALL MISCELLANEOUS ITEMS TO INCLUDE: MARKERBOARDS, TACKBOARDS, FIRE EXTINGUISHERS, NAME PLATES, SIGNAGE, CLOCKS, WALL-HUNG PICTURES/MAPS, ETC. THAT HAS NOT BEEN PREVIOUSLY REMOVED BY THE OWNER.
6. CONTRACTOR MUST MAINTAIN ACCESS TO AREAS ADJACENT TO DEMOLISHED AND IMPROVEMENT AREAS. SEE SPECIFICATIONS FOR REQUIREMENTS.

KEYNOTES

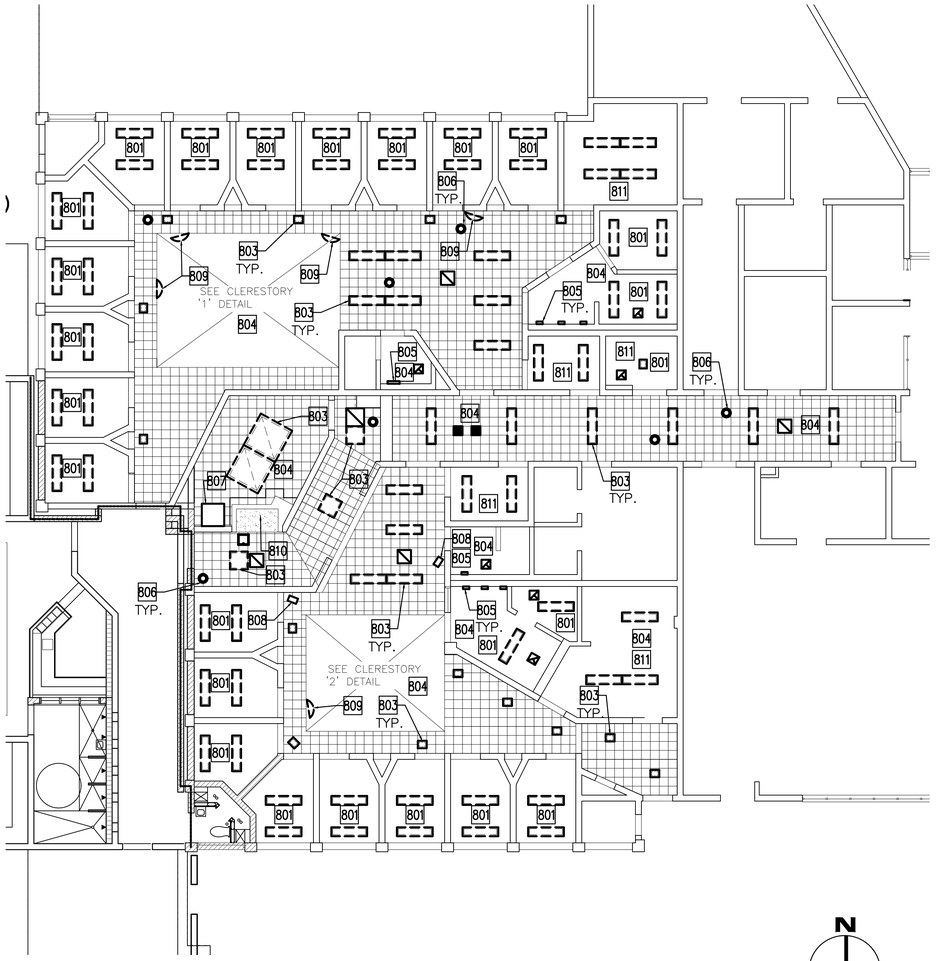
801 REMOVE (E) LIGHT FIXTURES AT 9'-4" EXPOSED CONCRETE CEILING
802 REMOVE (E) LIGHT FIXTURES AT SLOPED CLERESTORY SUSPENDED GYP. BD. CEILING, ACOUSTIC TILES ARE TO REMAIN
803 REMOVE (E) LIGHT FIXTURES IN 8'-0" GYP. BD. SOFFIT/CEILING, ACOUSTIC TILES ARE TO REMAIN
804 CLEAN ALL MECHANICAL GRILLES IN ROOM AND PREP FOR NEW PAINT
805 (E) WALL MOUNTED LIGHT FIXTURES TO BE REMOVED
806 (E) CEILING MOUNTED SECURITY CAMERA TO REMAIN
807 (E) PULL BOX CEILING ACCESS PANEL TO BE REMOVED AND REPLACED
808 (E) SECURITY CAMERA TO BE REMOVED
809 REMOVE ALL EXISTING SECURITY MIRRORS
810 REMOVE GYP. BD. CEILING AT CORRIDOR 161 ALCOVE
811 REMOVE (E) LIGHT FIXTURES IN 10'-0" EXPOSED CONCRETE CEILING



CLERESTORY '1'



CLERESTORY '2'



UNIT 1 & 2 - DEMOLITION REFLECTED CEILING PLAN

0 4' 8' 16'

SCALE: 1/8"= 1'-0"

N

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STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

DEMOLITION REFLECTED CEILING PLAN

DATE: 10/15/25

TECHNICIAN: MS

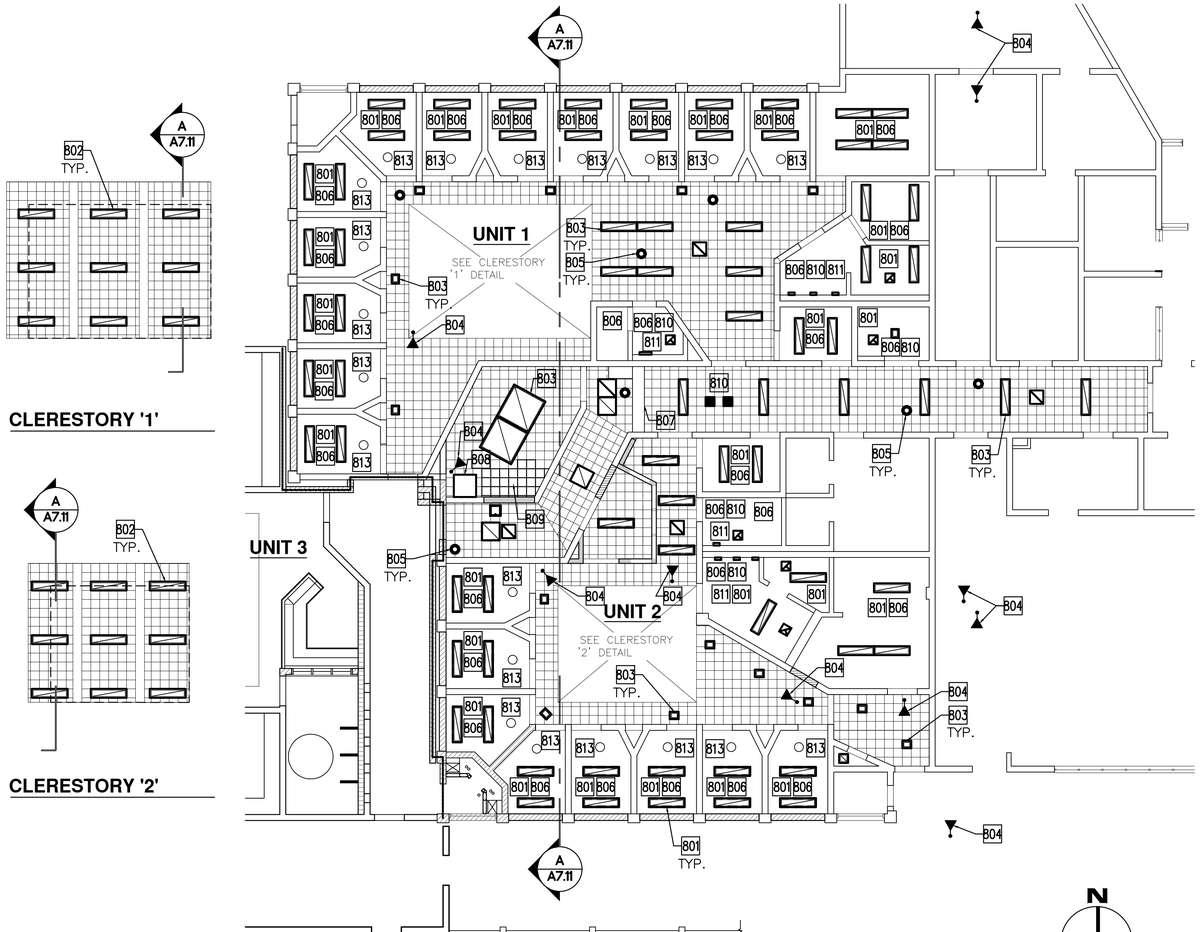
PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
A8.11D

KEYNOTES

801 PROVIDE NEW LED LIGHT FIXTURES AT 9'–4" EXPOSED CONCRETE CEILING
802 PROVIDE NEW LED LIGHT FIXTURES AT 15'–4" CLERESTORY SUSPENDED GYP. BD. CEILING
803 PROVIDE NEW LED LIGHT FIXTURES IN 8'–0" GYP. BD. SOFFIT/CEILING
804 NEW CEILING MOUNTED SECURITY CAMERA, BY SECURITY CONTRACTOR (BIRDI) – G.C. TO PROVIDE ALL ELECTRICAL & DATA/COMM
805 (E) SECURITY CAMERAS TO REMAIN
806 PAINT (E) CONCRETE CEILING
807 PAINT (E) CONCRETE BEAM
808 PROVIDE FLUSH MOUNTED 30" X 30" PULL BOX ACCESS PANEL WITH CYLINDER LOCK
809 PROVIDE NEW CEILING FRAMING WITH 3,000 PSI PLASTER FINISH & 12" X 12" ACOUSTIC TILES, MATCH EXISTING
810 PAINT ALL MECHANICAL GRILLES
811 PROVIDE NEW WALL MOUNTED LED LIGHT FIXTURES
812 PROVIDE NEW LED LIGHT FIXTURES AT 10'–0" EXPOSED CONCRETE CEILING
813 PROVIDE NEW SMOKE DETECTOR IN SLEEPING ROOMS, TYP.



CLERESTORY '1'

CLERESTORY '2'

UNIT 1 & 2 - REFLECTED CEILING PLAN

0 4' 8' 16'

SCALE: 1/8"= 1'–0"

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PROBATION
SANTA MARIA JJC
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4263 CALIFORNIA BLVD.
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County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

REFLECTED CEILING PLAN

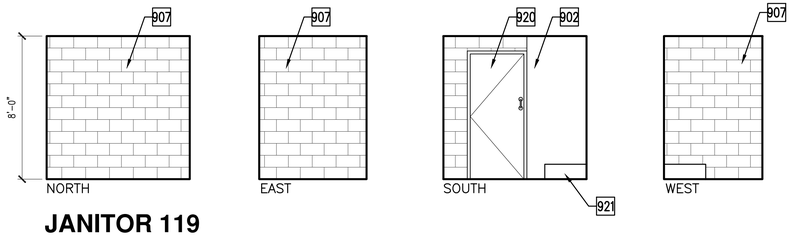
DATE: 10/15/25

TECHNICIAN: MS

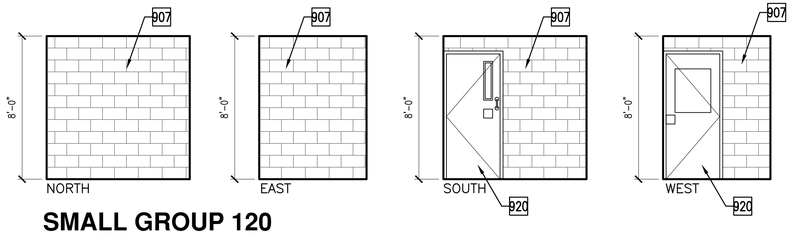
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JOB NUMBER: RA # 22.868

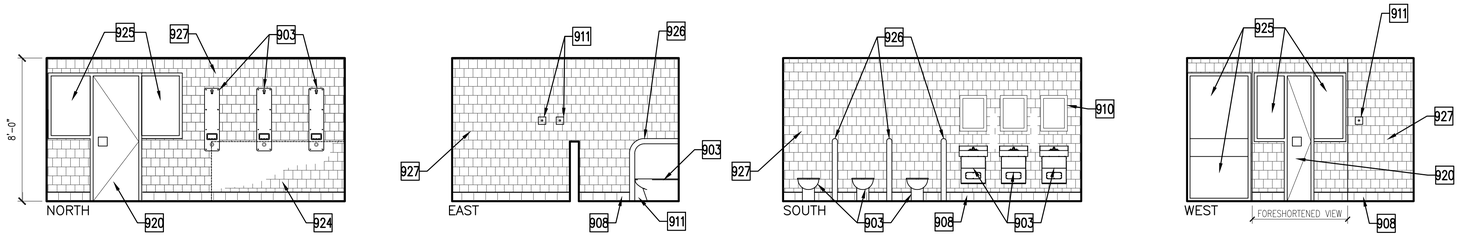
SHEET NUMBER
A8.11



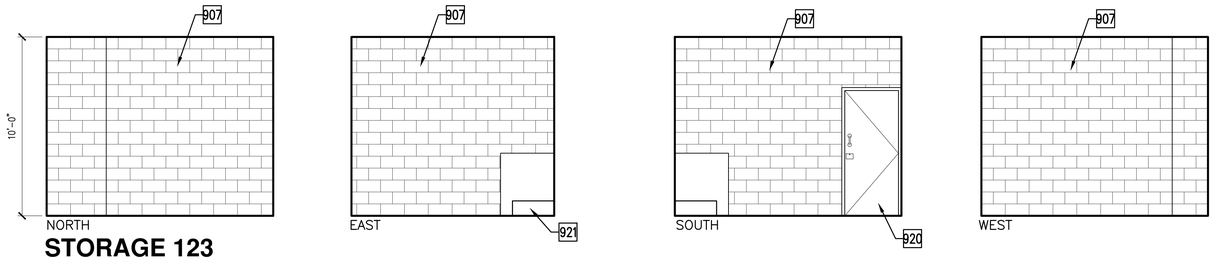
JANITOR 119



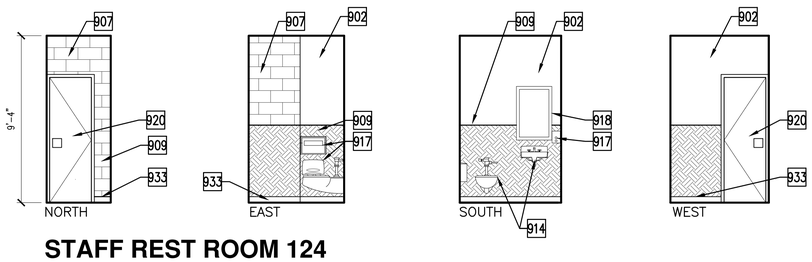
SMALL GROUP 120



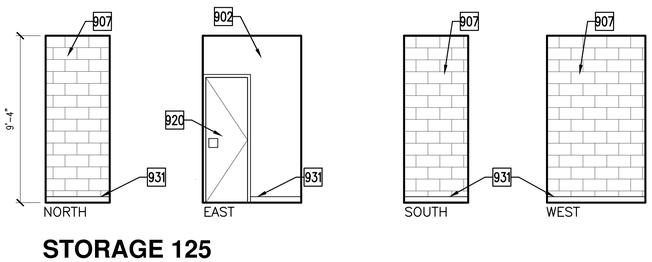
YOUTH TOILET/ SHOWER ROOM 121 & 122



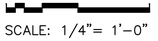
STORAGE 123



STAFF REST ROOM 124



STORAGE 125



SCALE: 1/4"= 1'-0"

KEYNOTES

901	PROVIDE NEW DOOR & FRAME W/ SECURITY HARDWARE, SEE DOOR SCHEDULE
902	(E) WALL W/ PLASTER FINISH, PAINT
903	PROVIDE NEW ANTI-LIGATURE PLUMBING FIXTURE
904	PROVIDE NEW ANTI-LIGATURE DRINKING FOUNTAIN WITH BOTTLE FILLER
905	PROVIDE NEW CMU WALL INFILL WHERE WINDOW WAS REMOVED
906	(E) CAST-IN- PLACE CONCRETE BED TO REMAIN
907	(E) CMU WALL, PAINT
908	PROVIDE CERAMIC TILE COVED BASE
909	PROVIDE 4'-0" HIGH FIBERGLASS REINFORCED PANEL WAINSCOT AT EACH WALL
910	PROVIDE NEW AINT-LIGATURE MIRROR, WHITEHALL WH1862
911	PROVIDE NEW ANTI-LIGATURE TOWEL HOOK, BOBRICK B-9884
912	(E) FRAMED SOFFIT, PAINT
913	PROVIDE WINDOW IN NEW CONTROL ROOM WALL, SEE WINDOW TYPES A5.11
914	PROVIDE NEW PLUMBING FIXTURE
915	INFILL WINDOW OPENING WITH CMU, MATCH (E)
916	PROVIDE NEW ALUMINUM FRAMED CLERESTORY WINDOWS WITH INSULATED SAFETY LAMINATED GLASS AND STEEL MESH SCREENS, SEE WINDOW TYPES A5.11
917	OWNER FURNISHED, CONTRACTOR INSTALLED ACCESSORIES – PROVIDE BACKING
918	PROVIDE NEW 24" X 36" MIRROR
919	PAINT ALL CLERESTORY WALL SURFACES
920	(E) DOOR, FRAME AND SECURITY HARDWARE TO REMAIN, PAINT
921	(E) TERRAZZO MOP SINK TO REMAIN, CLEAN/REFURBISH MOP SINK & SERVICE THE DRAIN IF NEEDED
922	PROVIDE NEW DOOR/WINDOW FRAME WITH LAMINATED SAFETY GLASS, SEE FRAME TYPES A5.11
923	PROVIDE NEW METAL STUD WALL W/ GYP. BD. AND 2,800 PSI PLASTER FINISH, PAINT
924	(E) WALL W/ NEW CERAMIC TILE FINISH IN FOREGROUND
925	(E) WINDOW W/ WIRED SAFETY GLASS
926	NEW STAINLESS STEEL ANTI-LIGATURE PARTITION, BRITEX MODEL US-PPP
927	PROVIDE NEW CERAMIC TILE WALL FINISH, FLOOR TO CEILING
928	INFILL DOOR OPENING WITH CMU, MATCH (E) – SEE STRUCTURAL DRAWINGS
929	(E) ELECTRICAL PANEL TO REMAIN
930	(E) WALL MOUNTED IDF CABINET & CABLE TRAY TO REMAIN
931	(E) RUBBER TOP SET BASE TO REMAIN
932	PROVIDE NEW MOP SINK, SEE PLUMBING DRAWINGS
933	PROVIDE NEW 4" TOP SET BASE
934	WALL MOUNTED HVAC UNIT, SEE MECHANICAL DRAWINGS
935	PROVIDE NEW DOOR & FRAME W/ SECURITY HARDWARE, SEE DOOR SCHEDULE & STRUCTURAL DRAWINGS FOR NEW OPENING REINFORCEMENT

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LICENSED
EXP. 9-30-27
STATE OF CALIFORNIA

PROJECT

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General Services Department
260 N. San Antonio Road
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COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

INTERIOR ELEVATIONS

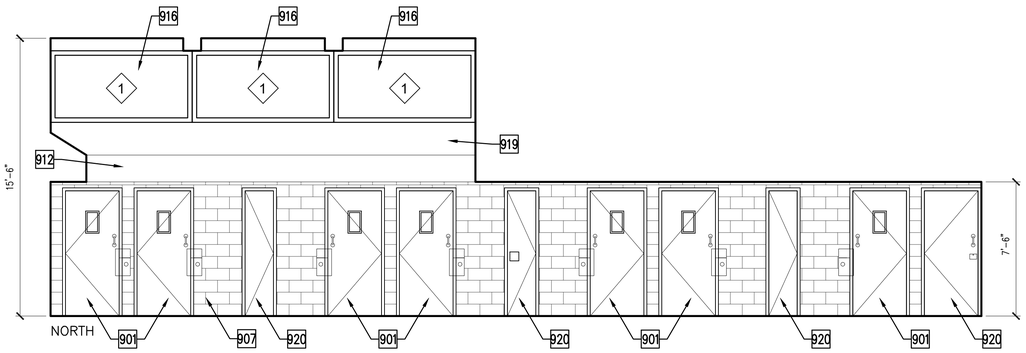
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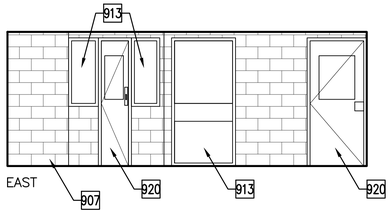
TECHNICIAN: MS

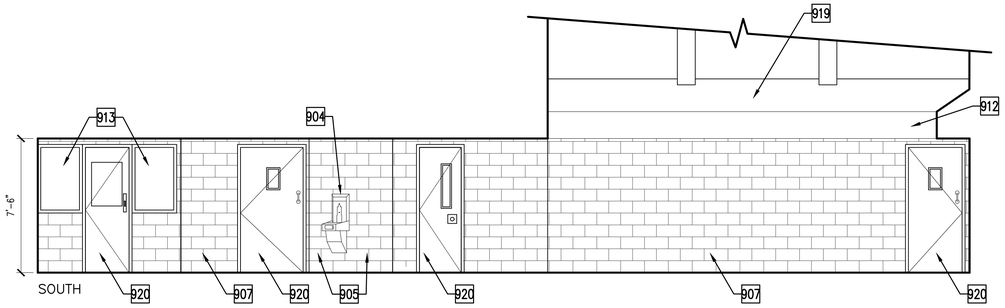
PROJECT MANAGER: MS

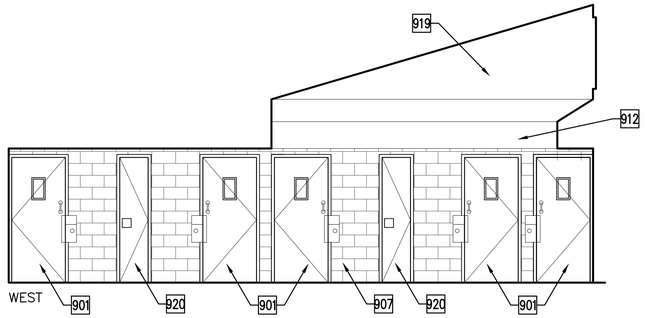
JOB NUMBER: RA # 22.868

SHEET NUMBER
A9.11

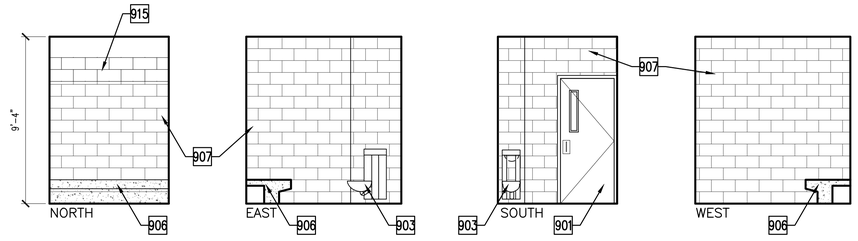




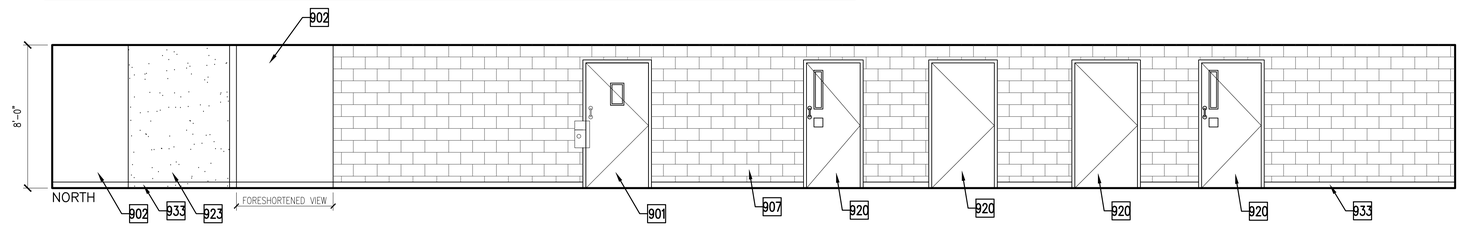


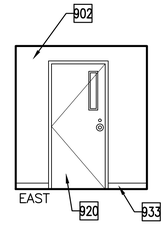


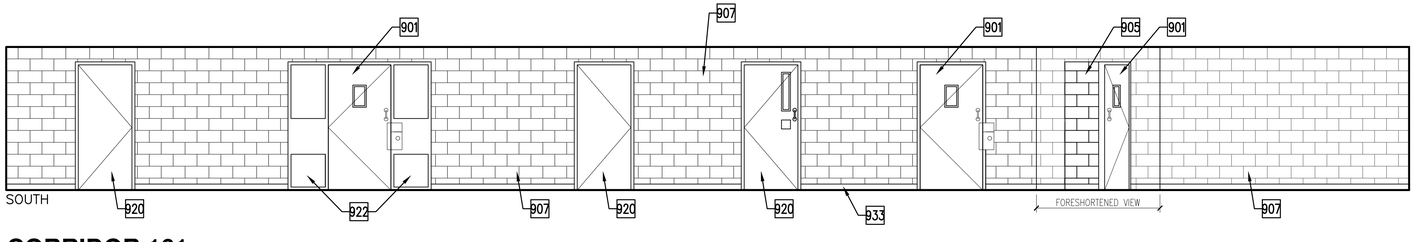
DAYROOM 126

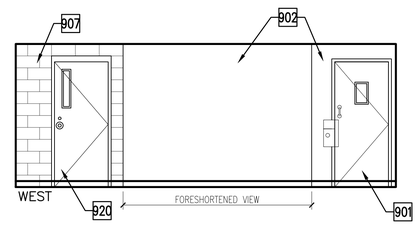


TYPICAL SLEEPING ROOM - UNIT 1









CORRIDOR 161

0 2' 4' 8'

SCALE: 1/4"= 1'-0"

KEYNOTES

##	
901	PROVIDE NEW DOOR & FRAME W/ SECURITY HARDWARE, SEE DOOR SCHEDULE
902	(E) WALL W/ PLASTER FINISH, PAINT
903	PROVIDE NEW ANTI-LIGATURE PLUMBING FIXTURE
904	PROVIDE NEW ANTI-LIGATURE DRINKING FOUNTAIN WITH BOTTLE FILLER
905	PROVIDE NEW CMU WALL INFILL WHERE WINDOW WAS REMOVED
906	(E) CAST-IN- PLACE CONCRETE BED TO REMAIN
907	(E) CMU WALL, PAINT
908	PROVIDE CERAMIC TILE COVED BASE
909	PROVIDE 4'-0" HIGH FIBERGLASS REINFORCED PANEL WAINSCOT AT EACH WALL
910	PROVIDE NEW AINT-LIGATURE MIRROR, WHITEHALL WH1862
911	PROVIDE NEW ANTI-LIGATURE TOWEL HOOK, BOBRICK B-9884
912	(E) FRAMED SOFFIT, PAINT
913	PROVIDE WINDOW IN NEW CONTROL ROOM WALL, SEE WINDOW TYPES A5.11
914	PROVIDE NEW PLUMBING FIXTURE
915	INFILL WINDOW OPENING WITH CMU, MATCH (E)
916	PROVIDE NEW ALUMINUM FRAMED CLERESTORY WINDOWS WITH INSULATED SAFETY LAMINATED GLASS AND STEEL MESH SCREENS, SEE WINDOW TYPES A5.11
917	OWNER FURNISHED, CONTRACTOR INSTALLED ACCESSORIES - PROVIDE BACKING
918	PROVIDE NEW 24" X 36" MIRROR
919	PAINT ALL CLERESTORY WALL SURFACES
920	(E) DOOR, FRAME AND SECURITY HARDWARE TO REMAIN, PAINT
921	(E) TERRAZZO MOP SINK TO REMAIN, CLEAN/REFURBISH MOP SINK & SERVICE THE DRAIN IF NEEDED
922	PROVIDE NEW DOOR/WINDOW FRAME WITH LAMINATED SAFETY GLASS, SEE FRAME TYPES A5.11
923	PROVIDE NEW METAL STUD WALL W/ GYP. BD. AND 2,800 PSI PLASTER FINISH, PAINT
924	(E) WALL W/ NEW CERAMIC TILE FINISH IN FOREGROUND
925	(E) WINDOW W/ WIRED SAFETY GLASS
926	NEW STAINLESS STEEL ANTI-LIGATURE PARTITION, BRITEX MODEL US-PPP
927	PROVIDE NEW CERAMIC TILE WALL FINISH, FLOOR TO CEILING
928	INFILL DOOR OPENING WITH CMU, MATCH (E) - SEE STRUCTURAL DRAWINGS
929	(E) ELECTRICAL PANEL TO REMAIN
930	(E) WALL MOUNTED IDF CABINET & CABLE TRAY TO REMAIN
931	(E) RUBBER TOP SET BASE TO REMAIN
932	PROVIDE NEW MOP SINK, SEE PLUMBING DRAWINGS
933	PROVIDE NEW 4" TOP SET BASE
934	WALL MOUNTED HVAC UNIT, SEE MECHANICAL DRAWINGS
935	PROVIDE NEW DOOR & FRAME W/ SECURITY HARDWARE, SEE DOOR SCHEDULE & STRUCTURAL DRAWINGS FOR NEW OPENING REINFORCEMENT

RA ARCHITECTS & ENGINEERS

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LICENSED ARCHITECT
EXP. 9-30-27
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SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

INTERIOR ELEVATIONS

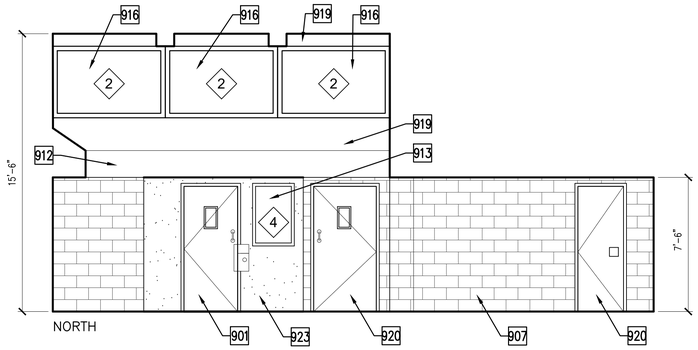
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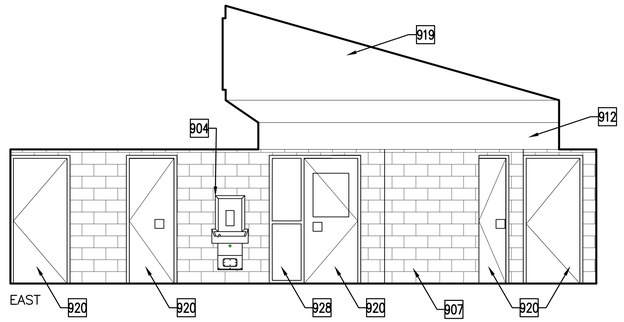
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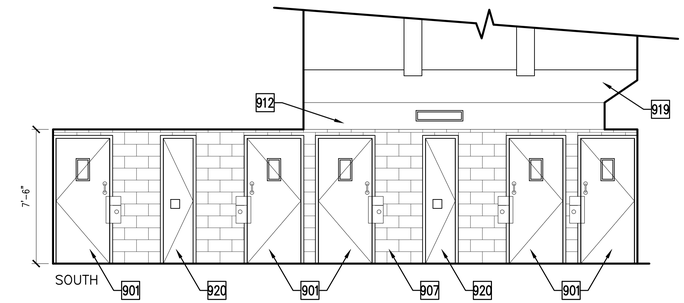
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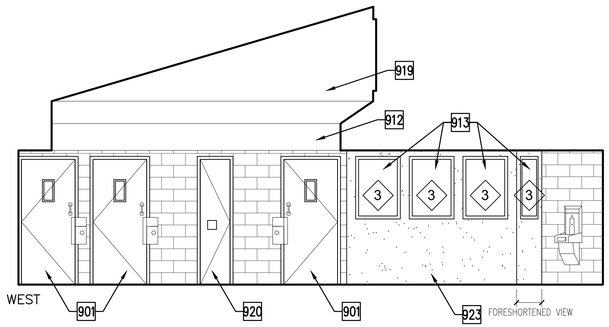
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SHEET NUMBER
A9.12

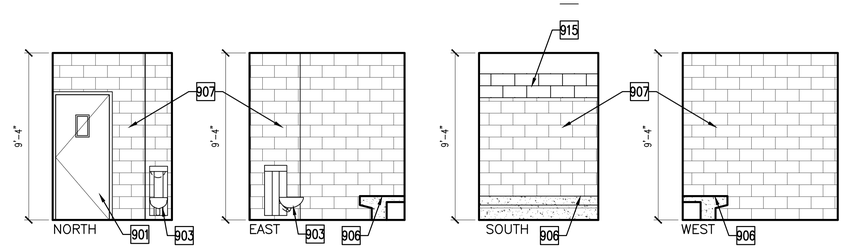




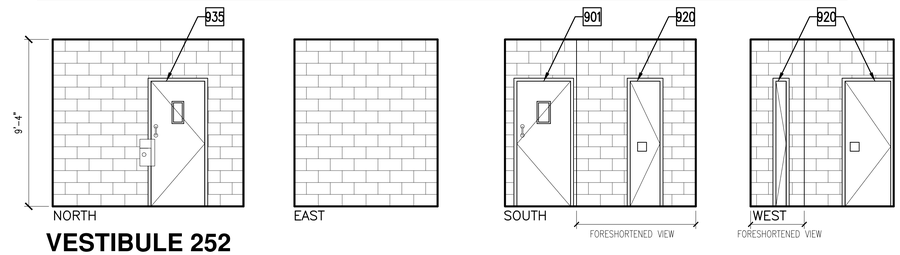




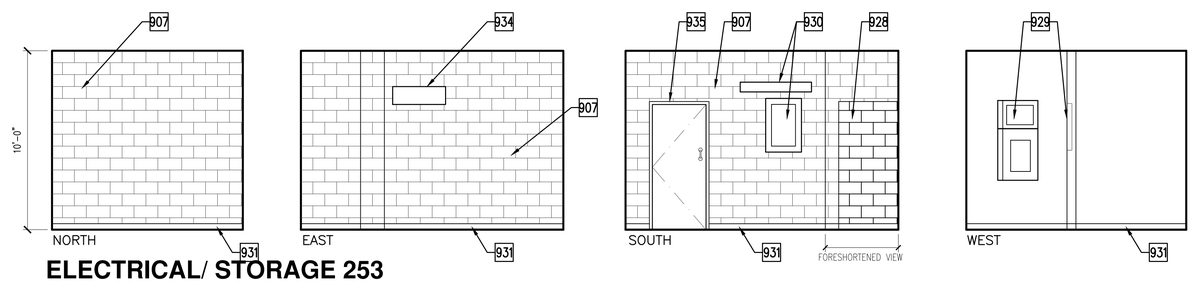
DAYROOM 241



TYPICAL SLEEPING ROOM - UNIT 2



VESTIBULE 252



ELECTRICAL/ STORAGE 253

KEYNOTES

901	PROVIDE NEW DOOR & FRAME W/ SECURITY HARDWARE, SEE DOOR SCHEDULE
902	(E) WALL W/ PLASTER FINISH, PAINT
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0 2' 4' 8'

SCALE: 1/4"= 1'-0"

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BSCC PLAN REVIEW NUMBER
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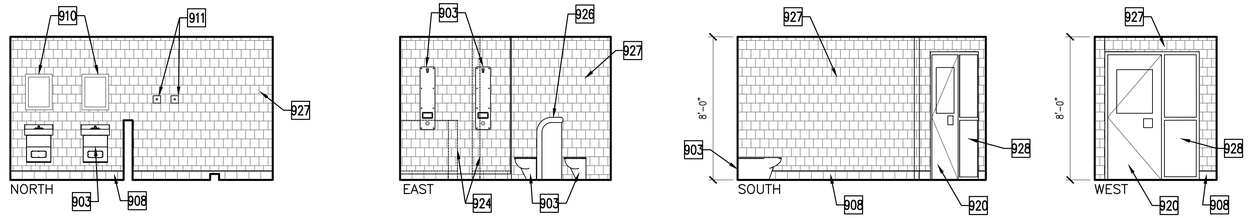
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TECHNICIAN: MS

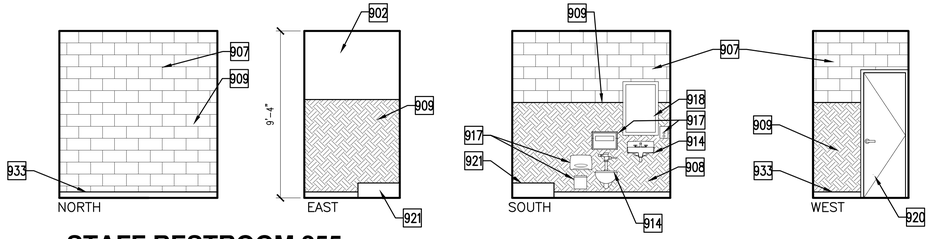
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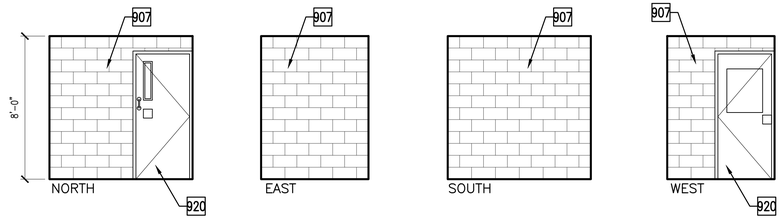
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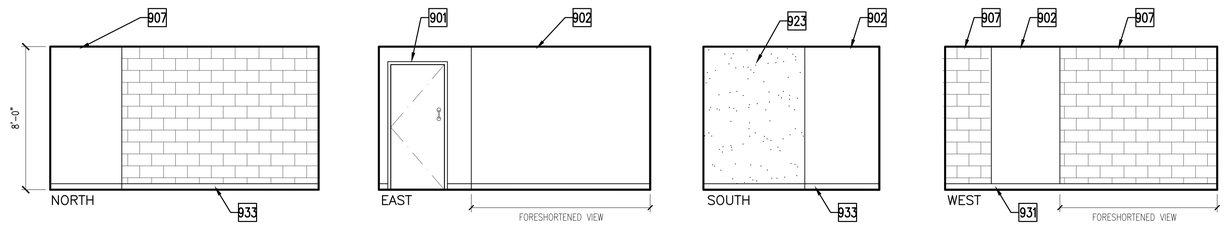
TOILET/SHOWER 254



STAFF RESTROOM 255



SMALL GROUP 256



EDUCATION GROUP 257

CONTROL 259 - SEE A3.11

KEYNOTES

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SCALE: 1/4"= 1'-0"

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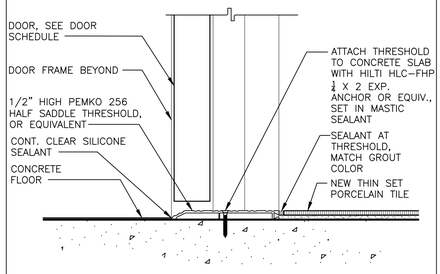
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TECHNICIAN: MS

PROJECT MANAGER: MS

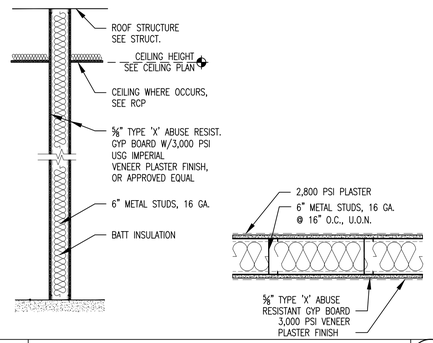
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SHEET NUMBER
A9.14



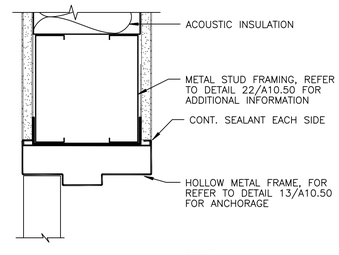
DOOR THRESHOLD

SCALE: 3"=1'-0" 41



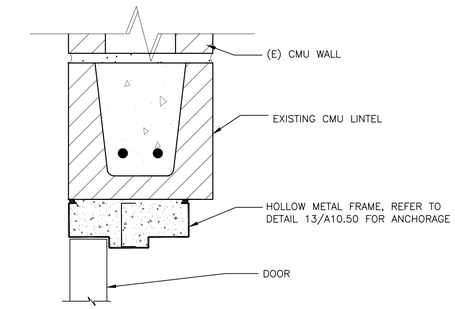
A WALL TYPE

SCALE: 3"=1'-0" 31



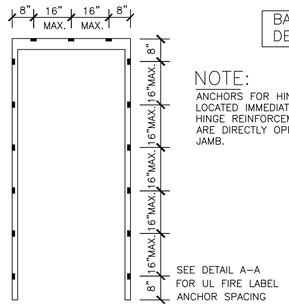
INTERIOR DOOR HEAD • (N) WALL

SCALE: 3"=1'-0" 21



DOOR HEAD • (E) CMU WALL

SCALE: 3"=1'-0" 11

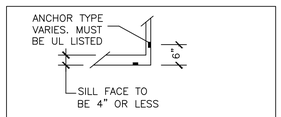


MS ANCHOR SPACINGS

BASIS OF DESIGN – TRUSSBILT METAL DETENTION FRAME, 12 GA.

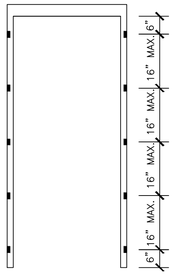
NOTE:

ANCHORS FOR HINGE JAMB ARE TO BE LOCATED IMMEDIATELY ABOVE OR BELOW HINGE REINFORCEMENT. LOCK JAMB ANCHORS ARE DIRECTLY OPPOSITE FROM THE HINGE JAMB.

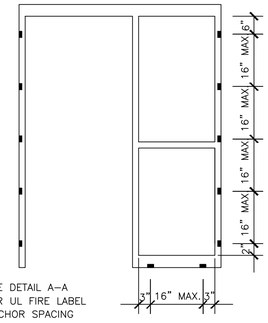


A–A

FOR FRAMES WITH A UL FIRE LABEL



EO ANCHOR SPACINGS



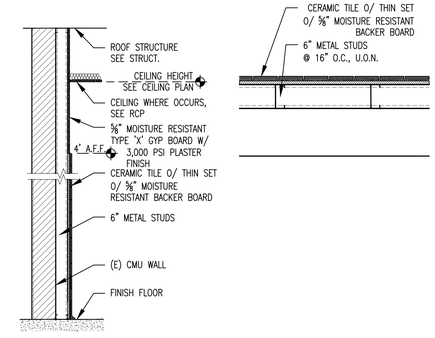
SEE DETAIL A–A FOR UL FIRE LABEL ANCHOR SPACING

NOTE:

1. ANCHOR SPACING'S SHOWN FOR UL, EO, WS, & MS ANCHORS ARE PER UL REQUIREMENTS.
2. FRAME SILLS LOCATED ON THE FLOOR ARE TO HAVE "EO" ANCHORS OR SILL CHANNELS.

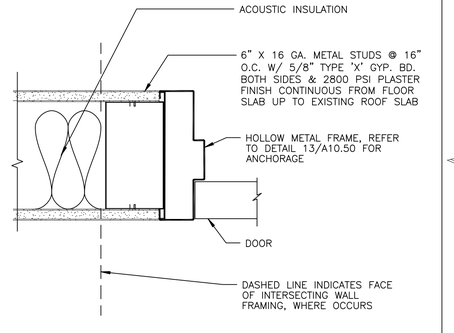
DOOR FRAME ANCHORING SPACINGS

SCALE: NTS 43



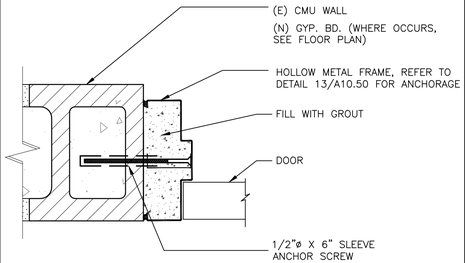
B WALL TYPE

32



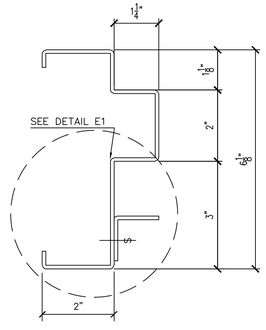
INTERIOR DOOR JAMB • (N) WALL

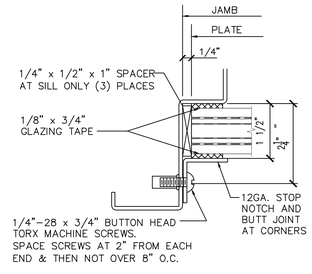
SCALE: 3"=1'-0" 22



DOOR JAMB • (E) CMU WALL

SCALE: 3"=1'-0" 12





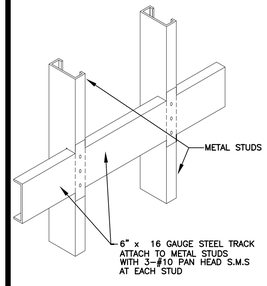
E1

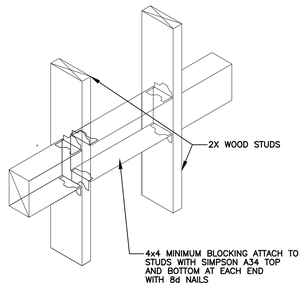
UNIT 2 CONTROL ROOM WINDOW

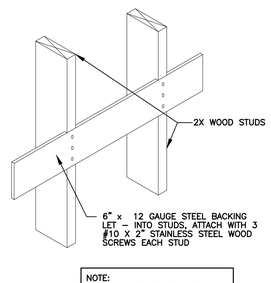
SCALE: 6"=1'-0" 33

DOOR FRAME ANCHORING

SCALE: 1"=1'-0" 13



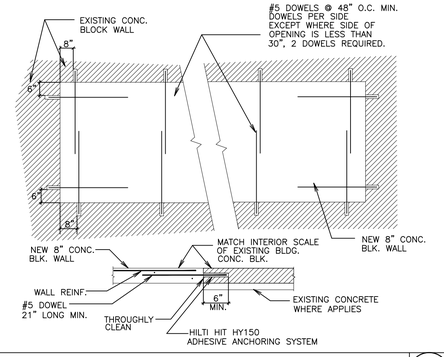




NOTE:
EXTEND BLOCKING ONE STUD BEYOND CABINET OR GRAB BAR LENGTH

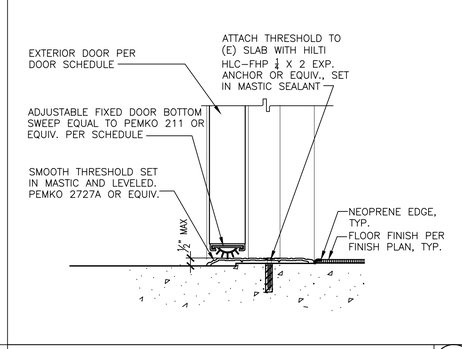
TYPICAL BLOCKING AT WOOD AND METAL FRAMED WALLS

SCALE: 3"=1'-0" 44



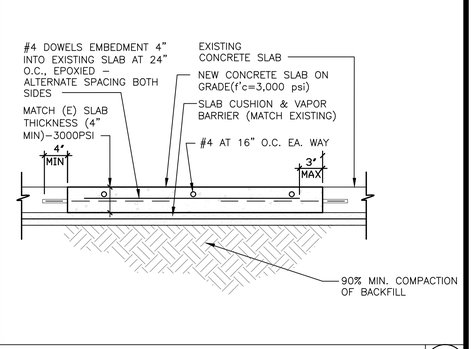
WALL INFILL AT WINDOW OPENING

SCALE: NTS 34



EXTERIOR DOOR THRESHOLD

SCALE: 3"=1'-0" 24



SLAB REPAIR

SCALE: FULL 14

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REVISIONS

SEAL

REGISTERED ARCHITECT
GREGORY ALLEN RAVATT
LICENSED PROS
EXP. 9-30-27
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
DETAILS

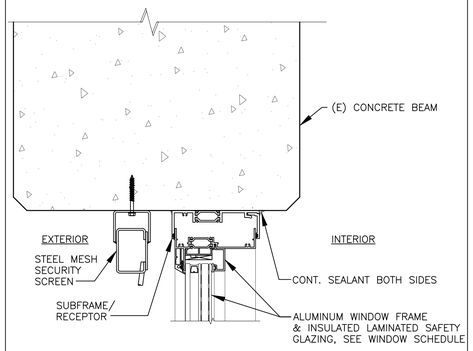
DATE: 10/15/25

TECHNICIAN: MS

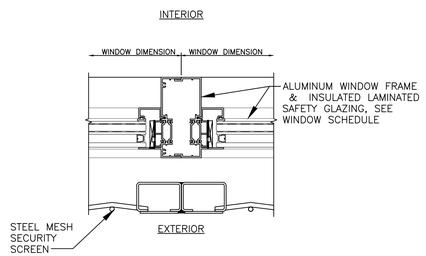
PROJECT MANAGER: MS

JOB NUMBER: RA # 22868

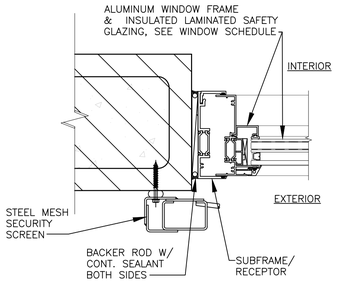
SHEET NUMBER
A10.50



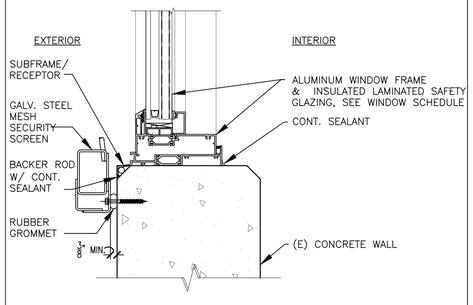
CLERESTORY WINDOWS - HEAD SCALE: 3"=1'-0" 31



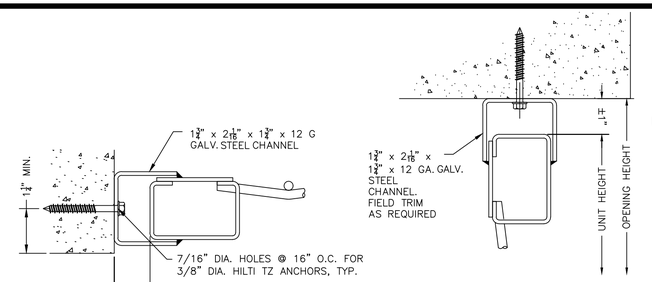
CLERESTORY WINDOWS - MULLION SCALE: 3"=1'-0" 32

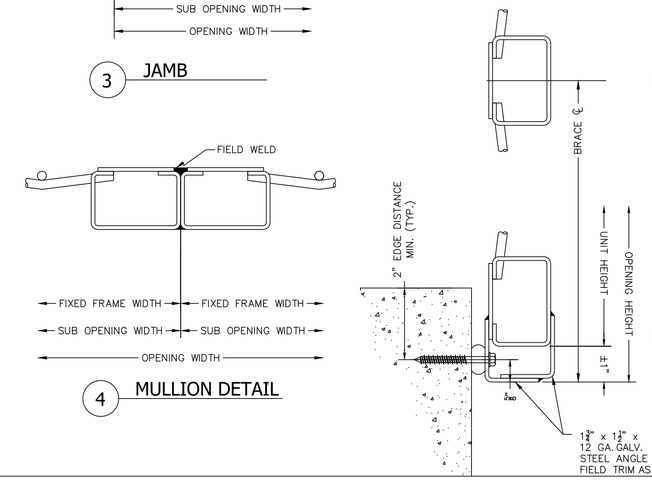


CLERESTORY WINDOWS - JAMB SCALE: 3"=1'-0" 33

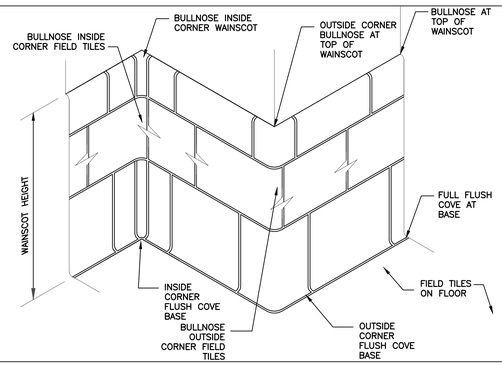


CLERESTORY WINDOW - SILL SCALE: 3"=1'-0" 34





WIRE MESH SECURITY SCREEN - TYPICAL MOUNTING DETAIL SCALE: 6"=1'-0" 12



CERAMIC TILE DETAIL SCALE: N.T.S. 44

SCALE: NTS 43

13

14

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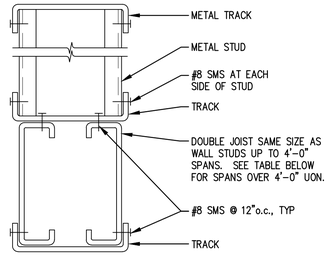
DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
A10.60

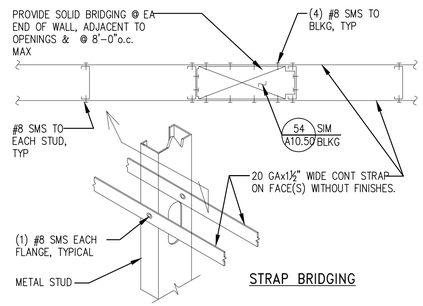


SPAN	MIN JOIST SIZE	
	4" & 6" STUD WALLS	8" STUD WALLS
4' TO 8'	600S137-33 (33 ksi)	800S137-33 (33 ksi)
OVER 8' TO 12'	600S162-54 (50 ksi)	800S162-54 (50 ksi)
OVER 12' TO 16'	800S162-54 (50 ksi)	1000S162-54 (50 ksi)

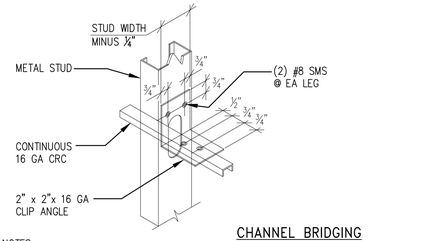
NOTE: SPANS OVER 16' REQUIRE MEMBER SIZES TO BE SHOWN ON DRAWINGS.

BOX HEADER

SCALE: NTS 31



STRAP BRIDGING



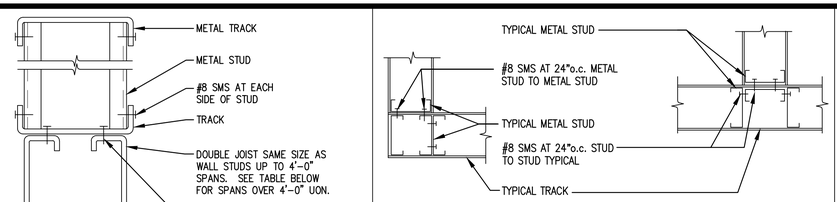
CHANNEL BRIDGING

NOTES:

1. ALL WALLS THAT DO NOT HAVE FINISH APPLIED ON BOTH SIDES SHALL HAVE SOLID BLOCKING OR CONTINUOUS BRIDGING @ 48"o.c.
2. BRIDGING MAY CONSIST OF EITHER CHANNEL OR STRAP BRIDGING FOR STUDS UP TO 6" WIDE. FOR STUDS OVER 6" WIDE, USE STRAP BRIDGING ONLY.
3. THIS DETAIL APPLIES TO BOTH INTERIOR AND EXTERIOR WALLS AS WELL AS FASCIAS, PARAPETS, DOUBLE WALLS, AND ANY OTHER SIMILAR WALL FRAMING UON.

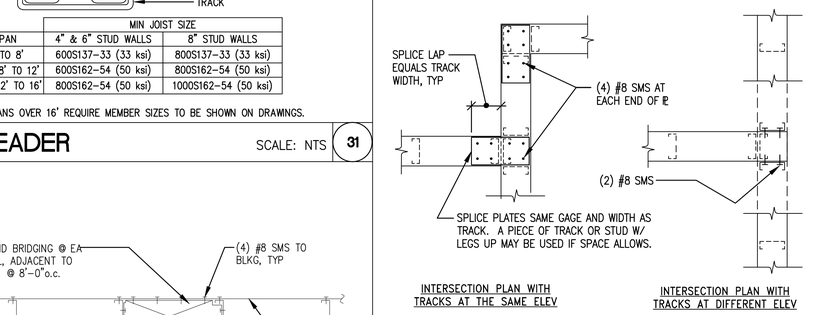
WALL BRIDGING

SCALE: NTS 33



STUD INTERSECTION

SCALE: NTS 21

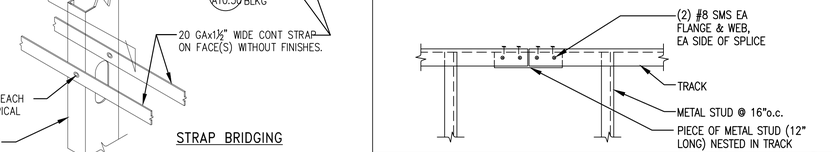


INTERSECTION PLAN WITH TRACKS AT THE SAME ELEV

INTERSECTION PLAN WITH TRACKS AT DIFFERENT ELEV

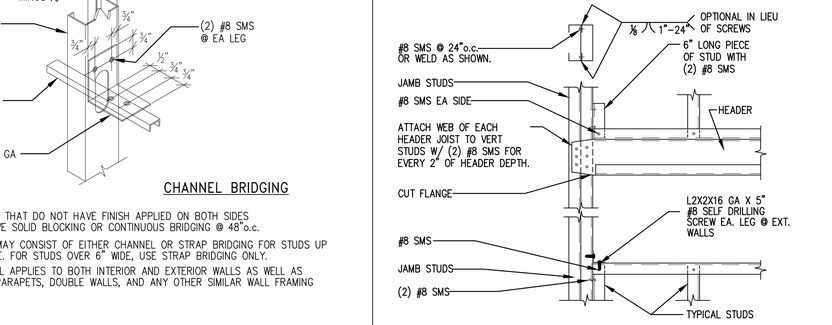
TOP TRACK INTERSECTION

SCALE: NTS 22



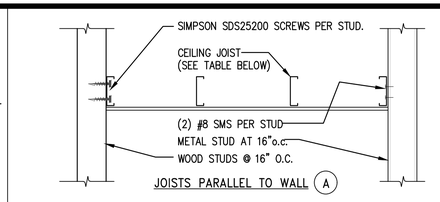
TRACK SPLICE

SCALE: NTS 23

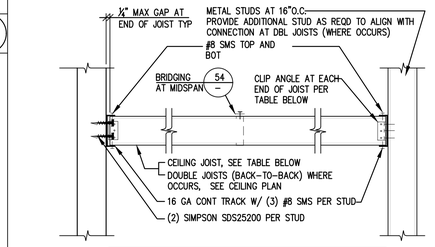


FRAMING AT OPENING

SCALE: NTS 24

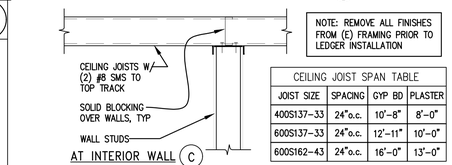


JOISTS PARALLEL TO WALL (A)



CLIP ANGLES			
JOIST DEPTH	CLIP ANGLE	ATTACHMENT TO JOIST/TRACK	ATTACHMENT TO WOOD WALL
4"	NOT REQ'D	–	–
6"	L2x2x16 GA x 0'-5"	(3) #8 SMS	(2) SIMPSON SDS25200
8"	L2x2x16 GA x 0'-7"	(4) #8 SMS	(2) SIMPSON SDS25200

JOISTS PERPENDICULAR TO WALL (B)



NOTE: REMOVE ALL FINISHES FROM (E) FRAMING PRIOR TO LEDGER INSTALLATION

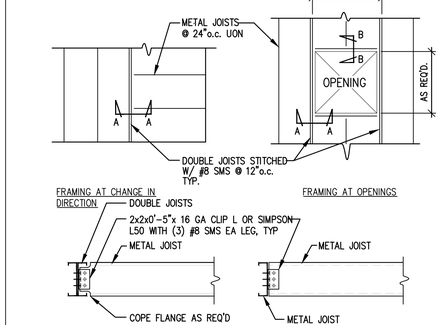
CEILING JOIST SPAN TABLE			
JOIST SIZE	SPACING	GYP BD	PLASTER
400S137-33	24"o.c.	10'-8"	8'-0"
600S137-33	24"o.c.	12'-11"	10'-0"
600S162-43	24"o.c.	16'-0"	13'-0"

AT INTERIOR WALL (C)

NOTE: HOLES/PUNCHOUTS ARE NOT ALLOWED IN CEILING JOISTS

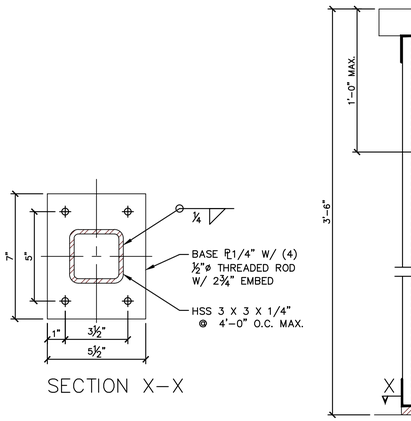
TYPICAL CEILING FRAMING

SCALE: NTS 12



CEILING FRAMING DETAILS

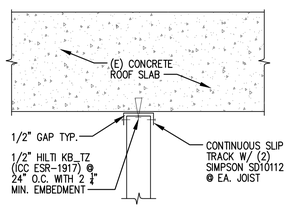
SCALE: NTS 13



SECTION X-X

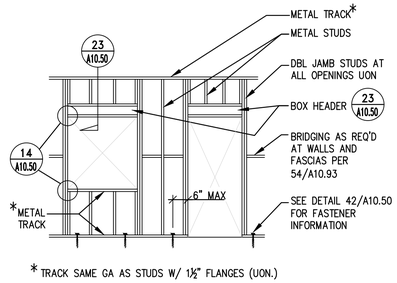
WALL COLUMN

SCALE: 3"=1'-0" 43



WALL TO (E) CONC. ROOF

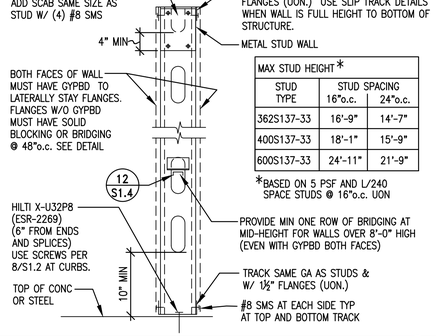
SCALE: 1"=1'-0" 44



* TRACK SAME GA AS STUDS W/ 1½" FLANGES (UON.)

METAL STUD WALL

SCALE: NTS 34

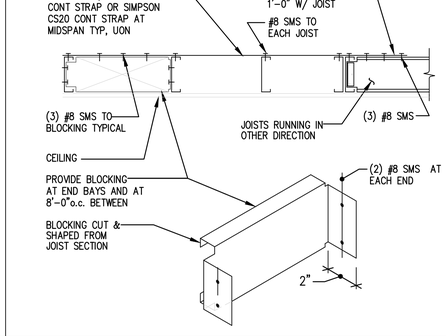


MAX STUD HEIGHT*		
STUD TYPE	STUD SPACING 16"o.c.	24"o.c.
362S137-33	16'-9"	14'-7"
400S137-33	18'-1"	15'-9"
600S137-33	24'-11"	21'-9"

*BASED ON 5 PSF AND L/240 SPACE STUDS @ 16"o.c. UON

INTERIOR NON-BEARING STUDS

SCALE: NTS 25



JOIST BRIDGING DETAIL

SCALE: NTS 14

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REVISIONS

SEAL

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PROJECT

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SANTA MARIA, CA 93455

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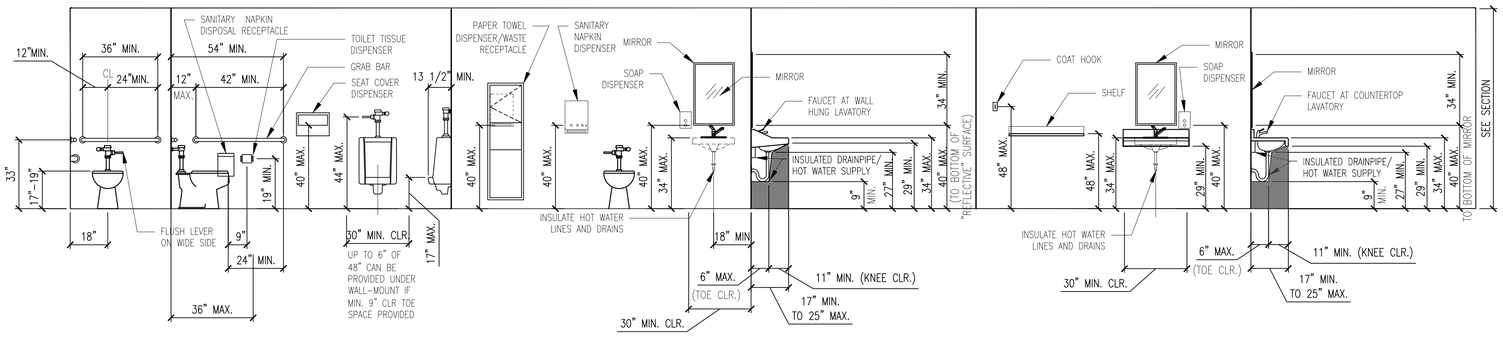
DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
A10.70

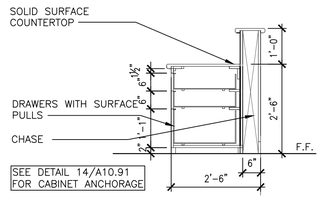


NOTES:

1. REGARDLESS OF STALL CONFIGURATION, A 48" LONG MINIMUM CLEARANCE FLOOR SPACE SHALL BE PROVIDED IN FRONT OF THE WATER CLOSET AT ACCESSIBLE STALL.
2. INTERIOR DIMENSIONS OF SINGLE ACCOMMODATION TOILET ROOMS SHALL INCLUDE A CLEAR FLOOR SPACE OF AT LEAST 60" IN DIAMETER OR A T-SHAPED CLEAR SPACE. NO DOOR MAY ENCROACH INTO THIS REQUIRED CLEAR SPACE BY MORE THAN 12".
3. SIDE GRAB BARS IN SINGLE ACCOMMODATION TOILET ROOMS MUST BE INSTALLED SUCH THAT THE FRONT END OF THE BAR IS LOCATED A MINIMUM OF 54" FROM THE BACK WALL.
4. THERE MUST BE NO SHARP OR ABRASIVE SURFACES UNDER LAVATORIES.
5. ALL ACCESSORIES INCLUDING BUT NOT LIMITED TO CLOTHES HOOKS, TOILET PAPER DISPENSER, SOAP DISPENSER, SEAT COVER, PAPER TOWEL DISPENSER SHALL BE ANTI-LIGATURE DESIGN.

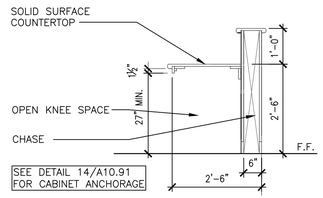
TYPICAL RESTROOM ACCESSORY MOUNTING HEIGHTS

SCALE: NTS | 11



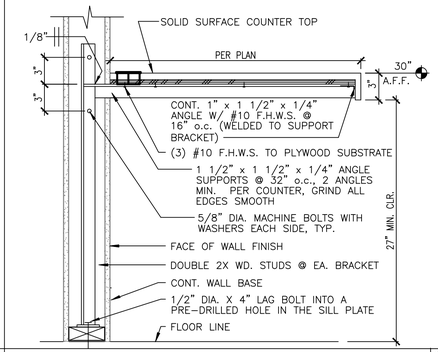
STAFF DESK- BASE CABINET

SCALE: 1/2"=1'-0" | 42



STAFF DESK - BASE CABINET

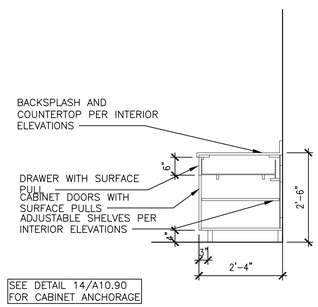
SCALE: 1/2"=1'-0" | 32



COUNTERTOP SUPPORT

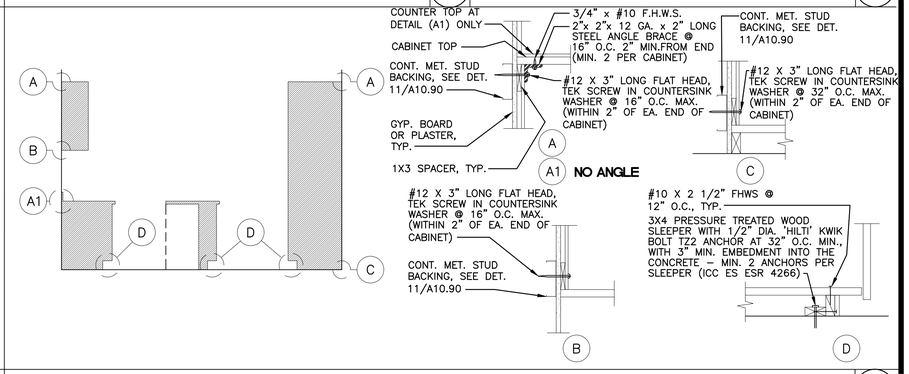
SCALE: 1 1/2"=1'-0" | 22

43 | 33 | 23 | 13



STAFF DESK - BASE CABINET

SCALE: 1/2"=1'-0" | 34



CABINET ANCHORAGE

SCALE: 1/2" = 1'-0" | 14

44 | 34

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REVISIONS

SEAL

REGISTERED ARCHITECT GREGORY ALLEN RAVATT LIC. NO. C-28608 EXP. 9-30-27 STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
DETAILS

DATE: 10/15/25
TECHNICIAN: MS
PROJECT MANAGER: MS
JOB NUMBER: RA # 22.868

SHEET NUMBER
A10.90

GENERAL NOTES

1. Construction shall comply with the latest edition of the California Building Code (CBC), IBC Standards, IBC adopted Standards, and IBC recognized Standards and of any regulating agencies which have authority over any portion of the work, including local, state and federal safety and health standards, laws and regulations.
2. General notes and typical details apply to all structural features, unless otherwise indicated.
3. If certain features are not fully shown or called out on the drawings or in the specifications, their construction shall be of the same character as for similar conditions.
4. The construction documents represent the finished structure and do not indicate methods, procedures or sequence of construction. It is the responsibility of the Contractor to take necessary precautions to maintain and ensure the integrity of the structure during construction. The Contractor shall provide all measures necessary to protect life and property during construction.
5. The Contractor shall be responsible for coordinating the work of all trades and shall check all dimensions and holes and openings required in structural members. All discrepancies shall be called to the attention of the Structural Engineer and shall be resolved before proceeding with the work.
6. Prior to submitting shop drawings and product data, the Contractor shall verify that the submittals meet the requirements of the drawings and specifications. The contractor shall specifically note any exceptions to these requirements with the submittal.
7. Openings, pockets, etc. shall not be placed in structural members unless specifically detailed on the structural drawings. Notify the Structural Engineer when work requires openings, pockets, etc. in structural members not shown on the structural drawings.
8. Where the general notes and the typical details are in conflict with the specifications, the general notes and typical details shall govern. Notes and details within these drawings take precedence over General Notes.
9. Construction materials shall be spread out if placed on slabs, floors or roofs. Load shall not exceed the design live load per square foot. Provide adequate shoring where overload is anticipated.
10. Unless specifically shown or noted on the structural drawings, anchor bolts or insets for equipment anchorage or installation shall be designed by a Civil or Structural Engineer registered in the state of California, and shall be shown on the architectural, mechanical and/or electrical drawings. Connections of items supported by the structure are the responsibility of the disciplines who are making these attachments. These attachments shall be designed to resist gravity, wind, seismic, thermal loads, etc.
11. All correspondence shall go through the Prime Consultant.

EXISTING UNDERGROUND UTILITIES

1. It is the responsibility of the Contractor to locate existing utilities whether shown hereon or not, and to protect them from damage. The location of any existing underground utilities shown on the drawings, if any, is approximate.
2. The Contractor shall be responsible for any damage which may result from his failure to locate and preserve all existing underground utilities.

DIMENSIONS

1. Do not scale drawings. Drawing scales given are approximate. Dimensions and elevations must be verified with Architectural Drawings. Discrepancies shall be conveyed to the Architect and the Structural Engineer and be resolved prior to proceeding.
2. See Architectural Drawings for dimensions, slopes, depressions and other information not specifically shown on the structural drawings.
3. The Contractor shall review and verify all dimensions prior to starting construction. The Architect/Engineer shall be notified immediately of any discrepancies or inconsistencies.

PROJECT DESIGN CRITERIA

1. Code: 2022 California Building Code
2. Risk Category: III
3. Design Live Loads

   Roof: 20 psf (reducible)

EXISTING CONDITIONS

1. Work shown is new unless noted as existing: (E).
2. Existing construction shown on these drawings was obtained from site investigation and can be used for bidding purposes. The contractor shall verify all existing job conditions, review all drawings and verify dimensions prior to construction. The contractor shall notify the Engineer of all discrepancies and exceptions before proceeding with the work.
3. The removal, cutting, drilling, etc. of existing work shall be performed with care in order not to jeopardize the structural integrity of the structure. If structural members or mechanical, electrical or architectural features not indicated for removal interfere with the new work, notify the Engineer immediately and obtain approval before removal of members.
4. The Contractor shall safely shore existing construction wherever existing supports are removed for the new work.
5. The Contractor shall perform the work with minimal inconvenience to the owner and without interruption of day-to-day work operations. The Contractor shall ensure safe travel of persons around areas of construction and shall coordinate all operations with the Owner or the Owner's agent.
6. The Contractor shall promptly repair any damage caused during operations, using materials and workmanship similar to that which was damaged.
7. All removed items, materials and debris, unless otherwise noted, shall be removed promptly from the site and disposed of in a legal manner.
8. Do not core or cut new openings in existing concrete or masonry without specific approval of the Structural Engineer. Submit dimensioned layout of all proposed new openings to the Structural Engineer for review and approval prior to coring or cutting openings. The Contractor, at their own expense, shall use non-destructive methods to locate existing reinforcing. Existing reinforcing shall not be cut without specific approval of the Structural Engineer.

GEOTECHNICAL DATA

1. No geotechnical report is provided for the project. Design of foundation is based on minimum requirements per Section 1806 of the CBC.
2. Foundation Type: Conventional spread foundations and drilled piers (friction).

   Design Values:

ISOLATED FOOTINGS	ALLOWABLE BEARING PRESSURES
DL + LL	1500 psf
DL + LL + Wind or Seismic	2000 psf
LATERAL RESISTANCE	
Passive Pressure	150 pcf
Coefficient of Friction	0.25

3. All footings shall bear on compacted undisturbed soil. Depth of footings shown on the drawings are minimum, and the bottom of footing shall be lowered as required to remove soft or loose materials.

FOUNDATIONS

1. See GEOTECHNICAL DATA notes for additional information.
2. When shown, the elevations of foundations indicate the estimated minimum foundation depths. Elevations shown are for bidding purposes only and are assumed to be in suitable bearing material.
3. The Contractor shall be solely responsible for all excavation procedures, including lagging, shoring and protection of adjacent property, structures, streets and utilities in accordance with the local jurisdiction.
4. Dewater excavations as required to maintain dry working conditions.
5. Excavations shall be properly backfilled. Do not place backfill behind retaining walls before concrete and/or masonry has attained specified 28-day compressive strength. Contractor shall brace or protect building and pit walls below grades from lateral loads until supporting floors and or roofs are in place and have attained full strength.
6. Footing backfill and utility trench backfill within building area shall be mechanically compacted in layers, to the approval of the Geotechnical Engineer. Flooding will not be permitted.
7. All abandoned footings, utilities, etc., that interfere with new construction, shall be removed.
8. The bottom of footings shall be level. Changes in footing elevations shall be made utilizing the TYPICAL STEP IN FOOTING detail, when included within these drawings.
9. Center footings under walls or columns unless otherwise indicated on these drawings.
10. Avoid footing penetrations and trenching near footings. Where unavoidable, see TYPICAL PIPE AND TRENCH detail, when included within these drawings.
11. Embedded items must be tied in place prior to foundation inspection.

CONCRETE

1. All portions of work pertaining to concrete construction shall conform to the California Building Code, Chapter 19, ACI Standard 318, and other referenced documents.
2. All concrete shall be ready-mix in accordance with ASTM C94.
3. Cement: ASTM C150 Type II. Where concrete is placed against soils that contain high levels of sulfides, use Type V cement.

   Reduced Embodied Carbon Option:
   Portland Limestone Cement (PLC) shall be ASTM C595 Type IL. Where concrete is placed against soils that contain high levels of sulfides, use ASTM C595 Type IL MS/HS cement.
4. Aggregate: ASTM C33. Aggregate for normal weight concrete shall conform to ASTM C-33.
5. Aggregate for lightweight concrete shall conform to ASTM C-330. The coarse aggregate size shall not exceed ¾" and the absolute volume of coarse aggregate shall not exceed 9.0 cubic feet per cubic yard of concrete.
6. Non-shrink Grout: ASTM C1107, premixed, non-staining, non-shrink grout.
7. Admixtures shall be approved by Structural Engineer prior to use. Calcium chloride or admixtures containing chloride(s) shall not be used.
8. Provide aggregates that do not contain any substance which may be deleteriously reactive with the alkalies in the cement. Fine and coarse aggregates shall be tested in accordance with ASTM C1260. Should the test data indicate potentially reactive aggregate, reject the aggregate(s) or perform additional testing using ASTM C1567.
9. Concrete mixes shall be designed by a qualified testing laboratory. Mix designs shall conform to ACI 318, Chapter 26, and CBC Sec. 1903, & 1904. Mixes are to be reviewed by owner's testing lab and submitted to the Architect/Engineer for approval. Do not cast concrete without approval by Architect/Engineer.

Concrete	Strength	Max Agg. Size	Max W/C Ratio
Slab-on-grade	2500 psi	1"	0.45
Foundations	2500 psi	1½"	0.45

   All concrete shall be hard rock aggregate, regular-weight concrete, 145 pcf, unless noted otherwise.
10. Maximum slump shall not exceed 3" +/- 1" for footings, slabs on grade, and 4" +/- 1" for other concrete. Slump limitations noted shall apply to concrete mix prior to the addition of any water-reducing admixtures or super-plasticizers.
11. Placement of concrete shall conform to ACI 304. Clean and roughen (by sandblasting, bushammer, or other approved method) to ¼" amplitude for all concrete surfaces against which concrete is to be placed.
12. Concrete shall be placed in accordance with ASTM C94 and ACI Standard 304.
13. When cold weather conditions exist, place concrete in compliance with ACI 306. When hot weather conditions exist, place concrete in compliance with ACI 305. In hot conditions, reinforcing shall be kept cool during concrete placement.
14. Location of construction joints not specified in these drawings must be reviewed by the Structural Engineer. Concrete slab on grade shall have control joints as shown on the foundation plan. Where construction/crack control joints are not specified, provide at a roughly square pattern with segments not exceeding 150 square feet in area.
15. Forms for concrete shall be laid out and constructed to provide for any required cambers.
16. Dry pack or place non-shrink grout under base plates, sill plates, etc., as required for full bearing.
17. All reinforcing bars, anchor bolts and other concrete inserts shall be secured in position prior to placing concrete. Stabbing of anchor bolts or reinforcing into wet concrete is not allowed.
18. Provide sleeves for plumbing, mechanical, and electrical openings in concrete before placing. Do not cut any reinforcing which may conflict. Coring in concrete is not permitted except as shown. Notify the Structural Engineer, in advance, of conditions not shown on the structural drawings.
19. Conduits or pipes shall not be embedded within a slab, wall, beam, concrete fill over metal deck, or column, unless noted otherwise.
20. See architectural drawings for all molds, grooves, reveals, ornaments and grounds to be cast in concrete.
21. Concrete elements shall reach specified 28-day compressive strength before being loaded, UNO.

MASONRY

1. All portions of work pertaining to masonry construction shall conform to the California Building Code, Chapter 21, TMS402/602-16, and other referenced documents.
2. Concrete Masonry Units: Concrete masonry units shall conform to ASTM C90 and be hollow, load-bearing, medium weight, manufactured from aggregates conforming to ASTM C331.
3. Mortar: Mortar shall conform to ASTM C270 type "S".
4. Grout: Grout shall conform to ASTM C476 and shall attain a minimum compression strength of 2000 psi at 28 days. Admixture shall be Sika grout aid or approved equal. Provide 6 lbs. of grout aid per cubic yard of grout.
5. Strength: Ultimate compressive strength, f'm, shall be 1,500 psi. [The strength of concrete block masonry construction shall be determined by the unit strength method in accordance with TMS 602 Article 1.4B.2 or by the prism test method in accordance with TMS 602 Article 1.4B.3.]
6. Units shall be laid in running (common) bond, unless noted otherwise.
7. All masonry shall be placed to maintain the vertical continuity of the cells to be filled. The vertical alignment shall be sufficient to maintain clear, unobstructed vertical flues measuring not less than 3 inches by 4 inches in 8-inch brick and block units.
8. Before block is placed on concrete, thoroughly clean concrete of all laitance and all loose material. Roughen as in a concrete construction joint.
9. All cells shall be grouted solid, unless noted otherwise.
10. Typical Reinforcement

    A. Vertical Reinforcement: #4 @ 16" o.c., unless noted otherwise.
       Horizontal Reinforcement: #4 @ 24" o.c., unless noted otherwise.
    B. All horizontal reinforcing shall be laid in bond beam units and against vertical bars.
    C. Vertical bars shall be centered in the cell of the unit, unless otherwise shown.
    D. Vertical bars shall be full height and braced at 6'-8" maximum intervals to prevent movement during grouting. Manufactured bar positioners shall be used.
    E. Maintain a minimum clearance between the bars and masonry units of ½ inch and between parallel bars of one diameter of the reinforcement.
    F. Lap splice reinforcing steel a length as indicated in typical details. Stagger horizontal splices a minimum of 24 inches, unless noted otherwise.
11. Bolts and inserts shall be secured in place prior to grouting with at least 1 inch of grout between the bolt and the masonry. See Typical Details for bolts.
12. No plumbing pipes shall be placed in masonry construction unless specifically noted or detailed on the drawings.
13. Electrical conduit may be routed in masonry walls as follows:

    A. Maximum size and quantity of conduit per cell (except at junction boxes) shall be as follows: for 8" block, one-1" diameter or two-¾" diameter; for 12" block, two-1" diameter or three-¾" diameter. Multiple conduits shall be bundled together.
    B. Conduit shall not be placed in a masonry cell containing reinforcing.
    C. Conduit shall not be placed in a pilaster.
    D. Conduit shall be placed at the centerline of the wall.

POST-INSTALLED ANCHORS

1. Post-Installed anchors include all adhesive anchors (reinforcing bar dowels and threaded rods) expansion anchors, screw anchors and undercut anchors set in holes drilled in existing concrete or masonry.
2. Installation of post-installed anchors shall conform to all requirements of the applicable code evaluation or IAPMO reports and manufacturers' recommendations.
3. Mark the location of all existing reinforcing in the substrate material within 12" of the proposed locations of all post-installed anchors. Notify the Engineer of any conflicts discovered between the proposed anchor locations and the existing reinforcing prior to fabrication of any steel and prior to any hole drilling, so as to avoid disturbing, cutting, or otherwise harming the existing reinforcing.
4. Holes for adhesive anchors in concrete shall be drilled. Cored holes are not permitted.
5. Do not install adhesive anchors in concrete if concrete strength is less than 2500 psi, age is less than 21 days, or temperature is less than 50 degrees Fahrenheit.
6. Adhesive Anchors in Concrete or Approved Equal (reinforcing bar dowels or threaded rods), UNO:

   A. HILTI "HIT-HY 200" ICC ESR-3187.
   B. HILTI "HIT-RE 500 V3" ICC ESR-3814.
   C. Simpson "SET-3G" Epoxy Adhesive. ICC ESR-4057.
   D. Simpson "AT-XP" Anchoring Adhesive IAPMO ER-263.
   E. Sika "Anchorfix-3001" ICC ESR-3608.
   F. Powers "Pure 110+" ICC ESR-3298,
7. Adhesive Anchors in Masonry or Approved Equal (reinforcing bar dowels or threaded rods), UNO:

   A. HILTI "HIT-HY 70" ICC ESR-2682.
   B. Simpson "SET-XP" Epoxy Adhesive. IAPMO ER-265.
   C. Powers "AC 100+ Gold" ICC ESR-2582.
8. Expansion Anchors in Concrete or Approved Equal, UNO:

   A. HILTI "Kwik-Bolt TZ" ICC ESR-1917.
   B. Simpson "Strong Bolt 2" ICC ESR-3037.
   C. Powers "Power-Stud+ SD2" ICC ER-2502.
9. Expansion Anchors in Masonry or Approved Equal, UNO:

   A. HILTI "Kwik-Bolt 3" ICC ESR-1385.
   B. Simpson "Strong Bolt 2" IAPMO ER-240.
   C. Powers "Power-Stud+ SD1" ICC ER-2966.
10. Screw Anchors or Approved Equal, UNO:

    A. HILTI "KWIK HUS-EZ" ICC ESR-3027 (concrete); ICC ESR-3056 (masonry).
    B. Simpson "Titen HD" ICC ESR-2713 (concrete); ICC ESR-1056 (masonry).
11. Undercut Anchors or Approved Equal:

    A. Simpson "Torq-Cut" ICC ESR-2705.
12. Adhesive dowels in horizontal or upwardly inclined orientations require continuous special inspection and shall be performed by personnel certified by an applicable certification program in accordance with ACI 318-14 17.8.
13. 10% of post installed anchors (but not less than 2 anchors) shall be tested in accordance to load tables below (refer to notes under special inspections for testing requirements). Anchors that fail the proof test shall be replaced by the contractor at no additional cost to the Owner.
14. Re-testing of replaced anchors that fail tests shall be paid for by the Contractor.
15. Typical embedment depths and proof loads for testing are indicated in the tables below.

ADHESIVE ANCHORS

ANCHOR SIZE	TYPICAL EMBEDMENT (U.O.N.)	PROOF LOAD NORMAL WEIGHT CONCRETE	PROOF LOAD LIGHT WEIGHT CONCRETE	PROOF LOAD GROUT-FILLED CMU BLOCK
#3 OR ⅜"ø	3½"	2100 lb.	1600 lb.	1600 lb.
#4 OR ½"ø	4½"	3700 lb.	1900 lb.	1900 lb.
#5 OR ⅝"ø	5⅝"	5800 lb.	2800 lb.	2800 lb.
#6 OR ¾"ø	6¾"	6900 lb.	–	–
#7 OR ⅞"ø	7⅞"	11500 lb.	–	–
#8 OR 1"ø	9⅜"	12400 lb.	–	–
#9 OR 1⅛"ø	10⅞"	19000 lb.	–	–

EXPANSION ANCHORS

ANCHOR SIZE	TYPICAL EMBEDMENT (U.O.N.)	PROOF TORQUE NORMAL WEIGHT CONCRETE	PROOF TORQUE LIGHT WEIGHT CONCRETE	PROOF TORQUE GROUT-FILLED CMU BLOCK
⅜"ø	2⅞"	25 ft.-lb.	15 ft.-lb.	15 ft.-lb.
½"ø	3⅞"	40 ft.-lb.	25 ft.-lb.	25 ft.-lb.
⅝"ø	5⅛"	60 ft.-lb.	35 ft.-lb.	35 ft.-lb.
¾"ø	5¾"	110 ft.-lb.	65 ft.-lb.	65 ft.-lb.

SCREW ANCHORS

ANCHOR SIZE	TYPICAL EMBEDMENT (U.O.N.)	PROOF TORQUE NORMAL WEIGHT CONCRETE	PROOF TORQUE LIGHT WEIGHT CONCRETE	PROOF TORQUE GROUT-FILLED CMU BLOCK
⅜"ø	2¾"ø	10 ft.-lb.	10 ft.-lb.	10 ft.-lb.
½"ø	3½"ø	20 ft.-lb.	20 ft.-lb.	20 ft.-lb.
⅝"ø	4½"ø	30 ft.-lb.	30 ft.-lb.	30 ft.-lb.
¾"ø	5½"ø	40 ft.-lb.	40 ft.-lb.	40 ft.-lb.

UNDERCUT ANCHORS

ANCHOR SIZE	TYPICAL EMBEDMENT (U.O.N.)	PROOF TESTING NOT REQUIRED		
½"ø	5¾"			
⅝"ø	8"			
¾"ø	10¼"			

STRUCTURAL STEEL & MISC. METALS

1. All portions of work pertaining to structural steel construction shall conform to the California Building Code, Chapter 22, and other referenced Standards.
2. Fabrication and erection of structural steel shall be in accordance with the latest edition of "Code of Standard Practice for Steel Buildings and Bridges", AISC 303.
3. Materials:

A. W Shapes:	ASTM A992 (f_y = 50 ksi)
B. Channels & Angles:	ASTM A36 (f_y = 36 ksi)
C. All other Shapes & Plates:	ASTM A572 Grade 50 (f_y = 50 ksi)
D. Structural Tubes (Rectangular HSS):	ASTM A500 Grade B (f_y = 46 ksi)
E. Structural Tubes (Round HSS):	ASTM A500 Grade B (f_y = 42 ksi)
F. Structural Pipes:	ASTM A53 Grade B (f_y = 35 ksi)

4. Bolts, unless noted otherwise on drawings:

A. Typical Steel Connections:	ASTM A325-N
B. Machine Bolts when specified (MB):	ASTM A307
C. Anchor Bolts & Rods:	ASTM F1554 Grade 55-S1

5. Joint type for bolted connections shall be Pre-Tensioned (PT), unless noted otherwise as Snug-Tightened (ST) or Slip-Critical (SC).
6. Compressible-washer-type direct tension indicators or twist-of-type tension control bolts conforming to RCSC, Specification for Structural Joints Using High-Strength Bolts, shall be provided at all bolted connections.
7. Faying surface for Slip-Critical (SC) bolts shall be Class A, unless noted otherwise, with bolt slip considered at the factored load level.
8. Anchor bolts shall be heavy hex headed, UNO. Bent bar anchors shall not be used.
9. Bolt holes shall be 1/16" larger in diameter than nominal size of bolt used, unless noted otherwise. Use of ⅛" larger diameter holes for baseplate anchor bolts is permitted.
10. For bolted connections, provide 1½ inch edge and end distance, unless noted otherwise.
11. All welding shall conform to the Structural Welding Code - Steel, AWS D1.1 and Seismic Supplement, AWS D1.8, by the American Welding Society. Welding rods shall be E70XX, unless noted otherwise.
12. The filler metal for all welding shall have a notch toughness of not less than 20 ft-lbs at 0 degrees F, as measured by a standard Charpy V-Notch test, ASTM E-23, in accordance with the applicable filler metal specification referenced in AWS D1.1 and Seismic Supplement AWS D1.8.
13. All welding shall be performed by certified welders.
14. All welds not specified shall be continuous fillet welds. Size of welds shall be based on AWS D1.1 for thicker part joined.
15. Weld symbols shown on the drawings do not necessarily differentiate between shop weld and field welds. When field welds are necessary due to construction procedure or sequence, welds shall be provided and be inspected per specifications. All welds shown as field welds shall be done in field as indicated.
16. All structural steel surfaces are to be painted or galvanized, unless noted otherwise. Steel that is not exposed to weather and is to be encased in concrete or masonry shall be left uncoated. Steel that is to receive spray-applied fireproofing shall be left uncoated. Faying surfaces of high-strength bolted connections and areas within 3 inches of field welded joints shall be left uncoated until welding and bolting operations are complete.
17. All structural steel, miscellaneous metal and connectors exposed to weather shall be hot-dip galvanized after fabrication, unless noted otherwise.
18. All faying surfaces for friction-bolted connections of galvanized members shall be roughened by means of hand wire brushing after galvanizing and before erection.
19. No holes or penetrations through structural steel members are allowed except as indicated on the structural drawings. Connections of items supported by structural steel members are the responsibility of the disciplines who are making these attachments. Attachment of lateral bracing to bottom flanges of steel beam members are not allowed except as indicated on the structural drawings.
20. Camber:

    A. Provide upward camber to all members shown to have camber. Amount measured in field prior to installation shall not deviate more than allowed by the AISC Specifications. Do not camber members located below elevator doors.
    B. Beams detailed without specified camber shall be fabricated so that after erection, any minor camber due to rolling or shop assembly shall be upward. Top of all members shall be clearly identified.
21. For fireproofing requirements, see architectural drawings and specifications.
22. Furnish shop and erection drawings of all structural steel for the Prime Consultant and Structural Engineer's review before fabrication.

REINFORCING STEEL

1. All portions of work pertaining to concrete reinforcing construction shall conform to the California Building Code, Chapter 19, ACI Standard 318, and other referenced documents.
2. Reinforcing Steel: ASTM A615 grade 60. ASTM A706 where welded or otherwise indicated.
3. Post Tensioning: ASTM A416 grade 270 seven wire, uncoated, stress-relieved strands.
4. Welded Wire Fabric: ASTM A185 (flat sheets only). Welded wire fabric shall be spliced by lapping a minimum of 18" or two cross wires, whichever is greater.
5. Headed terminators shall be HRC 100-series T-Heads (ICC ER-5292), or Lenton Terminators (IAPMO ER-0188), or approved equal.
6. Mechanical couplers shall be Lenton mechanical couplers (IAPMO ER-0129), or approved equal.
7. All reinforcement shall be continuous. Stagger splices where possible. Laps shall be per typical details, unless noted otherwise.
8. All reinforcing bar bends shall be made cold. Reinforcing bars shall not be re-bent without approval of Structural Engineer.
9. Dowels between footings and walls or columns shall be the same grade, size, spacing and number as the vertical reinforcement, respectively, unless noted otherwise.
10. Welding of reinforcement shall be with low hydrogen electrodes and shall conform to structural welding code - reinforcing steel, AWS D1.4, by the American Welding Society and ACI 318 Sec. 26.6.4.2. Welding rods used for the welding of reinforcing shall be E80XX. All welding shall be performed by certified welders.
11. Reinforcing steel shall be clean, free of excessive rust, grease, oil or other material likely to impair bond.
12. Minimum clear concrete cover for reinforcement, unless noted otherwise:

    A. Mild Reinforced Concrete:

Cast against earth:	3 inches
Cast in forms and exposed to earth or weather:	
#6 bar and larger:	2 inches
#5 bar and smaller:	1½ inches
Not exposed to earth or weather:	
Slabs and walls (#11 and smaller):	¾ inch
Beams, girders, and columns (to ties):	1½ inches

    Clearances are to closest reinforcement.

RA ARCHITECTS & ENGINEERS

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Written dimensions take precedence over scaled dimensions. Do not scale plans. Contractor shall verify all dimensions and conditions in the field. Any discrepancies shall be called to the attention of RA & Associates.

REVISIONS

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UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

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260 N. San Antonio Road
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BSCC PLAN REVIEW NUMBER
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SHEET TITLE

GENERAL NOTES

DATE: 10/15/25

TECHNICIAN: JG

PROJECT MANAGER: HT

JOB NUMBER: 250533

SHEET NUMBER

S0.1

SUBMITTALS

1. Submittals shall be submitted to the Prime Consultant and Structural Engineer for review prior to fabrication of the items.

2. A schedule for submittal of shop drawings shall be prepared by the Contractor and reviewed by the Prime Consultant and Structural Engineer prior to the start of fabrication. The schedule shall proportion the quantity of shop drawings to be reviewed in each submittal to allow sufficient time, as deemed reasonable in the professional judgement of the Prime Consultant and Structural Engineer, to permit adequate review. Allow a minimum of (10) working days for review by the Structural Engineer.

3. Shop drawings shall indicate the date or revision of drawing(s) from which the drawings were prepared. Submittals that do not identify the latest date or revision of drawing(s) will be returned without review. Only shop drawings that are complete will be accepted for review.

4. If, after review, the shop drawings must be revised and resubmitted, the shop drawings shall identify each revision and/or addition by clouding or other means to assure proper review.

5. Submittals will not be accepted directly from subcontractors. Submittals will be accepted from the General Contractor only after being reviewed and signed by the General Contractor, indicating compliance with the requirements of the construction documents. Submittals not complying with the requirements noted above or in the specifications will be returned without review.

6. Submittals shall include those indicated on the following list as well as any other items indicated in the specifications. This list is provided for convenience only and may not incorporate all requirements indicated in the project specifications.

STRUCTURAL STEEL

1. Shop Drawings and Erection Drawings:

   A. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
   B. Indicate welded connections with AWS A2.4 Welding symbols. Indicate net weld lengths and sizes. Distinguish between shop and field welds. Identify welds by WPS number.
   C. Include details of cuts, connections, splices, camber, holes, stiffeners, doubler plates, and other pertinent data, such as surface preparation. Include setting drawings, templates, and directions for installation of embedded items to be installed by others.
   D. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high–strength bolted slip–critical, direct–tension, or tensioned shear/bearing connections.

2. Manufacturer's Mill Certificates: Certify that products meet or exceed specified requirements.

3. Mill Test Reports: Indicate structural strength, destructive test analysis and non–destructive test analysis.

   A. Structural steel including chemical and physical properties and charpy V–Notch test results, where specifically required.
   B. Bolts, nuts, and washers including mechanical properties and chemical analysis.
   C. Direct–tension indicators.
   D. Tension–control, high–strength bolt–nut–washer assemblies.
   E. Weld filler metals, including charpy V–Notch test results, where specifically required.

4. Weld filler metal manufacturer's data sheets, indicating filler metal classification, characteristics, recommended ranges of heat inputs, permissible positions, strength and cvn toughness, if applicable.

5. Welders Certificates: Certify welders employed on the work, verifying AWS qualification within the previous 12 months.

6. Welding procedure specifications (WPS) per AWS D1.1–10 for each type of welded joint.

7. Welding procedure qualification record (PQR) for each weld procedure that is not prequalified by AWS D1.1–10.

CONCRETE REINFORCEMENT

1. Shop drawings complying with the requirements of ACI SP–66. include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

2. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

3. Welding procedure specifications (WPSS) for each unique type of weld of reinforcing steel, characterized by (position, process, size, material).

4. Product data and Code Evaluation Reports for the following products: Mechanical couplers, deformed bar anchors, and headed reinforcement.

5. Reports: Certified copies of mill test reports for each heat of reinforcing provided to the project, documenting compliance with the applicable ASTM specification, including chemical analysis, tensile tests and bend tests.

CAST–IN–PLACE CONCRETE

1. Mix designs and test data for concrete mixes, at least 15 days prior to intended placement. Mix design submittals shall include, as a minimum, the following:

   A. List of materials proposed weights and volumes of each material per cubic yard.
   B. Specification of source for each material.
   C. Gradation listing of aggregates and certification that coarse and fine aggregates meet the requirements listed in the concrete materials article of the cast–place concrete section of the specifications.
   D. List of admixtures, with manufacturer's data sheets.
   E. Certification that all aggregates are compatible with the proposed cement.
   F. Laboratory test reports from trial batches of field experience, as applicable for the specific mix proposed for use.
   G. The mix design shall be signed by a Professional Engineer licensed in the state of the project.

2. Product data, material safety data sheets (MSDS) and Code Evaluation Reports, as applicable, for proprietary materials and items, including curing compounds, epoxy resins, surface treatments and proprietary anchoring systems.

3. Drawings indicating proposed locations of construction joints and control joints.

4. Description of curing methods proposed and products to be employed.

POST–INSTALLED ANCHORS

1. Product data and Code Evaluation Reports for anchors proposed as alternatives to those specified.

2. Preparation instructions and recommendations.

3. Installation methods.

4. Storage and handling requirements and recommendations.

SCHEDULE OF SPECIAL INSPECTIONS AND TESTS 2022 CBC

1. Special inspections and testing shall be performed in accordance with the approved plans and specifications, statement of special inspections and building code sections 1704 and 1705.

2. The schedule of special inspections summarizes the special inspections and tests required. Special inspectors shall refer to the approved plans and specifications for detailed special inspection requirements. Any additional tests and inspections required by the approved plans and specifications shall also be performed.

3. Schedule of special inspections and tests applicable to this project.

   A. Special inspections per sections 1704 and 1705 (only indicated items are required)
   B. Special inspections for wind resistance/seismic resistance per section 1705.12/1705.13

Notation Used in Table:

Column headers:
- C Indicates continuous inspection is required.
- P Indicates periodic inspections are required. The notes below and/or contract documents should clarify

Box entries:
- X Is placed in the appropriate column to denote either "C" continuous or "P" periodic inspections.
- \--- Denotes an activity that is a one–time activity.
- Std. Indicates that the standard defines frequency.

Additional detail regarding inspections and tests are provided in the project specifications or notes on the drawings.

4. Contractor responsible for the construction of the seismic–force–resisting system shall submit a written statement of responsibility to the building official prior to the commencement of work on the system.

5. Reports will be submitted to the building official and the registered design professional in responsible charge in accordance with section 1704.2.4.

6. A final report of special inspections documenting required special inspections, testing and correction of any discrepancies noted in the inspection shall be submitted prior to issuance of a certificate of use and occupancy (section 1704.2.4). The final report will document.

   A. Required special inspections
   B. Correction of discrepancies noted in inspections.

7. The owner recognizes their obligation to ensure that the construction complies with the approved permit documents and to implement this program of special inspections in partial fulfillment of these obligations, the owner will retain and directly pay for the special inspections as required in section 1704.2.

8. This plan has been developed with the understanding that the building official will:

   A. Review and approve the qualifications of the special inspectors who will perform the inspections.
   B. Monitor special inspection activities on the job site to assure that the special inspectors are qualified and are performing their duties as called for in this statement of special in inspection.
   C. Review submitted inspection reports.
   D. Perform inspections as required by the local building code.

VERIFICATION AND INSPECTION		C	P	REQ'D (?)
1705.1.1 – Special Cases				
	Post Installed Anchors	X		YES
1705.2 – Steel Construction				
1705.2.1 – Structural steel				
1.	Review material test reports and certifications (AISC 360 N5.2)	---		YES
2.	Inspection of welding (AISC 360 N5.4)	Std.		YES
3.	NDT of welded joints (AISC 360 N5.5)		X	
4.	Inspection of high strength bolting (AISC 360 N5.6)	Std.		
5.	Verify compliance of steel members with details on construction documents (AISC 360 N8)		X	YES
6.	Headed stud anchors (AISC 360 Table N5.4–2)	Std.		YES
1705.3 Concrete				
Table 1705.3 – Concrete Construction				
1.	Inspection of reinforcing steel, including prestressing tendons and placement		X	
2.	Reinforcing bar welding			
	a. Verify weldability if not ASTM A706		X	
	b. Single pass fillet welds max 5/16"		X	
	c. Inspect other welds	X		
3.	Inspection of anchors cast in concrete		X	
4.	Inspection of anchors installed in hardened concrete.			
	a. Adhesive anchors horizontally or upward inclined	X		YES
	b. Mechanical anchors and other adhesive anchors		X	
5.	Verify use of required design mix		X	
6.	Prior to concrete placement fabricate specimens for strength tests, perform slump and air content tests and determine the temperature of the concrete	X		
7.	Inspect concrete and shotcrete placement for proper application techniques	X		
8.	Verify maintenance of specified curing temperature and techniques		X	
9.	Inspect prestressed concrete for:			
	a. Application of prestressing forces, and	X		
	b. Grouting of bonded prestressing tendons	X		
10.	Inspect erection of precast concrete members		X	
11.	Verify in–situ concrete strength, prior to stressing of tendons in posttensioned concrete and prior to removal of shores and forms from beams and structural slabs		X	
12.	Inspect formwork for shape, location, and dimensions of the concrete member being formed		X	
ACI 318–19 Section 26.12: Compressive tests of specimens taken during concrete placement			X	

POST–INSTALLED ANCHORS PER ICC AND/OR OTHER APPROVED AGENCY EVALUATION REPORTS

1. Verify the following:

   A. The specific manufacturer and model of anchors have been approved for the application by the Architect/Engineer.

   B. The holes are drilled at the angle required and of the diameter and depth required.

   C. The holes are clean prior to installation of the anchors.

   D. The adhesive packaging indicates an expiration date and that the expiration date has not passed.

   E. The adhesive is mixed properly and that the initial portion of adhesive coming out of the nozzle is wasted, as required by the manufacturer.

   F. The anchors are installed according to the manufacturer's recommendations.

2. Perform tests of anchors according to ASTM E 488 and as follows:

   A. Test ten percent of each application of anchors to the tensile or torque proof load as indicated on the drawings.

   B. One application of anchors or dowels shall be defined as those anchors or dowels installed by a single crew in a single day.

   C. Test locations are random at the discretion of the testing lab, unless otherwise directed by the Architect/Engineer.

   D. Tension test loads shall be maintained for a minimum of two minutes.

3. Tension Test criteria: Anchor displacement at the end of the loading period shall be limited to one–fifth of the nominal anchor diameter. Displacement following release of load shall return to zero.

4. Torque Test criteria: Test torque must be reached within a half turn of the nut, except for: ⅜" diameter anchors, for which test torque must be reached within a quarter turn of the nut.

5. If any anchor fails the test, test all anchors in the same application not previously tested until 10 consecutive anchors pass.

6. Adhesive dowels in horizontal or upwardly inclined orientations require continuous special inspection and shall be performed by personnel certified by an applicable certification program in accordance with ACI 318 section 17.8.

ABBREVIATIONS

#	Number or Pound		
&	And	IBC	International Building Code
∠ or L	Angle	ICC	International Code Council
@	At	ID	Inside Diameter
ABV.	Above	INFO.	Information
AB	Anchor Bolt	INT.	Interior
ADDL.	Additional		
AISC	American Institute of Steel Construction	JST.	Joist
		JT.	Joint
ALT.	Alternate		
APA	American Plywood Association	KSI	Kips per Square Inch
APPROX.	Approximate		
ARCH.	Architectural, Architect	LL	Live load
ASTM	American Standards of Testing and Materials	LLH	Long Leg Horizontal
		LLV	Long Leg Vertical
		LONG.	Longitudinal
BLDG.	Building	LOC.	Location
BLK.	Block, Blocking	LS	Lag Screw
BLW.	Below	LTWT	Light Weight
BM.	Beam		
BN	Boundary Nailing	MAX.	Maximum
BO	Bottom of	MB	Machine Bolt
BOT.	Bottom	MECH.	Mechanical
BRG.	Bearing	MFR.	Manufacturer
BS	Both Sides	MIN.	Minimum
BTWN.	Between	MISC.	Miscellaneous
CANT.	Cantilever	(N)	New
CBC	California Building Code	NS	Near Side
CHD.	Chord	NTS	Not to Scale
CIP	Cast–in–place	NWT	Normal Weight
CJ	Construction or Control Joint		
CJP	Complete Joint Penetration	OC	On Center
℄ or CL	Center Line	OD	Outside Diameter
CLG.	Ceiling	OH	Opposite Hand
CLR.	Clear	OPNG.	Opening
CMU	Concrete Masonry Unit		
COL.	Column	PAF	Powder–Actuated Fastener
CONC.	Concrete	PERP.	Perpendicular
CONN.	Connection	PEMB	Pre–Engineered Mtl. Bldg.
CONT.	Continuous	PL OR PL.	Plate
COORD.	Coordinate	PLF	Pounds per Linear Foot
CSK.	Countersink	PLY	Plywood
CTR.	Center	PJP	Partial Joint Penetration
		PSF	Pounds per Square Foot
D or d	Nail Penny Size	PSI	Pounds per Square Inch
ø or DIA.	Diameter	PT	Pressure Treated
DBA	Deformed Bar Anchor	PW	Puddle Weld
DBL.	Double		
DET.	Detail	QTY.	Quantity
DF	Douglas Fir		
DIAG.	Diagonal	RAD.	Radius
DIM.	Dimension	REINF.	Reinforcing
DKG.	Decking	REQ.	Required
DL	Dead Load	RET.	Retaining
DO.	Ditto		
DWG.	Drawing	SAD	See Architectural Drawings
		SCHD.	Schedule
(E)	Existing	SHT.	Sheet
EA.	Each	SHTG.	Sheathing
EF	Each Face	SIM.	Similar
EJ	Expansion Joint	SMD	See Mechanical Drawings
ELEV., EL.	Elevation	SMS	Sheet Metal Screw
EMBED.	Embedment	SOG	Slab on Grade
EN	Edge Nail, End Nail	SPEC.	Specification
EO	Edge of	SQ.	Square
EOC	Edge of Concrete	SS	Stainless Steel
EQ.	Equal	STD.	Standard
EQUIP.	Equipment	STGD.	Staggered
ES	Each Side	STIFF.	Stiffener
EW	Each Way	STL.	Steel
EXP.	Expansion	STRUCT.	Structural
EXT.	Exterior	STRGR.	Stringer
		SW	Shear Wall
FDN.	Foundation	SYM.	Symmetrical
FF	Finish Floor		
FG	Finish Grade	T&B	Top and Bottom
FIN.	Finish	T&G	Tongue and Groove
FJ	Floor Joist	TEMP.	Temporary
FLR.	Floor	THRU.	Through
FN	Field Nail	TN	Toe Nail
FOC	Face of Concrete	TO	Top of
FOM	Face of Masonry	TOB	Top of Beam
FOS	Face of Stud	TOC	Top of Concrete
FRMG.	Framing	TOG	Top of Grating
FS	Far Side	TOS	Top of Steel
FT.	Foot, Feet	TOW	Top of Wall
FTG.	Footing	TRANSV.	Transverse
		TYP.	Typical
GA.	Gauge		
GALV.	Galvanized	UNO	Unless Noted Otherwise
GL.	Grid Line	URM	Unreinforced Masonry
GLB	Glued–laminated Beam		
GWB	Gypsum Wall Board	VERT.	Vertical
		VIF	Verify in Field
HD	Holdown		
HDG	Hot Dipped Galvanized	WWF	Welded Wire Fabric
GYP.	Header	w/	With
HGR.	Hanger	w/o	Without
HORIZ.	Horizontal	WP	Work Point
HSB	High Strength Bolt	WSHR.	Washer
HSS	Hollow Structural Section		
HT.	Height		

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SHEET TITLE

GENERAL NOTES

DATE: 10/15/25

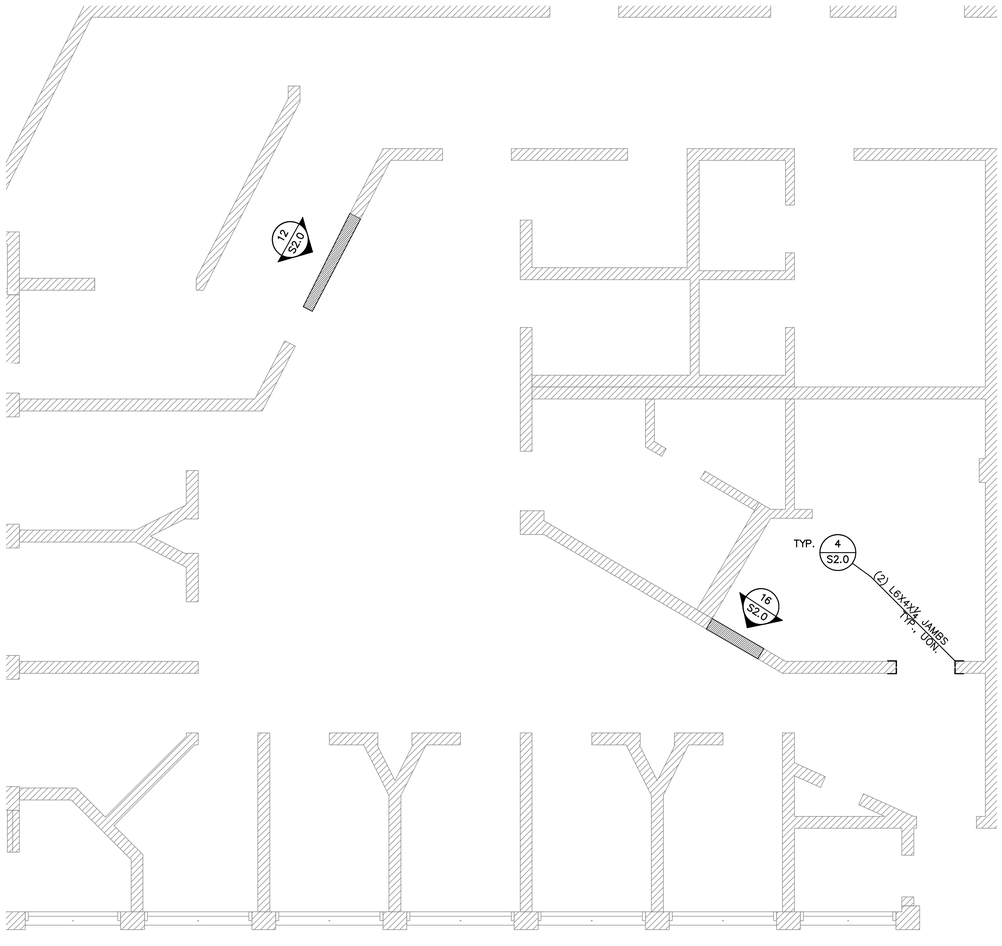
TECHNICIAN: JG

PROJECT MANAGER: HT

JOB NUMBER: 250533

SHEET NUMBER

S0.2



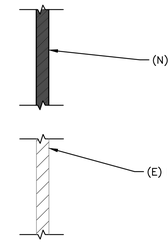
PARTIAL FIRST FLOOR PLAN
UNIT 1&2

SCALE: 1/4" = 1'-0"

FOUNDATION PLAN NOTES

1. SEE SHEETS S0.1 THROUGH S0.2 FOR GENERAL NOTES.
2. REFER TO GENERAL STRUCTURAL NOTES & DETAILS FOR GENERAL REQUIREMENTS OF CONSTRUCTION, MATERIALS, SHOP DRAWINGS AND REQUIREMENTS OF CONSTRUCTION OBSERVATIONS.
3. ALL NEW FOOTINGS AND GRADE BEAMS TO SIT ON COMPACTED, NON-EXPANSIVE FILL OR UNDISTURBED EXISTING GRADE.
4. SEE ARCHITECTURAL DRAWINGS FOR ALL EXTERIOR CONCRETE PAVING, SLABS, BASES, CURBS, SITE WALLS, ETC.
5. CONTRACTOR SHALL VERIFY ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS AND AS-BUILT FIELD DIMENSIONS PRIOR TO CONSTRUCTION.CONTRACTOR SHALL CONTACT STRUCTURAL ENGINEER REGARDING ANY DISCREPANCIES.
6. SEE ARCHITECTURAL PLANS FOR DEPRESSIONS AND/OR SLOPES IN CONCRETE SLABS.
7. SEE ARCHITECTURAL DRAWINGS FOR SIZE AND LOCATION OF ALL DOOR AND WINDOW OPENINGS.
8. SEE ARCHITECTURAL DRAWINGS FOR ALL FINISHES, FIRE PROTECTION, THERMAL AND MOISTURE PROTECTION, WATERPROOFING, AND ACOUSTICAL REQUIREMENTS FOR ALL CEILINGS, WALLS, FLOORS, ROOF DECKS AND TERRACES.
9. SEE ARCHITECTURAL DRAWINGS FOR ALL INTERIOR NON-LOAD BEARING PARTITION WALLS.
10. ALL STEEL MEMBERS AND CONNECTIONS EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED.

PLAN LEGEND



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SHEET TITLE
FOUNDATION AND FIRST FLOOR PLAN

DATE: 10/15/25

TECHNICIAN: JG

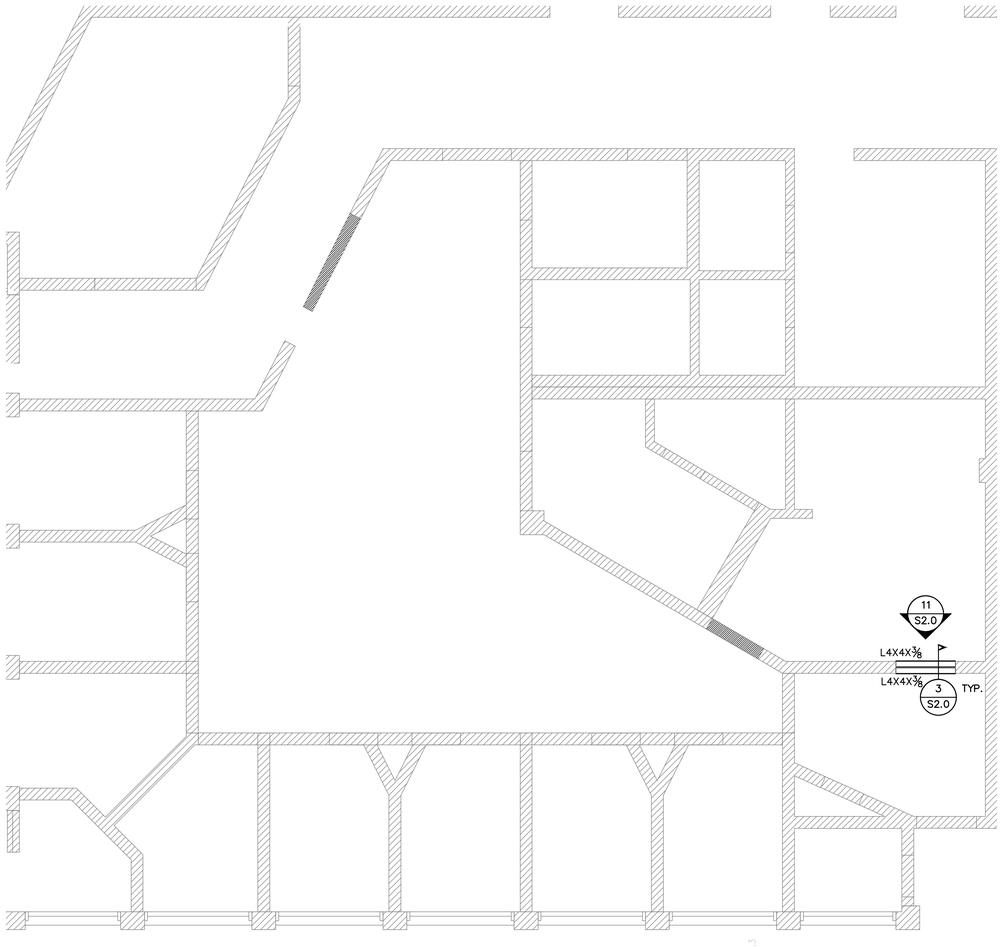
PROJECT MANAGER: HT

JOB NUMBER: 250533

SHEET NUMBER
S1.0

PLAN NOTES

1. SEE SHEETS S0.1 THROUGH S0.2 FOR GENERAL NOTES.
2. REFER TO GENERAL STRUCTURAL NOTES & DETAILS FOR GENERAL REQUIREMENTS OF CONSTRUCTION, MATERIALS, SHOP DRAWINGS AND REQUIREMENTS OF CONSTRUCTION OBSERVATIONS.
3. TOP OF ALL STEEL MEMBERS SHALL BE BELOW SLAB SOFFIT UON. SHIM TIGHT AND DRY PACK AS NEEDED FOR COMPLETE BEARING BETWEEN SLAB AND THE BEAM.
4. ALL JAMB REINFORCEMENT AT WALL OPENINGS IN EXISTING MASONRY WALLS SHALL BE L6X4X¼ UON. FOR JAMB TO HDR REINF. CONN. SEE
5. 7. ALL STEEL MEMBERS AND CONNECTIONS EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED.



MAIN FLAT ROOF FRAMING PARTIAL PLAN
UNIT 1&2

SCALE: 1/4" = 1'-0"

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SHEET TITLE
MAIN FLAT ROOF FRAMING PLAN

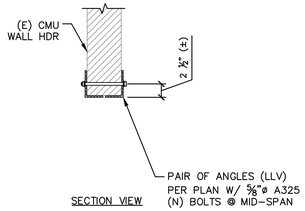
DATE: 10/15/25

TECHNICIAN: JG

PROJECT MANAGER: HT

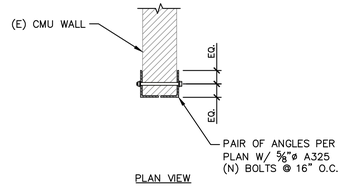
JOB NUMBER: 250533

SHEET NUMBER
S1.1



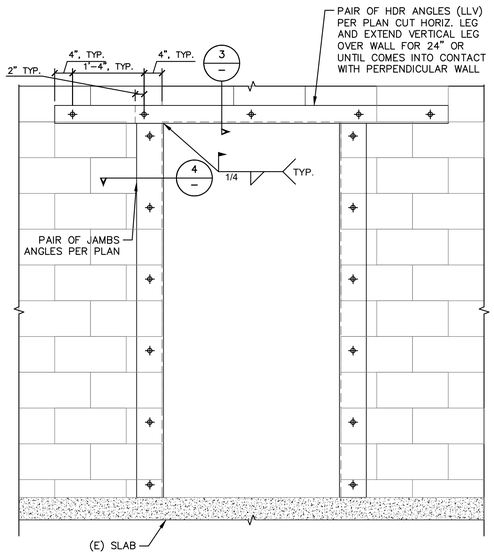
(E) CMU HEADER REINFORCEMENT DETAIL 3

SCALE: N.T.S.



(E) CMU WALL NEW JAMB CONNECTION DETAIL 4

SCALE: N.T.S.



ELEVATION VIEW

(E) CMU NEW HEADER DOOR REINFORCEMENT DETAIL 11

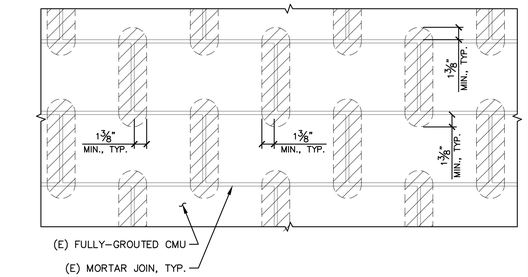
SCALE: N.T.S.

BAR SIZE	BASIC DEVELOPMENT LENGTH & LAP SPLICE LENGTH (ld), INCHES			DEVELOPMENT OF BAR W/ STD. HOOK (le), INCHES
	f'm=1500	f'm=2000	f'm=2500	
#3	14	12	12	6
#4	22	19	17	7
#5	35	30	27	8
#6	54	54	51	10
#7	63	63	63	11
#8	72	72	72	13

NOTES:
1. VALUES APPLY TO GRADE 60 REINFORCEMENT.
2. FOR EPOXY-COATED BARS, MULTIPLY LENGTHS NOTED BY 1.5.
3. SPLICES OF HORIZONTAL REINFORCEMENT IN WALLS SHALL BE STAGGERED.
4. SPLICES IN WALLS CONTAINING TWO CURTAINS OF REINFORCEMENT SHALL NOT OCCUR IN THE SAME LOCATION.
5. ALL LAP SPLICES SHALL BE NON-CONTACT W/ 2" TO 4" CLEAR SPACING BETWEEN ADJACENT REINFORCEMENT SPLICES.

TYPICAL DEVELOPMENT LENGTH & LAP SPLICE SCHEDULE – MASONRY 15

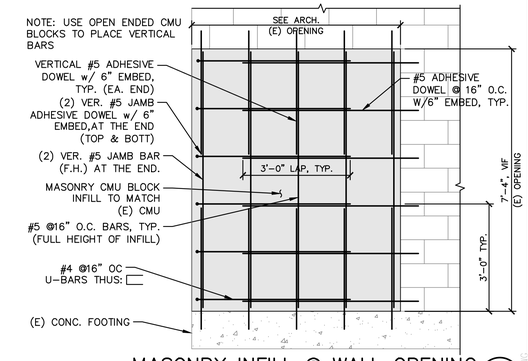
SCALE: N.T.S.



NOTES:
1. POST-INSTALLED ANCHORS SHALL ONLY BE INSTALLED IN FULLY GROUTED WALLS.
2. POST-INSTALLED ANCHORS SHALL NOT BE INSTALLED WITHIN SHADED AREAS OF WALLS, AS INDICATED ON THIS DRAWING.

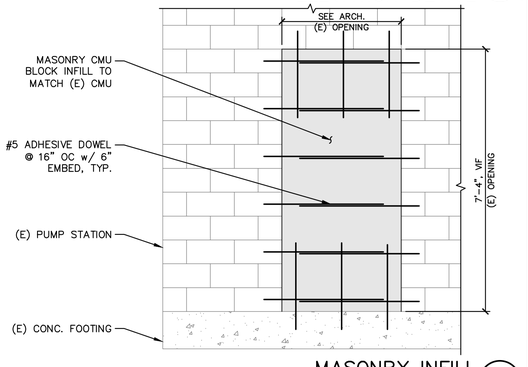
ANCHORS IN CONCRETE BLOCK WALLS ELEVATION 8

SCALE: N.T.S.



MASONRY INFILL @ WALL OPENING ELEVATION DETAIL 12

SCALE: 1/2" = 1'-0"



MASONRY INFILL ELEVATION DETAIL 16

SCALE: 1/2" = 1'-0"

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SHEET TITLE

STRUCTURAL DETAILS

DATE: 10/15/25

TECHNICIAN: JG

PROJECT MANAGER: HT

JOB NUMBER: 250533

SHEET NUMBER
S2.0

CONSTRUCTION NOTES

1. FOR ANY DISCREPANCIES BETWEEN OR WITHIN DRAWINGS (I.E.: BETWEEN DIAGRAMS, I/O TABLES AND SEQUENCE OF OPERATIONS) THE MOST IMPORTANT STRINGENT CONDITIONS WILL APPLY..
2. ALL WORK TO BE IN ACCORDANCE WITH REQUIREMENTS OF GOVERNING FIRE, BUILDING, MECHANICAL, PLUMBING, AND ELECTRICAL CODES.
3. MECHANICAL CONTRACTOR SHALL BE COGNIZANT OF THE BUILDING STRUCTURE AND CEILING SPACE. ALLOW FOR DIFFICULTIES IN INSTALLATION OF EQUIPMENT AND PRICING FOR ADDITIONAL OFFSETS OF DUCTS AND PIPES THAT ARE NOT SHOW NON DRAWING, BUT ARE REQUIRED TO PROVIDE A COMPLETE, FUNCTIONAL INSTALLATION.
4. VERIFY AT PROJECT SITE EXACT SIZE, LOCATION, INVERT ELEVATIONS, AND CLEARANCES OF ALL SERVICES BEING RELOCATED, EXTENDED, CONNECTED TO, OR REMOVED.
5. ALL DUCTWORK AND PIPING SHOWN ON PLANS ARE DIAGRAMMATIC AND SHALL NOT BE SCALED TO DETERMINE EXACT LOCATION.
6. CERTAIN VERTICAL AND HORIZONTAL DIMENSIONS ARE SHOWN IN DUCTS TO INDICATE THEIR GENERAL POSITION IN RELATIONSHIP TO THE SYSTEMS WITHIN THE SPACE AVAILABLE FOR SYSTEM INSTALLATION. PROVIDE ADDITIONAL OFFSETS SIMILAR TO THOSE SHOWN AS REQUIRED, AND TO COORDINATE WITH INSTALLATION REQUIREMENTS OF OTHER SYSTEMS AT NO ADDITIONAL COST TO OWNER.
7. IN LIEU OF RECTANGULAR DUCT, CONTRACTOR HAS OPTION TO USE ROUND DUCTWORK WHERE SPACE IS PERMITTED. SIZING SHALL BE BASED ON EQUAL FRICTION AND SHALL NOT EXCEED DESIGN PRESSURE LOSS.
8. COORDINATE REGISTER, DIFFUSER AND GRILLE LOCATIONS WITH CEILING SUPPORT MEMBERS AND LIGHTING FIXTURES. FINISHED CEILING CONFIGURATION SHALL FORM A FULLY INTEGRATED INSTALLATION IN EACH FINISHED SPACE.
9. INSTALL ALL DUCTWORK CONCEALED IN FURRED WALL AND CEILING UNLESS OTHERWISE NOTED.
10. PROVIDE FLEXIBLE CONNECTIONS AT ALL VIBRATION ISOLATED EQUIPMENT AND AS INDICATED ON FLOW DIAGRAMS, DETAILS, AND AS OTHERWISE SPECIFIED.
11. FLEXIBLE DUCTS, FLEXIBLE CONNECTIONS AND DUCT SEALERS SHALL BE LOCAL CODE APPROVED FOR CLASS "A". FILTERS SHALL BE UL APPROVED.
12. FLEXIBLE INSULATED DUCT SHALL BE UL 181 CLASS 1 RATED, REINFORCED AND INSULATED WITH THERMAL CONDUCTANCE OF NOT MORE THAN 0.23, IN COMPLIANCE WITH CMC STANDARD 6-5, REQUIREMENTS OF NFPA 90A AND 90B, AND LOCAL CODE APPROVED.
13. OPENINGS OF DUCTS AND OPENINGS OF OTHER RELATED AIR DISTRIBUTION COMPONENTS ARE TO BE COVERED WITH TAPE, PLASTIC, SHEET METAL OR OTHER METHODS TO PREVENT DUST OR DEBRIS WHICH MAY COLLECT IN THE SYSTEM FROM THE TIME THE MATERIALS ARRIVE ON SITE UNTIL FINAL STARTUP OF THE HEATING AND COOLING SYSTEMS.
14. FACTORY-MADE AIR DUCTS SHALL BE APPROVED FOR THE USE INTENDED, CONFORM TO THE REQUIREMENTS OF CMC STANDARD NO. 6-5 AND SHALL BE LISTED AND INSTALLED IN ACCORDANCE WITH THE TERMS OF THEIR LISTING.
15. INSTALL ALL PIPING AND DUCTWORK TO AVOID ARCHITECTURAL FRAMING, STRUCTURAL MEMBERS, AND OTHER OBSTRUCTIONS. COORDINATE PIPING AND DUCTWORK LOCATION WITH ALL APPLICABLE CONTRACT DRAWINGS AND INSTALLATION WORK OF OTHER TRADES PRIOR TO PLACING SLEEVES IN FLOORS OR WALLS.
16. ALL UTILITIES REQUIRED FOR THE CONTINUOUS OPERATION OF ALL EXISTING FACILITIES MUST BE MAINTAINED IN SERVICE AT ALL TIMES EXCEPT AS REQUIRED FOR NEW SYSTEMS CONNECTION. COORDINATE SHUTDOWN WITH RESPONSIBLE FACILITY PERSONNEL.
17. ALL REMOVED ITEMS DEEMED TO HAVE VALUE BY THE OWNER SHALL BE DELIVERED TO A PLACE OF STORAGE AT THE SITE AS DIRECTED. ALL OTHER ITEMS MUST BE DISPOSED OF OFF-SITE IN A LEGAL MANNER.
18. WORK SHALL BE EXECUTED IN A CAREFUL AND ORDERLY MANNER WITH THE LEAST POSSIBLE DISTURBANCE TO PUBLIC AND OCCUPANTS OF THE FACILITY.
19. CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR SAFETY OF ALL PERSONS ON OR ABOUT THE CONSTRUCTION SITE, IN ACCORDANCE WITH APPLICABLE LAWS AND CODES. GUARD ALL HAZARDS IN ACCORDANCE WITH THE SAFETY PROVISIONS OF THE LATEST MANUAL OF ACCIDENT PREVENTION PUBLISHED BY THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA AND OSHA.
20. SECURELY FASTEN ALL PIPING AND DUCTWORK WITHIN STRUCTURES TO THE BUILDING CONSTRUCTION BY MEANS OF HANGERS, SUPPORTS, GUIDE ANCHORS, AND SWAY BRACE SEISMIC RESTRAINTS TO MAINTAIN ALIGNMENT, TO PREVENT SAGGING, AND TO PREVENT NOISE AND EXCESSIVE STRAIN DUE TO MOVEMENT UNDER OPERATING CONDITIONS. COORDINATE ANCHORING POINTS TO ASSURE STRUCTURAL INTEGRITY DURING NORMAL OPERATION AND SEISMIC EVENTS.
21. PIPE SUPPORTS SHALL BE DESIGNED TO INCLUDE THE WEIGHT OF THE PIPE AND THE WEIGHT OF THE CONTENTS OF THE PIPE.
22. INSTALL WALL-MOUNTED ROOM THERMOSTATS 48" ABOVE FINISHED FLOOR UNLESS DIRECTED OTHERWISE. COORDINATE INSTALLATION LOCATION AND HEIGHT PRIOR TO THERMOSTAT ROUGH-IN.
23. COORDINATE THE LOCATION AND QUANTITY OF ALL ACCESS PANELS. PANELS ARE REQUIRED IN CEILINGS FOR ALL CONSTANT VOLUME BOXES, DAMPERS, VALVES, CONTROLS, AND OTHER ITEMS REQUIRING ROUTINE MAINTENANCE OR ADJUSTMENT, AND SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH ARCHITECTURAL SPECIFICATIONS. WHERE ACCESS PANELS AND ARE NOT SHOWN FOR VOLUME DAMPER ACCESS, PROVIDE CEILING MOUNTED REMOTE OPERATED VOLUME DAMPER CONTROL.
24. IDENTIFY LOCATIONS OF FIRE AND/OR SMOKE DAMPERS TO COMPLY WITH CBC 717.
25. DUCT PENETRATIONS THRU HORIZONTAL FIRE ASSEMBLIES MUST COMPLY WITH CBC 717.6.
26. NEW AIR SYSTEM MUST BE TEST AND BALANCED WITH APPROVED PROCEDURES, PER CGBSC 5.410.4.3. PROVIDE TEST REPORT TO INSPECTOR PRIOR TO FINAL INSPECTION, PER CGBSC 5.410.

GRILLES AND REGISTERS

CD-X / XXX CFM — SQUARE SUPPLY AIR REGISTER (ARROW INDICATES DIRECTION OF THROWS) HARD LID OR T-BAR

RR-X / XXX CFM — CEILING RETURN REGISTER

DUCTWORKS

- NEW DUCT
- 8ø — ROUND DUCT
- 12X8 — RECTANGULAR DUCT (FIRST FIGURE INDICATES PLAN SIZE)
- FLEXIBLE DUCT
- SUPPLY AIR DUCT UP
- SUPPLY AIR DUCT DOWN
- RETURN AIR DUCT UP
- RETURN AIR DUCT DOWN
- ROUND AIR DUCT UP
- ROUND AIR DUCT DOWN
- RADIUS ELBOW
- VANE ELBOW
- BRANCH TAKE-OFF (ROUND MAIN WITH 45° ROUND TAKE-OFF)
- BRANCH TAKE-OFF (ROUND MAIN WITH 90° ROUND TAKE-OFF)
- BRANCH TAKE-OFF (RECTANGULAR MAIN WITH ROUND TAKE-OFF)
- BRANCH TAKE-OFF (RECTANGULAR MAIN WITH RECTANGULAR TAKE-OFF
- DUCT SPLIT (ROUND MAIN WITH 180° ROUND BRANCHES)
- DUCT SPLIT (RECTANGULAR MAIN WITH 180° RECTANGULAR BRANCHES)
- DUCT SPLIT (RECTANGULAR MAIN WITH 90° RECTANGULAR SPLIT)
- REDUCER (RECTANGULAR TO RECTANGULAR)
- TRANSITION (RECTANGULAR TO ROUND)
- MANUAL VOLUME DAMPER

LEGEND

- ROOF EXHAUST VENT
- ROOF VENTS, SEE ARCHITECTURAL ROOF PLAN.
- CEILING EXHAUST FAN

PIPING

- R — REFRIGERANT LINES
- CD — CONDENSATE DRAIN PIPE
- PIPE UP OR RISE ELBOW TURNED UP
- PIPE DOWN OR DROP ELBOW, TURNED DOWN

MISCELLANEOUS

- (T) ZONE THERMOSTAT
- (TS) TEMPERATURE SENSOR
- POINT OF CONNECTION
- POINT OF DISCONNECTION

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
ARCH	ARCHITECTURAL
BDD	BACK DRAFT DAMPER
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
CD	CEILING DIFFUSER
CFM	CUBIC FEET PER MINUTE
DB	DRY BULB TEMPERATURE
DN	DOWN
(E)	EXISTING
EAT	ENTERING AIR TEMPERATURE
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
LAT	LEAVING AIR TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MIN	MINIMUM
(N)	NEW
PD	PRESSURE DROP
POC	POINT OF CONNECTION
POD	POINT OF DISCONNECTION
RPM	REVOLUTIONS PER MINUTE
SP	STATIC PRESSURE
TBR	TO BE REMOVED
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UTR	UP TO ROOF
WB	WET BULB TEMPERATURE

ABBREVIATIONS AND SYMBOLS

SCALE: NTS

14

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PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
MECHANICAL NOTES + SYMBOLS

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

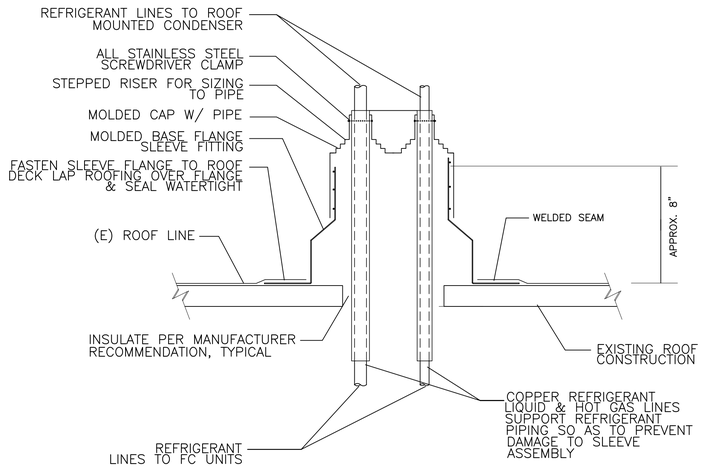
SHEET NUMBER
M0.01

EXHAUST FAN SCHEDULE

MARK	MANUFACTURER /MODEL #	QTY.	WEIGHT (LB.)	CFM	S.P. (IN. WG)	POWER	RPM	SONES	VOLTS	PHASE	Hz.	REMARKS
EF-1	_ _	1	50	1700	0.375	1/3 HP	1200	6.3	120	1	60	ROOFTOP MOUNTED FAN WITH ECM MOTOR. SUPPLY BACKDRAFT DAMPER AND BIRDSCREEN. FIELD VERIFY CURB DIMENSIONS AND ELECTRICAL TO MATCH.
EF-2	_ _	1	50	1200	0.375	1/4 HP	1200	6.3	120	1	60	ROOFTOP MOUNTED FAN WITH ECM MOTOR. SUPPLY BACKDRAFT DAMPER AND BIRDSCREEN. FIELD VERIFY CURB DIMENSIONS AND ELECTRICAL TO MATCH.
EF-3	_ _	1	50	2700	0.75	1/2 HP	1200	6.3	208	3	60	ROOFTOP MOUNTED FAN WITH ECM MOTOR. SUPPLY BACKDRAFT DAMPER AND BIRDSCREEN. FIELD VERIFY CURB DIMENSIONS AND ELECTRICAL TO MATCH.

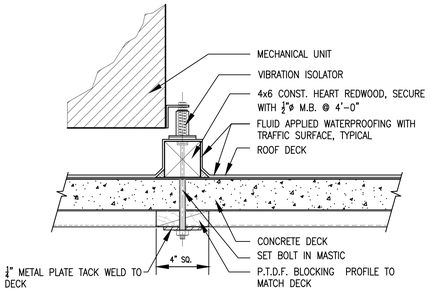
CONSTRUCTION KEYNOTES

1 REMOVE EXISTING ROOFTOP MOUNTED EXHAUST FAN AND REPLACE WITH LIKE KIND.



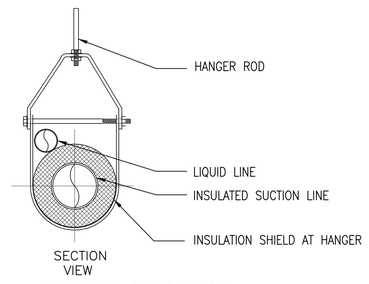
REFRIGERANT ROOF PENETRATION DETAIL

SCALE: NONE 21



CONDENSING UNIT ATTACHMENT TO ROOF DETAIL

SCALE: NONE 32

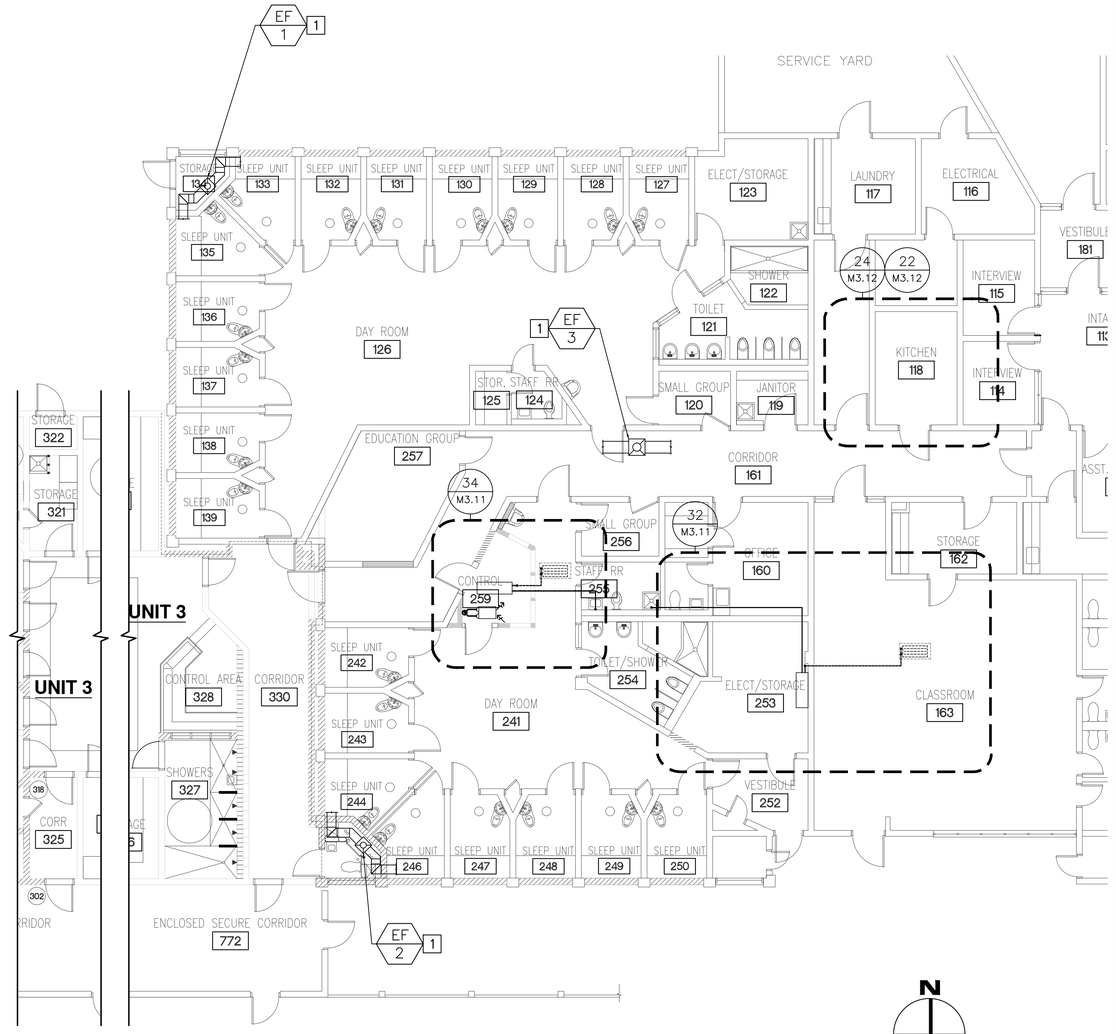


MAXIMUM PIPE/TUBING SUPPORT SPACING, FEET

NOM. SIZE	THRU 3/4"	1"	1-1/4"	1-1/2"	2	2-1/2"	3"	4"
PIPE	7 FT	7	7	9	10	11	12	14
TUBING	5 FT	6	7	8	8	9	10	10

REFRIGERANT LINE HANGER DETAIL

SCALE: NONE 31



UNIT 1 - FLOOR PLAN

0 4' 8' 16'

SCALE: 1/8"= 1'-0"

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SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
MECHANICAL FLOOR PLAN

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
M2.11

SPLIT SYSTEM HEAT PUMP/CONDENSING UNIT SCHEDULE

MARK	MANUFACTURER /MODEL #	QTY.	WEIGHT (LBS.)	TOTAL COOLING (BTUH)	TOTAL HEATING (BTUH)	SEER	VOLTS	PHASE	HZ.	COMP. RLA	COMP. LRA	CONDENSER FAN FLA	MCA (AMPS)	MOCP (AMPS)	REMARKS
HP 1	MITSUBISHI NTXSKH09A	1	126	9,000	12,000	18.9	208/230	1	60	10.0	12.5	1.77	14.0	25	–
CU 2	MITSUBISHI TRUYA0121KA70	1	92	12,000	N/A	21.2	208/230	1	60	7	12.0	1.77	11.0	28	COOLING ONLY CONDENSING UNIT

SPLIT SYSTEM FAN COIL SCHEDULE

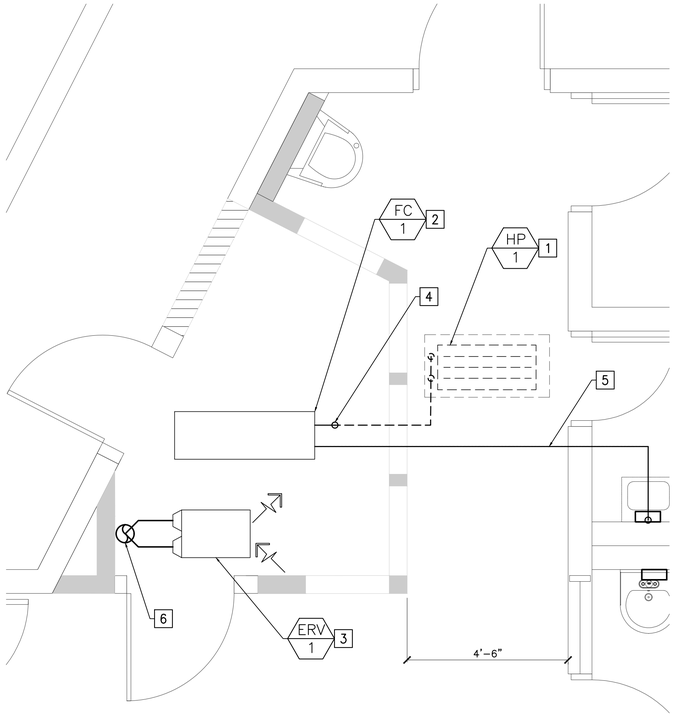
MARK	MANUFACTURER /MODEL #	QTY.	WEIGHT (LBS.)	TOTAL COOLING (BTUH)	TOTAL HEATING (BTUH)	CFM	VOLTS	PHASE	HZ.	HSPF	MCA (AMPS)	MOCP (AMPS)	REMARKS
FC 1	MITSUBISHI MSZ-GL06NA	1	34	9,000	12,000	212-311	230	1	60	11	1	15	ELECTRICAL FED FROM HP-1
FC 2	MITSUBISHI TPKA0A0121KA70	1	34	12,000	N/A	265-380	230	1	60	11	1	15	ELECTRICAL FED FROM CU-1, COOLING ONLY

ENERGY RECOVERY VENTILATOR SCHEDULE

MARK	MANUFACTURER /MODEL #	QTY.	WEIGHT (LBS.)	CFM (OSA)	VOLTS	PHASE	HZ.	RPM	MCA (AMPS)	MOCP (AMPS)	REMARKS
ERV 1	PANASONIC FV-04VE1	1	29	30	120	1	60	1479	.2	15	–

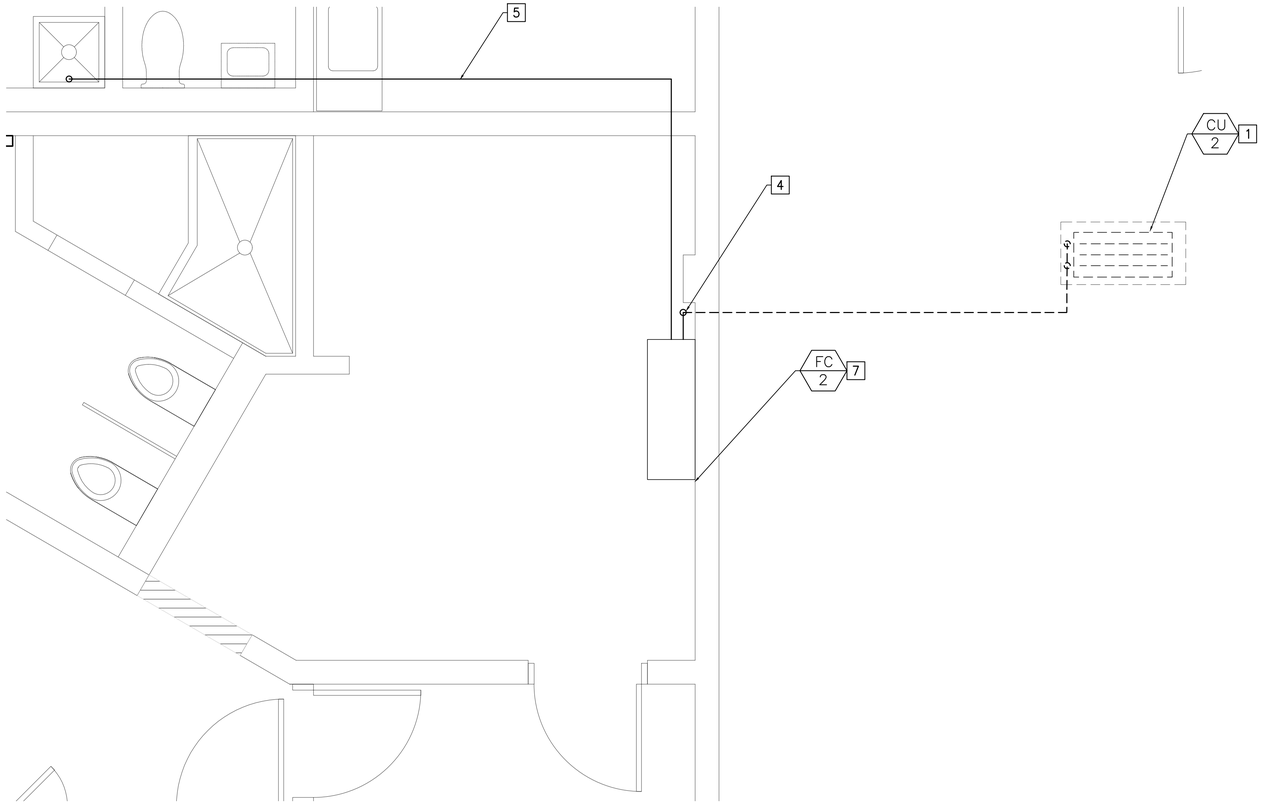
CONSTRUCTION KEYNOTES

1. (N) CONDENSING UNIT ON PAD ON ROOF SEE DETAIL 32/M2.11 FOR MOUNTING. COORDINATE WITH STRUCTURAL.
2. (N) RECESSED CEILING MOUNTED FAN COIL BETWEEN 16"O.C. JOIST, SEE MANUFACTURER INSTRUCTION FOR INSTALLATION.
3. (N) CEILING MOUNTED ENERGY RECOVERY VENTILATOR BETWEEN 16" O.C. JOIST, SEE MANUFACTURER INSTRUCTION FOR INSTALLATION.
4. (N) REFRIGERANT LINE SET. PENETRATE ROOF PER DETAIL 21/M3.11, HANG PER DETAIL 31/M2.11 AND SIZE PER MANUFACTURER'S RECOMMENDATION.
5. (N) 1/2" PVC CONDENSATE LINE TO MAINTAIN 1/8" DROP PER 1'. TERMINATE IN AT BATHROOM OR MOP SINK AS SHOWN
6. COMBINE OUTSIDE AIR DUCT AND EXHAUST DUCT WITH WHISPER COMFORT FV-WC04VE1 AND PENETRATE ROOF WITH ROOF CAP AND INSECT SCREEN.
7. (N) WALL MOUNTED, SEE MANUFACTURER INSTRUCTION FOR INSTALLATION.
8. (N) 1/2" PVC CONDENSATE LINE TO MAINTAIN 1/8" DROP PER 1'. TERMINATE AT JANITOR SINK.



34 – **STAFF CONTROL ROOM 259**
UNIT 2

0 2' 4' 8'
SCALE: 1/2"= 1'-0"



32 – **ELECTRICAL/STORAGE 253**
UNIT 2

0 2' 4' 8'
SCALE: 1/2"= 1'-0"

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COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
ENLARGED FLOOR PLANS

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
M3.11

PLUMBING FIXTURE SCHEDULE

TAG#	DESCRIPTION	WASTE	VENT	CW	HW	SPECIFICATIONS/COMMENTS
WC 1	LAV/TOILET (SLEEPING UNIT)	3"	2"	1-1/4"	–	ACORN–, Secure–Care – Ligature Resistant LR1418 series. 18" Lav/toilet ligature resistant Comby with Lavatory shaped bowl, 14–5/8"x9–5/8"x5" deep. standard elbow waste outlet is 1–1/2" O.D. plain end. toilet is blowout jet type with ligature resistant elongated bowl Manufactured to ASME a112.19.3 and CSA B45.4 requirements and will flush with a minimum of 25PSI flow pressure. trap has minimum 3–1/2 seal and will pass a 2–1/8" ball. Toilet waste outlet is 2–3/8" diameter plain and extending 3" beyond the fixture for wall outlet and gasketed waste for floor outlet. 45° angled bowl, left or right offset, per plan.
WC 2	LAV/TOILET (SLEEPING UNIT)	3"	2"	1-1/4"	–	SAME AS WC–1, WITH RIGHT ANGLED BOWL.
WC 3	WATER CLOSET (STAFF RR)	3"	2"	1-1/4"	–	Kohler, Kingston, K4325, 1.28 gpf., high efficiency, vitreous china, wall mount, elongated bowl, white with Sloan, Hydraulic Royal Optima Model# 153–1.28 ES–S TMO Sensor flushometer valve and Olsonite, 95CT white open front solid plastic seat. Exposed flush valve, Jay R Smith carrier.
WC 4	WATER CLOSET (SHOWER ROOM)	3"	2"	1-1/4"	–	WHITEHALL MANUFACTURING, MODEL WH2142–W–EGE10, LIGATURE RESISTANT SIPHON JET TOILET WITH AN ELONGATED BOWL MANUFACTURED TO COMPLY WITH ASME A112.19.3 AND CSA B45.4 STANDARDS. TOILET REQUIRES A MINIMUM WATER CONSUMPTION OF 1.28 GPF. ON–FLOOR UNITS CAN WITHSTAND LOAD RATING OF 5000 LBS. WITHOUT PERMANENT DAMAGE. TRAP HAS A MINIMUM OF 3–1/2" SEAL, WILL PASS A 2–1/8" BALL AND IS FULLY ENCLOSED. TOILET HAS A 1–1/2" NPT FLUSHING INLET CONNECTION. WALL WASTE OUTLET CONNECTION LOCATIONS FROM REAR OF FIXTURE ARE 10" OR 12" WITH A 7–1/2" GASKET FLANGE.
LV 1	LAVATORY (STAFF RR)	2"	1–1/2"	1/2"	1/2"	Kohler, Chesapeake, K1723, wall–mount, vitreous china, 20"x18–1/4", with Chicago Faucet Model# 404–VE2805–665ABCP, E–Cast Design faucet, with Neoperl 0.25 gpm Pressure Compensating/Multiple Laminar Stream Faucet Aerator, super low flow Control with Proflow PF203WH, white P–trap cover. Jay R Smith carrier.
LV 2	LAVATORY (SHOWER RM)	2"	1–1/2"	1/2"	1/2"	WHITEHALL MANUFACTURING, MODEL WH3740, LIGATURE RESISTANT STAINLESS STEEL BASIN POWDER COATED WHITE, ADA COMPLIANT. COUNTERTOP AND BASIN ARE CONSTRUCTED OF 16 GAUGE STAINLESS STEEL WITH EXPOSED SURFACES POWDER COATED WHITE. BASIN INCLUDES LIGATURE RESISTANT SIDE SPLASHES, OVERFLOW, GRID STRAINER, WASTE PIPING AND 1–1/2" P–TRAP.
SH 1	SHOWER (SHOWER RM.121 AND RM.254)	2"	1–1/2"	1/2"	1/2"	ACORN, LIGATURE RESISTANT, MODEL LR1748 SERIES. INSTALLED UNTO FINISHED WALL AND SERVICED FROM AN ACCESSIBLE PIPE CHASE. OPTIONAL WALL SLEEVE OR METAL TEMPLATE IS RECOMMENDED FOR ALL INSTALLATIONS FOR REQUIRED WALL OPENINGS. FIXTURE IS FABRICATED FROM 14 GAUGE, TYPE 304 STAINLESS STEEL WITH EXTERIOR SURFACES POLISHED TO A 34 SATIN FINISH., CONICAL SHOWERHEAD IS CHROME–PLATED BRASS, AND IS LEGATURE RESISTANT. THE SPRAY PATTERN IS NON–ADJUSTABLE. VALVE IS AN ASSE 1016 COMPLIANT T/P TEMPERATURE/PRESSURE BALANCING MIXING VALVE WITH PATENTED TRI–LEVEL HANDLE. VALVE AUTOMATICALLY MIXES HOT AND COLD WATER TO DELIVER BLENDED WATER WITHIN A SPECIFIC RANGE AND MEETS THE STRINGENT PERFORMANCE CRITERIA FOR TEMPERATURE AND PRESSURE CHANGES DEFINED BY ASSE 1016. VALVE INCLUDES A 1.6 GPM FLOW RESTRICTOR AND CAN BE REMOTELY LOCATED UP TO 10 FEET FROM OPERATING PUSHBUTTON. VALVE CONFORMS WITH LEAD FREE REQUIREMENTS OF NSF61, SECTION 9.
DF 1	DRINKING FOUNTAIN	1–1/2"	1–1/4"	1/2"	–	WHITEHALL MANUFACTURING, MODEL WHBF6, LIGATURE RESISTANT COMPLIANT, SENSOR OPERATED DRINKING FOUNTAIN AND BOTTLE FILLER. PROVIDE WALL ANCHORS AND ANCHORING HARDWARE WITH MIN. PULL–OUT FORCE OF 1000 LBS PER ANCHOR. PROVIDE 110–120VAC/60Hz/3A (MAX) ELECTRICAL RECEPTACLE FOR FACTORY SUPPLIED 120VAC/9VDCM 100mA PLUG–IN TRANSFORMER.
JS 1	JANITOR SINK (STAFF RR)	2"	1–1/2"	1/2"	1/2"	ACORN, TERRAZO–WARE, MODEL # TRH–242410, PRECAST MOP SINK PROVIDE FLEXIBILITY IN CONFIGURATION AND SIZE AS REQUIRED BY THE DESIGN OF THE BUILDING AND THE SPECIFIC INSTALLATION. MOP SINK ARE ATTRACTIVE , DURABLE FIXTURES DESIGNED TO BE EASY TO INSTALL AND MAINTAIN. FIXTURES ARE AVAILABLE IN 10" AND 6" HEIGHTS IN A VARIETY OF SQUARE AND RECTANGULAR SIZES. A 6" HIGH NEO–CORNER CONFIGURATION IS OPTIONALLY AVAILABLE.
TPV	TRAP PRIMER VALVE	–	–	3/8" (1 1/2" MAX) (1/2" MIN)	–	PRIME RITE MODEL # D–U, Machine corrosion resistant brass, contains no spring or diaphgram.
FD	FLOOR DRAIN	2"	1½"	–	–	Cast iron body flashing, flange, trap 5" diameter bronze grate top with security screws.

LEGEND/SYMBOLS

SYMBOL	SYSTEM	ABBREVIATION
	CONCENTRIC REDUCER	CR
	ECCENTRIC REDUCER	ER
	RISER DOWN (ELBOW)	NONE
	RISER UP (ELBOW)	NONE
	RISE OR DROP (PIPE RUN)	NONE
	BRANCH – TOP CONNECTION	NONE
	BRANCH – BOTTOM CONNECTION	NONE
	BRANCH – SIDE CONNECTION	NONE
	CAPPED/PLUGGED PIPE END	NONE
	TEE UP	NONE
	TEE DOWN	NONE
	HOSE BIB	HB
	RECESSED BOX, HOSE BIBB OR WALL HYDRANT	WH
	DRAIN (ALL TYPES) SPECIFY ON PLANS	NONE
	UNION – SCREWED	NONE
	UNION – FLANGED	NONE
CO	CLEANOUT PLUG	NONE
2	YARD CLEANOUT (OR) CLEANOUT TO GRADE 2 = TWO WAY	COTG
2	FLOOR CLEANOUT 2 = TWO WAY	COE
	WALL CLEANOUT	WCO
	GATE VALVE	GV
	BALL VALVE	BV
	BUTTERFLY VALVE	BFV
	GLOBE VALVE	GV
	ANGLE VALVE	AV
	CHECK VALVE–SWING TYPE	CV
	PLUG VALVE (GAS COCK)	PV
	PLUG VALVE (GAS COCK)	PV
	BACK FLOW PREVENTER DOUBLE CHECK VALVE	BFP
	BACK FLOW PREVENTER REDUCED PRESSURE TYPE	BFP
	TEMPERATURE PRESSURE RELIEF VALVE	TPRV
	TRAP PRIMER VALVE	TPV
	PRESSURE REDUCING VALVE	PRV
	SOLENOID VALVE	SV
	BALANCING VALVE	BLV
	STRAINER	STR
	CHECK VALVE–WAFER TYPE	CV
	POINT OF CONNECTION	POC
	POINT OF DISCONNECTION	POD
	PLUGGED TEE	PT
	ACCESS PANEL (WALL)	A/P
	ACCESS PANEL (CEILING)	A/P
	SPRINKLER HEAD	SP

ABBREVIATIONS

ABBREVIATION	MEANING
@	AT
ABV	ABOVE
AFF	ABOVE FINISHED FLOOR
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
BFP	BACKFLOW PREVENTER
BEL	BELOW
BLDG	BUILDING
BOP	BOTTOM OF PIPE
BTU	BRITISH THERMAL UNIT
CD	CONDENSATE DRAIN
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CO	CLEANOUT
COTG	CLEANOUT TO GRADE
COND	CONDENSATE
CI	CAST IRON
DEMO	DEMOLITION
DI	DRAIN INLET
DN	DOWN
DCW	DOMESTIC COLD WATER
DWH	DOMESTIC WATER HEATER
DWV	DRAIN WASTE VENT
(E) or EXSTG	EXISTING
ELEC	ELECTRICAL
ELEV	ELEVATION
FAU	FORCED AIR UNIT
FCO	FLOOR CLEAN OUT
FD	FLOOR DRAIN
FLR	FLOOR
FR	FROM
FS	FLOOR SINK
FW	FIRE WATER
G	GAS
GAL/HR or GPH	GALLONS PER HOUR
GPF	GALLONS PER FLUSH
GPM	GALLONS PER MINUTE
HB	HOSE BIBB
HS	HAND SINK
HP	HORSE POWER
HW	TEMPERED HOT WATER
HWR	TEMPERED HOT WATER RETURN
JS	JANITOR SINK

ABBREVIATION	MEANING
KS	KITCHEN SINK
LAV	LAVATORY
MAX	MAXIMUM
MH	MAN HOLE
MFR	MANUFACTURE OR MANUFACTURER
MIN	MINIMUM
(N)	NEW
NIC	NOT IN CONTRACT
NPT	NATIONAL PIPE THREAD
NTS	NOT TO SCALE
PLBG	PLUMBING
PLCS	PLACES
POC	POINT OF CONNECTION
POD	POINT OF DISCONNECTION
LBS or #	POUNDS
PRESS	PRESSURE
PRV	PRESSURE RELIEF VALVE
PS	PIPE SUPPORT
PSI	POUNDS PER SQUARE INCH
±	PLUS OR MINUS
SH	SHOWER
SHT MET	SHEET METAL
ST. STL. of SS	STAINLESS STEEL
SK	SINK
SOV	SHUT–OFF VALVE
SPECS	SPECIFICATIONS
STR	STRAINER
T	THERMOSTAT
TMV	THERMOSTATIC MIXING VALVE
TBR	TO BE REMOVED
THK	THICK
THWR	THEMPERED HOT WATER RETURN
TK	TANK
TYP	TYPICAL
TPRV	TRAP PRIMER RELIEF VALVE
UNO	UNLESS NOTED OTHERWISE
UPC	UNIFORM BUILDING CODE
VTR	VENT THROUGH ROOF
W	WIDE
W/	WITH
WC	WATER CLOSET
WH	WATER HEATER
WT	WEIGHT
WTR	WATER

PLUMBING PIPING SYMBOLS

SYMBOL	MEANING	ABBREVIATION
— — — V — — —	VENT PIPE	V
— — S — — (W)	SEWER OR WASTE LINE UNDER GROUND	S OR W
——— S ——— (W)	SEWER OR WASTE LINE ABOVE GROUND	
——— FW ———	FIRE WATER	FW
— - — - — - — or — - — CW — - — - —	COLD WATER	CW
— - — - — - — or — HW — - — - —	HOT WATER	HW
——— TW - - - -	TEMPERED HOT WATER	TW
——— TWR - - - -	TEMPERED HOT WATER RETURN	TWR
——— SP ———	FIRE SPRINKLER WATER	SP
——— CD ———	CONDENSATE DRAIN	CD
——— ID ——— (IW)	INDIRECT DRAIN OR INDIRECT WASTE	ID OR IW
——— E ———	ELECTRICAL	E
——— G ———	GAS (NATURAL)	G
——— TP ———	TRAP PRIMER VALVE LINE	TP
— — — SD — — —	STORM DRAIN	SD
— — SDO — —	STORM DRAIN OVERFLOW	SDO
	EXISTING PIPE TO BE REMOVED	

FIRE STOP NOTES AND TYPICAL APPLICATIONS

1. THE FIRE STOPPING CAULK SHALL BE A ONE PART, INTUMESCENT, LATEX ELASTOMER. THE CAULK SHALL BE CAPABLE OF EXPANDING A MINIMUM OF 3 TIMES AT 1000°F. THE MATERIAL SHALL BE THIXOTROPIC AND BE APPLICABLE TO OVERHEAD, VERTICAL AND HORIZONTAL FIRESTOPS. THE CAULK SHALL BE LISTED BY INDEPENDENT TEST AGENCIES SUCH AS "UL" OR "FM" AND BE TESTED TO AND PASS THE CRITERIA OF, ASTM E 814 FIRE TEST, TESTED UNDER POSITIVE PRESSURE, WITH THE REQUIREMENTS OF THE CEC (NFPA–70), BOCAI, SSBCCFI AND NFPA CODE #101.

PLUMBING CONSTRUCTION NOTES

1. ALL WORK TO COMPLY WITH 2022 CALIFORNIA PLUMBING CODE AND 2022 UNIFORM PLUMBING CODE AND ALL CALIFORNIA STATE AND LOCAL AMENDMENTS AND ORDINANCES.
2. DRAIN, WASTE AND VENT (DWV) PIPING BELOW SLAB SHALL BE SOLID WALL PVC, DWV, ASTM D2665 WITH SOLVENT CEMENTED JOINTS, PER SPECIFICATIONS.
3. LOCATE PLUMBING VENTS A MINIMUM OF 10' FROM AC/FAN FRESH AIR GRILLS.
4. ABOVE GROUND GAS PIPE AND FITTINGS SHALL BE CARBON STEEL BLACK PIPE SCHEDULE 40, ASTM A53 WITH MALLEABLE IRON THREADED FITTINGS OR WELDED JOINTS, PER SPECIFICATIONS.
5. PERFORM ALL TESTS TO DEMONSTRATE THE INTEGRITY OF THE SYSTEMS TO THE SATISFACTION OF THE OWNER.
6. THE DRAWINGS INDICATE THE EXTENT AND ARRANGEMENT OF THE PLUMBING SYSTEMS. PROVIDE WORK AND MATERIALS WHICH ARE NOT SPECIFICALLY MENTIONED BUT WHICH MAY BE REASONABLY ASSUMED NECESSARY FOR THE COMPLETION OF THE WORK AT NO ADDITIONAL COST TO THE OWNER.
7. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING UTILITY SERVICES DURING INSTALLATION OF PLUMBING SYSTEMS. THE DRAWINGS SHOW DIAGRAMMATICALLY THE LOCATION OF UTILITIES WHERE INFORMATION IS AVAILABLE. THE DRAWINGS ARE NOT EXACT AS TO QUANTITY, EXTENT OR LOCATION. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION DURING ALL PHASES OF THE WORK TO LOCATE, IDENTIFY AND PROTECT EXISTING UTILITIES. THE CONTRACTOR SHALL RECORD LOCATION OF AND REPAIR DAMAGE TO EXISTING UTILITIES WHICH ARE ENCOUNTERED AS A RESULT OF WORK UNDER THIS CONTRACT.
8. ALL CLEANOUTS SHALL BE ACCESSIBLE.
9. PLUMBER SHALL COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR EXACT LOCATION AND MOUNTING HEIGHT OF PLUMBING FIXTURES, DRAINS, ETC.
10. PROVIDE INDIVIDUAL STOPS AT EACH FIXTURE EXCEPT AS SHOWN ON DRAWINGS.
11. PROVIDE MINIMUM OF 24 INCHES CLEARANCE FOR RODDING OF CLEANOUTS.
12. ALL NEW WASTE LINES SHALL SLOPE NOT LESS THAN 1/4 INCHES PER FOOT (2%).
13. THROUGH PENETRATION OF FIRE–RATED WALLS AND CEILINGS SHALL BE FIRE STOPPED WITH MATERIALS AND METHODS CONFORMING TO UNDERWRITERS LABORATORIES LISTED ASSEMBLIES.
14. ABOVE AND BELOW SLAB STORM DRAINAGE PIPING SHALL BE SOLID CORE PVC, ASTM D 2665, OR SOLID CORE ABS, ASTM D 2661, WITH SOLVENT CEMENT JOINTS, PER SPECIFICATIONS.
15. THE AUTOMATIC FIRE SPRINKLER SYSTEM SHALL CONFORM TO THE REQUIREMENTS OF THE 2022 EDITION OF THE NATIONAL FIRE PROTECTION ASSOCIATION STANDARD #13 AND PER SPECIFICATIONS.
16. INSTALLATION OF THE FIRE SPRINKLER SYSTEM SHALL NOT BE STARTED UNTIL COMPLETE PLANS AND SPECIFICATIONS (INCLUDING WATER SUPPLY INFORMATION AND TYPE OF SYSTEM, IF ANY) HAVE BEEN APPROVED BY THE CALIFORNIA STATE FIRE MARSHAL
17. AT VARIOUS STAGES AND UPON COMPLETION, THE FIRE SPRINKLER SYSTEM SHALL BE TESTED IN THE PRESENCE OF THE FIRE MARSHAL.
18. DOMESTIC WATER PIPING SHALL BE TYPE K COPPER, ASTM B88. HARD COPPER ABOVE SLAB, SOFT COPPER BELOW SLAB, SOLDERED, PRESS SEAL OR GROOVED JOINTS ABOVE SLAB, NO JOINTS BELOW SLAB, PER SPECIFICATIONS.
19. SERVICE WATER PIPING OUTSIDE BUILDINGS SHALL BE HARD COPPER, TYPE K, ASTM B88 WITH BRAZED OR PRESSURE SEAL JOINTS ABOVE GRADE AND SOFT COPPER, TYPE K, ASTM B88 WITH BRAZED JOINTS OR SCHEDULE 80 PVC, ASTM D 1785, WITH SOLVENT CEMENTED JOINTS BELOW GRADE, PER SPECIFICATIONS.
20. DRAIN, WASTE AND VENT (DWV) PIPING ABOVE SLAB SHALL BE HUBLESS CAST IRON SOIL PIPE, ASTM A888 WITH HEAVY DUTY HUBLESS COUPLING JOINTS, PER SPECIFICATIONS. VENT PIPING MAY ALTERNATELY BE GALVANIZED STEEL PIPE, ASTM A53, TYPE–E WITH THREADED OR GROOVED JOINT COUPLINGS, PER SPECIFICATIONS.
21. SERVICE SEWER PIPING OUTSIDE BUILDINGS SHALL BE PVC SEWER PIPING, ASTM F891 WITH SOLVENT CEMENT JOINTS OR PVC TYPE PSM SEWER PIPING, ASTM D 3034, SDR 35 WITH GASKETED JOINTS, PER SPECIFICATIONS.
22. NATURAL GAS PIPING OUTDOORS SHALL BE CARBON STEEL BLACK PIPE, SCHEDULE 40, ASTM A53 WITH MALLEABLE IRON THREADED FITTINGS, ABOVE GRADE, ASTM D 2513, SDR II, WITH HEAT FUSION JOINTS, BELOW GRADE, PER SPECIFICATIONS.
23. SET TEMPERED WATER TEMPERATURE FOR LAVS AND SHOWERS AT 105 DEGREES.

PLUMBING DEMOLITION NOTES

1. THE DEMOLITION WORK SHALL BE PERFORMED USING THE DEMOLITION PLANS IN CONJUNCTION WITH THE ARCHITECTURAL DRAWINGS.
2. REMOVE EXISTING FIXTURES AS SHOWN ON THE PLANS OR AS REQUIRED FOR A COMPLETE AND OPERABLE SYSTEM, IN FULL ACCORDANCE AND COMPLIANCE WITH ALL APPLICABLE CODES.
3. ALL FIXTURES WHICH ARE REMOVED SHALL BE DISPOSED BY THE CONTRACTOR.
4. DEMOLITION AND WORK IN EXISTING AREAS: REMOVE EXISTING FIXTURES, EQUIPMENT AND PIPING AS REQUIRED AND TERMINATE PIPING SO AS NOT TO INTERFERE WITH NEW CONSTRUCTION.
5. INSTALLATION OF NEW SYSTEMS SHALL BE BY PRIORITY DETERMINED BY THE GENERAL CONTRACTOR IN ORDER TO FIT ALL TRADE REQUIRED EQUIPMENT INTO THE AVAILABLE SPACE.
6. COORDINATE PLUMBING WORK AND PIPING SYSTEM SHUTDOWN WITH THE COUNTY AND OTHER TRADES. INFORMATION ON TYPE OF SERVICE, PLANNED TIME AND ANTICIPATED LENGTH OF OUTAGE SHALL BE SUPPLIED TO THE COUNTY REFRESENTATIVE FOR SCHEDULING OF WORK, A MINIMUM OF TWO WEEKS BEFORE NEEDED.

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REVISIONS

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EXP. 9–30–26
MECHANICAL
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

NOTES AND SCHEDULES

DATE: 10/15/25

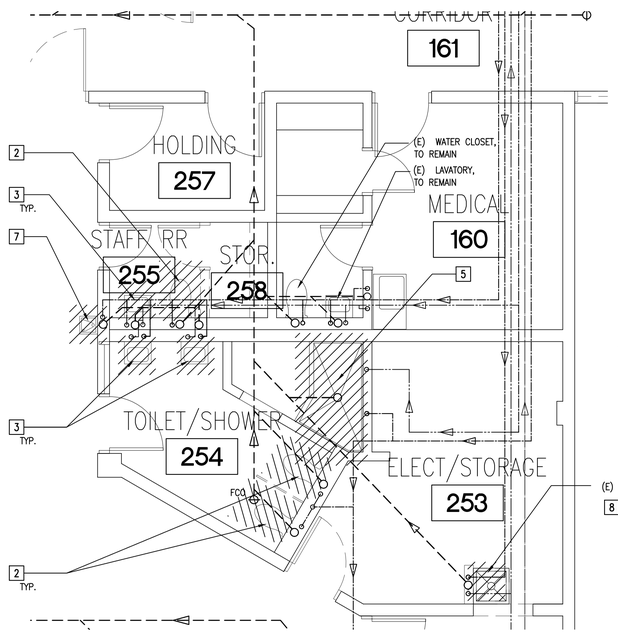
TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22868

SHEET NUMBER

P0.0

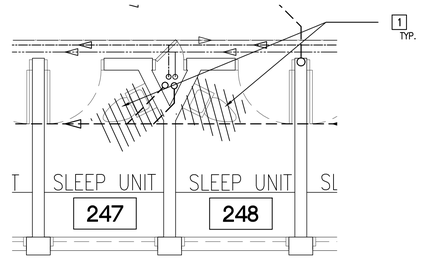


STAFF R.R. & YOUTH SHOWER
DEMOLITION - UNIT 2

33 –

0 2' 4' 8'

SCALE: 1/4"= 1'–0"

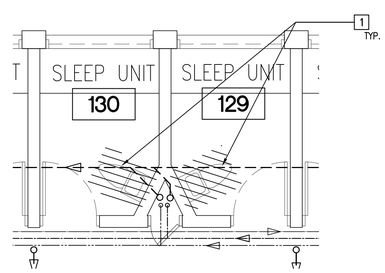


TYP. SLEEPING ROOM
DEMOLITION - UNIT 2

32 –

0 2' 4' 8'

SCALE: 1/4"= 1'–0"

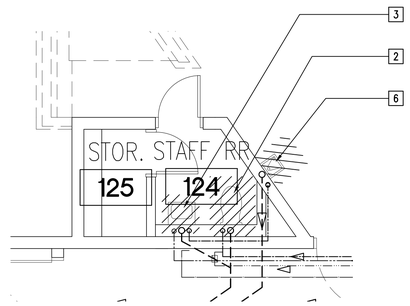


TYP. SLEEPING ROOM
DEMOLITION - UNIT 1

22 –

0 2' 4' 8'

SCALE: 1/4"= 1'–0"



STAFF RESTROOM
DEMOLITION - UNIT 1

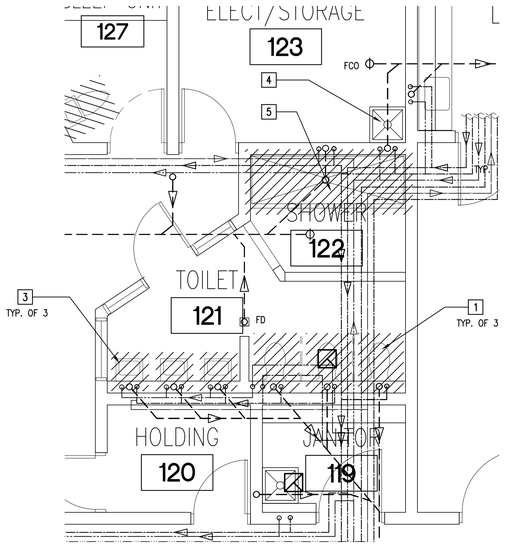
23 –

0 2' 4' 8'

SCALE: 1/4"= 1'–0"

KEYNOTES

1. REMOVE EXISTING SLEEPING ROOM WATER CLOSET/LAVATORY COMBINATION AND PREPARE FOR NEW FIXTURE UNIT.
2. REMOVE EXISTING STAFF ROOM WATER CLOSET AND PREPARE FOR NEW FIXTURE UNIT.
3. REMOVE EXISTING STAFF ROOM LAVATORY AND PREPARE FOR NEW FIXTURE UNIT.
4. EXISTING MOP SINK TO REMAIN.
5. REMOVE EXISTING SHOWER AND PREPARE FOR NEW FIXTURE UNIT.
6. REMOVE EXISTING DRINKING FOUNTAIN AND CAP PIPING AT P.O.D. WITHIN STUD WALL CAVITY.
7. REMOVE EXISTING DRINKING FOUNTAIN AND PREPARE FOR NEW FIXTURE UNIT RELOCATION.
8. EXISTING MOP SINK, TO BE REMOVED, AND TO BE REPLACED WITH FLOOR CLEAN OUT.

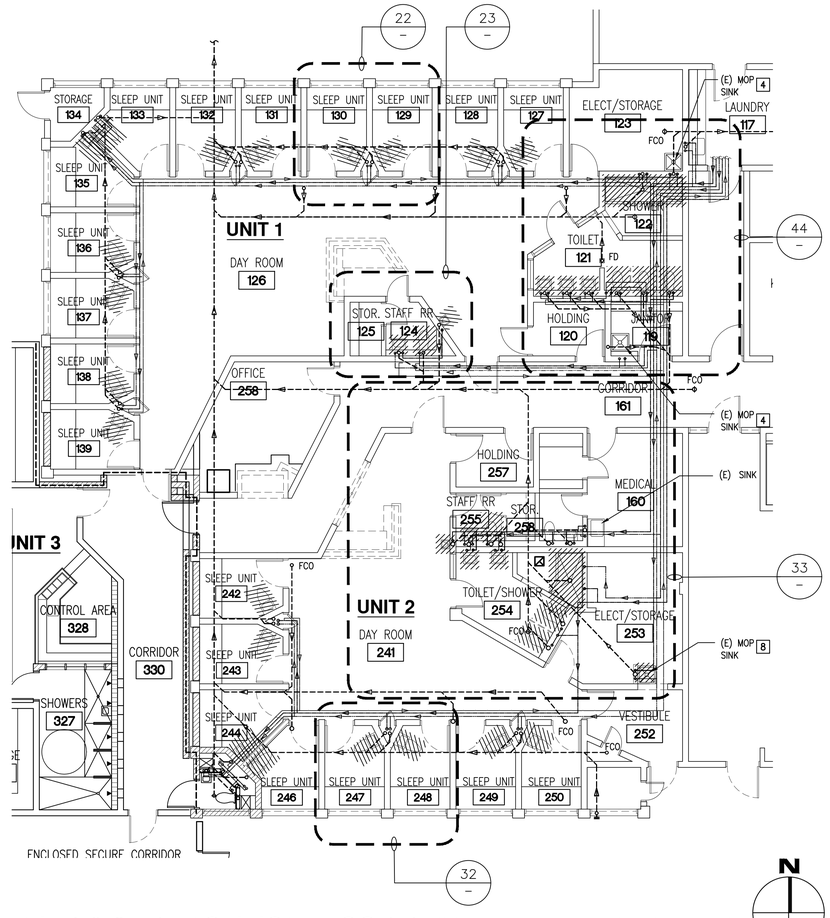


YOUTH SHOWER ROOM
DEMOLITION - UNIT 1

44 –

0 2' 4' 8'

SCALE: 1/4"= 1'–0"



UNIT 1 & 2 - DEMOLITION FLOOR PLAN

14 –

0 4' 8' 16'

SCALE: 1/8"= 1'–0"

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BSCC PLAN REVIEW NUMBER
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SHEET TITLE
PLUMBING
DEMOLITION FLOOR PLAN

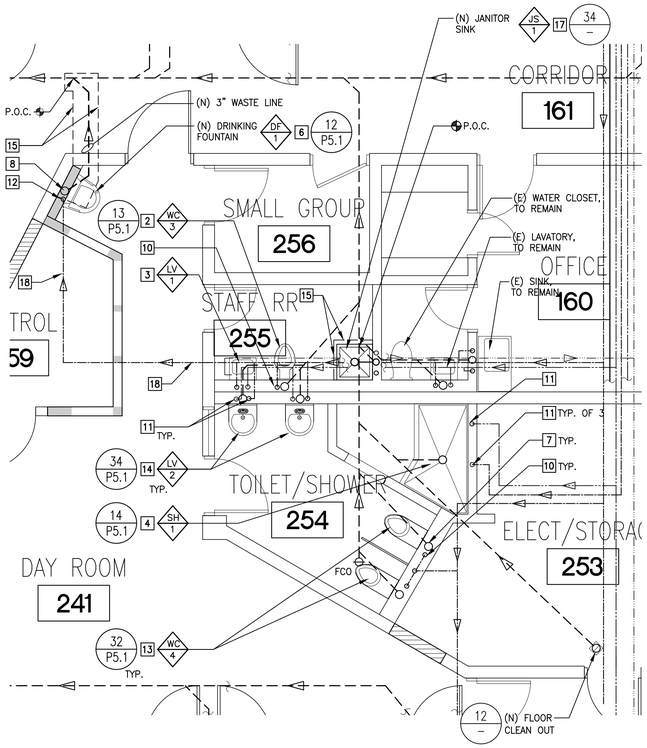
DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

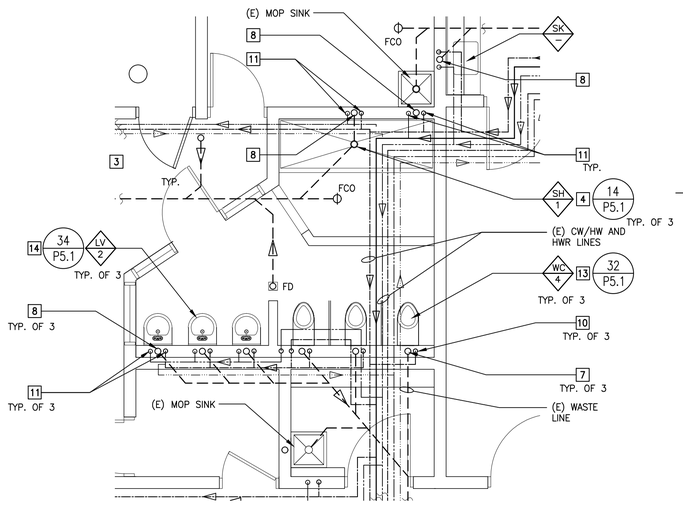
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SHEET NUMBER
P2.11D



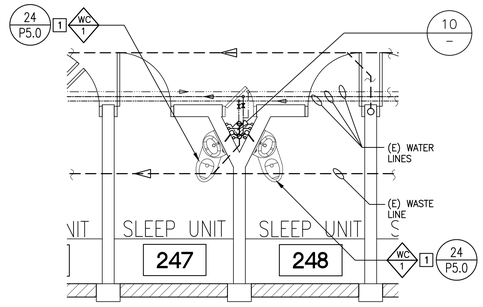
STAFF R.R. & YOUTH SHOWER
UNIT 2

43 — 0 2' 4' 8' — SCALE: 1/4"= 1'-0"



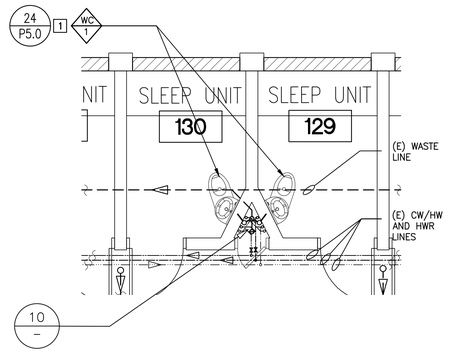
YOUTH SHOWER ROOM
UNIT 1

44 — 0 2' 4' 8' — SCALE: 1/4"= 1'-0"



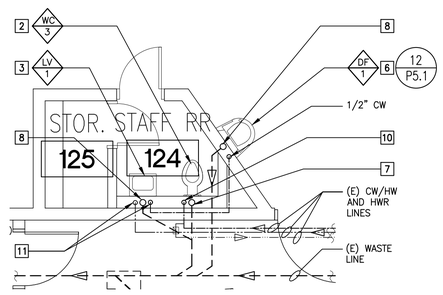
TYP. SLEEPING RM.
UNIT 2

30 — 0 2' 4' 8' — SCALE: 1/4"= 1'-0"



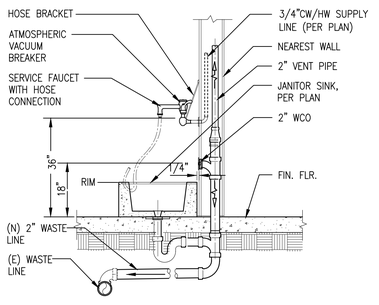
TYP. SLEEPING RM.
UNIT 1

32 — 0 2' 4' 8' — SCALE: 1/4"= 1'-0"



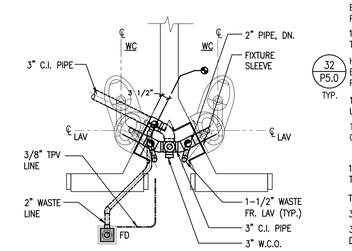
STAFF TOILET RM.
UNIT 1

33 — 0 2' 4' 8' — SCALE: 1/4"= 1'-0"

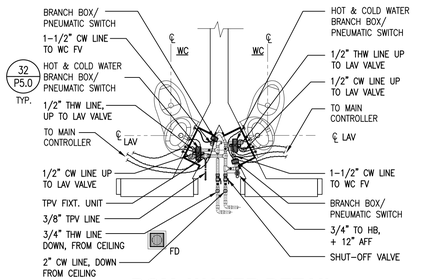


JANITOR SINK DETAIL

34 — SCALE: NONE



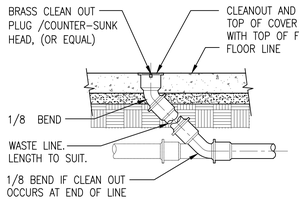
DRAIN, WASTE AND VENT DETAIL



DOM. WATER DETAIL
(W/ ELECTRONIC VALVE SYSTEM)

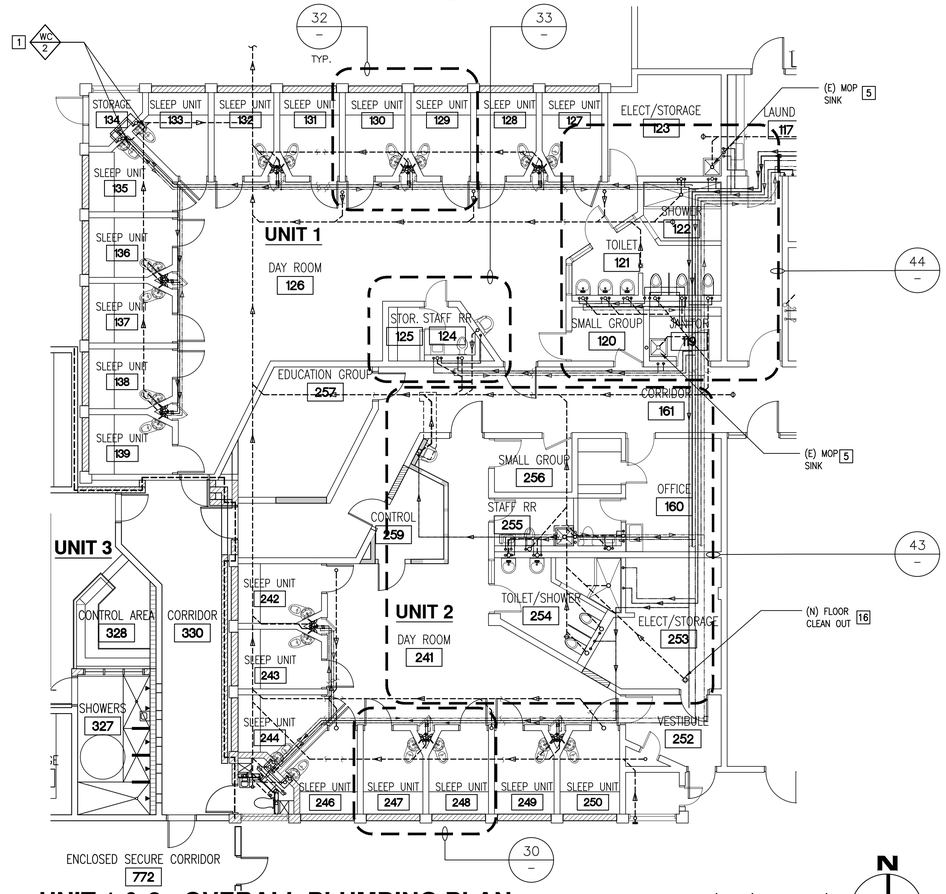
TYP. SLEEPING RM. - PLUMBING DETAIL
UNIT 1

10 — 0 4' 8' 16' — SCALE: 3/8" = 1'-0"



FLOOR CLEANOUT
(FCO) DETAIL

12 — SCALE: NONE



UNIT 1 & 2 - OVERALL PLUMBING PLAN

14 — 0 4' 8' 16' — SCALE: 1/8"= 1'-0"

N

KEYNOTES

1. INSTALL NEW SLEEPING ROOM WATER CLOSET ASSOCIATED WASTE, VENT AND WATER SUPPLY AND CONNECT TO EXISTING.
2. INSTALL NEW STAFF RESTROOM WATER CLOSET ASSOCIATED WASTE, VENT AND WATER SUPPLY AND CONNECT TO EXISTING.
3. INSTALL NEW STAFF RESTROOM LAVATORY AND WATER SUPPLY AND CONNECT TO EXISTING.
4. INSTALL NEW SHOWER AND ASSOCIATED WASTE, VENT AND WATER SUPPLY AND CONNECT TO EXISTING.
5. EXISTING MOP SINK , TO REMAIN.
6. INSTALL NEW DRINKING FOUNTAIN AND ASSOCIATED WASTE, VENT AND WATER SUPPLY AND CONNECT TO EXISTING.
7. 3" WASTE, DN., 2" VENT, UP
8. 2" WASTE, DN., 1-1/2" VENT, UP
9. 1-1/2" CW AND 1" THW SUPPLY LINE.
10. 1-1/4" CW SUPPLY LINE.
11. 1/2" THW SUPPLY LINE.
12. 1/2" CW SUPPLY LINE.
13. INSTALL YOUTH SHOWER ROOM WATER CLOSET ASSOCIATED WASTE, VENT AND WATER SUPPLY AND CONNECT TO EXISTING.
14. INSTALL YOUTH SHOWER ROOM LAVATORY AND WATER SUPPLY AND CONNECT TO EXISTING.
15. SAW-CUT EXISTING CONCRETE FLOOR FOR NEW WASTE LINE CONNECTION.
16. INSTALL NEW FLOOR CLEAN OUT, ON REMOVED EXISTING JANITOR SINK LOCATION, SEE DETAIL 12
17. INSTALL NEW JANITOR SINK AND ASSOCIATED WASTE, VENT AND WATER SUPPLY AND CONNECT TO EXISTING.
18. COORDINATE ROUTE OF COLD WATER IN SOFFIT CEILING WITH OTHER DISCIPLINES

RA ARCHITECTS & ENGINEERS

ARCHITECTURE
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Written dimensions take precedence over scaled dimensions. Do not scale plans. Contractor shall verify all dimensions and conditions in the field. Any discrepancies shall be called to the attention of RA & Associates.

REVISIONS

SEAL

REGISTERED PROFESSIONAL ENGINEER
JAMES B. ALBRECHT
No. M26555
EXP. 9-30-26
MECHANICAL
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
PLUMBING FLOOR PLAN

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
P2.11

Valves: EVS MASTER-TROL SYSTEMS

MODEL NUMBER AND OPTIONS SELECTION
MUST SPECIFY NUMBER OF CONTROLLERS REQUIRED:

☐ If quantity differs from Acorn factory quote, additional controllers are at additional cost.

BASE MODEL NUMBER(Must Specify)
- ❑ -CDT Server, PC, 1 Min. Up to 8 Versa-Links ___ Qty.
- ❑ -CDT Client, PC ___ Qty. *CDT Server required.
- ❑ -CPT Computer Palmtop, Programmer

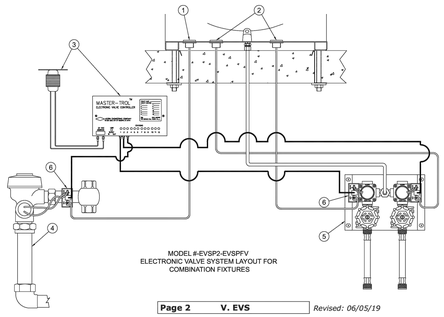
SYSTEM MASTER-TROL OPTIONS (Must Specify):
- ❑ Customer Specified Programming - Contact factory for details. Recommended for unmonitored configurations.
- ❑ Wiring Diagram - Acorn Provided *Floor plans must be provided by the customer to complete wiring diagram. 2 to 3 weeks lead time upon receipt of site floor plans
- ❑ Site Visit

CDT OPTIONS:(Must Specify)
- ❑ Monitor
  - ❑ -17" Screen, Standard
  - ❑ -19" Screen, with additional cost
  - ❑ -Touch-Screen, with additional cost ❑ -22" ❑ -27"
- ❑ Printer
- ❑ Storage Media, Specify:
  - ❑ CDRW-CD Writeable
  - ❑ DVDR-DVD Writeable
  - ❑ Zip File Compressor

FOR ADDITIONAL INFORMATION OR CUSTOMER SPECIFIED PROGRAMMING OPTIONS AND REQUIREMENTS; SEE SUPPLEMENTAL PAGES FOLLOWING.

Please visit *www.acorneng.com* for most current specifications.

NOTES:
1. Optional EVSPFV Flush Valve Stainless Steel Piezo Pushbutton.
2. Optional EVSP2 Lavatory Stainless Steel Piezo Pushbutton.
3. Electronic Valve Controller Includes 24VAC Transformer.
4. Solenoid Flush Valve Shown for Reference.
5. EVS-2 Hot & Cold Solenoid Valve.
6. Branch Box



MODEL #-EVSP2-EVSPFV
ELECTRONIC VALVE SYSTEM LAYOUT FOR COMBINATION FIXTURES

Acorn Engineering Company • 15125 Proctor Avenue • P.O. Box 3527 • City of Industry, CA 91744-0527 U.S.A.
Tel: (800) 488-8999 • (626) 336-4561 • Fax: (626) 961-2200 • www.acorneng.com • E-mail: info@acorneng.com

Valve On Time: Refers to the programmed solenoid valve timing cycle. The solenoid valve will operate for the duration of the cycle.

Master-Trol Water Management Systems can be configured to suit the facility. See below for configurations available for Master-Trol.

✦ Unmonitored Controller Only System
An unmonitored controller system configuration consists of an Electronic Valve Controller factory preprogrammed per customer specifications. There may be one or more valve controllers at the facility, but they exist independent of each other. Each Electronic Valve Controller can connect up to 12 solenoid valves. In this system the valve controllers are not linked. Programming may be altered in the field by using an optional -CPT Palmtop Computer or -CLT Laptop Computer.

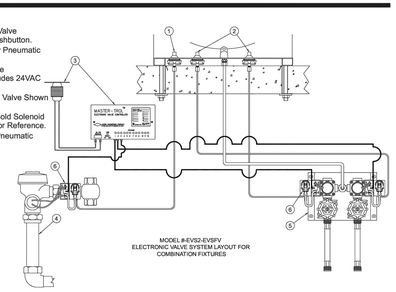
✦ Unmonitored Single Versa-Link System
An unmonitored Versa-Link system configuration enables one Versa-Link to connect to 32 controllers without a computer to monitor use. Valve controllers are factory preprogrammed per customers specifications.

The programming for all the valve controllers can be altered in the field from a single location on the link using an optional -CPT Palmtop Computer or -CLT Laptop Computer. Each Versa-Link is capable of connecting to 384 solenoid valves.

✦ Monitored Single Versa-Link System
A monitored Single Versa-Link system configuration enables one Versa-Link to connect up to 32 Master-Trol electronic valve controllers. The controllers are programmed and monitored in the field with an optional -CLT Laptop Computer or -CDT Computer Server. Each Versa-Link can control up to 384 solenoid valves.

✦ Monitored Multiple Versa-Link System
A monitored Multiple Versa-Link system configuration enables connection to up to eight Versa-Links each with 32 Master-Trol electronic valve controllers. The controllers are programmed and monitored in the field with an optional -CDT Computer Server or computer client. The computer includes the RS-485 interface card (which allows the connection of up to 8 Versa-Links) This system can monitor and control up to 3,072 solenoid valves.

NOTES:
1. EVSFV Flush Valve Pneumatic Pushbutton.
2. EVS2 Lavatory Pneumatic Pushbuttons.
3. Electronic Valve Controller Includes 24VAC Transformer.
4. Solenoid Flush Valve Shown for Reference.
5. EVS-2 Hot & Cold Solenoid Valve Shown for Reference.
6. Branch Box / Pneumatic Switch.



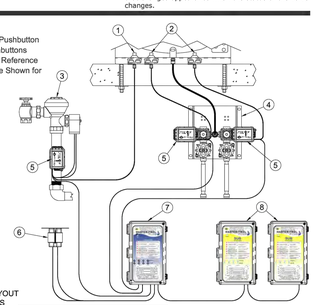
MODEL #-EVS2-EVSFV
ELECTRONIC VALVE SYSTEM LAYOUT FOR COMBINATION FIXTURES

Acorn Engineering Company • 15125 Proctor Avenue • P.O. Box 3527 • City of Industry, CA 91744-0527 U.S.A.
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·Master-Trol® PLUS Software Features: Some of the Master-Trol® Plus software features are listed below. For more information on settings and controls, please review the Master-Trol PLUS User Manual.

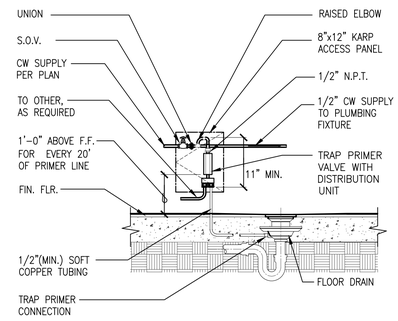
- **Multi-Server Client Software –** The client software is capable of monitoring and controlling valves on multiple Master-Trol® PLUS server computers.
- **On-Time –** Refers to the programmed timing cycle of a solenoid valve. The solenoid valve will operate for the duration of the specified on-time. On-Time can be up to 1 hour and set in 1/10th second increments.
- **Lock-out Time –** Refers to a specified length of time the valve will not operate after an actuation has occurred. If set, a lock-out time will temporarily disable the valve for a specified set time after each activation of the valve. Lock-Out Time can be up to 24 hours and set in one minute increments.
- **Variable Lock-Out –** This feature allows you to specify the number of activations that can occur before a lock out is implemented. If the specified number of activations occurs within a specified window of time then the valve is disabled for the specified Lock-Out time.
- **24-Hour Limits –** This feature allows you to limit how many activations or how much accumulated time a valve can operate within a 24 hour time period. At the end of a 24 hour period the user's limits are automatically reset for the next 24 hour period.
- **Windows of Operation –** This feature lets you specify windows of time where the valve is enabled. The valve is disabled outside of these windows of time. The feature also allows you to specify the days of the week that the windows are valid.
- **Auto Cycle –** If a valve has this feature enabled then it will automatically cycle once every 24 hours at a specified time. This is typically used on valves that receive very little usage to prevent the waste trap from drying out, stagnant water, and to help keep the valves lubricated.
- **Permissive Control –** This feature allows you to use permissive devices (vacuum transducer or switch) to enable and disable valves. If a vacuum transducer is connected to the controller then a valve can be programmed to disable if the vacuum level drops below a specified level. If a switch is connected to the controller then a valve can be programmed to disable when the switch circuit is closed. Permissive devices only control the valves on the controller to which the device is connected.
- **Alarms –** Audible and visible alarms can be set to alert personnel to situations that may require immediate attention.
- **Optional Graphical Floor Plan View –** This option provides a graphical layout of the facility to be used for navigating through the Master-Trol® PLUS client software. Each fixture is represented by a graphical icon that changes appearance when the status of the valve changes.

NOTES:
1. MTPFV Flush Valve Pneumatic Pushbutton
2. MTP2 Lavatory Pneumatic Pushbuttons
3. Solenoid Flush Valve Shown for Reference
4. MTP2 Hot & Cold Solenoid Valve Shown for Reference
5. Branch Box / Pneumatic Switch
6. 120V/24VAC 50VATransformer
7. Main Controller
8. 4-Port Sub-Module



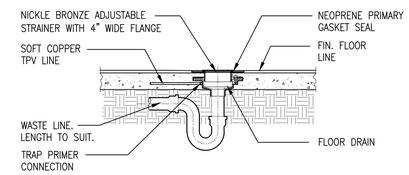
MODEL MTP2 / MTPFV
ELECTRONIC VALVE SYSTEM LAYOUT FOR COMBINATION FIXTURES

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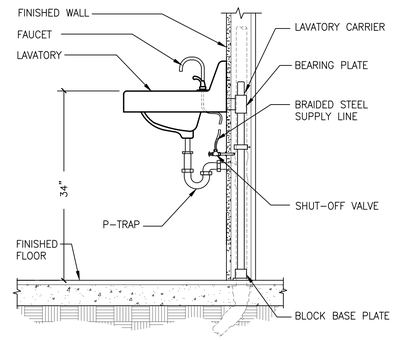
TRAP PRIMER VALVE (TPV) DETAIL

NO SCALE — 11 / P5.0



FLOOR DRAIN (FD) DETAIL

NO SCALE — 12 / P5.0

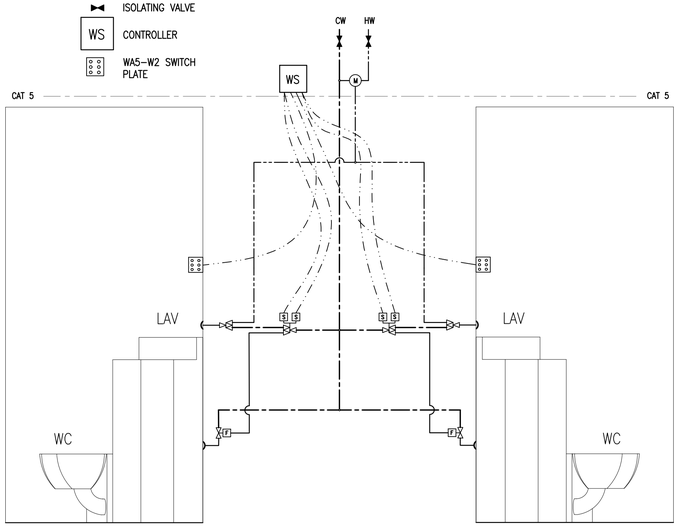


MASTER-TROL ELECTRONIC VALVE SYSTEM LAYOUT

NO SCALE — 32 / P5.0

LEGEND

- DELABLE 20000 PRE-MIX VALVE
- (M) TERMOSTATIC MIXER
- (F) FLASHING VALVE
- (S)(S) 2 PORT, SOLNOID VALVE
- ISOLATING VALVE
- WS CONTROLLER
- WA5-W2 SWITCH PLATE



TYPICAL SLEEPING ROOM WATER CONTROLLER

NO SCALE — 44 / P5.0

Secur-Care® - Ligature Resistant LR1418 Series
18" Lav/Toilet - Ligature Resistant Comby with Lavatory Oval Shaped Bowl



LR1418-2-CT-04-FV-PHL
Fixture May Show Some Available Options

Please visit ***www.acorneng.com*** for most current specifications.

18" Lav/Toilet - Ligature Resistant Comby with Lavatory Oval Shaped Bowl

Fixture is arranged to be installed on finished wall and serviced from an accessible pipe chase. Fixture is fabricated from 14 gage type 304 stainless steel cabinet and toilet bowl, polished to a satin finish. The inside of the toilet bowl also has a satin finish. Cabinet interior is sound-deadened with fire-resistant material. Optional Wall Sleeve or Metal Template is recommended for all installations to provide required wall openings. Engineered to reduce possible risk of the fixture being used as a ligature device.

Lavatory Oval Shaped Bowl is 14-5/8" x 9-5/8" x 5" deep. Standard elbow waste outlet is 1-1/2" O.D. plain end.

Optional Valve may be an Air-Control pneumatically operated, hemispherical pushbutton valve using atmospheric air. Pushbutton requires less than 5 pounds to activate valve. Valve is direct acting, non-metering type and is optionally available as metering with non-hold open feature. Metering valve timing is adjustable from 5 to 60 seconds. Valve can be remotely located up to 10 feet from the operating pushbutton. Bubbler and valve pushbuttons are spherical type. Valve and bubbler conform with lead-free requirements for NSF61, section 9 and CHSC 116875.

Toilet is blowout jet type with ligature resistant elongated bowl manufactured to ASME A112.19.3 and CSA B45.4 requirements and will flush with a minimum of 25 PSI flow pressure. Trap has minimum 3-1/2" seal and will pass a 2-1/8" ball. Toilet waste outlet is 2-3/8" diameter plain end extending 3" beyond the fixture for wall outlet and gasketed waste for floor outlet.

Regularly Furnished items include wall mounting hardware.

GUIDE SPECIFICATION

Provide and install Secur-Care® - Ligature Resistant 18" wide Lav/Toilet Comby (Specify model number and options). Provide hemispherical cabinet design to reduce risk of fixture being used as a ligature device. Fixture shall be fabricated from type 304 stainless steel. Construction shall be seamless welded and exposed surfaces shall have a satin finish. Provide oval shaped lavatory bowl. Fixture shall have an Air-Control pneumatically operated, pushbutton valve. Valve shall require less than 5 pounds to activate. Valve and bubbler conform with lead-free requirements for NSF61, section 9 and CHSC 116875. Provide Hemispherical Penal Bubbler and Hemispherical Penal Pushbutton. Provide toilet bowl housing to prohibit the attachment of objects. Toilet shall be concealed blowout jet type with an elongated bowl, self-draining flushing rim, and an integral contoured seat. Toilet shall meet ASME A112.19.3 and CSA B45.4 requirements and will flush with a minimum of 25 PSI flow pressure. Toilet trap shall have a minimum 3-1/2" seal that shall pass a 2-1/8" diameter ball and shall be fully enclosed. Cabinet interior shall be sound-deadened with fire-resistant material. Fixture shall withstand loading of 5,000 pounds without permanent damage. Fixture shall be furnished with necessary fasteners for proper installation.

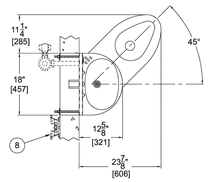
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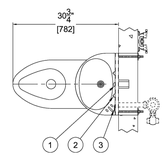
WATER CLOSET DETAIL

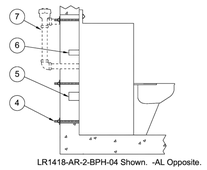
NO SCALE — 24 / P5.0

Secur-Care® - Ligature Resistant LR1418:
18" Lav/Toilet - Ligature Resistant Comby with Lavatory Oval Shaped Bowl

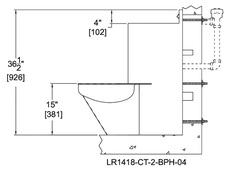
NOTES:
1. -BPH Hemispherical Lavy Bubbler
2. Hemispherical Lavy Valve Pushbuttons
3. Flush Valve Pushbutton
4. Wall Mounting Hardware
5. Toilet Waste Outlet
6. Lavy Waste Outlet
7. Optional -FV Flush Valve
8. -04 Air Control Valve







LR1418-AR-2-BPH-04 Shown. -AL Opposite.

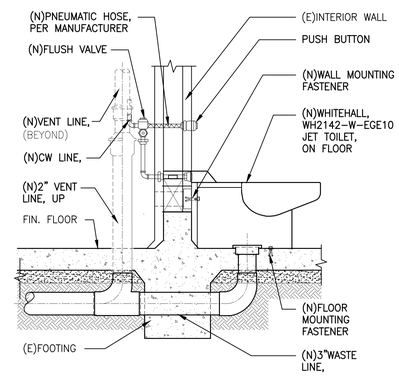


LR1418-CT-2-BPH-04

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TYPICAL WALL MOUNTED LAVATORY DETAIL (STAFF)

NO SCALE — 13 / P5.0



TYPICAL ROUGH-IN FLOOR MOUNTED WATER CLOSET DETAIL (SHOWER ROOM)

NO SCALE — 14 / P5.0

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MECHANICAL ELECTRICAL
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REVISIONS

SEAL

REGISTERED PROFESSIONAL ENGINEER
JAMES B. ALBRECHT
No. M26555
EXP. 9-30-26
MECHANICAL
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

PLUMBING DETAILS

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
P5.0

Whitehall Manufacturing®
Manufacturer of Healthcare and Rehabilitation Products since 1946

BestCare® Patients, Not Prisoners®
Healthcare and Ligature Resistant Products

Division of Acorn Engineering Company® ISO 9001 A MEMBER OF MORRIS GROUP INTERNATIONAL

Whitehall Ligature Resistant Siphon Jet Toilet

Model WH2142-W-EGE10
(Wall Supply)

~~WH2142-W-2-EGE10~~ - Standard
~~WHR2142-W-2-EGE10~~ - Replacement

~~WH2142ADA-W-2-EGE10~~ - ADA Height
~~WHR2142ADA-W-2-EGE10~~ - Replacement/ADA Height


WH2142-W-EGE10

Ligature Resistant Siphon Jet Toilet

Ligature Resistant Siphon Jet Toilet is arranged to be installed against a finished wall from the front side with a fixture-to-wall mounting channel. Unit is fabricated from 16 gage, type 304 stainless steel and is seamless welded construction with exterior surfaces powder coated white (interior of toilet will have a satin finish and will not be powder coated). Toilet will be provided with WH-LRSC-GRAY Ligature Resistant ABS Toilet Seat Cover.

Toilet is siphon jet type with an elongated bowl manufactured to comply with ASME A112.19.3 and CSA B45.4 standards. Toilet requires a minimum of 25 PSI flow pressure and uses a minimum water consumption of 1.28 GPF. On-floor units can withstand load rating of 5000 lbs. without permanent damage. Trap has a minimum 3-1/2" seal, will pass a 2-1/8" ball and is fully enclosed. Toilet has a 1-1/2" NPT flushing inlet connection. Wall waste outlet connection is a 5-1/2" gasket flange. Floor waste outlet locations from rear of fixture are 10" or 12" with a 7-1/2 gasket flange.

Flush Valves, Top Supply Covers and Wall Supply Access Panels are optionally available for all styles of Toilets and may be specified separately.

GUIDE SPECIFICATION

Provide and install Whitehall Best-Care™ Ligature Resistant Toilet (specify model number and options). Fixture shall be fabricated from 16 gage, type 304 stainless steel. On-floor units can withstand load rating of 5000 lbs. without permanent damage. Construction shall be seamless welded and exterior surfaces are powder coated white. Housing to include side access panels. Toilet shall be concealed siphon jet type with an elongated bowl and self-draining flushing rim. Toilet shall be ASME A112.19.3 and CSA B45.4 compliant. Toilet requires a minimum of 25 PSI flow pressure and uses a minimum water consumption of 1.28 GPF. Toilet trap shall have a minimum 3-1/2" seal and shall pass a 2-1/8" diameter ball and is fully enclosed. Provided with WH-LRSC-GRAY Ligature Resistant ABS Toilet Seat Cover.

- **Patented US 10,052,000 B2**

Please visit ***www.whitehallmfg.com*** *for most current specifications.*

Recyclable Product · Water Conserving Product · Complies with the following standards: ASME A112.19.3 · CSA B45.4 · WaterSense EPA

WH2142-W

Revised: 11/18/2022

Whitehall Manufacturing®
Manufacturer of Healthcare and Rehabilitation Products since 1946

BestCare® Patients, Not Prisoners®
Healthcare and Ligature Resistant Products

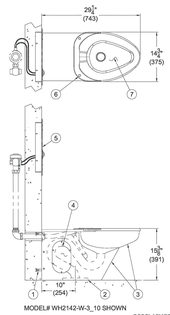
MODEL NUMBER AND OPTIONS SELECTION:

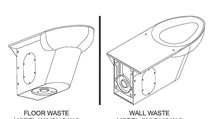
BASE MODEL NUMBER

☐ WH2142W-2-EGE10	Wall Outlet, Siphon Jet Toilet
☐ WH2142W-3-EGE10_10	Floor Outlet, Siphon Jet Toilet (10" rough-in from wall to the center of waste outlet)
☐ WH2142W-3-EGE10_12	Floor Outlet, Siphon Jet Toilet (12" rough-in from wall to the center of waste outlet)

Accessories:
Note: Gray Ligature Resistant Seat Cover is Standard

☐ WH-LRSC-WHITE	Ligature Resistant Seat Cover, White (Shipped Loose)
☐ WH-LRSC-BLACK	Ligature Resistant Seat Cover, Black (Shipped Loose)
☐ WH-LRSC-BLUE	Ligature Resistant Seat Cover, Dignity Blue (Shipped Loose)





IMPORTANT!
TOILETS ARE SUPPORTED ON THE FLOOR AND BOLT TO REINFORCED WALL. FIXTURES ARE NOT INTENDED FOR USE WITH TOILET CARRIERS.

NOTES:
1. WALL MOUNTING HARDWARE BY OTHERS
2. -3, FLOOR WASTE OUTLET SHOWN)
3. EXTERIOR SURFACES POWDER COATED WHITE
4. ACCESS PANELS (BOTH SIDES)
5. WH12898 FLUSH VALVE ACCESS PANEL w/ HYDRAULIC FLUSH VALVE SHOWN
6. WH-LRSC-GRAY WHITEHALL LIGATURE RESISTANT ABS TOILET SEAT COVER
7. INTERIOR OF TOILET w/ SATIN FINISH (NOT POWDER COATED)

DISCLAIMER:
This product is designed to decrease the probability that it may be utilized as an apparatus for ligature. It is not a replacement for professionals who are trained in the proper evaluation, management and supervision of persons at risk of suicide.

⚠ WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

All dimensions are nominal and subject to manufacturer's change without notice. Whitehall assumes no responsibility for use of void or superseded data. © Whitehall Manufacturing, Member of Morris Group International. Please visit **www.whitehallmfg.com** for most current specifications.

SELECTION SUMMARY & APPROVAL FOR MANUFACTURING

Model Number & Options_____Quantity_____
Company_____Date_____
Contact_____Title_____
Approval for Manufacturing/Signature_____

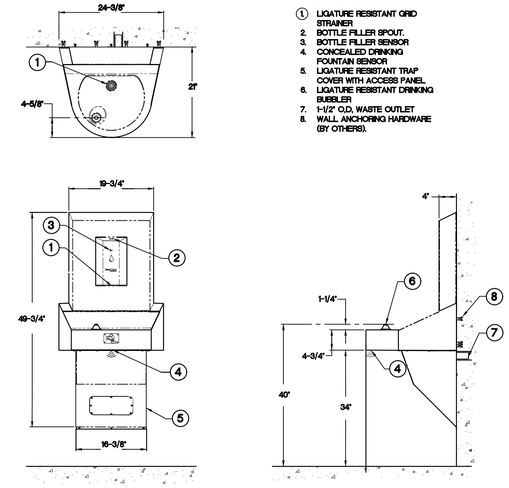
WH2142-W

Revised: 11/18/2022

WATER CLOSET DETAIL

SCALE: NONE

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KEYNOTES:

1. LIGATURE RESISTANT GRID STRAINER
2. BOTTLE FILLER SPOUT.
3. BOTTLE FILLER SENSOR
4. CONCEALED DRINKING FOUNTAIN SENSOR
5. LIGATURE RESISTANT TRAP COVER WITH ACCESS PANEL.
6. LIGATURE RESISTANT DRINKING BUBBLER
7. 1-1/2" O.D. WASTE OUTLET
8. WALL ANCHORING HARDWARE (BY OTHERS).

WHBF16

DRINKING FOUNTAIN DETAIL

SCALE: NONE

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Secur-Care® - Ligature Resistant LR1652FA Series

Ligature Resistant Lavatory with Oval Bowl - ADA 2010 Compliant - Front Access



See Note

LR1652FA-1-04-M

Patent Pending

Fixture May Show Some Available Options

Please visit ***www.acorneng.com*** *for most current specifications.*

Ligature Resistant Lavatory with Oval Bowl - ADA 2010 Compliant** - Front Access

Ligature Resistant Fixture is designed to be installed on a finished wall through a removable bottom secured with tamper-resistant screws. Optional Wall Sleeve is recommended to provide wall openings. Lavatory complies with ANSI, UFAS, CBC and ADA 2010 requirements for accessibility. Compliance is subject to the interpretation and requirements of the local code authority.

****NOTE:** Height of Lavatory Backsplash prevents ADA conformance for installation of a Mirror above unit since overall dimension exceeds requirements allowed for maximum height of reflective surface [ADA Reference: 603.3]. Contact Acorn Representative and/or Factory for a Modified Fixture to accommodate ADA Mirror height requirements.

Cabinet is fabricated from 14 gage, type 304 stainless steel and is seamless welded construction with exposed surfaces polished to a satin finish. Cabinet interior is sound-deadened with fire-resistant material.

Lavatory Oval Bowl is 14-3/4" x 9-1/2" x 4-1/2" deep and includes an integral fast drain. Standard P-trap waste outlet is 1-1/2" O.D. plain end and extends 3" beyond the rear of the fixture.

Optional Lavatory Valve is a pneumatically operated, pushbutton Air-Control valve using atmospheric air. Hemispherical pushbutton is vandal-resistant and requires less than 5 pounds to activate valve. Valve is metering, non-hold open type. Valve timing is adjustable from 5 to 60 seconds. Valve includes a 0.5 GPM flow control and can be remotely located up to 10 feet from the operating pushbutton. Valve and Bubbler conforms with lead free requirements of NSF61, Section 9 and CHSC 116875.

Regularly furnished items include a fast drain, an integral self-draining soap dish, hemispherical bubbler and pushbuttons, and mounting hardware. Wall anchors by others.

Suffix Option -DMB, Deck Mounted Bubbler optionally available, provides a hemispherical drinking bubbler that meets ADA requirements and lead free requirements of NSF61, Section 9 and CHSC 116875. This option also includes a separate hemispherical pushbutton and non-metering Air-Control valve with .7 GPM flow control.

DISCLAIMER: Due to the height off the Backsplash, a Mirror cannot be placed above unit with a reflective surface of 40" max A.F.F to conform with the ADA requirements.

GUIDE SPECIFICATION

Provide and install an Acorn - Ligature Resistant, ADA 2010 Compliant Lavatory with Oval Bowl, Front Access (specify model number and options). Unit shall conform with ANSI, UFAS, CBC and ADA requirements for accessibility. Fixture shall be fabricated from 14 gage, type 304 stainless steel. Construction shall be seamless welded and exposed surfaces shall have a satin finish. Countertop shall have an air-circulating, self-draining soap dish. Provide Air-Control pneumatically operated, metering, non-hold open valve with ADA compliant hemispherical pushbutton. Valve and Bubbler conform with lead free requirements of NSF61, Section 9 and CHSC 116875. Cabinet bottom shall be removable and secured with tamper-resistant screws. Cabinet interior shall be sound deadened with fire-resistant material. Fixture shall be furnished with necessary fasteners for proper installation.

Secur-Care® - Ligature Resistant LR1652FA:

Ligature Resistant Lavatory with Oval Bowl - ADA Compliant - Front Access

WALL THICKNESS AND TYPE (Must Specify)
Thickness: _____ Type: ❑ Concrete ❑ Block ❑ Steel

MODEL AND OPTIONS SELECTION:

BASE MODEL NUMBER
☑ LR1652FA — Ligature Resistant Lavatory with Oval Bowl -ADA Compliant - Front Access

FIXTURE MOUNTING AND WASTE (Must Specify)
☑ -1 — Off-Floor, Wall Outlet

VALVE SELECTION (Must Specify)
Air-Trol (Pneumatic)
❑ -03-M — Single Temp, Metering
❑ -04-M — Hot & Cold, Metering

Master-Trol (Electronic)
❑ -EVS1 — Single Temp
❑ -EVS2 — Hot & Cold
❑ -EVSP1 — Single Temp, Piezo Button
❑ -EVSP2 — Hot & Cold, Piezo Buttons

Master-Trol PLUS (Electronic)
❑ -MTP1 — Single Temp
❑ -MTP2 — Hot & Cold
❑ -MTPP1 — Single Temp, Piezo Button
❑ -MTPP2 — Hot & Cold, Piezo Buttons
-MTP VALVE OPTION
❑ -PFB — Power Failure Bypass (Provides emergency drinking water in the event of power failure)

Time-Trol (Electronic)
❑ -MVC1 — Single Temp
❑ -MVC1-BAT — Single Temp Battery Powered (Batteries Not Included)
❑ -MVC2 — Hot & Cold
❑ -MVC2-BAT — Hot & Cold Battery Powered (Batteries Not Included)

Programmable (Electronic) w/9VDC Plug-In Transformer
❑ -PPZ1 — Single Temp Programmable Piezo Button
❑ -PPZ2 — Hot & Cold Programmable Piezo Button

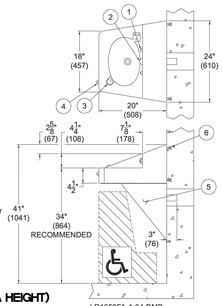
VALVE OPTIONS
❑ -BRS — Brass Body Valve
❑ -CI — Cycle Interrupt for Time-Trol Valves
❑ -TF — Transformer, 120VAC to 24VAC (-MVC option only)

CABINET OPTIONS
❑ -FMT — Fixture Mounted Trim
❑ -TG — 12 Gage Cabinet
❑ -THLR — Towel Hook
Left Side: ❑ Single ❑ Double
Right Side: ❑ Single ❑ Double

LAVATORY WASTE OPTIONS
❑ -LWE — Lavy Waste Extension (3" Standard)
Specify Length Beyond Fixture: _____

PRODUCT OPTIONS
❑ -DMB — Deck Mounted Hemispherical Drinking Bubbler (Cold water only) Not Applicable with -03-M tempered supply
☒ -EG — Enviro-Glaze, Specify Color: White
❑ -MT — Metal Template (Only 1 Required Per Project)
❑ -SW — Wall Sleeve
❑ -VAC — AcornVac System

Please visit ***www.acorneng.com*** for most current specifications.



(SET TO NON-ADA HEIGHT)

LR1652FA-1-04-DMB

NOTES:
1. Lavy Valve Hemispherical Pushbuttons
2. Lavy Hemispherical Bubbler
3. -DMB Deck Mounted Hemispherical Bubbler
4. Hemispherical Pushbutton for option -DMB
5. Removable Access Panel
6. Wall Mounting Anchors (By Others)

Important: Installation instructions and current rough-in are furnished with each fixture. Do not rough in without certified dimensions.
Dimensions are subject to manufacturer's tolerance of plus or minus 1/4" and change without notice. Acorn assumes no responsibility for use of void or superseded data. © Copyright 2009 Acorn Engineering Company

Selection Summary	Approved for Manufacturing
Model No. & Option_____	Company_____Title_____
Quantity_____	Signature_____ Date_____

LAVATORY DETAIL

SCALE: NONE

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Secur-Care® - Ligature Resistant LR1748 Series

Ligature Resistant - Wall Shower



LR1748-MV

• Patented D697,591
• Patent Pending

Fixture May Show Some Available Options

Please visit ***www.acorneng.com*** *for most current specifications.*

Ligature Resistant - Wall Shower

Shower is arranged to be installed onto finished wall and serviced from an accessible pipe chase. Optional Wall Sleeve or Metal Template is recommended for all installations for required wall openings. Fixture is fabricated from 14 gauge, type 304 stainless steel with exterior surfaces polished to a #4 satin finish.

Conical Showerhead is chrome-plated brass, and is Ligature-Resistant. The spray pattern is non-adjustable.

Valve is an ASSE 1016 compliant T/P Temperature/Pressure Balancing Mixing Valve with Patented Tri-Lever Handle. Valve automatically mixes hot and cold water to deliver blended water within a specific range and meets the stringent performance criteria for Temperature and Pressure changes defined by ASSE 1016. Valve includes a 1.6 GPM flow restrictor and can be remotely located up to 10 feet from the operating Pushbutton. Valve conforms with lead free requirements of NSF61, Section 9.

Optional Metering Valve in riser is a pneumatically operated Pushbutton, Air-Control Valve using atmospheric air. Pushbutton is Vandal-Resistant and requires less than 5 pounds of force to activate Valve. Valve is metering, non-hold open type. Valve timing is adjustable from 5 to 60 seconds. Valve conforms with the Lead-Free requirements of NSF61, Section 9.

Regularly furnished items include a Conical Showerhead, T/P Temperature/Pressure Balancing Mixing Valve and Mounting Hardware.

GUIDE SPECIFICATION

Provide and install Secur-Care® - Ligature-Resistant Wall Shower (specify model number and options). Shower Panel shall be fabricated from 14 gauge, type 304 stainless steel and shall have a #4 satin finish. Trim shall be stainless steel or chrome-plated brass. Shower Valve shall be ASSE 1016 T/P Temperature/Pressure Balancing Mixing Valve with Patented Tri-Lever handle. Fixture shall be furnished with necessary fasteners for proper installation.

Secur-Care® - Ligature Resistant: LR1748

Ligature Resistant Wall Shower

WALL THICKNESS AND TYPE (Must Specify)
Thickness: _____ Type: ❑ Concrete ❑ Block ❑ Steel

MODEL NUMBER AND OPTIONS SELECTION:

BASE MODEL NUMBER
☑ LR1748 Ligature Resistant Wall Shower

METERING RISER VALVE OPTIONS
❑ -MV — Metering Valve, Air-Control Metering
❑ -MV-EVS1 — Metering Valve, Electronic Valve System
❑ -MV-MTP1 — Metering Valve, Electronic Valve System PLUS
❑ -MV-MVC1 — Metering Valve, Time-Trol
❑ -MV-PPZ1 — Metering Valve, Programmable Piezo Button

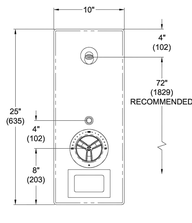
VALVE OPTIONS
❑ -BRS — Brass Body Valve
❑ -TF — Transformer, 120VAC to 24VAC (-MVC option only)

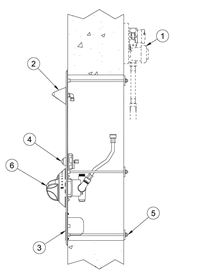
SHOWERHEAD OPTIONS
❑ -F — Flow Control, Must Specify:
❑ 2.0 GPM (Not Intended For Use in California)

PRODUCT OPTIONS
❑ -EG — Enviro-Glaze, Specify Color:_____
❑ -LRD — Less Recessed Soap Dish
❑ -MT — Metal Template (Only 1 Required Per Project)
❑ -SW — Wall Sleeve

Please visit ***www.acorneng.com*** for most current specifications.

NOTES:
1. -03-M Air-Control Valve
2. Conical Showerhead
3. Recessed Soap Dish
4. Hemispherical Pushbutton
5. Wall Mounting Hardware
6. T/P Temp. Press. Balancing Mixing Valve w/ Vandal and Ligature Resistant Tri-Lever Handle





LR1748-MV

⚠ WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

Important: Installation instructions and current rough-in are furnished with each fixture. Do not rough in without certified dimensions.
Dimensions are subject to manufacturer's tolerance of plus or minus 1/4" and change without notice. Acorn assumes no responsibility for use of void or superseded data. © Copyright 2009 Acorn Engineering Company

Selection Summary	Approved for Manufacturing
Model No. & Option_____	Company_____Title_____
Quantity_____	Signature_____ Date_____

SHOWER CONTROL DETAIL

SCALE: NONE

14

RA ARCHITECTS & ENGINEERS

ARCHITECTURE
GREG RAVATT, AIA

MECHANICAL ELECTRICAL
JIM ALBRECHT, PE

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REVISIONS

SEAL

REGISTERED PROFESSIONAL ENGINEER
JAMES B. ALBRECHT
No. M26555
EXP. 9-30-26
MECHANICAL
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

UNIT 3
PLUMBING DETAILS

DATE: 10/15/25

TECHNICIAN: MS

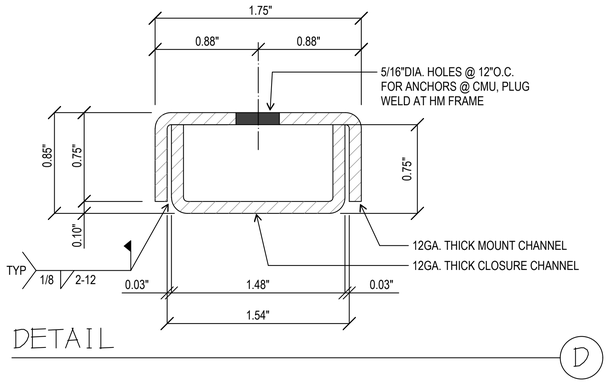
PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

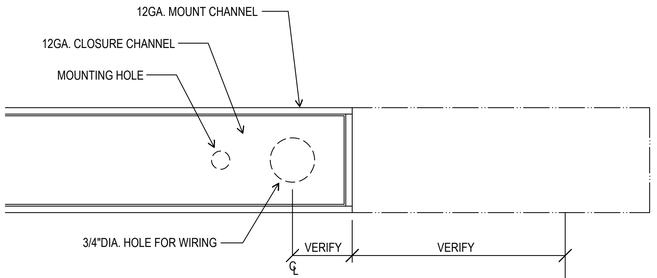
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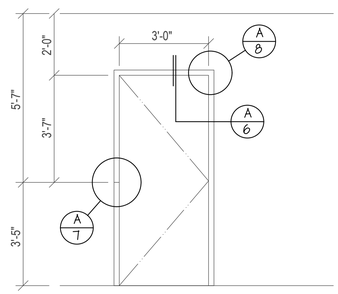


DETAIL D



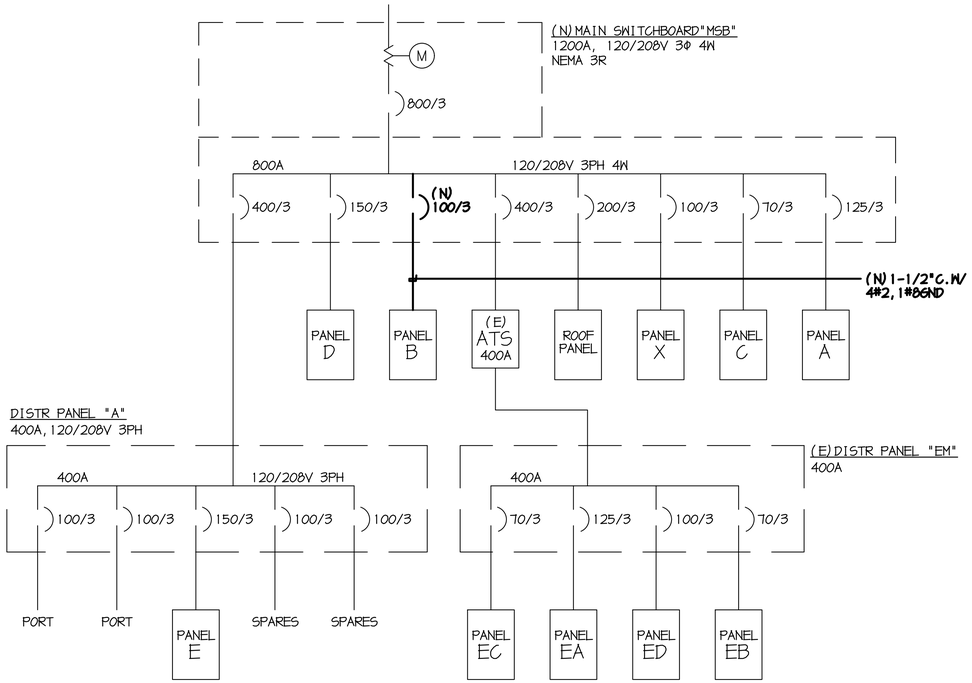
DETAIL C

NOTE: CONDUIT ROUTING SHALL BE FIELD VERIFIED



ENLARGED PARTIAL PLAN B

NOTE: CONDUIT ROUTING SHALL BE FIELD VERIFIED



SINGLE LINE DIAGRAM A

REFERENCE ONLY

GENERAL NOTES

1. VISIT JOB SITE AND VERIFY EXISTING CONDITIONS PRIOR TO BID.
2. THE ELECTRICAL WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE 2022 CALIFORNIA ELECTRICAL CODE AND ALL APPLICABLE LOCAL ORDINANCES. WHERE PLANS CALL FOR A HIGHER STANDARD THAN APPLICABLE CODES, THE PLANS SHALL GOVERN.
3. CONDUIT RUNS ARE SHOWN DIAGRAMMATICALLY. EXACT LOCATIONS SHALL BE DETERMINED IN THE FIELD TO SUIT FIELD CONDITIONS.
4. ALL ELECTRICAL EQUIPMENT, APPLIANCES AND LIGHTING FIXTURES SHALL BE LISTED BY A RECOGNIZED TEST LAB AND BEAR THAT LABEL OF APPROVAL.
5. CONTRACTOR SHALL FURNISH, INSTALL AND CONNECT ALL MATERIAL AND EQUIPMENT FOR THIS WORK UNLESS OTHERWISE NOTED.
6. FURNISH DISCONNECT SWITCHES AT REMOTE MOTORS.
7. ALL SPACES AS INDICATED ON PANELS OR SWITCHBOARDS SHALL BE COMPLETE WITH HARDWARE AND BUSSING FOR FUTURE BREAKER OR SWITCH.
8. CHECK ARCHITECTURAL PLANS FOR DOOR SWINGS BEFORE INSTALLING SWITCH OUTLETS.
9. GROUNDING AND BONDING SHALL BE PER CODE PLUS ANY ADDITIONAL PROVISIONS SPECIFIED OR SHOWN ON DRAWINGS.
10. ALL CONDUIT RUNS SHALL CONTAIN A CODE SIZED GREEN GROUND WIRE.
11. THESE PLANS ARE NOT COMPLETE UNTIL APPROVED BY THE AUTHORITY HAVING JURISDICTION.
12. ALL FEEDER CONDUCTORS SHALL BE IN CONDUIT. BRANCH CIRCUITS MAY BE NON-METALLIC SHEATHED CABLE.
13. ALL CONDUCTORS SHALL BE COPPER WITH TYPE THHN/THWN INSULATION.

SYMBOLS

- CONDUIT EXISTING
- CONDUIT CONCEALED IN WALL OR CEILING
- CONDUIT CONCEALED UNDER FLOOR OR BELOW GRADE
- CONDUIT STUBBED OUT AND CAPPED
- CONDUIT TURNED UP
- CONDUIT TURNED DOWN
- HATCH MARKS INDICATE NO. OF #12 WIRES IN CODE SIZED CONDUIT (3) MAX. IN 1/2" C., (5) MAX. IN 3/4" C., (8) MAX. IN 1"C., NO MARKS = 2#12.
- A-3 HOME RUN: LETTER INDICATES PANEL, NUMBER(S) INDICATES CIRCUIT(S).
- SAWCUT
- GROUND CONNECTION
- DISTRIBUTION SWITCHBOARD OR PANEL
- PANEL, BRANCH CIRCUIT TYPE, SURFACE AND FLUSH
- SIGNAL TERMINAL CABINET, SURFACE & FLUSH
- LINEAR SURFACE FIXTURE
- 2 OUTLET DATA: BAR INDICATES WALL MOUNT, LETTER INDICATES SWITCH CONTROL, NO. INDICATES CIRCUIT.
- SURFACE FIXTURE ON FLUSH OUTLET.
- RECESSED FIXTURE WITH JUNCTION BOX FOR THRU WIRING
- EXIT LIGHT WITH ARROWS AS SHOWN ON PLANS, WALL AND CEILING MOUNT.
- LOW LEVEL EXIT SIGN, +6" AFF, +4" FROM DOOR JAMB
- A / 100 LIGHT FIXTURE DESIGNATION, LETTER INDICATES TYPE, NO. INDICATES WATTAGE. SEE FIXTURE SCHEDULE.
- FC / 1 MECHANICAL EQUIPMENT DESIGNATION. SEE MECHANICAL DRAWINGS.
- SPECIAL RECEPTACLE – SEE PLAN
- METER
- FLUSH FLOOR RECEPTACLE
- RECEPTACLE, DUPLEX, 15A, 125V, NEMA 5-15R +18" U.N.O.
- DUPLEX RECEPTACLE MTD. ABOVE BACKSPLASH
- DUPLEX RECEPTACLE W/LOWER HALF SWITCHED
- GFI GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLE
- DOUBLE DUPLEX RECEPTACLE
- CEILING RECEPTACLE
- RECEPTACLE, DUPLEX, 20A, 125V, NEMA 5-20R +18" U.N.O.
- J JUNCTION BOX 4" SQUARE, 1-1/2" DEEP U.N.O.
- T THERMOSTAT F.B.O. +48"
- (2) MOTOR, NO. INDICATES HORSEPOWER
- CLOCK OUTLET +7'-6" U.N.O.
- DISCONNECT SWITCH, NON-FUSED
- F DISCONNECT SWITCH FUSED HORSEPOWER RATED OR SIZED AS NOTED
- COMBINATION MAGNETIC STARTER WITH DISCONNECT SWITCH AND FUSES
- MAGNETIC MOTOR STARTER W/OVERLOADS IN EACH PHASE
- D DIMMER W/INTEGRAL "ON-OFF" SW.
- PUSHBUTTON
- PC PHOTOCELL
- SD SMOKE DETECTOR
- TELEPHONE/COMPUTER/DATA OUTLET, TWO GANG BOX W/1 GANG COVERPLATE & GROMMETED OPENING +18" U.N.O.
- CABLE TV OUTLET +18" U.N.O.
- M MOTION SENSOR
- $ EXISTING SWITCH
- S SINGLE POLE SWITCH
- ^{2} DOUBLE POLE SWITCH
- ^{3} THREE WAY SWITCH
- ^{P} SWITCH W/PILOT LT.

  (QUIET TOGGLE TYPE RATED AT 20A, 120/277V A.C. +42" U.N.O.)
- ^{M} MANUAL MOTOR STARTER

FACP	FIRE ALARM CONTROL PANEL
GFI	GROUND FAULT CIRCUIT INTERRUPTING
LST	LABOR SAVING TANDEM
MLO	MAIN LUGS ONLY
w/	WITH
C.O.	CONDUIT ONLY
W.P.	WEATHERPROOF
F.B.O.	FURNISHED BY OTHERS, INSTALL & CONNECT
U.N.O.	UNLESS NOTED OTHERWISE
N.E.C.	NATIONAL ELECTRICAL CODE
N.I.C.	NOT IN CONTRACT
(E)	EXISTING
(N)	NEW
(R)	REMOVE
(RL)	RELOCATE
S/M	SURFACE MOUNT
U/G	UNDERGROUND
CWP	COLD WATER PIPE
AFF	ABOVE FINISHED FLOOR
HACR	HEATING AND AIR CONDITIONING RATED CIRCUIT BREAKER
N.L.	NIGHT LIGHT

NOTE: NOT ALL SYMBOLS SHOWN ARE USED ON THIS PROJECT

JMPE
ELECTRICAL ENGINEERING
LIGHTING DESIGN
CA REGISTRATION NO E13083
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REVISIONS

SEAL

REGISTERED PROFESSIONAL ENGINEER MICHAEL A. MALONEY E013083 EXP. 09/30/2027 ELECTRICAL STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
GENERAL NOTES
SYMBOLS
SINGLE LINE DIAGRAM

DATE: 12/18/2025

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22868

SHEET NUMBER
E0.1

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EXISTING PANEL "C"

SERVICE: 120/208V 3Φ 4W | MAIN BKR.: MLO | BUS: 225A | LOC.: SEE PLAN
SQUARE D, NQOB | MTG.: SURFACE

REMARKS	LOAD ΦA	LOAD ΦB	LOAD ΦC	REC	LTG	MISC	POLE	TRIP	CIRC	CIRC	TRIP	POLE	REC	LTG	MISC	LOAD ΦA	LOAD ΦB	LOAD ΦC	REMARKS
RM 153/155/156 LTG							1	20	1	2	20	1							RM 141 LTG
RM 145/151 LTG									3	4									RM 141 LTG
EXTERIOR LTG									5	6									RM 154 LTG
RM 140 LTG									7	8									EXTERIOR LTG
RM 141 LTG									9	10									EXTERIOR LTG
RM 141/152 RECEPS									11	12									RM 141/156/155 RECEPS
RM 140/145 RECEPS									13	14									RM 140/141 RECEPS
RM 141 CLOCK & RECEPS									15	16									STAFF DESK
SPARE									17	18									STAFF DESK
SPARE									19	20									DOOR POWER
SPARE									21	22									
									23	24									
									25	26									
									27	28									
									29	30									
									31	32									
									33	(N) 34	20	1					400		ERV / ROOF RECEPS
									35	36	25	2						1460	HP-1
									37	38	—	—				1460			———
									39	40	25	2					1150		CU-2
									41	42	—	—						1150	———
TOTAL WATTS= 5,620			ΦA= 1,460									ΦB= 1,550						ΦC= 2,610	
AMPS= (E)LOAD @ 33A + (N)LOAD @ 16A = 49A												MINIMUM BKR				A.I.C. RATING= 10,000 AMPS SYM			

EXISTING PANEL "EC"

SERVICE: 120/208V 3Φ 4W | MAIN BKR.: MLO | BUS: 225A | LOC.: SEE PLAN
SQUARE D NQOB | MTG.: FLUSH

REMARKS	LOAD ΦA	LOAD ΦB	LOAD ΦC	REC	LTG	MISC	POLE	TRIP	CIRC	CIRC	TRIP	POLE	REC	LTG	MISC	LOAD ΦA	LOAD ΦB	LOAD ΦC	REMARKS
EXISTING LOADS							1	20	1	2	20	1							EXISTING LOADS
									3	4									
									5	6									
									7	8									
									9	10									
									11	12									
									13	14									
									15	16									
									17	18									
							2	20	19	20									
							—	—	21	22									
							1	20	23	24									
OSSI EQUIPMENT	600						1	20	25 (N)	26									
OSSI EQUIPMENT		600							27	28									
SPARE			100						29	30									
TOTAL WATTS= 1,300			ΦA= 600									ΦB= 600						ΦC= 100	
AMPS= (E)LOAD @ 42A + (N)LOAD @ 4A = 46A												MINIMUM BKR				A.I.C. RATING= 10,000 AMPS SYM			

FIXTURE SCHEDULE

TYPE	MANUFACTURER AND CATALOG NUMBER	LED MODULE TYPE	LED MODULE COLOR	WATTS	DRIVER	OPTIC / LENS	REMARKS
A 55	KENALL MMAC14-S-O-7-FA-45L35K-DCC-DV-LVCD		3500K	45	ELECTRONIC	DIFFUSE	SURFACE 1FT X 4FT ANTI-LIGATURE
AN 55	KENALL MMAC24-S-O-7-FA-45L35K-DCC-DV-NLW-LVCD		3500K	45	ELECTRONIC	DIFFUSE	SURFACE 2FT X 4FT ANTI-LIGATURE W/ NIGHT LIGHT
B 25	KENALL RQCA0-1-23L35K-DCC-DV-2-1-DLN-CC		3500K	23	ELECTRONIC	POLYCARB	12"X12" RECESSED W/ NIGHT LIGHT
C 50	KENALL RMCD-2-FL/TR-0-45L35K-DCC-DV-2-1		3500K	45	ELECTRONIC	POLYCARB	24" X 24" RECESSED VERIFY CEILING TYPES
D 10	KENALL BHSH-MW-W-SO-35K9-DV-HE		3500K	7	ELECTRONIC	POLYCARB	BATHROOM SCONCE

EXISTING PANEL "B"

SERVICE: 120/208V 3Φ 4W | MAIN BKR.: MLO | BUS: 225A | LOC.: SEE PLAN
SQUARE D NQOB | MTG.: FLUSH

REMARKS	LOAD ΦA	LOAD ΦB	LOAD ΦC	REC	LTG	MISC	POLE	TRIP	CIRC	CIRC	TRIP	POLE	REC	LTG	MISC	LOAD ΦA	LOAD ΦB	LOAD ΦC	REMARKS
EXISTING LIGHTING							1	20	1	2	20	1							EXISTING LIGHTING
EXISTING LIGHTING									3	4									EXISTING LIGHTING
EXISTING LIGHTING									5	6									EXISTING LIGHTING
EXISTING RECEPS									7	8									EXISTING LIGHTING
EXISTING RECEPS									9	10									EXISTING LIGHTING
EXISTING RECEPS									11	12									EXISTING RECEPS
IRRIG CONTROL									13	14									EXISTING RECEPS
SPACE									15	16									EXISTING RECEPS
PARKING LOT LTG							1	20	17	18									SPARE
PARKING LOT LTG									19	20									SPARE
SIGN									21	22									SPARE
SPARE									23	24									EXISTING LIGHTING
309 OFFICE RECEPS	720			4			1	20	25 (N)	(N) 26	20	1				1600			REFRIG / MICROWAVE
311/312 OFFICE RECEPS		1080		6					27	28							1200		DISPOSAL
332 STAFF DESK			500	2					29	30								1500	SM APPLIANCE
302 MPR RECEPS	540			3					31	32						1500			SM APPLIANCE
319 MPR RECEPS		890		4					33	34	50	2					4800		RANGE
DOOR POWER			180			3			35	36	—	—						4800	———
TOTAL WATTS= 19,310			ΦA= 4,360									ΦB= 7,970						ΦC= 6,980	
AMPS= (E)LOAD @ 29A + (N)LOAD @ 53A = 82A												MINIMUM BKR				A.I.C. RATING= 10,000 AMPS SYM			

EXISTING PANEL "EB"

SERVICE: 120/208V 3Φ 4W | MAIN BKR.: MLO | BUS: 225A | LOC.: SEE PLAN
SQUARE D NQOB | MTG.: FLUSH

REMARKS	LOAD ΦA	LOAD ΦB	LOAD ΦC	REC	LTG	MISC	POLE	TRIP	CIRC	CIRC	TRIP	POLE	REC	LTG	MISC	LOAD ΦA	LOAD ΦB	LOAD ΦC	REMARKS
#1 RM 126 LIGHTING							1	20	1	2	20	1							#2 RM 120 & 123 LTS
SPARE									3	4									(N) WORKSTATION 1
RM 127 / 128 / 129 LTS									5	6									(N) WORKSTATION 2
RM 135 / 133 / 139 LTS									7	8									RM 130/131/132 LTS
RM 137 / 138 / 139 LTS									9	10									EXTERIOR LTS
MONITORS									11	12									RECEPS
TELCO TERMINAL									13	14									RECEPS
EF-1							1	15	15	16									SHOWER SOLENOID
EF-2							1	15	17	18									RM 117, FAN CONTROL
EF-3							3	15	19	20	20	3							HV-1
									21	22									
									23	24									
PARKING LOT LTS							2	20	25	26	15	3							HV-2
———							—	—	27	28									
CAMERAS							1	20	29	30									
HEATER CONTROL									31	32	20	1							
CAMERAS									33	34	20	1							REFRIG
CAMERAS									35	36	15	2							KITCHEN APPL
HV #2									37	38	—	—							KITCHEN APPL
									39	(N) 40	20	1							(N) WORKSTATIONS
									41	(N) 42	20	1							(N) WORKSTATIONS
TOTAL WATTS= 0			ΦA= 0									ΦB= 0						ΦC= 0	
AMPS= 0												MINIMUM BKR				A.I.C. RATING= 10,000 AMPS SYM			

#1 = COMBINE (E) LIGHTING CIRCUITS 1 & 3 & 6
#2 = COMBINE (E) LIGHTING CIRCUITS 2 & 4

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REVISIONS

SEAL

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

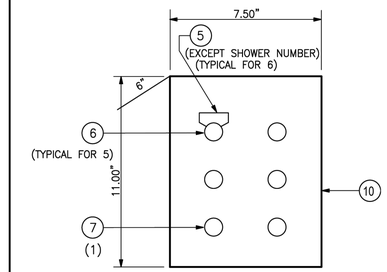
BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
FIXTURE SCHEDULE
PANEL SCHEDULES

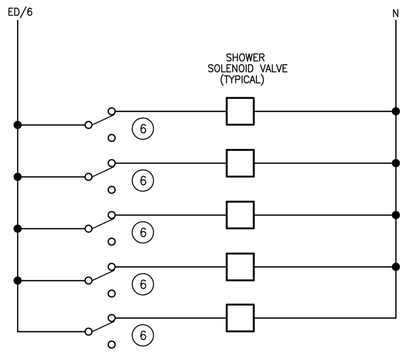
DATE: 10/23/2025
TECHNICIAN: MS
PROJECT MANAGER: MS
JOB NUMBER: RA # 22868
SHEET NUMBER
E0.2

CONTROL SYSTEMS COMPONENTS

I.D. NO.	DESCRIPTION	REFERENCE
(5)	LEGEND PLATE WITH ROOM NUMBERS	ALLEN–BRADLEY BULLETIN 800T (7–43)
(6)	2 POSITION SELECTOR SWITCH ↖ ON ↗ OFF MAINTAINED	ALLEN–BRADLEY BULLETIN 800T (7–20)
(7)	HOLE SEALS	HOFFMAN (9–15)
(10)	AUDIO MONITORING SWITCH BANK.	



SHOWER CONTROL SWITCH BANK



SHOWER CONTROL DIAGRAM

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BSCC PLAN REVIEW NUMBER
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SHEET TITLE
DETAILS

DATE: 10/13/25

TECHNICIAN: MS

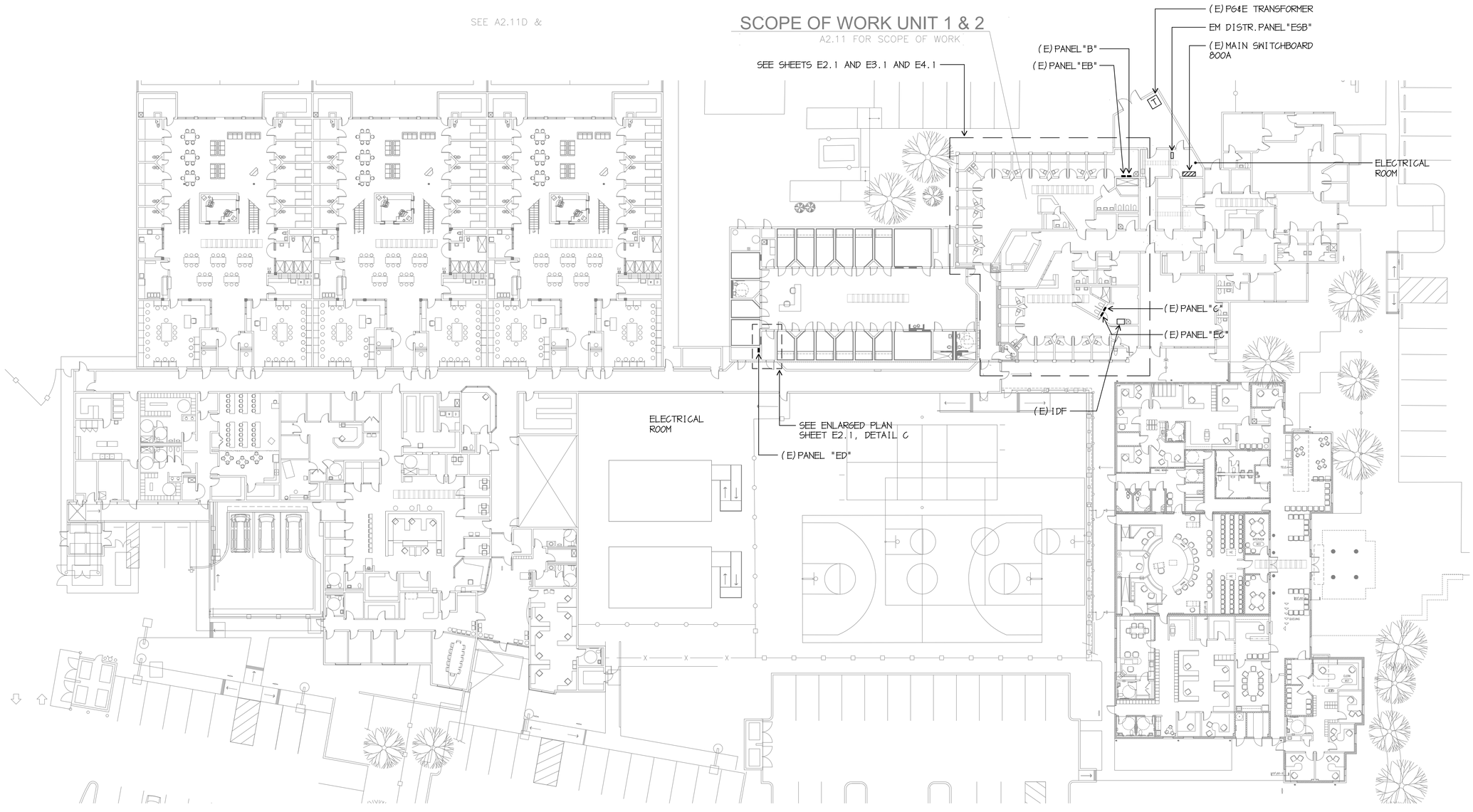
PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
E0.3

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OVERALL FLOOR POWER PLAN

SCALE: 1" = 20'-0"

NORTH

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#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
OVERALL FLOOR POWER PLAN

DATE: 12/18/2025

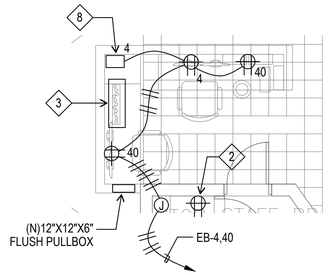
TECHNICIAN: MS

PROJECT MANAGER: MS

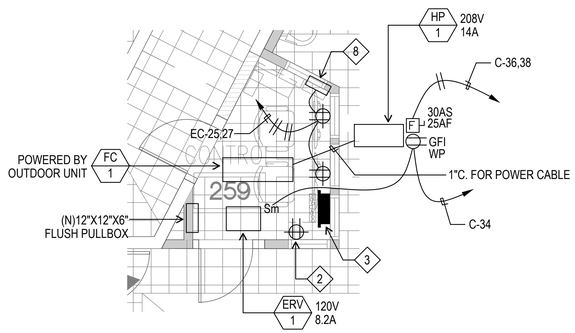
JOB NUMBER: RA # 22868

SHEET NUMBER
E1.1

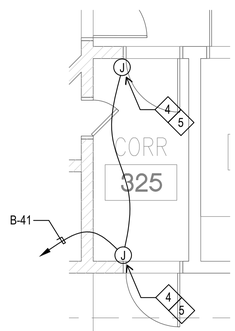
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ENLARGED POWER PLAN A



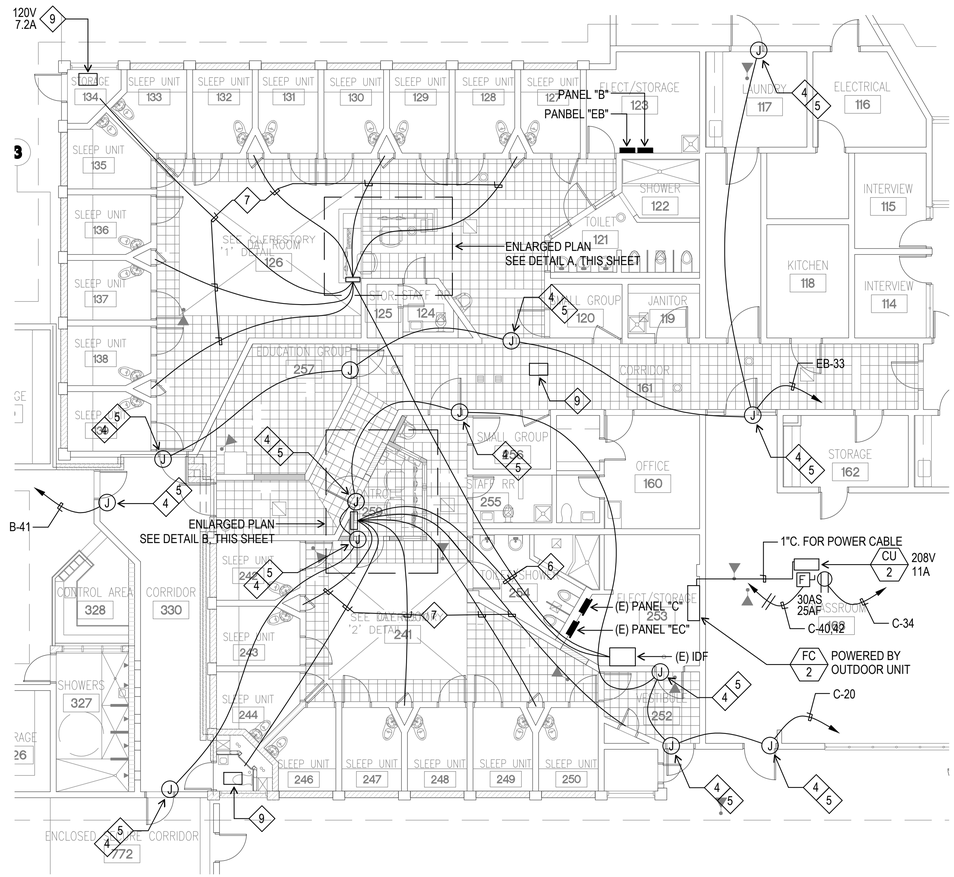
ENLARGED POWER PLAN B



ENLARGED POWER PLAN C

ELECTRICAL NOTES

1. RELOCATE (E) ELECTRICAL BOXES, OUTLETS, ETC. AS NECESSARY TO ACCOMODATE NEW WALLS
2. RE-USE EXISTING DEDICATED CIRCUITS AND CONNECT NEW RECEPTACLES.
3. PROVIDE NEW PULLBOX, 18"x24"x4", RECESSED IN NEW WALL TO INTERCEPT (15) EXISTING LOW VOLTAGE AND LIGHTING CONTROL CONDUITS. SEE DETAILS ON SHEET E0.3
4. CONNECT DOOR POWER. SEE DETAILS ON SHEET E0.1
5. PROVIDE DEEP 4S-J-BOX, TYPICAL AT DOORS FIELD VERIFY LOCATION
6. 3/4"C. FROM FLUSH PULL BOX TO IDF
7. 3/4"C. FROM FLUSH PULL BOX TO CLOSET
8. PROVIDE 300VA TRANSFORMER 120VAC - 12VDC FOR OSSI CONTROLS
9. REPLACE EXISTING EF. DISCONNECT EXISTING FAN. INSTALL NEW MOTOR RATED SWITCH AND CONNECT NEW EF TO THE SAME CIRCUIT AND CONTROL.



POWER & DATA PLAN

SCALE: 1/8" = 1'-0"

NORTH

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COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

POWER PLANS

DATE: 12/18/2025

TECHNICIAN: MS

PROJECT MANAGER: MS

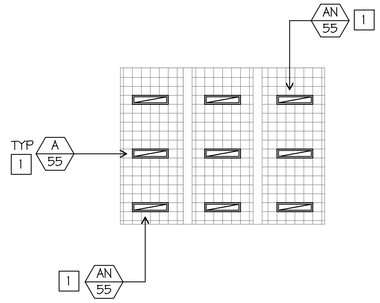
JOB NUMBER: RA # 22.868

SHEET NUMBER
E2.1

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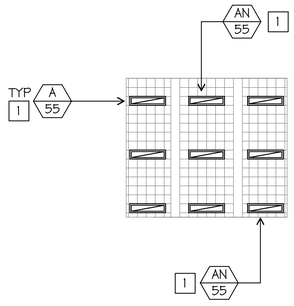
LIGHTING NOTES

1. REPLACE EXISTING FIXTURES CONNECT TO (E)CIRCUITS
2. NEW EF, 120V CONNECT TO (E) LIGHTING CIRCUIT
3. REMOVE EXISTING FIXTURE & PATCH CEILING
4. EXISTING LIGHTS TO REMAIN
5. NEW FIXTURE SURFACE MOUNT & CONNECT TO (E) CIRCUIT & CONTROL
6. PROVIDE WIRED ROOM CONTROLLER FOR EACH SLEEP UNIT. PROVIDE 120V FROM LIGHTING CIRCUIT. ROUTE CAT5 CABLE TO LIGHTING CONTROLLER IN STAFF STORAGE ROOM. (UNIT 1) STAFF DESK (UNIT 2)
7. PROVIDE ON-OFF NIGHT CONTROL CONSOLE FOR EACH SLEEPING ROOM LOCATED AT THE STAFF DESK.



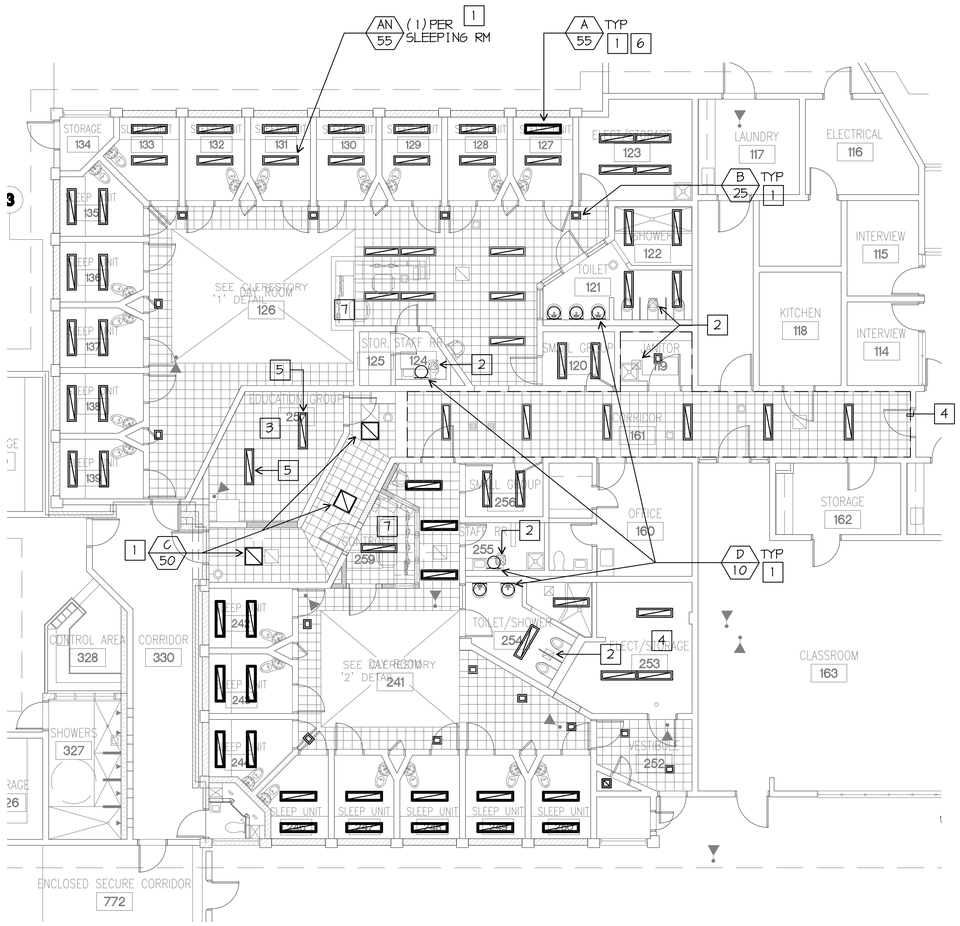
CLERESTORY 1

SCALE: 1/8" = 1'-0"



CLERESTORY 2

SCALE: 1/8" = 1'-0"



LIGHTING PLAN

SCALE: 1/8" = 1'-0"

NORTH

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General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

LIGHTING PLANS

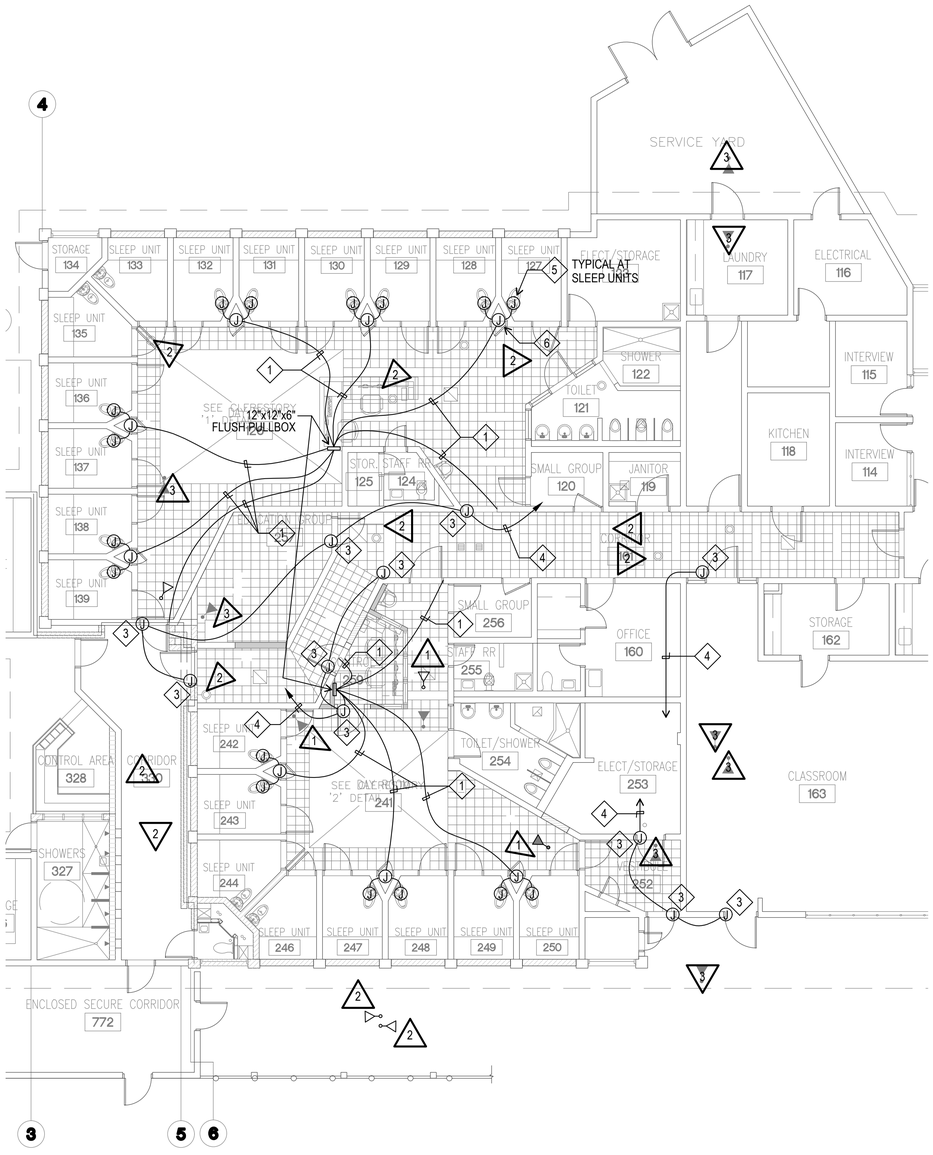
DATE: 12/18/2025

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
E3.1



CAMERA/INTERCOM PLAN

SCALE: 1/8" = 1'-0"

NORTH

CAMERA NOTES

1. NEW SECURITY CAMERA
   FURNISH AND INSTALL 3/4" CONDUIT WITH
   CAT6A FROM 4S BOX LOCATED NEAR CAMERAS TO NETWORK
   SWITCH LOCATED IN ROOM 253
2. EXISTING SECURITY CAMERAS TO REMAIN
   FURNISH AND INSTALL 3/4" CONDUIT WITH
   CAT6A FROM 4S BOX LOCATED NEAR CAMERAS TO NETWORK
   SWITCH LOCATED IN ROOM 253
3. NEW SECURITY CAMERAS FOR BSCC APPROVAL
   FURNISH AND INSTALL 3/4" CONDUIT WITH
   CAT6A FROM 4S BOX LOCATED NEAR CAMERAS TO NETWORK
   SWITCH LOCATED IN ROOM 253

ELECTRICAL NOTES

1. 3/4"C. FROM FLUSH PULL BOX TO DOOR FRAME
2. 3/4"C.O. (INTERCOM)
   SAWCUT CONCRETE FLOOR
3. 4S-DEEP J-BOX, TYPICAL AT BLOCK WALL
   INSIDE SLEEPING UNIT
4. 3/4"C.O. (INTERCOM) TO IDF
5. RECESSED IN BLOCKWALL J-BOX, 4S DEEP FOR
   INTERCOMM. FIELD VERIFY LOCATIONS.
6. SURFACE MOUNT J-BOX, DEEP IN PLUMBING CLOSETS.

JMPE
ELECTRICAL ENGINEERING
LIGHTING DESIGN
CA REGISTRATION NO E13083
24768
2860 SANTA MARIA WAY #D4
SANTA MARIA, CA 93455
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Written dimensions take precedence over scaled dimensions. Do not scale plans. Contractor shall verify all dimensions and conditions in the field. Any discrepancies shall be called to the attention of RA & Associates.

REVISIONS

SEAL

REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. MALONEY
ELECTRICAL
STATE OF CALIFORNIA
EXP. 09/30/2027

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 1 & 2 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

CAMERA / INTERCOM PLAN

DATE: 10/10/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER

E4.1

C:\Users\robar\OneDrive - JMPE Electrical Engineering\DWG\2024 DWGS\24768\24768 E4-1.dwg, 10/10/2025 2:19:11 PM, DWG To PDF.pc3

Attachment: A (part 3 of 3)

Project plans and specifications

COUNTY OF SANTA BARBARA, GENERAL SERVICES DEPARTMENT

PROBATION SANTA MARIA JUVENILE JUSTICE CENTER

UNIT 3 REMODEL

4263 CALIFORNIA BLVD. SANTA MARIA, CALIFORNIA 93455

SYMBOLS

BUILDING SECTION — SECTION NUMBER; SHEET NUMBER WHERE SECTION IS DRAWN

WALL SECTION — SECTION NUMBER; SHEET NUMBER WHERE SECTION IS DRAWN

DETAIL — DETAIL NUMBER; SHEET NUMBER WHERE DETAIL IS DRAWN

INTERIOR ELEVATION — 1 ELEVATION NUMBER; 2 DETAIL NUMBER; 3 SHEET FOUND; 4

WALL TYPE — WALL TYPE SEE A10.60

DOOR NUMBER — DOOR NUMBER SEE A5.11

WINDOW NUMBER — WINDOW LETTER SEE A5.11

KEYNOTE — NUMBER OR LETTER

REVISION NUMBER — REVISION NUMBER

ACCESSORY OR EQUIPMENT — ACCESSORY NUMBER OR LETTER

CEILING IDENTIFICATION — 8'-0" CEILING HEIGHT; GYP CEILING MATERIAL

BSCC REVIEW INFORMATION

BSCC PLAN REVIEW NUMBER 83-7574.06

SCOPE OF WORK

REMODEL/REFURBISH UNIT 3 THROUGHOUT FOR RELOCATION OF LOS PRIETOS CAMP DELINQUENT YOUTH. REMODEL IS TO INCLUDE BUT NOT LIMITED TO, AN INTERCOM/CALL BUTTON IN SLEEPING ROOMS TO NEW STAFF STATION, NEW DOORS AND FRAMES IN SLEEPING ROOMS TO SWING IN THE DIRECTION OF EGRESS, NEW STAFF RESTROOM, NEW VANDAL RESISTANT LIGHT FIXTURES, NEW STAFF CONTROL DESK WITH NEW SECURITY/MONITORING FEATURES, NEW CAMERA SYSTEM, NEW SMOKE DETECTORS, NEW YOUTH SHOWER/RESTROOMS WITH ANTI-LIGATURE PLUMBING FIXTURES. REFURBISH KITCHEN ADJACENT TO UNIT 1 FOR SERVICES TO UNIT 3. REFER TO DRAWINGS FOR FULL SCOPE OF WORK.

PROJECT TEAM

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805-928-5002

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CLIENT CONTACT:
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PROJECT MANAGER, CAPITAL PROJECTS
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SANTA MARIA, CA 93455
805-886-1390

GENERAL NOTES

(Use wherever applicable, unless noted otherwise in the plans, California Buidling Code and specifications.)

1. Do not scale plans.
2. This project and all construction shall conform with the California Code of Regulations, Title 24, 2022 California Building Code (CBC), 2022 California Historical Building Code (CHBC), 2022 California Existing Building Code (CEBC), 2022 California Green Building Standards Code (CGBSC), 2022 California Mechanical Code (CMC), 2022 California Plumbing Code (CPC), 2022 California Electrical Code (CEC), 2022 California Energy Code (CEC Part 6), 2022 California Fire Code (CFC), current (2022) California and (2010) Federal ADA Standards for Accessible Design.
3. All dimensions are to be verified in the field. Any discrepancies are to be immediately brought to the attention of the architect. Do not proceed with work without resolving discrepancies.
4. Dimensions shown shall take precedence over drawings scale or proportion. Larger scale drawings take precedence over smaller scale drawings.
5. Required sanitary facilities to be provided on the job.
6. Omissions and/or conflicts in the drawings shall not relieve the contractor from completing work which is necessary to carry out the intent of the drawing and/or complete work to standards required by code.
7. These notes indicate construction for BUILDING AND SITE unless otherwise noted or shown. Features of construction shown are typical and shall apply to all drawings unless otherwise noted or shown. Features of construction shown are typical and shall apply generally throughout to similar conditions. Unless noted otherwise all vestibules, closets, columns projections, recesses, or other adjacent areas within scheduled areas shall have finishes as scheduled for the respective spaces in which they occur. All omissions or conflicts between the various elements of the Working Drawings and/or General Notes shall be brought to the attention of the architect before proceeding with any work so involved.
8. All work, and all construction methods and materials shall comply with all provisions of the Building Codes and other rules, regulations and ordinances governing the place of the building. Building Code requirements in all cases take precedence over the drawing. It shall be the responsibility of anyone supplying labor or materials or both to bring to the attention of the architect any discrepancies or conflicts between the requirements of the code and the drawings.
9. Unless noted otherwise, all dimensions are to face of studs, concrete, or masonry.
10. Contractor shall arrange and pay for all temporary utility services and connections during construction.
11. Any changes in construction shall be accompanied by a Change Order issued by the General Contractor and approved by the owner and architect.
12. The contract drawings and specifications represent the finished improvements. Unless otherwise shown, they do not indicate method of construction. Contractor shall supervise and direct work and shall be solely responsible for all construction means, methods, techniques, sequences and procedures. Observation visits to the site shall not include inspections of the protective measures or the construction procedures required for same, which are the sole responsibility of the contractor.
13. Contractor hereby guarantees to the owner that all materials, fixtures, and equipment furnished to the project are new unless otherwise specified. Contractor also warrants that all work will be of good quality and free from any faults and defects for a period of one year after the date of substantial completion, unless a greater warranty or guarantee is required by the project specifications.
14. Anyone supplying labor and/or materials to the project shall carefully examine all subsurfaces to receive work. Any conditions detrimental to work shall be reported to the architect. Commencement of work shall imply acceptance of all subsurfaces.
15. Any material stored at the site shall be completely supported free of the ground, covered and otherwise protected to avoid damage.
16. Building contractor shall submit shop drawings for all fabricated structural components to the architect for review and approval.
17. No hazardous materials will be stored/used within the building which exceed quantities listed in 2022 CBC tables 307.1(1) and 307.1(2).
18. Approved numbers/addresses should be provided so as to be plainly visible from the street.
19. At the time of final inspection, a Building Operations and Maintenance Manual shall be placed in the building. The manual shall contain the information listed in CGBSC Section 4.410.1.
20. A separate grading permit is not required for this project.
21. All contractors performing work on this project shall comply with the requirements of the 2022 CFC Ch. 11 and 33, and NFPA 241 fire-prevention program throughout all phases of demolition and construction.
22. All finishes, furnishings, and materials shall meet the minimum requirements of 2022 CFC Chapter 8 for flame spread and smoke development.

SHEET INDEX

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ARCHITECTURE	
A1.10	OVERALL FLOOR PLAN – SCOPE OF WORK AREAS
A2.11D	DEMOLITION FLOOR PLAN – UNIT 3
A2.11	FLOOR PLAN – UNIT 3
A3.11	ENLARGED PLANS – KITCHEN & CONTROL DESK
A5.11	FINISH SCHEDULE & DOOR SCHEDULE
A7.11	BUILDING SECTIONS
A8.11D	DEMOLITION REFLECTED CEILING PLAN
A8.11	REFLECTED CEILING PLAN
A9.11	INTERIOR ELEVATIONS
A9.12	INTERIOR ELEVATIONS
A9.13	INTERIOR ELEVATIONS
A10.50	DETAILS
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M3.11	MECHANICAL FLOOR PLAN – KITCHEN
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E0.3	DETAILS
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E2.2	KITCHEN POWER PLAN
E3.1	LIGHTING PLAN
E4.1	CAMERA PLAN

CONCEALMENT OF SYSTEM DISTRIBUTION

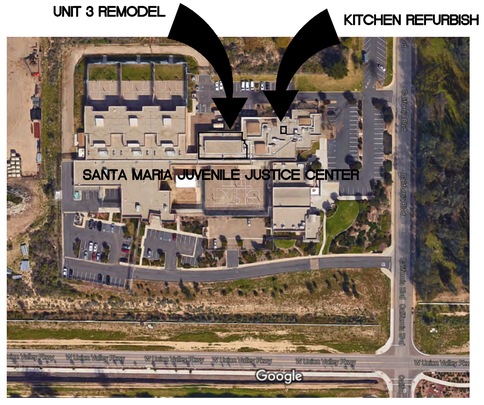
IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE ROUTING OF ALL WIRED SYSTEMS CABLING, RACEWAYS, CONDUIT, JUNCTION BOXES, BACK BOXES AND ENCLOSURES, ENSURING IT IS CONCEALED AT ALL YOUTH OCCUPIED SPACES.

THE CONTRACTOR IS ALSO FULLY RESPONSIBLE FOR RESTORING TO ORIGINAL CONDITION, ANY AND ALL AREAS OPENED (CEILINGS, SOFFITS, ETC.) TO PROVIDE CONCEALMENT OF THESE AFOREMENTIONED SYSTEMS.

ABBREVIATIONS

(E)/EXIST.	(E)/EXISTING
@ AT	
A.B.	ANCHOR BOLT
A.C.	ACOUSTIC
A.F.F.	ABOVE FINISHED FLOOR
ADDT.	ADDITIVE
ADJ.	ADJUSTABLE/ADJACENT
ALUM.	ALUMINUM
BD.	BOARD
BLK'G	BLOCKING
C.J.	CONTROL JOINT
C.M.U.	CONCRETE MASONRY UNIT
C.T.	CERAMIC TILE
C.T.FLR.	CERAMIC TILE FLOOR
C.T.I.	CERAMIC TILE INSTITUTE
CAB.	CABINET
CLG.	CEILING
CLR.	CLEAR
COL.	COLOR
CONC.	CONCRETE
CONT.	CONTINUOUS
CONT'D.	CONTINUED
CT.	COAT
DET.	DETAIL
DIA.	DIAMETER
DIM.	DIMENSION
DISP.	DISPENSER
DWG	DRAWING
E.J.	EXPANSION JOINT
ELEC.	ELECTRICAL
ENT	ENTRANCE
F.D.	FLOOR DRAIN
FIN.	EL. FINISHED ELEVATION
FIN.	FLR. FINISHED FLOOR
FLR.	FLOOR
FT.	FEET
FTG.	FOOTING
G.W.B.	GYPSUM WALL BOARD
GYP. BD.	GYPSUM BOARD
HT.	HEIGHT
INFO.	INFORMATION
INSUL.	INSULATION
L	LONG
M.R.	MOISTURE RESISTANCE
MAX.	MAXIMUM
MFR.	MANUFACTURER
MIN.	MINIMUM
MTL.	METAL
N.I.C.	NOT IN CONTRACT
NO./#	NUMBER
O/	OVER
O.C.	ON CENTER
OPEN'G	OPENING
P.T.D.F.	PRESSURE TREATED DOUGLAS FIR
PART'NS	PARTITIONS
PL.	PLATE
PLAS.LAM.	PLASTIC LAMINATE
PLYWD.	PLYWOOD
PREP.	PREPARE
PT.	PAINT
REF.	REFERENCE
REQ.	REQUIRED
S.F.	SQUARE FEET
S.S.	STAINLESS STEEL
SCHED.	SCHEDULE
SHT.	SHEET
SIM.	SIMILAR
SL.	SLIDING
SOFF.	SOFFIT
STL.	STEEL
STRUCT.	STRUCTURAL
SUSP.	SUSPENDED
THK.	THICK
TOIL.	TOILET
TYP.	TYPICAL
V.C.T.	VINYL COMPOSITION TILE
VFY.	VERIFY
W/	WITH
W.C.	WATER CLOSET
W.P.	WATER PROOF
W.W.M.	WELDED WIRE MESH

AREA OF WORK



EXISTING JUVENILE JUSTICE CENTER INFORMATION

LEGAL

EXISTING USE	JUVENILE HALL
LOCATION	4263 CALIFORNIA BLVD. SANTA MARIA, CA 93454
ASSESSOR PARCEL NO.	111-230-69
SITE AREA	80 ACRES
ZONING	PF – PUBLIC FACILITIES
DISTRICT	FRONT: 15'
SETBACKS	SIDE: 10'
	REAR: 10'
MAXIMUM HEIGHT	(3) STORIES OR 35'

REVIEW AGENCY PERMIT NUMBERS

CEQA/NEPA ENVIRONMENTAL	MITIGATED NEGATIVE DEC. 01-ND-15, SEPT. 2001
STATE BOC GRANT PROJ. NO.	013-99
FEDERAL OJP/CPO PROJ NO.	CA-22
BOC PLAN REVIEW NO.(HALL)	083-7574-04
BOC PLAN REVIEW NO.(COURT)	083-7574-01
CSFM PLAN REVIEW NO.(HALL)	43-42-45-0004-000-040-0
CSFM PLAN REVIEW NO.(COURT)	43-42-45-0021-000-040-0
SB COUNTY BLDG PERMIT NO.	02-00470
CITY OF SANTA MARIA PLAN CHECK	GOV 02-0002

PROJECT INFORMATION

20 BED JUVENILE HALL-UNIT 1 & 2 (1977)	11,700 SF	I-3 OCCUPANCY	TYPE I, NON-SPRINKLERED BLDG WITH 4 HOUR FIRE AREA SEP WALL
30 BED JUV HALL ADDTN – UNIT 3 (1999)	5,325 SF	I-3 OCCUPANCY	TYPE I, FULLY SPRINKLERED BLDG
90 BED ADDIITON TO JUVENILE HALL-			
UNITS 4, 5, & 6 (2005)	26,950 SF	I-3 OCCUPANCY	TYPE I, FULLY SPRINKLERED BLDG
(3) 30 BED HOUSING UNITS (TWO TIER)	18,000 SF	I-3/B OCCUPANCY	TYPE I, FULLY SPRINKLERED BLDG
INTAKE / ADMIN FACILITY	44,950 SF SUBTOTAL		
JUVENILE COURT ADDITION (2005)	12,000 SF 56,950 SF TOTAL ADDITION	A-3/B/I-3 OCCUPANCY	TYPE V, NON-RATED THROUGHOUT EXCEPT FOR I-3 OCCUPANCY AREA BEING TYPE V-1HR; FULLY SPRINKLERED BUILDING

SEE DRAWINGS FOR FIRE RATINGS OF BUILDING ELEMENTS AND REQUIRED SEPARATIONS, ETC.

RA ARCHITECTS & ENGINEERS

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REVISIONS

SEAL

REGISTERED ARCHITECT
GREGORY ALLEN RAVATT
LICENSE NO. C26608
EXP. 9-30-27
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

TITLE SHEET

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER

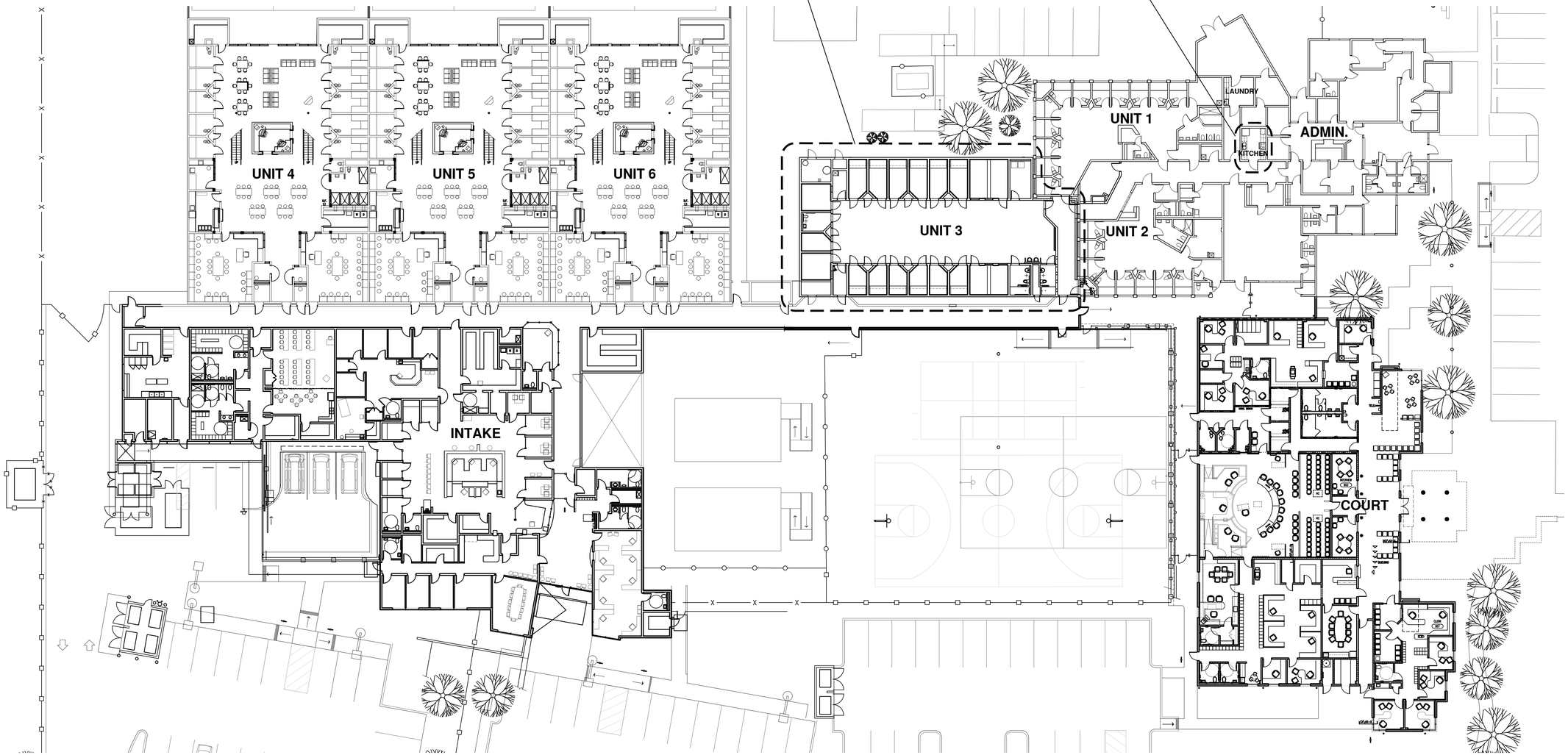
A0.01

SCOPE OF WORK UNIT 3

SEE A2.11D & A2.11 FOR SCOPE OF WORK

KITCHEN

SEE A3.11 FOR SCOPE OF WORK



OVERALL FLOOR PLAN - SCOPE OF WORK AREAS

N

0 10' 20' 40'

SCALE: 1"= 20'-0"

RA ARCHITECTS & ENGINEERS

ARCHITECTURE
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LICENSE #23608
EXP. 9-30-27
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83-7574.06

SHEET TITLE
OVERALL FLOOR PLAN
SCOPE OF WORK AREAS

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

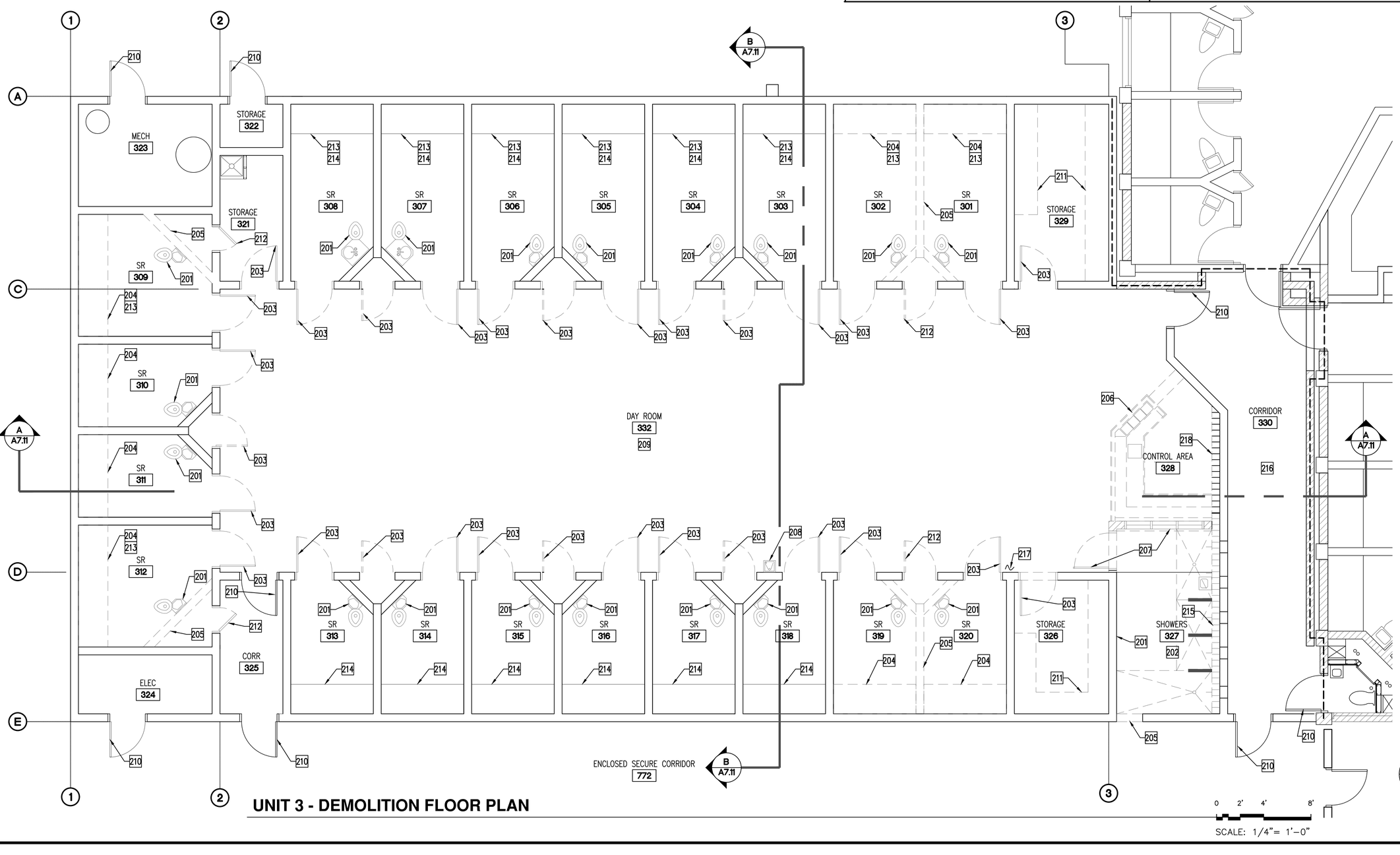
SHEET NUMBER
A1.10

GENERAL NOTES

1. THE DEMOLITION PLAN INDICATES THE APPROXIMATE EXTENT OF DEMOLITION REQUIREMENTS. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE EXTENT OF DEMOLITION REQUIRED TO INSTALL ALL NEW CONSTRUCTION.
2. REFER TO OTHER ARCHITECTURAL DEMOLITION PLANS FOR ADDITIONAL DEMOLITION SCOPE OF WORK.
3. REFER TO PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION REQUIREMENTS.
4. CONTRACTOR SHALL PROTECT PORTIONS OF EXISTING CONSTRUCTION NOT INDICATED TO BE DEMOLISHED. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPLACEMENT AND REPAIR OF ITEMS TO REMAIN.
5. CONTRACTOR SHALL REMOVE AND STORE ALL MISCELLANEOUS ITEMS TO INCLUDE: MARKERBOARDS, TACKBOARDS, FIRE EXTINGUISHERS, NAME PLATES, SIGNAGE, CLOCKS, WALL-HUNG PICTURES/MAPS, ETC. THAT HAS NOT BEEN PREVIOUSLY REMOVED BY THE OWNER.
6. CONTRACTOR MUST MAINTAIN ACCESS TO AREAS ADJACENT TO DEMOLISHED AND IMPROVEMENT AREAS. SEE SPECIFICATIONS FOR REQUIREMENTS.
7. AFTER REMOVING THE LAV./TOILETS IN EXISTING SLEEPING ROOMS, REMOVE THE STEEL SLEEVE PASS THROUGH INSERTED IN THE WALL OPENING BEHIND THE FIXTURE AND INFILL THE HOLE WITH CONCRETE BEFORE INSTALLING GYP. BD. WALL FINISH.

KEYNOTES

201	REMOVE PLUMBING FIXTURES AND ASSOCIATED PLUMBING IN SLEEPING ROOM, SEE GENERAL NOTE 7
202	REMOVE ALL PLUMBING FIXTURES AND ASSOCIATED PLUMBING, ACCESSORIES, PARTITION WALLS, CERAMIC FLOOR & WALL TILE IN EXISTING SHOWER ROOM
203	REMOVE METAL SECURITY DOOR AND FRAME, PREP FOR NEW WOOD DOORS
204	REMOVE CONCRETE BUNK
205	REMOVE (E) CMU WALL, SEE STRUCTURAL FOR REINFORCING AND SEQUENCE OF DEMOLITION
206	REMOVE CONTROL STATION CASEWORK, ELECTRICAL AND ELEVATED CONCRETE FLOOR (SEE BUILDING SECTION A/A7.11)
207	REMOVE DOOR AND ASSOCIATED CMU WALL WITH WINDOWS
208	REMOVE DRINKING FOUNTAIN
209	REMOVE (E) TABLES AND FURNITURE IN DAYROOM
210	(E) DOOR, FRAME AND HARDWARE TO BE REMAIN
211	REMOVE (E) SHELVING
212	REMOVE (E) DOOR & FRAME FOR WALL INFILL
213	REMOVE WALL MOUNTED STEEL BUNK ABOVE CONCRETE BUNK
214	(E) CONCRETE BUNK TO REMAIN
215	REMOVE (E) METAL STUD W/ PLASTER FINISH WALL
216	REMOVE VINYL TILE FLOORING, ADHESIVE & TOPSET BASE, PREP CONCRETE SLAB FOR CONCRETE SEALER
217	REMOVE PART OF CONCRETE SLAB FOR EXISTING FOOTING REINFORCEMENT, SEE STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION
218	REMOVE (E) PLASTER WALL FINISH, METAL STUDS TO REMAIN



UNIT 3 - DEMOLITION FLOOR PLAN

RA ARCHITECTS & ENGINEERS

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REVISIONS

SEAL

REGISTERED ARCHITECT GREGORY ALLEN RAVATT LICENSED ARCHITECT EXP. 9-30-27 STATE OF CALIFORNIA

PROJECT

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SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
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COUNTY PROJECT
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BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

DEMOLITION FLOOR PLAN

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22868

SHEET NUMBER
A2.11D

TITLE 24 SUICIDE HAZARD NOTES

THE ARCHITECTURAL PLANS SHALL BE REVIEWED BY THE BOARD (BSCC) FOR THE PURPOSE OF REDUCING HAZARDS POSED BY FIXTURES AND EQUIPMENT WHICH COULD BE USED FOR AN ACT OF SUICIDE BY A YOUTH. THE FACILITY HAS BEEN DESIGNED TO AVOID ANY SURFACES, EDGES, FIXTURES, OR FITTINGS THAT CAN PROVIDE AN ATTACHMENT FOR HANGING OR OTHER OPPORTUNITY FOR SELF–INFLICTED INJURY. THE FOLLOWING FEATURES HAVE BEEN INCORPORATED IN THE DESIGN OF SLEEPING ROOMS, BATHROOMS AND ANY OTHER AREA WHERE A JUVENILE MAY BE LEFT WITHOUT DIRECT VISUAL SUPERVISION.

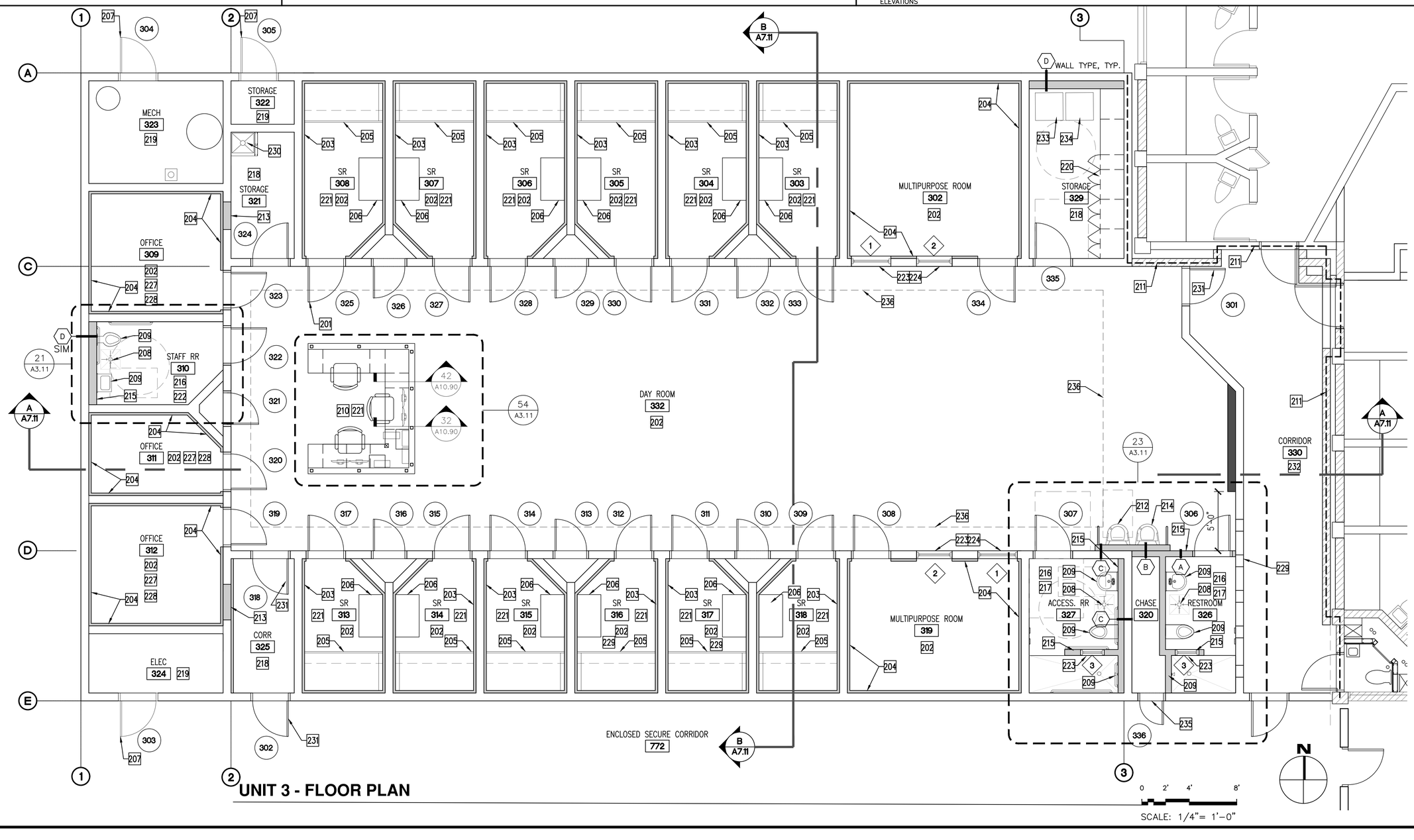
A. PLUMBING SHALL NOT BE EXPOSED. OPERATION OF CONTROL VALVES USE FLUSH BUTTONS OR SIMILAR. DRINKING FOUNTAIN WATER SPOUT IS WITHOUT CURVED PROJECTIONS.
B. TOWEL HOLDERS SHALL BE BALL–IN–SOCKET OR INDENTED CLASP, NOT PULL–DOWN HOOKS OR BARS.
C. SUPPLY AND RETURN GRILLES AND ANY OTHER VENT OR SECURITY COVER SHALL HAVE OPENINGS NO GREATER THAN 3/16 INCH OR HAVE 16 MESH PER SQUARE INCH.
D. BEDS, DESK SURFACES AND SHELVES SHALL HAVE NO SHARP EDGES AND SHALL BE CONFIGURED TO PREVENT ATTACHMENT.
E. LIGHT FIXTURES SHALL BE TAMPER RESISTANT.
F. FIXTURES SUCH AS MIRRORS SHALL BE MOUNTED USING TAMPER–RESISTANT FASTENERS.
G. EXTEND THE EXISTING CAMERA SYSTEM FOR THE COMPLEX TO INCLUDE NEW CAMERAS TO VIEW ENTRANCES TO ALL SLEEPING ROOMS AND YOUTH RESTROOMS.

GENERAL NOTES

1. DIMENSIONS ARE TO INSIDE FACE OF WALL AT EXTERIOR WALLS AND FACE OF EXISTING WALLS AS INDICATED TO FACE OF STUDS AT (N) INTERIOR WALLS U.O.N.
2. ALL OPENINGS ARE DIMENSIONED TO CENTERLINE OF OPENING U.O.N.
3. REFER TO SHEET A10.70 FOR TYP. METAL FRAMING DETAILS.
4. ALL OPENINGS NOT DIMENSION ARE 3" FROM INSIDE CORNER OF ADJACENT INTERSECTING WALL OR CENTERED IN THE WALL IN WHICH THEY OCCUR.
5. REFER TO ELECTRICAL DRAWINGS FOR NEW LOW VOLTAGE/ DATA/ PHONE LOCATIONS.
6. REFER TO ELECTRICAL DRAWINGS FOR SCOPE OF WORK FOR EXISTING AND NEW ELECTRICAL DISTRIBUTION.
7. REFER TO MECHANICAL DRAWINGS FOR SCOPE OF WORK TO HVAC SYSTEMS.
8. PATCH AND REPAIR ALL EXPOSED HOLES PRIOR TO PAINTING.
9. PROVIDE BLOCKING PER DETAIL 44/A10.60 AT ALL WALLS WHERE ITEMS ARE BEING INSTALLED THAT REQUIRE BLOCKING INCLUDING ACCESSORIES THAT ARE NOT IN CONTRACT.
10. ALL JOINTS, PENETRATIONS AND OTHER OPENINGS IN THE BUILDING ENVELOPE THAT ARE POTENTIAL SOURCES OF AIR LEAKAGE SHALL BE CAULKED, GASKETED, WEATHER STRIPPED, OR OTHERWISE SEALED TO LIMIT INFILTRATION AND EXFILTRATION.
11. ALL WALL FRAMING AND GYP. BD. SHALL GO TO UNDERSIDE OF ROOF STRUCTURE.
12. CLEAN ALL (E) MECHANICAL DUCTS AND (E) GRILLES. PAINT ALL GRILLES LOCATED IN CEILINGS, SOFFIT AND WALLS TO MATCH ADJACENT SURFACES.
13. PROVIDE NEW SMOKE DETECTORS IN ALL SLEEPING UNITS, TYP.
14. PRIOR TO THE INSTALLATION OF MECHANICAL, PLUMBING, ELECTRICAL AND ARCHITECTURAL EQUIPMENT AND COMPONENTS, ALL TRADES SHALL COORDINATE WITH OTHER TRADES USING THE SAME SPACE TO ENSURE THAT ALL COMPONENTS FIT WITHIN THE SPACE AVAILABLE.
15. PROVIDE AN INTERCOM IN ALL SLEEPING UNITS FOR COMMUNICATION WITH STAFF AT CONTROL DESK.
16. FOR WALL TYPES, SEE A10.60

KEYNOTES

201	PROVIDE NEW DOOR, FRAME AND ANTI–LIGATURE HARDWARE, TYP. U.O.N. THROUGHOUT FOR INTERIOR DOORS, SEE DOOR SCHEDULE A5.11
202	PROVIDE NEW VINYL PLANK FLOORING, SEE FINISH SCHEDULE A5.11
203	PROVIDE NEW GYPSUM BOARD FINISH O/ (E) CMU WALL FULL HEIGHT TO CEILING, ALL WALLS
204	PROVIDE NEW 2 ½" FURRED WALL W/ GYP. BD. FINISH O/ (E) CMU WALL FOR NEW ELECTRICAL RECEPTACLES
205	PROVIDE NEW WOOD BED FRAME O/ (E) CAST–IN–PLACE CONCRETE BED FOR TWIN SIZE MATTRESS, SEE TYPICAL SLEEPING ROOM A9.12 & DET. 12/A10.90
206	OWNER FURNISHED, CONTRACTOR INSTALLED FLOOR MOUNTED DESK – COORDINATE WITH OWNER
207	EXISTING DOOR, FRAME AND HARDWARE TO REMAIN
208	PROVIDE NEW FLOOR DRAIN, SEE PLUMBING DRAWINGS
209	PROVIDE NEW ANTI–LIGATURE PLUMBING FIXTURE, SEE PLUMBING DRAWINGS
210	PROVIDE NEW STAFF DESK WITH AN EMERGENCY SUMMONS ASSIST BUTTON, POWER, DATA, AND COMPUTER/HARDWARE/SOFTWARE REQUIRED FOR STAFF CONTROL OF MULTIPLE SYSTEMS
211	EXISTING 4 HR FIRE RATED SEPARATION WALL
212	PROVIDE NEW ACCESSIBLE ANTI–LIGATURE DRINKING FOUNTAIN WITH BOTTLE FILLER, SEE PLUMBING DRAWINGS
213	PROVIDE CMU WALL INFILL WHERE DOOR & FRAME WERE REMOVED, SEE STRUCTURAL DRAWINGS
214	PROVIDE NEW ANTI–LIGATURE DRINKING FOUNTAIN, SEE PLUMBING DRAWINGS
215	PROVIDE NEW METAL STUD WALL WITH FULL HT. CERAMIC TILE FINISH, SEE INTERIOR ELEVATIONS & WALL TYPE 'A' DET. 32/A10.50
216	PROVIDE THIN SET CERAMIC TILE FLOORING, SEE FINISH SCHEDULE A5.11
217	PROVIDE FULL HT. THIN SET CERAMIC TILE WALL FINISH, SEE INTERIOR ELEVATIONS
218	PROVIDE NEW SHEET VINYL FLOORING, SEE FINISH SCHEDULE A5.11
219	NO NEW WORK IN THIS ROOM
220	PROVIDE NEW CABINETS WITH LOCKING DOORS AND ADJUSTABLE STORAGE SHELVES, SEE INTERIOR ELEVATIONS
221	EXTEND EXISTING COMPLEX TWO–WAY SOUND ACTIVATED AUDIO MONITORING SYSTEM AND PROVIDE EQUIPMENT FOR COMMUNICATION DIRECTLY BETWEEN THE DAYROOM STAFF DESK AND OCCUPANTS OF EACH SLEEPING ROOM, GROUP ROOM AND YOUTH RESTROOM
222	PROVIDE 5'–6" HIGH CERAMIC TILE WAINSCOT AT EACH WALL
223	PROVIDE NEW SAFETY LAMINATED GLAZED VIEW WINDOWS, SEE WINDOW TYPES A5.11
224	PROVIDE CMU INFILL UNDER NEW WINDOW, SEE STRUCTURAL DRAWINGS
225	PROVIDE NEW PLUMBING FIXTURE, SEE PLUMBING DRAWINGS
226	PROVIDE BLOCKOUTS FOR PLUMBING FIXTURES, COORDINATE WITH PLUMBING
227	PROVIDE NEW OFFICES WITH EMERGENCY SUMMONS ASSIST BUTTON, SEE ELECTRICAL DRAWINGS
228	PROVIDE OFFICES WITH POWER AND DATA, SEE ELECTRICAL DRAWINGS
229	INFILL PLUMBING ACCESS OPENINGS IN CMU WALL PRIOR TO PAINTING ALL WALLS
230	CLEAN/REFURBISH EXISTING MOP SINK & SURROUNDING FRP WALL FINISH
231	NEW DOOR & FRAME WITH ELECTRONIC DOOR LOCK, STRIKE AND INTERCOM, N.I.C.
232	PROVIDE CONCRETE SEALER TO PREPPED CONCRETE SLAB
233	ELECTRIC WASHER – OWNER FURNISHED, CONTRACTOR INSTALLED
234	ELECTRIC DRYER – OWNER FURNISHED, CONTRACTOR INSTALLED
235	PROVIDE NEW OPENING IN (E) CMU WALL FOR NEW DOOR, SEE STRUCTURAL DRAWINGS
236	LINE OF SOFFIT ABOVE



UNIT 3 - FLOOR PLAN

SCALE: 1/4"= 1'–0"

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REVISIONS

SEAL

REGISTERED ARCHITECT GREGORY ALLEN RAVATT LICENSED 2008 EXP. 9-30-27 STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

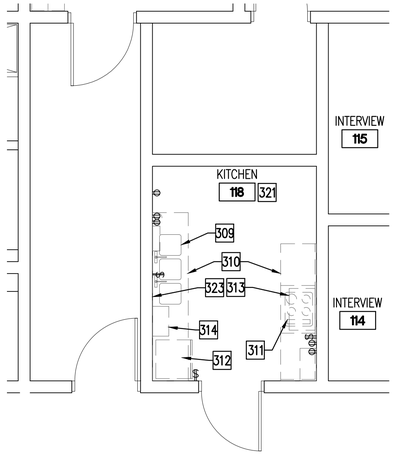
COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

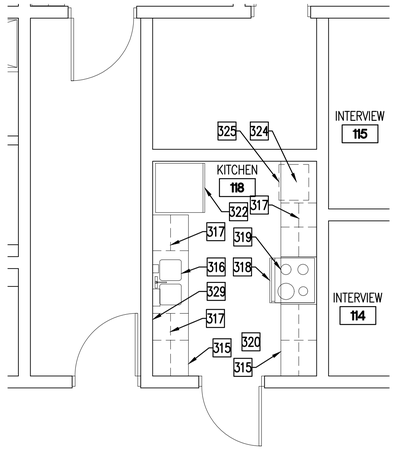
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FLOOR PLAN

DATE: 10/15/25
TECHNICIAN: MS
PROJECT MANAGER: MS
JOB NUMBER: RA # 22.868

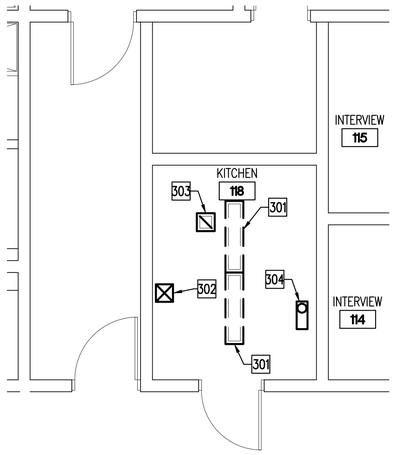
SHEET NUMBER
A2.11

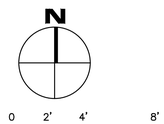


KITCHEN - DEMOLITION FLOOR PLAN

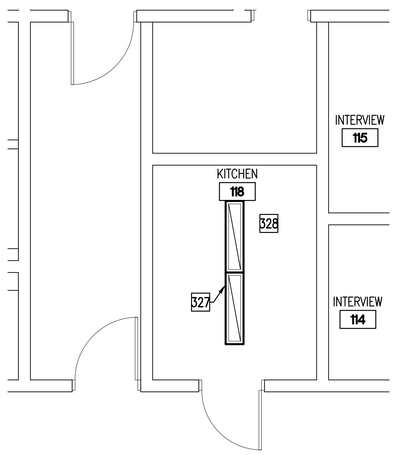


KITCHEN - FLOOR PLAN

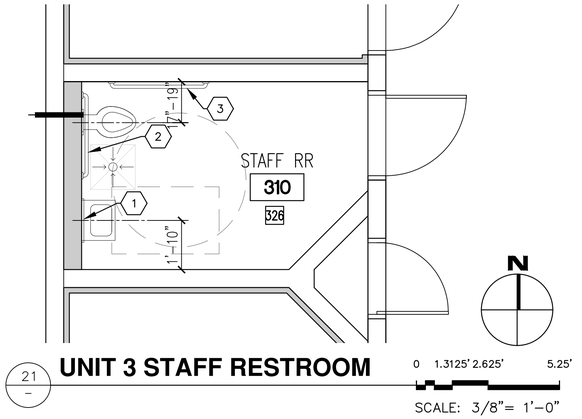




KITCHEN - DEMO. REFL. CEILING PLAN

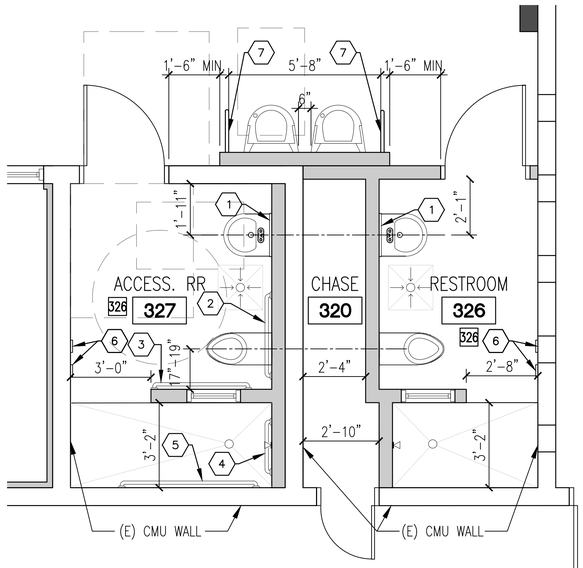


KITCHEN - REFLECTED CEILING PLAN



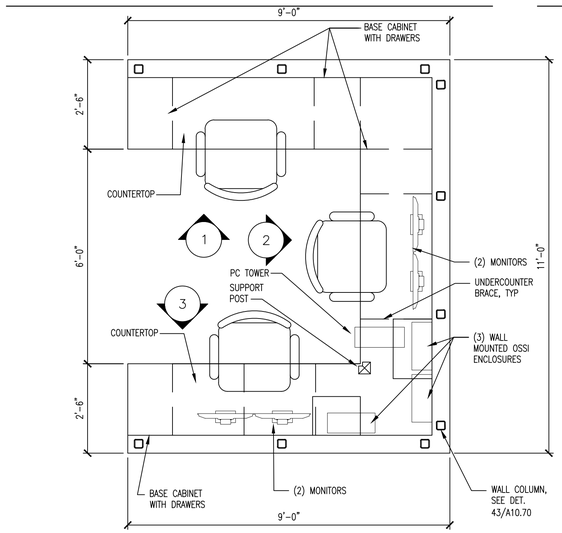
21 / –

UNIT 3 STAFF RESTROOM



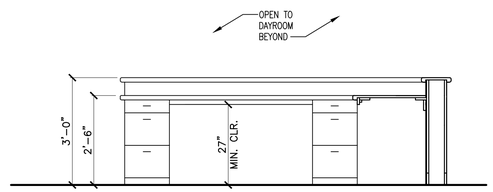
23 / –

UNIT 3 YOUTH RESTROOMS

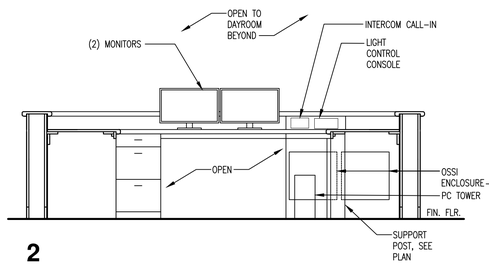


54 / –

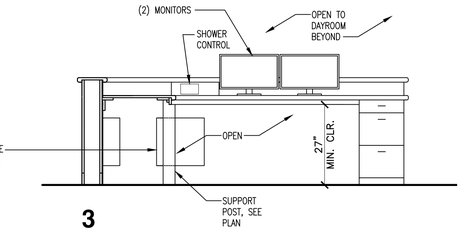
STAFF CONTROL DESK
UNIT 3



1



2



3

0 2' 4' 8'
SCALE: 1/2"= 1'-0"

KEYNOTES

301 REMOVE (E) LIGHT FIXTURES
302 REMOVE (E) MECHANICAL SUPPLY REGISTER
303 REMOVE (E) MECHANICAL RETURN REGISTER
304 REMOVE (E) RANGE HOOD VENT DUCT
305 PROVIDE NEW LED LIGHT FIXTURE, SEE ELECTRICAL
306 PROVIDE NEW MECHANICAL SUPPLY REGISTER, SEE MECHANICAL
307 PROVIDE NEW MECHANICAL RETURN REGISTER, SEE MECHANICAL
308 PROVIDE NEW RANGE EXHAUST HOOD, SEE MECHANICAL
309 REMOVE (E) SINKS, FAUCETS AND PIPING
310 REMOVE (E) CABINETS/COUNTERTOPS
311 REMOVE (E) ELECTRIC COOKTOP
312 REMOVE (E) BUILT-IN OVENS
313 REMOVE (E) EXHAUST HOOD
314 REMOVE (E) UPPER CABINET
315 PROVIDE NEW CASEWORK WITH SOLID SURFACE COUNTERTOP & BACKSPLASH
316 PROVIDE NEW DOUBLE SINK WITH FAUCET AND DISPOSAL, SEE PLUMBING DRAWINGS
317 PROVIDE NEW UPPER CABINETS
318 NEW ELECTRIC INDUCTION RANGE WITH OVENS, OWNER FURNISHED CONTRACTOR INSTALLED
319 PROVIDE NEW EXHAUST HOOD & DUCT, SEE MECHANICAL
320 PROVIDE NEW LINOLEUM FLOORING WITH COVED BASE
321 REMOVE (E) FLOORING & BASE
322 NEW REFRIGERATOR W/ BOTTOM FREEZER, OWNER FURNISHED CONTRACTOR INSTALLED
323 REMOVE (E) DRYWALL FINISH FOR OWNER SUPPLIED ACCESSORY BACKING INSTALLATION, COORDINATE WITH OWNER
324 PROVIDE NEW TALL CABINET
325 NEW BUILT-IN MICROWAVE, OWNER FURNISHED CONTRACTOR INSTALLED
326 PROVIDE BACKING IN ALL NEW METAL STUD WALLS FOR GRAB BARS, ACCESSORIES, ETC. – COORDINATE WITH OWNER FOR OWNER SUPPLIED ACCESSORIES
327 PROVIDE NEW LED LIGHT FIXTURES AT (E) GYP. BD. CEILING
328 PAINT EXISTING GYP. BD. CEILING
329 PROVIDE NEW GYP. BD. FINISH

ACCESSORY LEGEND

1 FRAMED MIRROR, SEE SPECIFICATIONS
2 36" LONG STAINLESS STEEL GRAB BAR, ATTACH PER DET. 31 & 41/A10.60
3 42" LONG STAINLESS STEEL GRAB BAR, ATTACH PER DET. 31 & 41/A10.60
4 24" LONG STAINLESS STEEL GRAB BAR, ATTACH PER DET. 31/A10.60
5 60" LONG STAINLESS STEEL GRAB BAR, ATTACH PER DET. 31/A10.60
6 BOBRICK B-9884 ADJUSTABLE AUTO-RELEASE CLOTHES/TOWEL HOOK
7 DRINKING FOUNTAIN BARRIER RAILS, BOBRICK 819298

NOTE: REFER TO DETAILS AND 21/A10.90 FOR MOUNTING HEIGHTS AND LOCATIONS.

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EXP. 9-30-27
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ENLARGED PLANS

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
A3.11

DOOR HARDWARE

REFER TO SPECIFICATION 087100 FOR FULL DESCRIPTION OF HARDWARE SETS

DHW-4
3 HINGE (HEAVYWEIGHT) IVES 5BB1HT 4.5"X4.5" BALL BEARING W/ HOSPITAL TIPS
1 CLASSROOM LOCK BEST SPSL-ML-R-16F
1 MORTISE CYLINDER BEST 1E74-C4-RP3-626 HOUSING W/ SCHLAGE SFIC CORE (VERIFY SYSTEM)
1 KICKPLATE IVES 8400 12" HIGH

DHW-5
3 HINGE (HEAVYWEIGHT) IVES 5BB1HT 4.5"X4.5" BALL BEARING W/ HOSPITAL TIPS
1 OFFICE/PRIVACY LOCK BEST SPSL-ML-A-16F
1 MORTISE CYLINDER BEST 1E74-C4-RP3-626 HOUSING W/ SCHLAGE SFIC CORE (VERIFY SYSTEM)
1 KICKPLATE IVES 8400 12" HIGH

DHW-6
3 HINGE (HEAVYWEIGHT) IVES 5BB1HT 4.5"X4.5" BALL BEARING W/ HOSPITAL TIPS
1 PASSAGE BEST SPSL-ML-ON-16F
1 THRESHOLD PEMKO 271 & PEMKO 211 W/ TORX FASTENERS (SEE DETAIL 34/A10.50)
1 KICKPLATE IVES 8400 12" HIGH

DHW-7
3 HINGE (HEAVYWEIGHT) IVES 5BB1HT 4.5"X4.5" BALL BEARING W/ HOSPITAL TIPS
1 STOREROOM/KEYED ENTRY BEST SPSL-ML-D-16F
1 MORTISE CYLINDER BEST 1E74-C4-RP3-626 HOUSING W/ SCHLAGE SFIC CORE (VERIFY SYSTEM)

DHW-8
3 HINGE (HEAVYWEIGHT) IVES 5BB1HT 4.5"X4.5" BALL BEARING W/ HOSPITAL TIPS
1 BATHROOM/PRIVACY BEST SPSL-ML-LT-16F
1 MORTISE CYLINDER BEST 1E74-C4-RP3-626 HOUSING W/ SCHLAGE SFIC CORE (VERIFY SYSTEM)
1 THRESHOLD PEMKO 256
1 KICKPLATE IVES 8400 12" HIGH

DHW-9
3 HINGE (HEAVYWEIGHT) IVES 5BB1HT 4.5"X4.5" BALL BEARING W/ HOSPITAL TIPS
1 OFFICE/PRIVACY LOCK BEST SPSL-ML-A-16F
1 MORTISE CYLINDER BEST 1E74-C4-RP3-626 HOUSING W/ SCHLAGE SFIC CORE (VERIFY SYSTEM)
1 THRESHOLD PEMKO 256
1 KICKPLATE IVES 8400 12" HIGH

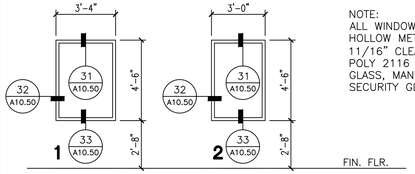
GENERAL NOTES- DOORS

1. THE MAXIMUM EFFORT TO OPERATE DOORS SHALL BE AS FOLLOWS: INTERIOR DOORS = 5 LBS., EXTERIOR DOORS = 5 LBS., FIRE DOORS = 15 LBS MAX. (THE AUTHORITY HAVING JURISDICTION MAY INCREASE THE MAXIMUM EFFORT TO OPERATE FIRE DOORS TO ACHIEVE POSITIVE LATCHING, BUT NOT TO EXCEED 15 LBS.
2. ALL DOOR HARDWARE IN UNIT SHALL BE ANTI-LIGATURE.
3. UNLESS OTHERWISE NOTED, ALL DOORS ARE 1 3/4" THICK.
4. ALL HOLLOW METAL DOORS SHALL BE 16 GAUGE AND HOLLOW METAL FRAMES SHALL BE 14 GAUGE UNLESS OTHERWISE NOTED.
5. VERIFY IN FIELD, HEIGHT AND WIDTH OF EXISTING DOORS AND/OR FRAMES TO BE REPLACED.
6. REFER TO DOOR HARDWARE INFORMATION ABOVE AND DOOR HARDWARE SPECIFICATION SECTION 087100 FOR ADDITIONAL HARDWARE GROUP INFORMATION.
7. UNLESS OTHERWISE NOTED, ALL DOOR FRAMES ARE 2" IN WIDTH.
8. CONTRACTOR SHALL VERIFY ALL DOOR AND WINDOW OPENINGS PRIOR TO FABRICATION.
9. CONTRACTOR SHALL SUBMIT DOOR SIGNAGE SCHEDULE TO ARCHITECT FOR APPROVAL PRIOR TO FABRICATION.
10. WOOD DOORS ARE TO BE HALEY ARCHITECTURAL 5-PLY ALC LUMBER CORE MANUFACTURED ACCORDING TO SPECS IN HALEY CATALOG. DOOR SHALL HAVE BIRCH, NATURAL, ROTARY STAIN GRADE VENEER.
11. ALL VISION PANELS SHALL HAVE FULLY TEMPERED SAFETY LAMINATED GLAZING, SEE DOOR TYPES FOR ADDITIONAL INFORMATION.
12. UNDERCUT DOOR 306 & 307

GEN. NOTES- FINISHES

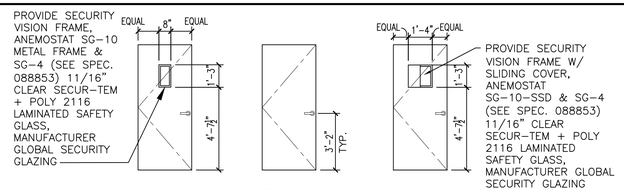
1. ALL INTERIOR FINISHES SHALL COMPLY WITH CBC CHAPTER 8 & TABLE 803.9.
   CLASSIFICATIONS PER CBC 803.1.1 ARE AS FOLLOWS:
   CLASS A: FLAME SPREAD INDEX 0-25; SMOKE DEVELOPED INDEX 0-450.
   CLASS B: FLAME SPREAD INDEX 26-75; SMOKE DEVELOPED INDEX 0-450.
   CLASS C: FLAME SPREAD INDEX 76-200; SMOKE DEVELOPED INDEX 0-450.
2. CONTENTS AND FURNISHINGS SHALL COMPLY WITH NFPA 101 LIFE SAFETY CODE, SECTION 10.3.

WINDOW TYPES

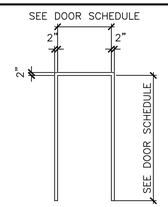


NOTE:
ALL WINDOWS HAVE 16 GA. HOLLOW METAL FRAMES WITH 11/16" CLEAR SECUR-TEM + POLY 2116 LAMINATED SAFETY GLASS, MANUFACTURER GLOBAL SECURITY GLAZING

DOOR TYPES



FRAME TYPES



ROOM FINISH SCHEDULE

ROOM		FLOOR				BASE				WALLS														CEILING								REMARKS	NO
										NORTH				EAST				SOUTH				WEST												
NO	NAME	M1	F1	M2	F2	M1	F1	M2	F2	M1	F1	M2	F2	M1	F1	M2	F2	M1	F1	M2	F2	M1	F1	M2	F2	M1	F1	M2	F2	M3	F3	M4	F4		
302	MULTIPURPOSE ROOM	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								302
303	SLEEPING ROOM	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								303
304	SLEEPING ROOM	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								304
305	SLEEPING ROOM	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								305
307	SLEEPING ROOM	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								307
308	SLEEPING ROOM	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								308
309	OFFICE	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								309
310	STAFF RESTROOM	CT	INT			CT	INT			ECMU	E	CT	INT	ECMU	E	CT	INT	ECMU	E	CT	INT	WGB	E	CT	INT	EC	E								310
311	OFFICE	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								311
312	OFFICE	VPF	INT			TSB	INT			GB	E			GB	E	CMU	–	GB	E			GB	E			EC	E								312
313	SLEEPING ROOM	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								313
314	SLEEPING ROOM	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								314
315	SLEEPING ROOM	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								315
316	SLEEPING ROOM	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								316
317	SLEEPING ROOM	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								317
318	SLEEPING ROOM	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								318
319	MULTIPURPOSE ROOM	VPF	INT			TSB	INT			GB	E			GB	E			GB	E			GB	E			EC	E								319
320	CHASE	ECONC				–	–			GB	E			GB	E			ECMU	E			ECMU	E			EC	E								320
321	STORAGE	SVF	INT			TSB	INT			ECMU	E			ECMU	E			ECMU	E			ECMU	E	CMU	E	EC	E								321
322	STORAGE	ECONC				–	–			ECMU	–			ECMU	–			ECMU	–			ECMU	–			–	–								322
323	MECHANICAL	ECONC				–	–			ECMU	–			ECMU	–			ECMU	–			ECMU	–			–	–								323
324	ELECTRICAL	ECONC				–	–			ECMU	–			ECMU	–			ECMU	–			ECMU	–			–	–								324
325	CORRIDOR	VPF	INT			TSB	INT			ECMU	E			ECMU	E			ECMU	E			GB	E	CMU	–	EC	E								325
326	RESTROOM	CT	INT			CT	INT			WGB	CT			ECMU	E	ECMU	CT	ECMU	CT			WGB	CT			WGB	E								326
327	ACCESSIBLE RESTROOM	CT	INT			CT	INT			ECMU	E			WGB	CT			ECMU	CT			ECMU	E	ECMU	CT	EC	E								327
329	STORAGE	SVF	INT			TSB	INT			GB	E			ECMU	E			ECMU	E			ECMU	E			GYP	E								329
330	CORRIDOR	ECONC	CS			TSB	INT			ECMU	E			ECMU	E			ECMU	E			ECMU	E			GYP	E								330
332	DAY ROOM	VPF	INT			TSB	INT			ECMU	E			ECMU	E			ECMU	E			ECMU	E			EGB	–	GB	–	EAT	P	NAT	P		332
118	KITCHEN	LIN	INT			LCB	INT			GB	E			GB	E			GB	E			ECMU	E			EGB	E								118

MATERIAL DESIGNATIONS

NOTE: NOT ALL DESIGNATIONS MAY OCCUR ON THIS SHEET.

FLOOR MATERIAL DESIGNATIONS
CONC – EXPOSED CONCRETE
CT – CERAMIC TILE
VPF – VINYL PLANK FLOORING
EPXY – EPOXY FLOORING
RT – RUBBER TILE
C – CARPET TILE
LIN – LINOLEUM
ECONC – EXISTING CONCRETE
EC – EXISTING CARPET
SVT – SHEET VINYL FLOORING

BASE MATERIAL DESIGNATIONS
TSB – TOP SET BASE
LCB – LINOLEUM COVE BASE
CTB – CERAMIC TILE BASE
EPXY – COVED EPOXY BASE
EW – EXISTING WOOD BASE
CPB – CARPET BASE
ETSB – EXISTING TOP SET BASE
ECTB – EXISTING CERAMIC TILE BASE

WALL MATERIAL DESIGNATIONS
GB – GYPSUM BOARD
MGYP – MOISTURE RESISTANT GYPSUM BOARD
CT – CERAMIC TILE
FRP – FIBERGLASS REINFORCED POLYESTER PANELS
EP – EXISTING PLASTER FINISH
NP – NEW SMOOTH PLASTER FINISH
ES – EXISTING STEEL
EW – EXISTING PAINTED WOOD
VCW – VINYL COVERED TACKABLE WALLBOARD
ETW – EXISTING TACKABLE WALL SYSTEM
AT – 12 X 12 ACOUSTIC TILE
EPLY – EXISTING PLYWOOD
EAT – EXISTING 12 X 12 ACOUSTIC TILE
EGYP – EXISTING GYPSUM BOARD
PSC – PLASTER SKIM COAT
ECMU– EXISTING CMU WALL
FAP – FABRIC WRAPPED ACOUSTICAL PANELS
WWP – WOOD WALL PANELS
CMU – CMU INFILL

CEILING MATERIAL DESIGNATIONS
EXP – EXPOSED STRUCTURE
ACT – SUSPENDED ACOUSTICAL CEILING
WGB – WATER RESISTANT GYP. BOARD
GYP – GYPSUM BOARD
EC – EXISTING CONCRETE
EWT – EXISTING PAINTED EXPOSED WOOD TRUSSES
EAT – EXISTING 12 X 12 ACOUSTIC TILE
EACT – EXISTING SUSPENDED ACOUSTIC TILE
EGYP – EXISTING GYP. BD.
EEWJ – EXISTING EXPOSED WOOD JOISTS
NAT – NEW 12 X 12 ACOUSTIC TILE

FINISH DESIGNATIONS
HS – HARDENER SEALER
E – ENAMEL PAINT
P – PAINT
INT – INTEGRAL FINISH
CS – CONCRETE SEALER
ST – STAIN

MISCELLANEOUS DESIGNATIONS
MIR – MIRROR
GRT – GROUT
GB – GYPSUM BOARD

DOOR AND FRAME SCHEDULE

DOOR						FRAME								
		SIZE				DETAIL								
TAG	TYPE	WD	HGT	THK	MATL	TYPE	MATL	HINGE	HEAD	STRIKE	THLD	SIGN	HARDWARE GROUP	REMARKS
301	EXISTING													N.I.C.- PART OF UNIT 1 & 2 SCOPE
302	EXISTING													N.I.C.- PART OF UNIT 1 & 2 SCOPE
303	EXISTING	3'-0"	7'-0"		HM	EXISTING	HM	–	–	–	–		EXISTING	
304	EXISTING	3'-0"	7'-0"		HM	EXISTING	HM	–	–	–	–		EXISTING	
305	EXISTING	3'-0"	7'-0"		HM	EXISTING	HM	–	–	–	–		EXISTING	
306	C	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	22/A10.50	21/A10.50	22/A10.50	53/A10.50	SEE DET.43/A10.60	DHW-8	SEE GEN. NOTES-DOORS NOTE #10
307	C	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	53/A10.50	SEE DET.43/A10.60	DHW-8	SEE GEN. NOTES-DOORS NOTE #10
308	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	24/A10.50	14/A10.50	24/A10.50	–		DHW-4	SEE GEN. NOTES-DOORS NOTE #10
309	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	34/A10.50		DHW-6	SEE GEN. NOTES-DOORS NOTE #10
310	B	2'-8"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW-7	SEE GEN. NOTES-DOORS NOTE #10
311	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	34/A10.50		DHW-6	SEE GEN. NOTES-DOORS NOTE #10
312	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	34/A10.50		DHW-6	SEE GEN. NOTES-DOORS NOTE #10
313	B	2'-8"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW-7	SEE GEN. NOTES-DOORS NOTE #10
314	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	34/A10.50		DHW-6	SEE GEN. NOTES-DOORS NOTE #10
315	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	34/A10.50		DHW-6	SEE GEN. NOTES-DOORS NOTE #10
316	B	2'-8"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW-7	SEE GEN. NOTES-DOORS NOTE #10
317	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	34/A10.50		DHW-6	SEE GEN. NOTES-DOORS NOTE #10
318	EXISTING													N.I.C.- PART OF UNIT 1 & 2 SCOPE
319	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	24/A10.50	14/A10.50	24/A10.50	–		DHW-5	SEE GEN. NOTES-DOORS NOTE #10
320	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	24/A10.50	14/A10.50	24/A10.50	–		DHW-5	SEE GEN. NOTES-DOORS NOTE #10
321	B	2'-8"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW-7	SEE GEN. NOTES-DOORS NOTE #10
322	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	53/A10.50	SEE DET.43/A10.60	DHW-9	SEE GEN. NOTES-DOORS NOTE #10
323	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	24/A10.50	14/A10.50	24/A10.50	–		DHW-5	SEE GEN. NOTES-DOORS NOTE #10
324	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW-7	SEE GEN. NOTES-DOORS NOTE #10
325	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	34/A10.50		DHW-6	SEE GEN. NOTES-DOORS NOTE #10
326	B	2'-8"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW-7	SEE GEN. NOTES-DOORS NOTE #10
327	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	34/A10.50		DHW-6	SEE GEN. NOTES-DOORS NOTE #10
328	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	34/A10.50		DHW-6	SEE GEN. NOTES-DOORS NOTE #10
329	B	2'-8"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW-7	SEE GEN. NOTES-DOORS NOTE #10
330	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	34/A10.50		DHW-6	SEE GEN. NOTES-DOORS NOTE #10
331	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	34/A10.50		DHW-6	SEE GEN. NOTES-DOORS NOTE #10
332	B	2'-8"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW-7	SEE GEN. NOTES-DOORS NOTE #10
333	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	34/A10.50		DHW-6	SEE GEN. NOTES-DOORS NOTE #10
334	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	24/A10.50	14/A10.50	24/A10.50	–		DHW-4	SEE GEN. NOTES-DOORS NOTE #10
335	A	3'-0"	7'-0"	1 3/4"	WOOD	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW-4	SEE GEN. NOTES-DOORS NOTE #10
336	B	2'-0"	7'-0"	1 3/4"	HM	A	HM	12/A10.50	11/A10.50	12/A10.50	–		DHW-7	

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REVISIONS

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LIC. NO. C-20808
EXP. 9-30-27
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
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County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

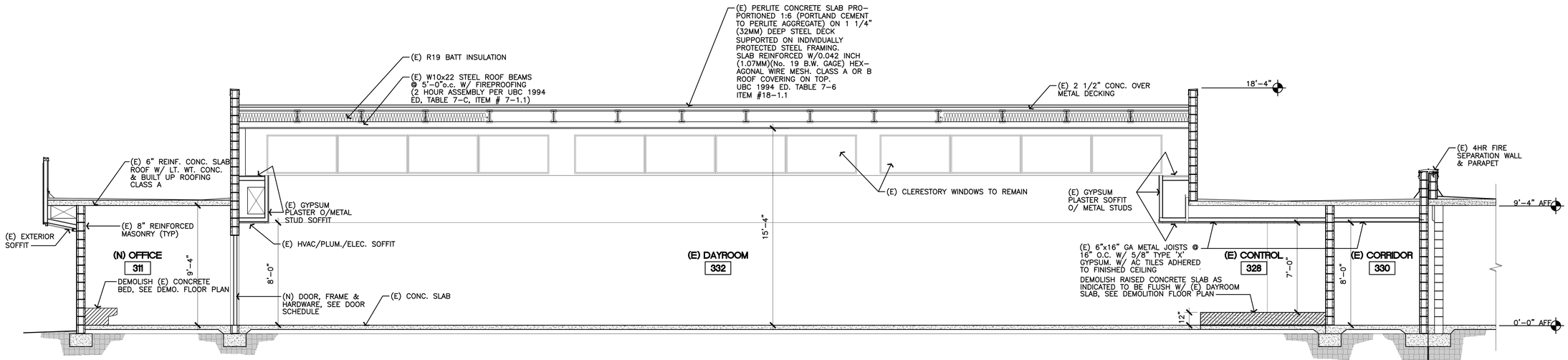
COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
FINISH SCHEDULE
DOOR SCHEDULE

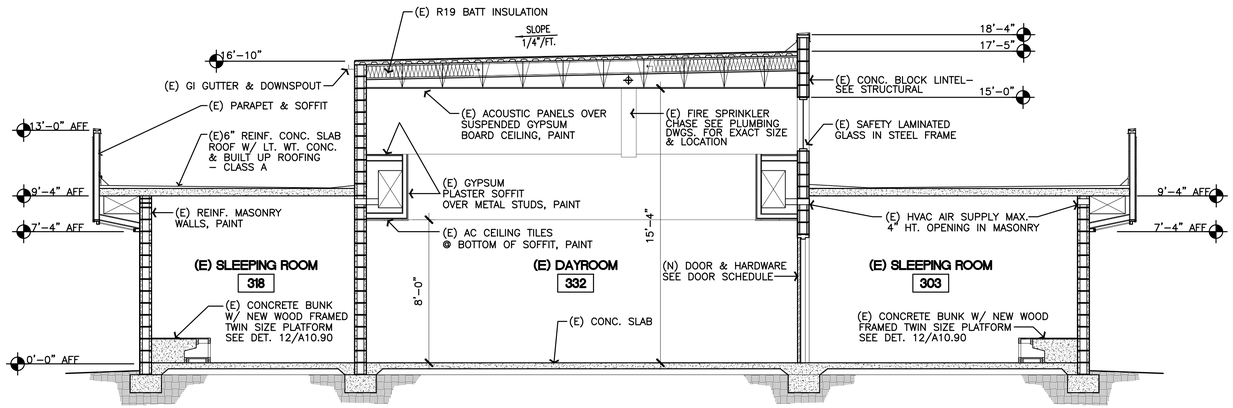
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TECHNICIAN: MS
PROJECT MANAGER: MS
JOB NUMBER: RA # 22.868

SHEET NUMBER
A5.11



BUILDING SECTION A

SCALE: 1/4"= 1'-0"



BUILDING SECTION B

0 2' 4' 8'

SCALE: 1/4"= 1'-0"

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EXP. 9-30-27
STATE OF CALIFORNIA

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SHEET TITLE

BUILDING SECTIONS

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

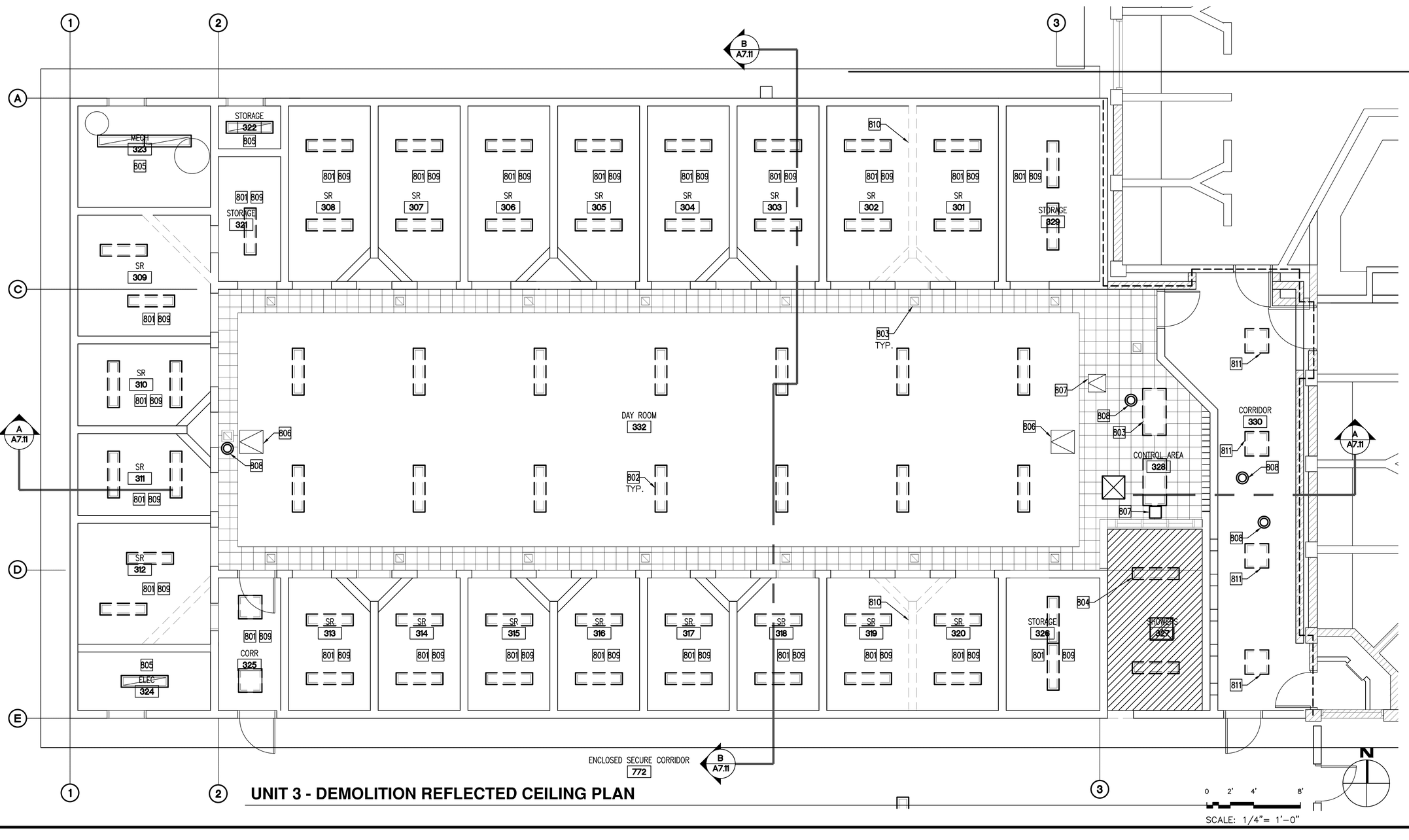
SHEET NUMBER
A7.11

GENERAL NOTES

1. THE DEMOLITION PLAN INDICATES THE APPROXIMATE EXTENT OF DEMOLITION REQUIREMENTS. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE EXTENT OF DEMOLITION REQUIRED TO INSTALL ALL NEW CONSTRUCTION.
2. REFER TO OTHER ARCHITECTURAL DEMOLITION PLANS FOR ADDITIONAL DEMOLITION SCOPE OF WORK.
3. REFER TO PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION REQUIREMENTS.
4. CONTRACTOR SHALL PROTECT PORTIONS OF EXISTING CONSTRUCTION NOT INDICATED TO BE DEMOLISHED. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPLACEMENT AND REPAIR OF ITEMS TO REMAIN.
5. CONTRACTOR SHALL REMOVE AND STORE ALL MISCELLANEOUS ITEMS TO INCLUDE: MARKERBOARDS, TACKBOARDS, FIRE EXTINGUISHERS, NAME PLATES, SIGNAGE, CLOCKS, WALL-HUNG PICTURES/MAPS, ETC. THAT HAS NOT BEEN PREVIOUSLY REMOVED BY THE OWNER.
6. CONTRACTOR MUST MAINTAIN ACCESS TO AREAS ADJACENT TO DEMOLISHED AND IMPROVEMENT AREAS. SEE SPECIFICATIONS FOR REQUIREMENTS.

KEYNOTES

801 REMOVE (E) LIGHT FIXTURES AT 9'-4" EXPOSED CONCRETE CEILING
802 REMOVE (E) LIGHT FIXTURES AT 15'-4" CLERESTORY SUSPENDED GYP. BD. CEILING
803 REMOVE (E) LIGHT FIXTURES IN 8'-0" GYP. BD. SOFFIT
804 REMOVE (E) LIGHT FIXTURES AND SUSPENDED PLASTER CEILING, FRAMING TO REMAIN FOR NEW GYP. BD. CEILING FINISH
805 (E) LIGHT FIXTURES TO REMAIN
806 (E) CLERESTORY CEILING ACCESS PANEL TO REMAIN
807 (E) GYP. BD. CEILING ACCESS PANEL TO REMAIN
808 (E) SECURITY CAMERA TO REMAIN
809 REMOVE (E) CEILING MOUNTED SMOKE DETECTOR, TO BE REPLACED WITH NEW
810 REMOVE WALL, SEE STRUCTURAL FOR REINFORCING AND SEQUENCE OF DEMOLITION
811 REMOVE RECESSED LIGHT FIXTURES



UNIT 3 - DEMOLITION REFLECTED CEILING PLAN

SCALE: 1/4"= 1'-0"

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REVISIONS

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BSCC PLAN REVIEW NUMBER
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SHEET TITLE

DEMOLITION REFLECTED CEILING PLAN

DATE: 10/15/25

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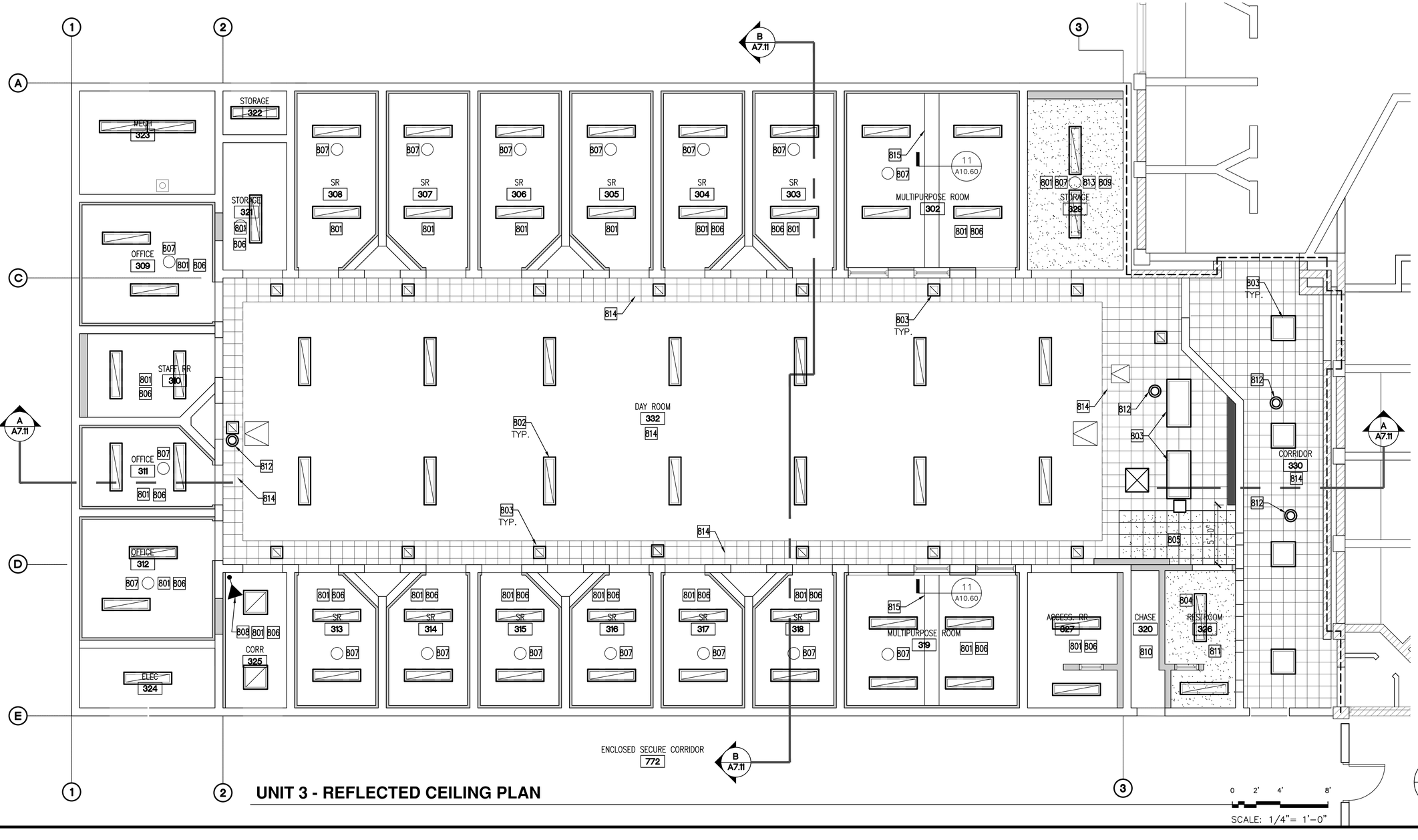
PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
A8.11D

KEYNOTES

801	PROVIDE NEW LED LIGHT FIXTURES AT 9'-4" EXPOSED CONCRETE CEILING
802	PROVIDE NEW LED LIGHT FIXTURES AT 15'-4" CLERESTORY SUSPENDED GYP. BD. CEILING
803	PROVIDE NEW LED LIGHT FIXTURES IN 8'-0" GYP. BD. SUSPENDED CEILING/ SOFFIT
804	PROVIDE NEW LED LIGHT FIXTURES AND GYP. BD. CEILING FINISH O/ (E) FRAMING
805	PROVIDE NEW TYPE 'X' GYP. BD. AND 3000 PSI PLASTER CEILING FINISH WITH 12" X 12" ACOUSTIC TILES TO MATCH EXISTING O/ (E) CEILING FRAMING
806	PAINT EXISTING CONCRETE CEILING
807	PROVIDE NEW CEILING MOUNTED SMOKE DETECTOR
808	NEW CEILING MOUNTED SECURITY CAMERA, BY SECURITY CONTRACTOR (BIRDI) – G.C. TO PROVIDE ALL ELECTRICAL & DATA/COMM
809	PROVIDE NEW CEILING FRAMING WITH TYPE 'X' GYP. BD. AND 3,000 PSI PLASTER FINISH, PAINT
810	EXPOSED CONCRETE CEILING AND (E) CEILING JOISTS TO REMAIN WHERE GYP. BD. WAS REMOVED AT NEW CHASE
811	PROVIDE NEW MOISTURE RESISTANT GYP. BD. OVER (E) CEILING FRAMING, PAINT
812	(E) SECURITY CAMERA TO REMAIN
813	MODIFY (E) FIRE SPRINKLER HEAD FOR LOWER HEIGHT NEW CEILING
814	PAINT EXISTING ACOUSTIC TILE CEILING
815	STRUCTURAL ROOF SLAB REINFORCING FOR REMOVED WALL, SEE STRUCTURAL DRAWINGS FOR SEQUENCE OF DEMOLITION AND REINFORCING DETAILS



UNIT 3 - REFLECTED CEILING PLAN

SCALE: 1/4"= 1'-0"

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EXP. 9-30-27
STATE OF CALIFORNIA

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COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
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SHEET TITLE
REFLECTED CEILING PLAN

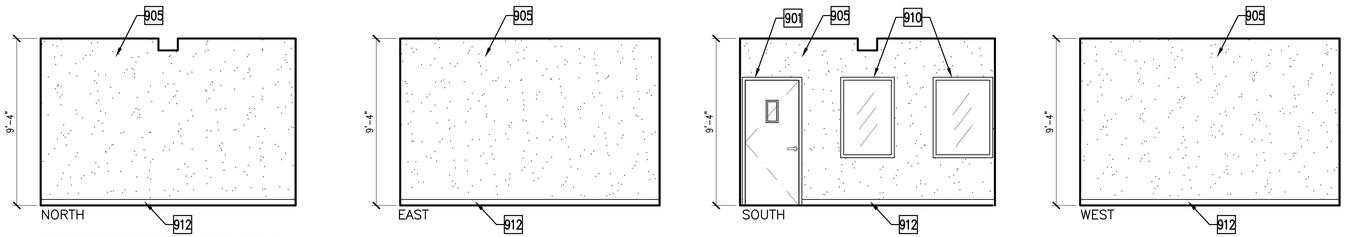
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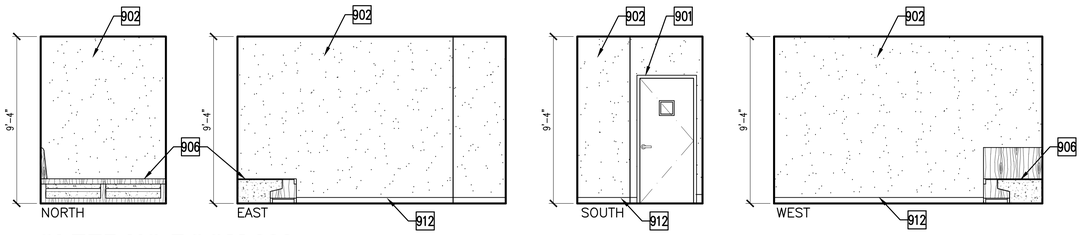
PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

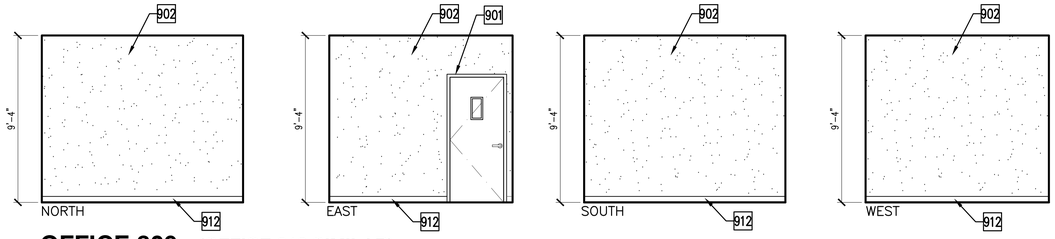
SHEET NUMBER
A8.11



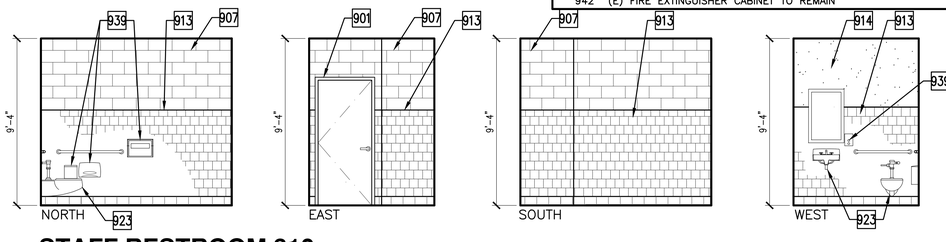
MULTIPURPOSE 302 (MULTIPURPOSE 319 SIMILAR)



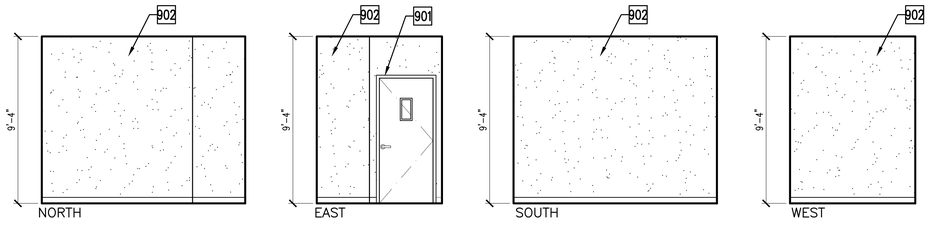
SLEEPING ROOM 303 (SLEEPING ROOM 304-308 SIMILAR)



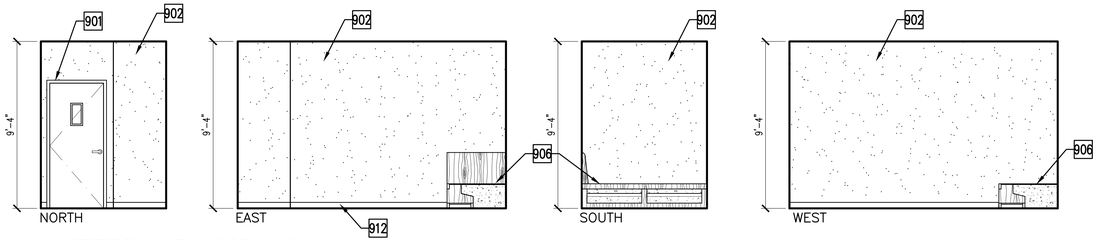
OFFICE 309 (OFFICE 312 SIMILAR)



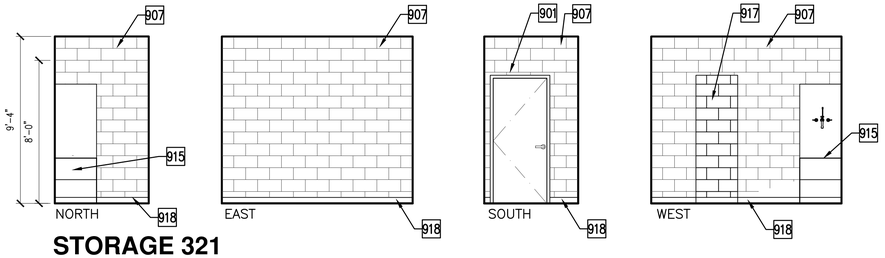
STAFF RESTROOM 310 SEE A3.11 FOR ADDITIONAL INFORMATION



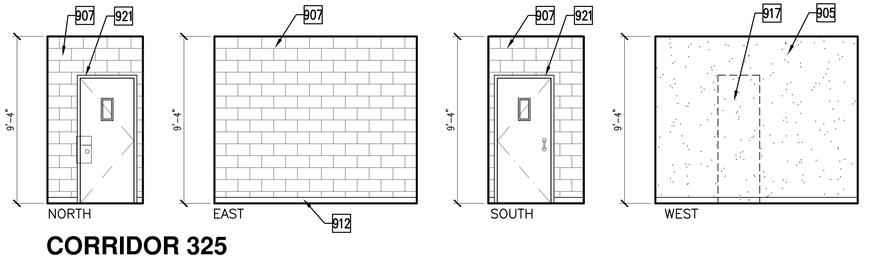
OFFICE 311



SLEEPING ROOM 313 (SLEEPING ROOM 314-318 SIMILAR)



STORAGE 321



CORRIDOR 325

0 2' 4' 8'

SCALE: 1/4"= 1'-0"

KEYNOTES

901	PROVIDE NEW DOOR W/ ANTI-LIGATURE HARDWARE, SEE DOOR SCHED.
902	PROVIDE NEW GYP. BD WALL FINISH, PAINT
903	PROVIDE NEW ANTI-LIGATURE PLUMBING FIXTURES, SEE PLUMBING DRAWINGS
904	PROVIDE NEW ANTI-LIGATURE DRINKING FOUNTAIN WITH BOTTLE FILLER, SEE PLUMBING DRAWINGS
905	PROVIDE NEW GYP. BD. O/ 2 1/2" STUDS
906	PROVIDE NEW WOOD BED FRAME O/ (E) CAST-IN- PLACE CONCRETE BED FOR TWIN SIZE MATTRESS
907	(E) CMU WALL, PAINT
908	NEW METAL SHELVING/ STORAGE SYSTEM
909	PROVIDE NEW FULL HT. CERAMIC TILE WALL FINISH
910	PROVIDE NEW STAFF MONITORING VIEW WINDOW, SEE WINDOW TYPES A5.11
911	PROVIDE CERAMIC TILE COVED BASE
912	PROVIDE 4" RUBBER TOP SET BASE
913	PROVIDE 5'-6" HIGH CERAMIC TILE WAINSCOT AT EACH WALL
914	PROVIDE NEW 6" METAL STUD PLUMBING WALL W/ WATER RESISTANT GYP. BD., PAINT
915	(E) MOP SINK TO REMAIN
916	PROVIDE TWO NEW ACCESSIBLE ANTI-LIGATURE DRINKING FOUNTAINS ONE WITH BOTTLE FILLER , SEE PLUMBING DRAWINGS
917	PROVIDE NEW CMU WALL INFILL, PAINT WHERE EXPOSED-SEE DETAIL 33/A10.50
918	PROVIDE COVED SHEET VINYL BASE
919	PROVIDE SOFFIT GYP. BD. FINISHED INFILL AT TV SHELF, MATCH (E) ADJACENT FINISH - ELECT. OUTLET TO BE MOVED TO WALL BEYOND
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941	INFILL (E) ACCESS PANEL W/ CMU
942	(E) FIRE EXTINGUISHER CABINET TO REMAIN

RA ARCHITECTS & ENGINEERS

ARCHITECTURE
GREG RAVATT, AIA

MECHANICAL ELECTRICAL
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REVISIONS

SEAL

REGISTERED ARCHITECT GREGORY ALLEN RAVATT LICENSED ARCHITECT EXP. 9-30-27 STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

INTERIOR ELEVATIONS

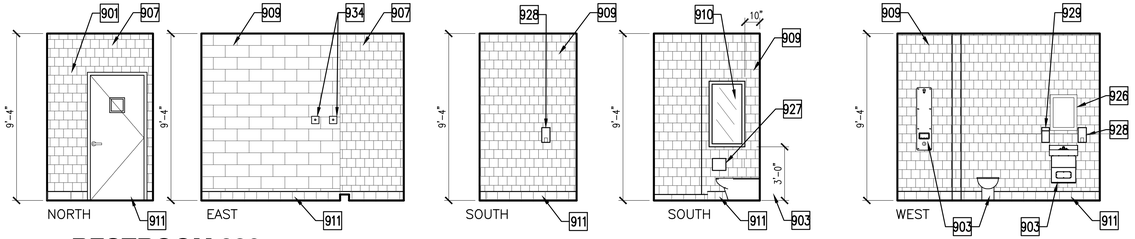
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TECHNICIAN: MS

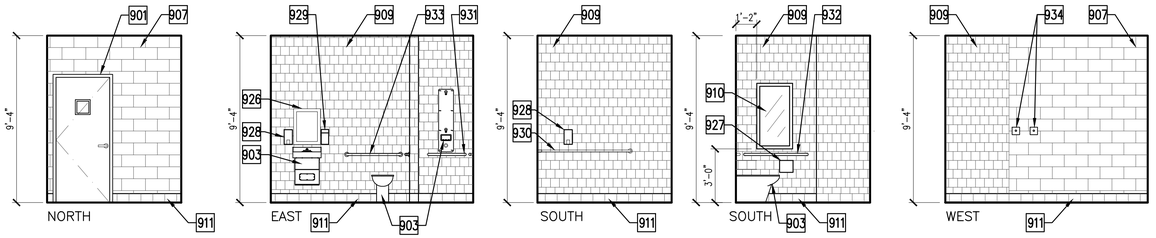
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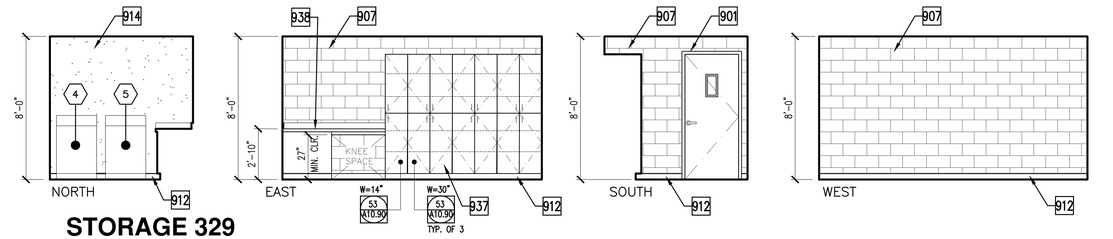
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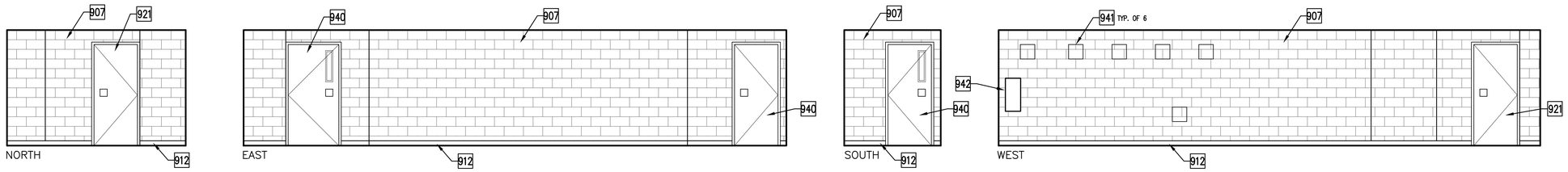
RESTROOM 326



ACCESSIBLE RESTROOM 327

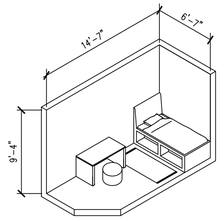


STORAGE 329

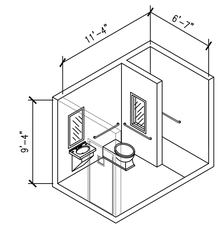


CORRIDOR 330

TYPICAL SLEEPING ROOM



TYPICAL YOUTH RESTROOM



KEYNOTES

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942	(E) FIRE EXTINGUISHER CABINET TO REMAIN

EQUIPMENT SCHEDULE

ITEM NO. (#)	ITEM	MANUFACTURER	MODEL/ ITEM #	INSTALL BY G.C.	BY OWNER
4	FRONT LOAD WASHER	SPEED QUEEN	FF7009WN	●	●
5	DRYER	SPEED QUEEN	DF7004WE (ELECT.)	●	●

0 2' 4' 8'

SCALE: 1/4"= 1'-0"

RA ARCHITECTS & ENGINEERS

ARCHITECTURE
GREG RAVATT, AIA

MECHANICAL ELECTRICAL
JIM ALBRECHT, PE

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GREGORY ALLEN RAVATT
LICENSED ARCHITECT
EXP. 9-30-27
STATE OF CALIFORNIA

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SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
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COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

INTERIOR ELEVATIONS

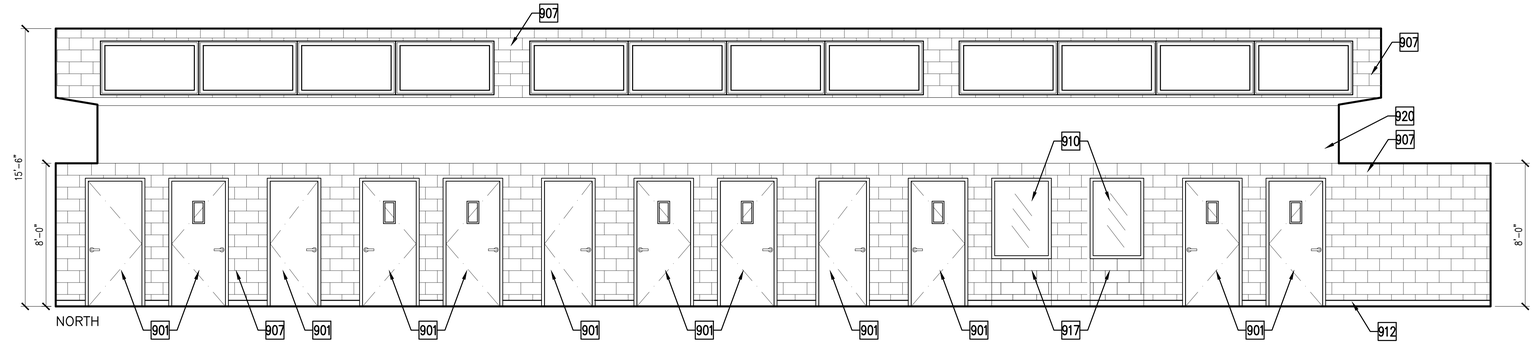
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TECHNICIAN: MS

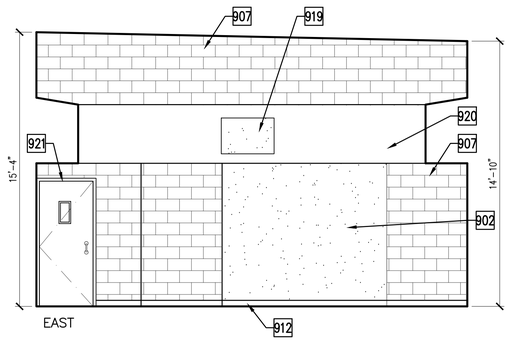
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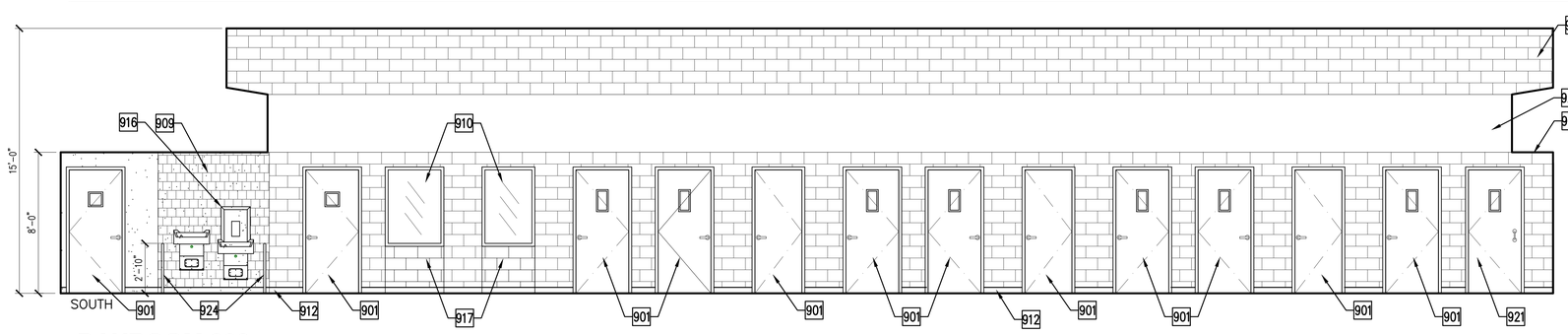
JOB NUMBER: RA # 22.868

SHEET NUMBER
A9.12

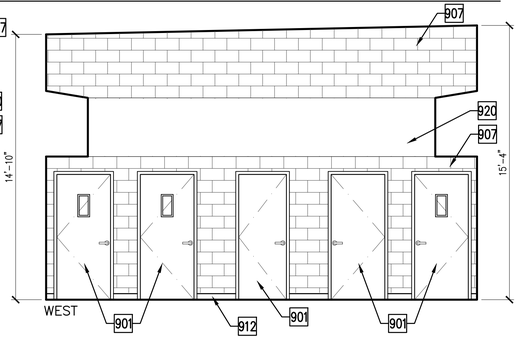


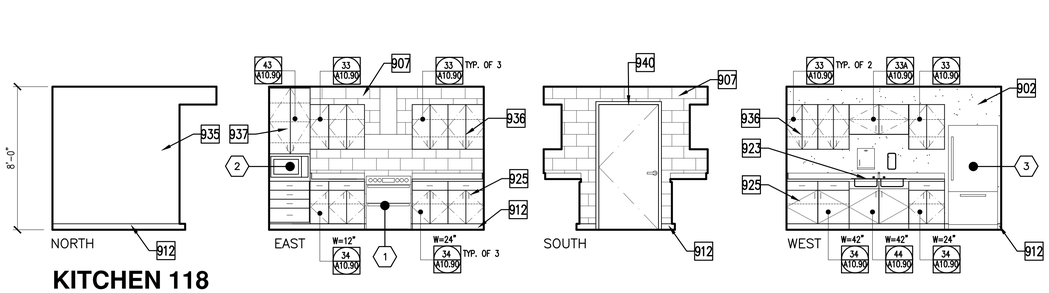
DAYROOM 332





DAYROOM 332





KITCHEN 118

0 2' 4' 8'

SCALE: 1/4"= 1'-0"

EQUIPMENT SCHEDULE

ITEM NO. (#)	ITEM	MANUFACTURER	MODEL/ ITEM #	INSTALL BY G.C.	BY OWNER
1	INDUCTION RANGE	SAMSUNG	NE63T8951SS	●	●
2	BUILT-IN MICROWAVE W/TRIM KIT	FRIGIDAIRE	GMBS3068AF GMTK2768AF	●	●
3	REFRIGERATOR/FREEZER	WHIRLPOOL	WRB329DMB	●	●

KEYNOTES

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901	PROVIDE NEW DOOR W/ ANTI-LIGATURE HARDWARE, SEE DOOR SCHED.
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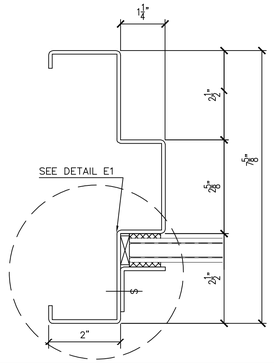
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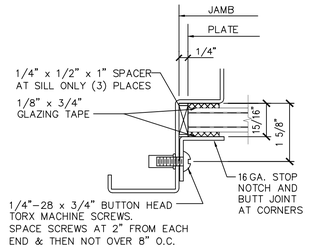
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PROJECT MANAGER: MS

JOB NUMBER: RA # 22868

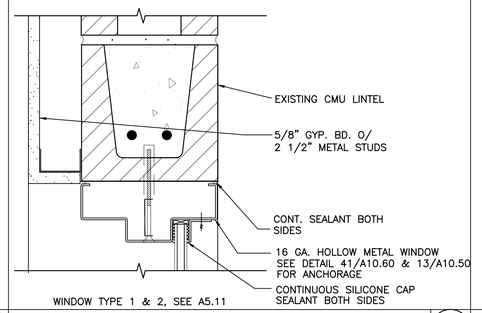
SHEET NUMBER
A9.13





MULTIPURPOSE ROOM WINDOW FRAME

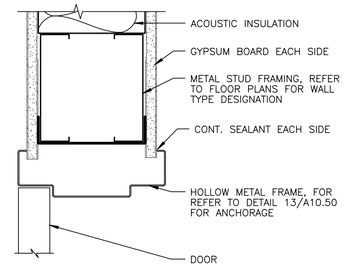
SCALE: 6"=1'-0" 41



WINDOW TYPE 1 & 2, SEE A5.11

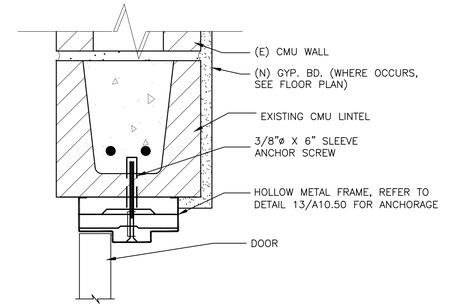
WINDOW HEAD

SCALE: 3"=1'-0" 31



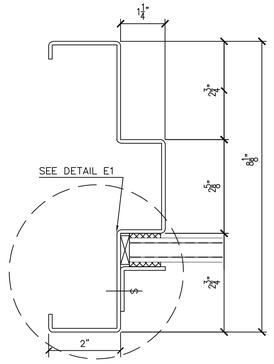
INTERIOR DOOR HEAD • (N) WALL

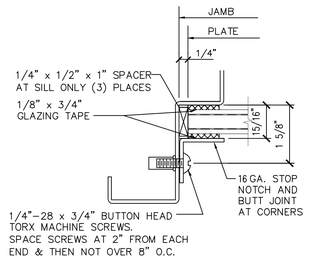
SCALE: 3"=1'-0" 21



DOOR HEAD • (E) CMU WALL

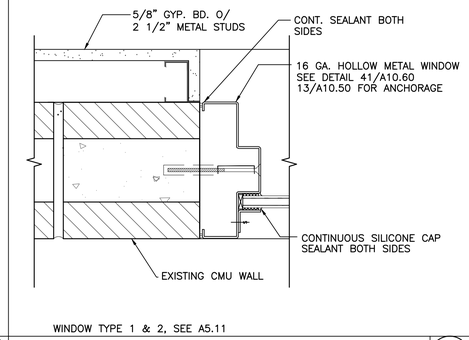
SCALE: 3"=1'-0" 11





SHOWER RESTROOM WINDOW FRAME

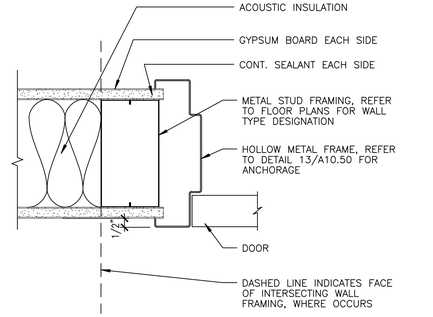
42



WINDOW TYPE 1 & 2, SEE A5.11

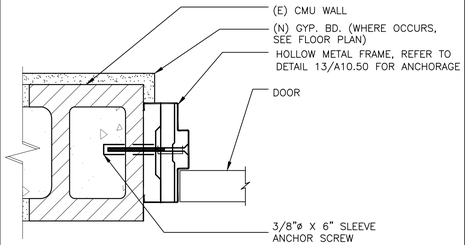
WINDOW JAMB

SCALE: 3"=1'-0" 32



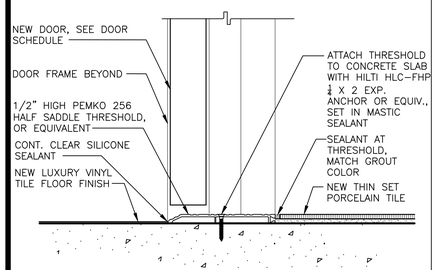
INTERIOR DOOR JAMB • (N) WALL

SCALE: 3"=1'-0" 22



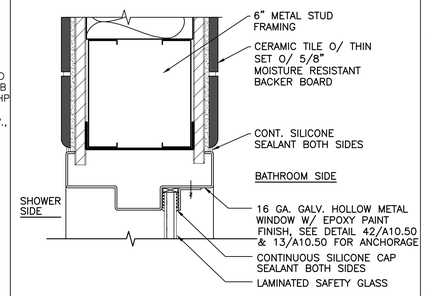
DOOR JAMB • (E) CMU WALL

SCALE: 3"=1'-0" 12



DOOR THRESHOLD

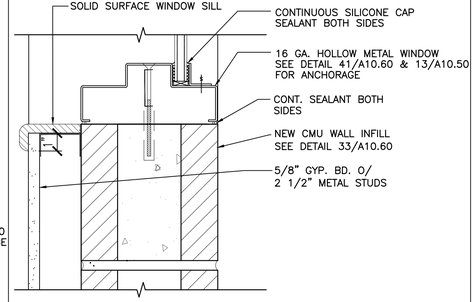
SCALE: 3"=1'-0" 53



WINDOW TYPE 3, SEE A5.11

SHOWER WINDOW HEAD

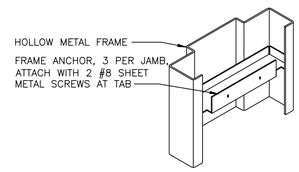
SCALE: 3"=1'-0" 43



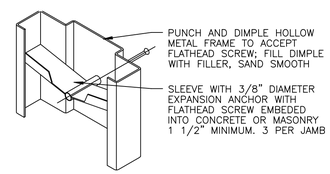
WINDOW TYPE 1 & 2, SEE A5.11

WINDOW SILL

SCALE: 3"=1'-0" 33



FRAME ANCHOR – METAL STUD

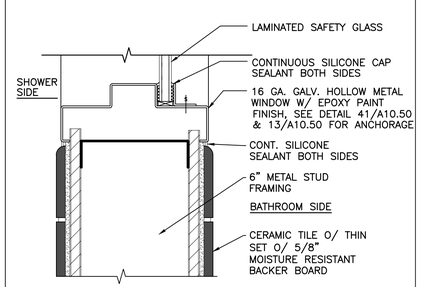


FRAME ANCHOR – MASONRY / CONCRETE

DOOR FRAME ANCHORING

SCALE: 1"=1'-0" 13

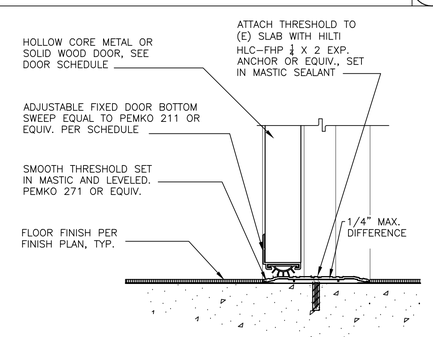
54



WINDOW TYPE 3, SEE A5.11

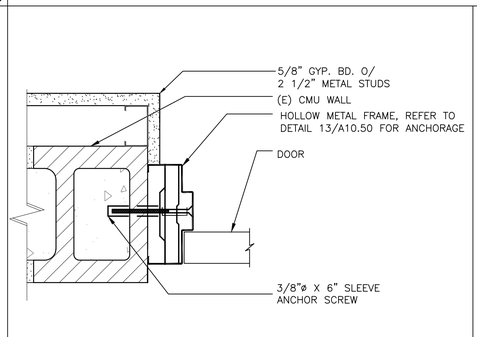
SHOWER WINDOW SILL

SCALE: 3"=1'-0" 44



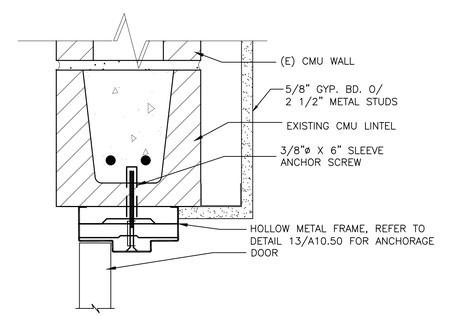
DOOR THRESHOLD

SCALE: 3"=1'-0" 34



INTERIOR DOOR HEAD • (N) WALL

SCALE: 3"=1'-0" 24



DOOR HEAD • (E) CMU WALL

SCALE: 3"=1'-0" 14

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Written dimensions take precedence over scaled dimensions. Do not scale plans. Contractor shall verify all dimensions and conditions in the field. Any discrepancies shall be called to the attention of RA & Associates.

REVISIONS

SEAL

REGISTERED ARCHITECT GREGORY ALLEN RAVATT C-26808 LICENSED ARCHITECT EXP. 9-30-27 STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
DETAILS

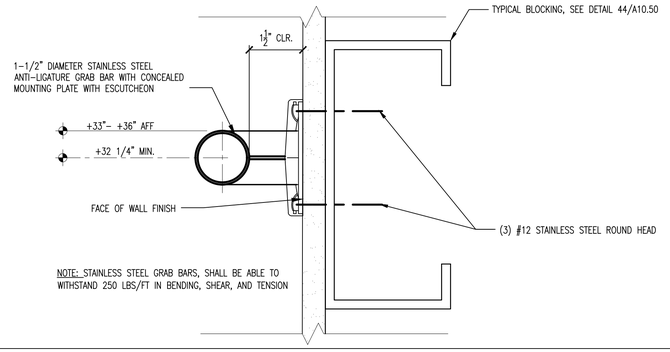
DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

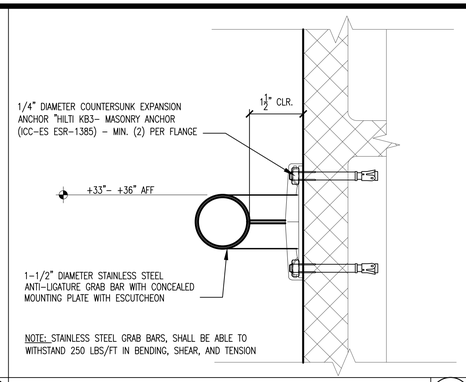
JOB NUMBER: RA # 22.868

SHEET NUMBER
A10.50



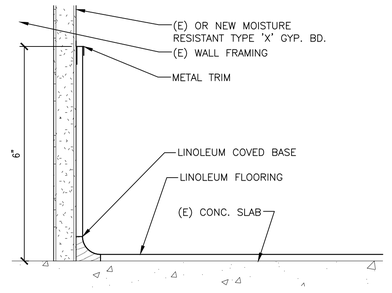
GRAB BAR • METAL STUD WALL

SCALE: 3"=1'-0" 41



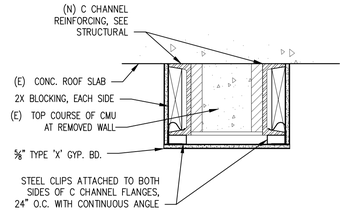
GRAB BAR • CMU WALL

SCALE: 3"=1'-0" 31



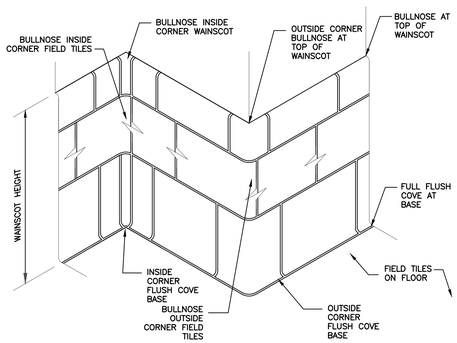
LINOLEUM BASE

SCALE: HALF 21



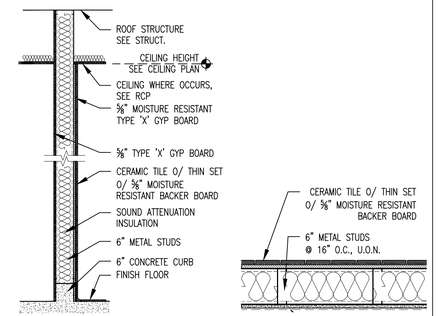
FINISH AT STRUCTURAL. REINFORCING

SCALE: 1 1/2"=1'-0" 11



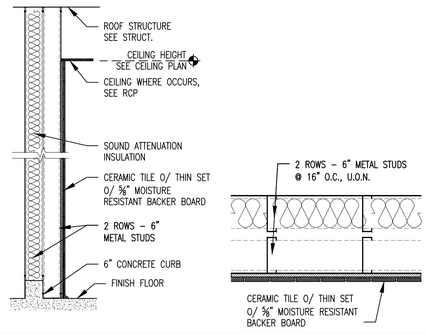
CERAMIC TILE DETAIL

SCALE: N.T.S. 42



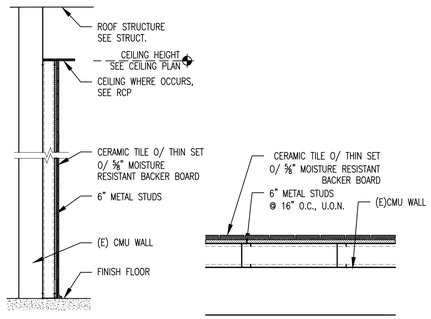
A WALL TYPE

32



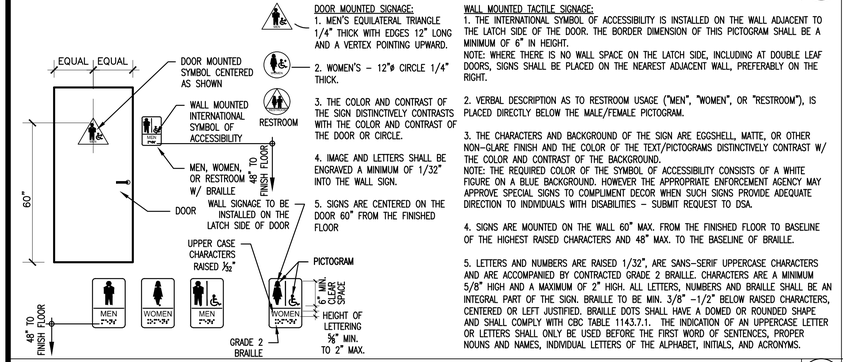
B WALL TYPE

22



C WALL TYPE

12



DOOR MOUNTED SIGNAGE:

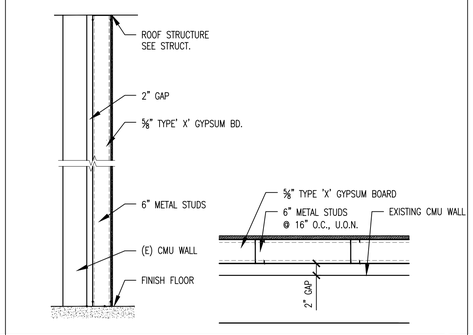
1. MEN'S EQUILATERAL TRIANGLE 1/4" THICK WITH EDGES 12" LONG AND A VERTEX POINTING UPWARD.
2. WOMEN'S - 12"ø CIRCLE 1/4" THICK.
3. THE COLOR AND CONTRAST OF THE SIGN DISTINCTIVELY CONTRASTS WITH THE COLOR AND CONTRAST OF THE DOOR OR CIRCLE.
4. IMAGE AND LETTERS SHALL BE ENGRAVED A MINIMUM OF 1/32" INTO THE WALL SIGN.
5. SIGNS ARE CENTERED ON THE DOOR 60" FROM THE FINISHED FLOOR

WALL MOUNTED TACTILE SIGNAGE:

1. THE INTERNATIONAL SYMBOL OF ACCESSIBILITY IS INSTALLED ON THE WALL ADJACENT TO THE LATCH SIDE OF THE DOOR. THE BORDER DIMENSION OF THIS PICTOGRAM SHALL BE A MINIMUM OF 6" IN HEIGHT.
NOTE: WHERE THERE IS NO WALL SPACE ON THE LATCH SIDE, INCLUDING AT DOUBLE LEAF DOORS, SIGNS SHALL BE PLACED ON THE NEAREST ADJACENT WALL, PREFERABLY ON THE RIGHT.
2. VERBAL DESCRIPTION AS TO RESTROOM USAGE ("MEN", "WOMEN", OR "RESTROOM"), IS PLACED DIRECTLY BELOW THE MALE/FEMALE PICTOGRAM.
3. THE CHARACTERS AND BACKGROUND OF THE SIGN ARE EGGSHELL, MATTE, OR OTHER NON-GLARE FINISH AND THE COLOR OF THE TEXT/PICTOGRAMS DISTINCTIVELY CONTRAST W/ THE COLOR AND CONTRAST OF THE BACKGROUND.
NOTE: THE REQUIRED COLOR OF THE SYMBOL OF ACCESSIBILITY CONSISTS OF A WHITE FIGURE ON A BLUE BACKGROUND. HOWEVER THE APPROPRIATE ENFORCEMENT AGENCY MAY APPROVE SPECIAL SIGNS TO COMPLIMENT DECOR WHEN SUCH SIGNS PROVIDE ADEQUATE DIRECTION TO INDIVIDUALS WITH DISABILITIES - SUBMIT REQUEST TO DSA.
4. SIGNS ARE MOUNTED ON THE WALL 60" MAX. FROM THE FINISHED FLOOR TO BASELINE OF THE HIGHEST RAISED CHARACTERS AND 48" MAX. TO THE BASELINE OF BRAILLE.
5. LETTERS AND NUMBERS ARE RAISED 1/32", ARE SANS-SERIF UPPERCASE CHARACTERS AND ARE ACCOMPANIED BY CONTRACTED GRADE 2 BRAILLE. CHARACTERS ARE A MINIMUM 5/8" HIGH AND A MAXIMUM OF 2" HIGH. ALL LETTERS, NUMBERS AND BRAILLE SHALL BE AN INTEGRAL PART OF THE SIGN. BRAILLE TO BE MIN. 3/8" -1/2" BELOW RAISED CHARACTERS, CENTERED OR LEFT JUSTIFIED. BRAILLE DOTS SHALL HAVE A DOMED OR ROUNDED SHAPE AND SHALL COMPLY WITH CBC TABLE 1143.7.1. THE INDICATION OF AN UPPERCASE LETTER OR LETTERS SHALL ONLY BE USED BEFORE THE FIRST WORD OF SENTENCES, PROPER NOUNS AND NAMES, INDIVIDUAL LETTERS OF THE ALPHABET, INITIALS, AND ACRONYMS.

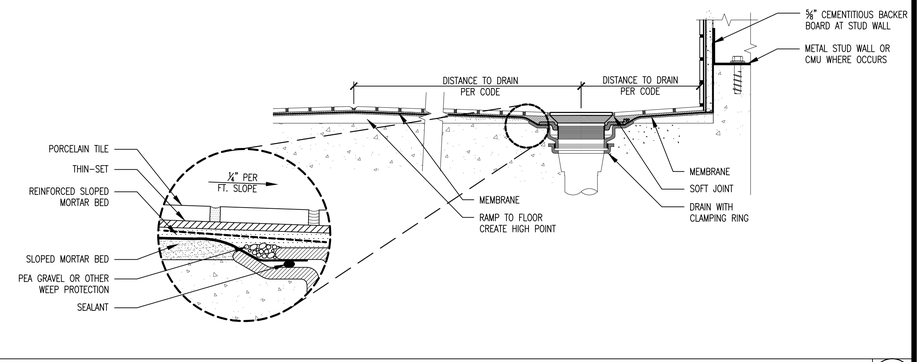
ACCESSIBILITY SIGNAGE AT RESTROOMS

SCALE: NTS 43



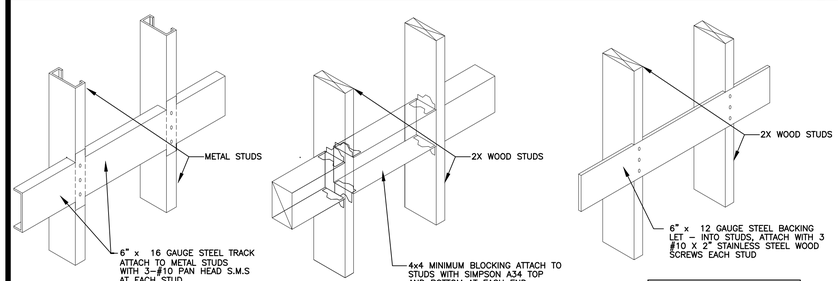
D WALL TYPE

33



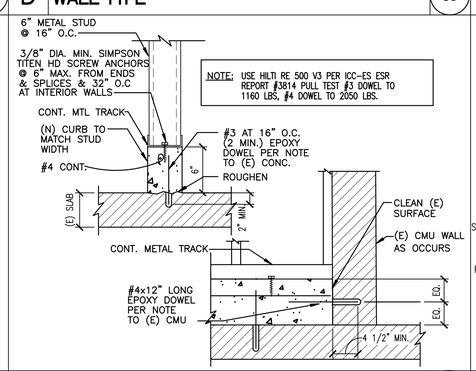
ACCESSIBLE SHOWER AREA

SCALE: NTS 13



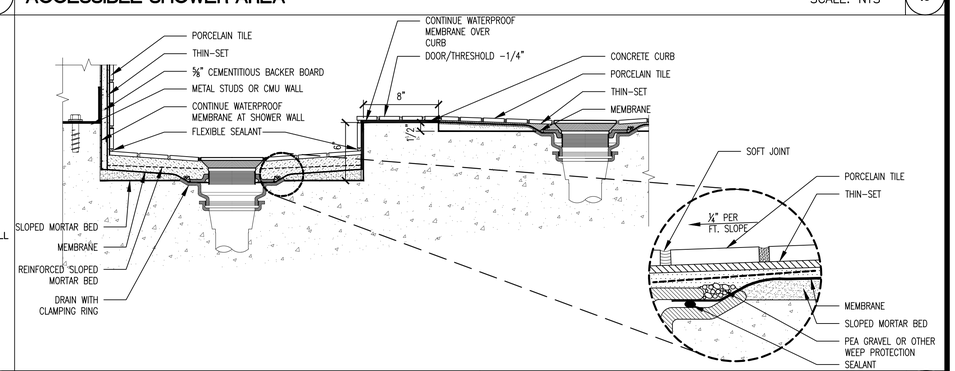
TYPICAL BLOCKING AT WOOD AND METAL FRAMED WALLS

SCALE: 3"=1'-0" 44



(N) CURB TO (E) SLAB/CURB

SCALE: 1"=1'-0" 34



MORTAR BED SHOWER DETAIL

SCALE: NTS 14

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REVISIONS

SEAL

REGISTERED ARCHITECT
GREGORY ALLEN RAVATT
LICENSED PROFESSIONAL
EXP. 9-30-27
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

COUNTY OF SANTA BARBARA CALIFORNIA

SHEET TITLE
DETAILS

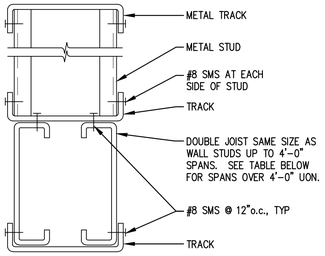
DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22868

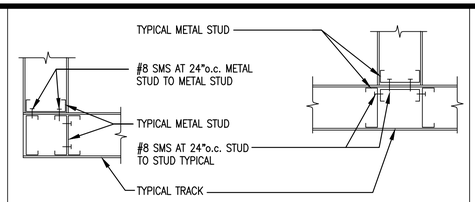
SHEET NUMBER
A10.60



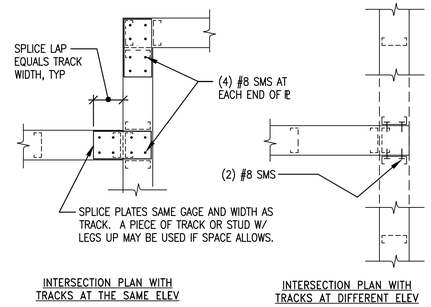
SPAN	MIN JOIST SIZE	
	4" & 6" STUD WALLS	8" STUD WALLS
4' TO 8'	600S137-33 (33 ksi)	800S137-33 (33 ksi)
OVER 8' TO 12'	600S162-54 (50 ksi)	800S162-54 (50 ksi)
OVER 12' TO 16'	800S162-54 (50 ksi)	1000S162-54 (50 ksi)

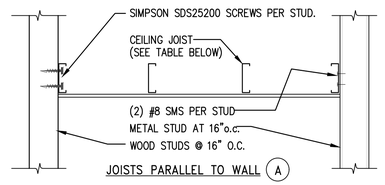
NOTE: SPANS OVER 16' REQUIRE MEMBER SIZES TO BE SHOWN ON DRAWINGS.

BOX HEADER SCALE: NTS 31

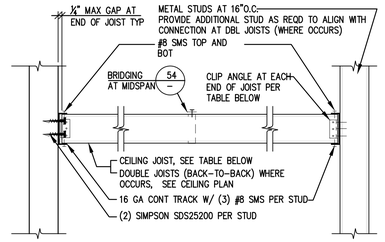


STUD INTERSECTION SCALE: NTS 21



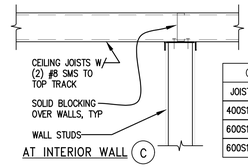


JOISTS PARALLEL TO WALL (A)



CLIP ANGLES			
JOIST DEPTH	CLIP ANGLE	ATTACHMENT TO JOIST/TRACK	ATTACHMENT TO WOOD WALL
4"	NOT REQ'D	–	–
6"	L2x2x16 GA x 0'-5"	(3) #8 SMS	(2) SIMPSON SDS25200
8"	L2x2x16 GA x 0'-7"	(4) #8 SMS	(2) SIMPSON SDS25200

JOISTS PERPENDICULAR TO WALL (B)



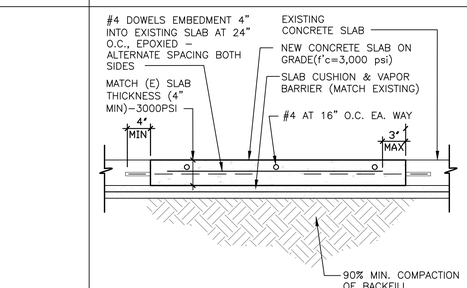
AT INTERIOR WALL (C)

NOTE: REMOVE ALL FINISHES FROM (E) FRAMING PRIOR TO LEDGER INSTALLATION

CEILING JOIST SPAN TABLE			
JOIST SIZE	SPACING	GYP BD	PLASTER
400S137-33	24"o.c.	10'-8"	8'-0"
600S137-33	24"o.c.	12'-11"	10'-0"
600S162-43	24"o.c.	16'-0"	13'-0"

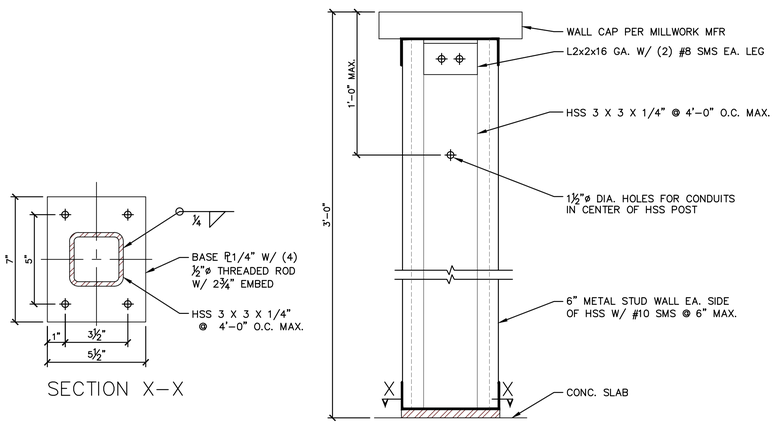
NOTE: HOLES/PUNCHOUTS ARE NOT ALLOWED IN CEILING JOISTS

TYPICAL CEILING FRAMING SCALE: NTS 12

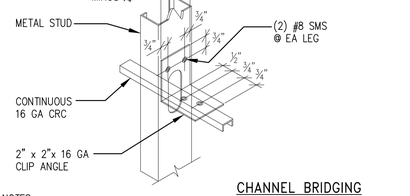


SLAB REPAIR SCALE: FULL 41

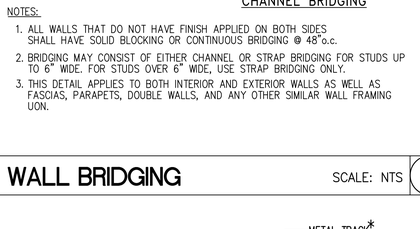
51



WALL COLUMN SCALE: 3"=1'-0" 43



STRAP BRIDGING

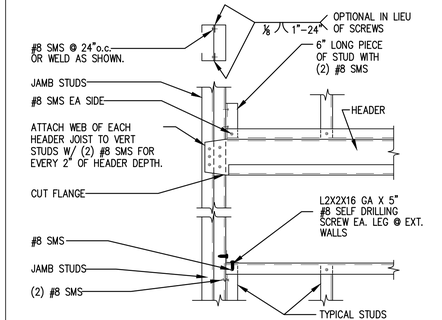


CHANNEL BRIDGING

NOTES:

1. ALL WALLS THAT DO NOT HAVE FINISH APPLIED ON BOTH SIDES SHALL HAVE SOLID BLOCKING OR CONTINUOUS BRIDGING @ 48"o.c.
2. BRIDGING MAY CONSIST OF EITHER CHANNEL OR STRAP BRIDGING FOR STUDS UP TO 6" WIDE. FOR STUDS OVER 6" WIDE, USE STRAP BRIDGING ONLY.
3. THIS DETAIL APPLIES TO BOTH INTERIOR AND EXTERIOR WALLS AS WELL AS FASCIAS, PARAPETS, DOUBLE WALLS, AND ANY OTHER SIMILAR WALL FRAMING UON.

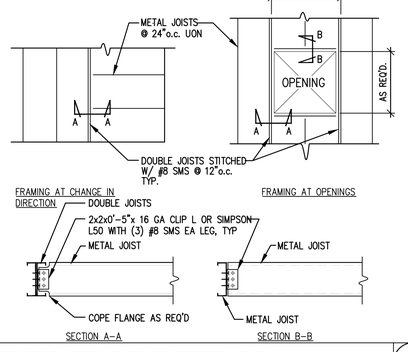
WALL BRIDGING SCALE: NTS 33



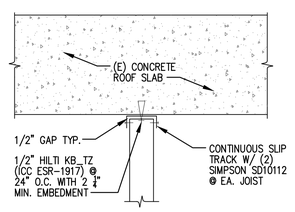
MAX STUD HEIGHT*		
STUD TYPE	STUD SPACING 16"o.c.	24"o.c.
362S137-33	16'-9"	14'-7"
400S137-33	18'-1"	15'-9"
600S137-33	24'-11"	21'-9"

*BASED ON 5 PSF AND L/240 SPACE STUDS @ 16"o.c. UON

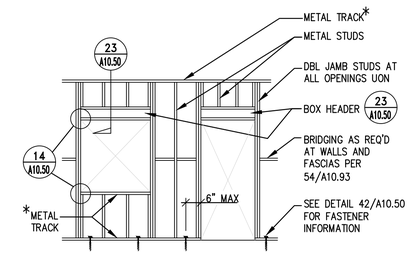
FRAMING AT OPENING SCALE: NTS 24



CEILING FRAMING DETAILS SCALE: NTS 13

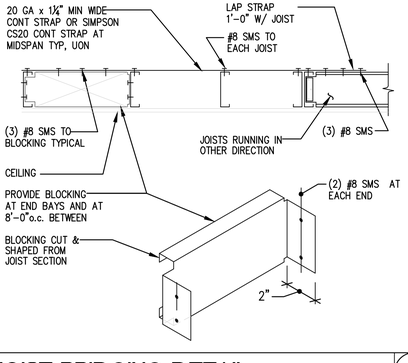


WALL TO (E) CONC. ROOF SCALE: 1"=1'-0" 44



*TRACK SAME GA AS STUDS W/ 1½" FLANGES (UON.)

METAL STUD WALL SCALE: NTS 34



JOIST BRIDGING DETAIL SCALE: NTS 14

INTERIOR NON-BEARING STUDS SCALE: NTS 25

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REVISIONS

SEAL

REGISTERED ARCHITECT GREGORY ALLEN RAVATT LIC. NO. C-28608 EXP. 9-30-27 STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
DETAILS

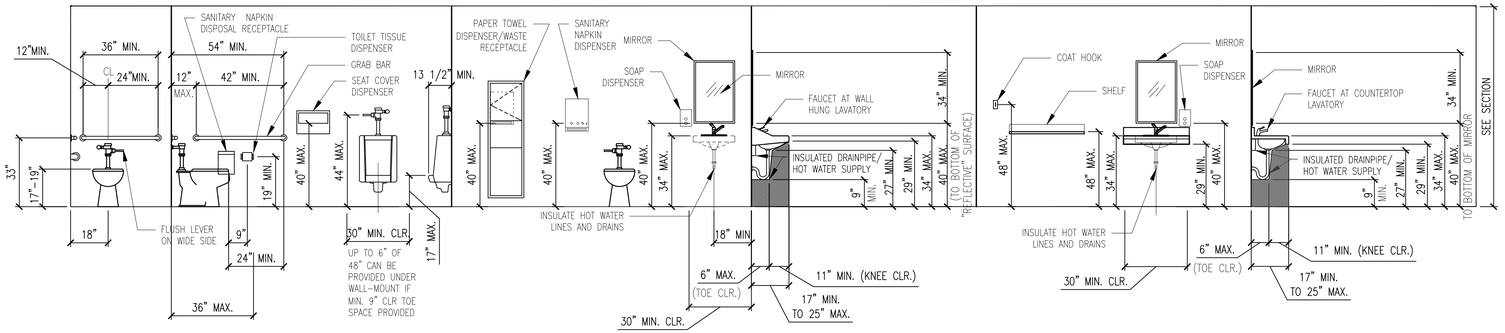
DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
A10.70



NOTES:

1. REGARDLESS OF STALL CONFIGURATION, A 48" LONG MINIMUM CLEARANCE FLOOR SPACE SHALL BE PROVIDED IN FRONT OF THE WATER CLOSET AT ACCESSIBLE STALL.

2. INTERIOR DIMENSIONS OF SINGLE ACCOMMODATION TOILET ROOMS SHALL INCLUDE A CLEAR FLOOR SPACE OF AT LEAST 60" IN DIAMETER OR A T-SHAPED CLEAR SPACE. NO DOOR MAY ENCROACH INTO THIS REQUIRED CLEAR SPACE BY MORE THAN 12".

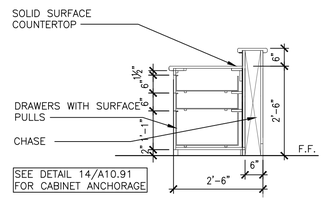
3. SIDE GRAB BARS IN SINGLE ACCOMMODATION TOILET ROOMS MUST BE INSTALLED SUCH THAT THE FRONT END OF THE BAR IS LOCATED A MINIMUM OF 54" FROM THE BACK WALL.

4. THERE MUST BE NO SHARP OR ABRASIVE SURFACES UNDER LAVATORIES.

5. ALL ACCESSORIES INCLUDING BUT NOT LIMITED TO CLOTHES HOOKS, TOILET PAPER DISPENSER, SOAP DISPENSER, SEAT COVER, PAPER TOWEL DISPENSER SHALL BE ANTI-LIGATURE DESIGN.

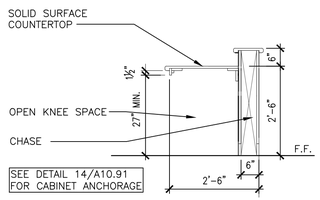
TYPICAL RESTROOM ACCESSORY MOUNTING HEIGHTS

SCALE: NTS (11)



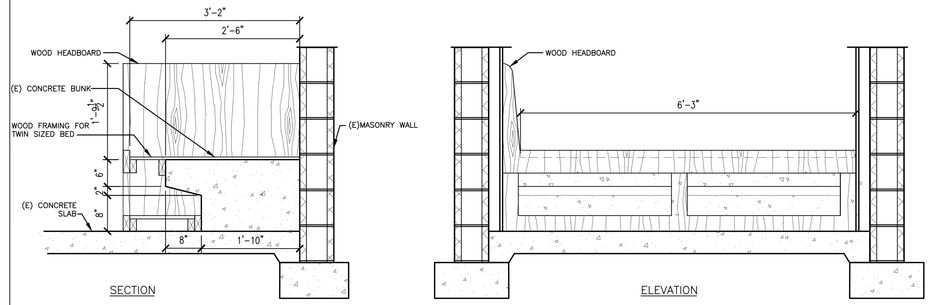
STAFF DESK- BASE CABINET

SCALE: 1/2"=1'-0" (42)



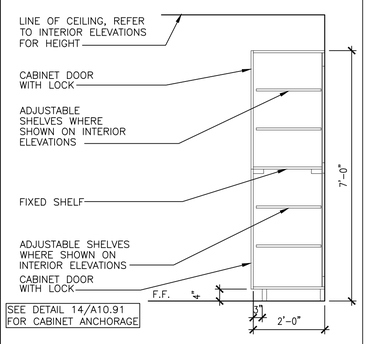
STAFF DESK - BASE CABINET

SCALE: 1/2"=1'-0" (32)



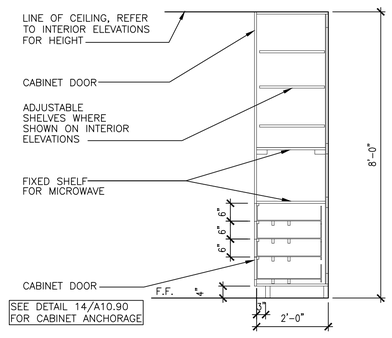
WOOD TWIN BED PLATFORM

SCALE: 3/4"=1'-0" (12)



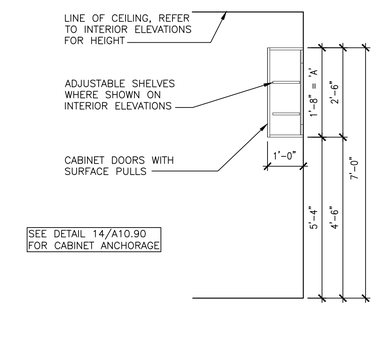
TALL CABINET

SCALE: 1/2"=1'-0" (53)



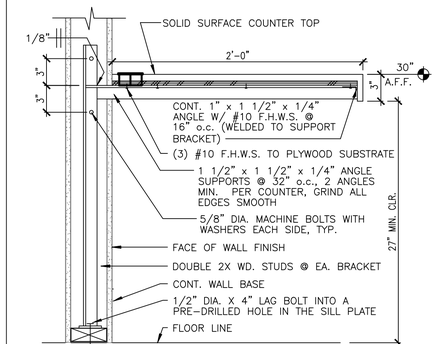
TALL CABINET WITH DRAWERS

SCALE: 1/2"=1'-0" (43)



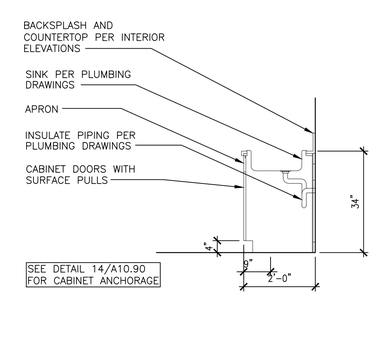
UPPER CABINET

SCALE: 1/2"=1'-0" (33)



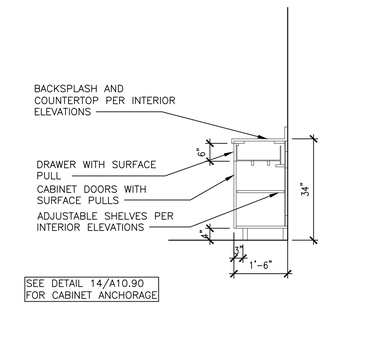
COUNTER SUPPORT

SCALE: 1 1/2"=1'-0" (13)



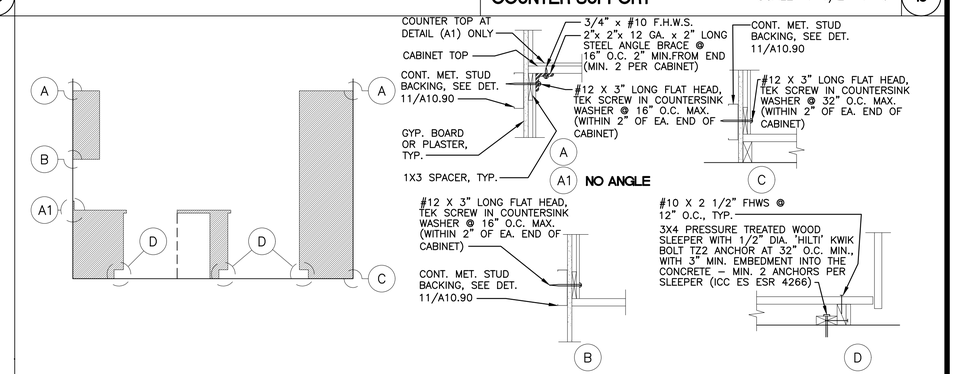
ACCESS. SINK CABINET

SCALE: 1/2"=1'-0" (44)



BASE CABINET

SCALE: 1/2"=1'-0" (34)



CABINET ANCHORAGE

SCALE: 1/2" = 1'-0" (14)

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REVISIONS

SEAL

REGISTERED ARCHITECT
GREGORY ALLEN RAVATT
LIC. NO. C-26808
EXP. 9-30-27
STATE OF CALIFORNIA

PROJECT

PROBATION
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UNIT 3 REMODEL

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County of Santa Barbara
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COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
DETAILS

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22868

SHEET NUMBER
A10.90

GENERAL NOTES

1. Construction shall comply with the latest edition of the California Building Code (CBC), IBC Standards, IBC adopted Standards, and IBC recognized Standards and of any regulating agencies which have authority over any portion of the work, including local, state and federal safety and health standards, laws and regulations.
2. General notes and typical details apply to all structural features, unless otherwise indicated.
3. If certain features are not fully shown or called out on the drawings or in the specifications, their construction shall be of the same character as for similar conditions.
4. The construction documents represent the finished structure and do not indicate methods, procedures or sequence of construction. It is the responsibility of the Contractor to take necessary precautions to maintain and ensure the integrity of the structure during construction. The Contractor shall provide all measures necessary to protect life and property during construction.
5. The Contractor shall be responsible for coordinating the work of all trades and shall check all dimensions and holes and openings required in structural members. All discrepancies shall be called to the attention of the Structural Engineer and shall be resolved before proceeding with the work.
6. Prior to submitting shop drawings and product data, the Contractor shall verify that the submittals meet the requirements of the drawings and specifications. The contractor shall specifically note any exceptions to these requirements with the submittal.
7. Openings, pockets, etc. shall not be placed in structural members unless specifically detailed on the structural drawings. Notify the Structural Engineer when work requires openings, pockets, etc. in structural members not shown on the structural drawings.
8. Where the general notes and the typical details are in conflict with the specifications, the general notes and typical details shall govern. Notes and details within these drawings take precedence over General Notes.
9. Construction materials shall be spread out if placed on slabs, floors or roofs. Load shall not exceed the design live load per square foot. Provide adequate shoring where overload is anticipated.
10. Unless specifically shown or noted on the structural drawings, anchor bolts or insets for equipment anchorage or installation shall be designed by a Civil or Structural Engineer registered in the state of California, and shall be shown on the architectural, mechanical and/or electrical drawings. Connections of items supported by the structure are the responsibility of the disciplines who are making these attachments. These attachments shall be designed to resist gravity, wind, seismic, thermal loads, etc.
11. All correspondence shall go through the Prime Consultant.

EXISTING UNDERGROUND UTILITIES

1. It is the responsibility of the Contractor to locate existing utilities whether shown hereon or not, and to protect them from damage. The location of any existing underground utilities shown on the drawings, if any, is approximate.
2. The Contractor shall be responsible for any damage which may result from his failure to locate and preserve all existing underground utilities.

DIMENSIONS

1. Do not scale drawings. Drawing scales given are approximate. Dimensions and elevations must be verified with Architectural Drawings. Discrepancies shall be conveyed to the Architect and the Structural Engineer and be resolved prior to proceeding.
2. See Architectural Drawings for dimensions, slopes, depressions and other information not specifically shown on the structural drawings.
3. The Contractor shall review and verify all dimensions prior to starting construction. The Architect/Engineer shall be notified immediately of any discrepancies or inconsistencies.

PROJECT DESIGN CRITERIA

1. Code: 2022 California Building Code
2. Risk Category: III
3. Design Live Loads

   Roof: 20 psf (reducible)

EXISTING CONDITIONS

1. Work shown is new unless noted as existing: (E).
2. Existing construction shown on these drawings was obtained from site investigation and can be used for bidding purposes. The contractor shall verify all existing job conditions, review all drawings and verify dimensions prior to construction. The contractor shall notify the Engineer of all discrepancies and exceptions before proceeding with the work.
3. The removal, cutting, drilling, etc. of existing work shall be performed with care in order not to jeopardize the structural integrity of the structure. If structural members or mechanical, electrical or architectural features not indicated for removal interfere with the new work, notify the Engineer immediately and obtain approval before removal of members.
4. The Contractor shall safely shore existing construction wherever existing supports are removed for the new work.
5. The Contractor shall perform the work with minimal inconvenience to the owner and without interruption of day-to-day work operations. The Contractor shall ensure safe travel of persons around areas of construction and shall coordinate all operations with the Owner or the Owner's agent.
6. The Contractor shall promptly repair any damage caused during operations, using materials and workmanship similar to that which was damaged.
7. All removed items, materials and debris, unless otherwise noted, shall be removed promptly from the site and disposed of in a legal manner.
8. Do not core or cut new openings in existing concrete or masonry without specific approval of the Structural Engineer. Submit dimensioned layout of all proposed new openings to the Structural Engineer for review and approval prior to coring or cutting openings. The Contractor, at their own expense, shall use non-destructive methods to locate existing reinforcing. Existing reinforcing shall not be cut without specific approval of the Structural Engineer.

GEOTECHNICAL DATA

1. No geotechnical report is provided for the project. Design of foundation is based on minimum requirements per Section 1806 of the CBC.
2. Foundation Type: Conventional spread foundations and drilled piers (friction).

   Design Values:

ISOLATED FOOTINGS	ALLOWABLE BEARING PRESSURES
DL + LL	1500 psf
DL + LL + Wind or Seismic	2000 psf
LATERAL RESISTANCE	
Passive Pressure	150 pcf
Coefficient of Friction	0.25

3. All footings shall bear on compacted undisturbed soil. Depth of footings shown on the drawings are minimum, and the bottom of footing shall be lowered as required to remove soft or loose materials.

FOUNDATIONS

1. See GEOTECHNICAL DATA notes for additional information.
2. When shown, the elevations of foundations indicate the estimated minimum foundation depths. Elevations shown are for bidding purposes only and are assumed to be in suitable bearing material.
3. The Contractor shall be solely responsible for all excavation procedures, including lagging, shoring and protection of adjacent property, structures, streets and utilities in accordance with the local jurisdiction.
4. Dewater excavations as required to maintain dry working conditions.
5. Excavations shall be properly backfilled. Do not place backfill behind retaining walls before concrete and/or masonry has attained specified 28-day compressive strength. Contractor shall brace or protect building and pit walls below grades from lateral loads until supporting floors and or roofs are in place and have attained full strength.
6. Footing backfill and utility trench backfill within building area shall be mechanically compacted in layers, to the approval of the Geotechnical Engineer. Flooding will not be permitted.
7. All abandoned footings, utilities, etc., that interfere with new construction, shall be removed.
8. The bottom of footings shall be level. Changes in footing elevations shall be made utilizing the TYPICAL STEP IN FOOTING detail, when included within these drawings.
9. Center footings under walls or columns unless otherwise indicated on these drawings.
10. Avoid footing penetrations and trenching near footings. Where unavoidable, see TYPICAL PIPE AND TRENCH detail, when included within these drawings.
11. Embedded items must be tied in place prior to foundation inspection.

CONCRETE

1. All portions of work pertaining to concrete construction shall conform to the California Building Code, Chapter 19, ACI Standard 318, and other referenced documents.
2. All concrete shall be ready-mix in accordance with ASTM C94.
3. Cement: ASTM C150 Type II. Where concrete is placed against soils that contain high levels of sulfides, use Type V cement.

   Reduced Embodied Carbon Option:
   Portland Limestone Cement (PLC) shall be ASTM C595 Type IL. Where concrete is placed against soils that contain high levels of sulfides, use ASTM C595 Type IL MS/HS cement.
4. Aggregate: ASTM C33. Aggregate for normal weight concrete shall conform to ASTM C-33.
5. Aggregate for lightweight concrete shall conform to ASTM C-330. The coarse aggregate size shall not exceed ¾" and the absolute volume of coarse aggregate shall not exceed 9.0 cubic feet per cubic yard of concrete.
6. Non-shrink Grout: ASTM C1107, premixed, non-staining, non-shrink grout.
7. Admixtures shall be approved by Structural Engineer prior to use. Calcium chloride or admixtures containing chloride(s) shall not be used.
8. Provide aggregates that do not contain any substance which may be deleteriously reactive with the alkalies in the cement. Fine and coarse aggregates shall be tested in accordance with ASTM C1260. Should the test data indicate potentially reactive aggregate, reject the aggregate(s) or perform additional testing using ASTM C1567.
9. Concrete mixes shall be designed by a qualified testing laboratory. Mix designs shall conform to ACI 318, Chapter 26, and CBC Sec. 1903, & 1904. Mixes are to be reviewed by owner's testing lab and submitted to the Architect/Engineer for approval. Do not cast concrete without approval by Architect/Engineer.

Concrete	Strength	Max Agg. Size	Max W/C Ratio
Slab-on-grade	2500 psi	1"	0.45
Foundations	2500 psi	1½"	0.45

   All concrete shall be hard rock aggregate, regular-weight concrete, 145 pcf, unless noted otherwise.
10. Maximum slump shall not exceed 3" +/- 1" for footings, slabs on grade, and 4" +/- 1" for other concrete. Slump limitations noted shall apply to concrete mix prior to the addition of any water-reducing admixtures or super-plasticizers.
11. Placement of concrete shall conform to ACI 304. Clean and roughen (by sandblasting, bushammer, or other approved method) to ¼" amplitude for all concrete surfaces against which concrete is to be placed.
12. Concrete shall be placed in accordance with ASTM C94 and ACI Standard 304.
13. When cold weather conditions exist, place concrete in compliance with ACI 306. When hot weather conditions exist, place concrete in compliance with ACI 305. In hot conditions, reinforcing shall be kept cool during concrete placement.
14. Location of construction joints not specified in these drawings must be reviewed by the Structural Engineer. Concrete slab on grade shall have control joints as shown on the foundation plan. Where construction/crack control joints are not specified, provide at a roughly square pattern with segments not exceeding 150 square feet in area.
15. Forms for concrete shall be laid out and constructed to provide for any required cambers.
16. Dry pack or place non-shrink grout under base plates, sill plates, etc., as required for full bearing.
17. All reinforcing bars, anchor bolts and other concrete inserts shall be secured in position prior to placing concrete. Stabbing of anchor bolts or reinforcing into wet concrete is not allowed.
18. Provide sleeves for plumbing, mechanical, and electrical openings in concrete before placing. Do not cut any reinforcing which may conflict. Coring in concrete is not permitted except as shown. Notify the Structural Engineer, in advance, of conditions not shown on the structural drawings.
19. Conduits or pipes shall not be embedded within a slab, wall, beam, concrete fill over metal deck, or column, unless noted otherwise.
20. See architectural drawings for all molds, grooves, reveals, ornaments and grounds to be cast in concrete.
21. Concrete elements shall reach specified 28-day compressive strength before being loaded, UNO.

MASONRY

1. All portions of work pertaining to masonry construction shall conform to the California Building Code, Chapter 21, TMS402/602-16, and other referenced documents.
2. Concrete Masonry Units: Concrete masonry units shall conform to ASTM C90 and be hollow, load-bearing, medium weight, manufactured from aggregates conforming to ASTM C331.
3. Mortar: Mortar shall conform to ASTM C270 type "S".
4. Grout: Grout shall conform to ASTM C476 and shall attain a minimum compression strength of 2000 psi at 28 days. Admixture shall be Sika grout aid or approved equal. Provide 6 lbs. of grout aid per cubic yard of grout.
5. Strength: Ultimate compressive strength, f'm, shall be 1,500 psi. [The strength of concrete block masonry construction shall be determined by the unit strength method in accordance with TMS 602 Article 1.4B.2 or by the prism test method in accordance with TMS 602 Article 1.4B.3.]
6. Units shall be laid in running (common) bond, unless noted otherwise.
7. All masonry shall be placed to maintain the vertical continuity of the cells to be filled. The vertical alignment shall be sufficient to maintain clear, unobstructed vertical flues measuring not less than 3 inches by 4 inches in 8-inch brick and block units.
8. Before block is placed on concrete, thoroughly clean concrete of all laitance and all loose material. Roughen as in a concrete construction joint.
9. All cells shall be grouted solid, unless noted otherwise.
10. Typical Reinforcement
    A. Vertical Reinforcement: #4 @ 16" o.c., unless noted otherwise.
       Horizontal Reinforcement: #4 @ 24" o.c., unless noted otherwise.
    B. All horizontal reinforcing shall be laid in bond beam units and against vertical bars.
    C. Vertical bars shall be centered in the cell of the unit, unless otherwise shown.
    D. Vertical bars shall be full height and braced at 6'-8" maximum intervals to prevent movement during grouting. Manufactured bar positioners shall be used.
    E. Maintain a minimum clearance between the bars and masonry units of ½ inch and between parallel bars of one diameter of the reinforcement.
    F. Lap splice reinforcing steel a length as indicated in typical details. Stagger horizontal splices a minimum of 24 inches, unless noted otherwise.
11. Bolts and inserts shall be secured in place prior to grouting with at least 1 inch of grout between the bolt and the masonry. See Typical Details for bolts.
12. No plumbing pipes shall be placed in masonry construction unless specifically noted or detailed on the drawings.
13. Electrical conduit may be routed in masonry walls as follows:
    A. Maximum size and quantity of conduit per cell (except at junction boxes) shall be as follows: for 8" block, one-1" diameter or two-¾" diameter; for 12" block, two-1" diameter or three-¾" diameter. Multiple conduits shall be bundled together.
    B. Conduit shall not be placed in a masonry cell containing reinforcing.
    C. Conduit shall not be placed in a pilaster.
    D. Conduit shall be placed at the centerline of the wall.

POST-INSTALLED ANCHORS

1. Post-Installed anchors include all adhesive anchors (reinforcing bar dowels and threaded rods) expansion anchors, screw anchors and undercut anchors set in holes drilled in existing concrete or masonry.
2. Installation of post-installed anchors shall conform to all requirements of the applicable code evaluation or IAPMO reports and manufacturers' recommendations.
3. Mark the location of all existing reinforcing in the substrate material within 12" of the proposed locations of all post-installed anchors. Notify the Engineer of any conflicts discovered between the proposed anchor locations and the existing reinforcing prior to fabrication of any steel and prior to any hole drilling, so as to avoid disturbing, cutting, or otherwise harming the existing reinforcing.
4. Holes for adhesive anchors in concrete shall be drilled. Cored holes are not permitted.
5. Do not install adhesive anchors in concrete if concrete strength is less than 2500 psi, age is less than 21 days, or temperature is less than 50 degrees Fahrenheit.
6. Adhesive Anchors in Concrete or Approved Equal (reinforcing bar dowels or threaded rods), UNO:
    A. HILTI "HIT-HY 200" ICC ESR-3187.
    B. HILTI "HIT-RE 500 V3" ICC ESR-3814.
    C. Simpson "SET-3G" Epoxy Adhesive. ICC ESR-4057.
    D. Simpson "AT-XP" Anchoring Adhesive IAPMO ER-263.
    E. Sika "Anchorfix-3001" ICC ESR-3608.
    F. Powers "Pure 110+" ICC ESR-3298,
7. Adhesive Anchors in Masonry or Approved Equal (reinforcing bar dowels or threaded rods), UNO:
    A. HILTI "HIT-HY 70" ICC ESR-2682.
    B. Simpson "SET-XP" Epoxy Adhesive. IAPMO ER-265.
    C. Powers "AC 100+ Gold" ICC ESR-2582.
8. Expansion Anchors in Concrete or Approved Equal, UNO:
    A. HILTI "Kwik-Bolt TZ" ICC ESR-1917.
    B. Simpson "Strong Bolt 2" ICC ESR-3037.
    C. Powers "Power-Stud+ SD2" ICC ER-2502.
9. Expansion Anchors in Masonry or Approved Equal, UNO:
    A. HILTI "Kwik-Bolt 3" ICC ESR-1385.
    B. Simpson "Strong Bolt 2" IAPMO ER-240.
    C. Powers "Power-Stud+ SD1" ICC ER-2966.
10. Screw Anchors or Approved Equal, UNO:
    A. HILTI "KWIK HUS-EZ" ICC ESR-3027 (concrete); ICC ESR-3056 (masonry).
    B. Simpson "Titen HD" ICC ESR-2713 (concrete); ICC ESR-1056 (masonry).
11. Undercut Anchors or Approved Equal:
    A. Simpson "Torq-Cut" ICC ESR-2705.
12. Adhesive dowels in horizontal or upwardly inclined orientations require continuous special inspection and shall be performed by personnel certified by an applicable certification program in accordance with ACI 318-14 17.8.
13. 10% of post installed anchors (but not less than 2 anchors) shall be tested in accordance to load tables below (refer to notes under special inspections for testing requirements). Anchors that fail the proof test shall be replaced by the contractor at no additional cost to the Owner.
14. Re-testing of replaced anchors that fail tests shall be paid for by the Contractor.
15. Typical embedment depths and proof loads for testing are indicated in the tables below.

ADHESIVE ANCHORS

ANCHOR SIZE	TYPICAL EMBEDMENT (U.O.N.)	PROOF LOAD NORMAL WEIGHT CONCRETE	PROOF LOAD LIGHT WEIGHT CONCRETE	PROOF LOAD GROUT-FILLED CMU BLOCK
#3 OR ⅜"ø	3½"	2100 lb.	1600 lb.	1600 lb.
#4 OR ½"ø	4½"	3700 lb.	1900 lb.	1900 lb.
#5 OR ⅝"ø	5⅝"	5800 lb.	2800 lb.	2800 lb.
#6 OR ¾"ø	6¾"	6900 lb.	–	–
#7 OR ⅞"ø	7⅞"	11500 lb.	–	–
#8 OR 1"ø	9⅜"	12400 lb.	–	–
#9 OR 1⅛"ø	10¾"	19000 lb.	–	–

EXPANSION ANCHORS

ANCHOR SIZE	TYPICAL EMBEDMENT (U.O.N.)	PROOF TORQUE NORMAL WEIGHT CONCRETE	PROOF TORQUE LIGHT WEIGHT CONCRETE	PROOF TORQUE GROUT-FILLED CMU BLOCK
⅜"ø	2⅞"	25 ft.-lb.	15 ft.-lb.	15 ft.-lb.
½"ø	3⅞"	40 ft.-lb.	25 ft.-lb.	25 ft.-lb.
⅝"ø	5⅛"	60 ft.-lb.	35 ft.-lb.	35 ft.-lb.
¾"ø	5¾"	110 ft.-lb.	65 ft.-lb.	65 ft.-lb.

SCREW ANCHORS

ANCHOR SIZE	TYPICAL EMBEDMENT (U.O.N.)	PROOF TORQUE NORMAL WEIGHT CONCRETE	PROOF TORQUE LIGHT WEIGHT CONCRETE	PROOF TORQUE GROUT-FILLED CMU BLOCK
⅜"ø	2¾"ø	10 ft.-lb.	10 ft.-lb.	10 ft.-lb.
½"ø	3½"ø	20 ft.-lb.	20 ft.-lb.	20 ft.-lb.
⅝"ø	4½"ø	30 ft.-lb.	30 ft.-lb.	30 ft.-lb.
¾"ø	5½"ø	40 ft.-lb.	40 ft.-lb.	40 ft.-lb.

UNDERCUT ANCHORS

ANCHOR SIZE	TYPICAL EMBEDMENT (U.O.N.)	PROOF TESTING NOT REQUIRED		
½"ø	5¾"			
⅝"ø	8"			
¾"ø	10¼"			

STRUCTURAL STEEL & MISC. METALS

1. All portions of work pertaining to structural steel construction shall conform to the California Building Code, Chapter 22, and other referenced Standards.
2. Fabrication and erection of structural steel shall be in accordance with the latest edition of "Code of Standard Practice for Steel Buildings and Bridges", AISC 303.
3. Materials:

A. W Shapes:	ASTM A992 (f_y = 50 ksi)
B. Channels & Angles:	ASTM A36 (f_y = 36 ksi)
C. All other Shapes & Plates:	ASTM A572 Grade 50 (f_y = 50 ksi)
D. Structural Tubes (Rectangular HSS):	ASTM A500 Grade B (f_y = 46 ksi)
E. Structural Tubes (Round HSS):	ASTM A500 Grade B (f_y = 42 ksi)
F. Structural Pipes:	ASTM A53 Grade B (f_y = 35 ksi)

4. Bolts, unless noted otherwise on drawings:

A. Typical Steel Connections:	ASTM A325-N
B. Machine Bolts when specified (MB):	ASTM A307
C. Anchor Bolts & Rods:	ASTM F1554 Grade 55-S1

5. Joint type for bolted connections shall be Pre-Tensioned (PT), unless noted otherwise as Snug-Tightened (ST) or Slip-Critical (SC).
6. Compressible-washer-type direct tension indicators or twist-of-type tension control bolts conforming to RCSC, Specification for Structural Joints Using High-Strength Bolts, shall be provided at all bolted connections.
7. Faying surface for Slip-Critical (SC) bolts shall be Class A, unless noted otherwise, with bolt slip considered at the factored load level.
8. Anchor bolts shall be heavy hex headed, UNO. Bent bar anchors shall not be used.
9. Bolt holes shall be 1/16" larger in diameter than nominal size of bolt used, unless noted otherwise. Use of ⅛" larger diameter holes for baseplate anchor bolts is permitted.
10. For bolted connections, provide 1½ inch edge and end distance, unless noted otherwise.
11. All welding shall conform to the Structural Welding Code - Steel, AWS D1.1 and Seismic Supplement, AWS D1.8, by the American Welding Society. Welding rods shall be E70XX, unless noted otherwise.
12. The filler metal for all welding shall have a notch toughness of not less than 20 ft-lbs at 0 degrees F, as measured by a standard Charpy V-Notch test, ASTM E-23, in accordance with the applicable filler metal specification referenced in AWS D1.1 and Seismic Supplement AWS D1.8.
13. All welding shall be performed by certified welders.
14. All welds not specified shall be continuous fillet welds. Size of welds shall be based on AWS D1.1 for thicker part joined.
15. Weld symbols shown on the drawings do not necessarily differentiate between shop weld and field welds. When field welds are necessary due to construction procedure or sequence, welds shall be provided and be inspected per specifications. All welds shown as field welds shall be done in field as indicated.
16. All structural steel surfaces are to be painted or galvanized, unless noted otherwise. Steel that is not exposed to weather and is to be encased in concrete or masonry shall be left uncoated. Steel that is to receive spray-applied fireproofing shall be left uncoated. Faying surfaces of high-strength bolted connections and areas within 3 inches of field welded joints shall be left uncoated until welding and bolting operations are complete.
17. All structural steel, miscellaneous metal and connectors exposed to weather shall be hot-dip galvanized after fabrication, unless noted otherwise.
18. All faying surfaces for friction-bolted connections of galvanized members shall be roughened by means of hand wire brushing after galvanizing and before erection.
19. No holes or penetrations through structural steel members are allowed except as indicated on the structural drawings. Connections of items supported by structural steel members are the responsibility of the disciplines who are making these attachments. Attachment of lateral bracing to bottom flanges of steel beam members are not allowed except as indicated on the structural drawings.
20. Camber:
    A. Provide upward camber to all members shown to have camber. Amount measured in field prior to installation shall not deviate more than allowed by the AISC Specifications. Do not camber members located below elevator doors.
    B. Beams detailed without specified camber shall be fabricated so that after erection, any minor camber due to rolling or shop assembly shall be upward. Top of all members shall be clearly identified.
21. For fireproofing requirements, see architectural drawings and specifications.
22. Furnish shop and erection drawings of all structural steel for the Prime Consultant and Structural Engineer's review before fabrication.

REINFORCING STEEL

1. All portions of work pertaining to concrete reinforcing construction shall conform to the California Building Code, Chapter 19, ACI Standard 318, and other referenced documents.
2. Reinforcing Steel: ASTM A615 grade 60. ASTM A706 where welded or otherwise indicated.
3. Post Tensioning: ASTM A416 grade 270 seven wire, uncoated, stress-relieved strands.
4. Welded Wire Fabric: ASTM A185 (flat sheets only). Welded wire fabric shall be spliced by lapping a minimum of 18" or two cross wires, whichever is greater.
5. Headed terminators shall be HRC 100-series T-Heads (ICC ER-5292), or Lenton Terminators (IAPMO ER-0188), or approved equal.
6. Mechanical couplers shall be Lenton mechanical couplers (IAPMO ER-0129), or approved equal.
7. All reinforcement shall be continuous. Stagger splices where possible. Laps shall be per typical details, unless noted otherwise.
8. All reinforcing bar bends shall be made cold. Reinforcing bars shall not be re-bent without approval of Structural Engineer.
9. Dowels between footings and walls or columns shall be the same grade, size, spacing and number as the vertical reinforcement, respectively, unless noted otherwise.
10. Welding of reinforcement shall be with low hydrogen electrodes and shall conform to structural welding code - reinforcing steel, AWS D1.4, by the American Welding Society and ACI 318 Sec. 26.6.4.2. Welding rods used for the welding of reinforcing shall be E80XX. All welding shall be performed by certified welders.
11. Reinforcing steel shall be clean, free of excessive rust, grease, oil or other material likely to impair bond.
12. Minimum clear concrete cover for reinforcement, unless noted otherwise:

    A. Mild Reinforced Concrete:

Cast against earth:	3 inches
Cast in forms and exposed to earth or weather:	
#6 bar and larger:	2 inches
#5 bar and smaller:	1½ inches
Not exposed to earth or weather:	
Slabs and walls (#11 and smaller):	¾ inch
Beams, girders, and columns (to ties):	1½ inches

    Clearances are to closest reinforcement.

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Written dimensions take precedence over scaled dimensions. Do not scale plans. Contractor shall verify all dimensions and conditions in the field. Any discrepancies shall be called to the attention of RA & Associates.

REVISIONS

SEAL

REGISTERED PROFESSIONAL ENGINEER
HOOMAN TAVACOLI
No. S 6738
STRUCTURAL
STATE OF CALIFORNIA

10/16/2025

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

Cannon
1050 Southwood Drive
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SHEET TITLE

GENERAL NOTES

DATE: 10/15/2025

DRAWN BY: JG

REVIEWED BY: HT

JOB NUMBER: 250533

SHEET NUMBER

S0.1

SUBMITTALS

1. Submittals shall be submitted to the Prime Consultant and Structural Engineer for review prior to fabrication of the items.

2. A schedule for submittal of shop drawings shall be prepared by the Contractor and reviewed by the Prime Consultant and Structural Engineer prior to the start of fabrication. The schedule shall proportion the quantity of shop drawings to be reviewed in each submittal to allow sufficient time, as deemed reasonable in the professional judgement of the Prime Consultant and Structural Engineer, to permit adequate review. Allow a minimum of (10) working days for review by the Structural Engineer.

3. Shop drawings shall indicate the date or revision of drawing(s) from which the drawings were prepared. Submittals that do not identify the latest date or revision of drawing(s) will be returned without review. Only shop drawings that are complete will be accepted for review.

4. If, after review, the shop drawings must be revised and resubmitted, the shop drawings shall identify each revision and/or addition by clouding or other means to assure proper review.

5. Submittals will not be accepted directly from subcontractors. Submittals will be accepted from the General Contractor only after being reviewed and signed by the General Contractor, indicating compliance with the requirements of the construction documents. Submittals not complying with the requirements noted above or in the specifications will be returned without review.

6. Submittals shall include those indicated on the following list as well as any other items indicated in the specifications. This list is provided for convenience only and may not incorporate all requirements indicated in the project specifications.

STRUCTURAL STEEL

1. Shop Drawings and Erection Drawings:

   A. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
   B. Indicate welded connections with AWS A2.4 Welding symbols. Indicate net weld lengths and sizes. Distinguish between shop and field welds. Identify welds by WPS number.
   C. Include details of cuts, connections, splices, camber, holes, stiffeners, doubler plates, and other pertinent data, such as surface preparation. Include setting drawings, templates, and directions for installation of embedded items to be installed by others.
   D. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high–strength bolted slip–critical, direct–tension, or tensioned shear/bearing connections.

2. Manufacturer's Mill Certificates: Certify that products meet or exceed specified requirements.

3. Mill Test Reports: Indicate structural strength, destructive test analysis and non–destructive test analysis.

   A. Structural steel including chemical and physical properties and charpy V–Notch test results, where specifically required.
   B. Bolts, nuts, and washers including mechanical properties and chemical analysis.
   C. Direct–tension indicators.
   D. Tension–control, high–strength bolt–nut–washer assemblies.
   E. Weld filler metals, including charpy V–Notch test results, where specifically required.

4. Weld filler metal manufacturer's data sheets, indicating filler metal classification, characteristics, recommended ranges of heat inputs, permissible positions, strength and cvn toughness, if applicable.

5. Welders Certificates: Certify welders employed on the work, verifying AWS qualification within the previous 12 months.

6. Welding procedure specifications (WPS) per AWS D1.1–10 for each type of welded joint.

7. Welding procedure qualification record (PQR) for each weld procedure that is not prequalified by AWS D1.1–10.

CONCRETE REINFORCEMENT

1. Shop drawings complying with the requirements of ACI SP–66. include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

2. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

3. Welding procedure specifications (WPSS) for each unique type of weld of reinforcing steel, characterized by (position, process, size, material).

4. Product data and Code Evaluation Reports for the following products: Mechanical couplers, deformed bar anchors, and headed reinforcement.

5. Reports: Certified copies of mill test reports for each heat of reinforcing provided to the project, documenting compliance with the applicable ASTM specification, including chemical analysis, tensile tests and bend tests.

CAST–IN–PLACE CONCRETE

1. Mix designs and test data for concrete mixes, at least 15 days prior to intended placement. Mix design submittals shall include, as a minimum, the following:

   A. List of materials proposed weights and volumes of each material per cubic yard.
   B. Specification of source for each material.
   C. Gradation listing of aggregates and certification that coarse and fine aggregates meet the requirements listed in the concrete materials article of the cast–place concrete section of the specifications.
   D. List of admixtures, with manufacturer's data sheets.
   E. Certification that all aggregates are compatible with the proposed cement.
   F. Laboratory test reports from trial batches of field experience, as applicable for the specific mix proposed for use.
   G. The mix design shall be signed by a Professional Engineer licensed in the state of the project.

2. Product data, material safety data sheets (MSDS) and Code Evaluation Reports, as applicable, for proprietary materials and items, including curing compounds, epoxy resins, surface treatments and proprietary anchoring systems.

3. Drawings indicating proposed locations of construction joints and control joints.

4. Description of curing methods proposed and products to be employed.

POST–INSTALLED ANCHORS

1. Product data and Code Evaluation Reports for anchors proposed as alternatives to those specified.

2. Preparation instructions and recommendations.

3. Installation methods.

4. Storage and handling requirements and recommendations.

SCHEDULE OF SPECIAL INSPECTIONS AND TESTS 2022 CBC

1. Special inspections and testing shall be performed in accordance with the approved plans and specifications, statement of special inspections and building code sections 1704 and 1705.

2. The schedule of special inspections summarizes the special inspections and tests required. Special inspectors shall refer to the approved plans and specifications for detailed special inspection requirements. Any additional tests and inspections required by the approved plans and specifications shall also be performed.

3. Schedule of special inspections and tests applicable to this project.

   A. Special inspections per sections 1704 and 1705 (only indicated items are required)
   B. Special inspections for wind resistance/seismic resistance per section 1705.12/1705.13

Notation Used in Table:

Column headers:
- C Indicates continuous inspection is required.
- P Indicates periodic inspections are required. The notes below and/or contract documents should clarify

Box entries:
- X Is placed in the appropriate column to denote either "C" continuous or "P" periodic inspections.
- ––– Denotes an activity that is a one–time activity.
- Std. Indicates that the standard defines frequency.

Additional detail regarding inspections and tests are provided in the project specifications or notes on the drawings.

4. Contractor responsible for the construction of the seismic–force–resisting system shall submit a written statement of responsibility to the building official prior to the commencement of work on the system.

5. Reports will be submitted to the building official and the registered design professional in responsible charge in accordance with section 1704.2.4.

6. A final report of special inspections documenting required special inspections, testing and correction of any discrepancies noted in the inspection shall be submitted prior to issuance of a certificate of use and occupancy (section 1704.2.4). The final report will document.

   A. Required special inspections
   B. Correction of discrepancies noted in inspections.

7. The owner recognizes their obligation to ensure that the construction complies with the approved permit documents and to implement this program of special inspections in partial fulfillment of these obligations, the owner will retain and directly pay for the special inspections as required in section 1704.2.

8. This plan has been developed with the understanding that the building official will:

   A. Review and approve the qualifications of the special inspectors who will perform the inspections.
   B. Monitor special inspection activities on the job site to assure that the special inspectors are qualified and are performing their duties as called for in this statement of special in inspection.
   C. Review submitted inspection reports.
   D. Perform inspections as required by the local building code.

VERIFICATION AND INSPECTION			C	P	REQ'D (?)
1705.1.1 – Special Cases					
	Post Installed Anchors		X		YES
1705.2 – Steel Construction					
1705.2.1 – Structural steel					
1.	Review material test reports and certifications	(AISC 360 N5.2)	–––		YES
2.	Inspection of welding	(AISC 360 N5.4)	Std.		YES
3.	NDT of welded joints	(AISC 360 N5.5)		X	
4.	Inspection of high strength bolting	(AISC 360 N5.6)	Std.		
5.	Verify compliance of steel members with details on construction documents (AISC 360 N8)			X	YES
6.	Headed stud anchors	(AISC 360 Table N5.4–2)	Std.		YES
1705.3 Concrete					
Table 1705.3 – Concrete Construction					
1.	Inspection of reinforcing steel, including prestressing tendons and placement			X	
2.	Reinforcing bar welding				
	a.	Verify weldability if not ASTM A706		X	
	b.	Single pass fillet welds max 5/16"		X	
	c.	Inspect other welds	X		
3.	Inspection of anchors cast in concrete			X	
4.	Inspection of anchors installed in hardened concrete.				
	a.	Adhesive anchors horizontally or upward inclined	X		YES
	b.	Mechanical anchors and other adhesive anchors		X	
5.	Verify use of required design mix			X	
6.	Prior to concrete placement fabricate specimens for strength tests, perform slump and air content tests and determine the temperature of the concrete		X		
7.	Inspect concrete and shotcrete placement for proper application techniques		X		
8.	Verify maintenance of specified curing temperature and techniques			X	
9.	Inspect prestressed concrete for:				
	a.	Application of prestressing forces, and	X		
	b.	Grouting of bonded prestressing tendons	X		
10.	Inspect erection of precast concrete members			X	
11.	Verify in–situ concrete strength, prior to stressing of tendons in posttensioned concrete and prior to removal of shores and forms from beams and structural slabs			X	
12.	Inspect formwork for shape, location, and dimensions of the concrete member being formed			X	
ACI 318–19 Section 26.12: Compressive tests of specimens taken during concrete placement				X	

POST–INSTALLED ANCHORS PER ICC AND/OR OTHER APPROVED AGENCY EVALUATION REPORTS

1. Verify the following:

   A. The specific manufacturer and model of anchors have been approved for the application by the Architect/Engineer.

   B. The holes are drilled at the angle required and of the diameter and depth required.

   C. The holes are clean prior to installation of the anchors.

   D. The adhesive packaging indicates an expiration date and that the expiration date has not passed.

   E. The adhesive is mixed properly and that the initial portion of adhesive coming out of the nozzle is wasted, as required by the manufacturer.

   F. The anchors are installed according to the manufacturer's recommendations.

2. Perform tests of anchors according to ASTM E 488 and as follows:

   A. Test ten percent of each application of anchors to the tensile or torque proof load as indicated on the drawings.

   B. One application of anchors or dowels shall be defined as those anchors or dowels installed by a single crew in a single day.

   C. Test locations are random at the discretion of the testing lab, unless otherwise directed by the Architect/Engineer.

   D. Tension test loads shall be maintained for a minimum of two minutes.

3. Tension Test criteria: Anchor displacement at the end of the loading period shall be limited to one–fifth of the nominal anchor diameter. Displacement following release of load shall return to zero.

4. Torque Test criteria: Test torque must be reached within a half turn of the nut, except for ⅜" diameter anchors, for which test torque must be reached within a quarter turn of the nut.

5. If any anchor fails the test, test all anchors in the same application not previously tested until 10 consecutive anchors pass.

6. Adhesive dowels in horizontal or upwardly inclined orientations require continuous special inspection and shall be performed by personnel certified by an applicable certification program in accordance with ACI 318 section 17.8.

ABBREVIATIONS

#	Number or Pound
&	And
∠ or L	Angle
@	At
ABV.	Above
AB	Anchor Bolt
ADDL.	Additional
AISC	American Institute of Steel Construction
ALT.	Alternate
APA	American Plywood Association
APPROX.	Approximate
ARCH.	Architectural, Architect
ASTM	American Standards of Testing and Materials
BLDG.	Building
BLK.	Block, Blocking
BLW.	Below
BM.	Beam
BN	Boundary Nailing
BO	Bottom of
BOT.	Bottom
BRG.	Bearing
BS	Both Sides
BTWN.	Between
CANT.	Cantilever
CBC	California Building Code
CHD.	Chord
CIP	Cast–in–place
CJ	Construction or Control Joint
CJP	Complete Joint Penetration
℄ or CL	Center Line
CLG.	Ceiling
CLR.	Clear
CMU	Concrete Masonry Unit
COL.	Column
CONC.	Concrete
CONN.	Connection
CONT.	Continuous
COORD.	Coordinate
CSK.	Countersink
CTR.	Center
D or d	Nail Penny Size
ø or DIA.	Diameter
DBA	Deformed Bar Anchor
DBL	Double
DET.	Detail
DF	Douglas Fir
DIAG.	Diagonal
DIM.	Dimension
DKG.	Decking
DL	Dead Load
DO.	Ditto
DWG.	Drawing
(E)	Existing
EA.	Each
EF	Each Face
EJ	Expansion Joint
ELEV., EL.	Elevation
EMBED.	Embedment
EN	Edge Nail, End Nail
EO	Edge of
EOC	Edge of Concrete
EQ.	Equal
EQUIP.	Equipment
ES	Each Side
EW	Each Way
EXP.	Expansion
EXT.	Exterior
FDN.	Foundation
FF	Finish Floor
FG	Finish Grade
FIN.	Finish
FJ	Floor Joist
FLR.	Floor
FN	Field Nail
FOC	Face of Concrete
FOM	Face of Masonry
FOS	Face of Stud
FRMG.	Framing
FS	Far Side
FT.	Foot, Feet
FTG.	Footing
GA.	Gauge
GALV.	Galvanized
GL.	Grid Line
GLB	Glued–laminated Beam
GWB	Gypsum Wall Board
HD	Holdown
HDG	Hot Dipped Galvanized
GYP.	Header
HGR.	Hanger
HORIZ.	Horizontal
HSB	High Strength Bolt
HSS	Hollow Structural Section
HT.	Height
IBC	International Building Code
ICC	International Code Council
ID	Inside Diameter
INFO.	Information
INT.	Interior
JST.	Joist
JT.	Joint
KSI	Kips per Square Inch
LL	Live load
LLH	Long Leg Horizontal
LLV	Long Leg Vertical
LONG.	Longitudinal
LOC.	Location
LS	Lag Screw
LTWT	Light Weight
MAX.	Maximum
MB	Machine Bolt
MECH.	Mechanical
MFR.	Manufacturer
MIN.	Minimum
MISC.	Miscellaneous
(N)	New
NS	Near Side
NTS	Not to Scale
NWT	Normal Weight
OC	On Center
OD	Outside Diameter
OH	Opposite Hand
OPNG.	Opening
PAF	Powder–Actuated Fastener
PERP.	Perpendicular
PEMB	Pre–Engineered Mtl. Bldg.
℗ OR PL.	Plate
PLF	Pounds per Linear Foot
PLY	Plywood
PJP	Partial Joint Penetration
PSF	Pounds per Square Foot
PSI	Pounds per Square Inch
PT	Pressure Treated
PW	Puddle Weld
QTY.	Quantity
RAD.	Radius
REINF.	Reinforcing
REQ.	Required
RET.	Retaining
SAD	See Architectural Drawings
SCHD.	Schedule
SHT.	Sheet
SHTG.	Sheathing
SIM.	Similar
SMD	See Mechanical Drawings
SMS	Sheet Metal Screw
SOG	Slab on Grade
SPEC.	Specification
SQ.	Square
SS	Stainless Steel
STD.	Standard
STGD.	Staggered
STIFF.	Stiffener
STL.	Steel
STRUCT.	Structural
STRGR.	Stringer
SW	Shear Wall
SYM.	Symmetrical
T&B	Top and Bottom
T&G	Tongue and Groove
TEMP.	Temporary
THRU.	Through
TN	Toe Nail
TO	Top of
TOB	Top of Beam
TOC	Top of Concrete
TOG	Top of Grating
TOS	Top of Steel
TOW	Top of Wall
TRANSV.	Transverse
TYP.	Typical
UNO	Unless Noted Otherwise
URM	Unreinforced Masonry
VERT.	Vertical
VIF	Verify in Field
WWF	Welded Wire Fabric
w/	With
w/o	Without
WP	Work Point
WSHR.	Washer

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REVISIONS

SEAL

REGISTERED PROFESSIONAL ENGINEER — HOSSMAN TAVALLALI — No. S 6738 — STRUCTURAL — STATE OF CALIFORNIA

10/16/2025

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

Cannon
1050 Southwood Drive
San Luis Obispo, CA 93401
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SHEET TITLE

GENERAL NOTES

DATE: 10/15/2025

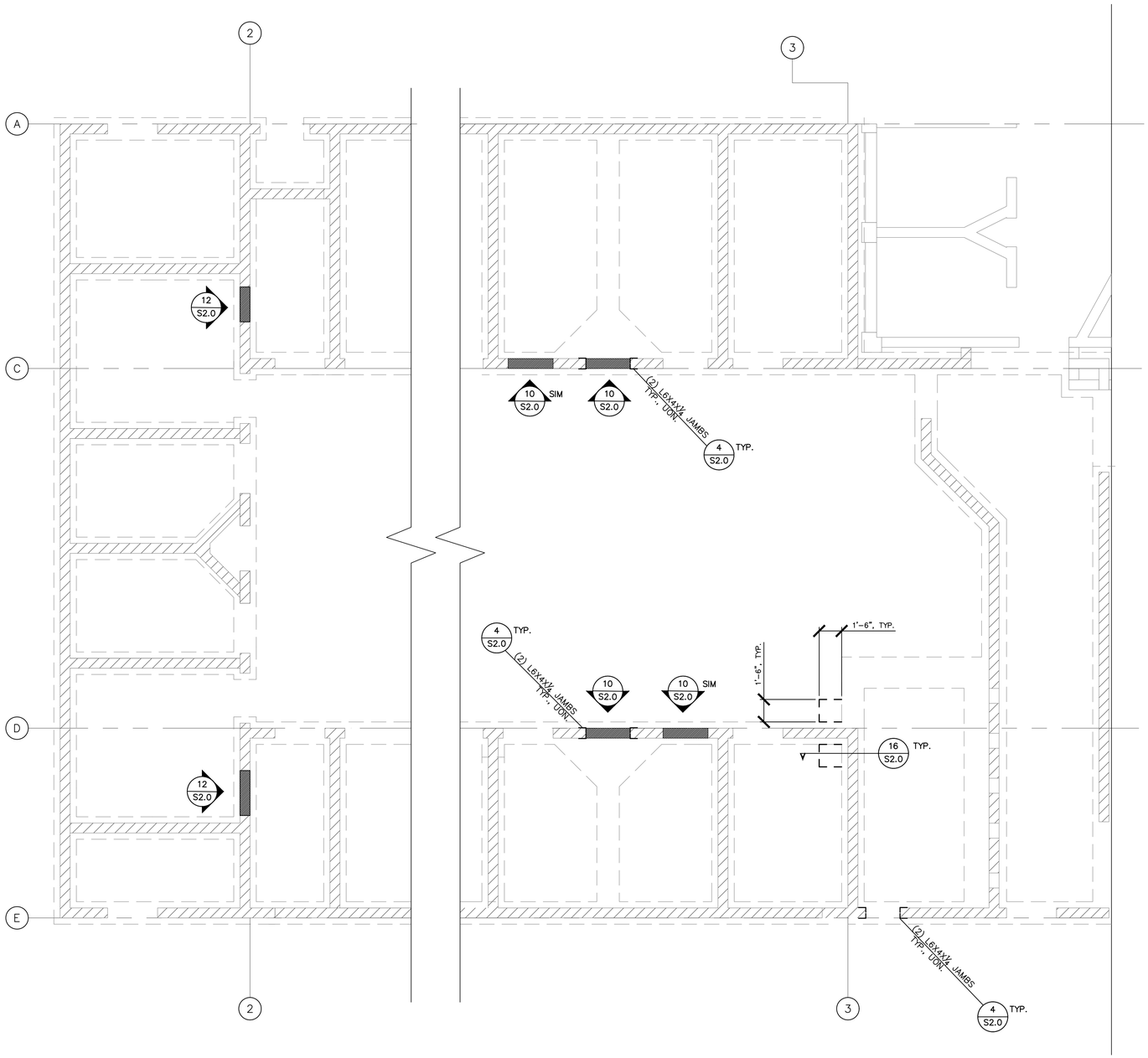
DRAWN BY: JG

REVIEWED BY: HT

JOB NUMBER: 250533

SHEET NUMBER

S0.2



PARTIAL FOUNDATION AND FIRST FLOOR PLAN
UNIT 3

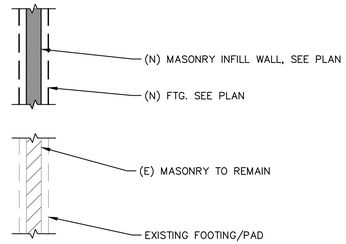
SCALE: 1/4" = 1'-0"

250533 S1.0

FOUNDATION PLAN NOTES

1. SEE SHEETS S0.1 THROUGH S0.2 FOR GENERAL NOTES.
2. REFER TO GENERAL STRUCTURAL NOTES & DETAILS FOR GENERAL REQUIREMENTS OF CONSTRUCTION, MATERIALS, SHOP DRAWINGS AND REQUIREMENTS OF CONSTRUCTION OBSERVATIONS.
3. ALL NEW FOOTINGS AND GRADE BEAMS TO SIT ON COMPACTED, NON-EXPANSIVE FILL OR UNDISTURBED EXISTING GRADE.
4. SEE ARCHITECTURAL DRAWINGS FOR ALL EXTERIOR CONCRETE PAVING, SLABS, BASES, CURBS, SITE WALLS, ETC.
5. CONTRACTOR SHALL VERIFY ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS AND AS-BUILT FIELD DIMENSIONS PRIOR TO CONSTRUCTION.CONTRACTOR SHALL CONTACT STRUCTURAL ENGINEER REGARDING ANY DISCREPANCIES.
6. SEE ARCHITECTURAL PLANS FOR DEPRESSIONS AND/OR SLOPES IN CONCRETE SLABS.
7. SEE ARCHITECTURAL DRAWINGS FOR SIZE AND LOCATION OF ALL DOOR AND WINDOW OPENINGS.
8. SEE ARCHITECTURAL DRAWINGS FOR ALL FINISHES, FIRE PROTECTION, THERMAL AND MOISTURE PROTECTION, WATERPROOFING, AND ACOUSTICAL REQUIREMENTS FOR ALL CEILINGS, WALLS, FLOORS, ROOF DECKS AND TERRACES.
9. SEE ARCHITECTURAL DRAWINGS FOR ALL INTERIOR NON-LOAD BEARING PARTITION WALLS.
10. ALL STEEL MEMBERS AND CONNECTIONS EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED.

PLAN LEGEND



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SHEET TITLE
FOUNDATION AND FIRST FLOOR PLAN

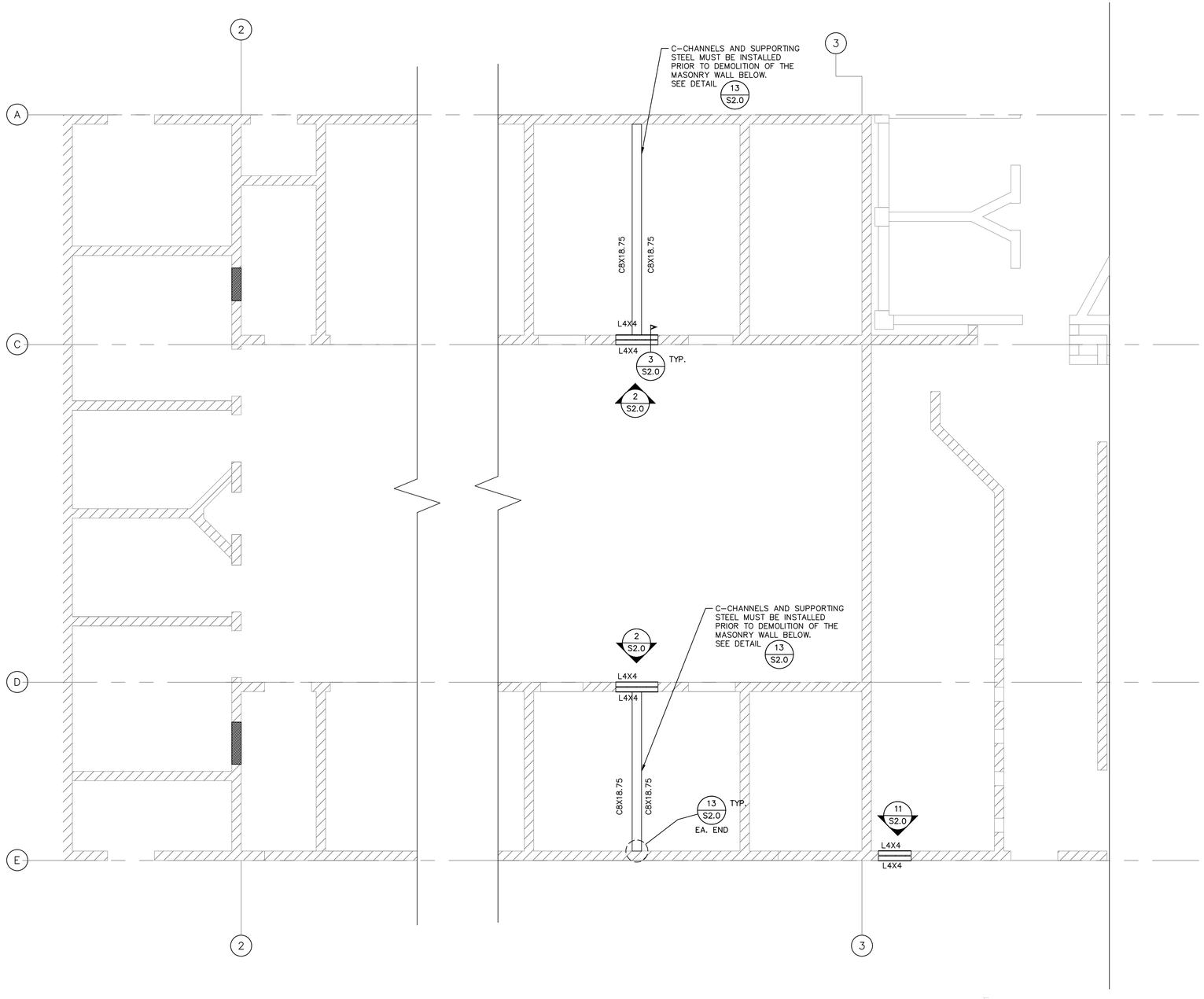
DATE: 10/15/2025

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SHEET NUMBER
S1.0



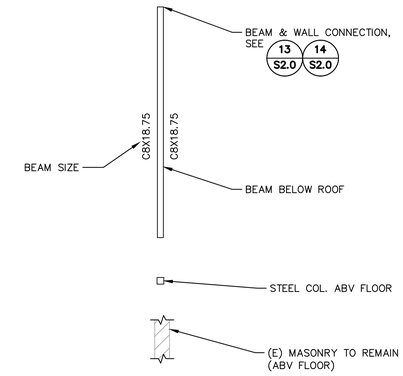
MAIN FLAT ROOF FRAMING PLAN
UNIT 3

SCALE: 1/4" = 1'-0"

PLAN NOTES

1. SEE SHEETS **S0.1** THROUGH **S0.2** FOR GENERAL NOTES.
2. REFER TO GENERAL STRUCTURAL NOTES & DETAILS FOR GENERAL REQUIREMENTS OF CONSTRUCTION, MATERIALS, SHOP DRAWINGS AND REQUIREMENTS OF CONSTRUCTION OBSERVATIONS.
3. TOP OF ALL STEEL MEMBERS SHALL BE BELOW SLAB SOFFIT UON. SHIM TIGHT AND DRY PACK AS NEEDED FOR COMPLETE BEARING BETWEEN SLAB AND THE BEAM.
4. L4X4 REFERS TO L4X4X$\frac{3}{8}$ HDR REINFORCEMENT UON.
5. L6X4 PREFERS TO L6X4X$\frac{3}{8}$ HDR REINFORCEMENT UON.
6. ALL JAMB REINFORCEMENT AT WALL OPENINGS IN EXISTING MASONRY WALLS SHALL BE L6X4X$\frac{1}{4}$ UON. FOR JAMB TO HDR REINF. CONN. SEE 2 S2.0
7. ALL STEEL MEMBERS AND CONNECTIONS EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED.

PLAN LEGEND



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SHEET TITLE
MAIN FLAT ROOF FRAMING PLAN

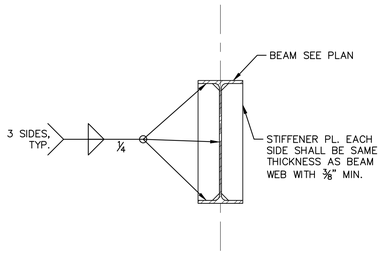
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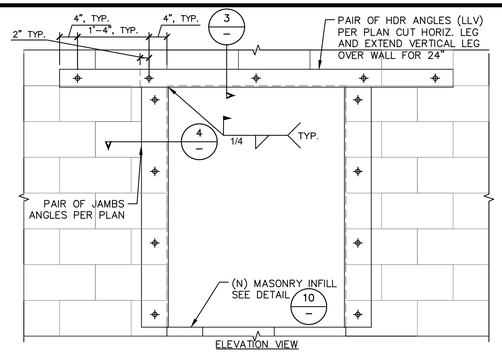
SHEET NUMBER
S1.1



NOTE:
FILLET WELD SIZES SHALL BE AS SHOWN, UNLESS A GREATER SIZE IS REQUIRED.

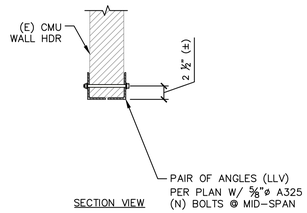
STIFFENER PLATE AT WF BEAMS 1

SCALE: N.T.S.



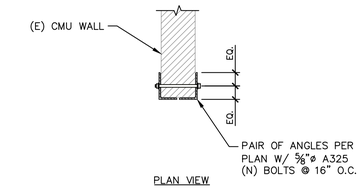
(E) CMU NEW WINDOW HEADER REINFORCEMENT DETAIL 2

SCALE: N.T.S.



(E) CMU HEADER REINFORCEMENT DETAIL 3

SCALE: N.T.S.



(E) CMU WALL NEW JAMB CONNECTION DETAIL 4

SCALE: N.T.S.

	BASIC DEVELOPMENT LENGTH (ld), INCHES			LAP SPLICE LENGTH, INCHES			DEVELOPMENT OF BAR W/ STD. HOOK (ldh), INCHES		
BAR SIZE	f'c=3000	f'c=4000	f'c=5000	f'c=3000	f'c=4000	f'c=5000	f'c=3000	f'c=4000	f'c=5000
#3	17	15	13	22	19	17	9	8	7
#4	22	19	17	29	25	22	11	10	9
#5	28	24	22	36	31	28	14	12	11
#6	33	29	26	43	37	34	17	15	13
#7	48	42	38	63	54	49	20	17	15
#8	55	48	43	72	62	56	22	19	17
#9	62	54	48	81	70	63	25	22	20
#10	70	61	54	91	79	70	28	25	22
#11	78	67	60	101	87	78	31	27	24

MODIFICATION FACTORS:

THE LENGTHS NOTED ABOVE SHALL BE MULTIPLIED BY THE FOLLOWING FACTORS, AS APPLICABLE:
- 1.3 FOR TOP BARS (MORE THAN 12" CONC. CAST BELOW)
- 1.3 FOR LIGHTWEIGHT CONCRETE
- 1.5 FOR BARS WITH LESS THAN 2 BAR DIAMETERS CLEAR SPACING OR FOR BARS WITH LESS THAN 1 BAR DIAMETER OF CONCRETE COVER
- 1.5 FOR EPOXY-COATED BARS, U.O.N.

THE MODIFICATION FACTORS NOTED ABOVE SHALL BE COMBINED WHEN MULTIPLE CONDITIONS OCCUR. FOR EXAMPLE, FOR TOP BARS IN LIGHTWEIGHT CONCRETE, THE SPLICE LENGTH NOTED ABOVE SHALL BE MULTIPLIED BY 1.3x1.3=1.69

NOTES:
1. VALUES APPLY TO GRADE 60 REINFORCEMENT
2. SPLICES OF HORIZONTAL REINFORCEMENT IN WALLS SHALL BE STAGGERED.
3. SPLICES IN WALLS CONTAINING TWO CURTAINS OF REINFORCEMENT SHALL NOT OCCUR IN THE SAME LOCATION.
4. LAP SPLICES IN CONCRETE MASONRY SHALL BE AS SPECIFIED IN "TYP. LAP SPLICE SCHEDULE – MASONRY".
5. USE MECHANICAL COUPLERS FOR #14 AND LARGER BARS.
6. TOP BAR FACTOR DOES NOT APPLY TO BARS IN WALLS.

TYPICAL DEVELOPMENT LENGTH & LAP SPLICE SCHEDULE – CONCRETE 6

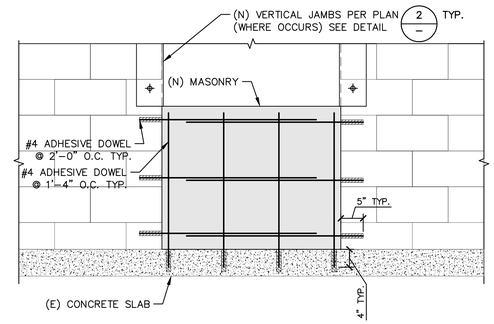
SCALE: N.T.S.

	BASIC DEVELOPMENT LENGTH & LAP SPLICE LENGTH (ld), INCHES			DEVELOPMENT OF BAR W/ STD. HOOK
BAR SIZE	f'm=1500	f'm=2000	f'm=2500	(le), INCHES
#3	14	12	12	6
#4	22	19	17	7
#5	35	30	27	8
#6	54	54	51	10
#7	63	63	63	11
#8	72	72	72	13

NOTES:
1. VALUES APPLY TO GRADE 60 REINFORCEMENT.
2. FOR EPOXY-COATED BARS, MULTIPLY LENGTHS NOTED BY 1.5.
3. SPLICES OF HORIZONTAL REINFORCEMENT IN WALLS SHALL BE STAGGERED.
4. SPLICES IN WALLS CONTAINING TWO CURTAINS OF REINFORCEMENT SHALL NOT OCCUR IN THE SAME LOCATION.
5. LAP SPLICES IN REINFORCED CONCRETE SHALL BE AS SPECIFIED IN "TYPICAL DEVELOPMENT LENGTH & LAP SPLICE SCHEDULE – CONCRETE", SEE DETAIL 6/–.
6. ALL LAP SPLICES SHALL BE NON-CONTACT W/ 2" TO 4" CLEAR SPACING BETWEEN ADJACENT REINFORCEMENT SPLICES.

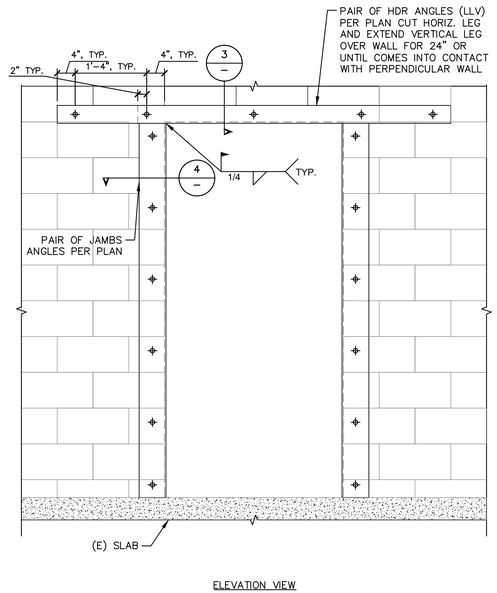
TYPICAL DEVELOPMENT LENGTH & LAP SPLICE SCHEDULE – MASONRY 9

SCALE: N.T.S.



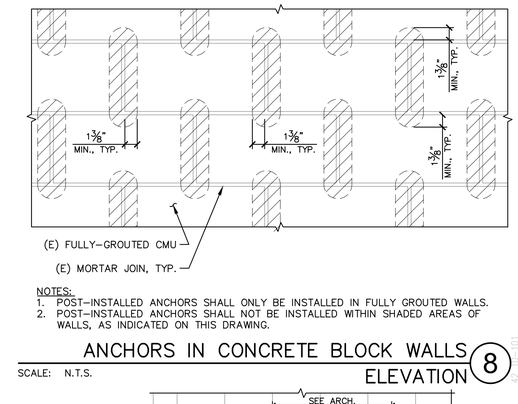
MASONRY INFILL AT WINDOWS REINFORCEMENT DETAIL 10

SCALE: 3/4" = 1'-0"



(E) CMU NEW HEADER DOOR REINFORCEMENT DETAIL 11

SCALE: N.T.S.

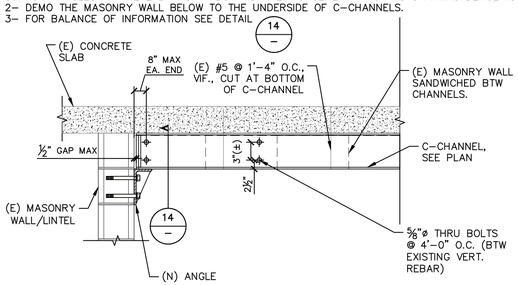


NOTES:
1. POST-INSTALLED ANCHORS SHALL ONLY BE INSTALLED IN FULLY GROUTED WALLS.
2. POST-INSTALLED ANCHORS SHALL NOT BE INSTALLED WITHIN SHADED AREAS OF WALLS, AS INDICATED ON THIS DRAWING.

ANCHORS IN CONCRETE BLOCK WALLS ELEVATION 8

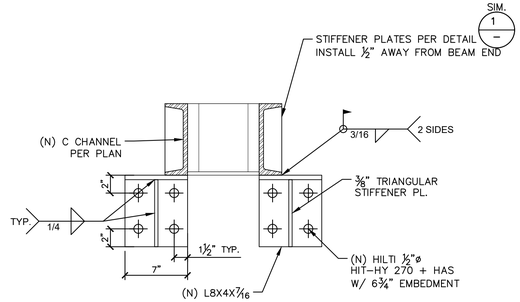
SCALE: N.T.S.

NOTES:
1– ATTACH C-CHANNEL TOGETHER W/THRU BOLTS SANDWICHING THE EXISTING MASONRY/CONCRETE WALL AND INSTALL ALL OTHER SUPPORTING STEEL FRAMING INCLUDING SUPPORT ANGLES AT THE END AND WINDOW HDR REINFORCEMENT PRIOR TO STARTING DEMOLITION.
2– DEMO THE MASONRY WALL BELOW TO THE UNDERSIDE OF C-CHANNELS.
3– FOR BALANCE OF INFORMATION SEE DETAIL 14/–



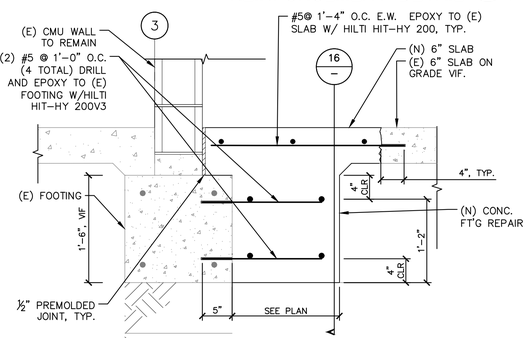
BEAM TO WALL (AT ROOF) CONNECTION DETAIL 13

SCALE: N.T.S.



BEAM TO WALL CONNECTION 14

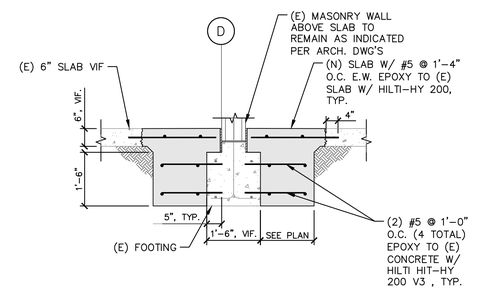
SCALE: 1 1/2" = 1'-0"



EXISTING FOOTING RETROFIT DETAIL 15

SCALE: 1" = 1'-0"

NOTES:
1– FOR BALANCE OF INFORMATION AND REBAR LOCATION SEE DETAIL **15/–**



EXISTING FOOTING RETROFIT DETAIL 16

SCALE: 1/2" = 1'-0"

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SHEET TITLE

STRUCTURAL DETAILS

DATE: 10/15/2025

DRAWN BY: JG

REVIEWED BY: HT

JOB NUMBER: 250533

SHEET NUMBER

S2.0

CONSTRUCTION NOTES

1. FOR ANY DISCREPANCIES BETWEEN OR WITHIN DRAWINGS (I.E.: BETWEEN DIAGRAMS, I/O TABLES AND SEQUENCE OF OPERATIONS) THE MOST IMPORTANT STRINGENT CONDITIONS WILL APPLY..
2. ALL WORK TO BE IN ACCORDANCE WITH REQUIREMENTS OF GOVERNING FIRE, BUILDING, MECHANICAL, PLUMBING, AND ELECTRICAL CODES.
3. MECHANICAL CONTRACTOR SHALL BE COGNIZANT OF THE BUILDING STRUCTURE AND CEILING SPACE. ALLOW FOR DIFFICULTIES IN INSTALLATION OF EQUIPMENT AND PRICING FOR ADDITIONAL OFFSETS OF DUCTS AND PIPES THAT ARE NOT SHOW NON DRAWING, BUT ARE REQUIRED TO PROVIDE A COMPLETE, FUNCTIONAL INSTALLATION.
4. VERIFY AT PROJECT SITE EXACT SIZE, LOCATION, INVERT ELEVATIONS, AND CLEARANCES OF ALL SERVICES BEING RELOCATED, EXTENDED, CONNECTED TO, OR REMOVED.
5. ALL DUCTWORK AND PIPING SHOWN ON PLANS ARE DIAGRAMMATIC AND SHALL NOT BE SCALED TO DETERMINE EXACT LOCATION.
6. CERTAIN VERTICAL AND HORIZONTAL DIMENSIONS ARE SHOWN IN DUCTS TO INDICATE THEIR GENERAL POSITION IN RELATIONSHIP TO THE SYSTEMS WITHIN THE SPACE AVAILABLE FOR SYSTEM INSTALLATION. PROVIDE ADDITIONAL OFFSETS SIMILAR TO THOSE SHOWN AS REQUIRED, AND TO COORDINATE WITH INSTALLATION REQUIREMENTS OF OTHER SYSTEMS AT NO ADDITIONAL COST TO OWNER.
7. IN LIEU OF RECTANGULAR DUCT, CONTRACTOR HAS OPTION TO USE ROUND DUCTWORK WHERE SPACE IS PERMITTED. SIZING SHALL BE BASED ON EQUAL FRICTION AND SHALL NOT EXCEED DESIGN PRESSURE LOSS.
8. COORDINATE REGISTER, DIFFUSER AND GRILLE LOCATIONS WITH CEILING SUPPORT MEMBERS AND LIGHTING FIXTURES. FINISHED CEILING CONFIGURATION SHALL FORM A FULLY INTEGRATED INSTALLATION IN EACH FINISHED SPACE.
9. INSTALL ALL DUCTWORK CONCEALED IN FURRED WALL AND CEILING UNLESS OTHERWISE NOTED.
10. PROVIDE FLEXIBLE CONNECTIONS AT ALL VIBRATION ISOLATED EQUIPMENT AND AS INDICATED ON FLOW DIAGRAMS, DETAILS, AND AS OTHERWISE SPECIFIED.
11. FLEXIBLE DUCTS, FLEXIBLE CONNECTIONS AND DUCT SEALERS SHALL BE LOCAL CODE APPROVED FOR CLASS "A". FILTERS SHALL BE UL APPROVED.
12. FLEXIBLE INSULATED DUCT SHALL BE UL 181 CLASS 1 RATED, REINFORCED AND INSULATED WITH THERMAL CONDUCTANCE OF NOT MORE THAN 0.23, IN COMPLIANCE WITH CMC STANDARD 6-5, REQUIREMENTS OF NFPA 90A AND 90B, AND LOCAL CODE APPROVED.
13. OPENINGS OF DUCTS AND OPENINGS OF OTHER RELATED AIR DISTRIBUTION COMPONENTS ARE TO BE COVERED WITH TAPE, PLASTIC, SHEET METAL OR OTHER METHODS TO PREVENT DUST OR DEBRIS WHICH MAY COLLECT IN THE SYSTEM FROM THE TIME THE MATERIALS ARRIVE ON SITE UNTIL FINAL STARTUP OF THE HEATING AND COOLING SYSTEMS.
14. FACTORY-MADE AIR DUCTS SHALL BE APPROVED FOR THE USE INTENDED, CONFORM TO THE REQUIREMENTS OF CMC STANDARD NO. 6-5 AND SHALL BE LISTED AND INSTALLED IN ACCORDANCE WITH THE TERMS OF THEIR LISTING.
15. INSTALL ALL PIPING AND DUCTWORK TO AVOID ARCHITECTURAL FRAMING, STRUCTURAL MEMBERS, AND OTHER OBSTRUCTIONS. COORDINATE PIPING AND DUCTWORK LOCATION WITH ALL APPLICABLE CONTRACT DRAWINGS AND INSTALLATION WORK OF OTHER TRADES PRIOR TO PLACING SLEEVES IN FLOORS OR WALLS.
16. ALL UTILITIES REQUIRED FOR THE CONTINUOUS OPERATION OF ALL EXISTING FACILITIES MUST BE MAINTAINED IN SERVICE AT ALL TIMES EXCEPT AS REQUIRED FOR NEW SYSTEMS CONNECTION. COORDINATE SHUTDOWN WITH RESPONSIBLE FACILITY PERSONNEL.
17. ALL REMOVED ITEMS DEEMED TO HAVE VALUE BY THE OWNER SHALL BE DELIVERED TO A PLACE OF STORAGE AT THE SITE AS DIRECTED. ALL OTHER ITEMS MUST BE DISPOSED OF OFF-SITE IN A LEGAL MANNER.
18. WORK SHALL BE EXECUTED IN A CAREFUL AND ORDERLY MANNER WITH THE LEAST POSSIBLE DISTURBANCE TO PUBLIC AND OCCUPANTS OF THE FACILITY.
19. CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR SAFETY OF ALL PERSONS ON OR ABOUT THE CONSTRUCTION SITE, IN ACCORDANCE WITH APPLICABLE LAWS AND CODES. GUARD ALL HAZARDS IN ACCORDANCE WITH THE SAFETY PROVISIONS OF THE LATEST MANUAL OF ACCIDENT PREVENTION PUBLISHED BY THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA AND OSHA.
20. SECURELY FASTEN ALL PIPING AND DUCTWORK WITHIN STRUCTURES TO THE BUILDING CONSTRUCTION BY MEANS OF HANGERS, SUPPORTS, GUIDE ANCHORS, AND SWAY BRACE SEISMIC RESTRAINTS TO MAINTAIN ALIGNMENT, TO PREVENT SAGGING, AND TO PREVENT NOISE AND EXCESSIVE STRAIN DUE TO MOVEMENT UNDER OPERATING CONDITIONS. COORDINATE ANCHORING POINTS TO ASSURE STRUCTURAL INTEGRITY DURING NORMAL OPERATION AND SEISMIC EVENTS.
21. PIPE SUPPORTS SHALL BE DESIGNED TO INCLUDE THE WEIGHT OF THE PIPE AND THE WEIGHT OF THE CONTENTS OF THE PIPE.
22. INSTALL WALL-MOUNTED ROOM THERMOSTATS 48" ABOVE FINISHED FLOOR UNLESS DIRECTED OTHERWISE. COORDINATE INSTALLATION LOCATION AND HEIGHT PRIOR TO THERMOSTAT ROUGH-IN.
23. COORDINATE THE LOCATION AND QUANTITY OF ALL ACCESS PANELS. PANELS ARE REQUIRED IN CEILINGS FOR ALL CONSTANT VOLUME BOXES, DAMPERS, VALVES, CONTROLS, AND OTHER ITEMS REQUIRING ROUTINE MAINTENANCE OR ADJUSTMENT, AND SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH ARCHITECTURAL SPECIFICATIONS. WHERE ACCESS PANELS AND ARE NOT SHOWN FOR VOLUME DAMPER ACCESS, PROVIDE CEILING MOUNTED REMOTE OPERATED VOLUME DAMPER CONTROL.
24. IDENTIFY LOCATIONS OF FIRE AND/OR SMOKE DAMPERS TO COMPLY WITH CBC 717.
25. DUCT PENETRATIONS THRU HORIZONTAL FIRE ASSEMBLIES MUST COMPLY WITH CBC 717.6.
26. NEW AIR SYSTEM MUST BE TEST AND BALANCED WITH APPROVED PROCEDURES, PER CGBSC 5.410.4.3. PROVIDE TEST REPORT TO INSPECTOR PRIOR TO FINAL INSPECTION, PER CGBSC 5.410.

MAKE-UP AIR UNIT SCHEDULE

EQUIP. MARK	MFG.	MODEL	AREA SERVED	INSTALL LOCATION	AIR FLOW (CFM)	E.S.P. (IN. W.C.)	ELECTRICAL DATA				FILTERS		MAX. WT. (LBS)	REMARKS
							MOTOR (W)	V/PH./FREQ.	MCA (AMPS)	MOCP (AMPS)	TYPE	QTY / SIZE #/ INxINxIN		
MAU-1	LOREN COOK	106KSPD	KITCHEN	ROOF	800	0.25	349	115V/ 1ø/60 Hz	X	X	MERV-13	PER MANU.	117	①②③④⑤

① PROVIDE W/ VIBRATION ISOLATION ROOF CURB & MATCHING CURB ADAPTER. ② PROVIDE BDD.

③ PROVIDE W/ FACTORY MOUNTED ELECTRICAL NONFUSED DISCONNECT. ④ PROVIDE W/ FACTORY MOUNTED ELECTRICAL UNPOWERED CONVENIENCE OUTLET. ⑤ INTERLOCK WITH KEF-1

KITCHEN EXHAUST FAN SCHEDULE

EQUIP. MARK	MFG.	MODEL	AREA SERVED	INSTALL LOCATION	AIR FLOW (CFM)	E.S.P. (IN. W.C.)	ELECTRICAL DATA				MAX. WT. (LBS)	REMARKS
							MOTOR (W)	V/PH./FREQ.	MCA (AMPS)	MOCP (AMPS)		
KEF-1	CAPTIVE AIRE	WRH-36	KITCHEN	KITCHEN	800	0.25	82	115V/ 1ø/60 Hz	N/A	N/A	135	①

① INTERLOCK WITH MAU-1

GRILLES AND REGISTERS

- CD-X / XXX CFM — SQUARE SUPPLY AIR REGISTER (ARROW INDICATES DIRECTION OF THROWS) HARD LID OR T-BAR
- RR-X / XXX CFM — CEILING RETURN REGISTER

DUCTWORKS

- NEW DUCT
- 8ø — ROUND DUCT
- 12X8 — RECTANGULAR DUCT (FIRST FIGURE INDICATES PLAN SIZE)
- FLEXIBLE DUCT
- SUPPLY AIR DUCT UP
- SUPPLY AIR DUCT DOWN
- RETURN AIR DUCT UP
- RETURN AIR DUCT DOWN
- ROUND AIR DUCT UP
- ROUND AIR DUCT DOWN
- RADIUS ELBOW
- VANE ELBOW
- BRANCH TAKE-OFF (ROUND MAIN WITH 45° ROUND TAKE-OFF)
- BRANCH TAKE-OFF (ROUND MAIN WITH 90° ROUND TAKE-OFF)
- BRANCH TAKE-OFF (RECTANGULAR MAIN WITH ROUND TAKE-OFF)
- BRANCH TAKE-OFF (RECTANGULAR MAIN WITH RECTANGULAR TAKE-OFF
- DUCT SPLIT (ROUND MAIN WITH 180° ROUND BRANCHES)
- DUCT SPLIT (RECTANGULAR MAIN WITH 180° RECTANGULAR BRANCHES)
- DUCT SPLIT (RECTANGULAR MAIN WITH 90° RECTANGULAR SPLIT)
- REDUCER (RECTANGULAR TO RECTANGULAR)
- TRANSITION (RECTANGULAR TO ROUND)
- MANUAL VOLUME DAMPER

LEGEND

- ROOF EXHAUST VENT
- ROOF VENTS, SEE ARCHITECTURAL ROOF PLAN.
- CEILING EXHAUST FAN

PIPING

- R — REFRIGERANT LINES
- CD — CONDENSATE DRAIN PIPE
- PIPE UP OR RISE ELBOW TURNED UP
- PIPE DOWN OR DROP ELBOW, TURNED DOWN

MISCELLANEOUS

- (T) ZONE THERMOSTAT
- (TS) TEMPERATURE SENSOR
- POINT OF CONNECTION
- POINT OF DISCONNECTION

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
ARCH	ARCHITECTURAL
BDD	BACK DRAFT DAMPER
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
CD	CEILING DIFFUSER
CFM	CUBIC FEET PER MINUTE
DB	DRY BULB TEMPERATURE
DN	DOWN
(E)	EXISTING
EAT	ENTERING AIR TEMPERATURE
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
LAT	LEAVING AIR TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MIN	MINIMUM
(N)	NEW
PD	PRESSURE DROP
POC	POINT OF CONNECTION
POD	POINT OF DISCONNECTION
RPM	REVOLUTIONS PER MINUTE
SP	STATIC PRESSURE
TBR	TO BE REMOVED
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UTR	UP TO ROOF
WB	WET BULB TEMPERATURE

ABBREVIATIONS AND SYMBOLS

SCALE: NTS

14

MECHANICAL SCHEDULES

SCALE: NTS

34

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REVISIONS

SEAL

REGISTERED PROFESSIONAL ENGINEER — JAMES B. ALBRECHT — No. M26555 — EXP. 9-30-26 — MECHANICAL — STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
MECHANICAL NOTES, SYMBOLS + SCHEDULES

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

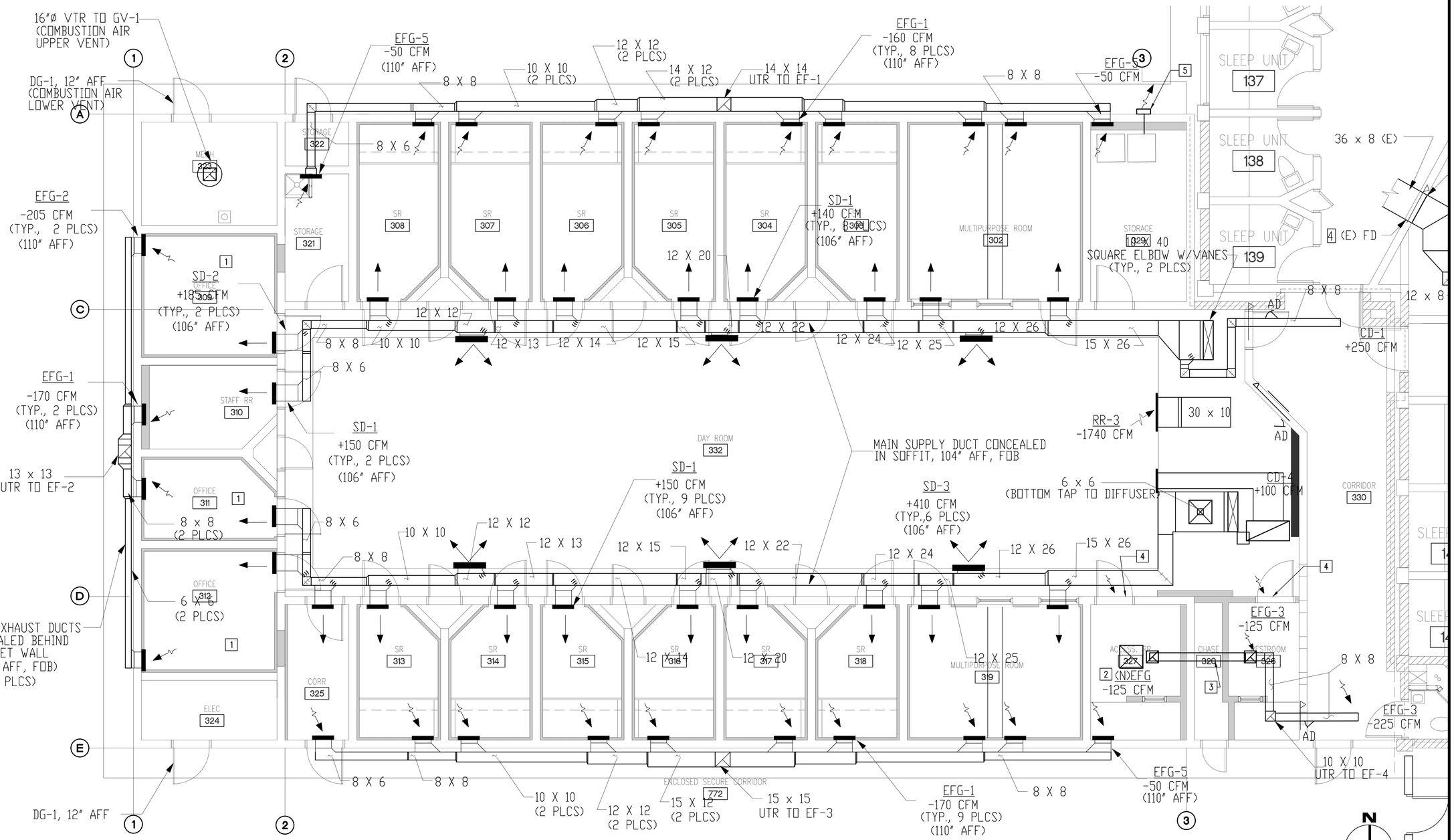
SHEET NUMBER
M0.01

SCOPE OF WORK KEYNOTES

1. RECOMMEND UTILIZING MULTIZONE SPLIT HEATPUMP SYSTEM FOR SEPARATE TEMPERATURE CONTROL. COUNTY TO ADVISE.
2. (N) EXHAUST FAN RETURN GRILLE. MATCH EXISTING BATHROOM EFG-3 ANEMOSTAT ASSG-RR WITH 10"x10" NECK SIZING.
3. EXTEND 8"x8" EXHAUST DUCT TO (N) RESTROOM.
4. UNDERCUT DOOR TO ALLOW FOR TRANSFER AIR.
5. DRYER VENT OUT THROUGH EXTERIOR WALL. SIZE PER MANUFACTURER RECOMMENDATION.

GENERAL NOTES

1. EVERYTHING SHOWN IS EXISTING UNLESS NOTED OTHERWISE.
2. COORDINATE WITH ARCH DETAILING FOR FURRED WALL AT EACH EXISTING SECURITY GRILLE LOCATION.



UNIT 3 - NEW MECHANICAL FLOOR PLAN

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SHEET TITLE
UNIT 3
NEW FLOOR PLAN
SCOPE OF WORK

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

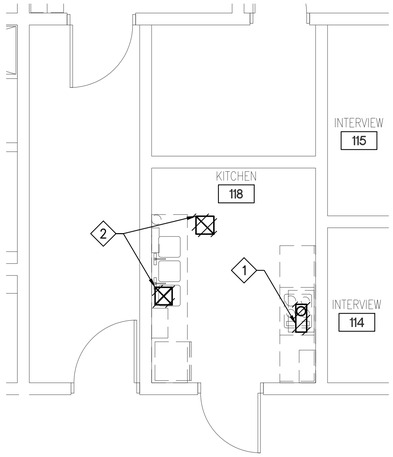
SHEET NUMBER
M2.11

DEMO KEYNOTES

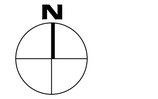
1. (E) KITCHEN HOOD, DUCT SYSTEM AND VENTILATION GRILLE TO BE REMOVED.
2. (E) SUPPLY AND RETURN GRILLE TO BE REMOVED. PREPARE OPENING FOR NEW SUPPLY AND RETURN.

CONSTRUCTION KEYNOTES

1. 10"ø KITCHEN EXHAUST FAN DUCT UP TO ROOF. SEE DETAIL 51/M3.11 FOR ROOF PENETRATION.
2. (N) MAU ON ROOF. AIR INTAKE TO MAINTAIN 10' CLEARANCE FROM ANY BUILDING EXHAUST. SEE DETAIL 41/M3.11 FOR MOUNTING.
3. PROVIDE NEW SUPPLY DIFFUSER AND RETURN GRILLE. SIZE TO MATCH EXISTING.
4. (N) 10"x10" VENTILATION DUCT UP TO MAU UNIT ON ROOF. MAU-1 TO INTERLOCK WITH KEF-1. PENETRATE ROOF SIMILAR TO DETAIL 51/M3.11.

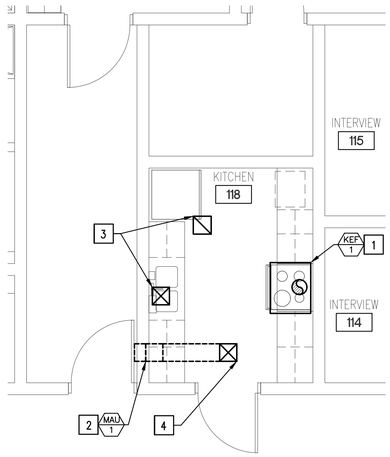


24 — **KITCHEN - DEMO FLOOR PLAN**

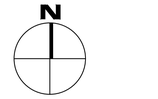


0 2' 4' 8'

SCALE: 1/4"= 1'-0"

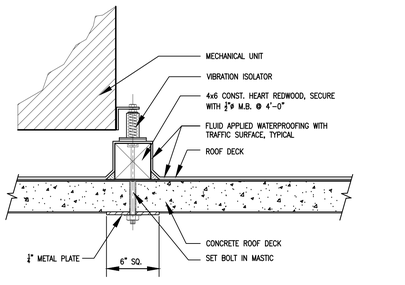


22 — **KITCHEN - FLOOR PLAN**



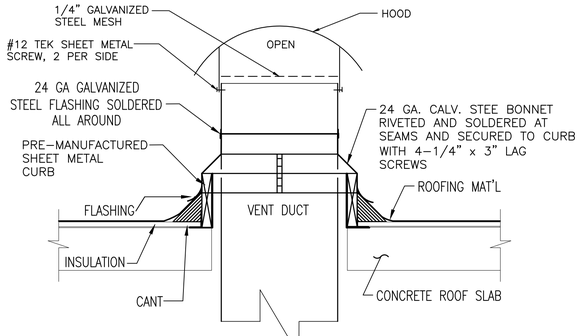
0 2' 4' 8'

SCALE: 1/4"= 1'-0"



MAU ON ROOF WITH VIBRATION ISOLATORS — 41

SCALE: NONE



ROOF PENETRATION AND ROOF JACK — 51

SCALE: NONE

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BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
MECHANICAL FLOOR PLAN KITCHEN

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
M3.11

PLUMBING FIXTURE SCHEDULE

TAG#	DESCRIPTION	WASTE	VENT	CW	HW	SPECIFICATIONS/COMMENTS
WC 1	WATER CLOSET (NON-ADA)	3"	2"	1-1/4"	-	SAME AS BELOW, INSTALLED STANDARD HEIGHT
WC 2	WATER CLOSET (ADA)	3"	2"	1-1/4"	-	WHITEHALL MANUFACTURING, MODEL WH2142-W-3, LIGATURE RESISTANT ADA COMPLIANT SIPHON JET TOILET. FLOOR MOUNTED. UNIT IS FABRICATED FROM 16 GAGE, TYPE 304 STAINLESS STEEL AND IS SEAMLESS WELDED CONSTRUCTION WITH EXTERIOR SURFACES POWDER COATED WHITE (INTERIOR OF TOILET WILL HAVE SATIN FINISH AND WILL NOT BR POWDER COATED). TOILET WILL BE PROVIDED WITH WH-LRSC-GRAY LEGATURE RESISTANT ABS TOILET SEAT COVER.
LV 1	NON-ADA LAVATORY	2"	1-1/2"	1/2"	1/2"	SAME AS BELOW, INSTALLED STANDARD HEIGHT
LV 2	ADA LAVATORY	2"	1-1/2"	1/2"	1/2"	ACORN-LIGATURE RESISTANT LAVATORY WITH OVAL BOWL- ADA 210 COMPLIANT FRONT ACCESS, MODEL LR1652FA-104-M WITH ENVIRO-GLAZE, COLOR: WHITE, UNIT SHALL CONFORM WITH ANSI, UFAS, CBC AND ADA REQUIREMENTS FOR ACCESSIBILITY. FIXTURE SHALL BE FABRICATED FROM 14 GAUGE, TYPE 304 STAINLESS STEEL. CONSTRUCTION SHALL BE SEAMLESS WELDED AND EXPOSED SURFACES SHALL HAVE A SATIN FINISH. COUNTERTOP SHALL HAVE AN AIR-CIRCULATING, SELF DRAINING SOAP DISH. PROVIDE AIR-CONTROL PNEUMATICALLY OPERATED, METERING, NON-HOLD OPEN VALVE WITH ADA COMPLIANT HEMISPHERICAL PUSHBUTTON. VALVE AND BUBBLER CONFORM WITH LEAD FREE REQUIREMENTS OF NSF61, SECTION 9 AND CHSC 116875. CABINET BOTTOM SHALL BE REMOVABLE AND SECURED WITH TAMPER-RESISTANT SCREWS. CABINET INTERIOR SHALL BE SOUND DEADENED WITH FIRE-RESISTANT MATERIAL. FIXTURE SHALL BE FURNISHED WITH NECESSARY FASTENERS FOR PROPER INSTALLATION.
SH 1	NON-ADA SHOWER	2"	1-1/2"	1/2"	1/2"	ACORN, LIGATURE RESISTANT, MODEL LR1748 INSTALLED STANDARD HEIGHT
SH 2	ADA SHOWER	2"	1-1/2"	1/2"	1/2"	ACORN, LIGATURE RESISTANT, MODEL LR1748ADA SERIES. INSTALLED ONTO FINISHED WALL AND SERVICED FROM AN ACCESSIBLE PIPE CHASE. OPTIONAL WALL SLEEVE OR METAL TEMPLATE IS RECOMMENDED FOR ALL INSTALLATIONS FOR REQUIRED WALL OPENINGS. FIXTURE IS FABRICATED FROM 14 GAUGE, TYPE 304 STAINLESS STEEL WITH EXTERIOR SURFACES POLISHED TO A 34 SATIN FINISH., CONICAL SHOWERHEAD IS CHROME-PLATED BRASS, AND IS LEGATURE RESISTANT. THE SPRAY PATTERN IS NON-ADJUSTABLE. VALVE IS AN ASSE 1016 COMPLIANT T/P TEMPERATURE/PRESSURE BALANCING MIXING VALVE WITH PATENTED TRI-LEVEL HANDLE. VALVE AUTOMATICALLY MIXES HOT AND COLD WATER TO DELIVER BLENDED WATER WITHIN A SPECIFIC RANGE AND MEETS THE STRINGENT PERFORMANCE CRITERIA FOR TEMPERATURE AND PRESSURE CHANGES DEFINED BY ASSE 1016. VALVE INCLUDES A 1.6 GPM FLOW RESTRICTOR AND CAN BE REMOTELY LOCATED UP TO 10 FEET FROM OPERATING PUSHBUTTON. VALVE CONFORMS WITH LEAD FREE REQUIREMENTS OF NSF61, SECTION 9.
DF 1	DRINKING FOUNTAIN ADA	1-1/2"	1-1/4"	1/2"	-	WHITEHALL MANUFACTURING, MODEL WHBF6, LIGATURE RESISTANT ADA COMPLIANT, SENSOR OPERATED DRINKING FOUNTAIN AND BOTTLE FILLER. PROVIDE WALL ANCHORS AND ANCHORING HARDWARE WITH MIN. PULL-OUT FORCE OF 1000 LBS PER ANCHOR. PROVIDE 110-120VAC/60Hz/3A (MAX) ELECTRICAL RECEPTACLE FOR FACTORY SUPPLIED 120VAC/9VDCM 100mA PLUG-IN TRANSFORMER.
DF 2	DRINKING FOUNTAIN	1-1/2"	1-1/4"	1/2"	-	WHITEHALL MANUFACTURING, MODEL WWBHF6-001, LR GRID STRAINER, LR DRINKING BUBBLER, VR FASTENERS, (PROVIDED), TRAP COVER WITH ACCESS PANEL, INFRARED SENSOR DRINKING FOUNTAIN. PROVIDE WALL ANCHORS AND ANCHORING HARDWARE WITH MIN. PULL-OUT FORCE OF 1000 LBS PER ANCHOR.
WC 3	STAFF RR WATER CLOSET (ADA)	3"	2"	1-1/4"	-	Kohler, Kingston, K4325 ADA height, 1.28 gpf., high efficiency, vitreous china, wall mount, elongated bowl, white with Sloan, Hydraulic Royal Optima Model# 153-1.28 ES-S TMO Sensor flushometer valve and Olsonite, 95CT white open front solid plastic seat. Exposed flush valve, Jay R Smith carrier. Solenoid Operator, 24VAC, 50/60 Hz, Transformer, 120VAC, 50/60 Hz. Prim., 24VAC, 50/60 Sec., Class II, UL Listed 50VA
LV 3	STAFF RR LAVATORY (ADA)	2"	1-1/2"	1/2"	1/2"	Kohler, Chesapeake, K1723, ADA, wall-mount, vitreous china, 20"x18-1/4", with Chicago Faucet Model# 404-VE2805-665ABCP, E-Cast Design faucet, with Neoperl 0.25 gpm Pressure Compensating/Multiple Laminar Stream Faucet Aerator, super low flow Control with Proflow PF203WH, white P-trap cover. Jay R Smith carrier.
KS 1	2-COMPARMENT SINK KITCHEN	2"	1-1/2"	1/2"	1/2"	18 gauge, Double Bowl, Stainless Steel, Top Mount, ADA, 35 1/2" x 19 3/4" x 5". Moen Chateau Faucet, Brushed Chrome, Single Lever, 1.5 gpm, ADA Compliant. Insulate exposed pipe per ADA.
GD 1	GARBAGE DISPOSER GRINDER	1½"	-	-	-	IN-SINK-ERATOR, 3/4-h.p. Evolution, Septic Assist Series. Stainless Steel Grind Chamber disposer or equal.
TPV	TRAP PRIMER VALVE	-	-	3/8" (1 1/2" MAX) (1/2" MIN)	-	PRIME RITE MODEL # D-U, Machine corrosion resistant brass, contains no spring or diaphgram.
FD	FLOOR DRAIN	2"	1-1/2"	-	-	Cast iron body flashing, flange, trap 5" diameter bronze grate top with security screws.

LEGEND/SYMBOLS

SYMBOL	SYSTEM	ABBREVIATION
	CONCENTRIC REDUCER	CR
	ECCENTRIC REDUCER	ER
	RISER DOWN (ELBOW)	NONE
	RISER UP (ELBOW)	NONE
	RISE OR DROP (PIPE RUN)	NONE
	BRANCH - TOP CONNECTION	NONE
	BRANCH - BOTTOM CONNECTION	NONE
	BRANCH - SIDE CONNECTION	NONE
	CAPPED/PLUGGED PIPE END	NONE
	TEE UP	NONE
	TEE DOWN	NONE
	HOSE BIB	HB
	RECESSED BOX, HOSE BIBB OR WALL HYDRANT	WH
	DRAIN (ALL TYPES) SPECIFY ON PLANS	NONE
	UNION - SCREWED	NONE
	UNION - FLANGED	NONE
CO	CLEANOUT PLUG	NONE
2	YARD CLEANOUT (OR) CLEANOUT TO GRADE 2 = TWO WAY	COTG
2	FLOOR CLEANOUT 2 = TWO WAY	COE
	WALL CLEANOUT	WCO
	GATE VALVE	GV
	BALL VALVE	BV
	BUTTERFLY VALVE	BFV
	GLOBE VALVE	GV
	ANGLE VALVE	AV
	CHECK VALVE-SWING TYPE	CV
	PLUG VALVE (GAS COCK)	PV
	PLUG VALVE (GAS COCK)	PV
	BACK FLOW PREVENTER DOUBLE CHECK VALVE	BFP
	BACK FLOW PREVENTER REDUCED PRESSURE TYPE	BFP
	TEMPERATURE PRESSURE RELIEF VALVE	TPRV
	TRAP PRIMER VALVE	TPV
	PRESSURE REDUCING VALVE	PRV
	SOLENOID VALVE	SV
	BALANCING VALVE	BLV
	STRAINER	STR
	CHECK VALVE-WAFER TYPE	CV
	POINT OF CONNECTION	POC
	POINT OF DISCONNECTION	POD
	PLUGGED TEE	PT
	ACCESS PANEL (WALL)	A/P
	ACCESS PANEL (CEILING)	A/P
	SPRINKLER HEAD	SP

ABBREVIATIONS

ABBREVIATION	MEANING
@	AT
ABV	ABOVE
AFF	ABOVE FINISHED FLOOR
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
BFP	BACKFLOW PREVENTER
BEL	BELOW
BLDG	BUILDING
BOP	BOTTOM OF PIPE
BTU	BRITISH THERMAL UNIT
CD	CONDENSATE DRAIN
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CO	CLEANOUT
COTG	CLEANOUT TO GRADE
COND	CONDENSATE
CI	CAST IRON
DEMO	DEMOLITION
DI	DRAIN INLET
DN	DOWN
DCW	DOMESTIC COLD WATER
DWH	DOMESTIC WATER HEATER
DWV	DRAIN WASTE VENT
(E) or EXSTG	EXISTING
ELEC	ELECTRICAL
ELEV	ELEVATION
FAU	FORCED AIR UNIT
FCO	FLOOR CLEAN OUT
FD	FLOOR DRAIN
FLR	FLOOR
FR	FROM
FS	FLOOR SINK
FW	FIRE WATER
G	GAS
GAL/HR or GPH	GALLONS PER HOUR
GPF	GALLONS PER FLUSH
GPM	GALLONS PER MINUTE
HB	HOSE BIBB
HS	HAND SINK
HP	HORSE POWER
HW	TEMPERED HOT WATER
HWR	TEMPERED HOT WATER RETURN
JS	JANITOR SINK

ABBREVIATION	MEANING
KS	KITCHEN SINK
LAV	LAVATORY
MAX	MAXIMUM
MH	MAN HOLE
MFR	MANUFACTURE OR MANUFACTURER
MIN	MINIMUM
(N)	NEW
NIC	NOT IN CONTRACT
NPT	NATIONAL PIPE THREAD
NTS	NOT TO SCALE
PLBG	PLUMBING
PLCS	PLACES
POC	POINT OF CONNECTION
POD	POINT OF DISCONNECTION
LBS or #	POUNDS
PRESS	PRESSURE
PRV	PRESSURE RELIEF VALVE
PS	PIPE SUPPORT
PSI	POUNDS PER SQUARE INCH
±	PLUS OR MINUS
SH	SHOWER
SHT MET	SHEET METAL
ST. STL. of SS	STAINLESS STEEL
SK	SINK
SOV	SHUT-OFF VALVE
SPECS	SPECIFICATIONS
STR	STRAINER
T	THERMOSTAT
TMV	THERMOSTATIC MIXING VALVE
TBR	TO BE REMOVED
THK	THICK
THWR	THEMPERED HOT WATER RETURN
TK	TANK
TYP	TYPICAL
TPRV	TRAP PRIMER RELIEF VALVE
UNO	UNLESS NOTED OTHERWISE
UPC	UNIFORM BUILDING CODE
VTR	VENT THROUGH ROOF
W	WIDE
W/	WITH
WC	WATER CLOSET
WH	WATER HEATER
WT	WEIGHT
WTR	WATER

PLUMBING PIPING SYMBOLS

SYMBOL	MEANING	ABBREVIATION
— — V — — —	VENT PIPE	V
— — S — — (W)	SEWER OR WASTE LINE UNDER GROUND	S OR W
——— S ——— (W)	SEWER OR WASTE LINE ABOVE GROUND	
——— FW ———	FIRE WATER	FW
—·—·—·—·— or —·— CW —·—·—	COLD WATER	CW
—·—·—·—·— or ——— HW ———	HOT WATER	HW
——— TW ———	TEMPERED HOT WATER	TW
——— TWR ———	TEMPERED HOT WATER RETURN	TWR
——— SP ———	FIRE SPRINKLER WATER	SP
——— CD ———	CONDENSATE DRAIN	CD
——— ID ——— (IW)	INDIRECT DRAIN OR INDIRECT WASTE	ID OR IW
——— E ———	ELECTRICAL	E
——— G ———	GAS (NATURAL)	G
——— TP ———	TRAP PRIMER VALVE LINE	TP
— — —SD— — —	STORM DRAIN	SD
— — SDO — —	STORM DRAIN OVERFLOW	SDO
//////////	EXISTING PIPE TO BE REMOVED	

FIRE STOP NOTES AND TYPICAL APPLICATIONS

1. THE FIRE STOPPING CAULK SHALL BE A ONE PART, INTUMESCENT, LATEX ELASTOMER. THE CAULK SHALL BE CAPABLE OF EXPANDING A MINIMUM OF 3 TIMES AT 1000°F. THE MATERIAL SHALL BE THIXOTROPIC AND BE APPLICABLE TO OVERHEAD, VERTICAL AND HORIZONTAL FIRESTOPS. THE CAULK SHALL BE LISTED BY INDEPENDENT TEST AGENCIES SUCH AS "UL" OR "FM" AND BE TESTED TO AND PASS THE CRITERIA OF, ASTM E 814 FIRE TEST, TESTED UNDER POSITIVE PRESSURE, WITH THE REQUIREMENTS OF THE CEC (NFPA-70), BOCAI, SSBCCFI AND NFPA CODE #101.

PLUMBING CONSTRUCTION NOTES

1. ALL WORK TO COMPLY WITH 2022 CALIFORNIA PLUMBING CODE AND 2022 UNIFORM PLUMBING CODE AND ALL CALIFORNIA STATE AND LOCAL AMENDMENTS AND ORDINANCES.
2. DRAIN, WASTE AND VENT (DWV) PIPING BELOW SLAB SHALL BE SOLID WALL PVC, DWV, ASTM D2665 WITH SOLVENT CEMENTED JOINTS, PER SPECIFICATIONS.
3. LOCATE PLUMBING VENTS A MINIMUM OF 10' FROM AC/FAN FRESH AIR GRILLS.
4. ABOVE GROUND GAS PIPE AND FITTINGS SHALL BE CARBON STEEL BLACK PIPE SCHEDULE 40, ASTM A53 WITH MALLEABLE IRON THREADED FITTINGS OR WELDED JOINTS, PER SPECIFICATIONS.
5. PERFORM ALL TESTS TO DEMONSTRATE THE INTEGRITY OF THE SYSTEMS TO THE SATISFACTION OF THE OWNER.
6. THE DRAWINGS INDICATE THE EXTENT AND ARRANGEMENT OF THE PLUMBING SYSTEMS. PROVIDE WORK AND MATERIALS WHICH ARE NOT SPECIFICALLY MENTIONED BUT WHICH MAY BE REASONABLY ASSUMED NECESSARY FOR THE COMPLETION OF THE WORK AT NO ADDITIONAL COST TO THE OWNER.
7. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING UTILITY SERVICES DURING INSTALLATION OF PLUMBING SYSTEMS. THE DRAWINGS SHOW DIAGRAMMATICALLY THE LOCATION OF UTILITIES WHERE INFORMATION IS AVAILABLE. THE DRAWINGS ARE NOT EXACT AS TO QUANTITY, EXTENT OR LOCATION. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION DURING ALL PHASES OF THE WORK TO LOCATE, IDENTIFY AND PROTECT EXISTING UTILITIES. THE CONTRACTOR SHALL RECORD LOCATION OF AND REPAIR DAMAGE TO EXISTING UTILITIES WHICH ARE ENCOUNTERED AS A RESULT OF WORK UNDER THIS CONTRACT.
8. ALL CLEANOUTS SHALL BE ACCESSIBLE.
9. PLUMBER SHALL COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR EXACT LOCATION AND MOUNTING HEIGHT OF PLUMBING FIXTURES, DRAINS, ETC.
10. PROVIDE INDIVIDUAL STOPS AT EACH FIXTURE EXCEPT AS SHOWN ON DRAWINGS.
11. PROVIDE MINIMUM OF 24 INCHES CLEARANCE FOR RODDING OF CLEANOUTS.
12. ALL NEW WASTE LINES SHALL SLOPE NOT LESS THAN 1/4 INCHES PER FOOT (2%).
13. THROUGH PENETRATION OF FIRE-RATED WALLS AND CEILINGS SHALL BE FIRE STOPPED WITH MATERIALS AND METHODS CONFORMING TO UNDERWRITERS LABORATORIES LISTED ASSEMBLIES.
14. ABOVE AND BELOW SLAB STORM DRAINAGE PIPING SHALL BE SOLID CORE PVC, ASTM D 2665, OR SOLID CORE ABS, ASTM D 2661, WITH SOLVENT CEMENT JOINTS, PER SPECIFICATIONS.
15. THE AUTOMATIC FIRE SPRINKLER SYSTEM SHALL CONFORM TO THE REQUIREMENTS OF THE 2022 EDITION OF THE NATIONAL FIRE PROTECTION ASSOCIATION STANDARD #13 AND PER SPECIFICATIONS.
16. INSTALLATION OF THE FIRE SPRINKLER SYSTEM SHALL NOT BE STARTED UNTIL COMPLETE PLANS AND SPECIFICATIONS (INCLUDING WATER SUPPLY INFORMATION AND TYPE OF SYSTEM, IF ANY) HAVE BEEN APPROVED BY THE CALIFORNIA STATE FIRE MARSHAL
17. AT VARIOUS STAGES AND UPON COMPLETION, THE FIRE SPRINKLER SYSTEM SHALL BE TESTED IN THE PRESENCE OF THE FIRE MARSHAL.
18. DOMESTIC WATER PIPING SHALL BE TYPE K COPPER, ASTM B88. HARD COPPER ABOVE SLAB, SOFT COPPER BELOW SLAB, SOLDERED, PRESS SEAL OR GROOVED JOINTS ABOVE SLAB, NO JOINTS BELOW SLAB, PER SPECIFICATIONS.
19. SERVICE WATER PIPING OUTSIDE BUILDINGS SHALL BE HARD COPPER, TYPE K, ASTM B88 WITH BRAZED OR PRESSURE SEAL JOINTS ABOVE GRADE AND SOFT COPPER, TYPE K, ASTM B88 WITH BRAZED JOINTS OR SCHEDULE 80 PVC, ASTM D 1785, WITH SOLVENT CEMENTED JOINTS BELOW GRADE, PER SPECIFICATIONS.
20. DRAIN, WASTE AND VENT (DWV) PIPING ABOVE SLAB SHALL BE HUBLESS CAST IRON SOIL PIPE, ASTM A888 WITH HEAVY DUTY HUBLESS COUPLING JOINTS, PER SPECIFICATIONS. VENT PIPING MAY ALTERNATELY BE GALVANIZED STEEL PIPE, ASTM A53, TYPE-E WITH THREADED OR GROOVED JOINT COUPLINGS, PER SPECIFICATIONS.
21. SERVICE SEWER PIPING OUTSIDE BUILDINGS SHALL BE PVC SEWER PIPING, ASTM F891 WITH SOLVENT CEMENT JOINTS OR PVC TYPE PSM SEWER PIPING, ASTM D 3034, SDR 35 WITH GASKETED JOINTS, PER SPECIFICATIONS.
22. NATURAL GAS PIPING OUTDOORS SHALL BE CARBON STEEL BLACK PIPE, SCHEDULE 40, ASTM A53 WITH MALLEABLE IRON THREADED FITTINGS, ABOVE GRADE, ASTM D 2513, SDR II, WITH HEAT FUSION JOINTS, BELOW GRADE, PER SPECIFICATIONS.
23. SET TEMPERED WATER TEMPERATURE FOR LAVS AND SHOWERS AT 105 DEGREES.

PLUMBING DEMOLITION NOTES

1. THE DEMOLITION WORK SHALL BE PERFORMED USING THE DEMOLITION PLANS IN CONJUNCTION WITH THE ARCHITECTURAL DRAWINGS.
2. REMOVE EXISTING FIXTURES AS SHOWN ON THE PLANS OR AS REQUIRED FOR A COMPLETE AND OPERABLE SYSTEM, IN FULL ACCORDANCE AND COMPLIANCE WITH ALL APPLICABLE CODES.
3. ALL FIXTURES WHICH ARE REMOVED SHALL BE DISPOSED BY THE CONTRACTOR.
4. DEMOLITION AND WORK IN EXISTING AREAS: REMOVE EXISTING FIXTURES, EQUIPMENT AND PIPING AS REQUIRED AND TERMINATE PIPING SO AS NOT TO INTERFERE WITH NEW CONSTRUCTION.
5. INSTALLATION OF NEW SYSTEMS SHALL BE BY PRIORITY DETERMINED BY THE GENERAL CONTRACTOR IN ORDER TO FIT ALL TRADE REQUIRED EQUIPMENT INTO THE AVAILABLE SPACE.
6. COORDINATE PLUMBING WORK AND PIPING SYSTEM SHUTDOWN WITH THE COUNTY AND OTHER TRADES. INFORMATION ON TYPE OF SERVICE, PLANNED TIME AND ANTICIPATED LENGTH OF OUTAGE SHALL BE SUPPLIED TO THE COUNTY REFRESENTATIVE FOR SCHEDULING OF WORK, A MINIMUM OF TWO WEEKS BEFORE NEEDED.

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PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

PLUMBING NOTES

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

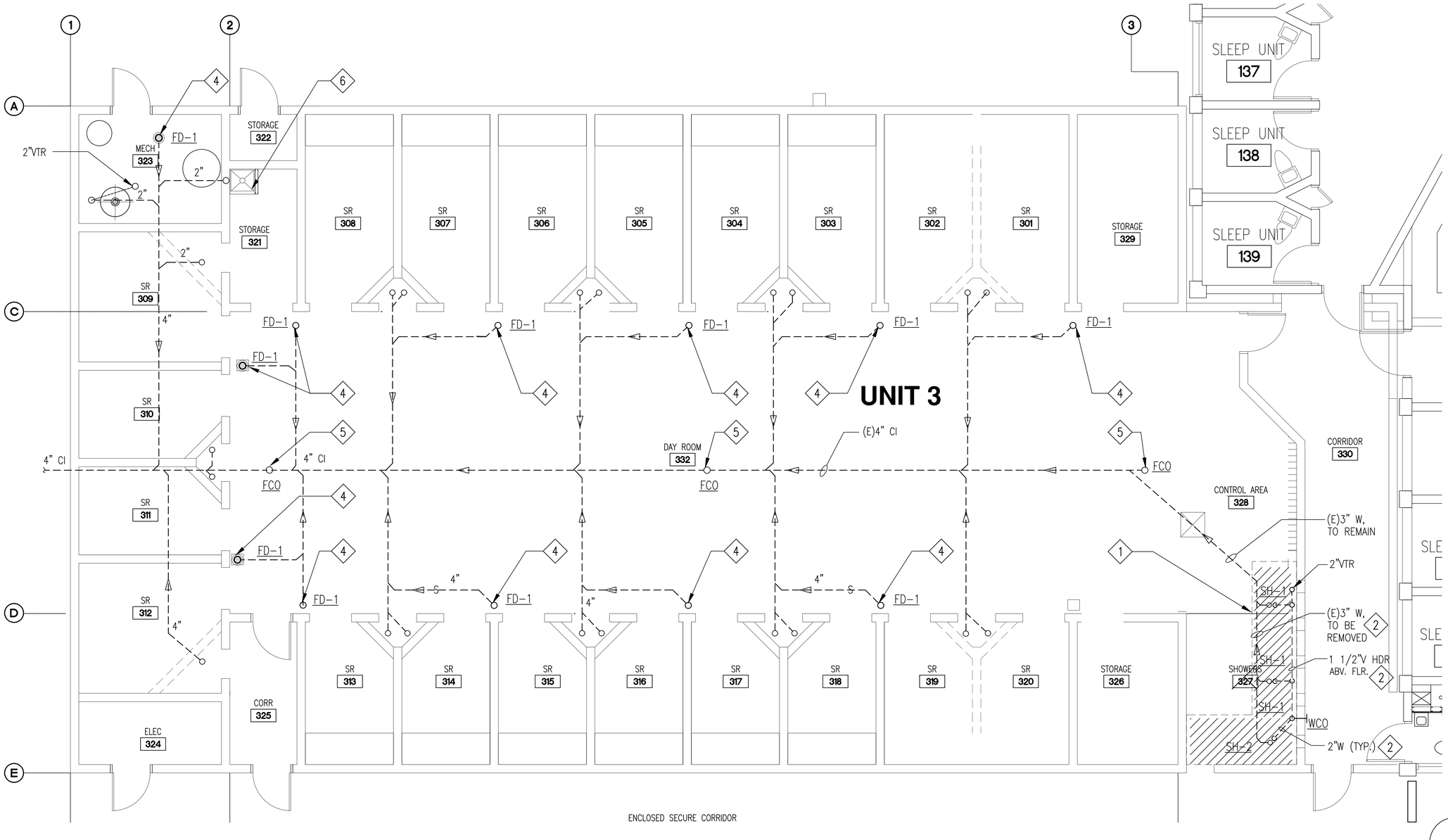
JOB NUMBER: RA # 22.868

SHEET NUMBER

P0.1

KEYNOTES

1. SAW-CUT AND REMOVE EXISTING CONCRETE SLAB AS REQUIRED TO ACCESS WASTE AND VENT LINES FOR REMOVAL.
2. REMOVE EXISTING WASTE AND VENT LINES BELOW SLAB AND VENT RISERS. PREPARE PIPING AT P.O.D. FOR NEW CONNECTION.
3. NOT USED.
4. EXISTING FLOOR DRAIN, TO REMAIN.
5. EXISTING FLOOR CLEAN OUT, TO REMAIN.
6. EXISTING JANITOR SINK, TO REMAIN.



UNIT 3 - DEMOLITION PLUMBING PLAN (BELOW GROUND)

14

0 2' 4' 8'

SCALE: 1/4"= 1'-0"

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BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
UNIT 3
PLUMBING DEMO. PLAN

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

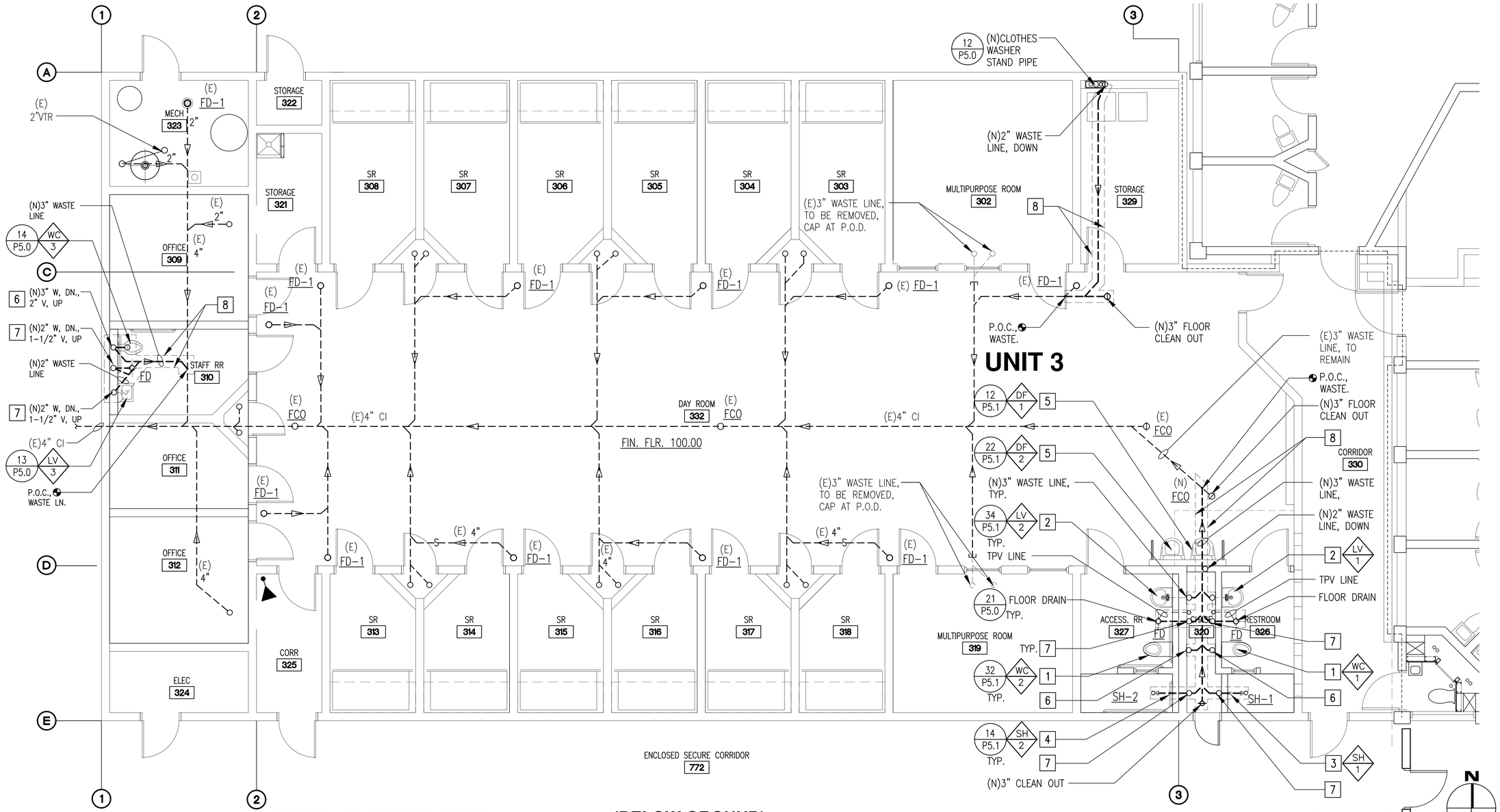
SHEET NUMBER
P2.11D

KEYNOTES

1. INSTALL NEW WATER CLOSET AND ALL ASSOCIATED WASTE, VENT AND WATER SUPPLY AND CONNECT TO EXISTING
2. INSTALL NEW LAVATORY AND ALL ASSOCIATED WASTE, VENT AND WATER SUPPLY AND CONNECT TO EXISTING
3. INSTALL NEW NON-ACCESSIBLE SHOWER AND ALL ASSOCIATED WASTE, VENT AND WATER SUPPLY AND CONNECT TO EXISTING
4. INSTALL NEW ACCESSIBLE SHOWER AND ALL ASSOCIATED WASTE, VENT AND WATER SUPPLY AND CONNECT TO EXISTING
5. INSTALL NEW DRINKING FOUNTAIN AND ALL ASSOCIATED WASTE, VENT AND WATER SUPPLY AND CONNECT TO EXISTING
6. 3" WASTE, DN. AND 2" VENT UP
7. 2" WASTE, DN. AND 1-1/2" VENT UP
8. SAW-CUT EXISTING CONCRETE FLOOR FOR NEW WASTE LINE CONNECTION

SHEET NOTES

1.) ALL PLUMBING SHOWN ON THIS SHEET IS EXISTING, UNLESS NOTED OTHERWISE.



UNIT 3 - PLUMBING PLAN (BELOW GROUND)

14

0 2' 4' 8'

SCALE: 1/4"= 1'-0"

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County of Santa Barbara
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260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
UNIT 3
NEW PLUMBING PLAN

DATE: 10/15/25

TECHNICIAN: MS

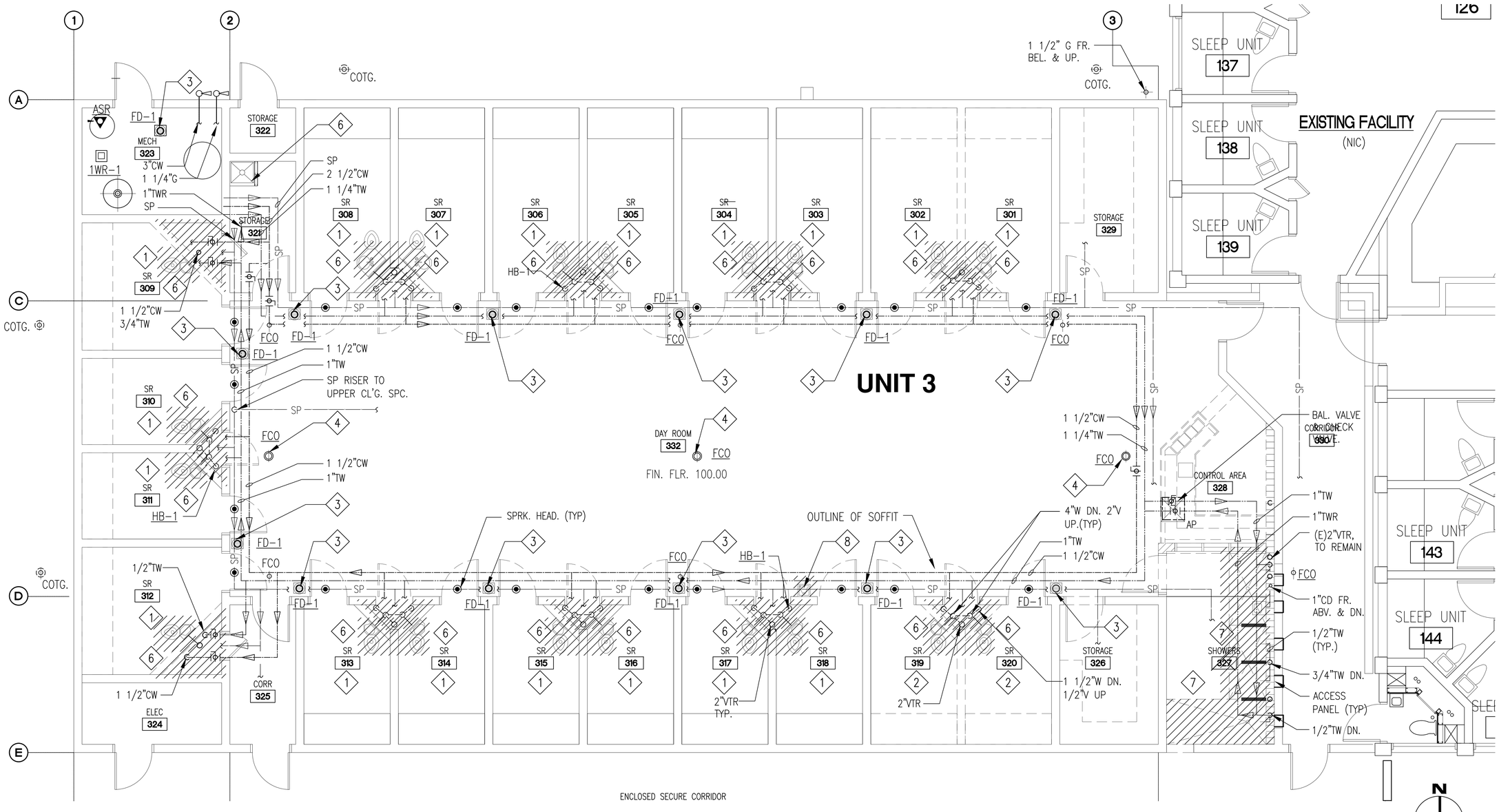
PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
P2.11

KEYNOTES

1. REMOVE (E) PLUMBING FIXTURES AND ALL ACCESSORIES AND CAP AT P.O.D.
2. REMOVE (E) PLUMBING FIXTURES AND ALL ACCESSORIES AND PREPARE FOR (N) PLUMBING FIXTURES CONNECTIONS.
3. EXISTING FLOOR DRAIN, TO REMAIN.
4. EXISTING FLOOR CLEAN OUT, TO REMAIN.
5. EXISTING JANITOR SINK, TO REMAIN.
6. REMOVE EXISTING COMBI WATER CLOSET. WASTE, VENT, COLD AND HOT WATER, AND TRAP PRIMER VALVE, TO REMAIN IN CHASE. WITH PERMANENT CAP. COLD WATER CONNECTION AT TRAP PRIMER VALVE FOR FLOOR DRAIN, TO REMAIN.
7. REMOVE EXISTING SHOWER.
8. REMOVE EXISTING DRINKING FOUNTAIN AND ASSOCIATED WASTE, VENT, AND COLD WATER PLUMBING, CAP AT P.O.D. WITHIN PLUMBING CHASE.



UNIT 3 - DEMOLITION PLUMBING PLAN (ABOVE GROUND)

14

0 2' 4' 8'

SCALE: 1/4"= 1'-0"

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COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
UNIT 3
PLUMBING DEMO. PLAN

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

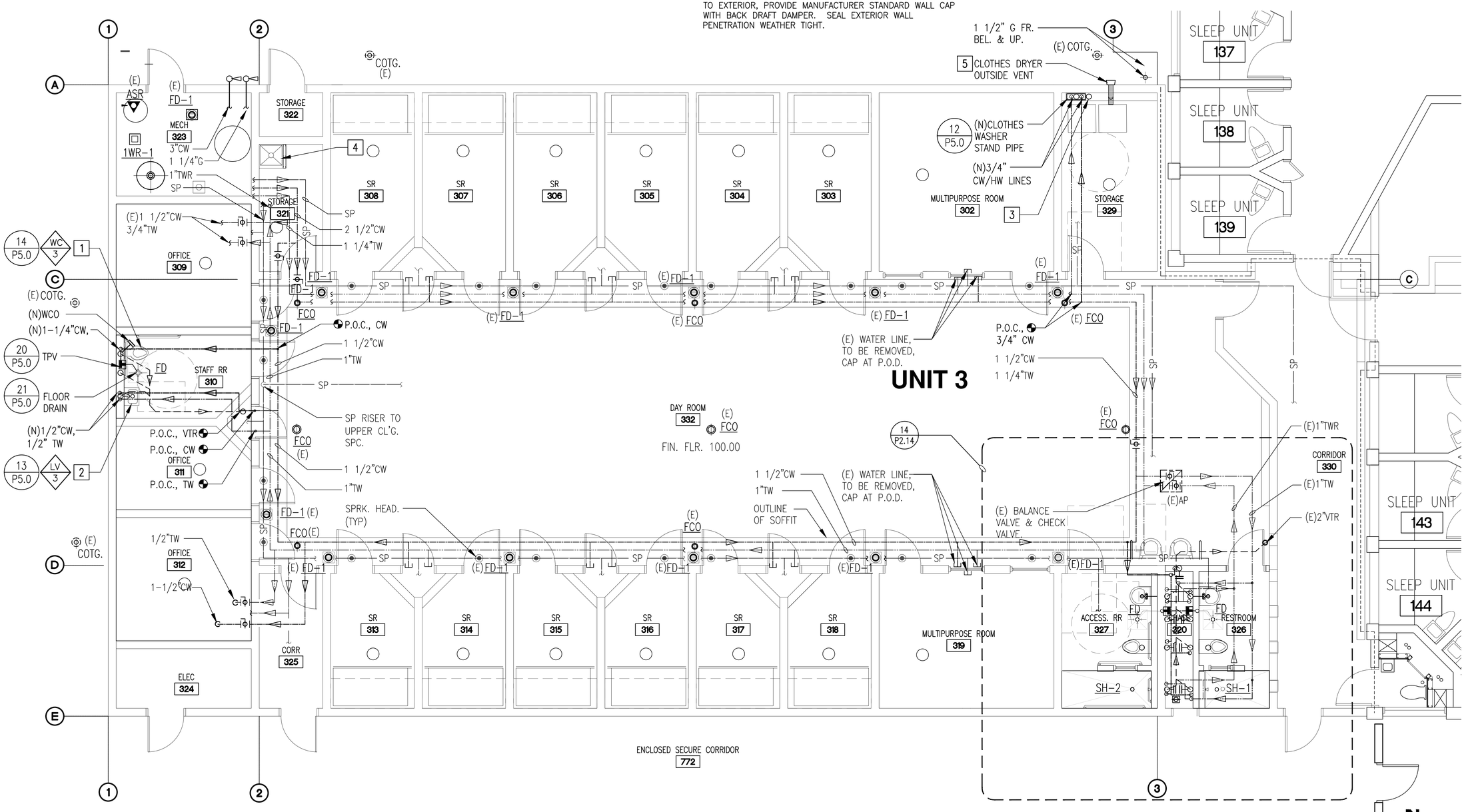
SHEET NUMBER
P2.12D

KEYNOTES

1. INSTALL NEW WATER CLOSET ASSOCIATED WATER SUPPLY AND CONNECT TO EXISTING.
2. INSTALL NEW LAVATORY AND WATER SUPPLY AND CONNECT TO EXISTING.
3. 2" WASTE, DN., 1–1/2" VENT, UP
4. (E) JANITOR SINK, TO REMAIN.
5. ROUTE 4" GALVANIZED STEEL DUCT UP IN WALL CAVITY, CAULK TO FINISH WALL PENETRATION. CORE DRILL EXTERIOR MASONRY WALL, 12" BELOW ROOF EAVE AND EXTEND DUCT TO EXTERIOR, PROVIDE MANUFACTURER STANDARD WALL CAP WITH BACK DRAFT DAMPER. SEAL EXTERIOR WALL PENETRATION WEATHER TIGHT.

SHEET NOTES

1.) ALL PLUMBING SHOWN ON THIS SHEET IS EXISTING, UNLESS NOTED OTHERWISE.



UNIT 3 - PLUMBING PLAN (ABOVE GROUND)

14

SCALE: 1/4"= 1'-0"

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COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
UNIT 3
NEW PLUMBING PLAN

DATE: 10/15/25

TECHNICIAN: MS

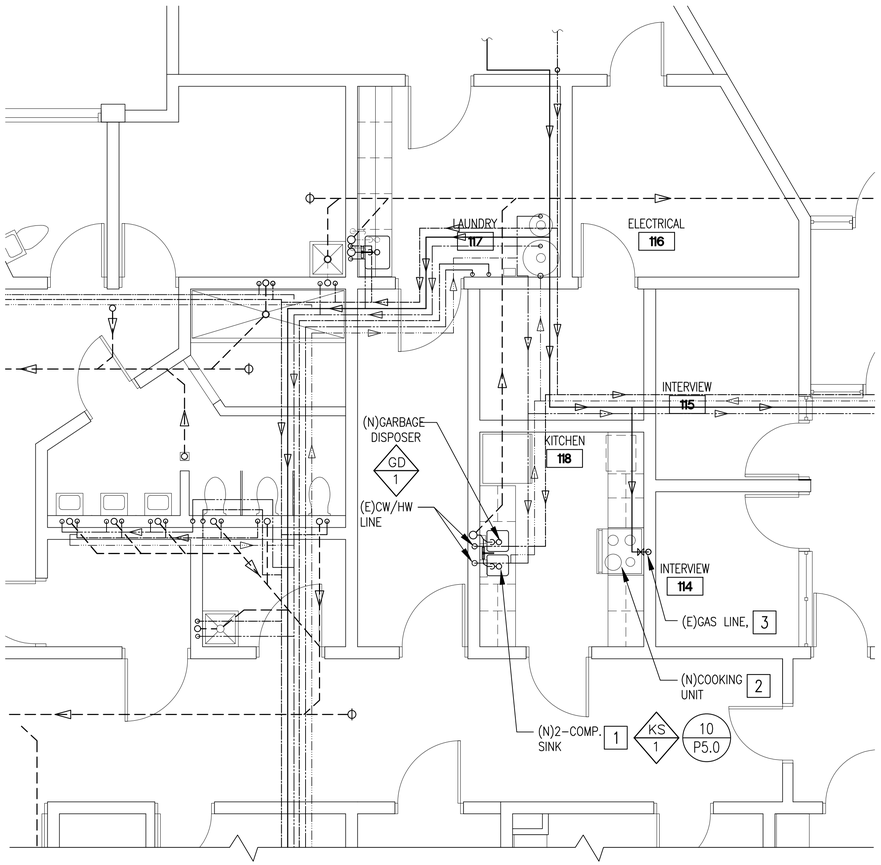
PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
P2.12

CONSTRUCTION KEYNOTES

1. INSTALL NEW 2–COMPARTMENT SINK WITH DISPOSER, AND ALL ASSOCIATED WASTE, VENT AND WATER SUPPLY AND RE–CONNECT TO EXISTING.
2. NEW ELECTRIC RANGE.
3. EXISTING NATURAL GAS LINE, CAPPED.



KITCHEN - CONSTRUCTION PLUMBING PLAN

44

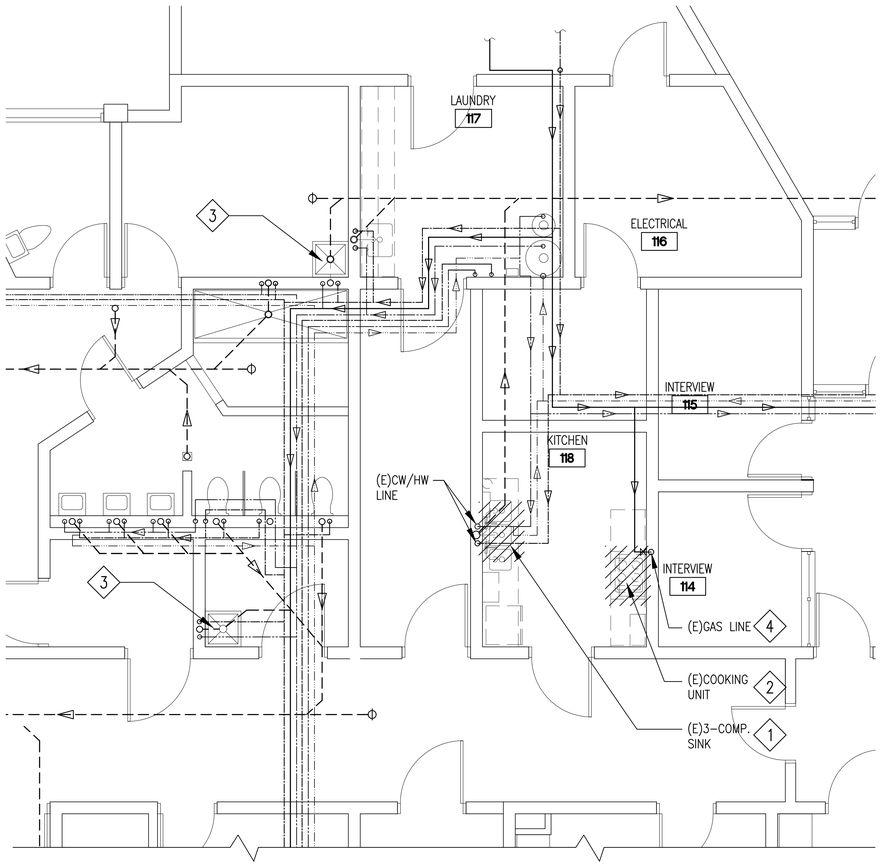
N

0 2' 4' 8'

SCALE: 1/4"= 1'–0"

DEMOLITION KEYNOTES

1. REMOVE (E) 3–COMPARTMENT SINK FIXTURE AND ALL ACCESSORIES AND PREPARE FOR (N) FIXTURE INSTALLATION.
2. REMOVE (E) GAS RANGE.
3. (E) MOP SINK TO REMAIN.
4. (E) NATURAL GAS LINE TO BE CAPPED.



KITCHEN - DEMOLITION PLUMBING PLAN

14

N

0 2' 4' 8'

SCALE: 1/4"= 1'–0"

SHEET NOTES

1.) ALL PLUMBING SHOWN ON THIS SHEET IS EXISTING, UNLESS NOTED OTHERWISE.

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COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
KITCHEN + LAUNDRY PLUMBING PLANS

DATE: 10/15/25

TECHNICIAN: MS

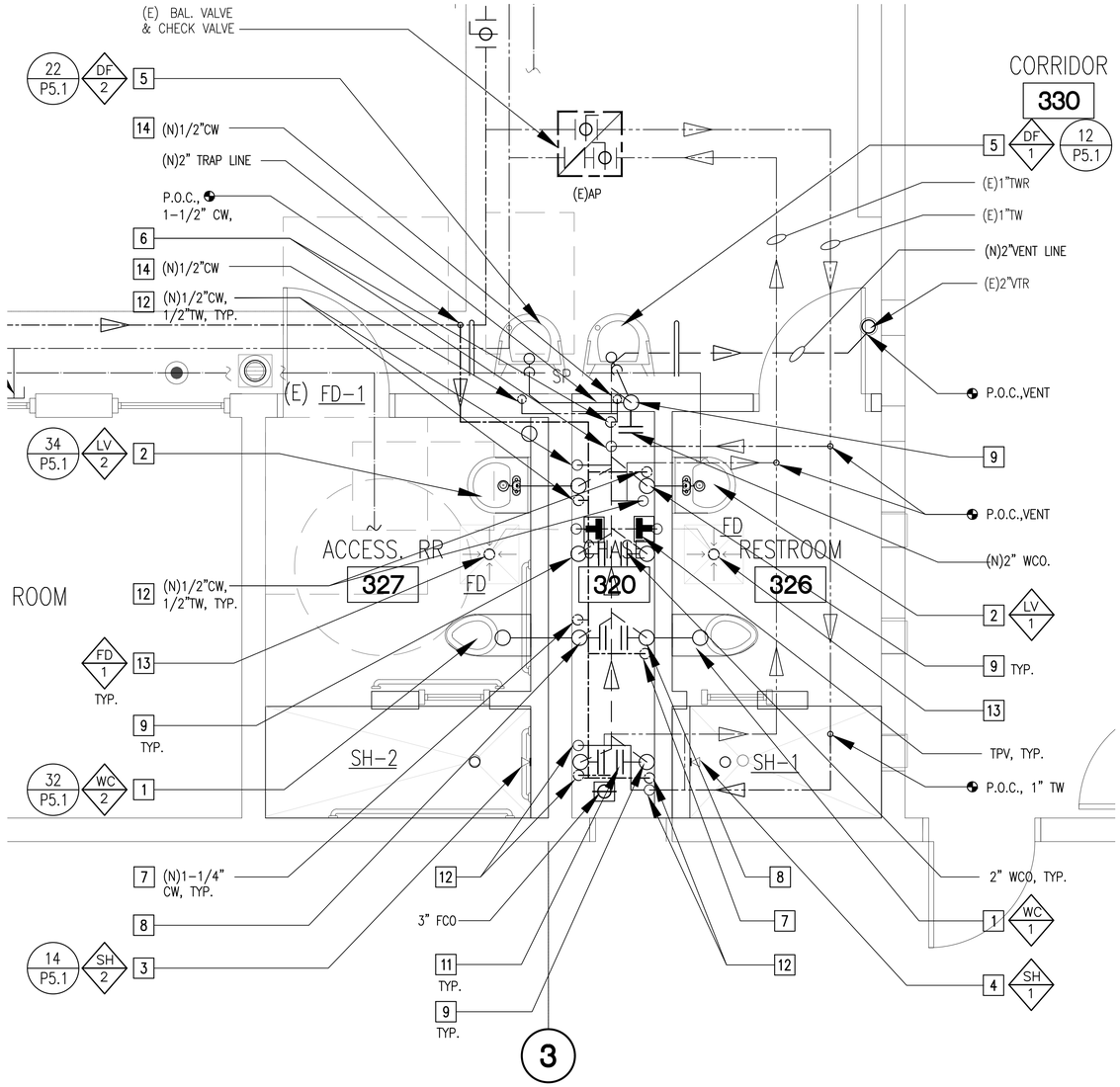
PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
P2.13

KEYNOTES

1. INSTALL NEW WATER CLOSET ASSOCIATED WATER SUPPLY AND CONNECT TO EXISTING.
2. INSTALL NEW LAVATORY AND WATER SUPPLY AND CONNECT TO EXISTING.
3. INSTALL NEW NON-ACCESSIBLE SHOWER ASSOCIATED WATER SUPPLY AND CONNECT TO EXISTING.
4. INSTALL NEW ACCESSIBLE SHOWER AND ASSOCIATED WATER SUPPLY AND CONNECT TO EXISTING.
5. INSTALL NEW DRINKING FOUNTAIN AND ASSOCIATED WATER SUPPLY AND CONNECT TO EXISTING.
6. 1-1/2" CW AND 1" THW SUPPLY LINE.
7. 1-1/4" CW SUPPLY LINE.
8. 3" WASTE, DN., 2" VENT, UP
9. 2" WASTE, DN., 1-1/2" VENT, UP
10. (E) JANITOR SINK, TO REMAIN.
11. (N) WALL CLEAN OUT.
12. 1/2" CW AND THW SUPPLY LINE.
13. INSTALL NEW FLOOR DRAIN AND ASSOCIATED WASTE, AND WATER SUPPLY AND CONNECT TO EXISTING.
14. 1/2" CW SUPPLY LINE.



UNIT 3 - ENLARGED PLUMBING PLAN (ABOVE GROUND) 14

0 4' 8' 16'

SCALE: 1/2"= 1'-0"

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BSCC PLAN REVIEW NUMBER
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SHEET TITLE
UNIT 3 - ENLARGED PLUMBING PLAN

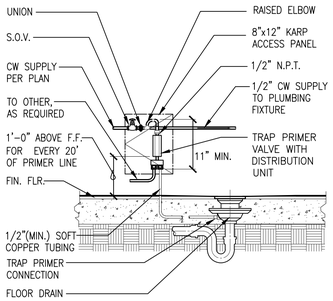
DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

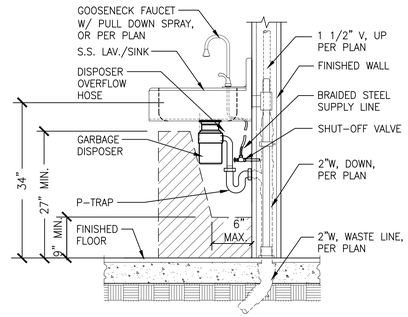
JOB NUMBER: RA # 22.868

SHEET NUMBER
P2.14



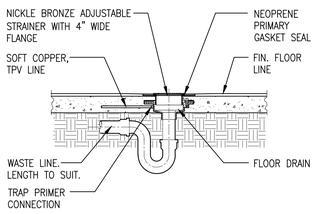
TRAP PRIMER VALVE (TPV) DETAIL

NO SCALE — 20 / P5.0



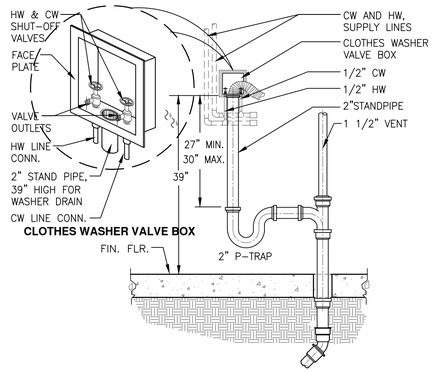
KITCHEN SINK WITH DISPOSER DETAIL

NO SCALE — 10 / P5.0



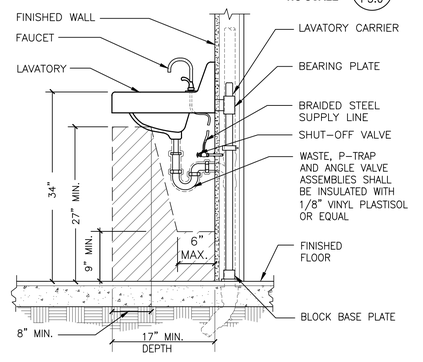
FLOOR DRAIN (FD) DETAIL

NO SCALE — 21 / P5.0



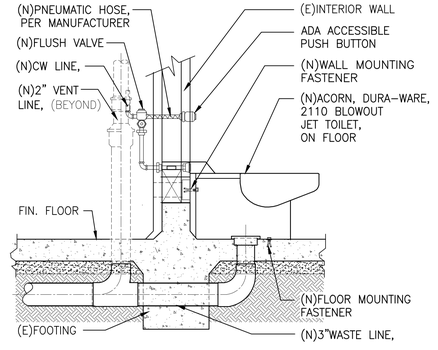
CLOTHES WASHER STAND PIPE DETAIL

NO SCALE — 12 / P5.0



TYPICAL WALL MOUNTED ACCESSIBLE LAVATORY DETAIL (STAFF)

NO SCALE — 13 / P5.0



TYPICAL ROUGH-IN FLOOR MOUNTED WATER CLOSET DETAIL (STAFF)

NO SCALE — 14 / P5.0

RA ARCHITECTS & ENGINEERS

ARCHITECTURE
GREG RAVATT, AIA

MECHANICAL ELECTRICAL
JIM ALBRECHT, PE

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REVISIONS

SEAL

REGISTERED PROFESSIONAL ENGINEER
JAMES B. ALBRECHT
No. M26555
EXP. 9-30-26
MECHANICAL
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

UNIT 3
PLUMBING DETAILS

DATE: 10/15/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER

P5.0

Whitehall Manufacturing® Manufacturer of Healthcare and Rehabilitation Products since 1946

BestCare® Patients, Not Prisoners® Healthcare and Ligature Resistant Products

Division of Acorn Engineering Company® ISO 9001 A MEMBER OF MORRIS GROUP INTERNATIONAL

Whitehall Ligature Resistant Siphon Jet Toilet

Model WH2142-W-EGE10
(Wall Supply)

~~WH2142-W-2-EGE10~~ - Standard
~~WHR2142-W-2-EGE10~~ - Replacement

~~WH2142ADA-W-2-EGE10~~ - ADA Height
~~WHR2142ADA-W-2-EGE10~~ - Replacement/ADA Height



WH2142-W-EGE10

Ligature Resistant Siphon Jet Toilet

Ligature Resistant Siphon Jet Toilet is arranged to be installed against a finished wall from the front side with a fixture-to-wall mounting channel. Unit is fabricated from 16 gage, type 304 stainless steel and is seamless welded construction with exterior surfaces powder coated white (interior of toilet will have a satin finish and will not be powder coated). Toilet will be provided with WH-LRSC-GRAY Ligature Resistant ABS Toilet Seat Cover.

Toilet is siphon jet type with an elongated bowl manufactured to comply with ASME A112.19.3 and CSA B45.4 standards. Toilet requires a minimum of 25 PSI flow pressure and uses a minimum water consumption of 1.28 GPF. On-floor units can withstand load rating of 5000 lbs. without permanent damage. Trap has a minimum 3-1/2" seal, will pass a 2-1/8" ball and is fully enclosed. Toilet has a 1-1/2" NPT flushing inlet connection. Wall waste outlet connection is a 5-1/2" gasket flange. Floor waste outlet locations from rear of fixture are 10" or 12" with a 7-1/2 gasket flange.

Flush Valves, Top Supply Covers and Wall Supply Access Panels are optionally available for all styles of Toilets and may be specified separately.

GUIDE SPECIFICATION
Provide and install Whitehall Best-Care™ Ligature Resistant Toilet (specify model number and options). Fixture shall be fabricated from 16 gage, type 304 stainless steel. On-floor units can withstand load rating of 5000 lbs. without permanent damage. Construction shall be seamless welded and exterior surfaces are powder coated white. Housing to include side access panels. Toilet shall be concealed siphon jet type with an elongated bowl and self-draining flushing rim. Toilet shall be ASME A112.19.3 and CSA B45.4 compliant. Toilet requires a minimum of 25 PSI flow pressure and uses a minimum water consumption of 1.28 GPF. Toilet trap shall have a minimum 3-1/2" seal and shall pass a 2-1/8" diameter ball and is fully enclosed. Provided with WH-LRSC-GRAY Ligature Resistant ABS Toilet Seat Cover.

• Patented US 10,052,000 B2

Please visit ***www.whitehallmfg.com*** *for most current specifications.*

Recyclable Product · Water Conserving Product · Complies with the following standards: WaterSense

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WH2142-W

Revised: 11/18/2022

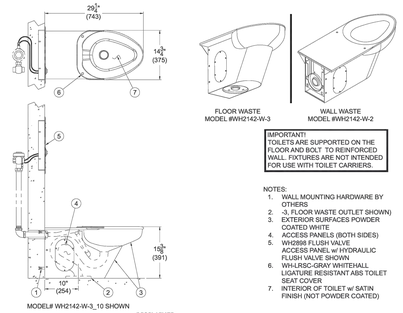
Whitehall Manufacturing® Manufacturer of Healthcare and Rehabilitation Products since 1946

BestCare® Patients, Not Prisoners® Healthcare and Ligature Resistant Products

MODEL NUMBER AND OPTIONS SELECTION:

BASE MODEL NUMBER
❑ WH2142W-2-EGE10 Wall Outlet, Siphon Jet Toilet
❑ WH2142W-3-EGE10_10 Floor Outlet, Siphon Jet Toilet (10" rough-in from wall to the center of waste outlet)
❑ WH2142W-3-EGE10_12 Floor Outlet, Siphon Jet Toilet (12" rough-in from wall to the center of waste outlet)

Accessories:
Note: Gray Ligature Resistant Seat Cover is Standard
❑ WH-LRSC-WHITE Ligature Resistant Seat Cover, White (Shipped Loose)
❑ WH-LRSC-BLACK Ligature Resistant Seat Cover, Black (Shipped Loose)
❑ WH-LRSC-BLUE Ligature Resistant Seat Cover, Dignity Blue (Shipped Loose)



IMPORTANT!
TOILETS ARE SUPPORTED ON THE FLOOR AND BOLT TO REINFORCED WALL. FIXTURES ARE NOT INTENDED FOR USE WITH TOILET CARRIERS.

NOTES:
1. WALL MOUNTING HARDWARE BY OTHERS
2. -3, FLOOR WASTE OUTLET SHOWN)
3. EXTERIOR SURFACES POWDER COATED WHITE
4. ACCESS PANELS (BOTH SIDES)
5. WH2898 FLUSH VALVE ACCESS PANEL w/ HYDRAULIC FLUSH VALVE SHOWN
6. WH-LRSC-GRAY WHITEHALL LIGATURE RESISTANT ABS TOILET SEAT COVER
7. INTERIOR OF TOILET w/ SATIN FINISH (NOT POWDER COATED)

DISCLAIMER:
This product is designed to decrease the probability that it may be utilized as an apparatus for ligature. It is not a replacement for professionals who are trained in the proper evaluation, management and supervision of persons at risk of suicide.

⚠ WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

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SELECTION SUMMARY & APPROVAL FOR MANUFACTURING
Model Number & Options_____Quantity_____
Company_____Date_____
Contact_____Title_____
Approval for Manufacturing/Signature_____

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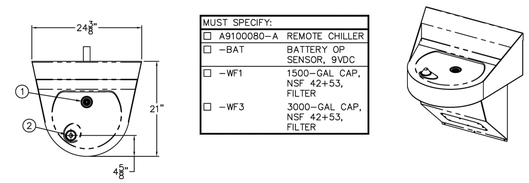
WH2142-W

Revised: 11/18/2022

ADA-WATER CLOSET DETAIL

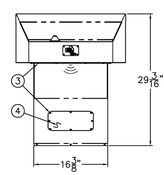
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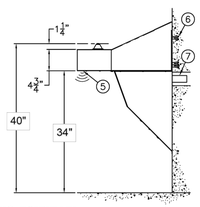
32



MUST SPECIFY:	
☐ A9100080-A	REMOTE CHILLER
☐ -BAT	BATTERY OP SENSOR, 9VDC
☐ -WF1	1500-GAL CAP, NSF 42+53, FILTER
☐ -WF3	3000-GAL CAP, NSF 42+53, FILTER

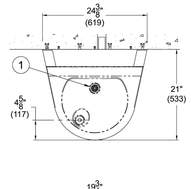
1. LR GRID STRAINER
2. LR DRINKING BUBBLER
3. VR FASTENERS PROVIDED
4. TRAP COVER WITH ACCESS PANEL
5. INFRARED SENSOR LOCATION
6. ANCHORING HARDWARE BY OTHERS
7. 1-1/2" P-TRAP WASTE OUTLET



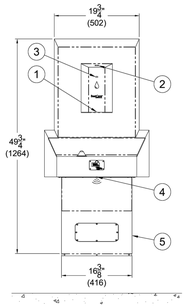


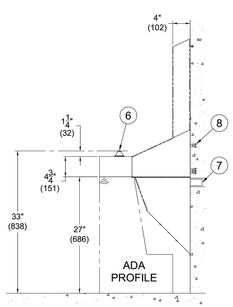
WHITEHALL •MWHBF6-001 DRINKING FOUNTAIN

NON - ADA DF-2



NOTES:
1. LIGATURE RESISTANT GRID STRAINER
2. BOTTLE FILLER SPOUT
3. BOTTLE FILLER SENSOR
4. CONCEALED DRINKING FOUNTAIN SENSOR
5. LIGATURE RESISTANT TRAP COVER WITH ACCESS PANEL
6. LIGATURE RESISTANT DRINKING BUBBLER
7. 1-1/2 O.D. WASTE OUTLET
8. WALL ANCHORING HARDWARE (BY OTHERS)





WHBF16

ADA DF-1

DRINKING FOUNTAIN DETAIL

SCALE: NONE

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ADA-DRINKING FOUNTAIN DETAIL

SCALE: NONE

12

Whitehall Manufacturing® Manufacturer of Healthcare and Rehabilitation Products since 1946

BestCare® Patients, Not Prisoners® Healthcare and Ligature Resistant Products

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Whitehall Ligature Resistant Stainless Steel Basin Powder Coated White ADA Compliant

Model WH3740



WH3740-WH3375-SO

Fixture May Show Some Available Options

Ligature Resistant Stainless Steel Basin

Ligature Resistant Stainless Steel Basin is engineered to combine the look and feel of commercial grade designer basins and countertops with durability and economy in mind. Each standard height Washbasin complies with ANSI, UFAS, and ADA requirements. Compliance is subject to the interpretation and requirements of the local code authority.

Countertop and Basin are constructed of 16 gauge stainless steel with exposed surfaces powder coated white. Basin includes ligature resistant side splashes, overflow, grid strainer, waste piping and 1-1/2" P-Trap.

Optional Ligature Resistant Faucet (WH3375-SO shown) is available. **See Individual BestCare Specification Sheets for 4" Centerset Faucet.**

Optional Mixing Valve WHST70-12 delivers tempered water flow by compensating for pressure and temperature fluctuations and is ASSE 1070 compliant. Valve is to be field set to 105º Fahrenheit and includes strainers and integral checks. Operating range is 30 to 100PSI.

Enclosure conceals P-trap and optional valve assembly and is fabricated from 18 gauge, type 304 stainless steel, powder coated white. **Fixture Mounting** is possible using a properly constructed wall or installed with an In-Wall Lavatory Support Carrier (specified separately).

Compatible Mounting Support Carrier
J.R. Smith Mfg. Co. Model #0805
https://www.JRsmith.com/home

GUIDE SPECIFICATION
Ligature Resistant stainless steel Washbasin. Unit with 34" standard rim height to conform with ANSI, UFAS and ADA Accessibility Standards. Provide integral "D" Shaped basin with an integral, rear overflow. Basin, countertop, backsplash and sidesplash to be constructed of type 304 stainless steel. Washbasin shall conform to ANSI Z124.3 and ANSI Z124.6. Trap enclosure to be constructed of 18 gauge, type 304 stainless steel and is powder coated white.

Please visit ***www.whitehallmfg.com*** *for most current specifications.*

Member of U.S. Green Building Council · Recyclable Product · Water Conserving Product · Complies with the following standards: WaterSense · Patent Pending

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WH3740

Revised: 03/30/2023

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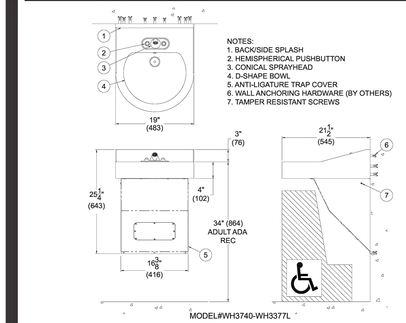
BestCare® Patients, Not Prisoners® Healthcare and Ligature Resistant Products

MODEL NUMBER AND OPTIONS SELECTION:

BASE MODEL NUMBER
❑ WH3740 Ligature Resistant Stainless Steel Washbasin

VALVE SELECTION
See Individual BestCare Specification Sheets for 4" Centerset Faucet

PRODUCT OPTIONS
❑ -WHST70-12 Tempering Valve With Integral Mounting Feet Brass Body With 1/2" NPT Connections



NOTES:
1. BACK/SIDE SPLASH
2. HEMISPHERICAL PUSHBUTTON
3. CONICAL SPRAYHEAD
4. D-SHAPE BOWL
5. ANTI-LIGATURE TRAP COVER
6. WALL ANCHORING HARDWARE (BY OTHERS)
7. TAMPER RESISTANT SCREWS

MODEL#WH3740-WH3377L

DISCLAIMER:
This product is designed to decrease the probability that it may be utilized as an apparatus for ligature. It is not a replacement for professionals who are trained in the proper evaluation, management and supervision of persons at risk of suicide.

⚠ WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

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SELECTION SUMMARY & APPROVAL FOR MANUFACTURING
Model Number & Options_____Quantity_____
Company_____Date_____
Contact_____Title_____
Approval for Manufacturing/Signature_____

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WH3740

Revised: 03/30/2023

ADA-LAVATORY DETAIL

SCALE: NONE

34

Secur-Care® - Ligature Resistant LR1748ADA Series
Ligature Resistant Wall Shower - ADA Compliant



LR1748ADA-03-M
Fixture May Show Some Available Options

• Patented D697,591
• Patent Pending

Please visit ***www.acorneng.com*** for most current specifications.

Acorn - Ligature Resistant Wall Shower - ADA Compliant

Shower is designed to be installed on a finished wall and serviced from an accessible pipe chase. Optional Wall Sleeve or Metal Template is recommended for all installations for required wall openings. The fixture is fabricated from 14 gauge, type 304 stainless steel and the exterior has a #4 satin finish. Unit conforms with ANSI, UFAS and ADA requirements for accessibility. Compliance is subject to the interpretation and requirements of the local code authority.
NOTE: Note intended for use in California.

Conical Showerheads are chrome-plated brass and are Ligature-Resistant with a non-adjustable multi-stream spray.

Valve is a ASSE T/P Temperature/Pressure Balancing Mixing Valve with Patented Tri-Lever Handle and a pneumatically operated, Pushbutton Air-Control Valve using atmospheric air. Hemispherical Pushbutton is Vandal-Resistant and requires less than 5 pounds of force to activate Valve. Valve is metering, non-hold open type. Valve timing is adjustable from 5 to 60 seconds. Valve includes a 1.6 GPM flow restrictor and can be remotely located up to 10 feet from the operating Pushbutton. Valve conforms with Lead-Free requirements of NSF61, Section 9.

Regularly furnished items include an ADA compliant Control Valve, two Conical Showerheads, a recessed Soap Dish, and Mounting Hardware. Refer to accessibility standards and guidelines for additional installation requirements.

GUIDE SPECIFICATION
Provide and install an Secur-Care®-Ligature Resistant, ADA Compliant Wall Shower (specify model number and options). Shower Panel is fabricated from 14 gauge, type 304 stainless steel with a #4 satin finish. Exposed trim is chrome-plated brass. Fixture is furnished with a fixed Showerhead. Shower is provided with an ADA compliant ASSE T/P Temperature/Pressure Balancing Mixing Valve with Patented Tri-Lever Handle Control Valve. A stainless steel recessed Soap Dish shall be factory installed in place. Fixture shall be provided with necessary fasteners for proper installation. Units to conform with ANSI, UFAS and ADA requirements for accessibility.

Acorn Engineering Company • 15125 Proctor Avenue • P.O. Box 3527 • City of Industry, CA 91744-0527 U.S.A.
Tel: (800) 488-8999 • (626) 336-4561 • Fax: (626) 961-2200 • www.acorneng.com • E-mail: info@acorneng.com

Secur-Care® - Ligature Resistant: LR1748ADA
Ligature Resistant Wall Shower - ADA Compliant

WALL THICKNESS AND TYPE (Must Specify)
Thickness: _____ Type: ❑ Concrete ❑ Block ❑ Steel

MODEL NUMBER AND OPTIONS SELECTION:

BASE MODEL NUMBER
☑ LR1748ADA Ligature Resistant Wall Shower - ADA Compliant

RISER VALVE SELECTION (Must Specify)
Air-Trol (Pneumatic)
❑ -03-M-MA2 Manifolded Single Temp, Metering
Master-Trol (Electronic)
❑ -EVS1-MA2 Single Temp
Master-Trol PLUS (Electronic)
❑ -MTP1-MA2 Single Temp
Time-Trol (Electronic)
❑ -MVC1-MA2 Single Temp
Programmable (Electronic) w/9VDC Plug-In Transformer
❑ -PPZ1-MA2 Single Temp Programmable Piezo Button

NOTE: Valve assemblies are manifolded to serve upper and lower Showerheads and Pushbuttons.

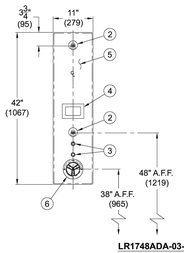
VALVE OPTIONS
❑ -BRS Brass Body Valve
❑ -TF Transformer, 120VAC to 24VAC (-MVC option only)

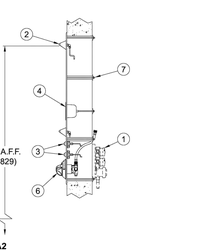
SHOWERHEAD OPTIONS
❑ -F Flow Control, Must Specify:
❑ 2.0 GPM (Not Intended For Use in California)

PRODUCT OPTIONS
❑ -EG Enviro-Glaze, Specify Color:_____
❑ -LRD Less Recessed Soap Dish
❑ -MT Metal Template (Only 1 Required Per Project)
❑ -SW Wall Sleeve

Please visit ***www.acorneng.com*** for most current specifications.

NOTES:
1. -03-M Air-Control Riser Valve
2. Conical Showerhead
3. Control Valve Pushbuttons
4. Recessed Soap Dish
5. Shower Panel
6. ASSE T/P Temp./Press. Balancing Mixing Valve w/ Tri-Lever Handle
7. Wall Mounting Hardware





LR1748ADA-03-M-MA2

⚠ WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

Important: Installation instructions and current rough-in are furnished with each fixture. Do not rough in without certified dimensions.
Dimensions are subject to manufacturer's tolerance of plus or minus 1/4" and change without notice. Acorn assumes no responsibility for use of void or superseded data. © Copyright 2006 Acorn Engineering Company

Selection Summary	Approved for Manufacturing
Model No. & Option_____	Company_____Title_____
Quantity_____	Signature_____ Date_____

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Tel: (800) 488-8999 • (626) 336-4561 • Fax: (626) 961-2200 • www.acorneng.com • E-mail: info@acorneng.com

ADA-SHOWER CONTROL DETAIL

SCALE: NONE

14

RA ARCHITECTS & ENGINEERS

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GREG RAVATT, AIA

MECHANICAL ELECTRICAL
JIM ALBRECHT, PE

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(805) 928-5002 FAX (805) 928-0195

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REVISIONS

SEAL

REGISTERED PROFESSIONAL ENGINEER
JAMES B. ALBRECHT
No. M26555
EXP. 9-30-26
MECHANICAL
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
UNIT 3
PLUMBING DETAILS

DATE: 10/15/25

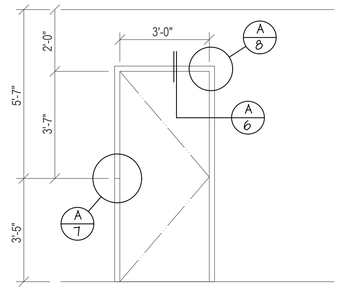
TECHNICIAN: MS

PROJECT MANAGER: MS

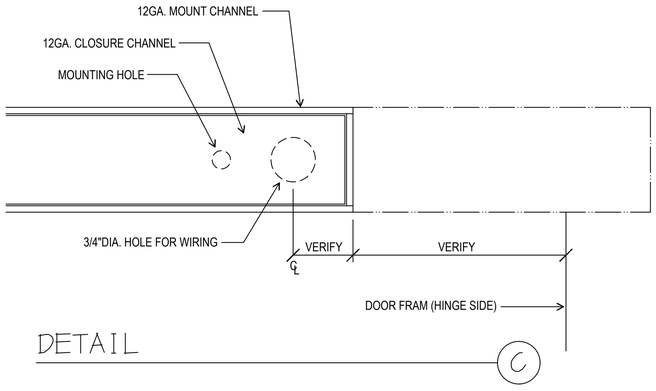
JOB NUMBER: RA # 22.868

SHEET NUMBER
P5.1

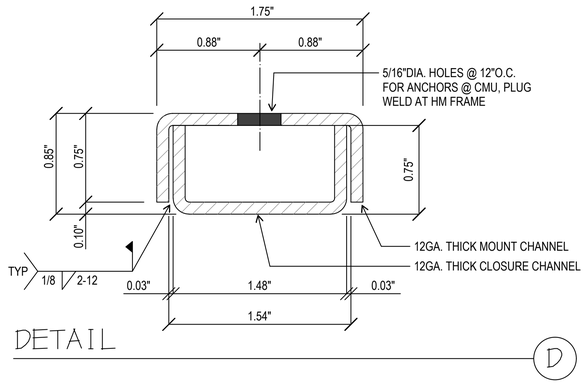
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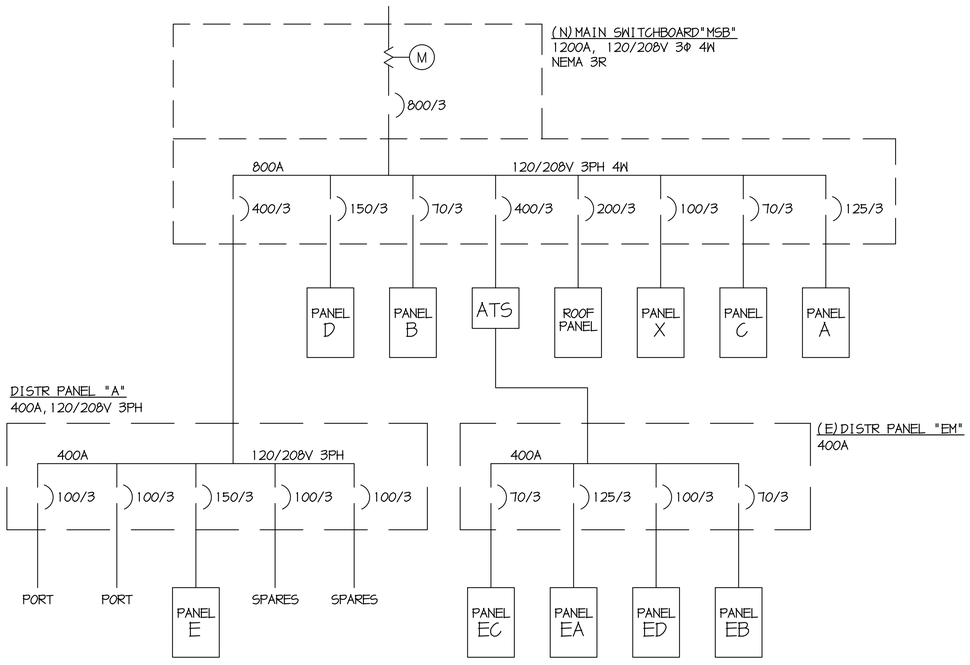
ENLARGED PARTIAL PLAN — B



DETAIL — C



DETAIL — D



SINGLE LINE DIAGRAM — A

REFERENCE ONLY

GENERAL NOTES

1. VISIT JOB SITE AND VERIFY EXISTING CONDITIONS PRIOR TO BID.
2. THE ELECTRICAL WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE 2022 CALIFORNIA ELECTRICAL CODE AND ALL APPLICABLE LOCAL ORDINANCES. WHERE PLANS CALL FOR A HIGHER STANDARD THAN APPLICABLE CODES, THE PLANS SHALL GOVERN.
3. CONDUIT RUNS ARE SHOWN DIAGRAMMATICALLY. EXACT LOCATIONS SHALL BE DETERMINED IN THE FIELD TO SUIT FIELD CONDITIONS.
4. ALL ELECTRICAL EQUIPMENT, APPLIANCES AND LIGHTING FIXTURES SHALL BE LISTED BY A RECOGNIZED TEST LAB AND BEAR THAT LABEL OF APPROVAL.
5. CONTRACTOR SHALL FURNISH, INSTALL AND CONNECT ALL MATERIAL AND EQUIPMENT FOR THIS WORK UNLESS OTHERWISE NOTED.
6. FURNISH DISCONNECT SWITCHES AT REMOTE MOTORS.
7. ALL SPACES AS INDICATED ON PANELS OR SWITCHBOARDS SHALL BE COMPLETE WITH HARDWARE AND BUSSING FOR FUTURE BREAKER OR SWITCH.
8. CHECK ARCHITECTURAL PLANS FOR DOOR SWINGS BEFORE INSTALLING SWITCH OUTLETS.
9. GROUNDING AND BONDING SHALL BE PER CODE PLUS ANY ADDITIONAL PROVISIONS SPECIFIED OR SHOWN ON DRAWINGS.
10. ALL CONDUIT RUNS SHALL CONTAIN A CODE SIZED GREEN GROUND WIRE.
11. THESE PLANS ARE NOT COMPLETE UNTIL APPROVED BY THE AUTHORITY HAVING JURISDICTION.
12. ALL FEEDER CONDUCTORS SHALL BE IN CONDUIT. BRANCH CIRCUITS MAY BE NON-METALLIC SHEATHED CABLE.
13. ALL CONDUCTORS SHALL BE COPPER WITH TYPE THHN/THWN INSULATION.

SYMBOLS

- CONDUIT EXISTING
- CONDUIT CONCEALED IN WALL OR CEILING
- CONDUIT CONCEALED UNDER FLOOR OR BELOW GRADE
- CONDUIT STUBBED OUT AND CAPPED
- CONDUIT TURNED UP
- CONDUIT TURNED DOWN
- HATCH MARKS INDICATE NO. OF #12 WIRES IN CODE SIZED CONDUIT (3) MAX. IN 1/2" C., (5) MAX. IN 3/4" C., (8) MAX. IN 1"C., NO MARKS = 2#12
- A-3 HOME RUN: LETTER INDICATES PANEL, NUMBER(S) INDICATES CIRCUIT(S).
- SAWCUT
- GROUND CONNECTION
- DISTRIBUTION SWITCHBOARD OR PANEL
- PANEL, BRANCH CIRCUIT TYPE, SURFACE AND FLUSH
- SIGNAL TERMINAL CABINET, SURFACE & FLUSH
- LINEAR SURFACE FIXTURE
- OUTLET DATA: BAR INDICATES WALL MOUNT, LETTER INDICATES SWITCH CONTROL, NO. INDICATES CIRCUIT.
- SURFACE FIXTURE ON FLUSH OUTLET.
- RECESSED FIXTURE WITH JUNCTION BOX FOR THRU WIRING
- EXIT LIGHT WITH ARROWS AS SHOWN ON PLANS, WALL AND CEILING MOUNT.
- LOW LEVEL EXIT SIGN, +6" AFF, +4" FROM DOOR JAMB
- A / 100 LIGHT FIXTURE DESIGNATION, LETTER INDICATES TYPE, NO. INDICATES WATTAGE. SEE FIXTURE SCHEDULE.
- FC / 1 MECHANICAL EQUIPMENT DESIGNATION. SEE MECHANICAL DRAWINGS.
- SPECIAL RECEPTACLE – SEE PLAN
- METER
- FLUSH FLOOR RECEPTACLE
- RECEPTACLE, DUPLEX, 15A, 125V, NEMA 5-15R +18" U.N.O.
- DUPLEX RECEPTACLE MTD. ABOVE BACKSPLASH
- DUPLEX RECEPTACLE W/LOWER HALF SWITCHED
- GFI GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLE
- DOUBLE DUPLEX RECEPTACLE
- CEILING RECEPTACLE
- RECEPTACLE, DUPLEX, 20A, 125V, NEMA 5-20R +18" U.N.O.
- JUNCTION BOX 4" SQUARE, 1-1/2" DEEP U.N.O.
- THERMOSTAT F.B.O. +48"
- (2) MOTOR, NO. INDICATES HORSEPOWER
- CLOCK OUTLET +7'-6" U.N.O.
- DISCONNECT SWITCH, NON-FUSED
- F DISCONNECT SWITCH FUSED HORSEPOWER RATED OR SIZED AS NOTED
- COMBINATION MAGNETIC STARTER WITH DISCONNECT SWITCH AND FUSES
- MAGNETIC MOTOR STARTER W/OVERLOADS IN EACH PHASE
- D DIMMER W/INTEGRAL "ON-OFF" SW.
- PUSHBUTTON
- PC PHOTOCELL
- SD SMOKE DETECTOR
- TELEPHONE/COMPUTER/DATA OUTLET, TWO GANG BOX W/1 GANG COVERPLATE & GROMMETED OPENING +18" U.N.O.
- CABLE TV OUTLET +18" U.N.O.
- M MOTION SENSOR
- $ EXISTING SWITCH
  - S SINGLE POLE SWITCH
  - ^{2} DOUBLE POLE SWITCH
  - ^{3} THREE WAY SWITCH
  - ^{P} SWITCH W/PILOT LT.

  QUIET TOGGLE TYPE RATED AT 20A, 120/277V A.C. +42" U.N.O.
- ^{M} MANUAL MOTOR STARTER

FACP	FIRE ALARM CONTROL PANEL
GFI	GROUND FAULT CIRCUIT INTERRUPTING
LST	LABOR SAVING TANDEM
MLO	MAIN LUGS ONLY
w/	WITH
C.O.	CONDUIT ONLY
W.P.	WEATHERPROOF
F.B.O.	FURNISHED BY OTHERS, INSTALL & CONNECT
U.N.O.	UNLESS NOTED OTHERWISE
N.E.C.	NATIONAL ELECTRICAL CODE
N.I.C.	NOT IN CONTRACT
(E)	EXISTING
(N)	NEW
(R)	REMOVE
(RL)	RELOCATE
S/M	SURFACE MOUNT
U/G	UNDERGROUND
CWP	COLD WATER PIPE
AFF	ABOVE FINISHED FLOOR
HACR	HEATING AND AIR CONDITIONING RATED CIRCUIT BREAKER
N.L.	NIGHT LIGHT

NOTE: NOT ALL SYMBOLS SHOWN ARE USED ON THIS PROJECT

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REVISIONS

SEAL

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. MALONEY — E013083 — EXP. 06/30/2027 — ELECTRICAL — STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
GENERAL NOTES
SYMBOLS
SINGLE LINE DIAGRAM

DATE: 10/06/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
E0.1

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EXISTING PANEL "E"

SERVICE: 120/208V 3Φ 4W | MAIN BKR.: MLO | BUS: 200A | LOC.: SEE PLAN
SQUARE D NQOD | MTG.: SURFACE

REMARKS	LOAD ΦA	LOAD ΦB	LOAD ΦC	REC	LTG	MISC	POLE	TRIP	CIRC	CIRC	TRIP	POLE	REC	LTG	MISC	LOAD ΦA	LOAD ΦB	LOAD ΦC	REMARKS
DAY ROOM							1	20	1	2	20	3							EXTERIOR LTG
OFFICE/STORAGE/CORRIDOR									3	4									EXTERIOR LTG
EQUIP ROOM									5	6									EXTERIOR LTG
RECEPS									7	8	20	1							ROOF RECEPS
RECEPS									9	10									OFFICE RECEPS
RECEPS									11	12									OFFICE RECEPS
SPARE									13	14									SPARE
MECH CONTROL									15	16									
SPARE									17	18	↓	↓							
OFFICE REF									19	20	15	3							EF-5
OFFICE RECEP									21	22									
OFFICE RECEP							↓	↓	23	24									EF-2
STAFF DESK							1	20	25 (N)	26	15	3							
EF-4							1	20	27	28									EF-3
STAFF DESK							1	20	29 (N)	30									
EF-1							3	15	31	32	15	3							HV-2
↓									33	34									
									35	36									
HV-1							3	50	37	38	50	3							
↓									39	40									
									41	42									
TOTAL WATTS= 0		ΦA= 0									ΦB= 0						ΦC= 0		
AMPS= 0											MINIMUM BKR					A.I.C. RATING= 10,000 AMPS SYM			

EXISTING PANEL "ED"

SERVICE: 120/208V 3Φ 4W | MAIN BKR.: MLO | BUS: 225A | LOC.: SEE PLAN
SQUARE D NQOB | MTG.: SURFACE

REMARKS	LOAD ΦA	LOAD ΦB	LOAD ΦC	REC	LTG	MISC	POLE	TRIP	CIRC	CIRC	TRIP	POLE	REC	LTG	MISC	LOAD ΦA	LOAD ΦB	LOAD ΦC	REMARKS
EXISTING LOADS							1	20	1	2	20	1							EXISTING LOADS
↓									3	4									↓
									5	6									
									7	8									
									9	10									
									11	12									
									13	14									
									15	16									
									17	18									
									19	20									
							↓	↓	21	22									
↓									23	24	↓	↓							↓
									25	26									
									27	28									
									29	30									
									31	32									
									33	(N) 34	20	1							STAFF DESK RECEPS
									35	36									STAFF DESK RECEPS
									37	38									STAFF DESK RECEPS
									39	40									OSSI ENCLOSURE
									41	42	↓	↓							OSSI ENCLOSURE
TOTAL WATTS= 0		ΦA= 0									ΦB= 0						ΦC= 0		
AMPS= 0											MINIMUM BKR					A.I.C. RATING= 10,000 AMPS SYM			

FIXTURE SCHEDULE

TYPE	MANUFACTURER AND CATALOG NUMBER	LED MODULE TYPE	COLOR	WATTS	DRIVER	OPTIC / LENS	REMARKS
A 55	KENALL MMAC14-S-0-7-FA-45L35K-DCC-DV-LVCD		3500K	45	ELECTRONIC	DIFFUSE	SURFACE 1FT X 4FT ANTI-LIGATURE
AN 55	KENALL MMAC24-S-0-7-FA-45L35K-DCC-DV-NLW-LVCD		3500K	45	ELECTRONIC	DIFFUSE	SURFACE 2FT X 4FT ANTI-LIGATURE W/ NIGHT LIGHT
B 25	KENALL RQCA0-1-23L35K-DCC-DV-2-1-DLN-CC		3500K	23	ELECTRONIC	POLYCARB	12"X12" RECESSED W/ NIGHT LIGHT
C 50	KENALL RMCD-2-FL/TR-0-45L35K-DCC-DV-2-1		3500K	45	ELECTRONIC	POLYCARB	24" X 24" RECESSED VERIFY CEILING TYPES
D 10	KENALL BHSH-MW-W-SO-35K9-DV-HE		3500K	7	ELECTRONIC	POLYCARB	BATHROOM SCONCE

EXISTING PANEL "B"

SERVICE: 120/208V 3Φ 4W | MAIN BKR.: MLO | BUS: 225A | LOC.: SEE PLAN
SQUARE D NQOB | MTG.: FLUSH

REMARKS	LOAD ΦA	LOAD ΦB	LOAD ΦC	REC	LTG	MISC	POLE	TRIP	CIRC	CIRC	TRIP	POLE	REC	LTG	MISC	LOAD ΦA	LOAD ΦB	LOAD ΦC	REMARKS
EXISTING LIGHTING							1	20	1	2	20	1							EXISTING LIGHTING
EXISTING LIGHTING									3	4									EXISTING LIGHTING
EXISTING LIGHTING									5	6									EXISTING LIGHTING
EXISTING RECEPS									7	8									EXISTING LIGHTING
EXISTING RECEPS									9	10									EXISTING LIGHTING
EXISTING RECEPS									11	12									EXISTING RECEPS
IRRIG CONTROL							↓	↓	13	14									EXISTING RECEPS
SPACE									15	16									EXISTING RECEPS
PARKING LOT LTG							1	20	17	18									SPARE
PARKING LOT LTG									19	20									SPARE
SIGN									21	22							610		KEF / MUA
SPARE							↓	↓	23	24	↓	↓							EXISTING LIGHTING
309 OFFICE RECEPS	720			4			1	20	25 (N)	(N) 26	20	1			1600				REFRIG / MICROWAVE
311/312 OFFICE RECEPS		1080		6					27	28							1200		DISPOSAL
332 STAFF DESK			500	2					29	30								1500	SM APPLIANCE
302 MPR RECEPS	540			3					31	32	↓	↓			1500				SM APPLIANCE
319 MPR RECEPS		890		4					33	34	50	2					4800		RANGE
DOOR POWER			180			3	↓	↓	35	36	—	—						4800	————
TOTAL WATTS= 19,920			ΦA= 4,360								ΦB= 8,580							ΦC= 6,980	
AMPS= (E)LOAD @ 29A + (N)LOAD @ 53A = 82A											MINIMUM BKR					A.I.C. RATING= 10,000 AMPS SYM			

EXISTING PANEL "EB"

SERVICE: 120/208V 3Φ 4W | MAIN BKR.: MLO | BUS: 225A | LOC.: SEE PLAN
SQUARE D NQOB | MTG.: FLUSH

REMARKS	LOAD ΦA	LOAD ΦB	LOAD ΦC	REC	LTG	MISC	POLE	TRIP	CIRC	CIRC	TRIP	POLE	REC	LTG	MISC	LOAD ΦA	LOAD ΦB	LOAD ΦC	REMARKS
#1 RM 126 LIGHTING							1	20	1	2	20	1							#2 RM 120 & 123 LTS
SPARE									3	4									WORKSTATION 1
RM 127 / 128 / 129 LTS									5	6									WORKSTATION 2
RM 135 / 133 / 139 LTS									7	8									RM 130/131/132 LTS
RM 137 / 138 / 139 LTS									9	10									EXTERIOR LTS
MONITORS									11	12									RECEPS
TELCO TERMINAL							↓	↓	13	14									RECEPS
EF-1							1	15	15	16									SHOWER SOLENOID
EF-2							1	15	17	18	↓	↓							RM 117, FAN CONTROL
EF-3							3	15	19	20	20	3							HV-1
↓									21	22									↓
									23	24									
PARKING LOT LTS							2	20	25	26	15	3							HV-2
————							—	—	27	28									
CAMERAS							1	20	29	30									↓
HEATER CONTROL									31	32	20	1							
CAMERAS									33	34	20	1							REFRIG
CAMERAS									35	36	15	2							KITCHEN APPL
HV #2							↓	↓	37	38	—	—							KITCHEN APPL
									39	(N) 40	20	1							WORKSTATIONS
									41	(N) 42	20	1							SPARE
TOTAL WATTS= 0			ΦA= 0								ΦB= 0							ΦC= 0	
AMPS= 0											MINIMUM BKR					A.I.C. RATING= 10,000 AMPS SYM			

#1 = COMBINE (E) LIGHTING CIRCUITS 1 & 3 & 6
#2 = COMBINE (E) LIGHTING CIRCUITS 2 & 4

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REVISIONS

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PROJECT

PROBATION
SANTA MARIA JJC
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4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
FIXTURE SCHEDULE
PANEL SCHEDULES

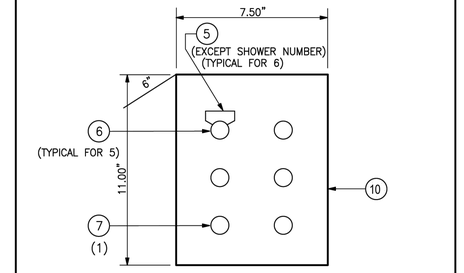
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TECHNICIAN: MS
PROJECT MANAGER: MS
JOB NUMBER: RA # 22868

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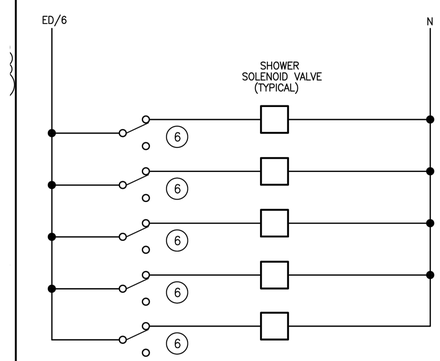
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CONTROL SYSTEMS COMPONENTS

I.D. NO.	DESCRIPTION	REFERENCE
(5)	LEGEND PLATE WITH ROOM NUMBERS	ALLEN–BRADLEY BULLETIN 800T (7–43)
(6)	2 POSITION SELECTOR SWITCH ↖ ↗ MAINTAINED ON OFF	ALLEN–BRADLEY BULLETIN 800T (7–20)
(7)	HOLE SEALS	HOFFMAN (9–15)
(10)	AUDIO MONITORING SWITCH BANK.	



SHOWER CONTROL SWITCH BANK



SHOWER CONTROL DIAGRAM

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REVISIONS

SEAL

REGISTERED PROFESSIONAL ENGINEER
JIM M. ALBRECHT
No. E015081
EXP. 09/30/2027
ELECTRICAL
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
DETAILS

DATE: 10/13/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

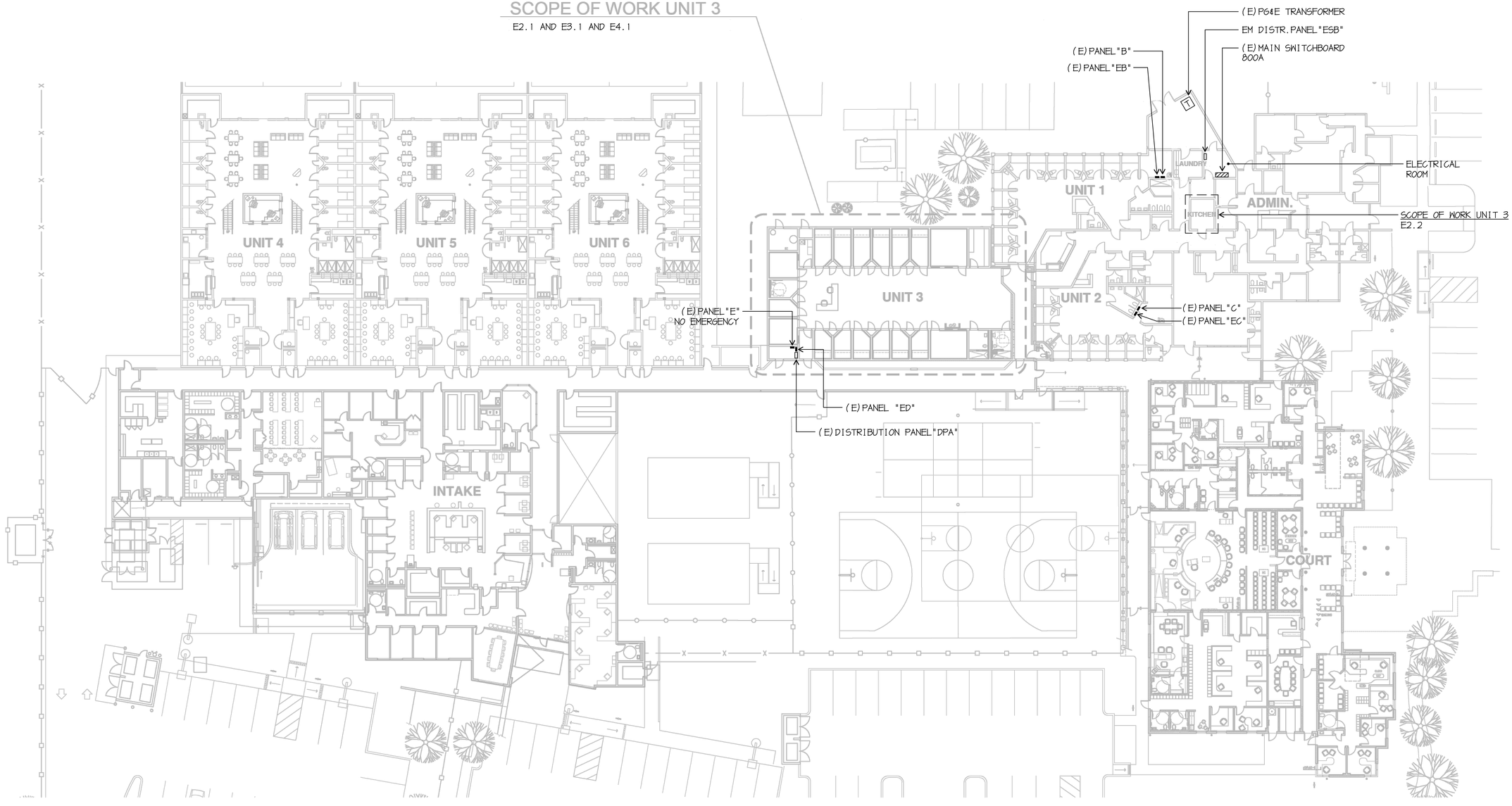
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SCOPE OF WORK UNIT 3

E2.1 AND E3.1 AND E4.1



OVERALL FLOOR POWER PLAN

SCALE: 1" = 20'-0"

NORTH

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REVISIONS

SEAL

REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. MALONEY
No. E013083
EXP. 06/30/2026
ELECTRICAL
STATE OF CALIFORNIA

PROJECT

PROBATION
SANTA MARIA JJC
UNIT 3 REMODEL

4263 CALIFORNIA BLVD.
SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
OVERALL FLOOR POWER PLAN

DATE: 08/21/25

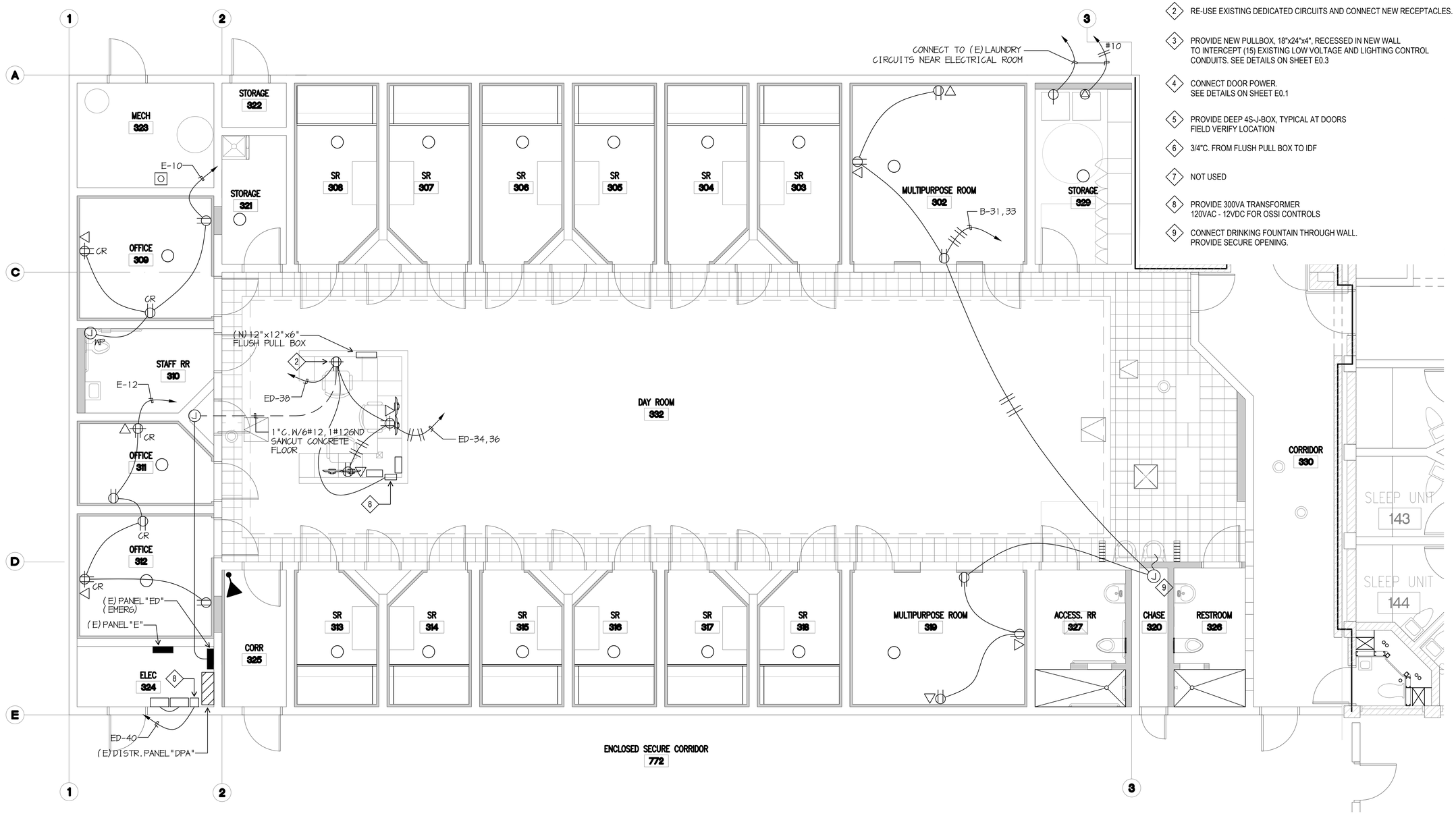
TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22868

SHEET NUMBER
E1.1

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ELECTRICAL NOTES

1. RELOCATE (E) ELECTRICAL BOXES, OUTLETS, ETC. AS NECESSARY TO ACCOMODATE NEW WALLS
2. RE-USE EXISTING DEDICATED CIRCUITS AND CONNECT NEW RECEPTACLES.
3. PROVIDE NEW PULLBOX, 18"x24"x4", RECESSED IN NEW WALL TO INTERCEPT (15) EXISTING LOW VOLTAGE AND LIGHTING CONTROL CONDUITS. SEE DETAILS ON SHEET E0.3
4. CONNECT DOOR POWER. SEE DETAILS ON SHEET E0.1
5. PROVIDE DEEP 4S-J-BOX, TYPICAL AT DOORS FIELD VERIFY LOCATION
6. 3/4"C. FROM FLUSH PULL BOX TO IDF
7. NOT USED
8. PROVIDE 300VA TRANSFORMER 120VAC - 12VDC FOR OSSI CONTROLS
9. CONNECT DRINKING FOUNTAIN THROUGH WALL. PROVIDE SECURE OPENING.

POWER PLAN

SCALE: 1/4" = 1'-0"

NORTH

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SANTA MARIA, CA 93455

County of Santa Barbara
General Services Department
260 N. San Antonio Road
Santa Barbara, CA 93110

COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

POWER PLAN

DATE: 12/19/2025

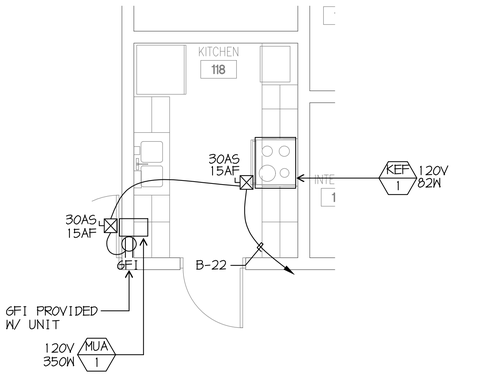
TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22868

SHEET NUMBER

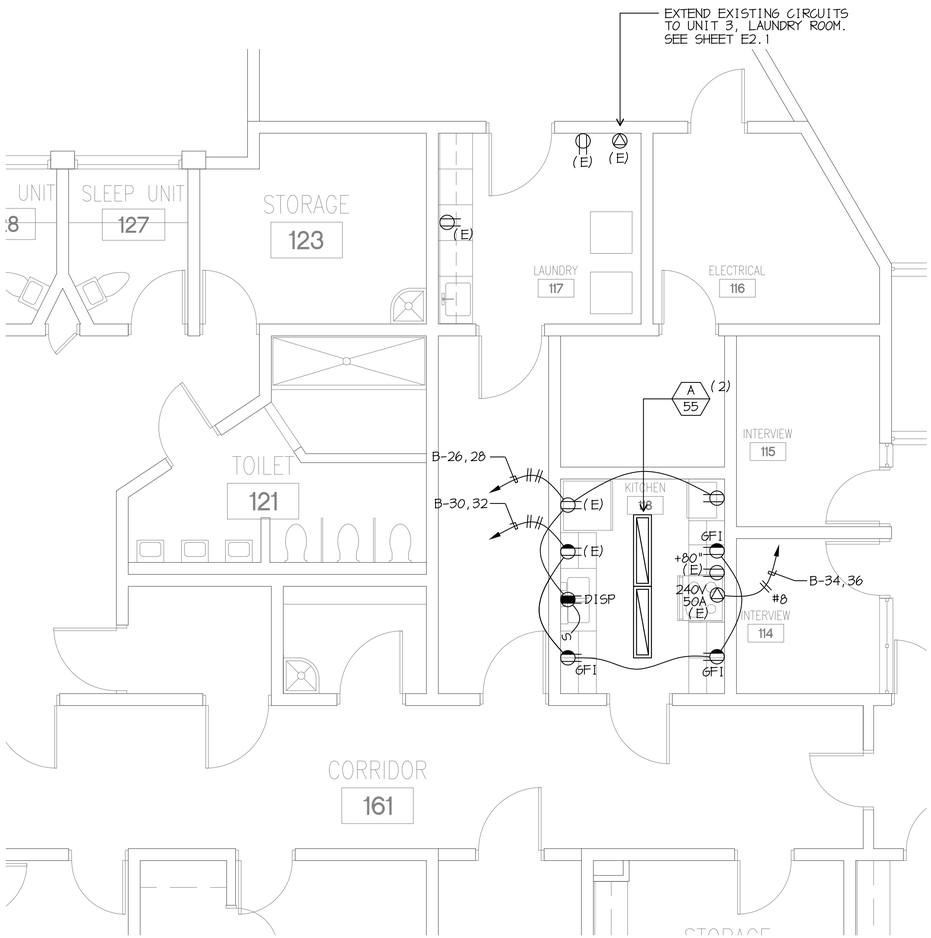
E2.1



KITCHEN ELECTRICAL PLAN
(MECH CONNECTIONS)

SCALE: 1/4" = 1'-0"

NORTH



KITCHEN POWER PLAN

SCALE: 1/4" = 1'-0"

NORTH

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COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE
KITCHEN / LAUNDRY POWER PLAN

DATE: 10/23/2025

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

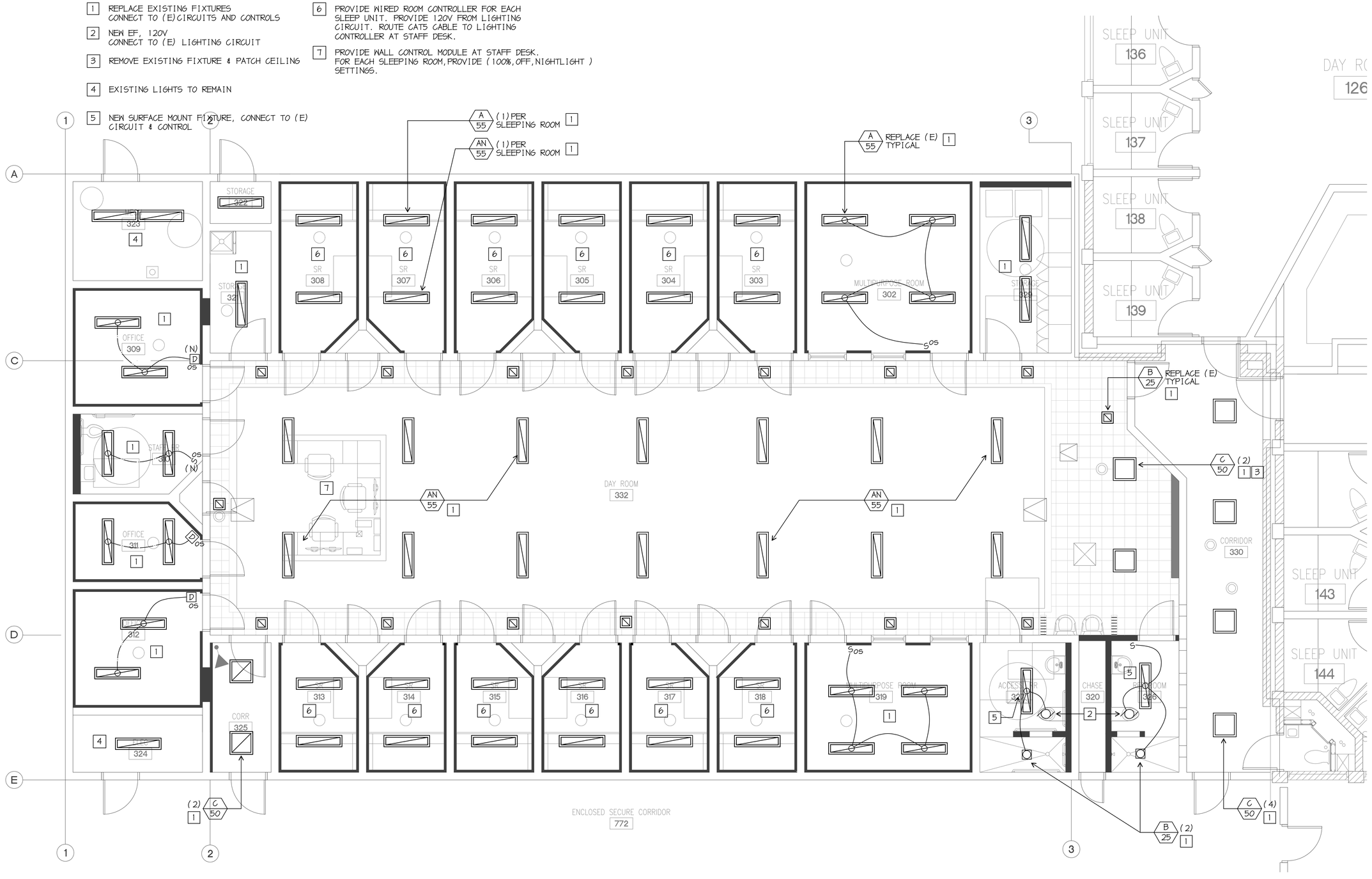
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E2.2

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LIGHTING NOTES

1. REPLACE EXISTING FIXTURES CONNECT TO (E) CIRCUITS AND CONTROLS
2. NEW EF, 120V CONNECT TO (E) LIGHTING CIRCUIT
3. REMOVE EXISTING FIXTURE & PATCH CEILING
4. EXISTING LIGHTS TO REMAIN
5. NEW SURFACE MOUNT FIXTURE, CONNECT TO (E) CIRCUIT & CONTROL
6. PROVIDE WIRED ROOM CONTROLLER FOR EACH SLEEP UNIT. PROVIDE 120V FROM LIGHTING CIRCUIT. ROUTE CAT5 CABLE TO LIGHTING CONTROLLER AT STAFF DESK.
7. PROVIDE WALL CONTROL MODULE AT STAFF DESK. FOR EACH SLEEPING ROOM, PROVIDE (100%, OFF, NIGHTLIGHT) SETTINGS.



LIGHTING PLAN

SCALE: 1/4" = 1'-0"

NORTH

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COUNTY PROJECT
#21055

BSCC PLAN REVIEW NUMBER
83-7574.06

SHEET TITLE

LIGHTING PLAN

DATE: 10/07/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22868

SHEET NUMBER
E3.1

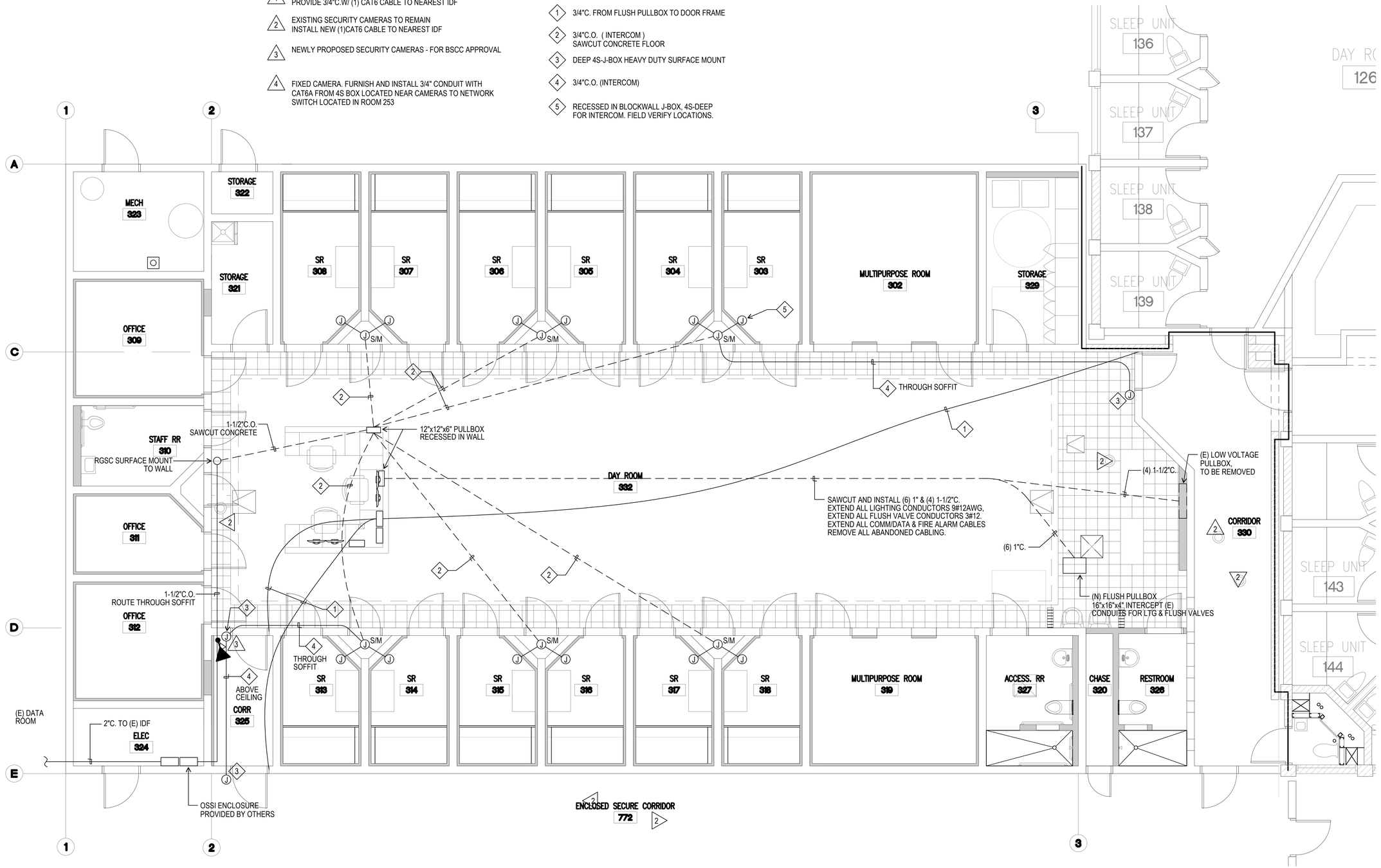
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CAMERA NOTES

1. PROPOSED SECURITY CAMERAS -PREVIOUSLY BSCC APPROVED PROVIDE 3/4"C.W/ (1) CAT6 CABLE TO NEAREST IDF
2. EXISTING SECURITY CAMERAS TO REMAIN INSTALL NEW (1)CAT6 CABLE TO NEAREST IDF
3. NEWLY PROPOSED SECURITY CAMERAS - FOR BSCC APPROVAL
4. FIXED CAMERA. FURNISH AND INSTALL 3/4" CONDUIT WITH CAT6A FROM 4S BOX LOCATED NEAR CAMERAS TO NETWORK SWITCH LOCATED IN ROOM 253

ELECTRICAL NOTES

1. 3/4"C. FROM FLUSH PULLBOX TO DOOR FRAME
2. 3/4"C.O. (INTERCOM) SAWCUT CONCRETE FLOOR
3. DEEP 4S-J-BOX HEAVY DUTY SURFACE MOUNT
4. 3/4"C.O. (INTERCOM)
5. RECESSED IN BLOCKWALL J-BOX, 4S-DEEP FOR INTERCOM. FIELD VERIFY LOCATIONS.



CAMERA/INTERCOM PLAN

SCALE: 1/4" = 1'-0"

NORTH

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BSCC PLAN REVIEW NUMBER
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SHEET TITLE

CAMERA PLAN

DATE: 10/09/25

TECHNICIAN: MS

PROJECT MANAGER: MS

JOB NUMBER: RA # 22.868

SHEET NUMBER
E4.1