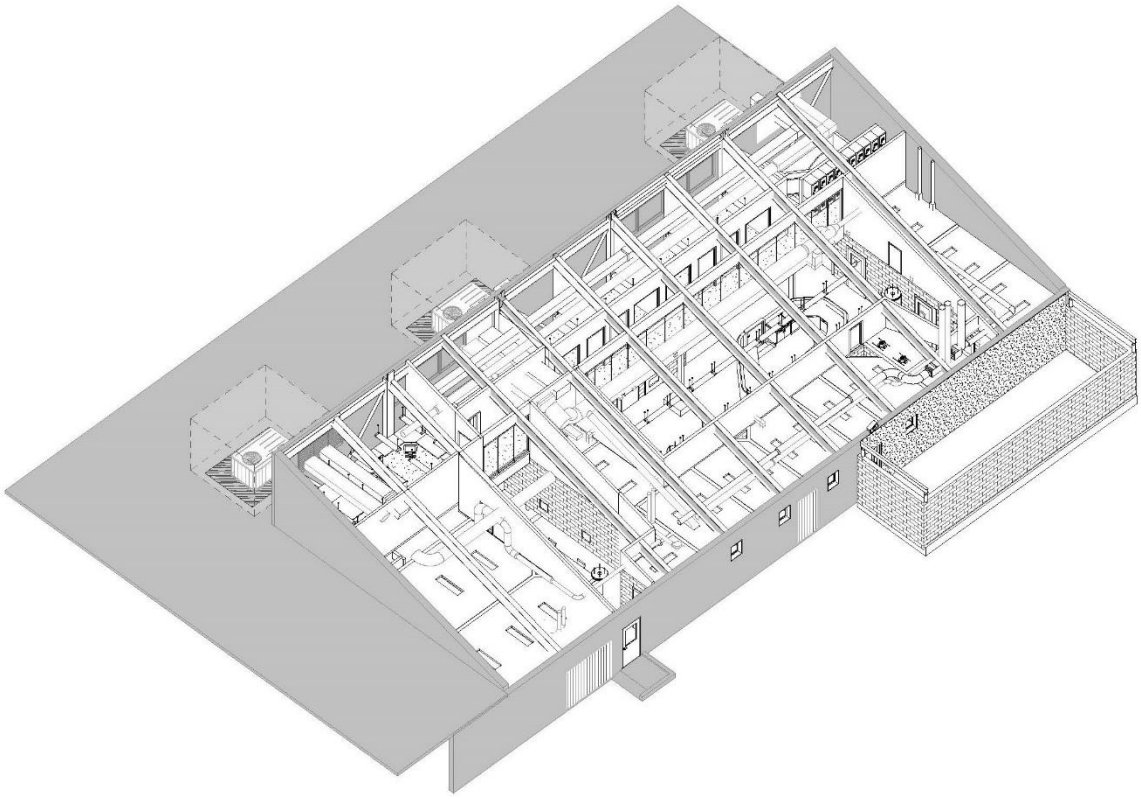
Hiland Mountain Correctional Center
Mental Health Upgrades

Project No. 2020-2102-0101

Technical Specifications



Construction Documents

September 19, 2019

RIM

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SECTION 02 41 16 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items.

B. Related Requirements:

1. Section 01010 "Summary" for restrictions on the use of the premises, Department's-occupancy requirements, and phasing requirements.
2. Section 01731 "Cutting and Patching".

1.3 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.

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.

1.4 MATERIALS OWNERSHIP

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

1.5 INFORMATIONAL SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate the following:

1. Interruption of utility services. Indicate how long utility services will be interrupted.

2. Coordination for shutoff, capping, and continuation of utility services.
3. Interruption of Owner's continuing occupancy of adjacent portions of existing building.

1.6 FIELD CONDITIONS

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

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

1. Before selective demolition, Department will remove the following items:

a. All furniture.

C. Notify Department 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. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
2. Hazardous materials will be removed by Department before start of the Work.

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.

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. Review record documents of existing construction provided by Department. Department does not guarantee that existing conditions are same as those indicated in record documents.

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

D. 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 Department.

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 Section 01010 "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. Department 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. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    c. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    d. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with site circulation and building exiting, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 01500 "Construction Facilities and Temporary Controls."

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

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

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. Maintain adequate ventilation when using cutting torches.
5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
6. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Transport items to Department’s storage area on-site.
3. 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. Protect items from damage during storage.
3. 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 Department, 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 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts. Do not overcut corners of window and door openings.

B. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Department's property, remove demolished materials from Project site.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

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

3.7 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

SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 REFERENCES

A. American Concrete Institute:

1. ACI 301 - Specifications for Structural Concrete.
2. ACI 318 - Building Code Requirements for Structural Concrete.
3. ACI 530.1 - Specifications for Masonry Structures.
4. ACI SP-66 - ACI Detailing Manual.

B. ASTM International:

1. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
3. A185/A185M-07 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
4. ASTM A496/A496M - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
5. ASTM A497/A497M - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
6. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
7. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
8. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
9. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
10. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
11. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
12. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
13. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.

C. American Welding Society:

1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

D. Concrete Reinforcing Steel Institute:

1. CRSI - Manual of Standard Practice.
2. CRSI - Placing Reinforcing Bars.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel, bending and cutting schedules, and supporting and spacing devices.

C. Certificates: Submit AWS qualification certificate for welders employed on the Work.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with CRSI - Manual of Standard Practice.

B. Prepare shop drawings in accordance with ACI SP-66.

1.4 QUALIFICATIONS

A. Welders: AWS qualified within previous 12 months.

1.5 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate with placement of formwork, formed openings and other Work.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Steel: Per Structural Drawings.

2.2 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions.

2.3 FABRICATION

A. Fabricate concrete reinforcement in accordance with CRSI Manual of Practice.

B. Form standard hooks as indicated on Drawings.

C. Form reinforcement bends with minimum diameters in accordance with ACI 318.

PART 3 - EXECUTION

3.1 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance.

1. Do not weld crossing reinforcement bars for assembly.

B. Do not displace or damage vapor retarder.

C. Accommodate placement of formed openings.

D. Space reinforcement bars with minimum clear spacing in accordance with ACI 318.

E. Maintain concrete cover around reinforcement.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 REFERENCES

A. American Concrete Institute:

1. ACI 301 - Specifications for Structural Concrete.
2. ACI 305 - Hot Weather Concreting.
3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
4. ACI 308.1 - Standard Specification for Curing Concrete.
5. ACI 318 - Building Code Requirements for Structural Concrete.

B. ASTM International:

1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

2. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

3. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
4. ASTM C33 - Standard Specification for Concrete Aggregates.
5. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
6. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
7. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
8. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
9. ASTM C150 - Standard Specification for Portland Cement.
10. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
11. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
12. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
13. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
14. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
15. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
16. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
17. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
18. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing.

19. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
20. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
21. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
22. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
23. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
24. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
25. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
26. ASTM C1218/C1218M - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
27. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
28. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
29. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
30. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
31. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
32. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
33. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
34. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
35. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on joint devices, attachment accessories, and admixtures.

C. Design Data:

1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:

    a. Hot and cold weather concrete work.
    b. Air entrained concrete work.

2. Identify mix ingredients and proportions, including admixtures.

D. Manufacturer's Installation Instructions: Submit installation procedures and interface required with adjacent Work.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301.

B. Conform to ACI 305 when concreting during hot weather.

C. Conform to ACI 306.1 when concreting during cold weather.

D. Acquire cement and aggregate from one source for Work.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Maintain concrete temperature after installation at minimum 50 degrees F (10 degrees C) for minimum 7 days.

1.5 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement: Per Structural Drawings.

B. Normal Weight Aggregates: ASTM C33.

C. Water: ACI 318; potable.

2.2 ADMIXTURES

A. Air Entrainment: ASTM C260.

B. Chemical: ASTM C494/C494M.

C. Plasticizing: ASTM C1017/C1017M.

D. Non-Shrink Grout: Per Structural Drawings.

2.3 JOINT DEVICES AND FILLER MATERIALS

A. Joint Filler: Asphalt impregnated fiberboard or felt.

B. Construction Joint Devices: Integral extruded plastic, formed to tongue and groove profile.

C. Expansion Joint Devices: extruded aluminum; resilient neoprene filler strip with Shore A hardness of 35 to permit plus or minus 25 percent joint movement with full recovery;

2.4 CONCRETE MIX

A. Provide concrete Per Structural Drawings.

B. Admixtures: Submit for review and approval prior to use.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify requirements for concrete cover over reinforcement.

C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.

B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

C. Remove debris and ice from formwork, reinforcement, and concrete substrates.

D. Remove water from areas receiving concrete before concrete is placed.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 301.

B. Notify testing laboratory minimum 24 hours prior to commencement of operations.

C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.

D. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

E. Extend joint filler from bottom of slab to within 1/4 inch of finished slab surface.

F. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

G. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor finish.

H. Install joint covers in longest practical length, when adjacent construction activity is complete.

I. Deposit concrete at final position. Prevent segregation of mix.

J. Place concrete in continuous operation for each panel or section determined by predetermined joints.

K. Consolidate concrete.

L. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

M. Place concrete continuously between predetermined expansion, control, and construction joints.

N. Do not interrupt successive placement; do not permit cold joints to occur.

O. Place Per Structural Drawings. Per Structural Drawings.

3.4 CONCRETE FINISHING

A. Provide formed concrete surfaces to be left exposed with smooth finish.

B. Finish concrete floor surfaces to requirements of Section 03 35 00.

3.5 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

1. Protect concrete footings from freezing for minimum 5 days.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Cure floor surfaces in accordance with ACI 301.

3.6 FIELD QUALITY CONTROL

A. Field testing will be performed by Owner's testing laboratory in accordance with ACI 318.

B. Provide free access to Work and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to testing firm for review prior to commencement of Work.

D. Concrete Inspections:

1. Continuous Placement Inspection: Inspect for proper installation procedures.
2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.

E. Strength Test Samples:

1. Sampling Procedures: ASTM C172.
2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, field cured.
3. Sample concrete and make one set of three cylinders for every 150 cu yds or less of each class of concrete placed each day and for every 5,000 sf (465 sq m) of surface area for slabs and walls.
4. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
5. Make one additional cylinder during cold weather concreting, and field cure.

F. Field Testing:

1. Slump Test Method: ASTM C143/C143M.
2. Air Content Test Method: ASTM C173/C173M.
3. Temperature Test Method: ASTM C1064/C1064M.
4. Measure slump and temperature for each compressive strength concrete sample.
5. Measure air content in air entrained concrete for each compressive strength concrete sample.

G. Cylinder Compressive Strength Testing:

1. Test Method: ASTM C39/C39M.
2. Test Acceptance: In accordance with ACI 318.
3. Test one cylinder at 7 days.
4. Test two cylinders at 28 days.
5. Retain one cylinder for testing when requested by Architect/Engineer.
6. Dispose remaining cylinders when testing is not required.

H. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

3.7 PATCHING

A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.

B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.

C. Patch imperfections as directed by Architect/Engineer in accordance with ACI 301.

3.8 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by Architect/Engineer.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

END OF SECTION

SECTION 03 35 00 - CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Finishing concrete floors.
2. Floor surface treatment.

1.2 REFERENCES

A. American Concrete Institute:

1. ACI 301 - Specifications for Structural Concrete.
2. ACI 302.1 - Guide for Concrete Floor and Slab Construction.

B. ASTM International:

1. ASTM E1155 - Standard Test Method for Determining Floor Flatness and of Levelness Using the F-number System.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on concrete hardener, sealer, curing compounds curing papers and slip resistant treatment, compatibilities, and limitations.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301 and ACI 302.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Deliver materials in manufacturer's packaging including application instructions.

1.6 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate the Work with concrete floor placement and concrete floor curing.

PART 2 - PRODUCTS

2.1 COMPOUNDS - HARDENERS AND SEALERS

A. Submit for review prior to use.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify floor surfaces are acceptable to receive the Work of this section.

3.2 FLOOR FINISHING

A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1.

B. Steel trowel surfaces which are to be exposed.

3.3 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation of Surface Flatness For Exposed Concrete Floors: 1/4 inch in 10 ft.

C. Maximum Variation of Surface Flatness Under Seamless Resilient Flooring: 1/4 inch in 10 ft.

D. Maximum Variation of Surface Flatness Under Carpeting: 1/4 inch in 10 ft.

E. Correct defects in defined traffic floor by grinding or removal and replacement of defective Work. Areas requiring corrective Work will be identified. Re-measure corrected areas by same process.

END OF SECTION

SECTION 04 22 00 - 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. Mortar and grout.
3. Steel reinforcing bars.
4. .

1.3 DEFINITIONS

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

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

1.4 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.
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.

1.5 ACTION 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."

C. Qualification Data: For testing agency.

D. 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 used in structural masonry.

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. Anchors, ties, and metal accessories.

E. 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.

F. 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.

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

1.6 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.

1.7 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.

1.8 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 (600 mm) 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 (4 deg C) 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.

2.2 CONCRETE MASONRY UNITS

A. Regional Materials: CMUs shall be manufactured within 500 miles (800 km) of Project site from aggregates that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) 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: Per Structural Drawings.
2. Density Classification: Normal weight.
3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
4. Size (Width): Manufactured to the following dimensions:

D. Decorative CMUs: ASTM C90.

1. Unit Compressive Strength: Per Structural Drawings.
2. Density Classification: Normal weight.

3. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
4. Pattern and Texture:

    a. Standard pattern, split-face finish

2.3 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. 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 (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.

G. Aggregate for Grout: ASTM C 404.

H. 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.

I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs, containing integral water repellent by same manufacturer.

J. Water: Potable.

2.4 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

2.5 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 or PVC.

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.

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 (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

2.6 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. Use Portland cement or mortar cement mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Per Structural Drawings.

D. Grout for Unit Masonry: Comply with ASTM C 476.

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. Verify that foundations are within tolerances specified.
2. 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 (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) 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 (6 mm in 3 m), or 1/2 inch (12 mm) 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).

2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

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 **bond** pattern indicated on Drawings; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. 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.

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

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

F. 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.

G. Fill cores in hollow CMUs with grout 24 inches (600 mm) 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 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.

B. Form control joints in concrete masonry as follows using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

3.7 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 1 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. (464 sq. m) 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 mortar air content and compressive strength.

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

3.8 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.

3.9 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. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

C. 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

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural shapes.
2. Channels and angles.
3. Hollow structural sections.
4. Structural pipe.
5. Structural plates.
6. Floor plates.
7. Bolts, connectors, and anchors.
8. Grout.

1.2 REFERENCE STANDARDS

A. American Institute of Steel Construction:

1. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges.
2. AISC 341 - Seismic Provisions for Structural Steel Buildings.
3. AISC 360 - Specification for Structural Steel Buildings.

B. American Society of Civil Engineers:

1. ASCE 19 - Standard Applications of Steel Cables for Buildings.

C. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
4. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
5. ASTM A193/A193M - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
6. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
7. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

8. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
9. ASTM A449 - Standard Specification for Quenched and Tempered Steel Bolts and Studs.
10. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.

11. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
12. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
13. ASTM A514/A514M - Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.
14. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
15. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.

16. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
17. ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4-in. (100-mm) Thick.
18. ASTM A618/A618M - Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.
19. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
20. ASTM A847/A847M - Standard Specification for Cold-Formed Welded and Seamless High Strength, Low Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance.
21. ASTM A852/A852M - Standard Specification for Quenched and Tempered Low-Alloy Structural Steel Plate with 70 ksi (485 MPa) Minimum Yield Strength to 4 in. (100 mm) Thick.
22. ASTM A913/A913M - Standard Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST).
23. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
24. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
25. ASTM E94 - Standard Guide for Radiographic Examination.
26. ASTM E164 - Standard Practice for Ultrasonic Contact Examination of Weldments.
27. ASTM E165 - Standard Test Method for Liquid Penetrant Examination.
28. ASTM E709 - Standard Guide for Magnetic Particle Examination.
29. ASTM F436 - Standard Specification for Hardened Steel Washers.

30. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
31. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
32. ASTM F1852 - Standard Specification for Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

33. ASTM F2329 - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.

D. American Welding Society:

1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
2. AWS D1.1 - Structural Welding Code - Steel.

E. Research Council on Structural Connections:

1. RCSC - Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.

F. SSPC: The Society for Protective Coatings:

1. SSPC - Steel Structures Painting Manual.
2. SSPC Paint 15 - Steel Joist Shop Paint.
3. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
4. SSPC SP 3 - Power Tool Cleaning.
5. SSPC SP 6 - Commercial Blast Cleaning.
6. SSPC SP 10 - Near-White Blast Cleaning.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings:

1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and bolts.
2. Connections.
3. Cambers.
4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

C. Manufacturer's Mill Certificate: Certify products meet or exceed specified requirements.

D. Mill Test Reports: Submit indicating structural strength, destructive and non-destructive test analysis.

E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the following:

1. Structural Steel: AISC 303 ASIC 341 and AISC 360.
2. Architecturally Exposed Structural Steel: AISC 303, Section 10.
3. High Strength Bolted Connections: RCSC Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.
4. Steel Cable Structures: ASCE 19.

1.5 QUALIFICATIONS

A. Fabricator: Company specializing in performing Work of this section with minimum 3 years documented experience with the following current AISC Certification:

1. Standard Steel Building Structures (STD).

B. Erector: Company specializing in performing Work of this section with minimum 3 years documented experience.

C. Shop Painter: Company specializing in performing Work of this section with minimum 3 years documented experience.

D. Welders and Welding Procedures: AWS D1.1 qualified within previous 12 months.

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL

A. Shapes and Plates: Per Structural Drawings.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. Bolts: Per Structural Drawings.

B. Nuts: Per Structural Drawings.

C. Washers: Per Structural Drawings.

D. Anchor Rods: Per Structural Drawings.

E. Threaded Rods: Per Structural Drawings. WELDING MATERIALS

F. Welding Materials: AWS D1.1; type required for materials being welded.

2.3 FINISHES

A. Prepare structural component surfaces in accordance with SSPC SP 6.

2.4 ACCESSORIES

A. Grout: Per Structural Drawings.

B. Shop Primer: SSPC Paint 15, Type 1, red oxide.

C. Touch-Up Primer: Match shop primer.

2.5 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.

B. Shop test bolted and welded connections as specified for field quality control tests.

C. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.

1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify bearing surfaces are at correct elevation.

C. Verify anchors rods are set in correct locations and arrangements with correct exposure for steel attachment.

3.2 PREPARATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Furnish templates for installation of anchor rods and embedments in concrete work.

3.3 ERECTION

A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.

B. Field weld components indicated on shop drawings.

C. Field connect members with threaded fasteners; torque to required resistance.

D. Do not field cut or alter structural members without approval of Architect/Engineer.

E. After erection, touch up welds and abrasions to match shop finishes.

3.4 GROUT INSTALLATION

A. Grout or shim bearing plates and equipment supports to proper elevation, snug tighten anchor bolts.

B. Fill void under bearing surface with grout. Install and pack grout to remove air pockets.

C. Moist cure grout.

D. Remove forms after grout is set. Trim grout edges to from smooth surface, splayed 45 degrees.

E. Tighten anchor bolts after grout has cured for a minimum of 3 days.

3.5 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

C. Maximum Offset From Alignment: 1/4 inch.

3.6 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for inspecting, testing.

B. Bolted Connections: Inspect in accordance with AISC 303.

1. Visually inspect all bolted connections.
2. For Direct Tension Indicators, comply with requirements of ASTM F959. Verify that gaps are less than gaps specified in Table 2.

C. Welding: Inspect welds in accordance with AWS D1.1.

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
2. Visually inspect all welds.
3. Ultrasonic Inspection: ASTM E164; perform on all full penetration welds.
4. Liquid Penetrant Inspection: ASTM E165.
5. Magnetic Particle Inspection: ASTM E709.
6. Radiographic Inspection: ASTM E94.

D. Correct defective bolted connections and welds.

END OF SECTION

SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.1 SUBMITTALS

A. Shop Drawings: Indicate decking plan, support locations, projections, openings and reinforcement, pertinent details, and accessories.

B. Product Data: Deck profile characteristics and dimensions, structural properties, and finishes.

1.2 QUALITY ASSURANCE

A. Perform Work in accordance with ASCE 3 for composite decks.

PART 2 - PRODUCTS

2.1 STEEL DECK

A. Sheet Steel: Per Structural Drawings.

B. Welding Materials: AWS D1.1.

C. Touch-Up Primer: Zinc chromate type.

2.2 FABRICATION

A. Decking: Sheet steel, configured as follows:

1. Span Design: multiple.
2. Minimum Metal Thickness Excluding Finish: Per Structural Drawings.
3. Nominal Height: Per Structural Drawings.
4. Formed Sheet Width: Per Structural Drawings.
5. Side Joints: Per Structural Drawings
6. Flute Sides: Per Structural Drawings.

B. Fasteners: Hardened steel, galvanized, self tapping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify field conditions are acceptable and are ready to receive work.

3.2 INSTALLATION

A. Erect metal decking in accordance with Steel Deck Institute Design Manual for Composite Decks, Form Decks, Roof Decks.

B. Bear decking on steel supports with 1-1/2 inch minimum bearing. Align and level.

C. Fasten deck to steel support members at ends and intermediate supports Per Structural Drawings.

D. Weld in accordance with AWS D1.1.

E. Install wet concrete stops at deck edge upturned to top surface of slab.

F. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.

G. Immediately after welding deck and other metal components in position, coat welds, weld blooms, burned areas, and damaged surface coating, with touch-up prime paint.

3.3 FIELD QUALITY CONTROL

A. Welding: Inspect welds in accordance with AWS D1.1.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel framing and supports for sliding and swinging detention doors.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

1.4 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Steel framing and supports for sliding and swinging detention doors.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

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

C. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

D. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G60 coating designation.

E. Perforated Metal: Galvanized-steel sheet, ASTM A 653/A 653M, G90 coating, commercial steel Type B, 0.119-inch thick, with 3/8-inch holes 1/2-inch o.c. in staggered rows, 50 percent minimum open area.

F. Chain-link Fencing: Provide fence fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:

1. Fabric Height: As indicated on Drawings.
2. Steel Wire for Fabric: Wire diameter of 0.113 inch.
    a. Mesh Size: 2 inches.
    b. Zinc-Coated Fabric: ASTM A 392, Type II, Class 1, 1.2 oz./sq. ft. with zinc coating applied before weaving.
3. Selvage: Knuckled at bottom edge.

2.2 FASTENERS

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

B. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

C. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

D. Post-Installed Anchors: Torque-controlled expansion anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5.

2.3 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

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

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

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

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

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

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.6 STRUCTURAL-STEEL DOOR SUPPORTS

A. Fabricate structural-steel door supports from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together. Continuously weld joints.

2.7 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.8 STEEL AND IRON FINISHES

A. Shop prime iron plates and tubing steel items with universal shop primer.

B. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

C. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with the following requirements:

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

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts through bolts, and other connectors.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 PERFORATED METAL INSTALLATION

A. Secure sheet metal to bottom of trusses with spanner head screws.

3.4 CHAIN-LINK FENCE INSTALLATION

A. Secure fencing fabric to metal trusses with spanner head screws and metallic cable securement clips.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

END OF SECTION

SECTION 05 51 00 - METAL STAIRS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes steel stair frame of structural sections, with closed risers; pan to receive concrete fill stair treads and landings; integral balusters and handrailing.

B. Related Sections:
1. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for placement of metal anchors specified in this section in concrete.
2. Section 05 50 00 - Metal Fabrications.
3. Section 05 52 00 - Metal Railings: Handrails and balusters other than specified in this
4. Section 09 90 00 - Painting and Coating: Paint finish.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.

B. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
5. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
6. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
7. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
8. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
9. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
10. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
11. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
12. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
13. ASTM F436 - Standard Specification for Hardened Steel Washers.
14. ASTM F844 - Standard Specification for Washers, Steel, Plain (Flat),Unhardened for General Use

15. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
16. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.

C. American Welding Society:
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
2. AWS D1.1 - Structural Welding Code - Steel.

D. California Department of Health Services:
1. CA/DHS/EHLB/R-174 - Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

E. Green Seal:
1. GC-3 - Environmental Criteria for Anti-Corrosive Paints.
2. GC-03[-2nd Edition, January 7, 1997] - Anti-Corrosive Paints.

F. National Association of Architectural Metal Manufacturers:
1. NAAMM AMP 510 - Metal Stairs Manual.
2. NAAMM MBG 531 - Metal Bar Grating Manual.

G. National Ornamental & Miscellaneous Metals Association:
1. NOMMA Guideline 1 - Joint Finishes.

H. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.
2. SSPC SP 1 - Solvent Cleaning.
3. SSPC SP 10 - Near-White Blast Cleaning.
4. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer.
5. SSPC Paint 20 - Zinc-Rich Coating, Type I - Inorganic and Type II - Organic.

1.3 DESIGN REQUIREMENTS

A. Fabricate stair assembly to support uniform live load of 100 lb/sq ft and concentrated load of 300 lb/sq ft with deflection of stringer or landing framing not to exceed 1/360 of span.

B. Railing assembly, wall rails, and attachments to resist lateral force of 75 lbs at any point without damage or permanent set.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Shop drawings shall be sealed by a professional engineer registered in the state of Alaska.

C. Shop Drawings: Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

D. Design Data: Submit design calculations sealed by a professional engineer registered in the state of Alaska.

E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM E985 - Permanent Metal Railing Systems and Rails for Buildings.

B. Finish joints in accordance with NOMMA Guideline 1.

1.6 QUALIFICATIONS

A. Prepare Shop Drawings and calculations under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Alaska.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Structural W-Shapes: ASTM A992/A992M.

B. Structural T-Shapes: Cut from structural W-shapes.

C. Channels and Angles: ASTM A36/A36M.

D. Round Hollow Structural Sections: ASTM A500/A500M, Grade B.

E. Square and Rectangular Hollow Structural Sections: ASTM A500/A500M, Grade B.

F. Structural Pipe: ASTM A53/A53M, Grade B.

G. Tubing: ASTM A513, Type 5, minimum 50 ksi yield strength.

H. Structural Plates: ASTM A36/A36M.

I. Floor Plates: ASTM A786/A786M; raised pattern.

J. Sheet Steel: ASTM A653/A653M, galvanized with coating class.

K. Tread and Landing Concrete Reinforcement: Bar type, unfinished.

L. Bolts: ASTM A307; Grade A.
   1. Finish: Unfinished.

M. Nuts: ASTM A563 heavy hex type.
   1. Finish: Unfinished.

N. Washers:
   1. For ASTM A307 Bolts: ASTM F844.
      a. Finish: Unfinished.

O. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; consistent with design of stair structure.

P. Welding Materials: AWS D1.1; type required for materials being welded.

Q. Shop Primer: SSPC Paint 15, Type 1, red oxide.

R. Touch-Up Primer: Match shop primer.

S. Stair Treads: concrete in metal pan; smooth surface; non-slip edge.

T. Concrete for Treads and Landings: Portland cement Type I, 3000 psi 28 day strength, 2 to 3 inch slump.

2.2 FABRICATION

A. Fit and shop assemble components in largest practical sections, for delivery to site.

B. Fabricate components with joints tightly fitted and secured.

C. Continuously seal joined pieces by continuous welds.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

F. Accurately form components required for anchorage of stairs, landings and railings to each other and to building structure.

2.3 FABRICATION - PAN STAIRS AND LANDINGS

A. Fabricate stairs and landings with closed risers and treads of metal pan construction, ready to receive concrete.

B. Form treads and risers with minimum 12 gage sheet steel stock.

C. Secure reinforced tread pans to stringers with clip angles; welded in place.

D. Form stringers with rolled steel channels, 12 inches deep.

E. Form landings with minimum 12 gage sheet stock. Reinforce underside with angles to attain design load requirements.

F. Form balusters with 1-1/2 inch diameter steel sections, welded to stringers.

2.4 SHOP FINISHING

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime paint items with two coats.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify field conditions are acceptable and are ready to receive work.

C. Verify concealed blocking and reinforcement is installed and correctly located to receive wall mounted handrails.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete with setting templates.

3.3 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Install anchors required for connecting stairs to structure.

C. Allow for erection loads. Install sufficient temporary bracing to maintain framing safe, plumb, and in alignment.

D. Field weld components indicated on shop drawings. Perform field welding in accordance with AWS D1.1.

E. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

F. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.

G. Obtain approval of Architect/Engineer prior to site cutting or creating adjustments not scheduled.

H. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.4 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

C. Maximum Offset From Alignment: 1/4 inch.

3.5 FIELD **QUALITY** CONTROL

A. Welding: Inspect welds in accordance with AWS D1.1.

3.6 SCHEDULES

A. Stairs A and B: Pan stairs and landings, plastic handrail cover, primed finish.

END OF SECTION

SECTION 05 52 13 - PIPE AND TUBE RAILINGS

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. Steel pipe and tube railings and handrails.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Railing brackets.
2. Grout.

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

C. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer registered in the State of Alaska, who is responsible for their preparation.

1.5 QUALITY ASSURANCE

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

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Railings and Guards:

   a. Uniform load of 50 lbf/ ft. applied in any direction.
   b. Concentrated load of 200 lbf applied in any direction.
   c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

   a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
   b. Infill load and other loads need not be assumed to act concurrently.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.3 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

D. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

E. Woven-Wire Mesh: Intermediate-crimp, square pattern, 2-inch woven-wire mesh, made from 0.134-inch-diameter wire complying with ASTM A 510.

2.4 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
3. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

1. 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.

2.5 MISCELLANEOUS MATERIALS

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

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

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

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

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

G. Connections: Fabricate railings with either welded or nonwelded connections.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. 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 flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

J. Form Changes in Direction as Follows:

1. By bending or by inserting prefabricated elbow fittings.

K. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of railing members with prefabricated end fittings.

M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

P. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

Q. Woven-Wire Mesh Infill Panels: Fabricate infill panels from woven-wire mesh crimped into 1-by-1/2-by-1/8-inch metal channel frames. Make wire mesh and frames from same metal as railings in which they are installed.

1. Orient wire mesh with wires horizontal and vertical.

R. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.7 STEEL AND IRON FINISHES

A. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

B. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with universal shop primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, wood, or dissimilar metals.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

A. Set metal angle recessed into concrete for smooth transition to top of concrete floor. Level with grout and fasten with recessed head anchor.

B. Cover anchorage joint with flange of same metal as post welded to angle..

C. Leave anchorage joint exposed with anchoring material flush with adjacent surface.

3.5 ATTACHING RAILINGS

A. Anchor railing ends at walls with round flanges anchored to wall construction.

B. Attach railings to wall with wall brackets. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets and railing end flanges to building construction as follows:

1. For steel-framed partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members or.

2. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

END OF SECTION

SECTION 05 75 00 - DECORATIVE FORMED METAL

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. Corner guards and end guards.

B. Related Requirements:

   1. Section 08 71 11 "Door Hardware" for metal protective trim units, according to BHMA A156.6, used for armor, kick, and mop plates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver decorative formed metal products wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.

B. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

   1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.

C. Store products on elevated platforms in a dry location.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls, columns, beams, and other construction contiguous with decorative formed metal by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 SHEET METAL

A. General: Provide sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections where exposed to view on finished units.

1. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, stretcher-leveled standard of flatness, 0.024 inch thick.

2.2 CORNER GUARD AND END GUARDS

A. Surface-Mounted, Metal Corner Guards: Fabricated as one piece from formed or extruded metal with formed edges; with 90- or custom degree turn to match wall condition.

1. Material: Stainless-steel sheet, Type 304.

a. Thickness: Minimum 0.075 inch.
b. Finish: Directional satin, No. 4.

2. Wing Size: Nominal 1-1/2 by 1-1/2 inches.
3. Length: 4’-0”
4. Corner Radius: 1/8 inch.
5. Mounting: Security head screws.

2.3 MISCELLANEOUS MATERIALS

A. Laminating Sealant: Structural silicone conforming to ASTM C 920, Type S, Grade NS, Class 25, Use NT and M, that will fully bond to metal and that will prevent telegraphing and oil canning and is compatible with substrate and noncombustible after curing.

1. VOC Content of Interior Adhesives: Adhesives and primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. Architectural Sealants: 250 g/L.

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. Dow Corning; 995 Silicone Structural Sealant.
b. Pecora; 890NTS.
c. Tremco; Spectrum 2.

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble decorative formed metal items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends.

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. Complete mechanical finishes of flat sheet metal surfaces before fabrication where possible. After fabrication, finish all joints, bends, abrasions, and other surface blemishes to match sheet finish.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.6 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.

C. Directional Satin Finish: No. 4.

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 decorative formed metal.

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

3.2 INSTALLATION

A. Locate and place decorative formed metal items level and plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install decorative formed metal.

1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

B. Adhere wall panels to substrate with laminating sealant.

C. Provide bead of epoxy sealant at edges.

3.3 ADJUSTING AND CLEANING

A. Clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

3.4 PROTECTION

A. Protect finishes of decorative formed metal items from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Wood blocking and nailers.
2. Wood furring.

B. Related Requirements:

1. Section 06 16 00 "Sheathing."
2. Section 06 20 13 "Exterior Finish Carpentry" for nonstructural carpentry items exposed to view and not specified in another Section.

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NLGA: National Lumber Grades Authority.
2. WCLIB: West Coast Lumber Inspection Bureau.
3. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Power-driven fasteners.
3. Powder-actuated fasteners.
4. Expansion anchors.
5. Metal framing anchors.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 25 percent.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC3b for exterior construction not in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat all miscellaneous carpentry.

2.3 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Furring.

B. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
2. Northern species, No. 2 Common grade; NLGA.
3. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

E. For furring strips for installing siding, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 FASTENERS

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

1. Provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Power-Driven Fasteners: NES NER-272.

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

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

2.5 MISCELLANEOUS MATERIALS

A. Flexible Flashing: See Section 07 25 00.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

D. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use copper naphthenate for items not continuously protected from liquid water.

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

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

3.2 WOOD SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, allow to dry to limits specified herein prior to installation.

END OF SECTION 06 10 53

SECTION 06 16 00 - SHEATHING

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 wall sheathing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
2. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For following products, from ICC-ES:

1. Fire-retardant-treated plywood.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

2.2 WOOD PANEL PRODUCTS

A. Plywood: DOC PS 1.

B. Thickness: As indicated on Drawings.

C. Factory mark panels to indicate compliance with applicable standard.

2.3 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

E. Application: Treat all plywood.

2.4 WALL SHEATHING

A. Plywood Wall Sheathing: Exterior sheathing.

1. Span Rating: Not less than 16/0.

2.5 FASTENERS

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

1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Power-Driven Fasteners: NES NER-272.

C. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

END OF SECTION

SECTION 06 20 13 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exterior wood trim.
2. Lumber siding.

B. Related Requirements:

1. Section 06 10 53 "Miscellaneous Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view and for framing exposed to view.

1.3 INFORMATIONAL SUBMITTALS

A. Compliance Certificates:

1. For lumber that is not marked with grade stamp.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1.5 FIELD CONDITIONS

A. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and the following grading rules:

1. NLGA: National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
2. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
3. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."

B. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

2.2 EXTERIOR TRIM

A. Lumber Trim for Semitransparent-Stained Finish:

1. Species and Grade: Western red cedar, Grade A; NLGA, WCLIB, or WWPA.
2. Maximum Moisture Content: 15 percent.
3. Finger Jointing: Not allowed.
4. Face Surface: Saw textured.

2.3 LUMBER SIDING

A. Provide kiln-dried lumber siding complying with DOC PS 20.

B. Species and Grade: Grade A western red cedar; NLGA, WCLIB, or WWPA.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.

1. For face-fastening siding, provide ringed-shank siding nails or hot-dip galvanized-steel siding nails.
2. For prefinished items, provide matching prefinished aluminum fasteners where face fastening is required.

B. Wood Filler: Plastic wood filler, sandable, approved for exterior application, color to match wood.

C. Flashing: Comply with requirements in Section 07620 "Sheet Metal Flashing and Trim" for flashing materials installed in exterior finish carpentry.

2.5 FABRICATION

A. Back out or kerf backs of standing and running trim wider than 5 inches, except members with ends exposed in finished work.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

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

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.

B. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut exterior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
3. Coordinate exterior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

A. Install flat-grain lumber with bark side exposed to weather.

B. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long except where necessary.

1. Use scarf joints for end-to-end joints.
2. Stagger end joints in adjacent and related members.

C. Fit exterior joints to exclude water. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.

D. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3.5 SIDING INSTALLATION

A. Vertical Lumber Siding: Nail at each furring strip.

1. Leave 1/8-inch gap at trim and corners unless otherwise recommended by manufacturer, and apply sealant.
2. Butt joints only over framing or blocking, nailing top and bottom on each side and staggering joints in subsequent courses.

B. Flashing: Install metal flashing as indicated on Drawings and as recommended by siding manufacturer.

C. Finish: Apply finish within two weeks of installation.

3.6 ADJUSTING

A. Replace exterior finish carpentry that is damaged or does not comply with requirements. Exterior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.7 CLEANING

A. Clean exterior finish carpentry on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.8 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 06 41 16 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

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. Plastic-laminate-faced architectural cabinets.

B. Related Requirements:

1. Section 09 22 16 “Non-Structural Metal Framing” for hanging strip reinforcement required for installing cabinets and concealed within other construction before cabinet installation.
2. Section 12 36 23 "Plastic-Laminate-Clad Countertops."
3. Section 12 36 61 “Simulated Stone Countertops.”

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products high-pressure decorative laminate adhesive for bonding plastic laminate and cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.

C. Samples for Color Verification:

1. Plastic laminates, 2 by 3 inch, for each color, pattern, and surface finish.

1.4 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. Installer Qualifications: Fabricator of products.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.

1. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

B. Grade: Custom, as modified in this specification.

C. Type of Construction: Frameless.

D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

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. Formica Corporation.
b. Panolam Industries International, Inc.
c. Wilsonart International; Div. of Premark International, Inc.

F. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Vertical Surfaces: Grade HGS.
3. Edges: PVC tape, 0.018-inch minimum thickness, matching laminate in color, pattern, and finish.

G. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.

a. Edges of Plastic-Laminate Shelves: PVC tape, 0.018-inch minimum thickness, matching laminate in color, pattern, and finish.
b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.

2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
3. Drawer Bottoms: Thermoset decorative panels.

H. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

J. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated on Drawings by laminate manufacturer's designations.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 8 to 13 percent.

B. Softwood Plywood: DOC PS 1.

2.3 CABINET HARDWARE AND ACCESSORIES

A. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening, self-closing.

B. Back-Mounted Pulls: BHMA A156.9, B02011.

C. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.

D. Shelf Rests: BHMA A156.9, B04013; plastic shelf rests with shelf hold-down clip and steel pins.

E. Drawer Slides: BHMA A156.9.

1. Grade 1: Side mounted; full-extension type; zinc-plated steel with polymer rollers.
2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
4. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.
5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.

F. Door Locks: BHMA A156.11, E07121.

G. Drawer Locks: BHMA A156.11, E07041.

H. Door and Drawer Silencers: BHMA A156.16, L03011.

I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

B. Adhesives: Do not use adhesives that contain urea formaldehyde.

C. Adhesive for Bonding Plastic Laminate: Contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive.

D. Cork: Natural sheet cork, fine-grain, premium grade natural composition cork complying with Military Specification MIL-C-15116, Type II.

2.5 FABRICATION

A. Fabricate cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

C. Verify electrical and building items affecting work are placed and ready to receive work.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.

C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing screws for exposed fastening, countersunk and filled flush with woodwork.

1. Use filler matching finish of items being installed.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

3.3 ADJUSTING AND CLEANING

A. Adjust for maximum offset of true alignment with different adjacent materials to 1/32 inch.

B. Adjust for true alignment of same materials to flush.

C. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

D. Clean, lubricate, and adjust hardware.

E. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION

SECTION 07 21 00 - 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. Foam-plastic board insulation.
2. Glass-fiber blanket insulation.
3. Vapor retarders.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

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

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

1.5 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.

1.6 DELIVERY, STORAGE, AND HANDLING

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

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.

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

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Molded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Type I, 10 psi.

2.2 GLASS-FIBER BLANKET INSULATION

A. 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.

2.3 VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

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

B. 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.

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

D. For preformed insulating units, 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.

E. Fill all joints greater than 1/4-inch with same material.

F. Do not compress insulation.

G. Fit insulation tightly on cavities and tightly to exterior side of mechanical and electrical services within plane of insulation.

3.3 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. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. 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. 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.

3.4 INSTALLATION OF VAPOR RETARDERS

A. Place vapor retarders on warm side of insulation. 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 and seal with sealant.

1. 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.
2. 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.

E. Extend vapor retarder tightly to full perimeter of window and door frames and other items interrupting plane of membrane. Tape seal penetrations.

3.5 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.

B. Prevent displacement of insulation during subsequent work.

END OF SECTION

SECTION 07 24 19 - WATER-DRAINAGE EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

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. EIFS-clad drainage-wall assemblies that are field applied over substrate.
2. Water-resistive barrier coatings.

B. Related Requirements:

1. Section 07 25 00 "Weather Barriers" for water-resistant building paper or building wrap and flexible flashings installed over sheathing behind mechanically fastened EIFS.

1.3 DEFINITIONS

A. Definitions in ASTM E 2110 apply to Work of this Section.

B. EIFS: Exterior insulation and finish system(s).

C. IBC: International Building Code.

1.4 ACTION SUBMITTALS

A. Product Data: For each EIFS component, trim, and accessory, including water-resistive barrier coatings.

B. Shop Drawings:

1. Include details for EIFS buildouts.

C. Samples for Verification: 8-inch-square panels for each type of finish-coat color and texture indicated, prepared using same tools and techniques intended for actual work.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates: Signed by EIFS manufacturer, certifying the following:

1. EIFS complies with requirements.
2. Substrates to which EIFS is indicated to be attached are acceptable to EIFS manufacturer.
3. Accessory products installed with EIFS, including joint sealants, flashing, water-resistive barrier coatings, trim, whether or not furnished by EIFS manufacturer and whether or not specified in this Section, are acceptable to EIFS manufacturer.

B. Field quality-control reports.

C. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For EIFS to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An installer who is certified in writing by product manufacturer as qualified to install Class PB EIFS using trained workers.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.

B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.

1. Stack insulation board flat and off the ground.
2. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

1. Proceed with installation of adhesives or coatings only when ambient temperatures have remained, or are forecast to remain, above 40 deg F for a minimum of 24 hours before, during, and after application. Do not apply EIFS adhesives or coatings during rainfall.

1.10 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of EIFS-clad drainage-wall assemblies that fail in materials or workmanship within specified warranty period.

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

   a. Bond integrity and weathertightness.
   b. Deterioration of EIFS finishes and other EIFS materials beyond normal weathering.

2. Warranty coverage includes the following components of EIFS-clad drainage-wall assemblies:

   a. EIFS finish, including base coats, finish coats, and reinforcing mesh.
   b. Insulation installed as part of EIFS.
   c. Insulation mechanical fasteners.
   d. EIFS accessories, including trim components and flashing.
   e. Water-resistive barrier coatings.
   f. EIFS drainage components.

3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with EIFS components.

2.2 PERFORMANCE REQUIREMENTS

A. EIFS Performance: Comply with ASTM E 2568 and with the following:

1. Weathertightness: Resistant to uncontrolled water penetration from exterior, with a means to drain water entering EIFS to the exterior.

2. Impact Performance: ASTM E 2568,High impact resistance.
3. Abrasion Resistance of Finish Coat: Sample consisting of 1-inch-thick EIFS mounted on 1/2-inch-thick gypsum board; cured for a minimum of 28 days and shows no cracking, checking, or loss of film integrity after exposure to 528 quarts of sand when tested according to ASTM D 968, Method A.
4. Mildew Resistance of Finish Coat: Sample applied to 2-by-2-inch clean glass substrate; cured for 28 days and shows no growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274.
5. Drainage Efficiency: 90 percent average minimum when tested according to ASTM E 2273.

2.3 EIFS MATERIALS

A. Water-Resistive Barrier Coating: EIFS manufacturer's standard formulation and accessories for use as water-resistive barrier coating; compatible with substrate.

1. Water-Resistance: Comply with physical and performance criteria of ASTM E 2570/E 2570M.

B. Molded, (Expanded) Rigid Cellular Polystyrene Board Insulation: Comply with ASTM E 2430/E 2430M, unless otherwise noted, and the following:

1. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, according to ASTM E 84.
2. Dimensions: Provide insulation boards of not more than 24 by 48 inches, with thickness indicated on Drawings.
3. Channeled Board Insulation: EIFS manufacturer's standard factory-fabricated profile with linear, vertical-drainage channels, slots, or waves on the back side of board.

C. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. according to ASTM E 2098/E 2098M and the following:

1. Reinforcing Mesh for EIFS, General: Not less than weight required to comply with impact-performance level specified in "Performance Requirements" Article.
2. Strip-Reinforcing Mesh: Not less than 11.0 oz./sq. yd. minimum.
3. Detail-Reinforcing Mesh: Not less than 11.0 oz./sq. yd. minimum.
4. Corner-Reinforcing Mesh: Not less than 11.0 oz./sq. yd. minimum.

D. Base Coat: EIFS manufacturer's standard mixture complying with one of the following:

1. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
2. Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at Project site.

E. Mechanical Fasteners: EIFS manufacturer's standard corrosion-resistant fasteners, consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; designed to resist Project's design loads; capable of pulling fastener head below surface of insulation board; and complying with the following:

1. For attachment to wood framing members and plywood sheathing, provide steel drill screws complying with ASTM C 1002, Type W.

F. Finish Coat: EIFS manufacturer's standard acrylic-based coating complying with the following:

1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.
2. Colors: As selected by Department from manufacturer's full range.
3. Textures: Light sand finish.

G. Water: Potable.

H. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784, manufacturer's standard cell class for use intended, and ASTM C 1063.

1. Casing Bead: Prefabricated, one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
2. Drip Screed/Track: Prefabricated, one-piece type for attachment behind insulation with face leg extended to form a drip, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
3. Weep Screed/Track: Prefabricated, one-piece type for attachment behind insulation with perforated face leg extended to form a drip and weep holes in track bottom, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg; designed to drain incidental moisture that gets into wall construction to the exterior at terminations of EIFS with drainage.
4. Expansion Joint: Closed-cell polyethylene backer rod and elastomeric sealant 3/4-inch-minimum.

2.4 MIXING

A. Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials, except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

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 wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where EIFS will be installed.

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

1. Begin coating application only after surfaces are dry.
2. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.

B. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind drainage plane of EIFS and deterioration of substrates.

3.3 EIFS INSTALLATION, GENERAL

A. Comply with ASTM C 1397, ASTM E 2511, and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.

3.4 SUBSTRATE PROTECTION APPLICATION

A. Install weather barrier over cedar board siding. Install trims to expel penetrating water.

3.5 TRIM INSTALLATION

A. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, door openings, and other penetrations. Coordinate with installation of insulation.

1. Weep Screed/Track: Use at bottom termination edges, at door heads of water-drainage EIFS.
2. Expansion Joint: Use where indicated on Drawings.
3. Casing Bead: Use at other locations.

3.6 INSULATION INSTALLATION

A. Board Insulation: Mechanically attach insulation to substrate in compliance with ASTM C 1397 and the following:

1. Mechanically attach insulation to substrate. Install top surface of fastener heads flush with plane of insulation. Install fasteners into or through substrates with the following minimum penetration:

    a. Wood Framing: 1 inch.

2. Apply insulation over substrates in courses with long edges of boards oriented horizontally.
3. Begin first course of insulation from screed/track and work upward. Work from perimeter casing beads toward interior of panels if possible.
4. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints, so no piece of insulation is less than 12 inches wide or 6 inches high. Offset joints not less than 6 inches from corners of window and door openings and not less than 4 inches from aesthetic reveals.

    a. Mechanical Attachment: Offset joints of insulation from horizontal joints in sheathing.

5. Apply channeled insulation, with drainage channels aligned vertically.
6. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than 1/16 inch occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
7. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
8. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/16 inch from surface of insulation and to remove yellowed areas due to sun

exposure; do not create depressions deeper than 1/16 inch. Prevent airborne dispersal and immediately collect insulation raspings or sandings.

9. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at aesthetic reveals to less than 3/4 inch.
10. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
11. Form joints for sealant application with back-to-back casing beads for joints within EIFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.
12. Before installing insulation and before applying field-applied reinforcing mesh, fully wrap board edges. Cover edges of board and extend encapsulating mesh not less than 2-1/2 inches over front and back face unless otherwise indicated on Drawings.
13. Treat exposed edges of insulation as follows:

    a. Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
    b. Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.
    c. At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.

14. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and water-resistive barrier coating.

3.7 BASE-COAT APPLICATION

A. Base Coat: Apply full coverage to exposed insulation with not less than 1/16-inch dry-coat thickness.

B. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.

C. Additional Reinforcing Mesh: Apply strip-reinforcing mesh around openings, extending 4 inches beyond perimeter. Apply additional 9-by-12-inch strip-reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch-wide, strip-reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches on each side of corners.

1. At aesthetic reveals, apply strip-reinforcing mesh not less than 8 inches wide.
2. Embed strip-reinforcing mesh in base coat before applying first layer of reinforcing mesh.

3.8 FINISH-COAT APPLICATION

A. Finish Coat: Apply full-thickness coverage over dry base coat, maintaining a wet edge at all times for uniform appearance, to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.

1. Embed aggregate in finish coat to produce a uniform applied-aggregate finish of color and texture matching approved sample.

3.9 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Water-resistive barrier coatings applied over sheathing.

B. Testing Agency: Engage a manufacturer's representative to inspect final application.

C. EIFS will be considered defective if it does not pass inspections.

D. Prepare test and inspection reports.

3.10 CLEANING AND PROTECTION

A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

END OF SECTION

SECTION 07 25 00 - WEATHER BARRIERS

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. Building paper.
2. Flexible flashing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.

2.2 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.040 inch.

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. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Butyl Self Adhered Flashing.
b. Raven Industries Inc.; Fortress Flashshield.
c. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.

d. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor V40 Self-Adhered Flashing.

B. Nails and Staples: ASTM F 1667.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after furring and insulation is installed.

B. Building Paper: Apply horizontally with a 2-inch overlap and a 6-inch end lap; fasten to sheathing with galvanized staples or roofing nails.

3.2 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over water-resistive barrier at bottom and sides of openings.
4. Lap water-resistive barrier over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION

SECTION 07 31 13 - ASPHALT SHINGLES

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. Asphalt shingles.
2. Underlayment.

1.3 DEFINITION

A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing Manual" for definitions of terms related to roofing work in this Section.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For each type of asphalt shingle indicated.

1. Include similar Samples of accessories involving color selection.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of asphalt shingle and underlayment product indicated, for tests performed by manufacturer and witnessed by a qualified testing agency.

B. Evaluation Reports: For self-adhering sheet underlayment, from ICC-ES or other testing and inspecting agency acceptable to authorities having jurisdiction, indicating that product is suitable for intended use under applicable building codes.

C. Sample Warranty: For manufacturer's warranty.

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. Asphalt Shingles: 200 sq. ft. of each type, in unbroken bundles.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Perform work in accordance with NRCA Waterproofing Manual.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture according to manufacturer's written instructions.

B. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.

C. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

D. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.

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

a. Manufacturing defects.

2. Material Warranty Period: 40 years from date of Substantial Completion.
3.
4. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to 110 mph for years from date of Substantial Completion.
5. Algae-Resistance Warranty Period: Asphalt shingles will not discolor for 20 years from date of Substantial Completion.

B. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of asphalt-shingle roofing that fail in materials or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance according to ASTM E 108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

A. Laminated-Strip, SBS-Modified Asphalt Shingles: ASTM D 3462/D 3462M, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing; complying with UL 2218, Class 4.

1. Butt Edge: Straight cut.
2. Strip Size: Manufacturer's standard.
3. Algae Resistance: Granules resist algae discoloration.
4. Weight: 270 lbs./square minimum.
5. Color and Blends: As indicated by manufacturer's designations.

B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970/D 1970M, minimum of 55-mil- thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release backing; cold applied.

2.4 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch-diameter, sharp-pointed, with a minimum 3/8-inch-diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.

1. Shank: Smooth.
2. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

C. Synthetic-Underlayment Fasteners: As recommended in writing by synthetic-underlayment manufacturer for application indicated.

D. Preformed Vent Flashing: preformed EPDM boot on a galvanized steel base sheet.

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.

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provisions have been made for flashings and penetrations through asphalt shingles.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 UNDERLAYMENT INSTALLATION

A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

B. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install lapped in direction that sheds water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days. Cover entire roof deck.

3.3 ASPHALT-SHINGLE INSTALLATION

A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."

B. Install starter strip along lowest roof edge, consisting of an asphalt-shingle strip with tabs removed with self-sealing strip face up at roof edge.

1. Extend asphalt shingles 3/4 inch over fasciae at eaves and rakes.
2. Install starter strip along rake edge.

C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

D. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

E. Fasten asphalt-shingle strips with a minimum of six roofing nails located according to manufacturer's written instructions.

F. Woven Valleys: Extend succeeding asphalt-shingle courses from both sides of valley 12 inches beyond center of valley, weaving intersecting shingle-strip courses over each other. Use one-piece shingle strips without joints in valley.

G. Hip and Ridge Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.

1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

3.4 ROOFING INSTALLER'S WARRANTY

A. WHEREAS <**Insert name**> of <**Insert address**>, herein called the "Roofing Installer," has performed roofing and associated work ("the work") on the following project:

1. Owner: <**Insert name of Department**>.
2. Address: <**Insert address**>.
3. Building Name/Type: <**Insert information**>.
4. Address: <**Insert address**>.
5. Area of the Work: <**Insert information**>.
6. Acceptance Date: <**Insert date**>.
7. Warranty Period: <**Insert time**>.
8. Expiration Date: <**Insert date**>.

B. AND WHEREAS Roofing Installer has contracted (either directly with Department or indirectly as a subcontractor) to warrant the work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of the work as are necessary to correct faulty and defective work and as are necessary to maintain the work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to the work and other parts of the building, and to building contents, caused by:

a. Lightning;
b. Peak gust wind speed exceeding <**Insert wind speed**> mph;
c. Fire;
d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
f. Vapor condensation on bottom of roofing; and

g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Department.

2. When the work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Department or by another responsible party so designated.
3. Roofing Installer is responsible for damage to the work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of the work.
4. During Warranty Period, if Department allows alteration of the work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of the alterations, but only to the extent the alterations affect the work covered by this Warranty. If Department engages Roofing Installer to perform the alterations, Warranty shall not become null and void unless Roofing Installer, before starting the alterations, notified Department in writing, showing reasonable cause for claim, that the alterations would likely damage or deteriorate the work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a use or service more severe than originally specified, this Warranty shall become null and void on date of the change, but only to the extent the change affects the work covered by this Warranty.
6. Department shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect the work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on the work and shall not operate to restrict or cut off Department from other remedies and resources lawfully available to Department in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of the work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Department or a subcontract with Department's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <**Insert day**> day of <**Insert month**>, <**Insert year**>.

1. Authorized Signature: <**Insert signature**>.
2. Name: <**Insert name**>.
3. Title: <**Insert title**>.

END OF SECTION

SECTION 07 53 23 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

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. New flashings through existing adhered ethylene-propylene-diene-monomer (EPDM) roofing system.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roofing system. Include details, and attachments to other work, including:

1. Base flashings and membrane terminations.

1.5 INFORMATIONAL SUBMITTALS

A. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install specified roofing system and system is eligible to receive the standard roofing manufacturer’s warranty.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

B. Perform work in accordance with NRCA Roofing Manual.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. Do not apply roofing membrane during unsuitable weather.

C. Do not apply roofing membrane when ambient temperature is below 40 degrees F.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

E. Do not expose material vulnerable to water or sun damage in quantities greater than can be weather-proofed in one day.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain components for roofing system from manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.

1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

2.3 EPDM ROOFING

A. EPDM: ASTM D 4637, Type I, nonreinforced, uniform, flexible EPDM sheet.

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. Carlisle SynTec Incorporated.
   b. Firestone Building Products.

2. Thickness: 60 mils, nominal.
3. Exposed Face Color: Black.

2.4 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.

B. Sheet Flashing: 60-mil-thick EPDM, partially cured or cured, according to application.

C. Bonding Adhesive: Manufacturer's standard.

D. Seaming Material: Manufacturer's standard, synthetic-rubber polymer primer and 3-inch-wide minimum, butyl splice tape with release film.

E. Lap Sealant: Manufacturer's standard, single-component sealant.

F. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:

1. Verify that roof openings and penetrations are in place and curbs are set and braced.

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

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

3.3 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

E. Turn membrane over top of curbs. Secure flashing to exterior face of curb at 8-inches on center.

END OF SECTION

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

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. Formed wall sheet metal fabrications.

B. Related Requirements:

1. Section 06 10 53 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Include identification of material, thickness, weight, and finish for each item and location in Project.
3. Include details for forming, including profiles, shapes, seams, and dimensions.
4. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
5. Include details of special conditions.
6. Include details of connections to adjoining work.
7. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches.

C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

C. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

D. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.7 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations 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.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Metallic-Coated Steel Sheet: Provide aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating process to comply with ASTM A 755/A 755M.

1. Surface: Smooth, flat.
2. Exposed Coil-Coated Finish:

    a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

3. Color: Medium Bronze.
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil

2.3 UNDERLAYMENT MATERIALS

A. Flexible Flashing as specified in Section 07 25 00 “Weather Barriers”.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.

1. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view unless specifically detailed.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8 inch offset of adjoining faces and of alignment of matching profiles.

C. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed 1/2 inch to form drip. Miter and seam corners.

D. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Fabricate door and window flashings for bayonet-type lapping joints.

E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal, but not less than one gage heavier thickness of metal being secured.

G. Do not use graphite pencils to mark metal surfaces.

2.6 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Verify roofing terminations and base flashings are in place, sealed, and secured.

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

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
4. Torch cutting or abrasive wheel cutting of sheet metal flashing and trim is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of ends, corners or intersections. Provide joints lapped 6-inches with two rows of sealant in the joint.

D. Fasteners: Use fastener sizes that penetrate wood blocking not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg. F set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg. F
2. Prepare joints and apply sealants to comply with requirements in Section 07920 "Joint Sealants."

3.3 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend blind leg 4 inches beyond wall openings.

3.4 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inchoffset of adjoining faces and of alignment of matching profiles.

3.5 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean off excess sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 84 13 - 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.

1.3 ACTION 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. 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.

1.4 QUALITY ASSURANCE

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

1. 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 one of 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."

1.5 PROJECT CONDITIONS

A. 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 Department'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. Specified Technologies Inc.
5. 3M Fire Protection Products.
6. Tremco, Inc.; Tremco Fire Protection Systems Group.

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.

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

C. 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.

D. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

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

E. 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. Fillers for sealants.

2. Substrate primers.
3. Collars.
4. Steel sleeves.

2.3 FILL MATERIALS

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

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

1. Grade: Nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

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 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. Department 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.

3.7 PENETRATION FIRESTOPPING SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Where Intertek ETL SEMKO-listed systems are indicated, they refer to design numbers in Intertek ETL SEMKO's "Directory of Listed Building Products" under "Firestop Systems."

C. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."

D. Firestopping with No Penetrating Items:

1. UL-Classified Systems: W-J- 0001-0999.
2. F-Rating: 2 hours.
3. Type of Fill Materials: Latex or silicone sealant.

E. Firestopping for Metallic Pipes, Conduit, or Tubing:

1. UL-Classified Systems: W-J- 1001-1999.
2. F-Rating: 2 hours.
3. Type of Fill Materials: Latex or silicone sealant.

F. Firestopping for Insulated Pipes:

1. UL-Classified Systems: W-J- 5001-5999.
2. F-Rating: 2 hours.
3. Type of Fill Materials: Latex or silicone sealant.

G. Firestopping for Miscellaneous Electrical Penetrants:

1. UL-Classified Systems: W-J- 6001-6999.
2. F-Rating: 2 hours.
3. Type of Fill Materials: Latex or silicone sealant.

H. Firestopping for Miscellaneous Mechanical Penetrants:

1. UL-Classified Systems: W-J- 7001-7999.
2. F-Rating: 2 hours.
3. Type of Fill Materials: Latex or silicone sealant.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Urethane joint sealants.
2. Mildew-resistant joint sealants.
3. Butyl joint sealants.
4. Epoxy joint sealants.

A. Related Sections:

1. Section 08 88 53 “Security Glazing” for glazing sealants.

1.3 ACTION SUBMITTALS

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

B. Samples for color Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer’s Installation Instructions: Indicate special procedures, surface preparations, and perimeter conditions requiring special attention.

B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

C. Field-Adhesion-Test Reports: For each sealant application tested.

D. Sample Warranties: For special warranties.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 FIELD CONDITIONS

A. 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 or are below 40 deg F.

2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

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

1. Warranty Period: 1 year from date of Substantial Completion for epoxy sealants

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

1. Warranty Period: One year from date of Substantial Completion.

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

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from 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 JOINT SEALANTS, 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 joint-sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Department from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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. BASF Construction Chemicals, LLC, Building Systems; Sonalastic Sonolastic NP1.
    b. Pecora Corporation; Dynatrol I-XL.
    c. Sika Corporation U.S.; Sikaflex Textured Sealant.
    d. Tremco Incorporated; Dymonic.

2. Applications: Applications as follows:

    a. Exterior metal to concrete joints not in the Open Recreation Yard.
    b. Exterior window frame perimeter joints.

2.3 MILDEW-RESISTANT JOINT SEALANTS

A. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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; 786-M White.
    b. GE Construction Sealants; SCS1700 Sanitary.
    c. Tremco Incorporated; Tremsil 200.

2. Applications: Applications as follows:

    a. Plastic laminate to wall joints in Medical Storage/Dispensary 29, Control 31, and Nurse Station 41.
    b. Plumbing fixtures to wall joints in Staff Toilet 28.

2.4 BUTYL JOINT SEALANTS

A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.

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. Bostik, Inc.; Chem-Calk 300.
    b. Pecora Corporation; BC-158.
    c. Tremco Incorporated; Tremco Butyl Sealant

2. Applications: Applications as follows:

    a. Concealed exterior metal to metal joints.

2.5 EPOXY JOINT SEALANTS

A. Multicomponent, Nonsag, Epoxy Joint Sealant: ASTM C 881, Type I and III, Grade 3, Classes B and 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. Pecora Corporation; DynaPoxy
    b. Sika Corporation; Sikadur 51 NS.

2. Applications: Applications as follows:

    a. All interior joints and EIFS joints..

2.6 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) for exterior applications and Type O (open-cell material) for interior applications, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. 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. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming 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 performance of the Work.

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, 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.

3. Clean nonporous joint substrate 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. Plastic laminate.
    d. Fiberglass reinforced panels.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by 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 or primer 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. Do not use solvent curing sealants in enclosed, occupied spaces.

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

D. Install sealant backings of kind 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. Oversize backing 30 to 50 percent of joint width.
2. Do not leave gaps between ends of sealant backings.
3. Do not stretch, twist, puncture, or tear sealant backings.
4. 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 in subparagraphs 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 profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

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

3.4 FIELD QUALITY CONTROL

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

1. Extent of Testing: Test completed and cured sealant joints as follows:

    a. Perform 5 tests at locations selected by Department.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

    a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following:

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

4. 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 material, sealant configuration, and sealant dimensions.
5. 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-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

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.

B. Repair or replace defaced or disfigured finishes caused by work of this Section.

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, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

SECTION 08 11 13 - 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 hollow-metal work.

B. Related Requirements:

1. Section 08 11 19 "Stainless-Steel Doors and Frames" for hollow-metal doors and frames manufactured from stainless steel.
2. Section 08 34 63 "Detention Doors and Frames" for hollow-metal doors and frames for detention facilities.
3. Section 08 71 11 "Door Hardware" for door hardware for hollow-metal doors.
4. Section 08 88 53 “Security Glazing”

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, and finishes.

B. Shop Drawings: Include the following:

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

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

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

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

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

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. Amweld International, LLC.
2. Curries Company; an Assa Abloy Group company.
3. Republic Doors and Frames.
4. Steelcraft; an Ingersoll-Rand company.

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

2.2 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Maximum-Duty Doors and Frames: SDI A250.8, Level 4. At interior locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches

c. Face: Uncoated, and metallic-coated as scheduled, cold-rolled steel sheet, minimum thickness of 0.067 inch.
d. Edge Construction: Model 1, Full Flush.
e. Core: Vertical steel-stiffener core.

3. Frames:

a. Materials: Uncoated or metallic-coated as scheduled, steel sheet, minimum thickness of 0.067 inch.
b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.3 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Maximum-Duty Doors and Frames: SDI A250.8, Level 4. At exterior locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches
c. Face: Metallic-coated steel sheet, minimum thickness of 0.067 inch, with minimum A40 coating.
d. Edge Construction: Model 1, Full Flush.
e. Core: Polyurethane.

1) Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.38 deg Btu/F x h x sq. ft. when tested according to ASTM C518.

3. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch, with minimum A40 coating.
b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

2. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.5 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.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

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

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

F. Power-Actuated Fasteners in Concrete: 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. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

H. Glazing: Comply with requirements in Section 08885 "Security Glazing."

2.6 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 metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.

2. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
3. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.
4. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
5. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

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

1. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
3. Factory apply rated labels to fire rated door and frame units.
4. Provide countersunk, flat- or oval-head exposed screws and bolts with security heads for exposed fasteners.
5. Grout Guards: Weld guards to frame at back of hardware mortises in all frames.
6. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
7. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. 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) Four anchors per jamb from 60 to 90 inches high.

    b. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

8. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
9. Door Silencers: Except on weather-stripped frames, 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 four door silencers.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Provide fixed frame moldings on inside of exterior and on secure side of interior doors and frames.
2. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.8 ACCESSORIES

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

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. 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. 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 SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    b. Install frames with removable stops for glazing.
    c. Fill frames with mineral-fiber insulation where indicated on Drawings.
    d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
5. 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 Steel Doors:

    a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
    c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
    d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

D. Glazing: Comply with installation requirements in Section 08 88 53 "Security Glazing" and with hollow-metal manufacturer's written instructions.

E. Apply glazing stops on the secure side of windows.

1. Secure stops with countersunk flat- or oval-head machine security 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. Adjust doors for smooth and balanced door movement.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

SECTION 08 11 19 - STAINLESS-STEEL 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. Stainless-steel, hollow-metal doors.
2. Stainless-steel, hollow-metal frames.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, 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 infills.

C. Schedule: Provide a schedule of stainless-steel, 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 a door hardware schedule.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain stainless-steel, hollow-metal work from single source from single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

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

B. Shipping Spreaders: Deliver welded frames with two removable spreader bars across bottom of frames, tack welded or mechanically attached to jambs and mullions.

C. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch-high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.

1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 STAINLESS-STEEL DOORS AND FRAMES

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. CURRIES Company; an ASSA ABLOY Group company.
2. Security Metal Products Corporation.
3. Stainless Doors, Incorporated.
4. Steelcraft; an Ingersoll-Rand company.

2.2 STAINLESS-STEEL DOORS

A. Description: Stainless-steel doors, not less than 1-3/4 inches thick, of seamless, hollow-metal construction. Construct doors with smooth, flush surfaces without visible joints or seams on faces.

1. Face Sheets: Fabricate from0.078-inch- thick, stainless-steel sheet.
2. Core Construction: Fabricate doors with core indicated.

a. Laminated Core: foam-plastic insulation fastened to face sheets with waterproof adhesive.

3. Vertical Edges for Single-Acting Doors: Beveled 1/8 inch in 2 inches.
4. Moldings for Infills in Doors: 0.038-inch-thick stainless steel.
5. Loose Stops for Infills in Doors: 0.038-inch-thick stainless steel.
6. Top and Bottom Channels: Closed with continuous channels, 0.062-inch-thick stainless steel.

a. Spot welded to both face sheets.

7. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 866 with reinforcing plates from stainless steel.

B. Performance: Level A, ANSI A250.4.

C. Materials:

1. Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, Type 304.

2. Foam-Plastic Insulation: Manufacturer's standard polystyrene board insulation with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within door.

D. Stainless-Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

    a. Run grain of directional finishes with long dimension of each piece.
    b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
    c. Directional Satin Finish: No. 4.

2.3 STAINLESS-STEEL FRAMES

A. Description: Fabricate stainless-steel frames of construction indicated, with faces of corners mitered and contact edges closed tight.

1. Door Frames: Machine mitered and full welded.

    a. Weld frames according to HMMA 820.

2. Door Frames for Openings 48 Inches Wide or Less: Fabricate from 0.062-inch- thick, stainless-steel sheet.
3. Infill Stops: Formed integral with stainless-steel frames, minimum 5/8 inch high, unless otherwise indicated.
4. Loose Stops for Infills: 0.038-inch-thick stainless steel.
5. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 866 with reinforcing plates from stainless steel.
6. Jamb Anchors:

    a. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.050-inch-thick stainless steel.

7. Floor Anchors: Not less than 0.078-inch-thick stainless steel, and as follows:

    a. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

8. Plaster Guards: Not less than 0.019-inch-thick stainless steel.

B. Performance: Level A, ANSI A250.4.

C. Materials:

1. Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, Type 304.
2. Frame Anchors: Stainless-steel sheet. Same type as door face.
3. Inserts, Bolts, and Anchor Fasteners: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 for bolts and nuts.

D. Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

    a. Run grain of directional finishes with long dimension of each piece.
    b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
    c. Directional Satin Finish: No. 4.

2.4 ACCESSORIES

A. Infill Panels: Stainless steel wire cloth, 2-inch openings with 0.250-inch diameter wires, trimmed edges.

B. Mineral Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers.

2.5 FABRICATION

A. Stainless-Steel Door Fabrication: Stainless-steel doors 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.

1. Seamless Edge Construction: Door face sheets joined at vertical edges by continuous weld extending full height of door; with edges ground and polished, providing smooth, flush surfaces with no visible seams.
2. Stops and Moldings: Factory cut openings in doors. Provide stops and moldings around infills. Form corners of stops and moldings with butted or mitered hairline joints. Drill stops to weep.

    a. Infills: Provide fixed stops and moldings welded on shower side of door.
    b. Coordinate rabbet width between fixed and removable stops with infill and type of installation indicated.

3. Hardware Preparation: Factory prepare stainless-steel doors to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Section 08711 "Door Hardware."

    a. Reinforce doors to receive nontemplated mortised and surface-mounted door hardware.

4. Locate hardware as indicated, or if not indicated, according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."
5. Tolerances: Fabricate doors to tolerances indicated in ANSI/NAAMM-HMMA 866.

B. Stainless-Steel Frame Fabrication: Fabricate stainless-steel frames 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.

1. Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated from same thickness metal as frames.
2. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
3. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. 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) Four anchors per jamb from 60 to 90 inches in height.

4. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

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

5. Hardware Preparation: Factory prepare stainless-steel frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Section 08711."

    a. Reinforce frames to receive nontemplated mortised and surface-mounted door hardware.
    b. Locate hardware as indicated, or if not indicated, according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."

6. Plaster Guards: Weld guards to frame at back of hardware mortises and mounting holes in frames to be grouted.
7. Tolerances: Fabricate frames to tolerances indicated in ANSI/NAAMM-HMMA 866.

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 stainless-steel doors and frames.

B. 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 and with installation spreaders in place, adjust and securely brace stainless-steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, 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 stainless-steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with ANSI/NAAMM-HMMA 866 and manufacturer's written instructions.

B. Stainless-Steel Frames: Install stainless-steel frames of size and profile indicated.

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. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    b. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors, if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Installation Tolerances: Adjust stainless-steel 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. Stainless-Steel Doors: Fit non-fire-rated doors accurately in frames with the following clearances:

1. Non-Fire-Rated Doors:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
b. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

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 stainless-steel doors or frames that are warped, bowed, or otherwise unacceptable.

B. Stainless-Steel Touchup: Immediately after erection, smooth any abraded areas of stainless steel and polish to match undamaged finish.

END OF SECTION

SECTION 08 14 16 - 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. Five-ply flush wood veneer-faced doors for transparent finish.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Factory-machining criteria.
5. Factory- finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Dimensions and locations of blocking for hardware attachment.
4. Dimensions and locations of mortises and holes for hardware.
5. Clearances and undercuts.
6. Requirements for veneer matching.
7. Doors to be factory finished and application requirements.
8. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, 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.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Special warranties.

1.6 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. Do not store doors in damp or wet areas or in areas where sun may bleach veneers. Break seal on site to permit ventilation. Seal top and bottom of doors with tinted sealer.

D. Mark each door on bottom rail with opening number used on Shop Drawings.

1.7 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 temperature and relative humidity at levels designed for building occupants for the remainder of construction period.

B. Environmental Limitations: Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, 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.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

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

    a. Delamination of veneer.
    b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
    c. 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.

PART 2 - PRODUCTS

2.1 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Provide labels from AWI certification program indicating that doors comply with requirements of grades specified.

2.2 SOLID-CORE FIVE-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Doors:

1. Performance Grade: ANSI/WDMA I.S. 1AHeavy Duty .

2. Architectural Woodwork Standards Grade: Custom.
3. Faces: Single-ply wood veneer not less than 1/50 inch thick.

a. Species: Red oak.
b. Cut: Plain sliced (flat sliced).
c. Match between Veneer Leaves: Book match.
d. Assembly of Veneer Leaves on Door Faces: Center-balance match.

4. Exposed Vertical Edges: Same species as faces or a compatible species - Architectural Woodwork Standards edge Type A

5. Core for Non-Fire-Rated Doors:

a. ANSI A208.1, Grade LD-1 particleboard.

1) Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

6. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.
7. Thickness: 1-3/4 inch unless noted otherwise.
8. Adhesives: Type I in accordance with WDMA T.M. 6.

2.3 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated.

1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

B. Factory machine doors for hardware that is not surface applied.

1. Locate hardware to comply with DHI-WDHS-3.

2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.

2.4 FACTORY FINISHING

A. Comply with referenced quality standard for factory finishing.

1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
2. Finish faces, all four edges, edges of cutouts, and mortises.
3. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Transparent Finish:

1. Architectural Woodwork Standards Grade: Custom.
2. Finish: ANSI/WDMA I.S. 1A TR-6 Catalyzed Polyurethane.
3. Staining: None required.
4. Effect: Open-grain finish.
5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Section 08 71 11 "Door Hardware."

B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 FIELD QUALITY CONTROL

A. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

B. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

3.4 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

SECTION 08 31 13 - DETENTION 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 detention access doors and frames for walls and ceilings.

B. Related Requirements:

1. Section 08 71 11 “Door Hardware” for cylinders.
2. Division 23 for heating and air-conditioning duct access doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details 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.

PART 2 - PRODUCTS

2.1 DETENTION ACCESS DOORS AND FRAMES

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. Babcock-Davis.
2. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
3. Larsen's Manufacturing Company.

B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

C. High-Security Detention Flush Access Doors (DAD):

1. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
2. Locations: Wall and ceiling.
3. Door Size: As indicated on Drawings.
4. Uncoated Steel Sheet for Door: Nominal 0.134 inch, 10 gage.

    a. Finish: Factory prime.

5. Frame Material: Same material, thickness, and finish as door, minimum 3/16-by-2-by-2-inch angle welded with joints ground smooth; factory prime.
6. Hinges: Manufacturer's standard security hinge.
7. Hardware: Tamper-resistant lock.

D. Hardware:

1. Lock Preparation: Prepare door panel to accept cylinder described in Section 08 71 11 "Door Hardware" and scheduled in Section 08 71 63 “Detention Door Hardware”

2.2 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. 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.

C. Frame Anchors: Same type as door face.

D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 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 framing.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

2.4 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.

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

SECTION 08 34 63 - DETENTION 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. Swinging detention doors.
2. Sliding detention doors.
3. Detention panels.
4. Detention frames.

B. Related Requirements:

1. Section 08 71 63 "Detention Door Hardware" for door hardware for detention doors.
2. Section 08 88 53 “Security Glazing”.

1.3 DEFINITIONS

A. Minimum-Thickness Steel: Indicated as the specified minimum thicknesses for base metal without coatings, according to NAAMM-HMMA 803.

B. Nominal-Thickness Stainless Steel: Indicated as the specified thicknesses for which over- and under-thickness tolerances apply, according to ASTM A 480/A 480M.

1.4 COORDINATION

A. Coordinate anchorage installation for detention frames. Furnish setting drawings, templates, and directions for installing anchorages, including anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, label compliance, and finishes for each detention door and frame type specified.

B. Shop Drawings: In addition to requirements below, provide a schedule using same reference numbers for details and openings as those on Drawings:

1. Elevations of each door type.
2. Direction of swing or slide.
3. Inmate and non-inmate sides.
4. Details of doors, including vertical and horizontal edge details, and metal thicknesses.
5. Details of frames, including dimensioned profiles, and metal thicknesses.
6. Locations of reinforcement and preparations for hardware.
7. Details of each different wall opening condition.
8. Details of anchorages, joints, field splices, and connections.
9. Details of food-pass openings.
10. Details of moldings, removable stops, and glazing.
11. Details of conduits, junction boxes, and preparations for electrically operated door hardware.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Welding certificates.

C. Product Test Reports: For each type of detention hollow-metal door and frame assembly including vision and side lights, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Examination reports documenting inspection of substrates, areas, and conditions.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. 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.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. 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."

1.9 DELIVERY, STORAGE, AND HANDLING

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

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

C. Store detention hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

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. Ceco Door Products; an ASSA ABLOY Group company.
2. Custom Products Division; Chief Industries, Inc.
3. Trussbilt; an ASSA ABLOY Group company.

B. Source Limitations: Obtain detention doors and frames from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

2.3 DETENTION DOOR AND FRAME ASSEMBLIES

A. Detention Door and Frame Assemblies: Provide detention door and frame assemblies that comply with the following, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:

1. Security Grade: Assemblies pass testing requirements in ASTM F 1450 for security grades specified.
2. Tool-Attack Resistance: Small-tool-attack-resistance rated when tested according to UL 437 and UL 1034.

B. Detention Frames: Provide sidelight and borrowed-light detention frames that comply with ASTM F 1592 and removable stop test according to NAAMM-HMMA 863, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.

2.4 DETENTION DOORS

A. General: Provide flush-design detention doors of seamless hollow construction, 2 inches thick unless otherwise indicated. Construct detention doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges.

1. For single-acting swinging detention doors, bevel both vertical edges 1/8 inch in 2 inches.
2. For sliding detention doors, square both vertical edges.

B. Core Construction: Provide the following core construction of same material as detention door face sheets, welded to both detention door faces:

1. Truss-Stiffened Core: 0.013-inch-thick, steel, truncated triangular stiffeners extending between face sheets and for full height and width of door; with stiffeners welded to face sheets not more than 3 inches o.c. vertically and 2-3/4 inches horizontally. Fill spaces between stiffeners with insulation.

C. Vertical Edge Channels: 0.123-inch-thick, continuous channel of same material as detention door face sheets, extending full-door height at each vertical edge; welded to top and bottom channels to create a fully welded perimeter channel. Noncontiguous channel is permitted to accommodate lock-edge hardware only if lock reinforcement is welded to and made integral with channel.

D. Top and Bottom Channels: 0.123-inch-thick metal channel of same material as detention door face sheets, spot welded, not more than 4 inches o.c., to face sheets.

1. Reinforce top edge of detention door with 0.053-inch-thick closing channel, welded so channel web is flush with top door edges.

E. Hardware Reinforcement: Fabricate reinforcing plates from same material as detention door face sheets to comply with the following minimum thicknesses:

1. Full-Mortise Hinges and Pivots: 0.187 inch thick.
2. Maximum-Security Surface Hinges: 0.250 inch thick.
3. Strike Reinforcements: 0.187 inch thick.
4. Slide-Device Hanger Attachments: As recommended by device manufacturer.
5. Lock Fronts, Concealed Holders, and Surface-Mounted Closers: 0.093 inch thick.
6. All Other Surface-Mounted Hardware: 0.093 inch thick.
7. Lock Pockets: 0.123 inch thick at non-inmate side, welded to face sheet.

F. Hardware Enclosures: Provide enclosures and junction boxes for electrically operated detention door hardware of same material as detention door face sheets, interconnected with UL-approved, 1/2-inch-diameter conduit and connectors.

1. Access Plates: Where indicated for wiring installation, provide access plates to junction boxes, fabricated from same material and thickness as face sheet and fastened with at least four security fasteners spaced not more than 6 inches o.c.

G. Interior Detention Doors: Construct interior doors to comply with materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances indicated in NAAMM-HMMA 863 and as specified.

1. Security Grade 3: Provide doors with face sheets of 0.067-inch-minimum-thickness, cold-rolled, steel.

2.5 DETENTION FRAMES

A. General: Provide fully welded detention frames with integral stops, of seamless construction without visible joints or seams. Fabricate detention frames with contact edges closed tight and corners mitered, reinforced, and continuously welded full depth and width of detention frame.

B. Stop Height: Provide minimum stop height of 0.625 inch for detention door openings and minimum stop height of 1-1/4 inches in security glazing or detention panel openings unless otherwise indicated.

C. Interior Detention Frames: Construct interior frames to comply with materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances indicated in NAAMM-HMMA 863 and as specified.

1. Security Grade 3: Provide frames fabricated from 0.067-inch-minimum-thickness, cold-rolled steel.

D. Hardware Reinforcement: Fabricate reinforcing plates from same material as detention frame to comply with the following minimum thicknesses:

1. Hinges and Pivots: 0.187 inch thick by 1-1/2 inches wide by 10 inches long.
2. Strikes and Closers: 0.187 inch thick.
3. Surface-Mounted Hardware: 0.093 inch thick.
4. Lock Pockets: 0.123 inch thick at non-inmate side, welded to face sheet. Provide 0.123-inch-thick, lock protection plate for attachment to lock pocket with security fasteners.

E. Hardware Enclosures: Provide enclosures and junction boxes for electrically operated detention door hardware, interconnected with UL-approved, 1/2-inch-diameter conduit and connectors.

1. Access Plates: Where indicated for wiring installation, provide access plates to junction boxes, fabricated from same material and thickness as face sheet and fastened with at least four security fasteners spaced not more than 6 inches o.c.

F. Mullions Bars: Provide closed or tubular mullions and transom bars where indicated. Fasten mullions and transom bars at crossings and to jambs by butt welding. Reinforce joints between detention frame members with concealed clip angles or sleeves of same metal and thickness as detention frame.

G. Jamb Anchors: Weld jamb anchors to detention frames near hinges and directly opposite on strike jamb or as required to secure detention frames to adjacent construction.

1. Number of Anchors: Provide two anchors per jamb plus the following:

a. Detention Door Frames: One additional anchor for each 18 inches, or fraction thereof, above 54 inches in height.

b. Detention Frames with Security Glazing or Detention Panels: One additional anchor for each 18 inches, or fraction thereof, above 36 inches in height.

2. Embedded Anchors: Provide detention frames with removable faces at jambs where embedded anchors are indicated. Anchors consist of the following three parts:

a. Embedded Plates: Steel plates, 0.188 inch thick by 4 inches wide by 6 inches long. Continuously weld two steel bars, 1/2 inch in diameter and 10 inches long with 2-inch 90-degree turndown on ends, to the embedded end of each plate. Weld steel angles, 0.188 inch thick by 2 by 2 by 4 inches long, to the exposed end of each plate. Embed at locations to match frame angles.
b. Frame Angles: Steel angles, 0.188 inch thick by 2 by 2 by 4 inches long, welded to detention frames with 1-inch-long welds at each end of angle.
c. Connector Angles: Steel angles, of size required, to connect frame angles and embedded plates.

3. Postinstalled Anchors: Minimum 1/2-inch-diameter concealed bolts with expansion shields or inserts. Provide conduit spacer from detention frame to wall, welded to detention frame. Reinforce detention frames at anchor locations.

H. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, formed of same material and thickness as detention frame, and as follows:

1. Monolithic Concrete Slabs: Clip anchors, with two holes to receive fasteners, welded to bottom of jambs and mullions with at least four spot welds per anchor.

I. Rubber Door Silencers: Except on weather-stripped detention doors, drill stops in strike jambs to receive three silencers on single-detention-door frames and drill head jamb stop to receive two silencers on double-detention-door frames. Keep holes clear during construction.

J. Grout Guards: Provide factory-installed grout guards of same material as detention frame, welded to detention frame at back of hardware cutouts, silencers, and glazing-stop screw preparations to close off interior of openings and prevent mortar or other materials from obstructing hardware operation or installation.

2.6 DETENTION PANELS

A. Provide fixed detention panels of same materials, construction, and finish as specified for adjoining detention door.

2.7 MOLDINGS AND STOPS

A. Provide fixed moldings on inmate side of glazed openings and removable stops on non-inmate side.

1. Height: As required to provide minimum 1-inch glass engagement, but not less than 1-1/4 inches.
2. Fixed Moldings: Formed from same material as detention door and frame face sheets, but not less than 0.093 inch thick, and spot welded to face sheets a maximum of 5 inches o.c.

3. Removable Stops: Formed from 0.123-inch-thick angle, of same material as detention door face sheets. Secure with button head security fasteners spaced uniformly not more than 9 inches o.c. and not more than 2 inches from each corner, and as necessary to satisfy performance requirements. Form corners with notched or mitered hairline joints.

B. Coordinate rabbet width between fixed and removable stops with glass or panel type and installation type indicated.

2.8 MATERIALS

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

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS (Commercial Steel), Type B.

C. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

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

E. Embedded Anchors: Fabricated from mild steel shapes and plates, hot-dip galvanized according to ASTM A 153/A 153M.

F. Post-Installed Anchors: Torque-controlled expansion anchors.

1. 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.

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

H. Glazing: Comply with Section 08885 "Security Glazing."

I. Insulation: Slag-wool-fiber/rock-wool-fiber or glass-fiber blanket insulation. ASTM C 665, Type I (unfaced); with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics. Minimum 1.5-lb/cu. ft. (24-kg/cu. m) density.

2.9 FABRICATION

A. Fabricate detention doors and frames rigid, neat in appearance, and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Weld exposed joints continuously; grind, fill, dress, and make smooth, flush, and invisible. 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 detention doors and frames to comply with manufacturing tolerances indicated in NAAMM-HMMA 863.

C. Removable Jamb Faces: Provide removable jamb faces where required for access to embedded anchors. Fabricate to allow secure reattachment of removable face with security fasteners.

D. Fabricate multiple-opening detention frames with mullions that have closed tubular shapes and with no visible seams or joints.

E. Hardware Preparation: Factory prepare detention doors and frames to receive mortised hardware, including cutouts, reinforcement, mortising, drilling, and tapping, according to final Door Hardware Schedule and templates provided by detention door hardware supplier.

1. Reinforce detention doors and frames to receive surface-mounted door hardware. Drilling and tapping may be done at Project site.
2. Locate door hardware according to NAAMM-HMMA 863.

F. Factory cut openings in detention doors.

G. Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

2.10 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish detention doors and frames after assembly.

2.11 STEEL SHEET 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" or SSPC-SP 8, "Pickling".

B. Factory Priming for Field-Painted Finish: Apply shop primer specified in "Shop Primer" Subparagraph below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mil.

1. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, corrosion-inhibiting, lead- and chromate-free, universal primer complying with SDI A250.10 acceptance criteria; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

2.12 SECURITY FASTENERS

A. Operable only by tools produced by fastener manufacturer or other licensed fabricator for use on specific fastener type. Provide 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. Acument Global Technologies North America.
b. Bryce Fastener.
c. Safety Socket LLC.
d. Tamperproof Screw Co., Inc.
e. Tamper-Pruf Screws.

2. Drive-System Type: 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).

5. Socket Flat Countersunk Head Fasteners:

   a. Heat-treated alloy steel, ASTM F 835 (ASTM F 835M).

6. Socket Head Cap Fasteners:

   a. Heat-treated alloy steel, ASTM A 574 (ASTM A 574M).

7. Protective Coatings for Heat-Treated Alloy Steel:

   a. Zinc and clear trivalent chromium where indicated.

2.13 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.

D. Pass-Through Openings: Fabricate flush openings using 0.093-inch- thick interior channels of same material as detention door faces, inverted to be flush with openings, welded to inside of both face sheets and with corners fully welded. Mount shutters on non-inmate side of detention doors. Reinforce for locks and pass-through hinges.

   1. Inset Shutters: Fabricate from two steel plates, 0.123 inch thick, of same material as detention door face sheets, spot welded together and sized to inset inside opening and to prevent inmate tampering of lock and hinges.

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 of detention frame connections before detention frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Inspect embedded plate installations before installing detention frames to verify that plate installations comply with requirements. Prepare inspection reports.

1. Remove and replace plates 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.

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

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory.

B. Before installation and with shipping spreaders removed, adjust detention frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb and perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of face.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of door rabbet.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

3.3 INSTALLATION

A. General: Install detention doors and frames plumb, rigid, properly aligned, and securely fastened in place, complying with Drawings, schedules, and manufacturer's written recommendations.

B. Anchorage: Set detention frame anchorage devices according to details on Shop Drawings and according to anchorage device manufacturer's written instructions.

1. Embedded Anchors: Install embedded plates in wall surrounding frame openings to match frame angle locations.
2. Postinstalled Anchors: Drill holes in existing construction at locations to match bolt locations, and install bolt expansion shields or inserts.

C. Where detention frames are fabricated in sections due to shipping limitations, assemble frames and install angle splices at each corner, of same material and thickness as detention frame, and extend at least 4 inches on both sides of joint.

1. Field splice only at approved locations. Weld, grind, and finish as required to conceal evidence of splicing on exposed faces.

2. Continuously weld and finish smooth joints between faces of abutted, multiple-opening, detention frame members.
3. Field Welding: Comply with the following requirements:

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

D. Placing Detention Frames: Install detention frames of sizes and profiles indicated. Set detention 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.

1. Embedded Anchors: Remove jamb faces from detention frames and set detention frames into opening. Weld steel connector angle to frame angle and to embedded plate with 1-inch- long welds at each end of connector angle to form a rigid frame assembly that is solidly anchored. Reinstall jamb faces using security fasteners.
2. Postinstalled Anchors: Install bolt. After bolt is tightened, weld bolt head to provide nonremovable condition. Grind, dress, and finish smooth welded bolt head.
3. Install detention frames with removable stops located on non-inmate side of opening.

E. Swinging Detention Doors: Fit non-fire-rated detention doors accurately in their frames, with the following clearances:

1. Between Doors and Frames at Jambs and Head: 1/8 inch.
2. Between Door Bottom and Nominal Surface of Floor Covering: 1/2 inch.
3. Between Detention Door and Countertop: 1/8 inch.

F. Sliding Detention Doors: Fit sliding detention doors in their frames according to manufacturer's written instructions and as required to allow doors to slide without binding.

G. Fire-Rated Detention Doors: Install with clearances as specified in NFPA 80.

H. Smoke-Control Detention Doors: Install according to NFPA 105.

I. Installation Tolerances: Comply with installation tolerances indicated in NAAMM-HMMA 863.

J. Glazing: Comply with installation requirements in Section 08885 "Security Glazing" unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

A. Inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.

B. Detention work will be considered defective if it does not pass tests and inspections.

C. Perform additional inspections to determine compliance of replaced or additional work.

D. Prepare field quality-control certification that states installed products comply with requirements in the Contract Documents.

E. Prepare test and inspection reports.

3.5 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 detention doors and frames that are warped, bowed, or otherwise unacceptable.

B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

1. After finishing smooth field welds, apply air-drying primer.

END OF SECTION

SECTION 08 56 53 - SECURITY 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. Exterior vision security windows.

B. Related Requirements:

1. Section 08 34 63 "Detention Doors and Frames" for detention-grade hollow-metal windows, sidelights, and door transoms.

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 window units.

B. Shop Drawings: For security windows.

1. Include plans, elevations, sections, and attachments to other work.
2. Full-size section details of framing members, including internal armoring, reinforcement, and stiffeners.
3. Location of weep holes.
4. Glazing details.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Test Reports: For each type of security window and accessory indicated as forced-entry resistant, for tests performed by a qualified testing agency.

C. Configuration Disclosure Drawing: For each type of forced-entry-resistant security window, complying with ASTM F 1233.

D. Sample Warranty: For special warranty.

E. Examination reports documenting inspections of substrates, areas, and conditions.

F. Field quality-control reports documenting inspections of installed products.

1. Field quality-control certification signed by Contractor.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer for installation of units required for this Project.

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

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Pack security windows in wood crates for shipment. Crate glazing separate from frames unless factory glazed.

B. Label security window packaging with drawing designation.

C. Store crated security windows on raised blocks to prevent moisture damage.

1.7 FIELD CONDITIONS

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

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace security 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.
b. Failure of welds.
c. Excessive air leakage.
d. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Attack Resistance: Provide units identical to those tested for compliance with requirements indicated, and as follows:

1. Forced-Entry Resistance: Class III when tested according to ASTM F 1233.
2. Forced-Entry Resistance: 60-minute protection level when tested according to SD-STD-01.01.

B. Structural Loads: Detention windows shall withstand the effects of wind loads, with no permanent deformation or breakage of components within window assembly when tested according to ASTM E 330.

1. Wind Loads: As required to resist 100 MPH wind, Exposure B**.**

C. Air Infiltration: Provide windows with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft..

D. Water Penetration under Static Pressure: Provide windows that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

E. Energy Performance: Provide windows with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below and certified and labeled in accordance with NFRC:

1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.65 Btu/sq. ft. x h x deg F as determined according to NFRC 100.

2.2 VISION SECURITY WINDOWS

A. Provide fixed vision security windows with framing on four sides and no operable sash or ventilator.

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. Action Bullet Resistant Corp.
b. Armortex; Model 625BR/BL.
c. United States Bullet Proofing, Inc.; Model W400.

B. Framing: Fabricate perimeter framing, mullions, and glazing stops from aluminum as follows:

1. Profile: Manufacturer's standard, with minimum face dimension indicated.

a. Minimum Face Dimension: 2 inches.

2. Depth: Manufacturer's standard.
3. Glass Orientation: Vertical.

C. Glazing and Glazing Materials: Comply with requirements in Section 08885 "Security Glazing."

D. Materials:

1. Aluminum Extrusions: ASTM B 221. Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength.
2. Aluminum Sheet and Plate: ASTM B 209.

2.3 FABRICATION

A. General: Fabricate security 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 the secure side of framing.

B. Provide weep holes and internal water passages for exterior security windows to conduct infiltrating water to the exterior.

C. Fabricate framing with manufacturer's standard, internal opaque armoring in thicknesses required for security windows to comply with ballistics-resistance performance indicated.

D. Glazing Stops: Finish glazing stops to match security window framing.

E. 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.

F. 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.

G. Preglazed Fabrication: Preglaze window units at factory. Comply with requirements in Section 08 88 35 "Security Glazing."

H. Weather Stripping: Factory applied.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA 500 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.

2.5 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

1. Color: Medium bronze.

2.6 ACCESSORIES

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

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

C. Compression-Type Glazing Strips and Weather Stripping: Unless otherwise indicated, provide compressible stripping for glazing and weather stripping, such as molded EPDM or neoprene gaskets complying with ASTM D 2000, Designations 2BC415 to 3BC620; molded PVC gaskets complying with ASTM D 2287; or molded, expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

D. Miscellaneous Glazing Materials: Provide material, size, and shape complying with requirements of glass manufacturers and with a proven record of compatibility with surfaces contacted in installation.

1. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
2. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
3. Spacers: Elastomeric blocks or continuous extrusions with a Type A Shore durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
4. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

E. 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.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

G. Sealants: For sealants required within fabricated security windows, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, nonmigrating, and pick resistant.

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 security windows.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of security windows.

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

3.2 INSTALLATION

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

B. Glazed Framing: Provide gasket-glazed framing. Comply with installation requirements in Section 088853 "Security Glazing."

C. Removable Glazing Stops and Trim: Fasten components with security fasteners.

D. Fasteners: Install security windows using fasteners recommended by manufacturer with head style appropriate for installation requirements, strength, and finish of adjacent materials.

E. Sealants: Comply with requirements in Section 07920 "Joint Sealants" for installing sealants, fillers, and gaskets.

1. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction.
2. Seal frame perimeter with sealant to provide weathertight construction.

F. 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.

3.3 FIELD QUALITY CONTROL

A. Inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.

B. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.

C. Prepare field quality-control certification that states installed products and their installation comply with requirements in the Contract Documents.

3.4 CLEANING AND PROTECTION

A. Clean surfaces promptly after installation of security windows. Take care to avoid damaging the finish. Remove excess glazing and sealant compounds, dirt, and other substances.

B. Clean glass of preglazed security windows promptly after installation. Comply with requirements in Section 08 88 53 "Security Glazing" for cleaning and maintenance.

C. Provide temporary protection to ensure that security windows are without damage at time of Substantial Completion.

END OF SECTION

SECTION 08 71 11 - DOOR HARDWARE

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. Mechanical door hardware for the following:

a. Swinging doors.

2. Cylinders for door hardware specified in other Sections.

B. Related Sections:

1. Section 08 71 63 "Detention Door Hardware" for hardware for detention doors and for hardware groups.

C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and who is available during the course of the Work to consult with Contractor and Department.

1. Warehousing Facilities: Within 2-hour service call range of Project's vicinity.

B. Source Limitations: Obtain each type of door hardware from a single manufacturer.

C. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
2. Comply with the following maximum opening-force requirements:

    a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
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 leading edge of the door.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

1.7 COORDINATION

A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.8 WARRANTY

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

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

    a. Structural failures including excessive deflection, cracking, or breakage.
    b. Faulty operation of doors and door hardware.
    c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

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

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled Part 3 of Section 08 71 63 “Detention Door Hardware”.

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

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. IVES Hardware; an Ingersoll-Rand company (IVES).
b. Lawrence Hardware Inc (LB).
c. McKinney Products Company; an ASSA ABLOY Group company (MCK).
d. Stanley Commercial Hardware; Div. of The Stanley Works (STH).

B. Hinge Weight: Unless otherwise indicated, provide the following:

1. Entrance Doors: Heavy-weight hinges.
2. Doors with Closers: Antifriction-bearing hinges.
3. Interior Doors: Standard and heavy-weight hinges as scheduled.

C. Antifriction-Bearing Hinges:

1. Mounting: Full mortise (butts) with shear resistant studs.
2. Bearing Material: Ball bearing.
3. Size: 4-1/2 by 4-1/2 inches unless noted otherwise.
4. Grade: Grade 1 (heavy weight) and Grade 2 (standard weight).
5. Base and Pin Metal:

a. Exterior Hinges: Stainless steel with stainless-steel pin.
b. Interior Hinges: Steel with steel pin.

6. Pins: Maximum security.
7. Tips: Flat button.
8. Corners: Square.

D. Plain-Bearing Hinges: Grade 1 (heavy weight).

1. Mounting: Full mortise (butts).
2. Size: 4-1/2 by 4-1/2 inches unless noted otherwise.
3. Base and Pin Metal: Steel with steel pin.
4. Pins: Maximum security.
5. Tips: Flat button.

6. Corners: Square.

2.3 SELF-CLOSING HINGES AND PIVOTS

A. Self-Closing Hinges and Pivots: BHMA A156.17.

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. Bommer Industries, Inc. (BI)
b. Hager Companies (HAG).
c. Lawrence Hardware Inc. (LB)
d. McKinney Products Company; an ASSA ABLOY Group company. (MCK)
e. Stanley Commercial Hardware; Div. of The Stanley Works. (STH)

B. Spring Hinges: Grade 1; wrought steel, with torsion spring.

1. Type: Single acting.
2. Mounting: Full mortise (butts).

2.4 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Mortise Locks: Minimum 3/4-inch latchbolt throw.

C. Lock Backset: 2-3/4 inches, unless otherwise indicated.

D. Lock Trim:

1. Description: Full face escutcheon.
2. Levers: Cast.

a. Angle return, flat face lever.

3. Escutcheons (Roses): Forged.

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

F. Mortise Locks: BHMA A156.13; Operational Grade 1; stamped steel case with steel or brass parts; Series 1000.

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. Best Access Systems; Div. of Stanley Security Solutions, Inc. (BLC)
b. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company. (CR)
c. SARGENT Manufacturing Company; an ASSA ABLOY Group company. (SGT)
d. Schlage Commercial Lock Division; an Ingersoll-Rand company. (SCH)

2.5 AUXILIARY LOCKS

A. Bored Auxiliary Locks: BHMA A156.5: Grade 1; with strike that suits frame.

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. Best Access Systems; Div. of Stanley Security Solutions, Inc. (BLC)
b. Medeco Security Locks, Inc.; an ASSA ABLOY Group company. (MED)
c. SARGENT Manufacturing Company; an ASSA ABLOY Group company. (SGT)
d. Schlage Commercial Lock Division; an Ingersoll-Rand company. (SCH)

2. Backset: 2-3/4 inches.
3. Material: Brass.
4. Deadlatches: Deadlocking latchbolt operated by turn inside with no cylinder.
5. Deadlocks: Deadbolt operated by key outside, no trim inside.

2.6 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

1. Manufacturers: Subject to compliance with requirements, provide products by following:

a. Medeco Security Locks, Inc.; an ASSA ABLOY Group company. (MED), no substitutions.

B. High-Security Lock Cylinders: BHMA A156.30; Grade 1; Type M, mechanical; permanent cores that are removable; face finished to match lockset.

1. Number of Pins: Six.
2. Type: Rim type.
3. Match existing keying.

2.7 OPERATING TRIM

A. Operating Trim: BHMA A156.6; stainless steel, 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. IVES Hardware; An Ingersoll-Rand Company. (IVES)
b. Rockwood Manufacturing Company. (RM)
c. Trimco. (TR)

B. Flat Push Plates: 0.050 inch thick, 4 inches wide by 16 inches high with rounded corners and beveled edges; secured with exposed security screws.

2.8 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal.

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. IVES Hardware; an Ingersoll-Rand company. (IVES)
b. Rockwood Manufacturing Company. (RM)
c. Trimco. (TR)

B. Wall Bumpers: Grade 1; with rubber bumper; 2-1/2-inch diameter, minimum 3/4-inch projection from wall; with backplate for concealed fastener installation; with convex or concave bumper configuration as scheduled.

2.9 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

B. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784.

1. Provide smoke-labeled gasketing on 20-minute-rated doors and on smoke-labeled doors.

C. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.

D. Rigid, Housed, Perimeter Gasketing: Sponge neoprene or nylon brush gasket material held in place by aluminum housing; fastened to frame stop with screws. Type as scheduled in Hardware Sets.

E. Automatic Door Bottoms: Sponge neoprene gasket material held in place by aluminum housing that automatically drops to form seal when door is closed; mounted to bottom edge of door with screws.

1. Mounting: Surface mounted on face of door.
2. Type: Low-closing-force type for doors required to meet accessibility requirements.

2.10 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening 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. National Guard Products. (NGP)
b. Pemko Manufacturing Co.; an ASSA ABLOY Group company. (PE)
c. Reese Enterprises, Inc. (REE)
d. Zero International. (ZI)

B. Saddle Thresholds:

1. Type: Thermal break and fluted top.
2. Base Metal: Aluminum.

2.11 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch-thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

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. IVES Hardware; an Ingersoll-Rand company. (IVES)
b. Rockwood Manufacturing Company. (RM)
c. Trimco. (TR)

B. Armor Plates: 36 inches high by door width with allowance for frame stops.

C. Kick Plates: 10 inches high by door width with allowance for frame stops.

D. Mop Plates: 4 inches high by 1 inch less than door width.

2.12 AUXILIARY DOOR HARDWARE

A. Auxiliary Hardware: BHMA A156.16.

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. IVES Hardware; an Ingersoll-Rand company. (IVES)
b. Rockwood Manufacturing Company. (RM)
c. Trimco. (TR)

B. Silencers for Metal Door Frames: Grade 1; neoprene or rubber; minimum diameter 1/2 inch; fabricated for drilled-in application to frame.

2.13 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware for all concealed to view fasteners when door is closed. Provide security screws where exposed to view when door is closed.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
3. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.14 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

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.

D. BHMA Designations: Comply with base material and finish requirements indicated by the following:

1. BHMA 626: Satin chromium plated over nickel, over brass or bronze base metal.
2. BHMA 627: Satin aluminum, clear coated, over aluminum base metal.
3. BHMA 628: Satin aluminum, clear anodized, over aluminum base metal.
4. BHMA 630: Satin stainless steel, over stainless-steel base metal.
5. BHMA 652: Satin chromium plated over nickel, over steel base metal.
6. BHMA 718: Satin aluminum, uncoated; aluminum base metal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

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

3.2 PREPARATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Lock Cylinders: Install construction cores to secure building and areas during construction period.

E. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07920 "Joint Sealants."

F. Stops: Provide wall stops for doors unless floor or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

G. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

H. Door Bottoms: Surface apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 08 71 63 - DETENTION DOOR HARDWARE

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 detention door hardware for the following:

1. Swinging detention doors.
2. Sliding detention doors.
3. Non-detention door hardware sets.

B. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

1. Cylinders for locks specified in other Sections.

1.3 COORDINATION

A. Templates: Obtain and distribute, to the parties involved, templates for detention doors, frames, and other work specified to be factory prepared for installing detention door hardware.

B. Electrical System Roughing-In: Coordinate layout and installation of electrically powered detention door hardware with connections to power supplies perimeter security system detention monitoring and control system fire-alarm system and detection devices and building control system.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of detention door hardware.

B. Shop Drawings: For each type of detention door hardware.

1. Include plans, elevations, sections, and attachment details.
2. Include diagrams for power, signal, and control wiring; differentiate between manufacturer-installed and field-installed wiring for detention door hardware. Include the following:

a. System schematic.
b. Point-to-point wiring diagram, including location of connections.
c. Riser diagram.

d. Elevation of each detention door type.

3. Detail interface between electrically powered detention door hardware and perimeter security detention monitoring and control fire-alarm and building control system.

C. Detention Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware as well as installation procedures and wiring diagrams. Coordinate the Detention Door Hardware Schedule with detention doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of detention door hardware.

1. Integrate detention door hardware indicated in "Detention Door Hardware Schedule" Article into Project's final Detention Door Hardware Schedule, and indicate complete designations of every item required for each detention door and opening.
2. Keying Schedule: Coordinate detention keying with other door hardware in Project's final Keying Schedule.
3. Indicate each detention lock and type of key cylinder using the following prefixes: "P" for paracentric, "M" for mogul, "HS" for high security, and "C" for commercial.
4. Indicate security level of each item.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer and supplier.

B. Product Certificates: For each type of detention door hardware.

C. Product Test Reports: For each type of detention lock and latch security door closer and sliding detention door device, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Examination reports documenting inspections of substrates, areas, and conditions.

E. Field quality-control reports documenting inspections of installed products.

F. Affidavit of Coordination: Letter signed by hardware supplier stating they have reviewed the drawings and specifications and have coordinated the hardware for completeness, substrates, conditions and project. Submittals submitted without affidavit will be returned unreviewed.

G. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For detention door hardware to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 01700 "Contract Closeout," include the following:

a. Normal remote security operation.
b. Normal local security operation.
c. Emergency security operation.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of detention door hardware.

B. Initial Maintenance Warranty Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of detention door hardware Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper detention door hardware operation. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.

C. 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.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer and an authorized representative of detention door hardware manufacturer for installation and maintenance of units required for this Project.

B. Supplier Qualifications: Detention door hardware supplier who is, or employs, a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about detention door hardware and keying.

1. Detention Door Hardware Supplier Qualifications: An experienced detention door hardware supplier who has completed projects with electrically powered detention door hardware similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance, and who is acceptable to manufacturer of primary materials.

a. Engineering Responsibility: Prepare data for electrically powered detention door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
b. Scheduling Responsibility: Preparation of Detention Door Hardware and Keying schedules.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Inventory detention door hardware on receipt and provide secure lockup for detention door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the Detention Door Hardware Schedule, and include basic installation instructions with each item or package.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of detention door hardware that fail in materials or workmanship within specified warranty period.

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

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of operators and detention door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering or detention use.

2. Warranty Period: Three years from date of Substantial Completion.
3. Warranty Period for Security Door Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Swinging Detention Door Assemblies: Provide detention door hardware as part of a detention door assembly that complies with security grade indicated, when tested according to ASTM F 1450, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.

1. Tool-Attack Resistance: Comply with small-tool-attack-resistance rating when tested according to UL 1034 and UL 437.

2.2 DETENTION DOOR HARDWARE, GENERAL

A. Provide detention door hardware for each door as scheduled in "Detention Door Hardware Schedule" Article to comply with requirements in this Section.

1. Detention Door Hardware Sets: Provide quantity, item, size, finish, or color indicated.
2. Sequence of Operation: Provide electrically powered detention door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Electrically Powered Detention Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Detention Door Hardware Control and Monitoring: Provide detention door hardware with features, functions, and internal equipment required to perform control and monitoring functions indicated in Section 28 40 00 “Detention Monitoring and Control System”.

D. Source Limitations: Obtain mechanical detention door hardware from same manufacturer as that of electrically powered or pneumatic detention door hardware.

E. Regulatory Requirements:

1. Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.

2.3 DETENTION HINGES

A. Utility Door Detention Hinges: Heavy weight, plain bearing; fabricated from cast iron or steel; 3/8-inch- diameter, case-hardened, steel hinge pin; with applied stop preventing door from opening more than 90 degrees and supporting door in horizontal position as a shelf; full surface.

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. Airteq Systems, a division of Norment Security Group; Airteq Systems Model No. 603FP.
   b. Hager Companies; Model No. 992.
   c. Southern Folger Detention Equipment Company, Folger Adam Products; Folger Adam Model No. 3FP.
   d. Southern Folger Detention Equipment Company, Southern Steel Products; Southern Steel Model 203FP.

2. Leaves: Drilled for countersunk security fasteners.
3. Size: Minimum 3 by 4 by 0.200 inch.
4. Security Grade: 3 according to ASTM F 1758.
5. Finish: BHMA 600.

B. Full-Surface Detention Hinges: Extra heavy weight; two heavy-duty thrust bearings with hardened-steel ball bearings; fabricated from stainless steel plate; stainless steel hinge pin with security stud.

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. Airteq Systems, a division of Norment Security Group; Airteq Systems Series 604 FMCS-CE.
   b. Southern Folger Detention Equipment Company, Folger Adam Products; Folger Adam Model No. 4-1/2FM-ICS.
   c. Southern Folger Detention Equipment Company, Southern Steel Products; Southern Steel Model No. 204FMSS.

2. Leaves: Drilled for countersunk security fasteners
3. Size: Minimum 4-1/2 by 4-1/2 by 3/16 inch.
4. Security Grade: 3 according to ASTM F 1758.
5. Finish: BHMA 630.

2.4 MECHANICAL DETENTION LOCKS AND LATCHES

A. Lock Mountings:

1. Steel-Plate Detention Doors: Mount detention lock to inside surface of 0.179-inch nominal-thickness steel enclosure with integrally formed mounting flanges. Attach enclosure to steel-plate detention door with security fasteners.

B. Utility-Door Mechanical Snaplatches, Mogul Cylinder:

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. Airteq Systems, a division of Norment Security Group; Airteq Systems Series 5017M.
b. Southern Folger Detention Equipment Company, Folger Adam Products; Folger Adam Series 17-M.
c. Southern Folger Detention Equipment Company, Southern Steel Products; Southern Steel Series 1017AM.

2. Function: Automatic snaplatch when door is closed; latchbolt retracted by mogul cylinder; keyed one side.
3. Latchbolt: 1 inch high by 7/16 inch thick; 5/16-inch throw.
4. Security Grade: 3 according to ASTM F 1577.

2.5 ELECTROMECHANICAL DETENTION LOCKS AND LATCHES

A. Connectors: Provide electromechanical detention locks and latches with factory-wired plug connector with 6-inch wire pigtail.

1. Provide security ring for installation of electromechanical detention lock in hollow-metal detention frame, welded to frame or access cover.
2. Equip direct-current, solenoid-operated detention locks and latches with diode transient voltage protection at each locking device.

B. Motor-Operated Deadlatches, Mogul Cylinder:

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. Airteq Systems, a division of Norment Security Group; Airteq Systems Series 9724.
b. Southern Folger Detention Equipment Company, Folger Adam Products; Folger Adam Series 120M.
c. Southern Folger Detention Equipment Company, Southern Steel Products; Southern Steel Series 10120AM.

2. Function: Remote switch activates electric motor that retracts latchbolt; automatic latching and deadlocking when door is closed (slam locking). Latchbolt can be mechanically retracted by mogul cylinder; keyed one side or two sides as scheduled.

a. Latchback: Latchbolt remains retracted until door is opened 2 inches, then releases
b. If power fails, latchbolt automatically deadlocks (fail secure).

3. Latchbolt: 1-1/2-inch-high by 3/4-inch- thick hardened steel; 1-inch throw.
4. Provide internal deadlock indicator switch.
5. Provide roller-type deadlock actuator.
6. Voltage: 24-V dc.
7. Listed and labeled for use on fire doors.
8. Security Grade: 3 according to ASTM F 1577.

C. Motor-Operated Deadlatches, Commercial Cylinder:

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. Airteq Systems, a division of Norment Security Group; Airteq Systems Series 9424.
b. Southern Folger Detention Equipment Company, Folger Adam Products; Folger Adam Series NS400M.
c. Southern Folger Detention Equipment Company; Southern Steel Series 10300M.

2. Function: Remote switch activates electric motor that retracts latchbolt; automatic latching and deadlocking when door is closed (slam locking). Latchbolt can be mechanically retracted by high-security commercial cylinder; keyed two sides.

a. Latchback: Latchbolt remains retracted until door is opened 2 inches (51 mm), then releases.
b. If power fails, latchbolt automatically deadlocks (fail secure).

3. Latchbolt: 1-1/2-inch-high by 5/8-inch- thick hardened steel; 3/4-inch throw.
4. Provide internal deadlock indicator switch.
5. Deadlock Actuator: Stainless steel.
6. Strike: Stainless steel.
7. Voltage: 24-V dc.
8. Security Grade: 3 according to ASTM F 1577.

2.6 DETENTION LOCK TRIM

A. Levers: Solid stainless steel.

2.7 DETENTION CYLINDERS AND KEYING

A. Source Limitations: Subject to compliance with requirements, provide cylinders and keying for paracentric and mogul cylinders by same manufacturer as for detention locks and latches.

B. Mogul Cylinders: Manufacturer's standard pin-tumbler type, minimum 2-inch diameter; body constructed from brass or bronze, stainless steel, or nickel silver; with stainless-steel tumblers and engaging cylinder balls; complying with the following:

1. Number of Pins: Six.
2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.

a. High-Security Grade: Listed and labeled as complying with pick- and drill-resistant testing requirements in UL 437 (Suffix A).

3. Finish: BHMA 626.

C. Keying System: Provide a factory-registered keying system complying with the following requirements:

1. Master Key System: Mogul cylinders operated by a change key and a master key. Match existing facility keying.

D. Keys: Provide cast silicon-bronze copper alloy keys complying with the following:

1. Stamping: Permanently inscribe each key with a visual key-control number and include the following notation:

    a. "DO NOT DUPLICATE."

2. Quantity: In addition to one extra blank key for each lock, provide the following:

    a. Cylinder Change Keys: Two.

2.8 SWITCHES

A. General: Provide switches configured with contact type required for functions indicated, including multiple circuiting where required by functional performance of Section 28 40 00 “Detention Monitoring and Control System”.

B. Concealed, Magnetic Door Position Switches: Consist of actuating magnet mortised into detention door and switch mortised into frame; with stainless-steel faceplates; 24-V dc, factory wired with plug connector. Wire in series with lock monitors. Attach with security fasteners.

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. Airteq Systems, a division of Norment Security Group; Airteq Systems Series DPS 6200.
    b. Southern Folger Detention Equipment Company, Southern Steel Products; Southern Steel Series 200MRS.
    c. Detex Corporation; MS-2049F

2.9 DETENTION OPERATING TRIM

A. Standard: BHMA A156.6, Grade 1.

B. Surface-Mounted Door Pulls: 8-3/4-inch overall length and 2-1/4-inch projection; attach to door with two security fasteners.

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. Airteq Systems, a division of Norment Security Group; Airteq Systems Series 612.
    b. Southern Folger Detention Equipment Company, Southern Steel Products; Southern Steel Series 212C.
    c. Stanley Security Solutions, Inc., Division of The Stanley Works; Series 2001.

2. Material: Cast bronze with BHMA 626 finish.

C. Flush Door Pulls: 5 inches high by 4 inches wide by 1 inch deep, with 1/8-inch- thick faceplate; attach to door with four security fasteners.

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. Airteq Systems, a division of Norment Security Group; Airteq Systems Series 614.

b. Southern Folger Detention Equipment Company, Southern Steel Products; Southern Steel Series 214S.
c. Stanley Security Solutions, Inc., Division of The Stanley Works; Series 1004.

2. Material: Formed, wrought, or cast brass/bronze with BHMA 626 finish.

2.10 SECURITY DOOR CLOSERS

A. Standard: BHMA A156.4, Grade 1.

1. Certified Products: Provide security door closers listed in BHMA's "Directory of Certified Door Products."

B. Concealed Security Door Closers:

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. LCN Closers, an Ingersoll-Rand company; Series 2210.
b. Norton Door Controls, an ASSA ABLOY Group company; Series 7970.
c. Sargent Manufacturing Company, an ASSA ABLOY Group company; Series 268.

2. Construction: Forged-steel arm; security roller; with track concealed in head of detention door, designed to eject foreign objects during opening and closing; fabricated with joints designed to prevent disassembly with ordinary hand tools. Closer arm and track fully concealed when door is closed.
3. Cover Plates: Heavy-duty metal, attached with security fasteners.
4. Provide door position switch integral to closer.

C. Unit Size: Comply with manufacturer's written recommendations for size of security door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to comply with field conditions and requirements for opening force.

2.11 DETENTION DOOR STOPS

A. Silencers for Detention Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum 1/2-inch diameter; fabricated for drilled-in application to detention door frame. Attach with security fasteners.

2.12 SLIDING DETENTION DOOR DEVICE ASSEMBLIES

A. Performance Requirements: Provide sliding detention door device assemblies, including locking device, receiver, overhead door hanger, bottom door guide, lock column, and enclosure, as a complete assembly, complying with Grade 1 according to ASTM F 1643, as determined by testing manufacturers' standard units representing those indicated for Project.

B. Assembly Construction:

1. Enclosure: Fabricated from 0.179-inch nominal-thickness steel plate, with 0.134-inch nominal-thickness steel removable cover. Baffle openings in enclosure. Provide closures for ends of housings.

    a. Provide hinged sloping-top housings. Flat-top housings may be provided for operators mounted to ceiling.

2. Lock Column: Vertical tube enclosure fabricated from 0.134-inch nominal-thickness steel, providing mechanical locking control of detention sliding door at door location; operated by paracentric key. Doors shall be capable of being locked at top and bottom, at rear of door, in both open and closed positions, with no components projecting into door opening.
3. Receiver: Fabricated from 0.134-inch nominal-thickness steel plate.
4. Hanger Assembly: Extend steel carrier full width of door plus full extent of door travel required for clear door opening. Provide antifriction ball-bearing steel rollers with hardened members and grease shield.
5. Finish: Factory prime painted.

C. Electromechanical-Locking, Electromechanical-Door-Movement, Sliding-Door Device Assemblies: Operated from remote-control panel that activates electric motors to unlock sliding doors and motorized rack-and-pinion drive mechanisms to open and close doors. Doors lock in open position and deadlock when closed. Provide factory-wired cable harness with plug connectors for each motor unit.

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. Airteq Systems, a division of Norment Security Group; Airteq Systems Model 7320.
    b. Southern Folger Detention Equipment Company, Folger Adam Products; Folger Adam Model 3B.
    c. Southern Folger Detention Equipment Company, Southern Steel Products; Southern Steel Model 3165LX.

2. Single-Door Function: In an emergency or if power fails, individual doors can be unlocked using a manual-release tool and manually moved; doors relock in either fully open or fully closed position.
3. Electric Key Switch: Operated by mogul key and provides electric control of detention sliding-door operation at door location.

2.13 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise approved by Department.

B. Base Metals: Produce detention door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified detention door hardware units and BHMA A156.18 finishes.

C. Fasteners: Provide flat-head security fasteners with finished heads to match surface of detention door hardware.

1. Security Fasteners: Fabricate detention door hardware using security fasteners with head style appropriate for fabrication requirements, strength, and finish of adjacent materials. Provide stainless-steel security fasteners in stainless-steel materials.
2. Concealed Fasteners: For detention door hardware units that are exposed when detention door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching detention door hardware. Where using through bolts on hollow-metal detention door and frame construction, provide sleeves for each through bolt.
3. Steel Through Bolts: For the following fire-rated applications unless door blocking is provided:

    a. Surface detention hinges to detention doors.
    b. Security door closers to detention doors and frames.

4. Spacers Bolts: For through bolting of hollow-metal detention doors.

D. Detention Lock Construction: Fabricate detention lock case and cover plate from steel plate. Fabricate bolts from solid sections; laminated construction is unacceptable.

2.14 HARDWARE FINISHES

A. Standard: Comply with BHMA A156.18.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. BHMA Designations: Comply with base material and finish requirements indicated by the following:

1. BHMA 600: Primed for painting, over steel base metal.
2. BHMA 626: Satin chromium plated over nickel, over brass or bronze base metal.
3. BHMA 630: Stainless steel, satin, over stainless-steel base metal.
4. BHMA 652: Satin chromium plated over nickel, over steel base metal.

2.15 SECURITY FASTENERS

A. Operable only by tools produced by fastener manufacturer or other licensed fabricator for use on specific fastener type. Provide 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. Acument Global Technologies North America.
    b. Bryce Fastener.
    c. Safety Socket LLC.
    d. Tamperproof Screw Co., Inc.
    e. Tamper-Pruf Screws.

2. Drive-System Type: Pinned Torx-Plus.
3. Fastener Strength: 120,000 psi.
4. Socket Button Head Fasteners:

    a. Heat-treated alloy steel, ASTM F 835.
    b. Stainless steel, ASTM F 879, Group 1 CW.

5. Socket Flat Countersunk Head Fasteners:

    a. Heat-treated alloy steel, ASTM F 835.
    b. Stainless steel, ASTM F 879, Group 1 CW.

6. Socket Head Cap Fasteners:

    a. Heat-treated alloy steel, ASTM A 574.
    b. Stainless steel, ASTM F 837, Group 1 CW.

7. Protective Coatings for Heat-Treated Alloy Steel:

    a. Zinc and clear trivalent chromium.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine detention doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

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

C. Verify locations of detention door hardware with those indicated on Shop Drawings.

D. Examine roughing-in for electrical power systems to verify actual locations of connections before detention door hardware installation.

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

3.2 PREPARATION

A. Steel Detention Doors and Frames: Comply with BHMA A156.115 Series.

1. Surface-Applied Detention Door Hardware: Drill and tap detention doors and frames according to SDI A250.6.

3.3 INSTALLATION

A. Mounting Heights: Mount detention door hardware units at heights indicated in DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."

B. Install each detention door hardware item to comply with Shop Drawings and manufacturer's written instructions. Where cutting and fitting are required to install detention door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinge Installation:

1. Welding: Where indicated, weld hinges to detention doors and frames with continuous fillet weld around three sides of hinge perimeter.
2. Security Fasteners: Provide socket flat countersunk head machine screws; finish screw heads to match surface of detention hinges. Install into drilled and tapped holes.

D. Install interconnecting wiring and connectors between detention door hardware devices. Terminate device wiring for detention door hardware installed in swinging doors at a plug-type connector located in lock pocket or door frame junction box and for sliding doors at a junction box in door frame.

E. Security Fasteners: Install detention door hardware using security fasteners with head style appropriate for installation requirements, strength, and finish of adjacent materials.

3.4 FIELD QUALITY CONTROL

A. Inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.

B. Perform the following tests and inspections:

1. After installing electrically powered detention door hardware and after electrical circuitry has been energized, test detention door hardware for compliance with requirements.

    a. Test: Operate lock of each door and group of doors in normal remote, normal local, and emergency operating modes. Verify that remote controls operate correct door locks and in correct sequence.

2. Verify that lock bolts engage strikes with required bolt projection.
3. Verify that detention door hardware is installed, connected, and adjusted according to the Contract Documents.
4. Verify that electrical wiring installation complies with manufacturer's submittal and written installation requirements.

C. Detention work will be considered defective if it does not pass tests and inspections.

D. Perform additional inspections to determine compliance of replaced or additional work.

E. Prepare field quality-control certification that states installed products comply with requirements in the Contract Documents.

F. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust and check each operating item of detention door hardware and each detention door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust detention door-control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by detention door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that detention door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DETENTION DOOR HARDWARE SCHEDULE

A. General: Provide door hardware for each detention door and non-detention door to comply with requirements in this Section and Section 08 71 11 “Door Hardware” with door hardware sets indicated below.

Door Hardware Set No. 01
Door No. 01A, 38A; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	SSF	204FMSS	600
1 EA	LOCKSET	SSF	10120AM	600
1 EA.	CYLINDER	SSF	MOGUL	626
1 EA.	CLOSER	LCN	2210	ALUM
1 EA.	DOOR PULL	SSF	214S	626
1 EA.	PUSH PLATE	IVES	8200	630
1 EA.	POSITION SWITCH	SSF	200MRS	600
1 SET.	GASKET	PE	S88	GRAY
1 EA.	KICK PLATE	IVES	8500	630
1 EA.	FLOOR STOP		SEE DETAIL	600

Door Hardware Set No. 02
Door No. 01B, 03, 07A, 16A, 26A, 26B; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	SSF	204FMSS	600
1 EA.	LOCKSET	SSF	10120AM	600
1 EA.	CYLINDER	SSF	MOGUL	626
1 EA.	CLOSER	LCN	2210	ALUM
1 EA.	DOOR PULL	SSF	214S	626
1 EA.	PUSH PLATE	IVES	8200	630
1 EA.	POSITION SWITCH	SSF	200MRS	600
3 EA.	SILENCER	IVES	SR64	GRAY
1 EA.	KICK PLATE	IVES	8500	630
1 EA.	FLOOR STOP		SEE DETAIL	600

Door Hardware Set No. 03
Door No. 04, 10A, 20A, 21A, 34, 35A; each to have the following:

No.	Item	Manufacturer	Description	Finish
1 EA.	LOCK SYSTEM	SSF	3165LX-bP-2	600
3 EA.	CYLINDER	SSF	MOGUL	626
1 EA.	DOOR PULL	SSF	214S	626
4 EA.	UTILITY HINGE	SSF	203FP	600
2 EA.	UTILITY LOCK	SSF	1017AM	600

Door Hardware Set No. 04
Door No. 05; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	STH	FBB168SRS	652
1 EA.	LOCKSET	SCH	L9080	626
1 EA.	KICK PLATE	IVES	8500	630
1 EA	WALL STOP	IVES	WS401/402CVX	626
3 EA.	SILENCER	IVES	SR64	GRAY

Door Hardware Set No. 05
Door No. 8; each to have the following:

3 EA.	HINGE	STH	FBB179	652
1 EA.	LOCKSET	SCH	L9080	626
1 EA.	WALL STOP	IVES	WS401/402CVX	626
1 EA.	KICK PLATE	IVES	8500	630
3 EA.	SILENCER	IVES	SR64	GRAY

Door Hardware Set No. 06
Door No. 11, 12A, 15A, 17, 18A, 19A, 22, 23A, M6; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	SSF	204FMSS	600
1 EA.	LOCKSET	SSF	10120AM	611
1 EA.	CYLINDER		MOGUL	626
2 EA.	DOOR PULL	SSF	214S	626
3 EA.	SILENCER	IVES	SR64	GRAY
1 EA.	FLOOR STOP		SEE DETAIL	600

Door Hardware Set No. 07
Door No. 16B; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	STH	FBB168SRS	630
1 EA.	LOCKSET	SSF	10300M-2	600
2 EA.	CYLINDER	MED		626
1 EA.	CLOSER	LCN	2210	ALUM.
1 EA.	POSITION SWITCH	SSF	200MRS	600
1 EA	PUSH PLATE	RM	70CxRE	630
1 EA.	DOOR PULL	SSF	212C	626
1 EA.	KICK PLATE	IVES	8500	630
1 EA.	WALL STOP	IVES	WS401/402CVX	626
1 SET	GASKET	PE	316AS	628
1 EA.	DOOR BOTTOM	PE	90137CNB	628
1 EA.	THRESHOLD	PE	273X4AFG	719

Door Hardware Set No. 08
Door No. 14, 24, 25, 46; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	STH	FBB168SRS	630
1 EA.	LOCKSET	SCH	L9082	626
1 EA.	WALL STOP	IVES	WS401/402CVX	626
1 EA.	KICK PLATE	IVES	8500	630
3 EA.	SILENCER	IVES	SR64	GRAY

Door Hardware Set No. 09
Door No. 27, M1, M2, M3, M4, M5; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	STH	FBB168SRS	652
1 EA.	LOCKSET	SCH	L9050	626
1 EA.	WALL STOP	IVES	WS401/402CVX	626
1 EA.	GASKET	PE	316AS	628
1 EA.	KICK PLATE	IVES	8500	630

Door Hardware Set No. 10
Door No. 28; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	STH	FBB179	652
1 EA.	LOCKSET	SCH	L9040	626
1 EA.	WALL STOP	IVES	WS401/402CVX	626
1 EA	KICK PLATE	IVES	8500	630
1 EA.	MOP PLATE	IVES	8500	630
3 EA.	SILENCER	IVES	SR64	GRAY

Door Hardware Set No. 11
Door No. 29A; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	STH	FBB179	652
1 EA.	LOCKSET	SCH	L9080	626
1 EA.	OVERHEAD STOP	GJ	904S	626
1 EA.	KICK PLATE	IVES	8400	630
3 EA.	SILENCER	IVES	SR64	GRAY

Door Hardware Set No. 12
Door No. 29B, 29C; each to have the following:

No.	Item	Manufacturer	Description	Finish
2 EA.	HINGE	SSF	204FMSS	600
1 EA.	LOCKSET	SCH	B680	626
1 EA	PULL	SSF	212C	626
2 EA.	SILENCER	IVES	SR64	GRAY
1 EA.	HOLDER	RM	490	626
1 EA.	POSITION SWITCH	SSF	200MRS	600

Door Hardware Set No. 13
Door No. 31A; each to have the following:

No.	Item	Manufacturer	Description	Finish
2 EA.	HINGE	STH	2060	652
1 EA.	LOCKSET	SCH	L9050	626
2 EA.	SILENCER	IVES	SR64	GRAY
1 EA.	WALL STOP	IVES	WS401/402CVX	626

Door Hardware Set No. 14
Door No. 33, 47, 48, 52; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	STH	FBB179	652
1 EA.	LOCKSET	SCH	L9080	626
1 EA.	WALL STOP	IVES	WS401/402CVX	626
3 EA.	SILENCER	IVES	SR64	GRAY

Door Hardware Set No. 15
Door No. 37, 39, 49, 50; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	STH	FBB179	652
1 EA.	DEADLOCK	SCH	L9465	626
1 EA.	WALL STOP	IVES	WS401/402CVX	626
3 EA.	SILENCER	IVES	SR64	GRAY

Door Hardware Set No. 16
Door No. 38B; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	STH	FBB168SRS	630
1 EA.	LOCKSET	SSF	10300M-1	600
1 EA.	CYLINDER	MED		626
1 EA.	CLOSER	LCN	2210	ALUM.
1 EA.	POSITION SWITCH	SSF	200MRS	600
1 EA	PUSH PLATE	RM	70CxRE	630
1 EA.	KICK PLATE	IVES	8500	630
1 EA.	OVERHEAD STOP	GJ	904S	626
1 SET	GASKET	PE	316AS	628
1 EA.	DOOR BOTTOM	PE	4131CPKL	628
1 EA.	THRESHOLD	PE	273X4AFG	719

Door Hardware Set No. 17
Door No. 40; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	STH	FBB179	652
1 EA.	LOCKSET	SCH	L9080	626
1 EA.	OVERHEAD STOP	GJ	904S	626
3 EA.	SILENCER	IVES	SR64	GRAY

Door Hardware Set No. 18
Door No. 51; each to have the following:

No.	Item	Manufacturer	Description	Finish
3 EA.	HINGE	STH	FBB179	652
1 EA.	LOCKSET	SCH	L9496	626
1 EA.	WALL STOP	IVES	WS401/402CVX	626
1 EA	KICK PLATE	IVES	8500	630
3 EA.	SILENCER	IVES	SR64	GRAY

Door Hardware Set No. 19
Door No. 07B, 10B, 12B, 15B,18B, 19B, 20B, 21B, 23B, 26C, 31B, 31C, 35B, 38, (Access Doors); each to have the following:

No.	Item	Manufacturer	Description	Finish
1 EA.	CYLINDER	MEDCO		626

END OF SECTION

SECTION 08 88 36 - INTEGRATED GLASS AND BLIND ASSEMBLIES

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 manually operated glass assemblies with integral horizontal louver blinds.

B. Related Requirements:

1. Section 08 11 13 “Hollow Metal Doors and Frames".
2. Section 08 88 53 “Security Glazing”.

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 blinds.
2. Include operating characteristics, handling, and furnished specialties and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, joint locations, transitions, and terminations, and anchoring details.
3. Detail fabrication and assembly of integrated glass and blind assembly.

C. Samples for Initial Selection: For each type and color of blind material.

1. Include Samples of accessories involving color selection.

D. Product Schedule: For each integrated glass and blind assembly. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's warranty.

B. Certificates of Compliance: Manufacturer’s certification that products furnished comply with specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For integrated glass and blind assembly to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Obtain integrated glass and blind assemblies from single manufacturer.

B. Insulated Glass Manufacturer Qualifications: Qualified insulating glass manufacturer, approved by integrated glass and blind assembly manufacturer.

C. Installer Qualifications:

1. Minimum three years documented experience in work of this Section.
2. Certified under AGA Certified Installer Program.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original, unopened, undamaged containers with labels intact, with temporary label on each light identifying manufacturer, glass type, quality, and nominal thickness.

B. Stack individual panels on edge leaned slightly against upright supports with separators between panels.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install glazing until construction and wet-work and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where glazing is indicated to fit to other construction, verify dimensions of other construction before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of glazed units through entire operating range. Notify Department of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.9 WARRANTY

A. Manufacturer's Special Warranty for Integrated Glass and Blind Assemblies: Manufacturer agrees to replace defective integrated glass and blind assemblies due to improper workmanship and materials, under normal installation, use, service and maintenance. within specified warranty period.

1. 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:

1. BetweenGlassBlinds, LLC.
2. Intigral, Inc,
3. Pilkington, a Nippon Sheet Glass Co., Ltd. subsidiary.

2.2 ASSEMBLY DESCRIPTION

A. Manual operated system with raising and tilting function for blinds encapsulated within a double-glazed unit.

2.3 MATERIALS

A. Glazing: Polycarbonate security glazing per 08 88 53 “Security Glazing”.

B. Venetian Blinds: Blinds raised and lowered by moving the slider up or down and tilted by slightly lifting or lowering same slider.

a. Slats: 0.492 inch wide color coated aluminum, color as selected by Department from manufacturer’s full color range.

C. Magnetic Device: Located inside the blind head rail within the cavity.

D. Magnet Operator:

1. Designed to tilt blinds.
2. Attached to internal glass in unit using designated guide.

2.4 MISCELLANEOUS GLAZING MATERIALS

A. See Section 08 88 53 “Security Glazing”.

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. Examine glazing units before installation. Reject units that are damaged.

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

3.2 PREPARATION

A. Clean surfaces to receive glass units prior to installation.

3.3 INSTALLATION

A. Comply with manufacturer's written installation instructions and Section 08 88 53 "Security Glazing".

3.4 TESTING AND DEMONSTRATION

A. Test window blinds to verify that operating mechanisms, and other operating components are functional. Correct deficiencies.

3.5 CLEANING AND ADJUSTING

A. Clean glass surfaces; remove temporary labels and foreign matter.

B. Replace cracked, broken, and imperfect glass, and glass that has been improperly installed.

C. Adjust moving parts to function smoothly, and lubricate as recommended by manufacturer.

3.6 PROTECTION

A. Remove and replace glazing and blind units that damaged.

B. Protect installed products until completion of project.

C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 08 88 53 - 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 monolithic polycarbonate and insulating security glazing, for the following applications:

1. Windows
2. Doors.
3. Interior borrowed lites.
4. Fire rated glazing.
5. Window films.
6. Window speakers.

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 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on security glazing, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Security Glazing Samples: For each type of security glazing; 4 inches square minimum.

C. Glazing Film Samples: For each type of film used; 6 inches square.

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.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installers of glazing and glazing film.

B. Product Certificates: For each type of product indicated, from manufacturer.

C. Product Test Reports: For each type of security glazing, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Sample Warranties: For special warranties.

1.7 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.

C. Security Glazing Testing Agency Qualifications: Subject to compliance with requirements, testing agency is one of the following:

1. H. P. White Laboratory, Inc.
2. Underwriters Laboratories, Inc.
3. Wiss, Janney, Elstner Associates, Inc.

D. Sealant Testing Agency Qualifications: Qualified according to ASTM C 1021 for testing indicated.

E. Manufacturer Qualifications: A single film manufacturer with minimum ten years experience.

F. Installer Qualifications: A film installer authorized by the film manufacturer.

1.8 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. Protect glazing film according to manufacturer's written instructions. Prevent damage from condensation, temperature changes, direct exposure to sun, or other causes.

1.9 FIELD 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.

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated Glass: Manufacturer agrees to replace coated glass that deteriorates within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Polycarbonate Sheet: Manufacturer agrees to replace polycarbonate sheet that deteriorates within specified warranty period. Deterioration of polycarbonate sheet is defined as defects developed from normal use that are not attributed to maintaining and cleaning polycarbonate sheet contrary to manufacturer's written instructions. Defects include yellowing and loss of light transmission.

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

C. Manufacturer's Special Warranty on Insulating Security Glazing: Manufacturer agrees to replace insulating security glazing that deteriorates within specified warranty period. Deterioration of insulating security glazing is defined as defects in individual lites developed from normal use or failure of hermetic seal under normal use. Deterioration does not include defects in individual lites or failure of hermetic seal that is attributed to glass breakage or to maintaining and cleaning insulating security glazing contrary to manufacturer's written instructions.

1. Defects in coated-glass lites include peeling, cracking, and other indications of deterioration in coating.
2. Defects in laminated-glass lites include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
3. Evidence of hermetic seal failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glazing.
4. Warranty Period: 10 years from date of Substantial Completion.

D. Manufacturer's Special Warranty on Fire Rated Glass: Manufacturer agrees to replace fire rated glass units that deteriorate 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 contrary to manufacturer's written instructions. Defects include obstructing vision through glass, and blemishes exceeding those allowed by referenced glass standard.

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

E. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

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

F. Manufacturer’s Special Warranty for Glazing Film: Manufacturer agrees to replace glazing film that deteriorates within specified warranty period. Deterioration of glazing film is defined as excessive or unusual loss of color, adhesive failure, bubbling, cracking, crazing, delamination, demetallization, or pealing. Warranty to cover labor for removal and reinstallation.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Security Glazing: Obtain each type of security glazing from single source from single manufacturer using the same types of lites, plies, interlayers, and spacers for each security glazing type indicated.

B. Source Limitations for Glazing Film: Obtain glazing film from single source from single manufacturer.

C. Source Limitations for Glazing Sealants: Obtain from single source from single manufacturer for each product and installation method.

2.2 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.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated.

1. Design Procedure for Glass: ASTM E 1300 and ICC's International Building Code.
2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.

    a. Basic Wind Speed: 100 mph.
    b. Importance Factor: 1.15.
    c. Exposure Category: B.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glazing framing members and glazing components.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

2.3 SECURITY GLAZING, GENERAL

A. 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: "Laminated Glazing Reference Manual" and "Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Plastic Glazing Labeling: Identify plastic sheets with appropriate markings of applicable testing and inspecting agency, indicating compliance with required fire-test-response characteristics.

C. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glazing, glass thickness, and safety glazing standard with which glazing complies.

D. Insulating Glazing Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the Insulating Glass Certification Council.

E. Thermal and Optical Performance Properties: Provide security glazing with performance properties specified, as indicated in manufacturer's published test data, based on construction products 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.
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.

2.4 LAMINATED GLASS

A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements, 0.25 inch composite thickness minimum with clear 0.060 inch polyvinyl butyral interlayer.

2.5 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.

2.6 INSULATING SECURITY GLAZING

A. Insulating Security Glazing: Factory-assembled units, consisting of sealed lites of glazing material indicated separated by a dehydrated interspace, qualified according to ASTM E 2190

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Spacer: Stainless steel.
3. Desiccant: Molecular sieve or silica gel, or blend of both.

2.7 FIRE-PROTECTION-RATED GLAZING

A. Laminated Ceramic Glazing: Laminated glass made from two plies of clear, ceramic glass; 8-mm total thickness; and complying with 16 CFR 1201, Category II.

1. SAFTI FIRST Fire Rated Glazing; SuperLite I-W.
2. Schott North America, Inc, Pyran Platinum.
3. Technical Glass Products; FireLite Plus.

2.8 GLAZING FILM

A. Optical Performance Properties: Provide glazing film with performance properties specified, as indicated in manufacturer's published test data, based on construction products indicated and on procedures indicated below:

1. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

B. Film: Clear polyethylene film with sputter coated silver alloy recommended for application to polycarbonate glazing.

1. Products: Subject to compliance with requirements, provide available products that may be incorporated into the Work include, but are not limited to, the following:
   a. 3M; Silver 15 Plastic.
   b. Decorative Films, LLC.; Solyx Silver 15
   c. Hanita Coatings; PolyZone Silver 20.
   d. Exterior Plexi Silver 20% VLT Window Tinting Film; distributed by WindowTint.com
   e. PR:Solar Window Films, Ltd.; CoolKote.
   f. Adhesive: As recommended by film manufacturer.

C. Properties (On 6-mm clear float glass):

1. Visible Light Reflectance (Interior): 56 percent minimum, 62 percent maximum.
2. Visible Light Reflectance (Exterior): 56 percent minimum, 62 percent maximum.
3. Visible Light Transmittance: 14 percent minimum, 19 percent maximum.
4. Glare Reduction: 75 percent minimum.

2.9 WINDOW SPEAKER

A. Self-contained amplified speaker unit through glazing with microphone on secure side for two-way communication, rugged aluminum construction, voice activated switch, background noise filtering, lineal volume control, installs with tamper-proof screws.

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. Armortex; SP-EL-HT-01.
   b. Haven Technology Corporation: SC100.
   c. Norcon Communications, Inc.; TTU-1-X.

2.10 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they 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. Field-applied sealants shall have a VOC content of 250 g/L or less.
4. Colors of Exposed Glazing Sealants: Black.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

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; 791.
b. Pecora Corporation; 864NST.
c. Tremco Incorporated; Spectrem 2.

2. Application: Exterior doors.

C. Security Sealant: Manufacturer's standard, nonsag, tamper-resistant sealant for joints with low movement complying with ASTM C 920, Grade NS, Class 12.5 or 25, Use NT, and with a Shore A hardness of at least 45 when tested according to ASTM C 661.

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. BASF Construction Chemicals, LLC, Building Systems; Sonolastic Ultra.
b. Pecora Corporation; DynaFlex.

2. Application: Exterior doors and interior windows and doors.

2.11 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: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by 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. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.12 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.

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. Minimum required bite.
5. 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.

B. Cut holes in glazing for window speakers where indicated on Drawings.

C. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

D. Clean surfaces to receive film thoroughly prior to installation.

E. Prepare surfaces to receive film using the methods recommended by the manufacturer.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of security glazing, sealants, gaskets, and other glazing materials and accessories 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 and impair performance and 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.

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 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 and films face exterior or interior as specified.

3.4 FILM INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Cut film edges neatly and tight to window sealant. Use new blade tips after 3 to 4 cuts.

C. Install in one continuous length free of air bubbles, blisters, or other defects.

3.5 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 washaway from security glazing.

3.6 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect security glazing from contact with contaminating substances resulting from construction operations, including weld splatter. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with security glazing, remove substances immediately as recommended in writing by security glazing manufacturer. Remove and replace security glazing that cannot be cleaned without damage.

C. Wash security glazing on both 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.

3.7 MONOLITHIC POLYCARBONATE SECURITY GLAZING SCHEDULE

A. Security Glazing (Interior Glazing): Monolithic polycarbonate with mar-resistant coating on both surfaces.

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. Bayer MaterialScience; Makrolon AR.
b. Global Security Glazing; Lexgard

2. Detention Security Grade: Grade 3 according to ASTM F 1915.
3. Thickness: 0.375 inch.

B. Fire Rated Security Glazing with Film (Interior Glazing): One pane of fire rated laminated and two panes of monolithic polycarbonate with mar-resistant coatings.

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. Bayer MaterialScience; Makrolon AR.
b. Global Security Glazing; Lexgard

2. Detention Security Grade: Grade 3 according to ASTM F 1915.
3. Thickness: 0.375-inch polycarbonate on Corridor side, 0.312-inch fire-protection-rated glazing, 0.125-inch polycarbonate on non-Dayroom side, panes not laminated.
4. Provide glazing film to second surface of 0.125-inch glazing.

3.8 INSULATING SECURITY GLAZING SCHEDULE

A. Security Glazing (Exterior Glazing): Low-e-coated, clear insulating security glazing. Outdoor lite is made of laminated glass and indoor lite is made of monolithic polycarbonate.

1. Detention Security Grade: Grade 3 according to ASTM F 1915 cold-temperature impact test and torch and small blunt impactor test.
2. Overall Unit Thickness: 1-1/4 inch.
3. Outdoor Lite: Laminated Glass

a. Minimum Thickness of Each Glass Ply: 3 mm.
b. Interlayer: 0.090 inch polyvinyl butyral.

c. Low-E Coating: Sputtered on fourth surface (inside face of inside pane).
d. Film: Adhere to on fourth surface (inside face of inside pane).

4. Indoor Lite: Monolithic polycarbonate.

   a. Thickness: 0.375 inch with glazing film on protected surface.

5. Interspace Content: Argon.
6. Interspace Dimension: 0.50 inch.
7. Protection Lite: 0.118 inch thick mar-resistant monolithic polycarbonate, not laminated to inner lite.
8. Provide safety glazing labeling.

END OF SECTION

SECTION 09 21 16.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

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. Gypsum board shaft wall assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each component of gypsum board shaft wall assembly.

1.4 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 support them on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with gypsum-shaftliner-board manufacturer's written instructions.

B. Do not install finish panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and 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 E119 by an independent testing agency.

2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

A. Fire-Resistance Rating: 1 hour.

B. Gypsum Shaftliner Board:

1. Type X: ASTM C1396/C1396M; manufacturer's proprietary fire-resistive liner panels with paper faces, 1 inch thick, with double beveled long edges.

C. Non-Load-Bearing Steel Framing, General: Complying with ASTM C645 requirements for metal unless otherwise indicated and complying with requirements for fire-resistance-rated assembly indicated.

1. Protective Coating: ASTM A653/A653M, G40, hot-dip galvanized unless otherwise indicated.

D. Studs: Manufacturer's standard profile for repetitive, corner, and end members as follows:

1. Depth: 2-1/2 inches.
2. Minimum Base-Metal Thickness: 0.021 inch.

E. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches long and matching studs in depth.

1. Minimum Base-Metal Thickness: Matching steel studs.

F. Finish Panels: Gypsum board as specified in Section 09 29 00 "Gypsum Board.".

2.3 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with shaft wall manufacturer's written instructions.

B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 09 29 00 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written instructions for application indicated.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.

1. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E488/E488M conducted by a qualified testing agency.
2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.

E. Reinforcing: Galvanized-steel reinforcing strips with 0.033-inch minimum thickness of base metal (uncoated).

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

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

3.2 INSTALLATION

A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated and manufacturer's written installation instructions.

B. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.

1. Reinforcing: Provide where items attach directly to shaft wall assembly as indicated on Drawings; accurately position and secure behind at least one layer of face panel.

C. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices and similar items.

D. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels while maintaining continuity of fire-rated construction.

E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.3 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and 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

SECTION 09 22 16 - 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.

1.3 DESIGN REQUIREMENTS

A. Design in accordance with American Iron and Steel Institute Publication “Specification for the Design of Cold-Formed Steel Structural Members”, except as otherwise shown or specified.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Notify manufacturer of damaged materials received prior to installing.

B. Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required in AISI's “Code of Standard Practice”.

PART 2 - PRODUCTS

2.1 FRAMING SYSTEMS

A. 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.

B. 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.

C. Slip-Type Head Joints: Where indicated, provide the following:

1. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.063 inch.

E. 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.

2.2 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.

B. Isolation Strip at Exterior Walls: Provide the following:

1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

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 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. 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.

3.3 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
2. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION

SECTION 09 29 00 - 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. Section 09 22 16 "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Mark-up construction drawings to indicate proposed gypsum wallboard control joint locations.

1.4 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.

1.5 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 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

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. Georgia-Pacific Building Products.
3. National Gypsum Company.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

C. Glass-Mat Gypsum Board, Type X: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.

1. Core: 5/8 inch.
2. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
3. Indentation: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
4. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.
5. Hard-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
6. Long Edges: Tapered.
7. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

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 as rated according to ASTM D 3274.

2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:

a. Bullnose bead.

b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. L-Bead: L-shaped; exposed long flange receives joint compound.
d. Expansion (control) joint.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

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. 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.

2. Fill Coat: For second coat, use drying-type, all-purpose compound.
3. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.5 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.

C. 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.

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 ACOUSTICAL INSULATION INSTALLATION:

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

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

C. Install batt insulation friction fit between framing members. Secure in place to prevent sag.

D. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

E. Extend insulation into profile of metal studs. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with panel placement.

3.3 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. Fit gypsum panels around ducts, pipes, and conduits.

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 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.

3.4 APPLYING INTERIOR GYPSUM BOARD

A. 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. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

B. STC-Rated Assemblies: Seal construction with acoustical insulation at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of sealant. Install sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies.

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. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Department for visual effect.

C. Interior Trim: Install in the following locations:

1. Bullnose Bead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where LC-Bead cannot be installed.

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 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 4: At panel surfaces that will be exposed to view.

    a. Primer and its application to surfaces are specified in Section 09900 "Painting."

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

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for ceilings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL PANELS, GENERAL

A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.

B. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.

2.3 ACOUSTICAL PANELS

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. Armstrong World Industries, Inc.; Model 1831 Fine Fissured.
2. CertainTeed Corp.; Vantage 10, Model VAN-157.
3. USG Interiors, Inc.; Subsidiary of USG Corporation: Model 560 Fissured.

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type III, mineral base with painted finish; Form 2, water felted.
2. Pattern: CD (perforated, small holes and fissured) or CE (perforated, small holes and lightly textured).

C. Color: White.

D. LR: Not less than 0.80.

E. NRC: Not less than 0.55.

F. CAC: Not less than 30.

G. Edge/Joint Detail: Square.

H. Thickness: 5/8 inch.

I. Modular Size: 24 by 24 inches.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.

B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.135-inch- diameter wire.

D. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

E. 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. Armstrong World Industries, Inc.
2. CertainTeed Corp.
3. USG Interiors, Inc.; Subsidiary of USG Corporation.

F. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation; with prefinished 15/16-inch-wide metal caps on flanges.

1. Structural Classification: Heavy-duty system.
2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
3. Face Design: Flat, flush.
4. Cap Material: Steel cold-rolled sheet.
5. Cap Finish: Painted white.

G. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners including seismic edge clips.

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

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

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions, ASTM E 580, and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
6. Attach hangers to steel roof deck with screws no longer than 1-1/4 inch. Attach hangers to structural members.
7. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
8. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Arrange directionally patterned acoustical panels as follows:

a. As indicated on reflected ceiling plans.

2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
4. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient stair accessories.
3. Resilient molding accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type and color of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.5 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.

1.6 FIELD CONDITIONS

A. Install resilient products after other finishing operations, including painting, have been completed.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace resilient base and accessories that do not comply with requirements or that fail in materials within specified warranty period.

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

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE

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. Armstrong World Industries, Inc.
2. Burke Mercer Flooring Products, Division of Burke Industries Inc.
3. Johnsonite; A Tarkett Company.
4. Roppe Corporation, USA.

B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

1. Group: II (layered).
2. Style and Location:

a. Style B, Cove: Provide in areas with resilient flooring.

C. Thickness: 0.125 inch.

D. Height: 4 inches.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed.

G. Inside Corners: Job formed.

H. Colors: As selected by Architect from standard range of industry colors. One color will be selected.

2.2 RUBBER STAIR ACCESSORIES

A. Fire-Test-Response Characteristics: 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. 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. Armstrong World Industries, Inc.
2. Burke Mercer Flooring Products, Division of Burke Industries Inc.

3. Johnsonite; A Tarkett Company.
4. Roppe Corporation, USA.

C. Stair Treads: ASTM F 2169.

1. Type: TS (rubber, vulcanized thermoset).
2. Class: 2 (pattern; embossed, grooved, or ribbed).

a. Provide raised square pattern.

3. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
4. Nosing Height: 2 inches.
5. Thickness: 1/4 inch and tapered to back edge.
6. Size: Lengths and depths to fit each stair tread in one piece.

D. Separate Risers: Smooth, flat; in height that fully covers substrate; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

1. Style: Coved toe, 7 inches high by length matching treads.
2. Thickness: 0.125 inch.

E. Stringers: Height and length after cutting to fit risers and treads and to cover stair stringers; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

1. Thickness: 0.125 inch.

F. Colors and Patterns: As selected by Architect from standard range of industry colors.

2.3 VINYL MOLDING ACCESSORY

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. Armstrong World Industries, Inc.
2. Burke Mercer Flooring Products, Division of Burke Industries Inc.
3. Johnsonite; A Tarkett Company.
4. Roppe Corporation, USA.

B. Description: Vinyl carpet edge for glue-down applications and reducer strip for resilient flooring.

C. Profile and Dimensions: 2 inch wide carpet to concrete reducer, 1 inch wide tile reducer, and 1-1/2 inch carpet to tile joiner.

D. Colors and Patterns: Match resilient base.

2.4 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.

1. Adhesives shall have a VOC content of 50 g/L or less.

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.

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. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. 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.

D. 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. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

    a. Form without producing discoloration (whitening) at bends. Shave back of base vertically at fold point and at two diagonal additional stress relief gouges on the vertical surface, approximately 1/2-inch long, 1-inch from the center gouge.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

    a. Miter or cope corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Stair Accessories:

1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.

2. Tightly adhere to substrates throughout length of each piece.

C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 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. Sweep and vacuum horizontal surfaces thoroughly.
3. 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.

END OF SECTION

SECTION 09 65 19 - 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. Vinyl composition floor tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.5 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.

B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. 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.

1.7 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 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.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace resilient flooring that do not comply with requirements or that fail in materials within specified warranty period.

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

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.

2.2 VINYL COMPOSITION FLOOR TILE

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. Armstrong World Industries, Inc; Standard Excelon 51911 Classic White.
2. Azrock Commercial Flooring, DOMCO; Cortina Collection V214 Ashes.
3. Mannington Mills, Inc; Standard Vinyl Composition Tile Pumice 152.

B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.

C. Wearing Surface: Smooth.

D. Thickness: 0.125 inch.

E. Size: 12 by 12 inches.

F. Colors and Patterns: As indicated by manufacturer's designations.

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 following limits for VOC content:

a. Vinyl Composition Tile Adhesives: 50 g/L or less.

C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile 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 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 10 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 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 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.

E. 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 direction alternating in adjacent tiles (basket-weave pattern).

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. Center transitions under doors.

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. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile 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, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply two coats.

E. Cover floor tile until Substantial Completion.

END OF SECTION

SECTION 09 68 13 - TILE CARPETING

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. Modular carpet tile.

B. Related Requirements:

1. Section 09 65 13 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 DEFINITIONS

A. Pile Thickness: Yarn Tuft heights above top surface of backing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation recommendations for each type of substrate.

B. Shop Drawings: For carpet tile installation, plans showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of edge, transition, and other accessory strips.

C. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.

D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd..

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Carpet and Rug Institute's CRI 104.

1.10 FIELD CONDITIONS

A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, the following:

    a. More than 10 percent edge raveling, snags, and runs.
    b. Dimensional instability.
    c. Excess static discharge.
    d. Loss of tuft-bind strength.
    e. Loss of face fiber.
    f. Delamination.

3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:

1. Basis-of-Design Product: The design for each carpet type is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

    a. Substitutions will be evaluated on overall performance, yarn performance, warranty, yarn colors, and size of pattern.

2.2 CARPET TILE

A. Color: As indicated by manufacturer's designations.

B. Fiber Content: 100 percent nylon 6, 6.

C. Fiber Type: Ultron or approved substitution.

D. Pile Characteristic: Tip-sheared patterned loop pile.

E. Yarn Twist: .

F. Density: 5,500 oz./cu. yd. minimum based on pile thickness.

G. Pile Thickness: 0.149 inches for finished carpet tile according to ASTM D6859.

H. Stitches: 10.33 stitches per inch.

I. Gage: 5/64 ends per inch.

J. Surface Pile Weight: 23t oz./sq. yd..

K. Primary Backing/Backcoating: Manufacturer's standard composite materials.

L. Secondary Backing: Manufacturer's standard material.

M. Backing System: .

N. Size: 18 by 36 inches.

O. Applied Treatments:

1. Soil-Resistance Treatment: Manufacturer's standard treatment.

P. Performance Characteristics:

1. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
2. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.

2.3 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 03 30 00 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

    a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
    c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

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

3.2 PREPARATION

A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: Partial glue down; install periodic tiles with releasable, pressure-sensitive adhesive .

C. Maintain dye-lot integrity. Do not mix dye lots in same area.

D. Maintain pile-direction pattern of brick horizontal ashlar.

E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

G. Install pattern parallel to walls.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION

SECTION 09 90 00 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Related Sections include the following:

1. Section 09 96 00 “High-Performance Coatings” for shower room floor finish.

C. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Department will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, labels and exterior horizontal traffic surfaces.

1. Prefinished items including, but not limited to, the following factory-finished components:

a. Architectural casework.
b. Acoustical ceiling panels.
c. Finished mechanical and electrical equipment.
d. Light fixtures.
e. Exterior concrete surfaces.

2. Concealed surfaces including, but not limited to, walls or ceilings in the following generally inaccessible spaces:

a. Furred areas.
b. Ceiling plenums.
c. Pipe spaces.

3. Finished metal surfaces including, but not limited to, the following:

    a. Anodized aluminum.
    b. Stainless steel.
    c. Chromium plate.

4. Operating parts include, but not limited to, moving parts of operating equipment and the following:

    a. Valve and damper operators.
    b. Linkages.
    c. Sensing devices.
    d. Motor and fan shafts.

5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

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 four Samples on 8-by-10 inch cardstock for Department’s review of color and texture only:
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.
5. Submit Samples on the following substrates for Department's review of color and texture only:

    a. Stained Wood: Provide 8- by 10-inch Samples of each stained wood finish to be used on representative rough sawn cedar surfaces.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. VOC content.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations: Obtain primers for each coating system from the same manufacturer as the finish coats.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label.

B. 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 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.

1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before starting or continuing with coating operation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Paint 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. Glidden Professional Paints/PPG Amercoat Industrial, Devoe Light Industrial
2. PPG Industries, Inc. (Pittsburgh Paints).
3. Rhodda Paint Co.
4. Sherwin-Williams Co. (Sherwin-Williams).

B. Stain Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. PPG Industries, Inc. (Pittsburgh Paints).
2. Samuel Cabot, Inc. (Samuel Cabot).
3. Sherwin-Williams Co. (Sherwin-Williams).

C. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT MATERIALS, GENERAL

A. 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.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

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. Primers, Sealers, and Undercoaters: 200 g/L.

D. Colors: As selected by Architect from manufacturer's full range.

1. Match existing wall color and door color.

2.3 INTERIOR PRIMERS

A. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application.

1. Glidden Professional Paints; 1090-1200 Ultra Basecoat Interior Latex Wall Primer/Sealer: Applied at a dry film thickness of not less than 1.2 mils.
2. Pittsburgh Paints; 6-2 SpeedHide Interior Quick-Drying Latex Sealer: Applied at a dry film thickness of not less than 1.0 mil.

3. Sherwin-Williams; PrepRite 200 Latex Wall Primer B28W200 Series: Applied at a dry film thickness of not less than 1.6 mils.

B. Interior Wood Primer for Acrylic-Enamel and Semigloss Alkyd-Enamel Finishes: Factory-formulated alkyd- or acrylic-latex-based interior wood primer.

1. Glidden Professional Paints; 3210-1200 Ultra-Hide Aquacrylic GRIPPER Stain Killer Primer Sealer: Applied at a dry film thickness of not less than 1.8 mils
2. Pittsburgh Paints; 17-921 Seal Grip 100 Percent Acrylic Universal Primer: Applied at a dry film thickness of not less than 1.6 mil.
3. Sherwin-Williams; Multi-Purpose Latex Primer B51W00020: Applied at a dry film thickness of not less than 1.6 mils.

C. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.

1. Glidden Professional Paints; 4160-6130 Devguard Multi-Purpose Tank and Structural Primer: Applied at a dry film thickness of not less than 2.0 mils.
2. Pittsburgh Paints; 90-712 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 2.0 mils.
3. Sherwin-Williams; Pro Industrial Pro-Cryl Universal Primer B66W00310: Applied at a dry film thickness of not less than 3.0 mils.

D. Interior Zinc-Coated Metal Primer: Factory-formulated galvanized metal primer.

1. Glidden Professional Paints; 4160-6130 Devguard Multi-Purpose Tank and Structural Primer: Applied at a dry film thickness of not less than 2.0 mils.
2. Pittsburgh Paints; 90-712 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 2.0 mils.
3. Sherwin-Williams; Pro Industrial Pro-Cryl Universal Primer B66W00310: Applied at a dry film thickness of not less than 3.0 mils.

2.4 EXTERIOR FINISH COATS

A. Exterior Semigloss Alkyd Enamel: Factory-formulated semigloss alkyd enamel for exterior application.

1. Glidden Professional Paints; 2516 Alkyd Semgloss Enamel; Applied at a dry film thickness of not less than 1.5 mils.
2. Pittsburgh Paints; Applied at a dry film thickness of not less than 1.5 mils.
3. Sherwin-Williams; SWP Exterior Oil Base Gloss A2 Series; Applied at a dry film thickness of not less than 4.0 mils.

2.5 EXTERIOR WOOD STAIN PRODUCTS

A. Semitransparent Oil/Alkyd Stain: Factory-formulated oil- or oil/alkyd-resin-based semitransparent wood stain applied at spreading rate recommended by manufacturer.

1. Pittsburgh Paints: 77-890 Series Rez Exterior Stain Semi-Transparent Oil Stains.
2. Samuel Cabot: Semi-Transparent Stains 0300/6300 Series.
3. Sherwin-Williams: Exterior Alkyd Semi-Transparent Wood Preservative Stain A14 Series.

2.6 INTERIOR FINISH COATS

A. Interior Flat Latex-Emulsion Size: Factory-formulated flat latex-based interior paint.

1. Glidden Professional Paints; 1200 Ultrahide 250 Interior Flat Latex Wall & Trim Finish: Applied at a dry film thickness of not less than 1.4 mils.
2. Pittsburgh Paints; 6-70 Line SpeedHide Interior Wall Flat-Latex Paint: Applied at a dry film thickness of not less than 1.0 mil.
3. Sherwin-Williams; ProMar 200 Interior Latex Flat Wall Paint B30W200 Series: Applied at a dry film thickness of not less than 1.4 mils.

B. Interior Semigloss Acrylic Enamel: Factory-formulated semigloss acrylic-latex enamel for interior application.

1. Glidden Professional Paints; 1406 Ultrahide 250 Acrylic Semi-Gloss Interior Wall & Trim Enamel: Applied at a dry film thickness of not less than 1.5 mils.
2. Pittsburgh Paints; 6-500 Series SpeedHide Interior Semi-Gloss Latex: Applied at a dry film thickness of not less than 1.0 mil.
3. Sherwin-Williams; ProMar 200 Latex Semi-Gloss, B31 Series: B31W200 Series: Applied at a dry film thickness of not less than 1.3 mils.

C. Interior Semigloss Alkyd Enamel: Factory-formulated semigloss alkyd enamel for interior application.

1. Glidden Professional Paints; 2516 Alkyd Semgloss Enamel; Applied at a dry film thickness of not less than 1.5 mils.
2. Pittsburgh Paints; Applied at a dry film thickness of not less than 1.5 mils.
3. Sherwin-Williams; SWP Exterior Oil Base Gloss A2 Series; Applied at a dry film thickness of not less than 4.0 mils.

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. Wood: 15 percent.
2. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

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. General: 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.

B. 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.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.

D. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

E. 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 3, "Power Tool Cleaning."

F. 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.

G. 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.

H. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
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.

I. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions.

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 with exterior paint.
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. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. 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.

D. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view in occupied spaces:

    a. Equipment, including panelboards.
    b. Uninsulated metal piping.
    c. Pipe hangers and supports.
    d. Metal conduit.
    e. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.
3. Sand lightly between each succeeding enamel or varnish coat.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces, except in mechanical equipment rooms, and electrical rooms.

F. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

G. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

H. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats.

I. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 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.

3.5 EXTERIOR PAINT SCHEDULE

A. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated metal surfaces:

1. Semi-Gloss Alkyd Enamel Finish: Two finish coat over a factory applied primer.

a. Finish Coats: Exterior semi-gloss alkyd enamel.

3.6 INTERIOR PAINT SCHEDULE

A. Concrete Unit Masonry: Provide the following finish systems over interior concrete masonry:

1. Semigloss Acrylic-Enamel Finish: One finish coat over existing painted surface.

a. Finish Coat: Interior semigloss acrylic enamel.

B. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:

1. Semigloss Acrylic-Enamel Finish: Two finish coats over a primer.

a. Primer: Interior gypsum board primer.
b. Finish Coats: Interior semigloss acrylic enamel.

C. Wood: Provide the following paint finish systems over new interior wood surfaces:

1. Semigloss Acrylic-Enamel Finish: Two finish coats over a wood undercoater.

a. Primer: Interior wood primer for acrylic-enamel and semigloss alkyd-enamel finishes.
b. Finish Coats: Interior semigloss acrylic enamel.

D. Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Semigloss Alkyd Enamel Finish: Two finish coats over a primer.

a. Primer: Interior ferrous-metal primer.
b. Finish Coats: Interior semi-gloss alkyd enamel.

E. Zinc-Coated Metal: Provide the following finish systems over interior zinc-coated metal surfaces:

1. Semigloss Alkyd-Enamel Finish: Two finish coats over a primer.

a. Primer: Interior zinc-coated metal primer.
b. Finish Coats: Interior semi-gloss alkyd enamel.

F. All-Service Jacket over Insulation: Provide the following finish system on cotton or canvas insulation covering:

1. Flat Acrylic Finish: Two finish coats. Add fungicidal agent to render fabric mildew proof.

a. Finish Coats: Interior flat latex-emulsion size.

3.7 EXTERIOR WOOD STAIN SCHEDULE

A. Exterior Wood Siding: Provide the following stain systems on exterior wood siding, and wood trim including fasciae and soffits:

1. Semitransparent Oil/Alkyd Finish: Two coats.

a. Stain Coats: Semitransparent oil/alkyd stain.

END OF SECTION

SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation and field application of high-performance coating systems to items and surfaces scheduled.

B. Related Sections include the following:

1. Section 09 90 00 "Painting" for general field painting.

1.3 DEFINITIONS

A. Standard coating terms defined in ASTM D 16 apply to this Section.

B. Gloss ranges used in this Section include the following:

1. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
2. High gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

C. Environments: The following terms are used in Part 2 of this Section to distinguish between different corrosive exposures:

1. "Severe environments" are highly corrosive industrial atmospheres with sustained exposure to high humidity and condensation and with frequent cleaning using strong chemicals. Environments with heavy concentrations of strong chemical fumes and frequent splashing and spilling of harsh chemical products are severe environments.
2. "Moderate environments" are corrosive industrial atmospheres with intermittent exposure to high humidity and condensation, occasional mold and mildew development, and regular cleaning with strong chemicals. Environments with exposure to heavy concentrations of chemical fumes and occasional splashing and spilling of chemical products are moderate environments.
3. "Mild environments" are industrial atmospheres with normal exposure to moderate humidity and condensation, occasional mold and mildew development, and infrequent cleaning with strong chemicals. Environments with low levels of mild chemical fumes and occasional splashing and spilling of chemical products are mild environments. Normal outdoor weathering is also considered a mild environment.

1.4 SUBMITTALS

A. Product Data: For each coating system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each material specified.

B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions.

1. Provide stepped Samples defining each separate coat, including primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
2. List of material and application for each coat of each sample. Label each sample for location and application.
3. Submit samples on the following substrates for Department’s review of color and texture:

    a. Submit four Samples on 8-by-10 inch cardstock for Department’s review of color and texture only:

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. VOC content.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed high-performance coating system applications similar in material and extent to those indicated for Project and whose work has a record of successful in-service performance.

B. Source Limitations: Obtain primers and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:

1. Name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. Handling instructions and precautions.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect materials from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and applying coatings.

1.7 PROJECT CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 45 and 95 deg F.

B. Do not apply coatings 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.

1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operation.
2. Work may continue during inclement weather only if areas and surfaces to be coated are enclosed and temperature within the area can be maintained within limits specified by manufacturer during application and drying periods.

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 indicated in the coating system descriptions.

B. Products: Subject to compliance with requirements, provide one of the products indicated in the coating system descriptions.

C. Manufacturers' Names: The following manufacturers are referred to in the coating system descriptions by shortened versions of their names shown in parenthesis:

1. Carboline Company (Carboline).
2. Pittsburgh Paint; PPG Industries, Inc. (PPG).
3. Sherwin Williams; Industrial and Marine Coatings (S-W).
4. Tnemec Company, Inc. (Tnemec).

2.2 COATINGS MATERIALS, GENERAL

A. Material Compatibility: Provide primers, undercoats, and finish-coat materials 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.

B. Material Quality: Provide manufacturer's highest grade of the various high-performance coatings specified. Materials not displaying manufacturer's product identification are not acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

2.3 COLORS

A. Colors: As selected by Architect from manufacturer's full range.

2.4 INTERIOR HIGH-PERFORMANCE COATING SYSTEMS

A. Concrete Shower Room Floors: Provide the following finish systems over interior concrete surfaces:

1. Moderate Environment (Semigloss Finish): One finish coat over an intermediate coat and a primer.

a. Primer: Epoxy primer applied at spreading rate recommended by manufacturer.

1) Carboline: 888 2-Component Polyamide Epoxy.
2) PPG: 97-14XX Series Pitt-Guard DTR Epoxy.
3) S-W: Primer not required.
4) Tnemec: Series 66 Hi-Build Epoxoline Polamidoamine Epoxy.

b. Intermediate Coat: Epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 2.0 to 5.0 mils.

1) Carboline: 888 2-Component Polyamide Epoxy.
2) PPG: 97-1XXX Series Aquapon High Build Semi-Gloss Polyamide Epoxy Coating.
3) S-W: Epolon II Multi-Mil Epoxy Series B62V800.
4) Tnemec: Intermediate coat not required.

c. Topcoat: Semigloss polyamide epoxy applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 2.0 to 5.0 mils, unless otherwise indicated.

1) Carboline: 888 2-Component Polyamide Epoxy.
2) PPG: 97-1XXX Series Aquapon High Build Semi-Gloss Polyamide Epoxy Coating.
3) S-W: Epolon II Multi-Mil Epoxy Series B62V800.
4) Tnemec: Series 66 Hi-Build Epoxoline Polamidoamine Epoxy.

B. Aggregate: Sand

PART 3 - EXECUTION

3.1 EXAMINATION

A. With Applicator present, examine substrates and conditions under which high-performance coatings will be applied, for compliance with coating application requirements.

1. Apply coatings only after unsatisfactory conditions have been corrected and surfaces to receive coatings are thoroughly dry.
2. Start of application is construed as Applicator's acceptance of surfaces within that particular area.

B. Coordination of Work: Review other Sections in which primers or other coatings are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of specified finish materials to ensure compatible primers.

1. If a potential incompatibility of primers applied by others exists, obtain the following from the primer Applicator before proceeding:

    a. Confirmation of primer's suitability for expected service conditions.
    b. Confirmation of primer's ability to be top coated with materials specified.

2. Notify Department about anticipated problems before using the coatings specified over substrates primed by others.

3.2 PREPARATION

A. Cleaning: Before applying high-performance coatings, clean substrates of substances that could impair bond of coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and coating application so dust and other contaminates from cleaning process will not fall on wet, newly coated surfaces.

B. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's written instructions for each substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove primers and reprime substrate.
2. Cementitious Substrates: Prepare concrete surfaces to be coated. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen if required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.

    a. Use abrasive blast-cleaning methods if recommended by coating manufacturer.
    b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not coat surfaces if moisture content exceeds that permitted in manufacturer's written instructions.

C. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
3. Use only the type of thinners approved by manufacturer and only within recommended limits.

3.3 APPLICATION

A. General: Apply high-performance coatings according to manufacturer's written instructions.

1. Use applicators and techniques best suited for the material being applied.
2. Do not apply high-performance coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
3. Coating colors, surface treatments, and finishes are indicated in the coating system descriptions.
4. Provide ventilation to prevent odors from passing to occupied adjacent spaces.
5. Provide finish coats compatible with primers used.
6. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, grilles, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.

B. Scheduling Coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for coating as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required is the same regardless of application method.

    a. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
    b. Where Drawings require sanding, sand between applications to produce a smooth, even surface. Broadcast sand over wet intermediate coat to resistance. Vacuum loose sand before topcoat application.
    c. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat does not cause undercoat to lift or lose adhesion.

2. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance. Give special attention to edges, corners, crevices, welds, exposed fasteners, and similar surfaces to ensure that they receive a dry film thickness equivalent to that of flat surfaces.

C. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brush Application: Use brushes best suited for material applied and of appropriate size for the surface or item being coated.

    a. Apply primers and first coats by brush unless manufacturer's written instructions permit using roller or mechanical applicators.
    b. Brush out and work brush coats into surfaces in an even film.
    c. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.

2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for the material and texture required.
3. Spray Equipment: Use mechanical methods to apply coating if permitted by manufacturer's written instructions and governing regulations.

    a. Use spray equipment with orifice size recommended by manufacturer for material and texture required.
    b. Apply each coat to provide the equivalent hiding of brush-applied coats.
    c. Do not double back with spray equipment building-up film thickness of two coats in one pass, unless recommended by manufacturer.

D. Minimum Coating Thickness: Apply each material no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by manufacturer, to material required to be coated or finished that has not been prime coated by others.

1. Recoat primed and sealed substrates if there is evidence of suction spots or unsealed areas in first coat, to ensure a finish coat with no burn-through or other defects caused by insufficient sealing.

F. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

3.4 CLEANING

A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

1. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings provided by others to protect their work.
2. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY 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. Private-use bathroom accessories for Staff Toilet.

B. Related Sections:

1. Section 10 28 13 "Detention Toilet Accessories" for accessories designed for installation in detention facilities.

1.3 ACTION 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.
2. Identify products using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.7 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.

1.8 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, 0.031-inch minimum nominal thickness unless otherwise indicated.

B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.

C. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.

D. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

E. 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.

F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

G. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

I. Adhesive: Two component epoxy type, waterproof.

2.2 PRIVATE-USE WASHROOM ACCESSORIES

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 & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.

B. Toilet Tissue (Roll) Dispenser (TPD):

1. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
2. Mounting: Surface mounted.
3. Operation: Noncontrol delivery with theft-resistant spindle.
4. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Combination Towel (Folded) Dispenser/Waste Receptacle (PTD/R):

1. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
2. Mounting: Recessed.

    a. Designed for nominal 4-inch wall depth.

3. Minimum Towel-Dispenser Capacity: 350 C-fold or 475 multifold paper towels.
4. Minimum Waste-Receptacle Capacity: 2 gal..
5. Material and Finish: Stainless steel, No. 4 finish (satin).
6. Liner: Reusable, vinyl waste-receptacle liner.
7. Lockset: Tumbler type for towel-dispenser compartment.

D. Liquid-Soap Dispenser (SD):

1. Description: Designed for dispensing soap in liquid or lotion form.
2. Mounting: Vertically oriented, surface mounted.
3. Capacity: 40 oz..
4. Materials: Stainless steel body, push button valve, unbreakable plastic refill indicator window, lock, vandal resistant mounting kit.
5. Lockset: Tumbler type.
6. Refill Indicator: Window type.

E. Mirror Unit (MI):

1. Frame: Stainless-steel angle, 0.05 inch thick.

    a. Corners: Welded and ground smooth.

2. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

    a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

3. Size: 24 by 36 inches.

2.3 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.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Department.

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.

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

SECTION 10 28 13 - DETENTION TOILET 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. Safety hooks.
2. Miscellaneous toilet accessories.
3. Stainless-steel mirrors.
4. Grab bars.
5. Shower seats.
6. Shower tracks and curtains.

B. Related Requirements:

1. Section 10 28 00 "Toilet, Bath, and Laundry Accessories" for nondetention toilet accessories.

1.3 COORDINATION

A. Coordinate size and location of recesses in wall construction to receive recessed detention toilet accessories.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples for Verification: For each type of product required, prepared on Samples of size indicated below:

1. Curtain Fabric: 10-inch square swatch or larger as required to show complete pattern repeat, with specified treatments applied. Mark top and face of material.

C. Product Schedule: For detention toilet accessories. Indicate types, quantities, sizes, and installation locations by room of each accessory required. Use same designations indicated on Drawings.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For detention toilet accessories to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Curtain Carriers: Eight full size units.
2. Curtains: One full-size unit.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace detention toilet accessories that fail in materials or workmanship within specified warranty period.

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

a. Structural failures including deflection exceeding 1/4 inch.
b. Faulty operation of hardware.
c. Deterioration of metals, metal finishes, and other materials.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Curtains: Provide curtain fabrics with the following characteristics:

1. Launderable to a temperature of not less than 90 deg F.
2. Flame resistant and identical to those that have passed NFPA 701 when tested by a testing and inspecting agency acceptable to authorities having jurisdiction.

a. Identify fabrics with appropriate markings of a qualified testing agency.

2.2 DETENTION SAFETY HOOKS

A. Multiple, Straight, Safety Hook Strip (Shower Rooms): Minimum 5-1/2-inch-high backplate by length indicated, formed from 0.078-inch- thick, stainless-steel sheet. Provide 3/8-inch-diameter, stainless-steel straight hooks attached to backplate. Provide pivoting assembly that maintains pressure on hook and snaps down when load exceeds 8 lbf.

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. American Specialties, Inc.; Clothes Hook Strip, Model No. 129.
    b. Bobrick Washroom Equipment, Inc.; Vandal-Resistant Clothes Hook, B-985.
    c. Norix Group, Inc.; Ball Clothes Hooks, Model S565-526.
    d. PSI LLC.; Ball Socket Four-Hook Strip, Model SHB-601.

2. Configuration: 18 inches long with four hooks.
3. Mounting: Front mounting with security fasteners.

B. Materials:

1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304.

C. Finishes:

1. Stainless-Steel Finish:

    a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
    b. Polished Finish: Grind and polish surfaces to produce uniform finish, free of cross scratches.

        1) Run grain of directional finishes with long dimension of each piece.
        2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
        3) Directional Satin Finish: No. 4.

2.3 COMBINATION DETENTION SHELVES WITH SAFETY HOOKS

A. Stainless-Steel Detention Shelf with Multiple, Straight Safety Hooks (Cells): Minimum 5-1/2 inches high by 8 inches deep by length indicated; formed from 0.078-inch-thick, stainless-steel sheet; with welded side gussets and hemmed or flanged front edge. Provide 3/8-inch- diameter, stainless-steel straight hooks held by 0.078-inch- thick, stainless-steel mounting plate. Provide pivoting assembly that maintains pressure on hook and snaps down when load exceeds 8 lbf.

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. American Specialties, Inc.; Bookshelf and Clothes Hooks, Model No. 128-1.
    b. PSI LLC.; Shelf with 4 Ball Socket Hooks, Model WSS-500-B.
    c. Willoughby Industries, Inc.; TH Series, Model WA-1824.

2. Configuration: 18 inches long with four hooks.

3. Mounting: Front mounting with security fasteners.

B. Materials:

1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304.

C. Finishes:

1. Stainless-Steel Finish:

a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
b. Polished Finish: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1) Run grain of directional finishes with long dimension of each piece.
2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3) Directional Satin Finish: No. 4.

2.4 MISCELLANEOUS DETENTION TOILET ACCESSORIES

A. Recessed, Detention Soap Dish: Minimum inside dimensions of 5-3/4 inches wide by 4-1/2 inches high by 2-1/2 inches deep with 3/4-inch lip around entire face; formed from 0.050-inch-thick, stainless-steel sheet. Secure to wall with rear-mounting steel strap and adjustment bolts.

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. A & J Washroom Accessories Inc.; Security Soap Dish, US80.
b. Acorn Engineering Company; Recessed Mount Soap Dish, Model 1832
c. Bradley Corporation; Security Recessed Soap Dish, Model SA16.

B. Materials:

1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304.

C. Finish:

1. Stainless-Steel Finish:

a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
b. Polished Finish: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1) Run grain of directional finishes with long dimension of each piece.
2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3) Directional Satin Finish: No. 4.

2.5 DETENTION MIRRORS

A. Large, Framed Detention Mirror with Round Corners: Formed from a single sheet of 0.050-inch-thick stainless steel; enclosed in a metal frame.

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. Southern Folger Detention Equipment Company; Large Safety Mirror, #432.
    b. Norix Group, Inc.; Ironman Cell Mirror, Model No. R565-411.
    c. Southern Folger; Safety Mirror, Model 432.

2. Size: Nominal 12 by 16 inches.
3. Frame: Formed from 0.030-inch-thick, stainless-steel sheet. Fabricate frame with welded and ground corners or from one piece of metal.
4. Mounting: Front mounting with security fasteners to 0.168-inch nominal-thickness, metallic-coated steel mounting plate.

B. Materials:

1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS (Commercial Steel), Type B; suitable for exposed applications.
2. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, CS (Commercial Steel), Type B; with G60 zinc (galvanized) coating designation.
3. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304.

C. Finishes:

1. Stainless-Steel Finish:

    a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
    b. Polished Finish: Grind and polish surfaces to produce uniform finish, free of cross scratches.

        1) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
        2) Mirrorlike Reflective, Nondirectional Polish: No. 8.

2.6 DETENTION GRAB BARS

A. Grab Bars: 1-1/2 inches in diameter; formed from 0.038-inch-thick, stainless-steel tubing, with 3-inch-diameter flanges formed from0.125-inch-thick, stainless steel. Closure plates formed from 0.125-inch-thick, stainless steel. All-welded 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. A & J Washroom Accessories Inc.; US130.
    b. Bradley Corporation; SA70 Series.
    c. Norix; Model IGS Series.

2. Length: As indicated on Drawings.
3. Mounting: Front mounting with security fasteners.

B. Materials:

1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304.
2. Stainless-Steel Tubing: ASTM A 1016 /A 1016M-08, austenitic stainless steel, Type 304, seamless.

C. Stainless-Steel Finish:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finish: Grind and polish surfaces to produce uniform finish, free of cross scratches.

    a. Run grain of directional finishes with long dimension of each piece.
    b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
    c. Directional Satin Finish: No. 4.

2.7 DETENTION SHOWER SEATS

A. Folding Shower Seat (SEAT):

1. Configuration: L-shaped seat, designed for wheelchair access.
2. Seat: Stainless steel, No. 4 finish (satin); 0.05-inch minimum nominal thickness; with single-piece, pan-type construction and edge seams welded and ground smooth.
3. Mounting Mechanism: Stainless steel, No. 4 finish (satin).

B. Shower Seats: Stainless steel, folding, surface mounted shower seat. ADA compliant, 33-by-22 inch overall size formed from 0.062-inch- thick, stainless-steel sheet or tubes.

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. Acorn Engineering Company, 1103 Series
    b. American Specialties, Inc., Model 8208
    c. Bradley Corporation; 956 Series.
    d. Norix Furniture; Model ISS-200
    e. Viking Products; Model Folding Shower Seat.

C. Materials:

1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304.

D. Stainless-Steel Finish:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

2. Polished Finish: Grind and polish surfaces to produce uniform finish, free of cross scratches.

    a. Run grain of directional finishes with long dimension of each piece.
    b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
    c. Directional Satin Finish: No. 4.

2.8 DETENTION SHOWER CURTAIN TRACK

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. Cubicle Curtain Factory, Inc.; Model 1200.
2. InPro Corporation; Model Clickeze Ultra Cubicle Track

B. Extruded-Aluminum Curtain Track: Not less than 1-1/4 inches wide by 3/4 inch high; with 0.058-inch minimum wall thickness.

1. Finish: Baked enamel, acrylic, or epoxy.

C. Curtain Track Accessories: Fabricate splices, end caps, connectors, end stops, coupling and joining sleeves, wall flanges, brackets, ceiling clips, and other accessories from same material and with same finish as track.

1. End Stop: Removable with carrier hook.

D. Curtain Carriers: Two nylon rollers and nylon axle with chrome-plated steel hook, one per curtain grommet.

E. Breakaway Curtain Carriers: Two-piece nylon breakaway curtain carriers designed to allow curtains to detach from tracks with a pulling force of no more than 5 lbf.

F. Exposed Fasteners: Stainless steel.

G. Concealed Fasteners: Hot-dip galvanized or stainless steel.

2.9 CURTAINS

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. Cubicle Curtain Factory, Inc.
2. InPro Corporation.
3. Tubular Specialties Manufacturing, Inc.

B. Shower Curtain: Curtain manufacturer's standard, polyester-reinforced vinyl fabric; flame resistant, stain resistant, and antimicrobial.

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. Herculite, Inc.; Sure-Chek Linen.
b. InPro Corporation; Super Bio-Stat.

2. Color: As selected by Department from manufacturer's standard range of colors.

C. Curtain Grommets: Two-piece, rolled-edge, rustproof, nickel-plated brass; spaced not more than 6 inches o.c.; machined into top hem.

D. Mesh Top: Manufacturer’s standard nylon mesh.

2.10 FABRICATION

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

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

C. Form edges and corners to be free of sharp edges and rough areas. Fold back exposed edges of unsupported sheet metal to form a 1/2-inch-wide hem on the concealed side, or ease edges to a radius of approximately 1/32 inch and support with concealed stiffeners.

D. Form metal in maximum lengths to minimize joints. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Weld corners and seams continuously to comply with referenced AWS standard and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
5. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure detention toilet accessories rigidly in place and to support expected loads. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce formed-metal units as needed to attach and support other construction.

G. Cut, reinforce, drill, and tap detention toilet accessories to receive hardware, security fasteners, and similar items.

H. Form exposed work true to line and level with accurate angles and surfaces. Grind off and ease edges unless otherwise indicated.

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

2.11 CURTAIN FABRICATION

A. Fabricate curtains as follows:

1. Width: Equal to track length from which curtain is hung plus 10 percent added fullness, but not less than 12 inches added fullness.
2. Length: Equal to floor-to-ceiling height, minus depth of track and carrier at top, and minus clearance above the finished floor as follows:

    a. Shower Curtains: 1/2 inch.

3. Provide manufacturer's standard top, side, and bottom hems with not less than double thickness material. Provide top mesh of not less than 1 inch and not more than 1-1/2 inches wide, triple thickness, reinforced with integral web.

2.12 SECURITY FASTENERS

A. Operable only by tools produced by fastener manufacturer or other licensed fabricator for use on specific type of fastener. 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. Acument Global Technologies North America.
    b. Bryce Fastener.
    c. Safety Socket LLC.
    d. Tamperproof Screw Co., Inc.
    e. Tamper-Pruf Screws.

2. Drive-System Type: Pinned Torx-Plus.
3. Fastener Strength: 120,000 psi.
4. Socket Button Head Fasteners:

    a. Stainless steel, ASTM F 879, Group 1 CW.

5. Socket Flat Countersunk Head Fasteners:

    a. Stainless steel, ASTM F 879, Group 1 CW.

2.13 ACCESSORIES

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

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 toilet accessories.

1. Examine roughing-in for embedded and built-in anchors to verify actual locations of detention toilet accessory connections before detention toilet accessory installation.
2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of detention toilet accessories.

B. Verify locations of detention toilet accessories.

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

3.2 INSTALLATION

A. Apply epoxy security sealant around perimeter in a continuous ribbon on back of detention toilet accessories before installation.

B. Security Fasteners: Install detention toilet accessories using security fasteners with head style appropriate for installation requirements, strength, and finish of adjacent materials. Provide stainless-steel security fasteners in stainless-steel materials.

C. Surface-Curtain Track Mounting: Fasten tracks to ceilings at intervals recommended by manufacturer. Center fasteners in track to ensure unencumbered carrier operation. Attach track to ceiling as follows:

1. Mechanically fasten directly to finished ceiling with toggle bolts.

D. Curtain Carriers: Provide curtain carriers adequate for 6-inch spacing along full length of curtain plus an additional carrier.

E. Curtains: Hang curtains on each curtain track.

3.3 FIELD QUALITY CONTROL

A. 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.

3.4 ADJUSTING AND CLEANING

A. Remove temporary labels and protective coatings.

B. Adjust safety hooks to release with application of 8-lbf load.

END OF SECTION

SECTION 10 51 23 - PLASTIC-LAMINATE-CLAD LOCKERS

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 plastic-laminate-clad wood lockers.

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 each type of locker.

B. Shop Drawings: For plastic-laminate-clad wood lockers.

1. Include plans, elevations, sections, and attachment details.
2. Show details full size.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in lockers.
5. Show locker fillers, trim, base, and accessories.
6. Show locker identification system and numbering sequence.

C. Samples for Initial Selection: For each type of the following:

1. High-pressure decorative laminates.
2. Thermoset decorative overlay panels.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms 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. Locker doors, complete with specified door hardware. Furnish no fewer than two doors of each type and color installed.
2. Units of the following locker hardware items equal two units:

a. Hinges.
b. Pulls.
c. Shelf rests.
d. Blank identification plates and holders.
e. Hooks.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver lockers until painting and similar operations that could damage lockers have been completed in installation areas. If lockers must be stored in other-than-installation areas, store only in areas where environmental conditions are the same as those in final installation location, and comply with requirements specified in "Field Conditions" Article.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install lockers until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

B. Field Measurements: Where lockers are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.

1. Locate concealed framing, blocking, and reinforcements that support lockers by field measurements before being enclosed, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where lockers are indicated to fit to other construction, establish dimensions for areas where lockers are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

A. Coordinate sizes and locations of concealed wood support bases.

1. Requirements are specified in Section 06 10 53 "Miscellaneous Rough Carpentry."

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that lockers can be supported and installed as indicated.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of lockers that fail in materials or workmanship within specified warranty period.

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

a. Structural failures.
b. Faulty operation of locks or hardware.
c. Deterioration of wood, finishes, and other materials beyond normal use.
d. .

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: For lockers indicated to be accessible, comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design", the ABA standards of the Federal agency having jurisdiction, and ICC A117.1.

2.2 PLASTIC-LAMINATE-CLAD WOOD LOCKERS

A. Construction Style: Flush overlay.

B. Final Assembly: Manufacturer's standard factory assembly.

C. Locker Body: Fabricated from particleboard-core panels covered on both sides with thermoset decorative overlay.

1. Side Panels: 5/8 inch thick.
2. Back Panel: 1/4 inch minimum thick.
3. Top Panel: 5/8 inch thick.
4. Bottom Panel: 5/8 inch thick.
5. Exposed Panel Edges: 3-mm-thick PVC.

D. Plastic-Laminate-Clad Wood Doors: High-pressure decorative laminate, Grade VGS, over both sides of particleboard core.

1. Thickness: 5/8 inch thick.
2. Panel Edges: 3-mm-thick PVC.

E. End Panels: Match style, material, construction, and finish of plastic-laminate-clad wood doors.

F. Shelves: Fabricated from particleboard-core panels covered on both sides with thermoset decorative overlay; fixed.

1. Thickness: 5/8 inch.
2. Exposed Edges: Thermoset decorative overlay to match panels.

G. Corners and Filler Panels: 5/8-inch-thick panels. Match style, material, construction, and finish of plastic-laminate-clad wood doors.

H. Continuous Finish Base: Plastic-laminate-clad, 3/4-inch-thick panel that matches door faces; fabricated in lengths as long as practical to enclose base and base ends of lockers.

I. Plastic-Laminate Colors, Patterns, and Finishes:

1. As indicated by manufacturer's designations.

2.3 MATERIALS

A. Composite Wood: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.
2. Particleboard: ANSI A208.1, Grade M-2.

B. High-Pressure Decorative Laminate: NEMA LD 3, grades as follows:

1. Vertical Surfaces: Grade VGS.

C. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

D. Anchors: Material, type, size, and finish as required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

E. Wood Support Base: 2-by-4-inch nominal-size lumber treated with manufacturer's standard preservative-treatment, process.

2.4 HARDWARE

A. Cam Padlock Hasp: Surface mounted, steel; finished to match other locker hardware.

B. Frameless Hinges (European Type): Fully concealed, self-closing, nickel-plated steel, with not less than 125 degrees of opening.

1. Provide two hinges for doors 36 inches high and less.
2. Provide three hinges for doors more than 36 inches high.

C. Accessible Handle: Metal, fixed, graspable lever handle and rose trim; surface mounted.

D. Shelf Rests: BHMA A156.9, B04013.

E. Hooks: Manufacturer's standard, ball-pointed aluminum or steel; chrome finished. Attach hooks with at least two fasteners.

1. Provide hooks as indicated on Drawings.

2. Provide two single-prong wall hooks for each compartment of single-tier lockers.

F. Exposed Hardware Finish: Satin chrome unless otherwise indicated.

G. Exposed Hardware Finish: Unless otherwise indicated, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

2.5 ACCESSORIES

A. Number Identification Plates: 1-1/2-inch-diameter, etched, embossed, or stamped, stainless-steel plates with black numbers and letters at least 1/2 inch high. Identify lockers in sequence indicated on Drawings. Finish plates to match other locker hardware.

2.6 FABRICATION

A. Fabricate each locker with shelves, an individual door and frame, an individual top, a bottom, and a back, and with common intermediate uprights separating compartments.

1. Fabricate lockers to dimensions, profiles, and details indicated.
2. Ease edges of corners of solid-wood members to 1/16-inch radius.

B. Fabricate lockers square, rigid, without warp, and with finished faces flat and free of dents, scratches, and chips. Accurately factory machine components for attachments. Make joints tight and true.

1. Fabricate lockers with joints that are dadoed or rabbeted, glued full length, and stapled. Dado side panels to receive shelving except where indicated to be adjustable.

C. Number Identification Plates: Inlay number plates flush in each locker door, near top, centered.

D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that the parts fit as intended, and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
2. Use only manufacturer's nuts, bolts, screws, and other devices for assembly.

E. Attach PVC edging to panels by thermally fusing edging to panels after panel fabrication.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and floors or support bases, with Installer present, 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 PREPARATION

A. Condition lockers to average prevailing humidity conditions in installation areas before installation.

B. Before installing lockers, examine factory-fabricated work for completeness and complete work as required, including removal of packing.

3.3 INSTALLATION

A. Install wood support base.

B. Install lockers level, plumb, and true; use concealed shims.

C. Connect groups of lockers together with manufacturer's standard fasteners, through predrilled holes, with no exposed fasteners on face frames. Fit lockers accurately together to form flush, tight, hairline joints.

D. Install lockers without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings, providing unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Installation Tolerance: No more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line. Shim as required with concealed shims.

E. Locker Anchorage: Fasten lockers through wood locker base, at ends, and not more than 36 inches o.c. with No. 8 flush-head wood screws sized for 1-inch penetration into wood base.

F. Locker Anchorage: Fasten lockers through back, near top and bottom, at ends with No. 8 pan-head sheet metal screws through metal backing or metal framing behind wall finish and spaced not more than 16 inches o.c.

G. Scribe and cut corner and filler panels to fit adjoining work using fasteners concealed where practical. Repair damaged finish at cuts.

H. Install number identification plates after lockers are in place.

1. Attach number identification plate on each locker door, near top, centered, with at least two screws with finish matching the plate.

3.4 ADJUSTING

A. Clean, lubricate, and adjust hardware. Adjust doors to operate easily without binding.

3.5 PROTECTION

A. Protect lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

B. Touch up marred finishes, or replace lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION

SECTION 11 19 00 - DETENTION 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 retention anchors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 RETENTION ANCHORS

A. Zinc plated steel welded ring and anchor strap, with 2,000 lb. minimum capacity.

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. Guardian Fall Protection; Model 00484.
b. Mackie Enterprises, Inc.; Model 80140-10
c. USA Products Group, Inc.; Model 822610

2.2 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fastening to In-Place Construction: Provide post installation concrete inserts for securing anchors to in-place concrete construction. Tack weld nut to stud and grind of excess threads.

END OF SECTION

SECTION 12 36 23 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

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 plastic-laminate countertops.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products high-pressure decorative and laminate adhesive for bonding plastic laminate.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show locations and sizes of cutouts and holes for plumbing fixtures installed in plastic-laminate countertops.

C. Samples for Verification:

1. Plastic laminates, 2 by 3 inches, for each color, pattern, and surface finish.

1.4 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. Installer Qualifications: Fabricator of products.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver countertops until painting and similar operations that could damage countertops have been completed in installation areas. If countertops must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE COUNTERTOPS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.

1. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

B. Grade: Custom.

C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.

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. Formica Corporation.
b. Panolam Industries International, Inc.
c. Wilsonart International; Div. of Premark International, Inc.

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated on Drawings by laminate manufacturer's designations.

E. Edge Treatment: 3-mm PVC edging.

F. Core Material: Particleboard.

G. Core Material at Sinks: Particleboard made with exterior glue.

H. Core Thickness: 3/4 inch.

1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

I. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.

1. Wood Moisture Content: 8 to 13 percent.

2.3 Particleboard: ANSI A208.1, Grade M-2, Grade M-2-Exterior Glue at sink locations**.**

2.4 ACCESSORIES

A. Grommets for Cable Passage through Countertops: 2-inch OD, Color as selected by Department from manufacturers full line, molded-plastic grommets and matching plastic caps with slot for wire passage.

2.5 MISCELLANEOUS MATERIALS

A. Adhesives: Do not use adhesives that contain urea formaldehyde.

B. Adhesive for Bonding Plastic Laminate: Contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive.

2.6 FABRICATION

A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:

B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.

B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
2. Seal edges of cutouts by saturating with varnish.

C. 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 plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.

3. 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 ADJUSTING AND CLEANING

A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean countertops on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

SECTION 12 36 61 - SIMULATED STONE COUNTERTOPS

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-surface-material countertops.

B. Related Sections:

1. Section 12 36 62 "Plastic-Laminate-Clad Countertops."

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge, and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

C. Samples for Verification: For the following products:

1. Countertop material, 3 inches square.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

PART 2 - PRODUCTS

2.1 SOLID-SURFACE-MATERIAL COUNTERTOPS

A. Configuration: Provide countertops with the following front and backsplash style:

1. Front: 1-1/2 inch laminated bullnose.

B. Countertops: 1/4-inch-thick, solid surface material laminated to 3/4-inch-thick particleboard with exposed edges built up with 3/4-inch-thick, solid surface material.

C. Fabrication: Fabricate tops in one piece with shop-applied edges unless otherwise indicated. Comply with solid-surface-material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

2.2 COUNTERTOP MATERIALS

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

B. Adhesives: Adhesives shall not contain urea formaldehyde.

C. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.

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. Avonite Surfaces.
b. E. I. du Pont de Nemours and Company.
c. Meganite Inc.

2. Colors and Patterns: As indicated on Drawings by manufacturer's designations.

D. Ledgers and Blocking: Dimension lumber conforming to DOC PS 20.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

1. Seal edges of cutouts in particleboard subtops by saturating with varnish.

END OF SECTION

SECTION 12 55 00 - DETENTION FURNITURE

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. Detention bunks.
2. Detention desks.
3. Detention seating.

B. Related Requirements:

1. Section 10 28 13 "Detention Toilet Accessories" for detention toilet and bath accessories.

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 detention furniture.

B. Shop Drawings: For detention furniture.

1. Include plans, elevations, sections, and attachment details.
2. Indicate locations, dimensions, and profiles of wall and floor reinforcements.
3. Show elevations of detention furniture and indicate dimensions of furniture, preparations for receiving anchors, and locations of anchorage.

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

PART 2 - PRODUCTS

2.1 DETENTION BUNKS

A. Freestanding Single Bunks:

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. American Jail Products, LLC; Floor-Mounted Bunk, No. 202.
    b. Chief Industries, Inc., Custom Products Division; Single Bunk Bed (Floor Mounted), No. B-100N.
    c. Norix Group, Inc.; Ironman Steel Floor-Mounted Single Bunk, Model No. B510-100.

2. Bunk Pan: Formed from 0.134-inch nominal-thickness steel sheet.

    a. Size: Minimum 27 inches wide by 76 inches long with bunk pan 14 inches above floor.
    b. Edges: Turn up edges of back, sides, and front, with minimum 2-inch flanges.

3. Legs and Frames: Formed from 2-by-2-by-3/16-inch steel angle welded at connections to each other and to bunk pan; provide four legs for each bunk.
4. Mounting Plates: Formed from 1/4-inch-thick steel plate punched with one hole for floor anchorage; provide one mounting plate for each leg.

B. Materials:

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS (Commercial Steel), Type B; suitable for exposed applications.
3. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS (Commercial Steel), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Finishes:

1. Steel Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

2.2 DETENTION DESKS

A. Wall-Mounted Desk:

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. American Jail Products, LLC; Wall-Mounted Table, No. 221.
    b. Norix Group, Inc.; 560-401.
    c. PDI Detention Furniture; Model DS2000 (custom size).
    d. PSI LLC.; Floor-Mounted Pedestal Bench, WDK 200.

2. Desk: Formed from 0.134-inch-thick, stainless-steel sheet, with minimum 1-1/2-inch flanged edges.

    a. Size: Minimum 20 inches wide by 16 inches deep at typical cell.
    b. Size: 30 inches wide by 16 inches deep at ADA cell.

B. Materials:

1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304.

C. Finishes:

1. Stainless-Steel Finish:

    a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
    b. Polished Finish: Grind and polish surfaces to produce uniform finish, free of cross scratches.

        1) Run grain of directional finishes with long dimension of each piece.
        2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
        3) Directional Satin Finish: No. 3.

2.3 DETENTION SEATING

A. Wall-Mounted Bench:

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. Chief Industries, Inc., Custom Products Division; Wall-Mounted Bench.
    b. PDI Detention Furniture; Model BN2000.
    c. PSI LLC.; Wall Mounted Bench, WB 200.

2. Bench Top: Formed from 0.141-inch-thick, stainless-steel sheet, with minimum 1-1/2-inch flanged edges.

    a. Size: Minimum 12 inches deep by 16 inches long in Cells.
    b. Size: Minimum 12 inches deep by 96 inches long in Day Room.

3. Supports: Formed from 0.188-inch-thick, stainless steel brackets without openings; welded to bench. Provide three supports for benches with length of more than 72 inches.

B. Materials:

1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304.

C. Finishes:

1. Stainless-Steel Finish:

a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
b. Polished Finish: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1) Run grain of directional finishes with long dimension of each piece.
2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3) Directional Satin Finish: No. 3.

2.4 FABRICATION

A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Coordinate dimensions and attachment methods of detention furniture 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.

1. Fabricate detention furniture with no more than 1/32-inch gap between component materials. Weld edges that cannot be crimped to meet tolerance so as to provide a seamless joint with no place for concealment of contraband.

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

F. Weld corners and seams continuously to comply with referenced AWS standard and 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 exposed welds and surfaces smooth and blended at exposed connections so that no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
5. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

G. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure detention furniture rigidly in place and to support expected loads. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce formed-metal units as needed to attach and support other construction.

H. Cut, reinforce, drill, and tap detention furniture 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. Use exposed security fasteners of type indicated or, if not indicated, flat-head (countersunk) security fasteners. Locate joints where least conspicuous.

K. Attach drawer slides to furniture with security fasteners.

2.5 SECURITY FASTENERS

A. Operable only by tools produced by fastener manufacturer or other licensed fabricator for use on specific type of fastener. 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. Acument Global Technologies North America.
    b. Bryce Fastener.
    c. Safety Socket LLC.
    d. Tamperproof Screw Co., Inc.
    e. Tamper-Pruf Screws.

2. Drive-System Type: Pinned Torx-Plus.
3. Fastener Strength: 120,000 psi.
4. Socket Button Head Fasteners:

    a. Heat-treated alloy steel, ASTM F 835.
    b. Stainless steel, ASTM F 879, Group 1 CW.

5. Socket Flat Countersunk Head Fasteners:

    a. Heat-treated alloy steel, ASTM F 835.
    b. Stainless steel, ASTM F 879, Group 1 CW.

6. Protective Coatings for Heat-Treated Alloy Steel:

    a. Zinc and clear trivalent chromium where indicated.

2.6 ACCESSORIES

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

B. 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 furniture.

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

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of detention furniture.

D. Inspect built-in and cast-in anchor installations, before installing detention furniture, 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 inspection reports.

E. Verify locations of detention furniture with those indicated on Shop Drawings.

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

3.2 INSTALLATION

A. Cutting, Fitting, and Placement: Obtain manufacturer's written approval for cutting, drilling, and fitting required for installing detention furniture. Set detention furniture accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

4. Finish exposed welds and surfaces smooth and blended at exposed connections so that no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
5. Fillet Welds: Continuous.

D. Assemble detention furniture requiring field assembly with security fasteners with no exposed fasteners on exposed faces and frames.

E. Anchor furniture with security fasteners to floors and walls at intervals required by expected loads, but not more than 12 inches o.c.

1. Install anchors through backup reinforcing plates where necessary to avoid metal distortion.
2. Use security fasteners with head styles 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. Provide stainless-steel security fasteners in stainless steel materials.
3. Weld nuts onto cast-in-place anchors after installation so as to be nonremovable.

F. Apply epoxy security sealant at all exposed gaps between detention furniture and adjacent construction greater than 1/16 inch.

3.3 FIELD QUALITY CONTROL

A. 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 if inspections indicate that work does not comply with specified requirements. Remove malfunctioning units; replace with new units.

C. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.

D. Prepare field quality-control certification that states installed products and their installation comply with requirements in the Contract Documents.

3.4 CLEANING AND PROTECTION

A. Touchup Painting: Immediately after erection, clean bolted connections and abraded areas of shop paint, and paint exposed areas with same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

END OF SECTION

SECTION 13 42 63 - STEEL DETENTION CELL MODULES

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 modular detention ceiling system.

B. Related Requirements:

1. Division 05 50 00 Section "Metal Fabrications" for welding requirements and standards.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Department, panel Installer, general contractor, ventilation subcontractor, electrical subcontractor, and other trades whose work interfaces with or affects detention panel installation.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to panel installation, including manufacturer's written instructions.
4. Review procedures for penetrating detention panels for utilities.
5. Examine support conditions for compliance with requirements, including alignment between and attachment to adjacent framing.
6. Review welding safety procedures.
7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
8. Review of procedures for repair of detention panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 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 detention panels.

B. Shop Drawings:

1. Include plans, sections, and attachment details. including: layout of ceiling systems, details of construction, gages of metal, anchoring details, conditions at openings, installation details and methods, and other data pertinent to the installation, including illustration of sequence of installation to accomplish ship-lap panels.

C. Delegated-Design Submittal: For design and installation procedures, sealed by a Registered Engineered licensed in the State of Alaska.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer Qualifications: A firm experienced in manufacturing detention ceiling panels similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a five-year minimum record of successful in-service performance.

B. Installer Certificates: Signed by panel manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install specified detention panel system and system will conform to performance standards.

1. Provide a list of three projects where at least one project was 50 cells and has been in operation for at least five years.
2. Technically qualified and experienced in furnishing and installing detention security acoustical panel.

C. Qualification Data: For Installer and manufacturer.

1. Provide copies of Welders Certifications in accordance with AWS D1.3.

D. Product Test Reports: For detention panels, for tests performed by a qualified testing agency, indicating compliance with specified requirements.

1. Impact Test: ASTM F2697, 400 impacts.
2. Static Load Test (Uplift): ASTM F2697, 2,000 lbs.

E. Evaluation Reports: For detention panels, from ICC-ES.

F. Sample Warranties: For manufacturer's special warranties.

G. Evaluation Reports: For detention modular panels, from ICC-ES.

H. Source quality-control reports.

I. Sample Warranty: For manufacturer's warranty.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Minimum five-years experience in fabricating detention panels of same type as being supplied.

B. Installer’s Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

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

1. AWS D1.3, "Structural Welding Code - Sheet Steel."

D. Mockups: Build mockups to set quality standards for fabrication and installation.

1. Build mockup of typical double occupancy cell as directed by Department.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Department specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store panels inside out of weather.

B. Store panels per manufacturer’s recommendations.

1.8 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of detention panels that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One-year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide TrussDek by TrussBilt or comparable product.

2.2 PANEL DESCRIPTION

A. Maximum Grade 1 and 2 security double skin plank type acoustical detention ceiling systems.

2.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer registered in the State of Alaska to demonstrate load capacity and installation procedures.

B. Capacities: Panels shall support panel dead load plus 5 psf. and a live load of 20 psf. or 300 pound concentrated load at any point over a 6” x 6” area (whichever produces the greatest effect)

C. Acoustical Performance:

1. Double skin plank ceiling system shall provide an NRC of not less than 0.70 when tested in accordance with ASTM C 423 and a Sound Transmission Class (STC) of not less than 28 when tested in accordance with ASTM E 90 and ASTM E 413.
2. Acoustical fill flame spread index shall not exceed 20 with smoke developed value not exceeding 10 when tested in accordance with ASTM C 84.

D. Security Performance (Grades 1 & 2).

2.4 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Steel shall be free of scale, pitting, coil breaks or other surface blemishes. Steel free of buckles, waves or other defects.

2.5 DETENTION PANELS

A. Panel face sheet: Uncoated steel sheet, thickness as required to span walls with described loads, 0.093-inch thick minimum.

B. Panels shall be metal skins each side of steel decking.

2.6 ACCESSORIES

A. Provide components including mounting angles, attachments, and other items for a complete assembly.

B. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.

C. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

2.7 FABRICATION

A. Fabricate detention panels in one piece ready for field installation without the need for midspan supports.

2.8 GENERAL FINISH REQUIREMENTS

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer 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 and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine detention panels before installation. Reject detention panels that are dented, or damaged.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

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

3.2 INSTALLATION

A. Comply with contract documents and manufacturer’s written instructions for installation of detention panels.

3.3 INSTALLATION, GENERAL

A. Preparation: Remove primer from surfaces to be welded. Surfaces to be welded shall be cleaned of loose scale, rust, oil, or grease and other foreign matter.

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

C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints.

D. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

E. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal mounting shapes are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts and other connectors.

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

G. Accurately locate partitions, holes, cut outs, and coordinate locations with other trades.

H. Detention panels shall be welded to mounting shapes with minimum 1-inch bearing.

3.4 WELDING PROCEDURES

A. Welds shall be neat, have a clean appearance and be deep penetration. Joints shall be tight and true.

B. Welds shall be uniform section and smoothness without overlaps, craters, porosity, and clinkers.

C. Remove projecting burrs, edges, or rough spots

D. Grind plug welds smooth where exposed to view.

E. Visual inspection of edges, end fillets and butt joints shall show good fusion width and penetration into base metals.

F. Take precautions to minimize stress and distortions due to heat.

G. Repair of defective welds by adding new material over the defects is not permitted.

3.5 FASTENINGS

A. Fasten supporting members to each other and to building construction as detailed to provide a secure, permanent installation.

B. Where fastening spacings and sizes are not shown, use spacings and sizes of bolts, screws and welds that will develop the strength of members before failure occurs in the fastenings.

3.6 REPAIRS

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
2. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

END OF SECTION

SECTION 21 05 00 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wet Pipe Sprinkler System.

B. System Design, Materials, Installation, and Certification.

C. System Supervision Alarms.

1.2 SCOPE DESCRIPTION

A. Provide a complete wet automatic fire sprinkler system, hydraulically calculated to protect the entire remodel area, complete and in operating order. This fire protection system shall be in compliance with the contract documents, applicable codes and standards, as well as the Authority having jurisdiction. Sprinklers shall be installed throughout the building, including outside roof canopies, attic areas, and utilizing systems compatible with the specific application.

1.3 SPECIAL REQUIREMENTS

A. Provide complete interface with electrical/transformer rooms and areas in compliance with the NEC. Apply the following practices:

1. Route no piping through electrical rooms with the following exceptions:

a. Branch piping supplying sprinklers protecting the electrical room. Note: This branch piping shall not exit the electrical room to supply additional sprinklers outside the room.

2. No piping shall be routed above electrical panels in compliance with the NEC.

B. Provide complete interface with building smoke and fire alarm system.

C. Provide valve supervision and water flow alarms and trouble signal monitoring system and shall automatically transmit to an approved station in accordance with the International Fire Code.

1.4 CODES AND STANDARDS

A. IBC Latest Adopted Edition.

B. NEC Latest Adopted Edition.

C. UPC Latest Adopted Edition.

D. IMC Latest Adopted Edition.

E. IFC Latest Adopted Edition.

F. NFPA 13 Standard for the Installation of Sprinkler Systems, latest adopted edition.

1.5 RELATED WORK

A. Section 09 90 00, Painting and Coating.

B. Section 22 05 00, Common Work Results for Plumbing.

C. Section 23 05 00, Common Work Results for HVAC.

D. Section 26 05 03, Equipment Wiring Connections.

E. Section 28 31 00, Fire Detection and Alarm.

1.6 REFERENCES

A. AWWA C510 Backflow Prevention Devices reduced pressure type and double check valve type.

B. USC University of Southern California: Foundation for Cross-connection Control and Hydraulic Research.

1.7 QUALITY ASSURANCE

A. Unless otherwise noted, this is substantially a "performance" specification.

B. Minimum qualifications of the contractor/subcontractor shall include the following:

1. Specialist Firm: Company specializing in automatic fire protection/sprinkler systems, possessing a minimum of three years' experience with systems similar in nature to the type specified herein.
2. Design Certification: Shop drawings shall be prepared by a person with a minimum certification of level II designer, supervised by a Licensed Professional Engineer or a level III or IV Fire Sprinkler Designer, certified by the National Institute for Certification in Engineering Technologies (NICET), in Fire Protection Engineering Technology Automatic Fire Sprinkler System Layout.
3. Equipment and components: Bear the "UL" label or the "FM" approval marking.
4. Maintain a complete stock of replacement parts.
5. Remain on 24 hour call for emergency service.
6. Maintain an office and telephone, with authorized representatives of the Fire Protection Contractor's firm, including the Designated Project Mechanical Sprinkler Supervisor, with a physical presence and address in Alaska.
7. Bids of wholesalers, contractor or any firm whose principal business is not that of manufacturing and/or installing fire protection systems is not acceptable.

C. Backflow Prevention: Installation and testing by a certified backflow assembly tester, in accordance with the Uniform Plumbing Code (UPC).

1.8 SUBMITTALS

A. Submit under provisions of Division 01.

B. Submit contractor's qualifications, proof of 3 years' experience under this contractor's firm name, and references for at least 5 projects in Alaska of similar type, size, and complexity.

C. Submit a copy of designer's NICET certification and resume', or Alaska P.E. license number.

D. Submit shop drawings and hydraulic calculations concurrently to the engineer and the City Fire Marshal for review. Submit one set of stamped approved shop drawings and hydraulic calculations to the Architect/Engineer when available from AHJ. Engineer will retain 1 set of "stamped approved" shop drawings. These sets must include the NICET certification or stamp of a licensed professional engineer as described above.

E. Submit backflow assembly tester UPC certificate. Submit letter of certification for installation signed by tester.

F. Submit all written reviews and contractor responses to reviews to the Architect/Engineer.

G. Submit product data, and sprinkler head layout. Sprinkler head layout shall be reviewed by the Architect/Engineer. All other approvals shall be secured prior to materials fabrication. Additional sprinklers as required shall be added at no additional cost to the contract.

H. Shop Drawings shall include the following information in compliance with NFPA 13:

1. Name of Owner, occupant and Building Permit Number.
2. Location, including street address and legal description.
3. Point of compass.
4. Fire Department Connections.
5. All necessary controlling equipment.
6. Location of water source, type, routing, depth of bury and size of supply piping. Identify location and size of city main and whether it is dead-end or circulating loop, and distance to the flow data test hydrant.
7. All distribution system piping and outlets. Include pipe and fitting types.
8. Location, make, model, size, and power requirements of [dry pipe] [pre-action] system air compressor, [low air alarm switch], air maintenance device, alarm pressure switch as well as the holding capacity, in gallons, for the [dry pipe] [pre-action] system.
9. Reflected ceiling plan showing ceiling heights, construction type, proposed location and type of sprinkler heads, and other ceiling devices such as HVAC diffusers, loud speakers, type and location of light fixtures, etc.
10. Interference control between sprinkler system and other trades.
11. Full height cross section.
12. Location of partitions. Identification of full height walls and draft stops.
13. Location and size of unsprinklered concealed spaces.
14. Identification of unheated areas.
15. Water Flow Test Results; include testing agency; time, date and location of test; actual pitot reading at flow hydrant; and equipment used to perform the test.
16. Make, model, Type, orifice, finish and Temperature rating of sprinklers and their respective locations.
17. On systems that are hydraulically calculated, indicate the square footage area protected by each system.
18. Hydraulic node points.

19. Make, model, and size of all fire protection control valves, alarm valves, [hose valves], [pumps, controllers, and related equipment], and check valves.
20. Identify low point drain and inspector test stations.
21. Indicate the type and location of all piping hangers and equipment supports.
22. Indicate the type and location of all seismic bracing and restraint.
23. Make, model, size, and locations of all pipe couplings, fittings and flanges.
24. Make, model, size, power requirement, and location of alarm bells, buzzers, detectors, and/or alarm panels.
25. Make, model, size, and configuration of fire pump as well as its installation into the system.
26. Provisions for flushing.
27. When the equipment to be installed is an addition or renovation to an existing [sprinkler] [standpipe] system, enough of the existing system shall be shown on the shop drawings to indicate the total number of sprinklers and the total square foot area protected by the entire system.
28. Name, address and telephone number of the contractor. If design is by a separate firm, include the name address and telephone number of the design facility.
29. Complete legend of all abbreviations and symbols indicated.
30. Complete schedule of all room occupancies.
31. Location of all unit heaters.
32. Location of all structural penetrations.
33. Note the location of all "exposed" piping.
34. Valve Supervision Alarm:

    a. Make and model on all supervisory switches, alarm and monitoring panel.
    b. Shop drawing and wire diagram of alarm system.
    c. Location of alarm annunciator, or remote monitoring method to be utilized for offsite monitoring.

1.9 MAINTENANCE INFORMATION AND RECORD DRAWINGS

A. Submit under provisions of Division 01.

B. Provide a complete building floor plan showing all system control valves, drain stations, air compressors, alarm and control panels, test valves, and other primary fire protection devices. Indicate all sprinkler zones, boundaries, and types of systems. Submit this plan prior to substantial completion for review by the mechanical engineer.

C. Include step by step instructions to place the fire protection system in service as well as to take it out of service. Provide complete maintenance information of all primary fire protection equipment, including valves, fittings, sprinklers. Identify equipment indicating whether devices are replacement items or repairable. Provide parts list and suppliers for repairable items. Include complete detailed "Record Drawings" and record calculations of the fire protection sprinkler system.

D. Install one copy of the record hydraulic calculations and shop drawings in a metal sleeve box on the wall near the fire sprinkler riser.

E. Provide 1 ***original*** copy of NFPA 25 in each O&M manual.

F. The contractor shall maintain current and up-to-date "Record Drawings" of the fire protection system at the job site, in accordance with Division 01. Significant changes in piping due to onsite coordination with other trades will require recalculation to confirm adequate pipe sizing.

1.10 REVIEWS, APPROVALS, AND PERMITS

A. Obtain written review and/or approval of the entire fire protection system design and arrangement from the following authorities:

1. Architect/Engineer.
2. Municipality of Anchorage Fire Marshal.

B. Comply with all review comments, revising the system design as required, and resubmitting in a timely manner, so as not to hinder the construction schedule.

C. Obtain and pay for all required permits, inspections, tests, and approvals as required by authorities having jurisdiction.

1.11 WATER FLOW INFORMATION, HYDRAULIC CALCULATIONS, SEISMIC CALCULATIONS

A. Obtain and verify the water supply Static Pressure, Residual Pressure, at full flow of the test hydrant, at a time of day, during the peak demand on the system, at the point of connection to the water utility system or at a nearby point acceptable to the approval authority. Obtain this data from actual flow test or AWWU Network Model Data. Identify the testing agency and the source of the test data.

B. The test shall be conducted by the designated project Design Supervisor, or Field Superintendent. The test shall be conducted in accordance with NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants.

C. Hydraulic Calculations shall be accomplished in compliance with the procedures established in NFPA 13. In addition to minimum NFPA 13 standards, a minimum 15% pressure buffer is required to be designed into the system. Where local authorities require additional buffer, the contractor shall comply with the more demanding requirement.

D. Hydraulic Calculations accomplished by computer program for submittal shall be accompanied by a complete legend of the abbreviations, nodes, and symbols utilized on the computer readout.

E. Hydraulic Calculations shall clearly identify the following:

1. System type, sprinkler "K" factor, and "C" factor.
2. Pipe and fittings type.
3. Fitting Equivalent Length chart which complies with the "C" factor and pipe type.
4. NFPA hazard designation, Design Density and size of the Design Remote Area.
5. The Elevation of the "highest" sprinkler.
6. The available water supply and system demand at the point of connection to the water supply, indicated on a logarithmic graph. Include hose demands.

F. Seismic Calculations shall clearly identify the following:

1. Type, length and size of brace.
2. Angle allowed of brace.
3. Maximum horizontal load of brace.
4. Brace attachment to structure and load rating.
5. Brace attachment to pipe and load rating.
6. Calculated load to be braced.

1.12 COORDINATION REQUIRED

A. The contractor shall examine the structural, architectural, mechanical, electrical and all other drawings relating to the building and plan his work accordingly. He shall check and verify all dimensions at the site before fabricating any portion of the system. Any discrepancies in piping and head locations resulting from failure to do so shall be corrected expeditiously to provide proper coordination of all trades.

B. Coordinate work with that of other trades to ensure that adequate space is provided for all work, including requirements for serviceability and accessibility. Locate sprinkler heads to avoid conflict with light fixtures and other installed equipment.

C. Structural penetrations for piping shall be identified and details of those penetrations shall be submitted to the structural engineer for approval, in a timely manner. Structural members which are damaged cut or penetrated without approval shall be replaced at no additional expense to the Owner.

D. Automatic fire protection piping in correctional facilities, psychiatric institutions shall be designed with full consideration given to the building occupants, minimizing inherent health risks caused by self-inflicted injury from the fire protection system. This includes but is not limited to exposed piping, security of all system controls and service points, and sprinkler types specifically listed for institutional application.

1.13 MATERIALS HANDLING AND STORAGE

A. Deliver, store, protect, and handle products to the site under provisions of Division 01. Deliver and store valves in manufacturer packaging with labeling in place. Prior to installation, piping onsite shall be wrapped with protective wrapping. Valves, piping, materials, and equipment shall be clean and new when system is accepted by the Owner.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide only new materials and equipment, which are standard products of a manufacturer regularly engaged in the manufacture of fire protection equipment.

B. All products shall bear the "UL" label or "FM" listing and be specifically approved for fire protection application where they are used.

2.2 PIPING

A. Wet Pipe Sprinkler Systems:

1. Black steel piping, ASTM A135 schedule 10 or ASTM A795 schedule 40, UL Listed or FM Approved for fire sprinkler service.
2. Piping may be roll-grooved, threaded, flanged, or welded for connection. All threaded pipe shall be schedule 40. No plain-end piping fitting connections are allowed.

2.3 GROOVED FITTINGS, COUPLINGS, AND MECHANICAL TEES

A. Grooved Fittings shall be Victaulic, Gruvlok, or equal. Galvanized fittings shall accompany galvanized piping. Couplings and mechanical tees shall be standard painted Victaulic, Gruvlok, or equal.

B. Slip-Fit fittings and couplings utilized for joining branch piping to new main piping shall not be allowed.

C. Contractor shall follow the manufacturer's suggested methods to prepare, carefully, the ends for these fittings to prevent leakage or system breakdown.

2.4 THREADED PIPE FITTINGS

A. Threaded pipe fitting for this system shall be cast iron 125# ANSI B16.4 or malleable iron 150# ANSI B16.3.

B. CPVC: Fitting shall be same manufacture as piping, CPVC ASTM F438 schedule 40 for up to 1-1/2 inches, CPVC ASTM F439 schedule 80 for 2 inch and over. Solvent by same manufacture as piping and fittings and as required to meet listing requirements.

2.5 PIPE FLANGES

A. Pipe flanges for this system shall be Cast Iron Class 125# ANSI B16.5.

2.6 PIPING HANGERS AND SUPPORTS

A. Pipe hangers shall conform to NFPA 13 standards.

2.7 FLEXIBLE SPRINKLER HOSE FITTINGS

A. FM approved and UL listed for use in fire protection service.

B. Seismically qualified for use pursuant to ICC-ES AC-156 Acceptance Criteria for Seismic Qualification by Shake-Table Testing of Nonstructural Components and Systems.

C. Composition: 100% Type 304 Stainless Steel. 175 or 300 PSI minimum rated pressure as appropriate for installed system.

D. Fully welded non-mechanical fittings, braided, leak-tested with minimum 1 inch true-bore internal corrugated hose diameter.

E. Ceiling bracket of G90 galvanized steel with snap-on clip ends positively attached to the ceiling using tamper-resistant screws. Flexible hose attachment shall be removable hub type with set screw.

2.8 ACCEPTABLE MANUFACTURERS FIRE PROTECTION VALVES AND EQUIPMENT

A. Reliable.

B. Tyco.

C. Potter Electric.

D. Notifier.

E. Victaulic.

F. Potter Roemer.

G. Croker.

H. Viking.

2.9 VALVES AND ALARMS ASSEMBLIES

A. Fire Protection Valves:

1. Control Valves: All Fire protection system control valves shall be supervised with switches compatible with the fire alarm system.

    a. OS&Y Gate Valves: Minimum working pressure 175 PSI non-shock cold water. UL listed for fire protection Victaulic Series 771 or equal.
    b. Butterfly Valves: UL listed for fire protection 175 PSI non-shock cold water, with integrated supervisory switch. Grooved, threaded, or wafer type acceptable. Victaulic Firelock Series 705 or 707 or equal.
    c. Swing Check Valves: UL listed for fire protection 175 PSI non-shock cold water, ductile iron body, stainless steel clapper assembly. Grooved, flanged, or wafer type acceptable. Victaulic Firelock Series 717 or equal.

B. Wet Pipe Sprinkler Systems:

1. Alarm Check Valve Assemblies.

    a. Provide sprinkler alarm valve assemblies, appropriate to the system, complete with all trimmings and accessories for proper alarm initiation and interface with fire alarm system. Include inlet and outlet pressure gauges, and main drain with discharge to the outside.

2. Water Flow Detectors:

    a. Provide water flow detectors installed at each system or zone control and for the main system header for multiple zone systems. Potter Electric, model VSR-F.

C. All electrical alarm and control wiring shall be provided in accordance with Division 26.

2.10 SPRINKLERS

A. Provide sprinklers as required by NFPA 13 standards and in compliance with the IBC chapter 9 for the entire project. Sprinkler finish and style as follows:

1. Sprinkler for correctional and psychiatric institutions shall be listed for institutional application. White Finish.
2. Sprinklers above ceilings and throughout shop and mechanical service areas shall be bronze finish, standard spray, upright or pendant type as required by the drawings.
3. Sidewall sprinklers shall be bronze finish in all service areas, and white throughout all public areas.
4. Dry pendant sprinklers protecting entry vestibules and outside overhangs shall be chrome finish Tyco DS-1 recessed or equal. Dry pendant sprinklers protecting unheated areas and piped from wet pipe systems shall have an "A Length" dimension of not less than 18".
5. Sprinkler Guards shall be of the same manufacturer and finish as the sprinkler which they are to be installed on. Red guards are acceptable for bronze sprinklers only. Chrome finish guards are required for chrome sprinkler heads.
6. Sprinklers of correct temperature rating shall be installed according to NFPA 13.
7. Provide sprinkler wrenches for each type of sprinkler.
8. Spare sprinkler cabinet to be red sheet steel manufactured by the same company that made the sprinklers. Size the cabinet in accordance with NFPA 13 standards. Provide sprinklers for the cabinet representative of the assortment provided for the system. Mount cabinet on the wall within 60" of the sprinkler control riser.

PART 3 - EXECUTION

3.1 CONTRACTOR COORDINATION

A. The fire protection contractor shall coordinate his work with the work of all other trades to assure timely installation and efficient use of mechanical areas including but not limited to boiler rooms, fan rooms, and ceiling spaces.

B. Any work installed without proper coordination shall be promptly removed and reinstalled in a manner to allow for a good practical arrangement of all items which need to be installed by all crafts involved.

C. In case of coordination dispute, the Architect/Engineer shall be consulted and his decision shall be binding.

D. All costs associated with coordination and arranging or rearranging of the fire protection system shall be borne by the affected contractor, without causing any additional expense to the Owner.

3.2 PIPING INSTALLATION

A. Install piping to conserve building space and route piping around access panels and openings. Piping shall not restrict any access opening.

B. Install low point drain stations in accordance with NFPA 13 standards. Identify the location of drain and test stations with signs on access panels, ceiling panels, or walls adjacent to the

station, visible from the floor. Discharge all test pipes and system main drain to outside. Coordinate discharge point with Owner's field representative.

C. Provide seismic protection for the piping system in accordance with NFPA 13 standards. Attach bracing to structure with through bolts, washers, and nuts. Provide clearance at all structural penetrations. Provide oversized escutcheon plates or flexible connections where sprinklers penetrate non-frangible ceiling membranes.

D. Dry system piping shall be installed to allow full service and complete drainage of the entire system. All dry piping shall be sloped to accomplish this requirement.

E. Piping shall be concealed in all areas with finished ceilings.

F. Piping concealed in walls shall be secured to studs 48" - 60" above the floor.

G. Pipe penetrations through rated fire walls shall be sealed by a "UL" listed system utilizing fire rated caulking. Submit data under paragraph 1.8 (Submittals) of this specification.

H. When piping is supported from manufactured structural members, the Installation of pipe hangers shall comply with truss manufacturer's recommendations for hanger attachments and loading.

I. When pipe hangers are attached to bar joist with wood top and bottom chords, chords shall be predrilled for fasteners, and fasteners shall maintain a minimum distance of 0'-6" from truss "panel points".

J. Pipe hangers shall be "Rod and Ring" type hangers throughout. Piping hangers shall have a minimum of ½" of adjustment on each side of the hanger ring nut, to allow for piping grade adjustment in the future.

K. All Trapeze members shall be fastened to truss chords or structural members.

L. Provide isolation mounts for air compressor.

M. Installation of all valves and equipment shall comply with manufacturer's suggested installation practices and directions.

N. Provide service access around all equipment.

3.3 SYSTEM TEST

A. Hydrostatically test the entire system in accordance with NFPA 13 standards.

B. Test all system alarm actuations and alarms.

C. Trip test dry pipe system to confirm system discharge time.

D. Perform main drain test.

E. 48-hour advance notice required for all tests to allow Owner's field representative to witness these tests.

3.4 PAINTING

A. Refer to Division 09.

3.5 PROJECT CLOSEOUT

A. The fire protection contractor shall submit a written affidavit at the completion of the system, stating that the fire protection system as installed complies with all referenced codes and standards, Local Fire Marshal's Office, and the Owner's Insurance Underwriters.

B. Furnish Written Guarantee to the Owner, that materials installations are free from mechanical defects and guaranteeing to replace and repair any and all unsatisfactory and defective work and items, to the satisfaction of the Owner, in a timely manner, for a period of one year after final acceptance of the building by the Owner, and to be responsible for any damage caused to the premises for any such unsatisfactory work.

C. The contractor shall respond within reasonable time, not to exceed 15 days to repair or replace latent or hidden defects at such time as they are discovered.

D. Provide hydraulic placard on system riser. Placard shall indicate sprinkler demand and hose demand as separate numbers.

E. Post the results of the original main drain test and date performed on the system riser in a permanent fashion.

F. Contractor shall fully train the Owner's designated maintenance engineer in the operation and maintenance of the entire fire protection system.

END OF SECTION

SECTION 22 05 00 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SCOPE

A. All provisions of the Contract including the General and Supplementary Conditions and the General Requirements apply to this work.

1.2 WORK INCLUDED

A. The work to be included in these and all other plumbing subsections shall consist of providing, installing, adjusting and setting into proper operation complete and workable systems for all items shown on the drawings, described in the specifications or reasonably implied. This shall include the planning and supervision to coordinate the work with other crafts and to maintain a proper time schedule for delivery of materials and installation of the work.

B. Division 01 of the specifications is to be specifically included as well as all related drawings.

1.3 RELATED WORK

A. Related Work Specified Elsewhere:

1. Fire Suppression Specifications: Division 21.
2. Heating, Ventilating and Air Conditioning (HVAC) Specifications: Division 23.
3. Electrical Specifications: Division 26.
4. Motors and Connections: Division 26.
5. Starters and Disconnects: Division 26.

B. Unless otherwise indicated on the electrical drawings or the electrical schedules, provide all plumbing equipment motors, motor starters, thermal overload switches, control relays, time clocks, thermostats, motor operated valves, float controls, damper motors, electric switches, electrical components, wiring and any other miscellaneous Division 22 controls. Disconnect switches are included in the electrical work, unless specifically called out on mechanical plans.

C. Carefully coordinate all work with the electrical work shown and specified elsewhere.

1.4 REFERENCED CODES - LATEST ADOPTED EDITION

A. NFPA 13 Installation of Sprinkler Systems.

B. NFPA 70 National Electrical Code (NEC).

C. IMC International Mechanical Code.

D. UPC Uniform Plumbing Code.

E. IECC International Energy Conservation Code.

F. IFC International Fire Code.

G. IFGC International Fuel Gas Code.

H. IBC International Building Code.

1.5 PROJECT RECORD DRAWINGS

A. In addition to other requirements of Division 01, mark up a clean set of drawings as the work progresses to show the dimensioned location and routing of all mechanical work which will become permanently concealed. Show routing of work in concealed blind spaces within the building. Show exact dimensions of buried piping off of columns or exterior walls.

B. Maintain record documents at job site in a clean, dry and legible condition. Keep record documents available for inspection by the Project Manager.

C. Show the location of all valves and their appropriate tag identification.

D. At completion of project, deliver these drawings to the Owner and obtain a written receipt.

1.6 SUBMITTALS

A. See General Conditions and the General Requirements in Division 01 regarding submittals.

B. Submit by specification section complete and all at one time; partial submittals will not be considered. Submittals shall be provided in electronic PDF Format. The data in the electronic file shall be arranged and indexed under basic categories in order of the Specification Sections. An index shall be included with bookmarks and identifying tabs between sections and references to sections of specifications

C. Catalog sheets shall be complete and the item or model to be used shall be clearly marked, and identified as to which item in the specifications or on the drawings is being submitted and with drawing fixture number where applicable.

D. Only submit on items specifically required by each specification section. If a submittal has not been requested, it will not be reviewed.

E. Submit product data for:

1. Hangers and Supports for Plumbing Piping and Equipment.
2. Vibration and Seismic controls for Plumbing Piping and Equipment.
3. Identification for Plumbing Piping and Equipment.

F. Provide shop drawings with calculations for selection of seismic/wind restraints in accordance with IBC and ASCE 7, certified by a qualified professional engineer, licensed in the State of Alaska. Seismic calculations shall be based upon Seismic Category D. Seismic calculations for natural gas piping shall utilize and Component Importance Factor, IP, of 1.5. All other components shall utilize an IP of 1.0 for seismic calculations.

1.7 OPERATING AND MAINTENANCE MANUALS

A. Submit maintenance manuals to the Engineer covering all equipment, fixtures, devices, etc. installed by the Contractor.

B. The operation and maintenance manuals shall be submitted by specification section complete and all at one time; partial operations and maintenance manual submittals will not be considered. The Operation and maintenance manuals shall be provided in electronic PDF Format. The data in the electronic file shall be arranged and indexed under basic categories. An index shall be included with bookmarks and identifying tabs between sections and references to sections of specifications. The manual shall contain, but not limited to, the following types of information:

1. Cover sheet with name, address, telephone number of Contractor, General Contractor and major equipment suppliers.
2. Catalog cuts of all equipment, fixtures, etc. installed (Marked to identify the specific items used).
3. Manufacturer's maintenance and overhaul instruction booklets including exploded views.
4. Identification numbers of all parts and nearest sources for obtaining parts and services.
5. A copy of valve schedule and reduced scale drawings showing valve locations.
6. Written summary of instructions to Owner.
7. All manufacturers' warranties and guarantees.
8. Contractors Warranty Letter.

C. A periodic maintenance form that includes all of the equipment shall be provided with the maintenance manual. The form shall list each piece of equipment and how often maintenance is required (daily, weekly, monthly, annually). Opposite each task shall be squares for check-off for a full year (initials) to verify that the tasks are being done.

1.8 HANDLING

A. See General Conditions and the General Requirements in Division 01 regarding material handling.

B. Deliver packaged materials to job site in unbroken packages with manufacturer's label, and store to facilitate inspection and installation sequence. All items must be labeled and identified as to make, size and quality.

1.9 SUBSTITUTIONS

A. See General Conditions and the General Requirements in Division 01 for substitution request procedures.

B. In accordance with the General Conditions and the General Requirements in Division 01, Substitution and Product Options, all substitute items must fit in the available space, and be of equal or better quality including efficiency performance, size, and weight, and must be compatible with existing equipment. The Owner shall be the final authority regarding acceptability of substitutes.

1.10 DIMENSIONS

A. Before ordering any material or doing any work, the Contractor shall verify all dimensions, including elevations, and shall be responsible for the correctness of the same. No extra charge or compensation will be allowed on account of differences between actual dimensions and measurements indicated on the drawings.

B. Any differences, which may be found, shall be submitted to the Owner for consideration before proceeding with the work.

1.11 MANUFACTURER'S DIRECTIONS

A. All manufactured articles shall be applied, installed and handled as recommended by the manufacturer, unless specifically called out otherwise. Advise the Architect/Engineer of any such conflicts before installation.

1.12 PERMITS, FEES, ETC.

A. The Contractor under each Division of these specifications shall arrange for a permit from the local authority. The Contractor shall pay for any inspection fees or other fees and charges required by ordinance, law, codes and these specifications.

1.13 TESTING

A. The Contractor under each section shall at his own expenses perform the various tests as specified and required by the Architect and as required by applicable code, the State and local authorities. The Contractor shall furnish all fuel and materials necessary for making tests.

1.14 TERMINOLOGY

A. Whenever the words "furnish", "provide", "furnish and install", "provide and install", and/or similar phrases occur, it is the intent that the materials and equipment described be furnished, installed and connected under this Division of the Specifications, complete for operation unless specifically noted to the contrary.

B. Where a material is described in detail, listed by catalogue number or otherwise called for, it shall be the Contractor's responsibility to furnish and install the material.

C. The use of the word "shall" conveys a mandatory condition to the contract.

D. "This section" refers to the section in which the statement occurs.

E. "The project" includes all work in progress during the construction period.

F. In describing the various items of equipment, in general, each item will be described singularly, even though there may be a multiplicity of identical or similar items.

1.15 SCHEDULE OF WORK

A. The work under the various sections must be expedited and close coordination will be required in executing the work. The various trades shall perform their portion of the work at such times as directed so as to meeting scheduled completion dates, and to avoid delaying any other trade. The Architect will set up completion dates. Each contractor shall cooperate in establishing these times and locations and shall process his work so as to ensure the proper execution of it.

1.16 COOPERATION AND CLEANING UP

A. The contractor for the work under each section of the specifications shall coordinate his work with the work described in all other sections of the specifications to the end that, as a whole, the job shall be a finished one of its kind, and shall carry on his work in such a manner that none of the work under any section of these specifications shall be handicapped, hindered or delayed at any time.

B. At all times during the progress of the work, the Contractor shall keep the premises clean and free of unnecessary materials and debris. The Contractor shall, on direction at any time from the Architect, clear any designated areas or area of materials and debris. On completion of any portion of the work, the Contractor shall remove from the premises all tools and machinery and all debris occasioned by the work, leaving the premises free of all obstructions and hindrances.

1.17 WARRANTY

A. Unless a longer warranty is hereinafter called for, all work, materials and equipment items shall be warrantied for a period of one year after acceptance by the Owner. All defects in labor and materials occurring during this period, as determined by the Architect/Engineer, shall be repaired and/or replaced to the complete satisfaction of the Architect/Engineer. Guarantee shall be in accordance with Division 01.

1.18 COMPLETION REQUIREMENTS

A. In accordance with the General Conditions and the General Requirements in Division 01, Project Closeout; before acceptance and final payment, the Contractor shall furnish:

1. Accurate project record drawings, shown in red ink on prints, showing all changes from the original plans made during installation of the work.
2. Contractors One Year Warranty.
3. All Manufacturers' Guarantees.
4. Test and Balance Reports.
5. Operation and Maintenance Manuals.

1.19 INSPECTION OF SITE - REMODEL PROJECTS

A. The accompanying plans do not indicate completely the existing plumbing and mechanical installations. The bidders for the work under these sections of the specifications shall inspect the existing installations and thoroughly acquaint themselves with conditions to be met and the work to be accomplished in removing and modifying the existing work, and in installing the new work in the present building and underground serving to and from that structure. Failure to

comply with this shall not constitute grounds for any additional payments in connection with removing or modifying any part of the existing installations and/or installing any new work.

1.20 RELOCATION OF EXISTING INSTALLATIONS

A. There are portions of the existing plumbing, mechanical and electrical systems, which shall remain in use to serve the finished building in conjunction with the indicated new installations. By actual examination at the site, each bidder shall determine those portions of the remaining present installations, which must be relocated to avoid interference with the installations of new work of his particular trade and that of all other trades. All such existing installations, which interfere with new installations, shall be relocated by the Contractor.

1.21 SALVAGE MATERIALS

A. The Contractor shall remove existing fixtures, equipment and other items associated with the plumbing systems where no longer required for the project. Where such items are exposed to view or uncovered by any cutting or removal of general construction and has no continuing function (as determined by the Architect/Engineer), they shall be removed.

B. All items or materials removed from the project shall be made available for the Owner's inspection. The Owner retains the option to claim any item or material. Contractor shall deliver any claimed item or material in good condition to the place designated by the Owner. All items not claimed become the property of the contractor and shall be removed from the site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All equipment shall be regularly cataloged items of the manufacturer and shall be supplied as a complete unit in accordance with the manufacturer's standard specifications along with any optional items required for proper installation unless otherwise noted. Maintain manufacturer's identification, model number, etc. on all equipment at all times.

B. Where more than one of an item is to be provided, all of the items shall be identical manufacture, make, model, color, etc.

2.2 RESTRICTED MATERIALS

A. No materials containing asbestos in any form shall be allowed.

B. No solder or flux containing lead shall be used on this project.

C. Any pipe or plumbing fitting or fixture, any solder, or any flux utilized on this project shall be "lead free" in accordance with the Safe Drinking Water Act, Section 1417. "Lead free" materials utilized in domestic water system shall not contain more than 0.2 percent lead when used with respect to solder and flux; and not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures. All materials utilized in domestic water system shall be certified by an ANSI accredited organization to conform to ANSI/NSF Standard 61.

D. Where materials or equipment provided by this Contractor are found to contain restricted materials, such items shall be removed and replaced with non-restricted materials items. Entire cost of restricted materials removal and disposal and cost of installing new items shall be the responsibility of the Contractor for those restricted materials containing items installed by the Contractor.

2.3 ELECTRICAL MOTORS

A. Motors: Furnish electric motors designed for the specific application and duty applied, and to deliver rated horsepower without exceeding temperature ratings when operated on power systems with a combined variation in voltage and frequency not more than + 10% of rated voltage. Motors for pumps and fans shall be selected to be non-overloading.

B. Verify from the drawings and specifications the available electrical supply characteristics and furnish equipment that will perform satisfactorily under the conditions shown and specified.

C. Size motors for 1.15 service factor and not to exceed 40º C temperature rise above ambient.

D. Fractional horsepower motors to have self-resetting thermal overload switch.

E. Provide NEMA Premium Efficiency, motors for all three phase motors one horsepower and larger. Standard efficiency motors will not be acceptable.

2.4 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

A. Plastic Nameplates: Laminated plastic with engraved letters.

B. Plastic Tags: Laminated plastic with engraved letters, minimum 1-1/2 inches diameter.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, for direct burial service.

2.5 PIPE HANGERS AND SUPPORTS

A. Acceptable Manufacturers:

1. Anvil.
2. B-Line Systems, Inc.
3. Erico.
4. PHD Manufacturing, Inc.
5. Tolco.

B. Plumbing Piping - DWV:

1. Conform to ANSI/MSS SP58.

2. Hangers for Pipe Sizes ½ to 1-½ Inch: Malleable iron or carbon steel, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated with neoprene isolation pad.

C. Plumbing Piping - Water:

1. Conform to ANSI/MSS SP58.
2. Hangers for Pipe Sizes ½ to 1-½ Inch: Malleable iron or carbon steel, adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
10. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
11. Vertical Support: Steel riser clamp.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
14. Copper Pipe Support: Carbon steel ring, adjustable, copper plated with neoprene isolation pad.
15. Design hangers to allow installation without disengagement of supported pipe.
16. Copper Plating: All hanger elements in metal-to-metal contact with copper pipe, except hanger rings with factory-applied 1/16 inch minimum thick plastic or tape cushion strip over all contact surfaces.
17. Strut Type Pipe Hanging System: Unistrut P-1000 series; framing members shall be No. 12 gage formed steel channels, 1-5/8 inch square, conforming to ASTM A 570 GR33, one side of channel shall have a continuous slot with inturned lips; framing nut with grooves and spring 1/2 inch size, conforming to ASTM 675 GR60; screws conforming to ASTM A 307; fittings conforming to ASTM A 575; all parts enamel painted or electro-galvanized.

D. Shield for Insulated Piping 1-½ Inches and Smaller: 18 gauge galvanized steel shield over insulation in 180º segments, minimum 12 inches long at pipe support.

E. Shield for Insulated Piping 2 Inches and Larger: Hard block, calcium silicate insert, 180° segment, 12 inch minimum length, block thickness same as insulation thickness, flame resistant vapor barrier covering and 18 gauge galvanized shield.

F. Shields for Vertical Copper Pipe Risers: Galvanized steel pipe.

2.6 HANGER RODS

A. Steel Hanger Rods: Mild steel, threaded both ends, threaded one end, or continuous threaded. Minimum Hanger Rod Sizes:

PIPE AND TUBE SIZE (INCHES)	ROD SIZE (INCHES)
¼-4	3/8
5-8	1/2
10-12	5/8

2.7 ANCHOR BOLTS

A. Anchor (Expansion) Bolts: Shall be carbon steel to ASTM A 307; nut shall conform to ASTM A194; shall be drilled-in type. Design values for shear and tension shall be not more than 80 percent of the allowable load.

2.8 FLASHING

A. Metal Flashing: 26-gauge minimum galvanized steel.

B. Metal Counter Flashing: 22 gauge minimum galvanized steel.

C. Flexible Flashing: 47-mil thick sheet butyl, compatible with roofing.

D. Caps: Steel, 22-gauge minimum; 16 gauge at fire resistant elements.

2.9 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gauge galvanized steel for 4 inch diameter and larger, 22 gauge up to 3" diameter.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe or 18 gauge galvanized steel for 4 inch diameter and larger, 22 gauge up to 3" diameter.

C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: UL listed caulking system.

D. Fire Stopping Insulation: Mineral fiber type, non- combustible.

E. Caulk: Fire stop sealant in compliance with ASTM E814, UL 1479 and Division 07.

F. Mechanical Sleeve Seals: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.10 ACCEPTABLE MANUFACTURERS: VIBRATION ISOLATORS AND SEISMIC RESTRAINT

A. Vibration isolators and Seismic Restraint shall be manufactured by:

1. Amber/Booth.
2. Cooper Industries.
3. International Seismic Application Technology.
4. Kinetics Noise Control.
5. Mason Industries.
6. Vibro-Acoustics.

B. Substitutions: Items of same function and performance are acceptable in conformance with Division 01.

2.11 SEISMIC BRACING AND SUPPORT OF SYSTEMS AND COMPONENTS

A. General:

1. Seismic restraint designer shall coordinate all attachments with the structural engineer of record.
2. Design analysis shall include calculated dead loads, static seismic loads, and capacity of materials utilized for the connection of the equipment or system to the structure.
3. Analysis shall detail anchoring methods, bolt diameter, and embedment depth.
4. All seismic restraint devices shall be designed to accept without failure the forces calculated per the applicable building code and as summarized in installation requirements.
5. The total height of the structure (h) and the height of the system to be restrained within the structure (z) shall be determined in coordination with architectural plans and the General Contractor.

B. Friction from gravity loads shall not be considered resistance to seismic forces.

2.12 SEISMIC BRACING COMPONENTS

A. Steel strut shall be 1-5/8 wide in varying heights and mig-welded combinations as required to meet load capacities and designs indicated. A material heat code, part number, and manufacturer's name shall be stamped on all strut and fittings to maintain traceability to material test reports.

1. Material for epoxy painted strut: ASTM A1011, SS, Grade 33.
2. Material for pre-galvanized strut: ASTM A653, SS, Gr. 33.
3. Material for Hot-Dip Galvanized strut: ASTM A1011, SS, Grade 33 and hot-dip galvanized after fabrication in accordance with ASTM A123.
4. Material for fittings and accessories: ASTM A907 Gr. 33, Structural Quality or ASTM A1011, SS. Gr.33.
5. Fittings and accessories: Products shall be of the same manufacturer as strut and designed for use with that product.

2.13 VIBRATION ISOLATORS (ROTATING EQUIPMENT EXCEPT FANS)

A. Floor Mount: Closed spring mount with iso-stiff springs and limit stop for seismic restraint. Isolators are to be sized and selected by equipment manufacturer.

B. Hangers: Closed spring hanger with acoustic isolator.

C. Provide pairs of neoprene side snubbers or restraining springs where side torque or thrust may develop.

D. Color code spring mounts, spring selected to operate at no greater than 2/3 solid deflection and have ¼" ribbed neoprene pads.

2.14 LIMITS OF VIBRATION

A. The factory is to statically and dynamically balance all rotating machinery, fans and pumps, etc. Do dynamic balancing at the operating speed of the motor.

B. Select isolated equipment in accordance with the weight distribution, to produce uniform deflection on the vibration mounts. Deflection of vibration mounts shall be required to produce 95% vibration isolation efficiency, based on the equipment HP, rpm, location in regard to critical spaces and stiffness of the building supporting structural members, supporting the equipment.

C. For fan-motor units in which the impeller is supported by the motor shaft, the motor and impeller shall be dynamically balanced as an integral unit.

2.15 EARTHQUAKE BUMPERS AND SNUBBERS

A. Bumpers:

1. Fabricate the bumper cradle of 6 X 4 X 3/8" angle iron minimum and provide with at least two holes for bolting to the floor.
2. Attach one or more elastomeric mountings to pad the 6" leg of the angle iron.
3. Design the mounting to deflect not more than ¾" under the shock loading of 1 g in any direction in the horizontal plane.
4. Manufacturer: Vibration Mounting Series "SR" seismic restraints, or similar.

B. Snubbers:

1. Interlocking steel members restrained by shock absorbent rubber materials.
2. Elastomeric materials shall be replaceable and a minimum of ¾” thickness.
3. Maintain 1/8” air gap in all directions in design of snubber.
4. Acceleration of 4 g’s in any direction.
5. All-directional restraint.
6. Manufacturer: Mason Industries Z-1011 Seismic Snubber.

PART 3 - EXECUTION

3.1 DRAWINGS

A. The drawings are partly diagrammatic, not necessarily showing all offsets or exact locations of piping and ducts, unless specifically dimensioned. The contractor shall provide all materials and labor necessary for a complete and operable system. Complete details of the building which affect the mechanical installation may not be shown. For additional details, see Architectural, Structural, and Electrical Drawings. Coordinate work under this section with that of all related trades.

3.2 INSTALLATION

A. All work shall comply with the latest adopted applicable codes and ordinances including, but not limited to, the IMC, UPC, IBC, NEC, NFPA, IECC, IFGC and IFC Standards; all local and state amendments to all codes and standards.

B. Obtain and pay for all inspection fees, connection charges and permits as a part of the Contract.

C. Compliance with codes and ordinances shall be at the Contractor's expense.

3.3 MEASUREMENTS

A. Verify all measurements on the job site.

B. Locate all equipment and fixtures on the centers of walls, openings, spaces, etc., unless specified otherwise.

C. Check all piping, equipment, etc. to clear openings.

D. Rough-in dimensions shall be per manufacturer's recommendations and in compliance with current ADA and ANSI 117.1 standards.

3.4 OPERATING INSTRUCTIONS

A. Before the facility is turned over to the Owner, instruct the Owner or Owner's personnel in the operation, care and maintenance of all systems and equipment under the jurisdiction of the Plumbing Division. These instructions shall also be included in a written summary in the Operating Maintenance Manuals.

B. The Operation and Maintenance Manuals shall be utilized for the basis of the instruction. Provide a minimum of eight hours of onsite instruction to the owner designated personnel.

C. When required by individual specification sections provide additional training on plumbing systems and equipment as indicated in the respective specification section.

D. Provide schedule for training activities for review prior to start of training.

3.5 SYSTEM ADJUSTING

A. Each part of each system shall be adjusted and readjusted as necessary to ensure proper functioning of all plumbing systems. Test all plumbing equipment, fixtures and piping for proper water distribution, drainage, pressure and flow, adjust systems as required to eliminate splashing, noise and vibration.

3.6 CUTTING, FITTING, REPAIRING, PATCHING AND FINISHING

A. Arrange and pay for all cutting, fitting, repairing, patching and finishing of work by other trades where it is necessary to disturb such work to permit installation of mechanical work. Perform work only with craftsmen skilled in their respective trades.

B. Avoid cutting, insofar as possible, by setting sleeves, frames, etc. and by requesting openings in advance. Assist other trades in securing correct location and placement of rough-frames, sleeves, openings, etc. for piping.

C. Cut all holes neatly and as small as possible to admit work. Include cutting where sleeves or openings have been omitted. Perform cutting in a manner so as not to weaken walls, partitions or floors. Drill holes required to be cut in floors without breaking out around holes.

3.7 PAINTING

A. Perform all of the following painting in accordance with provisions of Division 09 with colors as selected by the Architect. Provide the following items as a part of plumbing work:

1. Factory applied prime and finish coats on plumbing equipment.
2. Factory applied prime coat on access doors.
3. Pipe identification where specified.

B. If factory finish on any equipment furnished is damaged in shipment or during construction, refinish to equal original factory finish.

3.8 IDENTIFICATION

A. Tag all valves with heat resistant laminated plastic labels or brass tags engraved with readily legible letters. Securely fasten to the valve stem or bonnet with beaded chain. Provide a framed, typewritten directory under glass, and installed where directed. Provide complete record drawings that show all valves with their appropriate label. Seton 250-BL-G, or 2961.20-G, 2” round or equal.

B. Label all equipment with heat resistant laminated plastic labels having engraved lettering ½" high. If items are not specifically listed on the schedules, consult the Engineer concerning designation to use. Seton engraved Seton-Ply nameplates or equal.

C. Identify piping to indicate contents and flow direction of each pipe exposed to view by a labeled sleeve in letters readable from floor at least once in each room and at intervals of not more that 20' apart and on each side of partition penetrations. Coloring scheme in accordance with ANSI A13.1-1981, Seton Opti-Code or equal.

3.9 PIPE HANGERS AND SUPPORTS

A. Support plumbing piping in accordance with the latest adopted edition of the UPC.

B. Support horizontal piping as follows:

MATERIALS	TYPES OF JOINTS	HORIZONTAL	VERTICAL
Cast-Iron Hub-less	Shielded Coupling	Every other joint, unless over 4 feet then support each joint [1,2,3,4]	Base and each floor, not to exceed 15 feet
Copper Tube and Pipe	Soldered or Brazed	1 ½ inches and smaller, 6 feet; 2 inches and larger, 10 feet	Each floor, not to exceed 10 feet[5]
Steel, Brass, and Tinned Copper Pipe for Gas	Threaded or Welded	½ inch, 6 feet; ¾ inch and 1 inch, 8 feet; 1 ¼ inches and larger, 10 feet	½ inch, 6 feet; ¾ inch and 1 inch, 8 feet; 1 ¼ inches every floor level
Schedule 40 PVC and ABS DWV	Solvent Cemented	All sizes, 4 feet; allow for expansion every 30 feet [3,6]	Base and each floor' provide mid-story guides; provide for expansion every 30 feet[6]
CPVC	Solvent Cemented	1 inch and smaller, 3 feet; 1 ¼ inches and larger, 4 feet	Base and each floor; provide mid-story guides[6]
Copper	Mechanical	In accordance with standards acceptable to the Authority Having Jurisdiction	
Steel and Brass	Mechanical	In accordance with standards acceptable to the Authority Having Jurisdiction	
Polypropylene (PP)	Fusion weld (socket, butt, saddle, electrofusion), threaded (metal threads only), or mechanical	1 inch and smaller, 32 inches; 1 ¼ inches and larger, 4 feet[7]	Base and each floor; provide mid-story guides[7]

Notes:

[1] Support adjacent to joint, not to exceed 18 inches.
[2] Brace not to exceed 40 foot intervals to prevent horizontal movement.
[3] Support at each horizontal branch connection.
[4] Hangers shall not be placed on the coupling.
[5] Vertical water lines shall be permitted to be supported in accordance with recognized engineering principles with regard to expansion and contraction, where first approved by the Authority Having Jurisdiction.
[6] See the appropriate IAPMO Installation Standard for expansion and other special requirements.
[7] See manufacturer installation instructions for additional requirements.

C. Install hangers to provide minimum ½ inch space between finished covering and adjacent work.

D. Place a hanger within 12 inches of each horizontal elbow.

E. Use hangers with 1-½ inch minimum vertical adjustment.

F. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

G. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.

H. Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.

I. Support riser piping independently of connected horizontal piping.

J. Provide transverse seismic support for all piping systems.

3.10 FLASHING

A. Provide flexible flashing and metal counter-flashing where piping penetrates weather or waterproofed walls, floors, and roofs.

B. Flash vent pipes projecting 3 inches minimum above finished roof surface with pre-manufactured butyl boot.

C. Seal floor drains watertight to adjacent materials.

3.11 SLEEVES

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

B. Set sleeves in position in construction. Provide reinforcing around sleeves.

C. Extend sleeves through floors one inch above finished floor level. Caulk sleeves full depth and provide floor plate.

D. Where piping penetrates floor, ceiling, or wall, install sleeve, close off space between pipe and adjacent work with fire stopping insulation and caulk seal. Use fire rated caulking where fire rated walls are penetrated. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

E. Install chrome plated steel escutcheons at finished surfaces.

3.12 SEISMIC RESTRAINT

A. General:

1. All piping and equipment shall be restrained to resist seismic/wind forces per the applicable building code(s) as a minimum. Restraint attachments shall be made by bolts, welds or a positive fastening method. Friction shall not be considered. All attachments shall be proven capable of accepting the required wind load by calculations. Additional requirements specified herein are included specifically for this project.
2. Install seismic and wind restraint devices per the manufacturer's submittals. Any deviation from the manufacturer's instructions shall be reviewed and approved by the manufacturer.
3. Attachment to structure for suspended pipe and equipment: 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.
4. Wall penetrations may be used as bracing locations provided the wall can provide adequate resistance without significant damage.

5. Coordinate sizes and locations of cast-in-place inserts for post-tensioned slabs with seismic restraint manufacturer.
6. Provide hanger rod stiffeners where indicated or as required to prevent buckling of rods due to seismic forces.
7. Where rigid restraints are used on equipment or piping, support rods for the equipment or piping at restraint locations must be supported by anchors rated for seismic use. Post-installed concrete anchors must be in accordance with ACI 355.2.
8. Ensure housekeeping pads have adequate space to mount equipment and seismic restraint devices and shall also be large enough to ensure adequate edge distance for restraint anchor bolts to avoid housekeeping pad breakout failure.

B. Equipment Restraints:

1. Seismically restrain equipment all equipment. Install fasteners, straps and brackets as required to secure the equipment.
2. Install seismic snubbers on HVAC equipment supported by floor-mounted, non-seismic vibration isolators. Locate snubbers as close as possible to vibration isolators and attach to equipment base and supporting structure as required.
3. Install neoprene grommet washers on equipment anchor bolts where clearance between anchor and equipment support hole exceeds 1/8" (3.2 mm).
4. 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.

C. Piping Systems:

1. For projects with a Seismic Design Category of C, provide seismic cable restraints on the following:

    a. All piping systems assigned a component importance factor, Ip, of 1.5 with a nominal pipe diameter greater than 2" (50 mm) or trapeze-supported piping with combined operating weight over 10 lbs/ft (15 kg/m).

2. For projects with a Seismic Design Category of D, E or F, provide seismic cable restraints on the following:

    a. All piping greater than 3" (75 mm) nominal diameter.
    b. All piping systems assigned a component importance factor, Ip, of 1.5 with a nominal pipe diameter greater than 1" (25 mm) or trapeze-supported piping with combined operating weight over 10 lbs/ft (15 kg/m).

3. "12-inch rule", where pipe can be exempted from seismic restraint based on the length of the support rods, is accepted if one of the following conditions are met:

    a. Hangers are detailed to avoid bending of the hangers and their attachment; and provisions are made for piping to accommodate expected deflections. The maximum stress due to combined loading including bending in the hangers must be less than 21.6 ksi.
    b. Isolation hangers are added to hanger rod to provide swivel joint and to prevent bending moment in hanger.

4. Restraint spacing:

a. For ductile piping, space lateral supports a maximum of 40' (12 m) o.c., and longitudinal supports a maximum of 80' (24 m) o.c.
b. For non-ductile piping (e.g., cast iron, PVC) space lateral supports a maximum of 20' (6 m) o.c., and longitudinal supports a maximum of 40' (12 m) o.c.
c. For piping with hazardous material inside (e.g., natural gas, medical gas) space lateral supports a maximum of 20' (6 m) o.c., and longitudinal supports a maximum of 40' (12 m) o.c.
d. For pipe risers, restrain the piping at floor penetrations using the same spacing requirements as above.

5. Brace a change of direction longer than 12' (3.7 m).
6. Longitudinal restraints for single pipe supports shall be attached directly to the pipe, not to the pipe hanger.
7. For supports with multiple pipes (trapezes), secure pipes to trapeze member with clamps approved for application.
8. Piping on roller supports shall include a second roller support located on top of the pipe at each restraint location to provide vertical restraint.

D. Install restraint cables so they do not bend across edges of adjacent equipment or building structure.

E. Install flexible metal hose loops in piping which crosses building seismic joints, sized for the anticipated amount of movement.

F. Install flexible piping connectors 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.

G. Coordinate seismic restraints with thermal expansion compensators, guides and anchor points. Thermal expansion anchor points shall be designed to accommodate seismic forces.

3.13 SCOPE OF VIBRATION ISOLATION WORK

A. All vibrating equipment and the interconnecting pipe shall be isolated to eliminate the transmission of objectionable noise and vibration from the structure.

B. Plumbing equipment shall be carefully checked upon delivery for proper mechanical performance, which shall include proper noise and vibration operation.

C. All installed rotating equipment with excessive noise and/or vibration, which cannot be corrected in place, shall be replaced at no cost to Owner.

3.14 GENERAL PROCEDURES – VIBRATION ISOLATION

A. Select isolators in accordance with the manufacturer's recommendations and the equipment weight distribution to allow for proper static deflection of the isolators in relation to the span of the building structure supporting the equipment, considering the allowable deflection and weight of the structure.

B. Install isolators so they can be easily removed for replacement.

C. Mount all equipment absolutely level.

D. Install all isolators per manufacturer's instructions.

E. Install vibration isolators for mechanical motor driven equipment.

F. Set steel bases for 1" clearance between housekeeping pad and base.

G. All vibration isolated equipment shall be fitted with earthquake bracing and snubbers suitable for seismic control in accordance with the IBC.

H. Piping vibration isolation flexible connections shall be installed at a 90° angle to equipment deflection direction unless otherwise noted.

3.15 INSTALLATION OF EQUIPMENT

A. Unless otherwise indicated, mount all equipment and install in accordance with manufacturer's recommendations and approved submittals.

B. Maintain manufacture recommended minimum clearances for access and maintenance.

C. Where equipment is to be anchored to structure, furnish and locate necessary anchoring and vibration isolation devices.

D. Furnish all structural steel, such as angles, channels, beams, etc. required to support all piping, equipment and accessories installed under this Division. Use structural supports suitable for equipment specified or as indicated. In all cases, support design will be based upon data contained in manufacturer's catalog.

E. Openings: Arrange for necessary openings in buildings to allow for admittance and reasonable maintenance or replacement of all equipment furnished under this Contract.

F. Access Doors: Provide as necessary for reasonable maintenance of all equipment valves, controls, etc.

END OF SECTION

SECTION 22 07 00 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Piping Insulation.

B. Jackets and Accessories.

1.2 RELATED WORK

A. Division 09 - Painting: Painting Insulation Jacket.

B. Section 22 05 00 - Common Work Results for Plumbing.

C. Section 22 40 00 - Plumbing Fixtures.

1.3 REFERENCES

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

B. ANSI/ASTM C533 - Calcium Silicate Block and Pipe Thermal Insulation.

C. ANSI/ASTM C547 - Mineral Fiber Preformed Pipe Insulation.

D. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).

E. ANSI/ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.

F. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

G. ASTM D635 – Standard Test Method for Rate of Burning and/or Extent and Tim of Burning of Plastics in a Horizontal Position.

H. ASTM E84 - Surface Burning Characteristics of Building Materials.

I. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.

J. NFPA 255 - Surface Burning Characteristics of Building Materials.

K. UL 723 - Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

A. Submit product data under provisions of Division 01.

B. Include product description, thickness for each service, and locations.

C. Submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

A. Applicator: Company specializing in piping insulation application with three years minimum experience.

B. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.

C. Materials: Flame spread/smoke developed rating of 25/50 in accordance with UL 723, ASTM E84, or NFPA 255.

D. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

1.6 DELIVERY STORAGE AND HANDLING

A. Division 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

C. Shipment of materials from manufacturer to installation location shall be in weather tight transportation.

D. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer.

1.8 FIELD MEASURMENTS

A. Verify field measurements prior to fabrication.

1.9 WARRANTY

A. Division 01- Execution and Closeout Requirements: Product warranties and product bonds.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Armacell.

B. Certain-Teed.

C. IMCOA.

D. Johns Manville.

E. Knauf.

F. Owens-Corning.

G. Manson.

H. Nomaco.

I. Pittsburgh - Corning.

J. K-Flex USA.

K. Armstrong.

L. TRUEBRO.

M. Substitutions: Under provisions of Division 01.

2.2 INSULATION - PIPING

A. Type A: Glass fiber, rigid, molded, non-combustible insulation; ANSI/ASTM C547; 'k' value of 0.23 at 75º F, rated from 0º F to 850º F, vapor retarder jacket of Kraft paper bonded to aluminum foil, self-sealing lap and butt strips; Johns Manville "Micro-Lok" or approved equal.

B. Type F: ADA insulation; preformed cellular foam, preformed for P-trap and hot water angle stop and supply tube at handicap sinks and lavatories; in compliance with the Americans with Disability Act (ADA); burning characteristics per ASTM D635; TRUEBRO “Lav Guard 2” or approved equal.

C. Type G: ADA plumbing enclosure skirt; preformed high-impact stain resistant rigid PVC, stainless steel screws and wall anchors; in compliance with the Americans with Disability Act (ADA); burning characteristics per ASTM D635 TRUEBRO “Lav Shield” or approved equal.

2.3 FIELD APPLIED JACKET

A. Vapor Barrier Jackets: Kraft reinforced foil vapor barrier with self-sealing adhesive joints.

B. PVC Jackets and solvent welding adhesive: One piece, pre-molded type, Johns Manville "Zeston 2000", fitting covers and jacketing material. Johns Manville "Perma-Weld" solvent welding adhesive.

2.4 INSULATION ACCESSORIES

A. Adhesives: Waterproof and fire-retardant type.

B. Impale Anchors: Galvanized steel, 12 gauge, self-adhesive pad.

C. Joint Tape: Glass fiber cloth, open mesh.

D. FSK Joint Tape; ASTM C1136 Foil-Scrim-Kraft (FSK) lamination coated with solvent acrylic pressure sensitive adhesive; capable of adhering to fibrous and sheet metal surfaces; tri-directionally reinforced 2x3 squares per inch fiberglass scrim; 9.5 mils thick, -40 to 240º F service temperatures; Venture Tape "1525CW" or approved equal.

E. Tie Wire: Annealed steel, 16 gauge.

F. Insulated pipe supports: Calcium silicate with galvanized steel jacket (min. 24 gauge); ANSI/ASTM C533; rigid white; 'k' value of 0.37 at 100º F, rated to 1,200º F; Thermal Pipe Shields "T-1000 Calsil" or equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install materials after piping and equipment has been tested and approved.

B. Clean surfaces for adhesives.

C. Prepare surfaces in accordance with manufacturer's recommendations.

3.2 INSTALLATION - PIPING

A. Install materials in accordance with manufacturer's recommendations, building codes and industry standards.

B. Continue insulation vapor barrier through penetrations except where prohibited by code.

C. Locate insulation and cover seams in least visible locations.

D. Neatly finish insulation at supports, protrusions, and interruptions.

E. Provide insulated cold pipes conveying fluids below ambient temperature with vapor retardant jackets with self-sealing laps. Insulate complete system, including under fitting jackets.

F. For insulated pipes conveying fluids above ambient temperature, secure jackets with self-sealing lap or outward clinched, expanded staples. Bevel and seal ends of insulation at equipment, flanges, and unions. Insulate complete system, including under fitting jackets.

G. Provide insert fabricated of Johns Manville Thermo-12 or other heavy density insulating material suitable for temperature between support shield and piping on piping 1-½" inches diameter or larger. Insulation inserts shall not be less than the following lengths:

1-½" to 2-½" pipe size	10" long
3" to 6" pipe size	12" long
8" to 10" pipe size	16" long
12" and over	22" long

H. Fully insulate all piping including all spaces under jacketing.

I. Jackets:

1. Indoor, Concealed Applications: Insulated pipes shall have vapor barrier jackets, factory-applied. Vapor barrier PVC fittings may also be used provided joints are sealed with solvent welding adhesive approved by the jacket manufacturer.
2. For pipe exposed in mechanical equipment rooms or in finished spaces below 10 feet above finished floor, finish with PVC jacket and fitting covers.
3. Insulate all exposed trap arms, drains, and hot water supplies for handicap protection on handicap accessible fixtures.

3.3 SCHEDULE - PIPING

PIPING	TYPE	PIPE SIZE Inch	MINIMUM INSULATION THICKNESS Inch
Domestic Cold Water	A	All Sizes	1”
Domestic Hot Water Supply – Mains	A	All Sizes	1”
Domestic Hot Water Supply – Branch Lines	A	All Sizes	1”
Domestic Hot Water Recirculating	A	All Sizes	
Vent Through Roof	A	All Sizes	1"
Piping Exposed to Freezing	A	All Sizes	2"
Handicap lavatories, sinks @ waste and supply	F, G	All Sizes	½"

END OF SECTION

SECTION 22 10 00 - PLUMBING PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Sanitary Sewer Piping.

B. Water Piping.

C. Dental Air Piping.

D. Dental Vacuum Piping.

E. Valves.

F. Water Hammer Arrestors.

G. Dielectric Connections.

H. Cleanouts.

I. Trap Primer Valves.

1.2 RELATED WORK

A. Division 02 - Excavating, Backfilling, Trenching.

B. Section 22 05 00 – Common Work Results for Plumbing.

C. Section 22 07 00 - Plumbing Insulation.

D. Section 22 40 00 - Plumbing Fixtures.

1.3 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Any pipe or plumbing fitting or fixture, any solder, or any flux utilized on this project shall be “lead free” in accordance with the Safe Drinking Water Act, Section 1417. “Lead free” materials utilized in domestic water system shall not contain more than 0.2 percent lead when used with respect to solder and flux; and not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures. All materials utilized in domestic water system shall be certified by an ANSI accredited organization to conform to ANSI/NSF Standard 61.

1.4 SUBMITTALS

A. Submit product data under provisions of Division 01.

B. Include data on pipe materials, pipe fittings, valves and accessories.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division 01.

B. Store and protect products under provisions of Division 01.

C. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 service weight. Fittings: Cast iron. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets.

B. Cast Iron Pipe: CISPI 301, hubless, service weight. Fittings: Cast iron. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies, Husky Series 4000 or approved equal.

2.2 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: CISPI 301, hubless, service weight. Fittings: Cast iron. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies, Husky Series 4000 or approved equal.

2.3 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88, Type L, hard drawn. Fittings: ASME B16.18, cast copper alloy, or ASME B16.22, wrought copper. Joints: ANSI/ASTM B32, solder, Grade 95TA; Flux: ASTM B813 or Press-Fit.

B. Chlorinated Polyvinyl Chloride (CPVC) Piping:

1. ½" To 2": FlowGuard Gold CPVC or equal, ASTM D2846, NSF listed, SDR 11, Schedule 40, Fittings: Solvent welded socket type.
2. Larger than 2": Corzan CPVC or equal, ASTM F441, NSF listed, Schedule 80, Fittings: ASTM F439 Solvent welded socket type.

C. Polypropylene (PP-R) Piping:

1. Pipe shall be manufactured from a PP-R resin meeting the short-term properties and long-term strength requirements of ASTM F 2389. The pipe shall contain no rework or recycled materials except that generated in the manufacturer's own plant from resin of

the same specification from the same raw material. All pipe shall be made in a three layer extrusion process. Domestic hot water shall contain a fiber layer (faser) to restrict thermal expansion. All pipe shall comply with the rated pressure requirements of ASTM F 2389. All pipe shall be certified by NSF International as complying with NSF 14, NSF 61, and ASTM F 2389 or CSA B137.11.

Pipe shall be Aquatherm® Greenpipe®, or Greenpipe® Faser®, available from Aquatherm, Inc.. Piping specifications and ordering information are available at www.aquathermpipe.com. Installation of Polypropylene piping in return air plenums is prohibited.

2.4 DENTAL PIPING

A. Copper Tubing: ASTM B88, Type K, hard drawn. Tubing and fitting shall be labeled for medical gas use. Fittings: ASME B16.18, cast copper alloy, or ASME B16.22, wrought copper. Joints: AWS A5.8 classification bcup-3 or bcup-4 silver braze.

2.5 DENTAL VACUUM PIPING

A. PVC Pipe ASTM D1785, PVC 1120 Or 1220, And Schedule 80. Fittings: ASTM D2466, PVC Long Radius Or Wye Type. Joints: ASTM D2564, Solvent Cement.

2.6 INTERIOR TRENCH EXCAVATION AND BACKFILL

A. General

1. This section describes general requirements, products, and methods of execution relating to excavation, back-fill, and compaction of inside trenches for mechanical work. Inside trenches are those which occur within an arbitrary, imaginary boundary five feet beyond the outside perimeter of the structure.
2. Provide all trench work for mechanical work of every description and of whatever substance encountered to the depth indicated, or to provide pipe slopes and elevations shown on the drawings. Excavate and backfill utility trenches. Place and compact bedding material. Compact backfill material.

B. Bedding Material

1. Select bedding material from trench excavation using care to separate it from unsuitable material. If suitable bedding material is not available from trench excavation, import it from sources approved by the Owner.
2. Use granular material, free from large stones, boulders, debris, and frozen material. Maximum aggregate size ¾" minus to have less than 6% passing through a #200 sieve. Maintain moisture content within a range that will allow specified compaction.
3. Do not use any frost susceptible materials.

C. Trench Backfill

1. Backfill material shall be 3/8" pea gravel of smaller. In the case of cast iron drain, waste and vent piping, the backfill material shall be ¾" gravel and earth or smaller.

2.7 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 2 Inches and Under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.

B. Pipe Size Over 2 Inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping: 1/16 inch thick preformed neoprene bonded to fiber.

C. Grooved and Shouldered Pipe End Couplings: Malleable iron housing clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; "C" shape composition sealing gasket; steel bolts, nuts, and washers; galvanized couplings for galvanized pipe.

2.8 ACCEPTABLE MANUFACTURERS - DIELECTRIC CONNECTIONS

A. Elster Perfection - Clearflow.

B. Substitutions: Under provisions of Division 01.

2.9 DIELECTRIC CONNECTIONS

A. Dielectric Connections: Dielectric waterway fitting shall have zinc electroplated steel casing with polypropylene inner lining to provide a dielectric waterway. The fitting shall be designed to meet requirements of ASTM F1545 for continuous use at temperatures up to 225°F and for pressures up to 300 psi. IAPMO, UPC and NSF-61 listed for use with potable water.

2.10 ACCEPTABLE MANUFACTURERS - ALL VALVE TYPES

A. Apollo.

B. FNW.

C. Hammond.

D. Milwaukee.

E. Nibco.

F. Red-White Valve Corp.

G. Substitutions: Under provisions of Division 01.

2.11 GATE VALVES

A. Up to 3 Inches: Not permitted.

B. 3 inches and over: ASTM A 126, gray iron with bolted bonnet, flanged ends, bronze trim, solid wedge disk, rising stem. Asbestos free packing and gasket.

2.12 GLOBE VALVES

A. Not permitted. Use ball or butterfly valves for throttling service.

2.13 BALL VALVES

A. Up to 2 Inches: Bronze two piece body, full port, forged brass, chrome plated ball, Teflon seats and stuffing box ring, lever handle, solder, threaded or press-fit ends.

B. Over 2 Inches: Cast steel, two piece body, full port chrome plated steel ball, Teflon seat and stuffing box seals, lever handle, flanged, solder, threaded or press-fit ends.

2.14 BUTTERFLY VALVES

A. Iron body, bronze disc, resilient replaceable seat for service to 180º F, lug ends.

2.15 SWING CHECK VALVES

A. Up to 2 Inches: Bronze swing disc, solder, screwed or press-fit ends.

B. Over 2 Inches: Iron body, bronze trim, swing disc, renewable disc and seat, flanged, solder, threaded or press-fit ends.

2.16 SPRING LOADED CHECK VALVES

A. Iron body, bronze trim, spring loaded, renewable composition disc, wafer, flanged, solder, threaded or press-fit ends.

2.17 BALANCE VALVE

A. Straight pattern, calibrated balance valve for 400 psig maximum working pressure, with NSF 61 compliant lead free brass body, type 304 stainless steel ball, glass and carbon filled TFE seat rings, brass and EPT check valves, EPDM stem o-ring, plastic wheel handle for shut-off service, and lockshield key cap with set screw memory bonnet for balancing service. NPT or sweat ends. Bell & Gossett Circuit Setter Plus or approved equal.

2.18 ACCEPTABLE MANUFACTURERS - WATER HAMMER ARRESTORS

A. J.R. Smith.

B. Zurn.

C. Mifab.

D. Substitutions: Under provisions of Division 01.

2.19 WATER HAMMER ARRESTORS

A. ANSI A112.26.1; sized in accordance with PDI WH-201, pre-charged suitable for operation in temperature range -100ºF to 300ºF and maximum 250 psig working pressure; Series 5000 manufactured by J.R. Smith or approved equal.

2.20 DRAIN VALVES

A. Bronze body, chrome plated brass ball, RPTFE seals and stuffing box ring, stainless steel handle with vinyl cover. 3/4" NPT x 3/4" Hose thread, with duct cover and chain, sweat ends. Apollo 78-100 Series or approved equal.

2.21 ACCEPTABLE MANUFACTURERS - CLEANOUTS

A. J.R. Smith.

B. Zurn.

C. Mifab.

D. Substitutions: Under provisions of Division 01.

2.22 CLEANOUTS

A. Exterior Surfaced Areas: Round cast iron access frame and non-skid cover, bronze plug, vandal resistant screws. J.R. Smith Model 4251 or approved equal.

B. Interior Finished Floor Areas: Enamel paint coated cast iron, two piece body with double drainage flange, weep holes, reversible clamping collar, bronze plug, and adjustable round nickel bronze scoriated cover in service areas and round with depressed cover to accept floor finish in finished floor areas. J.R. Smith Model 4021 or approved equal.

C. Interior Finished Wall Areas: Line type with lacquered cast iron body and round epoxy coated gasketed cover, bronze plug, and round stainless steel access cover secured with machine screw. J.R. Smith Model 4022 or approved equal.

D. Interior Unfinished Accessible Areas: Caulked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.23 ACCEPTABLE MANUFACTURERS – TRAP PRIMER VALVES

A. Precision Plumbing Products, Inc.

B. Mifab.

C. Zurn.

D. Substitutions: Under provisions of Division 01.

2.24 MANUAL TRAP PRIMER VALVE

A. Valve: Machined of brass, containing no springs or diaphragms. “O” rings acceptable for –40°F to +450°F operation. Distribution Unit: Brass fitting with copper water reservoir. Clear plastic cover. Tappings for up to four drain taps. Precision Plumbing Model Prime-Rite or approved equal.

2.25 LAVATORY TEMPERING VALVE

A. Lead free brass construction and chrome finish, adjustable temperature selection with threaded cap and adjustment tool, thermal actuator, corrosion resistant internal components, integral checks. Mounting bracket for secure installation. Provide with tee fitting for cold and hot water faucet connections.

B. Construction

1. Body: DZR Brass.
2. Springs: Stainless Steel.
3. Internal Cap: Brass.
4. Piston: Engineered Polymer.
5. Inlet Strainer Screens: Stainless Steel.

C. Performance:

1. Factory set to 105°F.
2. Maximum Operating Pressure: 230 psi.
3. Hot Water Inlet Temperature Range: 120ºF – 180°F.
4. Cold Water Inlet Temperature Range: 40ºF – 80°F.
5. Temperature Adjustment Range: 100ºF – 120°F.
6. Minimum Flow: 0.25 GPM.
7. Listing: ASSE 1070, CSA, IAPMO.
8. Approval: ASSE 1070, CSA B125.7, NSF 61 Certified.

D. CASH ACME Heatguard 135 Series or approved equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

B. Route piping in orderly manner and maintain gradient.

C. Install piping to conserve building space and not interfere with use of space.

D. Group piping whenever practical at common elevations.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Provide clearance for installation of insulation and access to valves and fittings.

G. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.

H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

I. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting. Refer to Division 09.

J. Establish invert elevations, slopes for drainage to 1/4” per foot, 1/8” per foot if 4" or over, minimum. Maintain gradients.

K. Install valves with stems upright or horizontal, not inverted.

L. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with Teflon™ based thread lubricate. Ensure clearance at cleanout for rodding of drainage system.

3.3 APPLICATION

A. Install unions downstream of valves and at equipment connections.

B. Install ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.

C. Install ball or balance valve valves for throttling, bypass, or manual flow control services. (No globe valves permitted.)

3.4 TESTING

A. Test all water piping in accordance with Section 609 of the UPC. Submit a signed statement to the Engineer stating testing dates, procedure and initials of tester.

B. Test all sanitary sewer and vent piping in accordance with Section 712 of the UPC. Submit a signed statement to the Engineer stating testing dates, procedure and initials of tester.

C. Test all storm drainage piping in accordance with Section 1109 of the UPC. Submit a signed statement to the Engineer stating testing dates, procedure and initials of tester.

3.5 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Flush, clean and disinfect the potable water system in accordance with Section 609 of the UPC. Submit a signed statement to the Engineer stating disinfection dates, procedure and initials of tester.

3.6 INTERIOR TRENCH EXCAVATION AND BACKFILL

A. Excavation

1. Place all excavated material suitable for back-fill in an orderly manner, and in conformance with safety codes.
2. Dispose of all material not suitable for back filling.
3. Form bell holes so pipelines rest on continuous undisturbed soil. If larger rocks or boulders are encountered, remove them. If trenches are below specified grade, backfill to required depth with select granular materials free from debris, rock, or frozen material, and compact to proper grade before installing piping.

B. Location

1. Locate trenches to accommodate utilities shown on the drawings.
2. Excavate trench with adequate width to allow compaction equipment to be used at the sides of pipes.
3. Make trench side slopes conform to prevailing safety code requirements.

C. Dewatering

1. Perform whatever work is necessary to prevent the flow and accumulation of surface or ground water in the excavation.

D. Timing

1. Do not back-fill until underground mechanical system has been properly tested, inspected and approved.
2. Coordinate with the work of others, and complete all trench work in a timely manner.

E. Bedding

1. Place bedding material under, around, and over the pipe in lifts not exceeding six inch in depth.
2. Work material around pipe by hand methods, taking care to keep any oversize or sharp stones out of contact with the pipe, and to provide uniform support for the pipe.
3. Cover pipe with bedding material to building sub-grade or to a minimum 12 inch depth before adding other backfill.

F. Backfilling

1. Continue placing backfill material until trench is completely filled to building sub-grade, or as shown on the drawings.
2. Place backfill material in lifts not to exceed 12 inches in depth.

G. Compaction

1. Compact bedding material to at least 95 percent of maximum density, taking care not to damage the pipe.
2. Compact backfill under footings, slabs, and other structures to 95% of maximum density or more, if required by the Owner. Where 95% compaction cannot be achieved, fill remaining voids with concrete.
3. Compact other areas to preclude future settlement, or at least to 85% of maximum density.

H. Finishing

1. After completion of backfilling, dispose of excess material and smooth the surface to grade.
2. Do not allow heavy equipment to be used over backfilled work that does not have sufficient cover to prevent pipe damage.

I. Special Precautions

1. Avoid unauthorized and unnecessary excavations.
2. Minimize number and size of excavations under footings or bearing walls.
3. Support footings, foundations, and walls with timbers and jacks if there appears to be any possible change of damage, and keep such precautions in place until work is completed and sufficient backfill is in place to eliminate possible damage.
4. Avoid damage to all existing underground services, cables, conduit lines or foundations. Repair any existing underground work damaged at no additional cost to the Owner.
5. Protect excavated materials from moisture during the period prior to reinstallation.

3.7 DENTAL SYSTEM

A. Install systems in accordance with NFPA 99 for a category 3 system.

B. Certify dental air and vacuum systems are complete, and tests performed per NFPA 99. Document tests and submit.

END OF SECTION

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Water Closets.

B. Combi Units.

C. Lavatories.

D. Sinks.

E. Janitor Sinks.

F. Showers.

G. Floor Drains.

H. Hose Bibbs.

1.2 RELATED WORK

A. Section 22 05 00 - Common Work Results for Plumbing.

B. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment.

C. Section 22 08 00 – Commissioning of Plumbing.

D. Section 22 10 00 – Plumbing Piping.

1.3 REFERENCES

A. ANSI/ASSE 1012 - Backflow Preventers with Immediate Atmospheric Vent.

B. ANSI/ASSE 1011 - Hose Connection Vacuum Breakers.

C. ANSI/ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.

D. ANSI A112.21.1 - Floor Drains.

1.4 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by same manufacturer throughout.

B. Trim: By same manufacturer for each product specified throughout.

1.5 SUBMITTALS

A. Submit product data under provisions of Division 01.

B. Include sizes, rough-in requirements, service sizes, and finishes.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Division 01.

B. Include fixture trim exploded view and replacement parts lists.

C. Provide Manufacturer's parts list and maintenance information on specialties.

1.7 WARRANTY

A. Provide manufacturer's warranty under provisions of Division 01.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS – WATER CLOSET/ LAVATORY COMBI UNITS

A. Willoughby Industries with I-CON Flush Valve.

B. Substitutions: Under provisions of Division 01.

2.2 ACCEPTABLE MANUFACTURERS – WATER CLOSETS, LAVATORIES (STAFF)

A. Kohler.

B. Crane.

C. Owner approved equal.

2.3 ACCEPTABLE MANUFACTURERS - WATER CLOSET SEATS

A. Kohler

B. Church.

C. Bemis.

D. Substitutions: Under provisions of Division 01.

2.4 ACCEPTABLE MANUFACTURERS - SINKS

A. Just.

B. Elkay.

C. Owner approved equal.

2.5 ACCEPTABLE MANUFACTURERS - FIXTURE CARRIERS

A. J.R. Smith.

B. Zurn.

C. Substitutions: Under provisions of Division 01.

2.6 ACCEPTABLE MANUFACTURERS – SINK & LAVATORY FAUCETS

A. Delta.

B. Owner approved equal.

2.7 ACCEPTABLE MANUFACTURERS – JANITORS SINKS

A. Fiat.

B. Mustee.

C. Owner approved equal.

2.8 ACCEPTABLE MANUFACTURERS – SHOWER VALVES

A. Bradley.

B. Owner approved equal.

2.9 WATER CLOSET/LAVATORY COMBINATION UNITS (P-1, P-2)

A. Materials: All materials, including interior piping are Type 304 stainless steel finish. Fixture to be made from heavy gauge stainless steel with seamless welded surfaces.

B. Toilet: All welded construction with exposed welds ground smooth, and all accessible seams and voids eliminated. Fixture to withstand up to 5000 lb. load on front edge of toilet with certified

test results of such loading available upon request. Interior of cabinet to be fire-resistant, sound-deadening material.

C. Flush Valve: Electric valve assembly with anti-suicide push button. Flush valve to be non-metallic assembly. Flush action by electric solenoid, 24VAC. Valve to shut on loss of line pressure. Programmed to 1.6 gallons. Provide flush valve with bypass lever. Electronic Valve to be I-CON Momentum model, VLV-FVL-3801 Series.

D. Lavatory: Die drawn oval bowl with multiple hole fast drain with air vent. Self-draining soap dishes, integral escutcheons and bubbler.

E. No exposed mounting fasteners to be in cell area.

2.10 WATER CLOSET (P-3)

A. Bowl: ANSI A112.19.2; The elongated bowl shall be 10″ or 12″ rough-in with a 1-1/2″ top spud. Bowl shall be made of vitreous china. Bowl shall be 1.6 gpf. Bowl shall have 11-3/8″ x 10-3/8″ water area. Bowl shall have 2-1/4″ passageway.

B. Flush Valve: ANSI A112.18.1; exposed chrome plated, diaphragm type with oscillating handle, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker.

C. Seat: Solid white plastic, open front, extended back, brass bolts, without cover.

D. Wall Mounted Carrier: ANSI A112.6.1; cast iron and steel frame concealed arm supports, bearing plate and studs; manufactured by Smith.

2.11 LAVATORY (P-4)

A. Basin: ANSI A112.19.2; vitreous china wall-hung lavatory 20 x 18 inch minimum, with 4 inch high back, drillings on 4 inch centers, rectangular basin with splash lip, front overflow, and soap depression. Wall hung for carrier with concealed arms.

B. Faucet: Single handle lavatory deck faucet for exposed mounting on three hole sinks 4” centerset. All metal fabricated body 5” spout Metal grid strainer. Vandal resistant lever handle. Red/blue colored graphics indicate hot/cold temperature Control mechanism is the diamond embedded ceramic disc cartridge. Control handle shall return to the neutral position when valve is turned off Adjustable handle limit stop 3/8" O.D. copper supply tubes with 1/2"-14 NPSM adapters Chrome Finish Vandal Resistant 0.5 GPM spray outlet with wrench.

C. Offset open grid drain: Chrome plated cast brass one piece top, 1/16" thick, tubular 1-1/4" tailpiece.

D. Faucet Supplies: Chrome finish polished brass, commercial duty 1/4 turn ball valve angle stop, 1/2" I. D. Inlet x 5" horizontal extension tubes, combination V. P. Loose key handle, escutcheon and flexible copper riser.

E. P-Trap: Heavy cast brass adjustable body, with slip nut, 1-1/4” inlet, box flange and seamless tubular wall bend.

2.12 JANITORS SINK (P-5)

A. Basin: The sink shall have overall outside dimensions of 36” x 24” x 10”. The molding shall be done in matched metal dies under heat and pressure resulting in a one-piece homogeneous product. The unit shall have 10” high walls with not less than 1” wide.

B. Faucet: Chrome plated with vacuum breaker, integral stops, adjustable wall brace, pail hook and 3⁄4” hose thread on spout.

C. Accessories: Hose and bracket, rubber drain adapter, vinyl bumperguard, mop hanger.

2.13 SHOWER VALVE (P-6)

A. Metering Valve: To be low profile with chrome plated brass material, Internal parts to be anti-liming and corrosion-resistant material. The timing cycle to be 30 seconds in duration.

B. Mixing Valve: ASSE 1070 certified, Adjustable setpoint within temperature range, dirt and lime resistant, 1/2” copper and 1/2” NPT tailpiece connection. Valve operating conditions: Maximum operating pressure: 125 PSI and Maximum inlet temperature 180 Deg F.

C. Shower Accessories: Fixed direction shower head (2.5 GPM), vandal resistant components.

2.14 SHOWER VALVE (P-7) - ADA

A. Metering Valve: To be low profile with chrome plated brass material, Internal parts to be anti-liming and corrosion-resistant material. The timing cycle to be 30 seconds in duration.

B. Mixing Valve: ASSE 1070 certified, Adjustable setpoint within temperature rage, dirt and lime resistant, 1/2” copper and 1/2” NPT tailpiece connection. Valve operating conditions: Maximum operating pressure: 125 PSI and Maximum inlet temperature 180 Deg F.

C. Shower Accessories: Fixed direction shower head (2.5 GPM), vandal resistant components.

D. Grab Bars & Accessories: Recessed security seat, grab bars.

2.15 SINK (P-8)

A. Basin: Seamless die-drawn construction of Type-304,18-8 stainless steel. Interior and top surfaces polished to a non-porous, hand-Blended, finish with highlighted bowl rim. Fully coated underside insulated for sound and reduces condensation. Straight-sided compartment with radius corners provides greater capacity. Self-rimming top mount with stainless steel mounting channels. Conforms to ASME/ANSI A112.19.3M. Certified conformance with ASME A112.19.3/CSA B45.4, Uniform Plumbing Code (UPC) and International Plumbing Code (IPC) and Americans with Disabilities Act (ADA).

B. Faucet: Solid brass fabricated body, 4" centerset, 4 5/32" long. 11" high spout, swings 360°, solid brass cast body, for exposed mounting on 2 and 3 hole sinks with 4" centers, all operating parts are replaceable from the top, hot and cold stems are interchangeable, 1/2"-14 NPSM threaded male inlet shanks, control mechanism is a rotating cylinder type with stainless steel plate and 90° rotating, with replaceable non-metallic seats, 1.5 gpm max. flow rate @ 60 psi, chrome finish.

C. Faucet Supplies: Chrome finish polished brass, commercial duty 1/4 turn ball valve angle stop, 1/2" I. D. Inlet x 5" horizontal extension tubes, combination V. P. Loose key handle, escutcheon and flexible copper riser.

2.16 P-TRAP

A. P-trap shall be chrome plated cast brass body, with 17 gauge seamless tubular wall bend, cast brass slip nuts. Reducing washers shall be used with reducing cast brass nut**,** chrome plated brass escutcheons.

2.17 ANGLE STOPS AND SUPPLY RISERS

A. Quarter-turn lead free brass ball valve with convertible loose key handle, chrome plated copper, or braided stainless supply risers and chrome plated brass escutcheons.

2.18 ACCEPTABLE MANUFACTURERS - FLOOR DRAINS

A. J.R. Smith.

B. Zurn.

C. Josam.

D. Mifab.

E. Substitutions: Under provisions of Division 01.

2.19 FLOOR DRAINS

A. FD-1: ANSI A112.21.1; lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer [and trap primer connection as indicated]; Model 2005-A manufactured by J.R. Smith.

2.20 ACCEPTABLE MANUFACTURERS - HOSE BIBBS/HYDRANTS

A. Woodford.

B. J.R. Smith.

C. Zurn.

D. Josam.

E. Mifab.

F. Substitutions: Under provisions of Division 01.

2.21 HOSE BIBBS/HYDRANTS

A. Interior Hose Bibb (HB-1): Bronze or brass, replaceable disc, hose thread spout, plated finish, tee handle, with vacuum breaker in conformance with ANSI/ASSE 1011; Model 24P manufactured by Woodford.

2.22 TRAP PRIMER VALVE

A. Valve: Machined of brass, containing no springs or diaphragms. “O” rings acceptable for –40 to +450 F operation.

B. Distribution Unit: Brass fitting with copper water reservoir. Clear plastic cover. Tappings for up to four drain taps.

C. Prime-Rite Trap Primer as manufactured by Precision Plumbing Products or equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate cutting of floor construction to receive drains to required invert elevations.

3.2 INSPECTION

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

B. Verify adjacent construction is ready to receive rough-in work of this Section.

3.3 INSTALLATION

A. Install each fixture with removable p-trap for servicing and cleaning.

B. Provide angle stop and supply risers at each fixture. Provide chrome plated escutcheons for both hot and cold water supplies and waste piping.

C. Install components level and plumb

D. Install and secure fixtures in place with wall or floor carriers, supports as per the manufacturers instructions.

E. Solidly attach floor mounted water closets to toilet flange with non-corroding t-bolts, washers and acorn nuts.

F. Seal fixtures to wall and floor surfaces with silicone sealant, color to match fixture.

G. Mount fixtures above finished floor in accordance with Architectural.

H. Install specialties in accordance with manufacturer's instructions to permit intended performance.

I. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

J. Install water hammer arrestors complete with accessible isolation valve.

3.4 ADJUSTING AND CLEANING

A. Adjust stops, valves or flow control valves for intended water flow rate to fixtures without splashing, noise, or overflow.

B. Remove and clean all aerators and filters from faucets and other plumbing fixtures after the domestic water system has been tested, flushed and disinfected as per Section 22 10 00.

C. At completion remove all visible stickers and tags not intended to be left in place, thoroughly clean all surfaces of plumbing fixtures.

END OF SECTION

SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SCOPE

A. All provisions of the Contract including the General and Supplementary Conditions and the General Requirements apply to this work.

1.2 WORK INCLUDED

A. The work to be included in these and all other mechanical subsections shall consist of providing, installing, adjusting and setting into proper operation complete and workable systems for all items shown on the drawings, described in the specifications or reasonably implied. This shall include the planning and supervision to coordinate the work with other crafts and to maintain a proper time schedule for delivery of materials and installation of the work.

B. Division 01 of the specifications is to be specifically included as well as all related drawings.

1.3 RELATED WORK

A. Related Work Specified Elsewhere:

1. Fire Suppression Specifications: Division 21.
2. Plumbing Specifications: Division 22.
3. Electrical Specifications: Division 26.
4. Motors and Connections: Division 26.
5. Starters and Disconnects: Division 26.

B. Unless otherwise indicated on the electrical drawings or the electrical schedules, provide all mechanical equipment motors, motor starters, thermal overload switches, control relays, time clocks, thermostats, motor operated valves, float controls, damper motors, electric switches, electrical components, wiring and any other miscellaneous Division 23 controls. Disconnect switches are included in the electrical work, unless specifically called out on mechanical plans.

C. Carefully coordinate all work with the electrical work shown and specified elsewhere.

1.4 REFERENCED CODES - LATEST ADOPTED EDITION

A. NFPA 13 Installation of Sprinkler Systems.

B. NFPA 70 National Electrical Code (NEC).

C. IMC International Mechanical Code.

D. UPC Uniform Plumbing Code.

E. IECC International Energy Conservation Code.

F. IFC International Fire Code.

G. IFGC International Fuel Gas Code.

H. IBC International Building Code.

1.5 PROJECT RECORD DRAWINGS

A. In addition to other requirements of Division 01, mark up a clean set of drawings as the work progresses to show the dimensioned location and routing of all mechanical work which will become permanently concealed. Show routing of work in concealed blind spaces within the building. Show exact dimensions of buried piping off of columns or exterior walls.

B. Maintain record documents at job site in a clean, dry and legible condition. Keep record documents available for inspection by the Project Manager.

C. Show the location of all valves and their appropriate tag identification.

D. At completion of project, deliver these drawings to the Owner and obtain a written receipt.

1.6 SUBMITTALS

A. See General Conditions and the General Requirements in Division 01 regarding submittals.

B. Submit by specification section complete and all at one time; partial submittals will not be considered. Submittals shall be provided in electronic PDF Format. The data in the electronic file shall be arranged and indexed under basic categories in order of the Specification Sections. An index shall be included with bookmarks and identifying tabs between sections and references to sections of specifications.

C. Catalog sheets shall be complete and the item or model to be used shall be clearly marked, and identified as to which item in the specifications or on the drawings is being submitted and with drawing fixture number where applicable.

D. Only submit on items specifically required by each specification section. If a submittal has not been requested, it will not be reviewed.

E. Submit product data for:

1. Hangers and Supports for HVAC Piping and Equipment.
2. Vibration and Seismic controls for HVAC Piping, Ductwork and Equipment.
3. Identification for HVAC Piping, Ductwork and Equipment.

F. Provide shop drawings with calculations for selection of seismic/wind restraints in accordance with IBC and ASCE 7, certified by a qualified professional engineer, licensed in the State of Alaska. Seismic calculations shall be based upon Seismic Category D. Seismic calculations for natural gas piping shall utilize and Component Importance Factor, IP, of 1.5. All other components shall utilize an IP of 1.0 for seismic calculations.

1.7 OPERATING AND MAINTENANCE MANUALS

A. Submit maintenance manuals to the Engineer covering all equipment, devices, etc. installed by the Contractor.

B. The operation and maintenance manuals shall be submitted by specification section complete and all at one time; partial operations and maintenance manual submittals will not be considered. The Operation and maintenance manuals shall be provided in electronic PDF Format. The data in the electronic file shall be arranged and indexed under basic categories. An index shall be included with bookmarks and identifying tabs between sections and references to sections of specifications. The manual shall contain, but not limited to, the following types of information:

1. Cover sheet with name, address, telephone number of Contractor, General Contractor and major equipment suppliers.
2. Catalog cuts of all equipment, etc. installed (Marked to identify the specific items used).
3. Manufacturer's maintenance and overhaul instruction booklets including exploded views.
4. Identification numbers of all parts and nearest sources for obtaining parts and services.
5. Reduced scale drawings of the control system and a verbal description of how these controls operate.
6. A copy of the final test and balance report.
7. A copy of valve schedule and reduced scale drawings showing valve locations.
8. Written summary of instructions to Owner.
9. All manufacturers' warranties and guarantees.
10. Contractors Warranty Letter.

C. A periodic maintenance form that includes all of the equipment shall be provided with the maintenance manual. The form shall list each piece of equipment and how often maintenance is required (daily, weekly, monthly, annually). Opposite each task shall be squares for check-off for a full year (initials) to verify that the tasks are being done.

1.8 HANDLING

A. See General Conditions and the General Requirements in Division 01 regarding material handling.

B. Deliver packaged materials to job site in unbroken packages with manufacturer's label, and store to facilitate inspection and installation sequence. All items must be labeled and identified as to make, size and quality.

1.9 SUBSTITUTIONS

A. See General Conditions and the General Requirements in Division 01 for substitution request procedures.

B. In accordance with the General Conditions and the General Requirements in Division 01, Substitution and Product Options, all substitute items must fit in the available space, and be of equal or better quality including efficiency performance, size, and weight, and must be compatible with existing equipment. The Owner shall be the final authority regarding acceptability of substitutes.

1.10 DIMENSIONS

A. Before ordering any material or doing any work, the Contractor shall verify all dimensions, including elevations, and shall be responsible for the correctness of the same. No extra charge or compensation will be allowed on account of differences between actual dimensions and measurements indicated on the drawings.

B. Any differences, which may be found, shall be submitted to the Owner for consideration before proceeding with the work.

1.11 MANUFACTURER'S DIRECTIONS

A. All manufactured articles shall be applied, installed and handled as recommended by the manufacturer, unless specifically called out otherwise. Advise the Architect/Engineer of any such conflicts before installation.

1.12 PERMITS, FEES, ETC.

A. The Contractor under each Division of these specifications shall arrange for a permit from the local authority. The Contractor shall pay for any inspection fees or other fees and charges required by ordinance, law, codes and these specifications.

1.13 TESTING

A. The Contractor under each section shall at his own expenses perform the various tests as specified and required by the Architect and as required by applicable code, the State and local authorities. The Contractor shall furnish all fuel and materials necessary for making tests.

1.14 TERMINOLOGY

A. Whenever the words "furnish", "provide", "furnish and install", "provide and install", and/or similar phrases occur, it is the intent that the materials and equipment described be furnished, installed and connected under this Division of the Specifications, complete for operation unless specifically noted to the contrary.

B. Where a material is described in detail, listed by catalogue number or otherwise called for, it shall be the Contractor's responsibility to furnish and install the material.

C. The use of the word "shall" conveys a mandatory condition to the contract.

D. "This section" refers to the section in which the statement occurs.

E. "The project" includes all work in progress during the construction period.

F. In describing the various items of equipment, in general, each item will be described singularly, even though there may be a multiplicity of identical or similar items.

1.15 SCHEDULE OF WORK

A. The work under the various sections must be expedited and close coordination will be required in executing the work. The various trades shall perform their portion of the work at such times as directed so as to meeting scheduled completion dates, and to avoid delaying any other trade. The Architect will set up completion dates. Each contractor shall cooperate in establishing these times and locations and shall process his work so as to ensure the proper execution of it.

1.16 COOPERATION AND CLEANING UP

A. The contractor for the work under each section of the specifications shall coordinate his work with the work described in all other sections of the specifications to the end that, as a whole, the job shall be a finished one of its kind, and shall carry on his work in such a manner that none of the work under any section of these specifications shall be handicapped, hindered or delayed at any time.

B. At all times during the progress of the work, the Contractor shall keep the premises clean and free of unnecessary materials and debris. The Contractor shall, on direction at any time from the Architect, clear any designated areas or area of materials and debris. On completion of any portion of the work, the Contractor shall remove from the premises all tools and machinery and all debris occasioned by the work, leaving the premises free of all obstructions and hindrances.

1.17 WARRANTY

A. Unless a longer warranty is hereinafter called for, all work, materials and equipment items shall be warrantied for a period of one year after acceptance by the Owner. All defects in labor and materials occurring during this period, as determined by the Architect/Engineer, shall be repaired and/or replaced to the complete satisfaction of the Architect/Engineer. Guarantee shall be in accordance with Division 01.

1.18 COMPLETION REQUIREMENTS

A. In accordance with the General Conditions and the General Requirements in Division 01, Project Closeout; before acceptance and final payment, the Contractor shall furnish:

1. Accurate project record drawings, shown in red ink on prints, showing all changes from the original plans made during installation of the work.
2. Contractors One Year Warranty.
3. All Manufacturers' Guarantees.
4. Test and Balance Reports.
5. Operation and Maintenance Manuals.

1.19 INSPECTION OF SITE - REMODEL PROJECTS

A. The accompanying plans do not indicate completely the existing plumbing and mechanical installations. The bidders for the work under these sections of the specifications shall inspect the existing installations and thoroughly acquaint themselves with conditions to be met and the work to be accomplished in removing and modifying the existing work, and in installing the new work in the present building and underground serving to and from that structure. Failure to

comply with this shall not constitute grounds for any additional payments in connection with removing or modifying any part of the existing installations and/or installing any new work.

1.20 RELOCATION OF EXISTING INSTALLATIONS

A. There are portions of the existing plumbing, mechanical and electrical systems, which shall remain in use to serve the finished building in conjunction with the indicated new installations. By actual examination at the site, each bidder shall determine those portions of the remaining present installations, which must be relocated to avoid interference with the installations of new work of his particular trade and that of all other trades. All such existing installations, which interfere with new installations, shall be relocated by the Contractor.

1.21 SALVAGE MATERIALS

A. The Contractor shall remove existing equipment, duct, grilles and other items associated with the mechanical systems where no longer required for the project. Where such items are exposed to view or uncovered by any cutting or removal of general construction and has no continuing function (as determined by the Architect/Engineer), they shall be removed.

B. All items or materials removed from the project shall be made available for the Owner's inspection. The Owner retains the option to claim any item or material. Contractor shall deliver any claimed item or material in good condition to the place designated by the Owner. All items not claimed become the property of the contractor and shall be removed from the site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All equipment shall be regularly cataloged items of the manufacturer and shall be supplied as a complete unit in accordance with the manufacturer's standard specifications along with any optional items required for proper installation unless otherwise noted. Maintain manufacturer's identification, model number, etc. on all equipment at all times.

B. Where more than one of an item is to be provided, all of the items shall be identical manufacture, make, model, color, etc.

2.2 RESTRICTED MATERIALS

A. No materials containing asbestos in any form shall be allowed.

B. No solder or flux containing lead shall be used on this project.

C. Where materials or equipment provided by this Contractor are found to contain restricted materials, such items shall be removed and replaced with non-restricted materials items. Entire cost of restricted materials removal and disposal and cost of installing new items shall be the responsibility of the Contractor for those restricted materials containing items installed by the Contractor.

2.3 ELECTRICAL MOTORS

A. Motors: Furnish electric motors designed for the specific application and duty applied, and to deliver rated horsepower without exceeding temperature ratings when operated on power systems with a combined variation in voltage and frequency not more than + 10% of rated voltage. Motors for pumps and fans shall be selected to be non-overloading.

B. Verify from the drawings and specifications the available electrical supply characteristics and furnish equipment that will perform satisfactorily under the conditions shown and specified.

C. All motors for use with equipment with variable frequency drives shall be inverter ready motors. Verify compatibility and sizing of motor with variable frequency drive.

D. Size motors for 1.15 service factor and not to exceed 40º C temperature rise above ambient.

E. Fractional horsepower motors to have self-resetting thermal overload switch.

F. Provide Premium Efficiency, motors for all three phase motors one horsepower and larger. Standard efficiency motors will not be acceptable.

2.4 IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

A. Plastic Nameplates: Laminated plastic with engraved letters.

B. Plastic Tags: Laminated plastic with engraved letters, minimum 1-1/2 inches diameter.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, for direct burial service.

2.5 PIPE HANGERS AND SUPPORTS

A. Acceptable Manufacturers:

1. PHD Manufacturing, Inc.
2. Michigan Hanger Company.
3. B-Line Systems, Inc.

B. Hydronic Piping:

1. Conform to ANSI/MSS SP58.
2. Hangers for Pipe Sizes ½ to 1-½ Inch: Malleable iron, adjustable swivel, split ring for steel pipe, copper swivel for copper pipe.
3. Hangers for Hot Pipe Sizes 2 to 4 Inches and Cold Pipe Sizes 2 Inches and Larger: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.

5. Multiple or Trapeze Hangers: Steel channels or strut with hanger rods. Cast iron roll and stand for hot pipe sizes 6 inches and over.
6. Wall Support for Pipe Sizes to 3 Inches: Strut triangular bracket with pipe clamp and cushion insulator.
7. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron roll for hot pipe sizes 6 inches and over.
8. Vertical Support: Steel riser clamp.
9. Floor Support for Pipe Sizes to 4 Inches and All Cold Pipe Sizes: Cast iron adjustable pipe saddle, locknut nipple, floor flange or steel support.
10. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
11. Copper Pipe Support: Carbon steel ring, adjustable, copper plated with felt isolation pad or all copper ring or swivel.

C. Shield for Insulated Piping 1-½ Inches and Smaller: 18 gauge galvanized steel shield over insulation in 180º segments, minimum 12 inches long at pipe support.

D. Shield for Insulated Piping 2 Inches and Larger: Hard block, calcium silicate insert, 180° segment, 12 inch minimum length, block thickness same as insulation thickness, flame resistant vapor barrier covering and 18 gauge galvanized shield.

E. Shields for Vertical Copper Pipe Risers: Galvanized steel pipe.

F. Design hangers to allow installation without disengagement of supported pipe.

G. Copper Plating: All hanger elements in metal-to-metal contact with copper pipe, except hanger rings with factory-applied 1/16 inch minimum thick plastic or tape cushion strip over all contact surfaces.

H. Strut Type Pipe Hanging System: Unistrut P-1000 series; framing members shall be No. 12 gage formed steel channels, 1-5/8 inch square, conforming to ASTM A 653 GR33, one side of channel shall have a continuous slot with inturned lips; framing nut with grooves and spring 1/2 inch size, conforming to ASTM 675 GR60; screws conforming to ASTM A 307; fittings conforming to ASTM A 575; all parts enamel painted or electro-galvanized.

I. Fixed Strut Rooftop Pipe Supports: Foam bottom, UV stabilized thermoplastic base, with hot dip galvanized strut support. Size as required for pipe. Minimum 6” Height, utilize adjustable height as required. Erico Caddy Pyramid ST or approved equal.

2.6 HANGER RODS

A. Steel Hanger Rods: Threaded both ends, or continuous threaded.

2.7 ANCHOR BOLTS

A. Anchor (Expansion) Bolts: Shall be carbon steel to ASTM A 307; nut shall conform to ASTM A194; shall be drilled-in type. Design values for shear and tension shall be not more than 80 percent of the allowable load.

2.8 FLASHING

A. Metal Flashing: 26-gauge minimum galvanized steel.

B. Metal Counter Flashing: 22 gauge minimum galvanized steel.

C. Flexible Flashing: 47-mil thick sheet butyl, compatible with roofing.

D. Caps: Steel, 22-gauge minimum; 16 gauge at fire resistant elements.

2.9 EQUIPMENT CURBS

A. Fabricate curbs of wood or steel beam, unless specifically called out otherwise.

2.10 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gauge galvanized steel for 4 inch diameter and larger, 22 gauge up to 3" diameter.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe or 18 gauge galvanized steel for 4 inch diameter and larger, 22 gauge up to 3" diameter.

C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: UL listed caulking system.

D. Fire Stopping Insulation: Mineral fiber type, non- combustible.

Caulk: Fire stop sealant in compliance with ASTM E814, UL 1479 and Division 07.

2.11 FORMED STEEL CHANNEL

A. Manufacturers:

1. Allied Tube & Conduit Corp.
2. B-Line Systems.
3. Midland Ross Corporation, Electrical Products Division
4. Unistrut Corp.
5. Substitutions under provisions of Division 01.

B. Product Description: Galvanized 12 gauge (2.8 mm) thick steel. With holes 1-1/2 inches (38 mm) on center.

2.12 ACCEPTABLE MANUFACTURERS: VIBRATION ISOLATORS AND SEISMIC RESTRAINT

A. Vibration isolators and Seismic Restraint shall be manufactured by:

1. Amber/Booth.
2. Cooper Industries.
3. International Seismic Application Technology.

4. Kinetics Noise Control.
5. Mason Industries.
6. Vibro-Acoustics

B. Substitutions: Items of same function and performance are acceptable in conformance with Division 01.

2.13 VIBRATION ISOLATORS (ROTATING EQUIPMENT EXCEPT FANS)

A. Floor Mount: Closed spring mount with iso-stiff springs and limit stop for seismic restraint. Isolators are to be sized and selected by equipment manufacturer.

B. Hangers: Closed spring hanger with acoustic isolator.

C. Provide pairs of neoprene side snubbers or restraining springs where side torque or thrust may develop.

D. Color code spring mounts, spring selected to operate at no greater than 2/3 solid deflection and have ¼" ribbed neoprene pads.

2.14 FAN ISOLATION

A. Provide spring type isolators for fans and heating and ventilation units.

B. Spring isolators shall be free standing and laterally stable without any housing and complete with a molded neoprene cup or ¼ inch neoprene acoustical friction pad between the baseplate and the support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be not less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection.

C. Seismically restrained spring isolators shall be as described above, built into a ductile iron or steel housing to provide all directional seismic snubbing. The snubber shall be adjustable vertically and allow a maximum of ¼ inch travel in all directions before contacting the resilient snubbing collars. Mountings shall be SSLFH as manufactured by Mason Industries.

D. Cabinet unit heaters, panel fans, and other ventilation units mounted to solid ductwork or structure shall be internally factory isolated.

2.15 VENTILATING SYSTEMS FLEXIBLE CONNECTIONS

A. Fabricate of neoprene coated flameproof fabric a minimum of 2" wide tightly crimped into metal edging strip and attach to ducting and equipment by screws or bolts at 6" intervals. DuroDyne Dynalon treated duct material, or equal. Durolon or equal for outdoor or high pressure applications.

2.16 LIMITS OF VIBRATION

A. The factory is to statically and dynamically balance all rotating machinery, fans and pumps, etc. Do dynamic balancing at the operating speed of the motor.

B. Select isolated equipment in accordance with the weight distribution, to produce uniform deflection on the vibration mounts. Deflection of vibration mounts shall be required to produce 95% vibration isolation efficiency, based on the equipment HP, rpm, location in regard to critical spaces and stiffness of the building supporting structural members, supporting the equipment.

C. For fan-motor units in which the impeller is supported by the motor shaft, the motor and impeller shall be dynamically balanced as an integral unit.

2.17 EARTHQUAKE BUMPERS AND SNUBBERS

A. Bumpers:

1. Fabricate the bumper cradle of 6 X 4 X 3/8" angle iron minimum and provide with at least two holes for bolting to the floor.
2. Attach one or more elastomeric mountings to pad the 6" leg of the angle iron.
3. Design the mounting to deflect not more than ¾" under the shock loading of 1 g in any direction in the horizontal plane.
4. Manufacturer: Vibration Mounting Series "SR" seismic restraints, or similar.

B. Snubbers:

1. Interlocking steel members restrained by shock absorbent rubber materials.
2. Elastomeric materials shall be replaceable and a minimum of ¾" thickness.
3. Maintain 1/8" air gap in all directions in design of snubber.
4. Acceleration of 4 g's in any direction.
5. All-directional restraint.
6. Manufacturer: Mason Industries Z-1011 Seismic Snubber.

2.18 SEISMIC BRACING AND SUPPORT OF SYSTEMS AND COMPONENTS

A. General:

1. Seismic restraint designer shall coordinate all attachments with the structural engineer of record.
2. Design analysis shall include calculated dead loads, static seismic loads, and capacity of materials utilized for the connection of the equipment or system to the structure.
3. Analysis shall detail anchoring methods, bolt diameter, and embedment depth.
4. All seismic restraint devices shall be designed to accept without failure the forces calculated per the applicable building code and as summarized in installation requirements.
5. The total height of the structure (h) and the height of the system to be restrained within the structure (z) shall be determined in coordination with architectural plans and the General Contractor.

B. Friction from gravity loads shall not be considered resistance to seismic forces.

2.19 SEISMIC BRACING COMPONENTS

A. Steel strut shall be 1-5/8 wide in varying heights and mig-welded combinations as required to meet load capacities and designs indicated. A material heat code, part number, and

manufacturer's name shall be stamped on all strut and fittings to maintain traceability to material test reports.

1. Material for epoxy painted strut: ASTM A1011, SS, Grade 33.
2. Material for pre-galvanized strut: ASTM A653, SS, Gr. 33.
3. Material for Hot-Dip Galvanized strut: ASTM A1011, SS, Grade 33 and hot-dip galvanized after fabrication in accordance with ASTM A123.
4. Material for fittings and accessories: ASTM A907 Gr. 33, Structural Quality or ASTM A1011, SS. Gr.33.
5. Fittings and accessories: Products shall be of the same manufacturer as strut and designed for use with that product.

PART 3 - EXECUTION

3.1 DRAWINGS

A. The drawings are partly diagrammatic, not necessarily showing all offsets or exact locations of piping and ducts, unless specifically dimensioned. The contractor shall provide all materials and labor necessary for a complete and operable system. Complete details of the building which affect the mechanical installation may not be shown. For additional details, see Architectural, Structural and Electrical Drawings. Coordinate work under this section with that of all related trades.

3.2 INSTALLATION

A. All work shall comply with the latest adopted applicable codes and ordinances including, but not limited to, the IMC, UPC, IBC, NFPA, IECC, IFGC and IFC Standards; all local and state amendments to all codes and standards.

B. Obtain and pay for all inspection fees, connection charges and permits as a part of the Contract.

C. Compliance with codes and ordinances shall be at the Contractor's expense.

D. Install in accordance with manufacturer's instructions.

3.3 MEASUREMENTS

A. Verify all measurements on the job site.

B. Locate all equipment on the centers of walls, openings, spaces, etc., unless specified otherwise.

C. Check all piping, ducts, etc. to clear openings.

D. Rough-in dimensions shall be per manufacturer's recommendations and in compliance with current ADA and ANSI 117.1 standards.

3.4 OPERATING INSTRUCTIONS

A. Before the facility is turned over to the Owner, instruct the Owner or Owner's personnel in the operation, care and maintenance of all systems and equipment under the jurisdiction of the Mechanical Division. These instructions shall also be included in a written summary in the Operating Maintenance Manuals.

B. The Operation and Maintenance Manuals shall be utilized for the basis of the instruction. Provide a minimum of eight hours of on site instruction to the owner designated personnel.

C. When required by individual specification sections provide additional training on HVAC systems and equipment as indicated in the respective specification section.

D. Provide schedule for training activities for review prior to start of training.

3.5 SYSTEM ADJUSTING

A. Each part of each system shall be adjusted and readjusted as necessary to ensure proper functioning of all controls, proper air distribution, elimination of drafts, noise and vibration.

B. Balance air and water systems for volume quantities shown and as required to ensure even temperature and the elimination of drafts. Balancing shall be done by a qualified firm acceptable to the Engineer. Provide balancing log to the Engineer before substantial completion.

3.6 CUTTING, FITTING, REPAIRING, PATCHING AND FINISHING

A. Arrange and pay for all cutting, fitting, repairing, patching and finishing of work by other trades where it is necessary to disturb such work to permit installation of mechanical work. Perform work only with craftsmen skilled in their respective trades.

B. Avoid cutting, insofar as possible, by setting sleeves, frames, etc. and by requesting openings in advance. Assist other trades in securing correct location and placement of rough-frames, sleeves, openings, etc. for ducts and piping.

C. Cut all holes neatly and as small as possible to admit work. Include cutting where sleeves or openings have been omitted. Perform cutting in a manner so as not to weaken walls, partitions or floors. Drill holes required to be cut in floors without breaking out around holes.

3.7 PAINTING

A. Perform all of the following painting in accordance with provisions of Division 09 with colors as selected by the Architect. Provide the following items as a part of mechanical work:

1. Factory applied prime and finish coats on mechanical equipment.
2. Factory applied prime and finish coat on all air registers, grilles and diffusers, unless otherwise specified.
3. Factory applied prime coat on access doors.
4. Pipe identification where specified.

B. If factory finish on any equipment furnished is damaged in shipment or during construction, refinish to equal original factory finish.

3.8 IDENTIFICATION

A. Tag all valves with heat resistant laminated plastic labels or brass tags engraved with readily legible letters. Securely fasten to the valve stem or bonnet with beaded chain. Provide a framed, typewritten directory under glass, and installed where directed. Provide complete record drawings that show all valves with their appropriate label. Seton 250-BL-G, or 2961.20-G, 2" round or equal.

B. Label all equipment with heat resistant laminated plastic labels having engraved lettering ½" high. If items are not specifically listed on the schedules, consult the Engineer concerning designation to use. Seton engraved Seton-Ply nameplates or equal.

C. Identify piping to indicate contents and flow direction of each pipe exposed to view by a labeled sleeve in letters readable from floor at least once in each room and at intervals of not more that 20' apart and on each side of partition penetrations. Coloring scheme in accordance with ANSI A13.1-1981, Seton Opti-Code or equal.

3.9 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as follows:

PIPE SIZE	MAX. HANGER SPACING	HANGER DIAMETER
½ to 1-¼ inch	6'-0"	3/8"
1-½ to 2 inch	10'-0"	3/8"
2-½ o 3 inch	10'-0"	½"
4 to 6 inch	10'-0"	5/8"
8 to 12 inch	14'-0"	7/8"
14 inch and Over	20'-0"	1"

B. Install hangers to provide minimum ½ inch space between finished covering and adjacent work.

C. Place a hanger within 12 inches of each horizontal elbow.

D. Use hangers with 1-½ inch minimum vertical adjustment.

E. Support vertical piping at every floor.

F. Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.

G. Support riser piping independently of connected horizontal piping.

H. Support all piping on flat roofs using rooftop pipe supports. Install per manufacturer's instructions. Install piping minimum 6" above roof surface.

3.10 EQUIPMENT BASES AND SUPPORTS

A. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

B. Construct support of steel members. Brace and fasten with flanges bolted to structure.

C. Provide rigid anchors for pipes after vibration isolation components are installed.

D. Anchor (Expansion) Bolts: Install anchor bolts for all mechanical equipment, piping and ductwork as required. Tightly fit and clamp base-supported equipment anchor bolts at all equipment support points. Provide locknuts where equipment, piping, and ductwork is hung. Install anchor (expansion) bolts in holes drilled in concrete where necessary to hang piping or ductwork, or to anchor stationary equipment from existing concrete slabs.

3.11 FLASHING

A. Provide flexible flashing and metal counter-flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Provide curbs for mechanical roof installations 16 inches minimum high above roofing surface. Flexible sheet flash and counter-flash with sheet metal; seal watertight.

C. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.12 SLEEVES

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

B. Set sleeves in position in construction. Provide reinforcing around sleeves.

C. Extend sleeves through floors one inch above finished floor level. Caulk sleeves full depth and provide floor plate.

D. Where piping or ductwork penetrates floor, ceiling, or wall, install sleeve, close off space between pipe or duct and adjacent work with fire stopping insulation and caulk seal. Use fire rated caulking where fire rated walls are penetrated. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

E. Install chrome plated steel escutcheons at finished surfaces.

3.13 SCOPE OF VIBRATION ISOLATION WORK

A. All vibrating equipment and the interconnecting pipe shall be isolated to eliminate the transmission of objectionable noise and vibration from the structure.

B. HVAC equipment shall be carefully checked upon delivery for proper mechanical performance, which shall include proper noise and vibration operation.

C. All installed rotating equipment with excessive noise and/or vibration, which cannot be corrected in place, shall be replaced at no cost to Owner.

3.14 GENERAL PROCEDURES – VIBRATION ISOLATION

A. Select isolators in accordance with the manufacturer's recommendations and the equipment weight distribution to allow for proper static deflection of the isolators in relation to the span of the building structure supporting the equipment, considering the allowable deflection and weight of the structure.

B. Install isolators so they can be easily removed for replacement.

C. Mount all equipment absolutely level.

D. Install all isolators per manufacturer's instructions.

E. Install vibration isolators for mechanical motor driven equipment.

F. Set steel bases for 1" clearance between housekeeping pad and base.

G. All vibration isolated equipment shall be fitted with earthquake bracing and snubbers suitable for seismic control in accordance with the IBC.

H. Piping vibration isolation flexible connections shall be installed at a 90° angle to equipment deflection direction unless otherwise noted.

3.15 SEISMIC RESTRAINT

A. General:

1. All equipment, piping and ductwork shall be restrained to resist seismic/wind forces per the applicable building code(s) as a minimum. Restraint attachments shall be made by bolts, welds or a positive fastening method. Friction shall not be considered. All attachments shall be proven capable of accepting the required wind load by calculations. Additional requirements specified herein are included specifically for this project.
2. Install seismic and wind restraint devices per the manufacturer's submittals. Any deviation from the manufacturer's instructions shall be reviewed and approved by the manufacturer.
3. Attachment to structure for suspended equipment, pipe and duct: 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.
4. Wall penetrations may be used as bracing locations provided the wall can provide adequate resistance without significant damage.
5. Coordinate sizes and locations of cast-in-place inserts for post-tensioned slabs with seismic restraint manufacturer.
6. Provide hanger rod stiffeners where indicated or as required to prevent buckling of rods due to seismic forces.
7. Where rigid restraints are used on equipment, ductwork or piping, support rods for the equipment, ductwork or piping at restraint locations must be supported by anchors rated for seismic use. Post-installed concrete anchors must be in accordance with ACI 355.2.

8. Ensure housekeeping pads have adequate space to mount equipment and seismic restraint devices and shall also be large enough to ensure adequate edge distance for restraint anchor bolts to avoid housekeeping pad breakout failure.

B. Concrete Anchor Bolts:

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 pre- or post-tensioned 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. Mechanical 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.

C. Equipment Restraints:

1. Seismically restrain equipment all equipment. Install fasteners, straps and brackets as required to secure the equipment.
2. Install seismic snubbers on HVAC equipment supported by floor-mounted, non-seismic vibration isolators. Locate snubbers as close as possible to vibration isolators and attach to equipment base and supporting structure as required.
3. Install neoprene grommet washers on equipment anchor bolts where clearance between anchor and equipment support hole exceeds 1/8" (3.2 mm).
4. 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.

D. Duct Systems:

1. Seismically restrain all ductwork listed below, using seismic cable restraints:

    a. All ducts with cross-sectional area equal to or greater than 6 ft2 (0.55 m2).
    b. Any ductwork which if it were to fail would result in damage to a piece of equipment or building function that has a component importance factor of 1.5.
    c. All ductwork weighing more than 17 lbs/ft (25 kg/m).

2. "12-inch rule", where duct can be exempted from seismic restraint based on the length of the support rods, is accepted if one of the following conditions are met:

    a. The hangers shall be detailed to avoid significant bending of the hangers and their attachments. The maximum stress due to combined loading including bending in the hangers must be less than 21.6 ksi.
    b. Isolation hangers are added to hanger rod to provide swivel joint and to prevent bending moment in hanger.

3. Space lateral supports a maximum of 30' o.c. (9 m), and longitudinal supports a maximum of 60' (18 m) o.c.
4. Duct risers shall be restrained at floor penetrations every 30' (9 m) maximum spacing.
5. Fire damper locations may be used as restraint locations for all directions except away from the damper.
6. Brace a change of direction longer than 12' (3.7 m).
7. Install restraint cables so they do not bend across edges of adjacent equipment or building structure.

E. Piping Systems:

1. For projects with a Seismic Design Category of C, provide seismic cable restraints on the following:

    a. All piping systems assigned a component importance factor, Ip, of 1.5 with a nominal pipe diameter greater than 2" (50 mm) or trapeze-supported piping with combined operating weight over 10 lbs/ft (15 kg/m).

2. For projects with a Seismic Design Category of D, E or F, provide seismic cable restraints on the following:

    a. All piping greater than 3" (75 mm) nominal diameter.
    b. All piping systems assigned a component importance factor, Ip, of 1.5 with a nominal pipe diameter greater than 1" (25 mm) or trapeze-supported piping with combined operating weight over 10 lbs/ft (15 kg/m).

3. "12-inch rule", where pipe can be exempted from seismic restraint based on the length of the support rods, is accepted if one of the following conditions are met:

    a. Hangers are detailed to avoid bending of the hangers and their attachment; and provisions are made for piping to accommodate expected deflections. The maximum stress due to combined loading including bending in the hangers must be less than 21.6 ksi.
    b. Isolation hangers are added to hanger rod to provide swivel joint and to prevent bending moment in hanger.

4. Restraint spacing:

    a. For ductile piping, space lateral supports a maximum of 40' (12 m) o.c., and longitudinal supports a maximum of 80' (24 m) o.c.
    b. For non-ductile piping (e.g., cast iron, PVC) space lateral supports a maximum of 20' (6 m) o.c., and longitudinal supports a maximum of 40' (12 m) o.c.
    c. For piping with hazardous material inside (e.g., natural gas, medical gas) space lateral supports a maximum of 20' (6 m) o.c., and longitudinal supports a maximum of 40' (12 m) o.c.
    d. For pipe risers, restrain the piping at floor penetrations using the same spacing requirements as above.

5. Brace a change of direction longer than 12' (3.7 m).
6. Longitudinal restraints for single pipe supports shall be attached directly to the pipe, not to the pipe hanger.
7. For supports with multiple pipes (trapezes), secure pipes to trapeze member with clamps approved for application.

8. Piping on roller supports shall include a second roller support located on top of the pipe at each restraint location to provide vertical restraint.
9. Install restraint cables so they do not bend across edges of adjacent equipment or building structure.
10. Install flexible metal hose loops in piping which crosses building seismic joints, sized for the anticipated amount of movement.
11. Install flexible piping connectors 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.
12. Coordinate seismic restraints with thermal expansion compensators, guides and anchor points. Thermal expansion anchor points shall be designed to accommodate seismic forces.

3.16 INSTALLATION OF EQUIPMENT

A. Unless otherwise indicated, mount all equipment and install in accordance with manufacturer's recommendations and approved submittals.

B. Maintain manufacture recommended minimum clearances for access and maintenance.

C. Where equipment is to be anchored to structure, furnish and locate necessary anchoring and vibration isolation devices.

D. Furnish all structural steel, such as angles, channels, beams, etc. required to support all piping, ductwork, equipment and accessories installed under this Division. Use structural supports suitable for equipment specified or as indicated. In all cases, support design will be based upon data contained in manufacturer's catalog.

E. Openings: Arrange for necessary openings in buildings to allow for admittance and reasonable maintenance or replacement of all equipment furnished under this Contract.

F. Access Doors: Provide as necessary for reasonable maintenance of all equipment valves, controls, etc.

END OF SECTION

SECTION 23 05 05 - SELECTIVE DEMOLITION FOR HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work specified in this Section includes the demolition, removal, and disposition of certain mechanical work.

B. Drawings, the provisions of the Agreement, and Administrative Specification Sections apply to all work of this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.

B. Do not begin installation until all unsatisfactory conditions are resolved. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 DEMOLITION, REMOVAL AND DISPOSITION

A. Saw-cut concrete as shown or required.

B. Piping, Ductwork, Equipment, Control Wiring and Tubing To Be Removed: Remove all piping, ductwork, equipment, control wiring and tubing as indicated. Drawings do not show all existing piping, ductwork, equipment, control wiring and tubing which is to be removed. Unless indicated otherwise, where existing equipment has been removed, or its use replaced by new equipment, remove connecting piping and ductwork back to the branch in the main so that there will be no dead ends or unused pipe lines in mechanical spaces at completion.

C. Materials To Contractor: Materials shown or specified to be removed, other than the materials indicated to be turned over to Owner.

D. Protect any active piping and/or wiring encountered; remove, plug or cap utilities to be abandoned. Notify the Architect of utilities encountered whose service is not known.

E. Debris Removal: Existing materials removed and not reinstalled or turned over to the Owner shall be immediately removed from the site and disposed of by the Contractor.

F. Repairs: Any portion of the facility damaged, cut back or made inoperable by this Contractor shall be repaired with similar materials as the existing structure and/or damaged item as instructed by the Architect.

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Air Systems:

1. Constant Volume Air Systems.

B. Hydronic Systems:

1. Constant Flow Systems.

1.2 SCOPE

A. Furnish the professional services of a qualified and approved balancing and testing firm to perform the work of this specification section.

B. The work of this section includes but is not necessarily limited to:

1. Testing and balancing existing hydronic heating and ventilation systems as indicated on drawings.
2. Testing and balancing fans and air handling systems.
3. Testing and balancing new liquid heat transfer systems.
4. Working directly with the control subcontractor to obtain proper system adjustments.
5. Domestic water distribution system adjustment.

C. The work of this section does not include:

1. Adjusting burners for proper combustion operation.
2. Liquid waste transfer system adjustment.
3. Fire protection systems.

1.3 APPLICABLE CODES AND STANDARDS

A. SMACNA Manual for the Balancing and Adjustment of Air Distribution Systems.

B. AMCA Publication 203, Field Performance Measurements.

C. American Air Balancing Council (AABC) Recommended Procedures

D. National Environmental Balancing Bureau (NEBB) Recommended Procedures

1.4 QUALIFICATION OF THE BALANCING FIRM OR COMPANY

A. Subcontractor minimum qualifications include:

1. Demonstrate satisfactory completion of five projects of similar scope in the State of Alaska during the past five years. Provide references if requested.
2. NEBB Certified in Testing, Adjusting and Balancing of Air and Hydronic Systems.

1.5 TIMING OF WORK

A. Do not begin balancing and testing until the systems, including controls, are completed and in full working order.

B. Schedule the testing and balancing work in cooperation with other trades.

C. Complete the testing and balancing at least one week before the date of substantial completion and before any occupancy occurs

1.6 CONTRACTOR RESPONSIBILITY TO BALANCING AGENCY

A. Award the test and balance contract to an approved firm or company upon receipt of contract to allow the Balance and Testing Agency to schedule this work in cooperation with other trades involved and comply with completion date.

B. Put all heating, ventilating and air conditioning systems, equipment and controls into full operation for the Balancing Agency and continue the operation of same during each working day of testing balancing.

C. Provide scaffolding, ladders and access to each system for proper testing balancing.

D. Ensure that the building enclosure is complete, including but not limited to, structural components, windows and doors installed, door hardware complete, ceilings complete, stair, elevator and mechanical shafts complete, roof systems complete, all plenums sealed, etc.

E. Make any changes in pulleys, belts and dampers, or add any dampers as required for correct balance as recommended by the Balance and Testing Agency at no additional cost to the Owner.

F. Complete installation, programming (including design parameters and graphics), calibration, and startup of all building control systems.

G. Require that the building control system firm provide access to hardware and software, or onsite technical support required to assist the TAB effort. The hardware and software or the onsite technical support shall be provided at no cost to the TAB firm.

1.7 REPORT

A. Certified Reports shall be included in project O & M manuals. Reports shall include: testing, adjusting, and balancing reports bearing the signature of the Test and Balance Agency Representative. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the system. Follow the procedures and format specified below:

1. Draft Reports: Upon completion of testing, adjusting and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports.
2. Final Reports: Upon verification and approval of the draft report; prepare final reports, typewritten, organized and formatted as specified below.
3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, 3-ring binders. Provide binding edge labels with the project identification and a title descriptive of the documents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:

    a. General Information and Summary.
    b. Air Systems.
    c. Hydronic Systems.
    d. Temperature Control Systems.
    e. System Deficiency Reports and Corrective Actions.

4. Report Contents: Provide the following minimum information, forms and data:

    a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency; contractor; owner, architect, engineer and project. Include addresses, contact names and telephone numbers. Also, include a certification sheet containing the name, address, telephone number and signature of the Certified Test and Balance Personnel. Include in this division a listing of the instrumentation used for the procedures along with the proof of calibration.
    b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form.
    c. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

1.8 SUBMITTALS

A. Submit in accordance with Division 01.

B. Submit balancing agency qualifications and sample balancing forms.

C. Provide list of equipment to be used and date of last calibration.

D. Submit preliminary balance report a minimum of one week prior to balancing system.

PART 2 - PRODUCTS

2.1 INSTRUMENTS

A. Maintain all instruments accurately calibrated and in good working order. Use instruments with the following minimum performance characteristics.

1. Air Velocity Instruments: Direct reading in feet per minute, 2% accuracy.
2. Static Pressure Instruments: Direct reading in inches' water gauge, 2% accuracy.
3. RPM Instruments: Direct reading in revolutions per minute, .5% accuracy; or revolution counter accurate within 2 counts per 1,000.
4. Pressure Readout: Direct reading in feet of water or PSI, .5% accuracy.
5. Temperature Instruments - Direct reading in degrees F, +.5% accuracy.
6. Water Flow Instruments: Differential pressure type; direct reading in feet of water or PSI, accuracy, suitable for readout balancing valve provided.
7. Sound Measuring Instrument: Octave Band Analyzer which essentially complies to AASA Standards SI.6 1960 with a range of 24DB to 150 DB sound pressure level ref. .0002 microbar. Calibrate sound test instrument before use to a closed coupler and a driving loudspeaker that produces a know-sound pressure level at the microphone of the analyzer.

PART 3 - EXECUTION

3.1 GENERAL PROCEDURES FOR ALL SYSTEMS

A. Start with new, clean filters.

B. In cooperation with the control manufacturer's representative, coordinate adjustments of automatically operated dampers and valves to operate as specified, indicated and/or noted.

C. Use manufacturer's ratings on all equipment to make required calculations.

D. Make final adjustments for each space per heating or cooling comfort requirement. State reason for variance from design CFM, i.e., "too noisy", "drafty", etc.

E. Mark equipment and balancing device settings (including damper-control positions, valve position indicators, fan-speed-controls, and similar controls and devices) with paint or other suitable permanent identification material to show final settings.

3.2 REQUIREMENTS FOR ALL AIR HANDLING SYSTEMS

A. Identify each diffuser, grille and register as to location and area.

B. Identify and list size, type and manufacturer of diffusers, grilles, registers and all testing equipment.

C. In readings and tests of diffusers, grilles and registers, include required FPM velocity and required CFM and test CFM after adjustments. If test apparatus is designed to read CFM directly, velocity reading may be omitted. Identify test apparatus used. Identify wide open (W.O.) runs.

D. Check and record the following items:

1. Air temperatures; mixed air, after coils, outside air, return air and supply air.
2. Pressure drop at each coil, filter bank, etc.
3. Operating suction and discharge pressure.
4. Full nameplate data of all equipment.
5. Rated and actual running amperage and voltage of all motors.
6. Drive data including sheaves and belts and adjustments.
7. Electrical overloads/heaters sizes and ranges of motors.

3.3 BALANCING LOW VELOCITY CONSTANT VOLUME DUCTWORK

A. Analyze system and identify major branches. Tabulate design CFM for each branch.

B. Select the branch which appears to be the longest run from the fan or to have the highest static pressure requirements.

C. Adjust other branch dampers or the fan to establish 110% design air flow through the selected branch.

D. Adjust the air flow through each air inlet (exhaust systems) or outlet (supply systems) on the selected branch to within +5% of the requirements so that at least one branch damper serving an inlet (or outlet) is wide open.

E. Proceed to another branch and set up 110% design airflow. Balance each inlet or outlet to within +5% of requirements, again leaving at least one wide open run. Repeat this process until all branches are balanced 110% airflow.

F. Once each branch has been balanced at 110% flow with one wide open run on each branch, balance with branches together, leaving at least one branch damper wide open. At this point, adjust the fan delivery so that each branch is at about 110% design airflow. Adjust the branch

dampers so that each inlet (or outlet) in the system is within 10% of the required airflow.

G. Adjust the fan for design airflow.

H. Read and record the airflow at each inlet and outlet.

I. Secure each branch damper and mark the balanced position of the damper quadrant.

J. Test and record entering and leaving air temperatures of coils.

K. Test and record entering and leaving water temperatures of coils.

L. Test and record static pressure drop across each filter and coil bank.

3.4 FLUID SYSTEM TESTING AND BALANCING

1. Test and record flow at the unit heaters.
2. Permanently mark adjusted position of all balancing valves. Stamp indicator plate of circuit setters and other balancing valves without memory stop.

END OF SECTION

SECTION 23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Piping Insulation.

B. Ductwork Insulation.

C. Jackets and Accessories.

1.2 RELATED WORK

A. Division 09 – Painting.

B. Section 23 05 00 – Common Work Results for HVAC Systems.

C. Section 23 21 13 – Hydronic Piping.

D. Section 23 21 16 – Hydronic Specialties.

E. Section 23 31 00 – HVAC Ducts and Casings.

F. Section 23 33 00 – Air Duct Accessories.

1.3 REFERENCES

A. ASTM B209 - Aluminum and Aluminum-alloy Sheet and Plate.

B. ASTM C195 - Mineral Fiber Thermal Insulating Cement.

C. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging.

D. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

E. ANSI/ASTM C533 - Calcium Silicate Block and Pipe Thermal Insulation.

F. ANSI/ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

G. ANSI/ASTM C547 - Mineral Fiber Pipe Insulation (Preformed).

H. ANSI/ASTM C552 - Cellular Glass Thermal Insulation.

I. ANSI/ASTM C553 - Mineral Fiber Blanket Insulation.

J. ANSI/ASTM C578 - Preformed, Block Type Cellular Polystyrene Thermal Insulation.

K. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).

L. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.

M. ASTM C449 - Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement.

N. ASTM C610 - Expanded Perlite Block and Pipe Thermal Insulation.

O. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).

P. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

Q. ASTM C1427 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

R. ASTM D774 – Standard Test Method for Bursting Strength of Paper.

S. ASTM D1000 - Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications.

T. ASTM E84 - Surface Burning Characteristics of Building Materials.

U. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.

V. NFPA 255 - Surface Burning Characteristics of Building Materials.

W. UL 723 - Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

A. Submit product data under provisions of Division 01.

B. Include product description, thickness for each service, and locations.

C. Submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

A. Applicator: Company specializing in piping insulation application with three years minimum experience.

B. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.

C. Materials: Flame spread/smoke developed rating of 25/50 in accordance with UL 723, ASTM E84, or NFPA 255.

D. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

C. Shipment of materials from manufacturer to installation location shall be in weather tight transportation.

D. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesive, mastics, and insulation cements.

1.8 FIELD MEASURMENTS

A. Verify field measurements prior to fabrication.

1.9 WARRANTY

A. Division 01- Execution and Closeout Requirements: Product warranties and product bonds.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Armacell.

B. Certain-Teed.

C. IMCOA.

D. Johns Manville.

E. Knauf.

F. Owens-Corning.

A. Manson.

B. Nomaco.

C. Pittsburgh - Corning.

D. K-Flex USA.

E. Armstrong.

F. Substitutions: Under provisions of Division 01.

2.2 INSULATION - PIPING

A. Type A: Glass fiber, rigid, molded, non-combustible insulation; ANSI/ASTM C547; 'k' value of 0.23 at 75º F, rated from 0º F to 850º F, vapor retarder jacket of Kraft paper bonded to aluminum foil, self-sealing lap and butt strips; Johns Manville "Micro-Lok" or approved equal.

2.3 FIELD APPLIED PIPING JACKET

A. Vapor Barrier Jackets: Kraft reinforced foil vapor barrier with self-sealing adhesive joints.

B. PVC Jackets and solvent welding adhesive: One piece, pre-molded type, Johns Manville “Zeston 2000”, fitting covers and jacketing material. Johns Manville “Perma-Weld” solvent welding adhesive.

2.4 INSULATION - DUCTWORK

A. Type K: Exterior FSK Duct Wrap: Flexible glass fiber; ASTM C553; commercial grade; 'k' value of 0.27 at 75º F, 0.6 lb./cu. ft. density. 0.00035 inch vinyl scrim facing with 2” stapling tab. Johns Manville “Microlite Standard Duct Wrap” or equal.

B. Type M: Duct Liner: Rigid Fiber Board; ASTM C1071; 'k' value of 0.23 at 75º F; coated air side for maximum 6,000 ft./min. air velocity, UL listed adhesive galvanized steel pins. Johns Manville “Permacote Linacoustic R-300" or approved equal.

C. Type O: Outdoor Installation: Cellular glass; ASTM C552-07, 'k' value of 0.29 at 75° F, 7.5 lb./cu. ft. density, zero water vapor permeability. Foamglass insulating system or approved equal.

2.5 FIELD APPLIED EQUIPMENT AND DUCTWORK JACKETS

A. Aluminum Jackets: ASTM B209; 0.016 inch thick; corrugated or textured finish, longitudinal slip joints.

B. Stainless Steel Jackets: Type 304 stainless steel; 0.010 inch thick; corrugated finish.

C. Re-Wettable Canvas Jacketing: , Fiberglass cloth made from texturized yarns, impregnated throughout with an inorganic fire retardant asbestos free adhesive; 20x14 thread count, 14.5 oz./sq.yd, 0.04 inch thickness, 1,000º F upper temperature limit; GLT Products “Style 1989” or approved equal.

D. Waterproof Duct Cladding: Composite membrane of multi-ply embossed UV-resistant aluminum foil/polymer laminate, rubberized asphalt, metalized polyester film, and low temperature acrylic adhesive. Zero water vapor transmission per ASTM E96-00, >16 lbs./in. peel adhesion per ASTM D1000; 164% elongation at break and 50 lbs./in. tensile strength per PSTC 131; 150 psi

puncture resistance per ASTM D774, upper temperature limit of 150° F. Product shall be self-adhesive and create a water tight seal. Polyguard "Alumaguard All Weather" or approved equal.

2.6 INSULATION ACCESSORIES

A. Adhesives: Waterproof and fire-retardant type.

B. Lagging Adhesive: Fire resistive to NFPA 255.

C. Impale Anchors: Galvanized steel, 12 gauge, self-adhesive pad.

D. Joint Tape: Glass fiber cloth, open mesh.

E. FSK Joint Tape; ASTM C1136 Foil-Scrim-Kraft (FSK) lamination coated with solvent acrylic pressure sensitive adhesive; capable of adhering to fibrous and sheet metal surfaces; tri-directionally reinforced 2x3 squares per inch fiberglass scrim; 9.5 mils thick, -40 to 240º F service temperatures; Venture Tape “1525CW” or approved equal.

F. Tie Wire: Annealed steel, 16 gauge.

G. Insulated pipe supports: Calcium silicate with galvanized steel jacket (min. 24 gauge); ANSI/ASTM C533; rigid white; 'k' value of 0.37 at 100º F, rated to 1,200º F; Thermal Pipe Shields “T-1000 Calsil” or equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install materials after piping, equipment and ductwork has been tested and approved.

B. Clean surfaces for adhesives.

C. Prepare surfaces in accordance with manufacturer's recommendations.

3.2 INSTALLATION – PIPING INSULATION

A. Install materials in accordance with manufacturer's recommendations, building codes and industry standards.

B. Continue insulation vapor barrier through penetrations except where prohibited by code.

C. Locate insulation and cover seams in least visible locations.

D. Neatly finish insulation at supports, protrusions, and interruptions.

E. Provide insulated cold pipes conveying fluids below ambient temperature with vapor retardant jackets with self-sealing laps. Insulate complete system, including under fitting jackets.

F. For insulated pipes conveying fluids above ambient temperature, secure jackets with self-sealing lap or outward clinched, expanded staples. Bevel and seal ends of insulation at equipment, flanges, and unions. Insulate complete system, including under fitting jackets.

G. Provide insert fabricated of Johns Manville Thermo-12 Gold or other heavy density insulating material suitable for temperature between support shield and piping on piping 1-½" inch diameter or larger. Insulation inserts shall not be less than the following lengths:

1-½" to 2-½" pipe size	10" long
3" to 6" pipe size	12" long

H. Fully insulate all piping including all spaces under jacketing.

I. Jackets:

1. Indoor, Concealed Applications: Insulated pipes shall have vapor barrier jackets, factory-applied. Vapor barrier PVC fittings may also be used provided joints are sealed with solvent welding adhesive approved by the jacket manufacturer.
2. For pipe exposed in mechanical equipment rooms or in finished spaces below 10 feet above finished floor, finish with PVC jacket and fitting covers or metal jacket.

3.3 SCHEDULE – PIPING

PIPING	TYPE	PIPE SIZE	MINIMUM INSULATION THICKNESS
Heating Glycol/Water Supply and Return	A	1-1/4” and Smaller	1-1/2”
Heating Glycol/Water Supply and Return	A	1-1/2" and Larger	2”

3.4 INSTALLATION – DUCTWORK INSULATION

A. Install materials in accordance with manufacturer's instructions.

B. Provide insulation with vapor barrier when air conveyed may be below ambient temperature. Continue insulation with vapor barrier through penetration.

C. Exterior Insulation (Type K) Application:

1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
2. Secure insulation without vapor barrier with staples, tape, or wires.
3. Install without sag on underside of ductwork. Use mechanical fasteners to prevent sagging. Secure insulation with mechanical fasteners on 15 inch centers maximum, on bottom and side of ductwork with dimension exceeding 20 inches. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
4. Maximum 25% compression.

D. Fiberglass Duct Liner (Type M) Application:

1. Adhere insulation with approved adhesive for 100 percent coverage. Secure insulation with mechanical fasteners on 15 inch centers maximum on top and side of ductwork with dimension exceeding 20 inches. Butt joints together tightly then seal and smooth. Thoroughly coat ends of liner with adhesive. Do not use nail-type fasteners. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
2. Ductwork dimensions indicated are net inside dimensions required for air flow. Increase ductwork to allow for insulation thickness.
3. Install liner as indicated on plans.

E. Where ductwork is scheduled for exterior insulation and is shown on the plans to be internally lined, the exterior insulation thickness may be reduced by the thickness of the lining. Where exterior insulation can be eliminated or reduced due to thickness of lining, overlap exterior insulation a minimum 24 inches over lined ductwork.

F. Where canvas jacketing is indicated, apply mastic in sufficient thickness to completely cover the texture of the canvas material.

3.5 SCHEDULE - DUCTWORK

DUCTWORK	TYPE	INSULATION THICKNESS	FINISH
Exhaust & Relief Ducts Within 10 ft. of Exterior Openings	K	1"	FSK
Supply Ducts	K	1"	FSK
Internal Acoustic Lining	M	1"	
Ducts Installed Outdoors	O	2”	Waterproof Duct Cladding

END OF SECTION

SECTION 23 09 00 - INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electric Control System.

B. Control Valves.

C. Thermostats.

D. Room Pressure Monitoring.

1.2 RELATED SECTIONS

A. Section 23 09 93 - Sequence of Operation for HVAC Controls.

1.3 REFERENCES

A. American Society of Mechanical Engineers:

1. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

B. ASTM International:

1. ASTM B32 - Standard Specification for Solder Metal.
2. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
3. ASTM D1693 - Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.

C. National Electrical Manufacturers Association:

1. NEMA DC 3 - Residential Controls - Electrical Wall Mounted Room Thermostats.

D. National Fire Protection Association:

1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

1.4 SUBMITTALS

A. Submit product data under provisions of Division 01.

B. Product Data: Include list which indicates use, operating range, total range and location for manufactured components.

C. Submit manufacturer's installation instructions under provisions of Division 01.

1.5 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Division 01.

B. Accurately record actual locations of instrumentation.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS – THERMOSTATS AND CONTROL VALVES

A. Honeywell.

B. Siemens.

C. Johnson.

D. Belimo.

E. Substitutions: Under provisions of Section Division 01.

2.2 LOW VOLTAGE THERMOSTATS

A. Digital 24 vac voltage thermostat: 7 day programming, digital display, menu-drive, precise temperature control (+/-1 degree F), battery backup, 40 F to 85 F set point range, hardwired power.

2.3 CONTROL VALVES

A. Forged brass body, stainless steel base plate and bearing plate, chrome plated brass stem, paddle and stem seal assembly compatible with heating system fluid, fully rated for 300 PSIG, 200 deg F fluid temperature, 30 psi close off. Powerhead replaceable without removal of valve body from system. Powerhead secured to valve body with machine screws and sealed with O ring.

2.4 ROOM PRESSURE MONITOR

A. The SRCM room pressure monitor shall be capable of monitoring the differential pressure between two individual spaces at all specified locations on the drawings. The device shall have a display resolution of 0.0001” WC.

B. Pressure monitors shall have accuracy performance +/- 0.25% of full scale, full scale shall be limited +/- 0.10" maximum.

C. Each monitor shall have a 4.3" TFT, dimmable, full color touch-screen display with a 480 x 272 resolution. The touch screen shall display the current differential pressure, the room status (green – ok, red – in alarm, yellow - warning) as well integral "Room Condition Banner" in one device. If unit has separate Room Condition Display it will not be considered an equal.

D. The monitor will have an internal pressure sensor as well as the capability to use an external (remote) pressure sensor input. Each monitor must be provided with a NIST traceable calibration certificate for the internal differential pressure transducer.

E. Each monitor shall be flush mount design and installed in a standard off-the-shelf electrical wall box with no visible external fasteners; visible screw heads are not acceptable. The Monitor shall be rated for wipe down cleaning procedures.

F. Each Monitor shall have two levels of password protection; user and supervisory. Room type and alarm set points must only be able to be changed using the supervisory security level. Each monitor shall have 1 touch room status to "Occupied" or "Unoccupied" under the user security level. Key switches are not acceptable.

G. Each Monitor shall have the ability to be set in Negative, Positive, or Neutral status enabled through the touch screen. These setting must be able to be stored in memory to speed up room changeover. Key switches are not acceptable.

H. The display should have customizable text for "Room ID" and "Room Condition" panels to allow for unique site nomenclature.

I. Each Monitor shall be able to be calibrated through the touch screen interface with the touch of a button.

J. Each Monitor shall have the ability for the setup to be cloned so that the settings can be copied and uploaded to each Room Pressure Monitor in the facility if desired. This is to be done through a standard USB connection.

K. Each monitor must have the ability to communicate through the BACnet protocol as installed or have the ability to be field upgradable to BACnet without being sent back to the manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide proper grounding of all control wiring.

3.2 IDENTIFICATION

A. All controllers, transmitters, switches, thermostats, gauges, and devices with adjustable setpoints shall be permanently tagged for identification.

3.3 POWER AND INTERFACE CONNECTIONS

A. Coordinate fully with other Divisions of this specification to provide all necessary power connections and interface connections for a complete and fully operable control system.

B. Electric wiring and wiring connection required for the installation of the control system as herein specified shall be provided by the Controls Contractor.

C. Line voltage wiring shall be installed in raceways. .

D. Low voltage wiring shall be physically protected and installed in raceways.

E. All wiring shall comply with the requirements of local and national electrical codes and with Division 26.

F. All wiring and conduit shall be installed by qualified personnel with electrical certificate of fitness.

3.4 INSTRUCTION AND ADJUSTMENT

A. Upon completion of the project, the controls contractor shall adjust and validate all thermostats, controllers, damper operators, relays, etc. provided under this section, or where sequence is listed, he shall validate and calibrate controls provided by others.

B. Instruction manuals shall be provided by the controls contractor and approved by the Engineer. Such manuals shall cover the function and operation of the control system on the project for use by the Owner's operating personnel. Such manuals shall be used in conjunction with two (2) hours of on-site instruction to familiarize operating personnel with the control system. The required instruction shall consist of a "classroom" period and a "field" period.

1. The classroom portion shall cover:

    a. Preventive maintenance procedures.
    b. A brief description of the controls' sequence of operation.
    c. A discussion and explanation of all alarms, switches, and gauges.
    d. A summary and brief explanation of steps to be taken for specific alarm or control malfunctions.

2. The field portion shall consist of a building walk- through to physically locate and examine all control devices, and demonstrations on control setpoint adjustment procedures. Adjusting procedures should emphasize methods for continual building "fine-tuning." Also, demonstrate all controls sequences to the Owner and Engineer on final acceptance.

C. The controls contractor shall provide a complete controls maintenance section for inclusion in the mechanical maintenance manuals. This shall include as-built control diagrams, Sequence of Operation, control parts list, equipment data sheets, preventive maintenance requirements and schedules, and the above-mentioned instruction manual.

D. At the instruction period, a one (1) year "In Warranty" maintenance agreement shall be presented to Owner's Representative.

3.5 WARRANTY

A. Upon completion of the project, as defined either by acceptance of the building by the Owner or use of the equipment by the Owner for its intended purposes - whichever occurs first, a warranty period of one (1) year shall commence. The warranty shall consist of a commitment by the controls contractor to provide, at no cost to the Owner, parts and labor as required to repair or replace such parts of the control system that prove inoperative due to defective materials or installation practices. This warranty expressly excludes routine service, such as instrument calibration.

END OF SECTION

SECTION 23 09 93 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Roof Top Unit.

B. Exhaust Fans.

C. Unit Heaters (Existing).

1.2 RELATED SECTIONS

A. Section 23 05 00 - Common Work Results for HVAC.

B. Section 23 09 23 - Direct Digital Control System for HVAC.

C. Section 23 74 00 – Packaged Outdoor HVAC Equipment.

1.3 SYSTEM DESCRIPTION

A. This Section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other Sections.

1.4 SUBMITTALS

A. Submit under provisions of Division 01.

B. Submit diagrams indicating mechanical system controlled and control system components. Label with settings, adjustable range of control and limits. Include written description of control sequence.

C. Include flow diagrams for each control system, graphically depicting control logic.

D. Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.

1.5 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Division 01.

B. Accurately record actual set points and settings of controls, including changes to sequences made after submission of shop drawings.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3.1 ROOF TOP UNIT CONTROL (RTU-1, 2, 3)

A. The roof top unit shall be controlled by a programmable thermostat. Contractor shall provide initial programming per owner's specifications.

B. Thermostat to have 7-day individual programs, 4 program periods per day. Fan, heating, and cooling to be separate outputs. Minimum 2 stages of heating. Thermostat to monitor filter changes based upon actual fan runtime.

3.2 EXHAUST FAN CONTROL (EF-1, 3, 9)

A. Local lighting circuit shall operate fan.

3.3 EXHAUST FAN CONTROL (EF-2, 4, 5, 6, 7, 8, 10)

A. Fan shall be in continuous operation.

3.4 UNIT HEATERS (UH-E)

A. Terminal control valve and fan shall cycle together to maintain set point. Connect unit heaters together as second stage of heat on RTU thermostat.

END OF SECTION

SECTION 23 11 23 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Pipe and pipe fittings.

B. Valves.

1.2 RELATED WORK

A. Section 23 05 00 - Common Work Results for HVAC

1.3 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure rating marked on valve body.

1.4 SUBMITTALS

A. Submit product data under provisions of Division 01.

B. Include data on pipe materials, pipe fittings, valves and accessories.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division 01.

B. Store and protect products under provisions of Division 01.

C. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.1 NATURAL GAS PIPING, ABOVE GRADE

A. Piping: Steel Pipe ASTM A53, Schedule 40 black. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, forged steel welding type.

B. Joints:

1. Low pressure, 2” and under: Screwed or Viega MegaPressG Cold Press Mechanical Joint. Press fittings are acceptable to last tee for connection to the appliance. Utilize threaded piping at the last tee.

2. Medium pressure or larger than 2": ANSI/AWS D1.1, welded.

2.2 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 2 Inches and Under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.

B. Pipe Size Over 2 Inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping: 1/16 inch thick preformed neoprene bonded to fiber.

C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.3 ACCEPTABLE MANUFACTURERS – GAS COCKS AND BALL VALVES

A. Apollo.

B. Hammond.

C. Milwaukee.

D. Nibco.

E. Substitutions: Under provisions of Division 01

2.4 GAS COCKS

A. Up to 2 Inches: Bronze body, bronze tapered plug. non-lubricated, Teflon packing, threaded ends.

B. Over 2 Inches: Cast iron body and plug, non- lubricated, Teflon packing, flanged ends.

2.5 BALL VALVES

A. Up to 2 Inches: Bronze two piece body, full port, forged brass, chrome plated ball, Teflon seats and stuffing box ring, lever handle, solder, threaded or press-fit ends.

B. Over 2 Inches: Cast steel, two piece body, full port chrome plated steel ball, Teflon seat and stuffing box seals, lever handle, flanged, solder, threaded or press-fit ends.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Verify that excavations are to required grade, dry, and not over excavated.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom to conserve building space and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Provide clearance for installation of insulation and access to valves and fittings.

H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.

I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

J. Install valves with stems upright or horizontal, not inverted.

3.3 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.4 TESTING

A. Test all piping in accordance with IFGC and UPC requirements. The test pressure used shall be no less than 10 times the proposed maximum working pressure, but not less than 10 psig for low pressure gas systems (7 inch WC) or 60 psig for medium pressures gas systems (2 psig or 5 psig). All welded pipe shall be tested with not less than 60 psig test pressures.

END OF SECTION

SECTION 23 21 13 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Pipe and Pipe Fittings.

B. Valves.

1.2 RELATED WORK

A. Section 23 05 00 - Common Work Results for HVAC.

B. Section 23 07 00 - HVAC Insulation.

C. Section 23 21 16 - Hydronic Piping Specialties.

1.3 REGULATORY REQUIREMENTS

A. Conform to ANSI/ASME B31.9.

1.4 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Welding Materials and Procedures: Conform to ANSI/ASME SEC 9, and applicable state labor regulations.

C. Welders Certification: In accordance with ANSI/ASME SEC 9.

1.5 SUBMITTALS

A. Submit product data under provisions of Division 01.

B. Include data on pipe materials, pipe fittings, valves, and accessories.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division 01.

B. Store and protect products under provisions of Division 01.

C. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.1 HEATING WATER AND GLYCOL PIPING, ABOVE GROUND

A. Steel Pipe: ASTM A53, Schedule 40, for sizes 4 inch and over, black.

1. Fittings: ANSI/ASTM B16.3, malleable iron or ASTM A234, steel welding type fittings.
2. Joints: Screwed, or ANSI/AWS D1.1, welded.

B. Copper Tubing: ASTM B88, Type L, hard drawn.

1. Fittings: ANSI/ASME B16.18 Cast Copper Alloy Solder Joint Pressure Fittings or ANSI/ASME B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
2. Joints: ASTM B32, solder, Grade 95TA or ANSI/AWS A5.8, BCuP silver braze; Flux: ASTM B813.
3. Press Fittings: Viega ProPress Fittings are allowed. Sealing elements for press fittings shall be EPDM.Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer. Press end shall have Smart Connect feature design leakage path. Smart Connect™ (SC Feature) In ProPress ½" to 4" dimensions the Smart Connect Feature assures leakage of liquids and/or gases from inside the system past the sealing element of an un-pressed connection. The function of this feature is to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.

C. Grooved piping systems are not allowed.

2.2 EQUIPMENT DRAINS AND OVERFLOWS

A. Steel Pipe: ASTM A53, Schedule 40 galvanized.

1. Fittings: Galvanized cast iron, or ANSI/ASTM B16.3 malleable iron.
2. Joints: Screwed, or grooved mechanical couplings.

B. Copper Tubing: ASTM B88, Type L, hard drawn.

1. Fittings: ANSI/ASME B16.18 cast bronze, or ANSI/ASME B16.29 solder wrought copper.
2. Joints: ASTM B32, solder, Grade 95TA or ANSI/AWS A5.8, BCuP silver braze; Flux: ASTM B813.

C. PVC Pipe: ASTM D1785, Schedule 40, and Schedule 80 for sizes 8 inch and larger, or ASTM D2241, SDR 21 or 26.

1. Fittings: ASTM D2466 or D2467, PVC.
2. Joints: ASTM D2855, solvent weld.

D. ABS Pipe: ASTM D2680 or D2751.

1. Fittings: ASTM D2751.
2. Joints: ASTM D2235, solvent weld.

2.3 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 2 Inches and Under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.

B. Pipe Size Over 2 Inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping.

C. Grooved and Shouldered Pipe End Couplings: Malleable iron housing clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; C-shape elastomer composition sealing gasket for operating temperature range from -30º F to 230º F; steel bolts, nuts, and washers; galvanized couplings for galvanized pipe.

2.4 GATE VALVES

A. Gate valves will not be permitted. Use ball or butterfly valves for isolation.

2.5 GLOBE VALVES

A. Globe valves will not be permitted. Use ball or butterfly valves for throttling.

2.6 ACCEPTABLE MANUFACTURERS - ALL VALVE TYPES

A. Apollo.

B. Crane.

C. FNW.

D. Hammond.

E. Milwaukee.

F. Red-White Valve Corp.

G. Nibco.

H. Substitutions: Under provisions of Division 01.

2.7 BALL VALVES

A. Up to 2 Inches: Bronze two piece body, full port, forged brass, chrome plated ball, Teflon seats and stuffing box ring, lever handle, solder or threaded ends. Seat material to be compatible with fluid handled.

B. Over 2 Inches: Cast steel, two piece body, full port chrome plated steel ball, Teflon seat and stuffing box seals, lever handle, flanged. Seat material to be compatible with liquid handled.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. After completion, fill, clean, and treat systems.

3.2 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.

B. Install piping to conserve building space, and not interfere with use of space and other work.

C. Group piping whenever practical at common elevations.

D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 23 05 16.

E. Provide clearance for installation of insulation, and access to valves and fittings.

F. Provide access where valves and fittings are not exposed.

G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

I. Prepare pipe, fittings, supports, and accessories for finish painting. Refer to Division 09.

J. Install valves with stems upright or horizontal, not inverted.

3.3 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.

C. Install ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.

D. Install ball or butterfly valves for throttling, bypass, or manual flow control services.

E. Provide spring loaded check valves on discharge of condenser water pumps.

F. Provide ¾ inch ball drain valves at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.

3.4 TESTING

A. Test all heating water and glycol piping hydrostatically at 100 psig or 150 percent of working pressure, whichever is greater, for a period of 4 hours. Observe piping during this period and repair all leaks.

END OF SECTION

SECTION 23 21 16 - HYDRONIC SPECIALTIES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Air Vents.

B. Strainers.

C. Flow Control Valves.

1.2 RELATED WORK

A. Section 23 05 00 - Common Work Results for HVAC.

1.3 REFERENCES

A. ANSI/ASME - Boilers and Pressure Vessels Code.

1.4 REGULATORY REQUIREMENTS

A. Conform to ANSI/ASME Boilers and Pressure Vessels Code Section 8D for manufacture of tanks.

1.5 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by same manufacturer throughout.

1.6 SUBMITTALS

A. Submit product data under provisions of Division 01 and Section 23 05 00.

1.7 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Division 01.

B. Include installation instruction, assembly views, lubrication instructions, and replacement parts list.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division 01.

B. Store and protect products under provisions of Division 01.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - AIR VENTS

A. Taco.

B. Amtrol.

C. Bell & Gossett.

D. Substitutions: Under provisions of Division 01.

2.2 AIR VENTS

A. Manual Type: Disk type vent with built-in check valve for manual or automatic operation, discs replaceable without draining system, 1/8 inch shank, rated at 50 psi; Hoffman No. 508 or equal.

B. Float Type: Maintenance free solid brass construction, continuous air venting, 150 psig standard working pressure, 240° F maximum temperature, 1⁄2 inch male tread at vent point for pressure testing or remote venting, 1/2 or ¾ inch female threaded connections. Provide with mini ball valve for isolation. Taco 409 , Spirotherm Spirotop VTP or approved equal.

2.3 ACCEPTABLE MANUFACTURERS - STRAINERS

A. Bell & Gossett.

B. Taco.

C. Armstrong.

D. Substitutions: Under provisions of Division 01.

2.4 STRAINERS

A. Size 2 inch and Under: Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.

B. Size 2-½ inch to 4 inch: Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

2.5 ACCEPTABLE MANUFACTURERS - FLOW CONTROL VALVES

A. Griswold.

B. FlowCon.

C. Hydronic Components, Inc., HCI

D. RWV Hydronic Controls.

E. Substitutions: Under provisions of Division 01.

2.6 FLOW CONTROL VALVES

A. Construction, Valves 2” and Smaller: ASTM B584 Brass body, rated at 300 psig @ 250 ºF with union on inlet, temperature and pressure test plug on inlet.

B. Construction, Valves larger than 2”: Class 150 Flange End Valves shall consist of steel pipe with flange ends, and stainless steel flow control cartridge assembly; 230 psig @ 250 ºF; flange ends compatible with ANSI B 16.5-2017 150 lb. Steel flanges shall be permanently marked to show direction of flow.

C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 14 times minimum pressure required for control. Four operating pressure ranges shall be available with the minimum range requiring less than 3 psi differential pressure to actuate the mechanism.

D. Control Mechanism: Stainless steel one-piece cartridge with segmented port design and full travel linear coil spring.

E. Accessories:

1. In-line strainer on inlet and ball valve on outlet.
2. Pressure/temperature test valves.
3. Provide Identification tags indelibly marked with flow rate, model number, zone identification. Tags shall be 3" x 3" aluminum.

PART 3 - EXECUTION

3.1 INSTALLATION AND APPLICATION

A. Install specialties in accordance with manufacturer's instructions to permit intended performance.

B. Provide manual air vents at system high points and as indicated.

C. Provide shutoff valves on water inlet to terminal heating units such as radiation, unit heaters, and fan coil unit.

D. Provide balancing valves on water outlet from terminal heating units.

3.2 AIR VENT APPLICATION SCHEDULE

Location	Type
Terminal heating units, mains below	Manual
Terminal heating units, mains above	None

Note: For terminal heating units, mains above unit, install branch piping connections at bottom of mains or 45° from bottom to allow air migration to mains.

END OF SECTION

SECTION 23 31 00 - HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Ceiling cabinet fans.
2. Inline cabinet fans.
3. Centrifugal square inline fans.

B. Related Sections:

1. Section 23 05 00 - Common Work Results for HVAC.
2. Section 23 05 93 – Testing, Adjusting and Balancing.
3. Section 23 07 00 - HVAC Insulation.
4. Section 23 09 93 – Sequence of Operations for HVAC Controls.
5. Section 23 31 00 - HVAC Ducts and Casings.
6. Section 23 33 00 - Air Duct Accessories.
7. Division 26 - Equipment Wiring Connections: Execution and product requirements for connecting equipment specified by this section.

1.2 REFERENCES

A. American Bearing Manufacturers Association:

1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

B. Air Movement and Control Association International, Inc.:

1. AMCA 99 - Standards Handbook.
2. AMCA 204 - Balance Quality and Vibration Levels for Fans.
3. AMCA 210 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
4. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.
5. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

C. American Refrigeration Institute:

1. ARI 1060 - Air-to-Air Energy Recovery Ventilation Equipment Certification Equipment Program.

D. National Electrical Manufacturers Association:

1. NEMA MG 1 - Motors and Generators.
2. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

E. Underwriters Laboratories Inc.:

1. UL 705 - Power Ventilators.
2. UL 762 – Kitchen Exhaust Fans.

1.3 SUBMITTALS

A. Product Data: Submit data on each type of fan and include accessories, fan curves with specified operating point plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, electrical characteristics and connection requirements.

B. Manufacturer's Installation Instructions: Submit fan manufacturer’s instructions.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.5 QUALITY ASSURANCE

A. Performance Ratings: Conform to AMCA 210.

B. Sound Ratings: AMCA 301, tested to AMCA 300.

C. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Greenheck Corp.

B. Loren Cook Company.

C. Twin City.

D. Substitutions: Under provisions of Division 01.

2.2 INLINE CABINET EXHAUST FANS

A. Description: Fan shall be an inline mounted, direct drive, centrifugal exhaust fan.

B. Certifications: Fan shall be manufactured by an ISO 9001 certified company. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA Certified Ratings Seal for sound and air performance.

C. Construction: Fan housing shall be minimum 20 gauge galvanized steel and acoustically insulated. Blower and motor assembly shall be mounted to a minimum 14 gauge reinforcing channel and shall be easily removable from the housing. Motor shall be mounted on vibration isolators. Unit shall be supplied with integral wiring box and disconnect receptacle shall be standard. Discharge position shall be convertible from right angle to straight through by moving interchangeable panels. The outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and nylon bushings.

D. Wheel: Wheel shall be centrifugal forward curved type, constructed of galvanized steel. Wheel shall be balanced in accordance with AMCA Standard 204-05, Balance Quality and Vibration Levels for Fans.

E. Motor: Motor shall be open drip proof type with permanently lubricated sealed bearings, built-in thermal overload protection and disconnect plug. Motor shall be furnished at the specified voltage.

2.3 CEILING EXHAUST FANS

A. Description: Fan shall be ceiling mount type, direct drive, centrifugal exhaust fan rated for continuous operation.

B. Certifications: Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705).

C. Construction: Fan housing shall be galvanized steel with rust proof paint. Grille shall be white polypropylene construction. The outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and nylon bushings.

D. Wheel: Wheel shall be centrifugal forward curved type, constructed of galvanized steel. Wheel shall be balanced in accordance with AMCA Standard 204-05, Balance Quality and Vibration Levels for Fans.

E. Motor: Motor shall be 4-pole totally enclosed type with permanently lubricated sealed bearings, built-in thermal overload protection and disconnect plug. Motor shall be furnished at the specified voltage.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Suspended Cabinet Fans: Install flexible connections specified in Section [23 33 00] between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

B. Provide backdraft dampers on outlet from cabinet and ceiling fans and as indicated on Drawings.

C. Install safety screen where inlet or outlet is exposed.

END OF SECTION

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Volume Control Dampers.
2. Duct Test Holes.
3. Turning Vanes.

1.2 RELATED SECTIONS

A. Section 23 05 00 - Common Work Results For HVAC.

1.3 REFERENCES

A. Sheet Metal and Air Conditioning Contractors:

1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.4 SUBMITTALS

A. Division 01 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit for the following. Include where applicable electrical characteristics and connection requirements.

1. Volume control dampers.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage: Store materials in a dry area indoor, protected from damage.

PART 2 - PRODUCTS

2.1 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

B. Fabricate splitter dampers of material same gauge as duct to 24 inches size in either direction, and two gauges heavier for sizes over 24 inches.

C. Fabricate splitter dampers of single thickness sheet metal to streamline shape. Secure blade with continuous hinge or rod. Operate with minimum 1/4 inch diameter rod in self aligning, universal joint action flanged bushing with set screw.

D. Fabricate single blade dampers for duct sizes to 9-1/2 x 30 inch.

E. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

F. Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

G. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where rod lengths exceed 30 inches provide regulator at both ends. Where volume dampers are located above gypsum or other non-accessible ceilings, extend damper rods to ceiling and install recessed concealed regulator with adjustable cover for flush installation, with cover. Exposed portions shall be chrome plated. Regulator shall include spring washer, lock nut, coupling, ninety degree screw or gear drive and rod as required, Young Regulator or equal.

H. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

2.2 FLEXIBLE DUCT CONNECTIONS

A. Manufacturers:

1. Duro-Dyne.
2. Substitutions: Division 01 - Product Requirements.

B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards, and as indicated.

C. UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 20 oz. per sq. yd., approximately 3 inches wide, crimped into metal edging strip.

D. Leaded vinyl sheet, minimum 0.55 inch thick, 0.87 lbs. per sq. ft., 10 dB attenuation in 10 to 10,000 Hz range.

2.3 DUCT TEST HOLES

A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.4 TURNING VANES

A. Double Width: Air foil design double width galvanized turning vanes with 2 inch inside radius.

B. Single Width: Single galvanized turning vane with 2 inch radius and minimum 1" trailing straight leg.

C. Acoustical Vanes: Double width vanes with inner vane of perforated galvanized steel with 3/32 inch holes on 5/32 inch spacing. Fill space between vanes with minimum 1.5 lb/cu ft glass fiber duct liner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Verify ducts and equipment installations are ready for accessories.

C. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.2 INSTALLATION.

A. Install temporary duct test holes as required for testing and balancing purposes. Cut or drill in ducts. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

END OF SECTION

SECTION 23 34 00 - HVAC FANS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Centrifugal fans.
2. Axial/mixed flow fans.
3. Propeller fans.
4. Downblast centrifugal roof fans.
5. Upblast centrifugal roof fans.
6. Centrifugal wall fans.
7. Ceiling cabinet fans.
8. Inline cabinet fans.
9. Duct blower or cabinet fans.
10. Centrifugal square inline fans.
11. Roof mounted tiered exhaust fan.
12. Inline kitchen hood exhaust fans.
13. Ceiling fans.
14. High Volume, Large-Diameter fans.

B. Related Sections:

1. Section [_____] - [_____]: Roof curbs.
2. Section [_____] - [_____]: Roof curb flashing.
3. Section 23 05 00 - Common Work Results for HVAC.
4. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
5. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.
6. Section 23 05 53 - Identification for HVAC Piping, Ductwork and Equipment.
7. Section 23 05 93 – Testing, Adjusting and Balancing.
8. Section 23 07 00 - HVAC Insulation.
9. Section 23 09 00 - Instrumentation and Control for HVAC.
10. Section 23 09 23 - Direct-Digital Control System for HVAC.
11. Section 23 09 93 – Sequence of Operations for HVAC Controls.
12. Section 23 31 00 - HVAC Ducts and Casings.
13. Section 23 33 00 - Air Duct Accessories.
14. Division 26 - Equipment Wiring Connections: Execution and product requirements for connecting equipment specified by this section.

1.2 REFERENCES

A. American Bearing Manufacturers Association:

1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

B. Air Movement and Control Association International, Inc.:

1. AMCA 99 - Standards Handbook.
2. AMCA 204 - Balance Quality and Vibration Levels for Fans.
3. AMCA 210 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
4. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.
5. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

C. American Refrigeration Institute:

1. ARI 1060 - Air-to-Air Energy Recovery Ventilation Equipment Certification Equipment Program.

D. National Electrical Manufacturers Association:

1. NEMA MG 1 - Motors and Generators.
2. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

E. Underwriters Laboratories Inc.:

1. UL 705 - Power Ventilators.
2. [UL 762 – Kitchen Exhaust Fans.]

1.3 SUBMITTALS

A. Submit shop drawings and product data under provisions of [Division 01] [23 05 00 Common Work Results for HVAC].

B. Shop Drawings: Indicate size and configuration of fan assembly, mountings, weights, ductwork and accessory connections.

C. Product Data: Submit data on each type of fan and include accessories, fan curves with specified operating point plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions: Submit fan manufacturer’s instructions.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Submit shop drawings and product data under provisions of [Division 01] [23 05 00 Common Work Results for HVAC].

B. Operation and Maintenance Data: Submit instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.5 QUALITY ASSURANCE

A. Performance Ratings: Conform to AMCA 210 [and bear AMCA Certified Rating Seal.]

B. Sound Ratings: AMCA 301, tested to AMCA 300 [and bear AMCA Certified Sound Rating Seal.]

C. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

D. Balance Quality: Conform to AMCA 204.

E. Energy Recovery Unit Wheel Energy Transfer Rating: Meet ARI 1060.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum [three] [_____] years [documented] experience.

B. Installer: Company specializing in performing Work of this section with minimum [three] [_____] years [documented] experience [approved by manufacturer].

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division 01 in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs.

B. Protect motors, shafts, and bearings from weather and construction dust.

C. Protect motors, shafts, and bearings from weather and construction dust.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.9 WARRANTY

A. Provide warranty under provisions of [Division 01] [23 05 00 Common Work Results for HVAC]: Product warranties and product bonds.

B. Furnish [five] [_____] year manufacturer’s warranty for fans.

1.10 EXTRA MATERIALS

A. Furnish [two] [_____] sets of belts for each fan.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Greenheck Corp.

B. Loren Cook Company.

C. Twin City.

D. [PennBarry.]

E. [_____]

F. Substitutions: [Under provisions of Division 01] [Not Permitted].

2.2 GENERAL

A. Fans used shall not decrease motor size, increase noise level, or increase tip speed by more than 10 percent, or increase inlet air velocity by more than 20 percent, from specified criteria. Fans shall be capable of accommodating static pressure variations of plus or minus 10 percent.

B. Base performance on sea level conditions unless otherwise noted.

C. Statically and dynamically balance fans to eliminate vibration or noise transmission to occupied areas.

2.3 CENTRIFUGAL FANS

A. Wheel and Inlet:

1. Backward Inclined: Steel [or aluminum] construction with smooth curved inlet flange, back plate, backward curved blades welded or riveted to flange and back plate; cast iron [or cast steel] hub riveted to back plate and keyed to shaft with set screws. Statically and dynamically balanced.
2. Forward Curved: [Black enamel] [Galvanized] steel construction with inlet flange, back plate, shallow blades with inlet and tip curved forward in direction of airflow, mechanically secured to flange and back plate; steel hub swaged to back plate and keyed to shaft with set screw. Statically and dynamically balanced.
3. Airfoil Wheel: Steel construction with smooth curved inlet flange, back plate die formed hollow airfoil shaped blades continuously welded at tip flange, and back plate; cast iron [or cast steel] hub riveted to back plate and keyed to shaft with set screws. Statically and dynamically balanced.
4. Radial: Steel construction with [inlet flange,] [reinforced] back plate, plate blades [with reinforcing gussets] [and] [wearing strips] welded or riveted to back plate [and flange]; cast iron [or cast steel] hub riveted to back plate and keyed to shaft with set screws. Statically and dynamically balanced.

B. Housing:

1. Steel, spot welded [for AMCA 99 Class I and II fans, and continuously welded for Class III], braced, designed to minimize turbulence with spun inlet bell and shaped cut-off.
2. Factory finish before assembly to manufacturer's standard. For fans handling air downstream of humidifiers, [furnish two additional coats of paint.] [fabricate of galvanized steel.] [Prime coating on aluminum parts is not required.]
3. Bolted construction with horizontal flanged split housing [, where indicated].
4. Fabricate plug fans without volute housing, in lined steel cabinet.

C. Bearings and Sleeves:

1. Bearings: Pillow block type, self-aligning, grease-lubricated [ball bearings, with ABMA 9 [L-10 life at 50,000 hours] [L-50 life at 100,000 hours]] [roller bearings, or ABMA 11, [L-10 life at 120,000 hours] [L-50 life at 400,000 hours]].
2. Shafts: Hot rolled steel, ground and polished, with key way, protectively coated with lubricating oil, and shaft guard.
3. V-Belt Drive: Cast iron or steel sheaves, dynamically balanced, keyed. Variable and adjustable pitch sheaves for motors 15 hp and under, selected so required rpm is obtained with sheaves set at mid-position. Fixed sheave for 20 hp and over, matched belts, and drive rated as recommended by manufacturer or minimum 1.5 times nameplate rating of motor.
4. Belt Guard: Fabricate to SMACNA Standard; 0.106 inch thick, 3/4 inch diamond mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation, with provision for adjustment of belt tension, lubrication, and use of tachometer with guard in place.

D. Motor: [Open drip proof] [Totally enclosed fan cooled] [Class 1, Group D, explosion proof], [Electronically commutated variable speed].

E. Accessories:

1. Inlet/Outlet Screens: Galvanized steel welded grid.
2. Access Doors: Shaped to conform to scroll, with quick opening latches and gaskets.
3. Disconnect Switch: Factory wired, NEMA ICS 2, AC general purpose Class A, manually operated unit with number of poles as required by the load served, full-voltage controller for [thermal overload protected] fractional horsepower induction motors [with thermal overload unit] [with magnetic starter], NEMA 250 [Type 1] [Type 1, lockable] [Type 1, heavy duty] [Type 3R] [Type 4] enclosure [with red pilot light].

2.4 AXIAL/MIXED FLOW FANS

A. Hub and Impeller:

1. Mixed Flow: Steel [or aluminum] welded construction with smooth curved inlet flange, wheel cone, back plate and cambered blades. Statically and dynamically balanced.
2. Airfoil Impeller Blades: Adjustable die cast aluminum alloy [or glass reinforced polyester resin] [or welded steel die formed blades with belt drive]. Statically and dynamically balanced.
3. Hub: Die cast aluminum alloy or cast iron hub [or with belt drive of spun, welded steel], bored and keyed to shaft; to facilitate indexing of blade angle with [manual] [automatic] adjustment stops.
4. Cast Components: X-ray components after fabrication and statically and dynamically balance assembly before attachment to motor or shaft.

B. Casing:

1. Fabricate casing of [1/4 inch] [[_____] inch] steel for fans [40 inch] [50 inch] [[_____] inch] in diameter and smaller and [3/8 inch] [[_____] inch] steel for larger fans.
2. Continuously weld, with inlet and outlet flange connections, and motor or shaft supports. Incorporate flow straightening guide vanes for fans specified for static pressures greater than [one inch wg] [1.5 inch wg] [2 inches wg] [[_____] inches wg].
3. Finish [with one coat enamel applied to interior and exterior] [by hot dip galvanizing finished assembly].

C. Bearings and Drives:

1. Bearings: Pillow block type, self-aligning, grease-lubricated [ball bearings, with ABMA 9 [L-10 life at 50,000 hours] [L-50 life at 100,000 hours]] [roller bearings, or ABMA 11, [L-10 life at 120,000 hours] [L-50 life at 400,000 hours]].
2. Shafts: Hot rolled steel, ground and polished, with keyway, protectively coated with lubricating oil.
3. V-Belt Drive: Cast iron or steel sheaves, dynamically balanced, keyed. Variable and adjustable pitch sheaves for motors 15 hp and under selected so required rpm is obtained with sheaves set at mid-position; fixed sheave for 20 hp and over, matched belts, and drive rated as recommended by manufacturer or minimum 1.5 times nameplate rating of motor.
4. Belt Guard: Fabricate to SMACNA Standards; 0.106 inch thick, 3/4 inch diamond mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation, with provision for adjustment of belt tension, lubrication, and use of tachometer with guard in place.

D. Lubrication: Extend lubrication fittings to outside of casing.

E. Motor: [Open drip proof] [Totally enclosed fan cooled] [Class 1, Group D, explosion proof], [Electronically commutated variable speed].

F. Accessories:

1. Inlet Bell: Bell mouth inlet fabricated of [steel] [aluminum] [fiberglass reinforced plastic] with flange.
2. Outlet Cones: Fabricated of steel with flanges, outlet area/inlet area ratio of [1.5/1.0] [_____], with center pod as recommended by manufacturer.
3. Inlet Screens: Galvanized steel welded grid to fit inlet bell.
4. Access Doors: Shaped to conform to casing with quick opening latches and gaskets.
5. Blade Pitch Actuator: Factory mounted and calibrated, electric actuator requiring single phase power and accepting electric input.
6. Stall Alarm Probe: Factory installed sensing probe to detect fan operation in stall.
7. Vibration Detector: Factory installed vibration switch to stop fan [with extra set of contacts].

2.5 PROPELLER FANS

A. Construction:

1. Propeller: Shaped steel or cast aluminum blade with hubs, statically and dynamically balanced, [keyed and] locked to shaft, directly connected to motor [or furnished with V-belt drive]. Statically and dynamically balanced.
2. Frame: One piece, square steel with die formed venturi orifice, mounting flanges and supports, with baked enamel finish.

B. Accessories:

1. Back-draft Damper: Multiple blade with offset hinge pin, blades linked.
2. Outlet Damper: Multiple blade with offset hinge pin, blades linked, line voltage motor drive, power open, spring return.
3. Safety Screens: Expanded galvanized metal over inlet, motor, and drive [and outlet]; to comply with OSHA regulations.
4. Fan speed controller.

5. Disconnect Switch: Factory wired, NEMA ICS 2, AC general purpose Class A, manually operated unit with number of poles as required by the load served, full-voltage controller for [thermal overload protected] fractional horsepower induction motors [with thermal overload unit] [with magnetic starter], NEMA 250 [Type 1] [Type 1, lockable] [Type 1, heavy duty] [Type 3R] [Type 4] enclosure [with red pilot light].

2.6 DOWNBLAST CENTRIFUGAL ROOF FANS

A. Fan Unit: Downblast type. [V-belt] [direct] drive, with [spun aluminum] [galvanized steel with baked-on enamel] [fiberglass reinforced plastic] housing; resilient mounted motor; aluminum wire bird screen; square base to suit roof curb with continuous curb gaskets.

B. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

C. Motor: [Open drip proof] [Totally enclosed fan cooled] [Class 1, Group D, explosion proof], [Electronically commutated variable speed].

D. Accessories:

1. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked [and line voltage motor drive, power open, spring return].
2. Motor Operated Damper: Aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked and [line] [_____] voltage motor drive, power [open] [closed], [spring return] [_____].
3. Roof Curb: [8 inch] [12 inch] [16 inch] [20 inch] [24 inch] [[_____] inch] high [self-flashing] of [galvanized steel] [aluminum] construction with continuously welded seams [, built-in cant strips] [, 1 inch insulation and curb bottom] [, interior baffle with acoustic insulation, curb bottom] [, ventilated double wall] [, hinged curb adapter], and factory installed nailer strip.
4. Disconnect Switch: Factory wired, NEMA ICS 2, AC general purpose Class A, manually operated unit with number of poles as required by the load served, full-voltage controller for [thermal overload protected] fractional horsepower induction motors [with thermal overload unit] [with magnetic starter], NEMA 250 [Type 1] [Type 1, lockable] [Type 1, heavy duty] [Type 3R] [Type 4] enclosure [with red pilot light].

2.7 UPBLAST CENTRIFUGAL ROOF FANS

A. Fan Unit: Upblast type. [V-belt] [direct] drive, spun aluminum housing with grease tray; resilient mounted motor; aluminum wire bird screen; square base to suit roof curb with continuous curb gaskets.

B. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

C. Motor: [Open drip proof] [Totally enclosed fan cooled] [Class 1, Group D, explosion proof], [Electronically commutated variable speed].

D. Accessories:

1. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked [and line voltage motor drive, power open, spring return].
2. Motor Operated Damper: Aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked and [line] [_____] voltage motor drive, power [open] [closed], [spring return] [_____].
3. Roof Curb: [16 inch] [20 inch] [24 inch] [[_____] inch] high [self-flashing] of [galvanized steel] [aluminum] construction with continuously welded seams [, built-in cant strips] [, 1 inch insulation and curb bottom] [, interior baffle with acoustic insulation, curb bottom] [, ventilated double wall] [, hinged curb adapter], and factory installed nailer strip.
4. Disconnect Switch: Factory wired, NEMA ICS 2, AC general purpose Class A, manually operated unit with number of poles as required by the load served, full-voltage controller for [thermal overload protected] fractional horsepower induction motors [with thermal overload unit] [with magnetic starter], NEMA 250 [Type 1] [Type 1, lockable] [Type 1, heavy duty] [Type 3R] [Type 4] enclosure [with red pilot light].

2.8 CENTRIFUGAL WALL FANS

A. Fan Unit: [V-belt] [direct] drive with spun aluminum housing; resiliently mounted motor; aluminum wire bird screen.

B. Sheaves: For V-belt drives, provide cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

C. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor NEMA 250 [Type 1] [Type 1, lockable] [Type 1, heavy duty] [Type 3R] [Type 4] [_____] enclosure.

D. Motor: [Open drip proof] [Totally enclosed fan cooled] [Class 1, Group D, explosion proof], [Electronically commutated variable speed].

E. Accessories:

1. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked [and line voltage motor drive, power open, spring return].
2. Motor Operated Damper: Aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked and [line] [_____] voltage motor drive, power [open] [closed], [spring return] [_____].
3. Roof Curb: [16 inch] [20 inch] [24 inch] [[_____] inch] high [self-flashing] of [galvanized steel] [aluminum] construction with continuously welded seams [, built-in cant strips] [, 1 inch insulation and curb bottom] [, interior baffle with acoustic insulation, curb bottom] [, ventilated double wall] [, hinged curb adapter], and factory installed nailer strip.
4. Disconnect Switch: Factory wired, NEMA ICS 2, AC general purpose Class A, manually operated unit with number of poles as required by the load served, full-voltage controller for [thermal overload protected] fractional horsepower induction motors [with thermal overload unit] [with magnetic starter], NEMA 250 [Type 1] [Type 1, lockable] [Type 1, heavy duty] [Type 3R] [Type 4] enclosure [with red pilot light].

2.9 CEILING CABINET FANS

A. Centrifugal Fan Unit: Direct driven with [injection molded resin] [galvanized steel] housing [lined with 1/2 inch acoustic insulation], resilient mounted motor, gravity backdraft damper in discharge opening, integral outlet duct collar. [Discharge position convertible by moving interchangeable panels.]

B. Disconnect Switch: [Cord and plug in housing] [Fan mounted toggle switch] for thermal overload protected motor.

C. Grille: [Molded white plastic] [Aluminum [with baked white enamel finish]] [Painted steel].

D. Wheel: [DWDI] Centrifugal forward curved type constructed of injection molded or polypropylene resin.

E. Motor: [Direct drive, open drip proof type.] [Electronically commutated variable speed].

F. Accessories:

1. Wall cap with damper, round duct inlet.
2. Wall cap with rectangular duct inlet.
3. Eave elbow.
4. Roof jack constructed of corrosion resistant, galvanized steel with baked enamel finish.
5. Roof cap [with roof curb].
6. Filter box.
7. Brick vent constructed of extruded aluminum with inlet screen.
8. Ceiling radiation damper.
9. Integral [LED] light in grille.
10. Disconnect Switch: Factory wired, NEMA ICS 2, AC general purpose Class A, manually operated unit with number of poles as required by the load served, full-voltage controller for [thermal overload protected] fractional horsepower induction motors [with thermal overload unit] [with magnetic starter], NEMA 250 [Type 1] [Type 1, lockable] [Type 1, heavy duty] [Type 3R] [Type 4] enclosure [with red pilot light].

2.10 INLINE CABINET FANS

A. Configuration: Inline.

B. Centrifugal Fan Unit: Direct driven with [injection molded resin] [galvanized steel] housing [lined with 1/2 inch acoustic insulation], resilient mounted motor, gravity backdraft damper in discharge opening, integral inlet and outlet duct collar.

C. Disconnect Switch: [Cord and plug in housing] [Fan mounted toggle switch] for thermal overload protected motor.

D. Wheel: [Double width, double inlet] Centrifugal forward curved type constructed of injection molded or polypropylene resin.

E. Motor: [Direct drive, open drip proof type.] [Electronically commutated variable speed].

F. Accessories:

1. Wall cap with damper, round duct inlet.

2. Wall cap with rectangular duct inlet.
3. Eave elbow.
4. Roof jack constructed of corrosion resistant, galvanized steel with baked enamel finish.
5. Roof cap [with roof curb].
6. Filter box.
7. Brick vent constructed of extruded aluminum with inlet screen.

2.11 DUCT BLOWER OR CABINET FANS

A. Product Description: V-belt drive with galvanized steel housing [lined with [1/2] [1] [_____] inch acoustic glass fiber insulation], removable side panel for access, inlet and outlet duct collar, [gravity backdraft damper in discharge,] horizontal hanging brackets.

B. Fan Wheel: Double width-double inlet [backward inclined] [forward curved] centrifugal type.

C. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

D. Motor and Drive Mounting: [Out of] [Within] air stream.

E. Motor: [Open drip proof] [Totally enclosed fan cooled] [Class 1, Group D, explosion proof], [Electronically commutated variable speed].

F. Bearings: ABMA 9 life at 200,000 hours.

G. Accessories:

1. Belt guard.
2. Slide out filter box with [permanent] [throwaway] type filter.
3. Disconnect Switch: Factory wired, NEMA ICS 2, AC general purpose Class A, manually operated unit with number of poles as required by the load served, full-voltage controller for [thermal overload protected] fractional horsepower induction motors [with thermal overload unit] [with magnetic starter], NEMA 250 [Type 1] [Type 1, lockable] [Type 1, heavy duty] [Type 3R] [Type 4] enclosure [with red pilot light].

2.12 CENTRIFUGAL SQUARE INLINE FANS

A. Product Description: [V-belt] [Direct] drive with galvanized steel housing [lined with [1/2] [1] [_____] inch acoustic glass fiber insulation], integral inlet cone, removable access doors on 3 sides, inlet and outlet duct collar, [gravity backdraft damper in discharge,] horizontal hanging brackets.

B. Fan Wheel: Backward inclined centrifugal type, aluminum construction.

C. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

D. Motor and Drive Mounting: Out of air stream.

E. Motor: [Open drip proof] [Totally enclosed fan cooled] [Class 1, Group D, explosion proof], [Electronically commutated variable speed].

F. Bearings: ABMA 9 life at 200,000 hours.

G. Accessories:

1. Belt guard.
2. Motor cover.
3. Inlet safety screen.
4. Outlet safety screen.
5. Flexible duct connector.
6. Filter box with [permanent] [throwaway] type filter.
7. Flanged [inlet] [outlet].
8. [Inlet] [Outlet] ductwork companion flange.
9. Disconnect Switch: Factory wired, NEMA ICS 2, AC general purpose Class A, manually operated unit with number of poles as required by the load served, full-voltage controller for [thermal overload protected] fractional horsepower induction motors [with thermal overload unit] [with magnetic starter], NEMA 250 [Type 1] [Type 1, lockable] [Type 1, heavy duty] [Type 3R] [Type 4] enclosure [with red pilot light].

2.13 ROOF MOUNTED TIERED EXHAUST FAN

A. Description: Fan shall be a tiered aluminum, low profile, roof mounted, belt driven, centrifugal exhaust ventilator.

B. Certifications: Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.

C. Construction: The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The fan shall be enclosed in a tiered extruded aluminum housing. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. Bearings, drives and motor shall be mounted on a minimum 12 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators. Unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM, static pressure, and maximum fan RPM.

D. Wheel: Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204-96, Balance Quality and Vibration Levels for Fans.

E. Motor: [Open drip proof] [Totally enclosed fan cooled] [Class 1, Group D, explosion proof], [Electronically commutated variable speed].

F. Bearings: Bearings shall be designed and individually tested specifically for use in air handling applications. Construction shall be heavy duty regreasable ball type in a cast iron housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.

G. Belts & Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives

shall be sized for 150% of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM.

2.14 INLINE KITCHEN HOOD EXHAUST FANS

A. Fan shall be duct mounted, belt driven, tubular centrifugal inline blower with backward inclined wheels.

B. Certifications: Fan shall be manufactured at an ISO 9001 certified facility. Fans to be listed and include the UL762 Label for grease removal and shall be built in accordance with NFPA 96. Fan shall bear the AMCA certified ratings seal for sound and air performance.

C. Construction: The housings shall be continuously welded heavy gauge steel with integral duct flanges to prevent grease and moisture leakage. Belt tubes shall be continuously welded to ensure belt remains free of grease and moisture. Bearing covers to be sealed with silicone gasketing rated for 400 Deg F and include a labyrinth shaft seal to protect the bearings from the airstream contaminants (felt or neoprene shaft seals are not acceptable). Fan housings to include two threaded and plugged drain connections that are located at 90 Deg from the motor.

D. Access Doors: Fans shall include an oversize access door to allow for duct cleaning and for removal of the fan wheel, shaft and bearings without lowering the fan from the duct system. Fastening bolts for the oversized access door shall be no more than 4 inches apart on center. The oversize access door to include silicone gasketing rated for 400 Deg F.

E. Coating: All steel fan components shall be coated with an electrostatically applied, baked polyester powder coating. Each component shall be subject to a five stage environmentally friendly wash system, followed by a minimum 2-mil thick baked powder finish. Paint must exceed 1,000-hour salt spray under ASTM B117 test method.

F. Wheel: Wheel shall be steel, non-overloading, centrifugal backward inclined, airfoil type. Blades on all sizes shall be continuously welded to the backplate and deep spun inlet shroud. All sizes shall be securely keyed to the fan shaft. Wheel shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204-96, Balance Quality and Vibration Levels for Fans.

G. Motor: Motor shall be heavy-duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure. Premium efficiency, in compliance with Division 26.

H. Blower Shaft: Blower shaft shall be AISI C-1045 hot rolled and accurately turned, ground and polished. Shafting shall be sized for a critical speed of at least 125% of maximum RPM.

I. Bearings: Bearings shall be heavy-duty grease lubricated and self-aligning. Bearings shall be selected for a basic rating fatigue life L (10) of 80,000 hours at maximum operating speed.

J. Belts and Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be precision-machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150% of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM.

K. Belt Guard: Fabricate to SMACNA Low Pressure Duct Construction Standards; of 12 gauge, ¾ inch diamond mesh wire screen welded to steel angle frame or equivalent, prime coated.

Secure to fan or fan supports without short circuiting vibration isolation, with provision for adjustment of belt tension, lubrication, and use of tachometer with guard in place.

2.15 CEILING FANS

A. Airfoils: Matrix composite; fan sweep.

B. Motor: EC motor with digital inverter drive.

C. Controls: Wired Wall Control with fan on/off and fan speed adjustment.

D. Universal mounting, provide extension tube as required.

E. Color: [White].

2.16 HIGH-VOLUME, LARGE-DIAMETER FANS

A. Airfoils: Matrix composite; fan sweep.

B. Motor: EC motor with digital inverter drive.

C. Controls: Wired Wall Control with fan on/off and fan speed adjustment. .

D. Universal mounting, provide extension tube as required.

E. Color: White.

F. The fan shall be ETL certified and built pursuant to construction guidelines set forth by UL standards 507 and CSA standard C22.2 No. 113-08. The fan shall be designed to move an effective amount of air for cooling and destratification in small, low ceiling, commercial applications. The fan, in operation, shall not disturb other hanging objects 2' outside of its circumference to a distance of 3' below its airfoils. The fan shall incorporate a direct drive system designed specifically for high volume, low speed fans to ensure silent operation. The sound levels from the fan operating at maximum speed shall not exceed 40 dBA (measured 20' below the blades and 20' horizontally from the center of the fan).

G. Airfoils: The fan shall be equipped with ten (10) high volume, low speed airfoils of precision extruded aluminum alloy. Each airfoil shall be of the high performance MiniTEC design. The airfoils shall be connected by means of two (2) sets of bolts and lock washers per airfoil. The airfoils shall be connected to the hub and interlocked with zinc plated steel retainers.

H. Winglets: The fan shall be equipped with ten (10) MiniTEC winglets designed to redirect outward airflow into downward airflow, thereby enhancing the efficiency and effectiveness of the fan. The winglets shall be molded polyethylene terephthalate thermoplastic polyester resin. A winglet shall be attached at the tip of each airfoil. The standard color of the winglets shall be "Super Durable Black." As an option, winglets may be powder coated or painted as specified by the architect or owner.

I. Motor: The fan motor shall be a permanent magnet brushless motor rated for continuous operation at maximum speed with the capability of modulating the fan speed from 0-100% without the use of a gearbox or other mechanical means of control. The motor shall operate from any voltage ranging from 100-130 VAC, 1 φ, and 60Hz, without requiring adapters or

customer selection. The motor shall be a non-ventilated, heat sink design with the capability of continuous operation in -40 deg F to 131 deg F ambient conditions.

J. Hub: The fan hub shall be constructed of steel for high strength and durability. The hub shall be precision machined to achieve a well-balanced and solid rotating assembly. The hub shall incorporate five (5) safety retaining clips made of 1/8" (0.3 cm) thick steel that shall restrain the hub/airfoil assembly in case of shaft failure.

K. Mounting System: The fan mounting system shall be designed for quick and secure installation from the structure. All components in the mounting system shall be of welded construction using low carbon steel no less than 3/16" (0.5 cm) thick and powder coated or plated for corrosion resistance and appearance. All mounting bolts shall be SAE Grade 8 or equivalent.

L. Safety Cable: The fan shall be equipped with a safety cable that provides an additional means of securing the fan assembly to the building structure. The safety cable shall be 3/16" (0.5 cm) diameter and fabricated out of 7 x 19 stranded galvanized steel. The loops shall be secured with swaged Nicopress fittings, pre-loaded and tested to 3,000 lb·f (13,345 N). Field construction of safety cables is not permitted.

M. Controller: The fan controller shall be incorporated into the fan assembly. The controller shall be factory programmed to minimize starting and braking torques. The controller shall be equipped with a simple diagnostic program and an LED light to identify and relay faults in the system. The controller shall be housed in an enclosure independent of the motor to prevent overheating or electrical interference.

N. Wall Control: The fan shall be equipped with a remote wall control. The wall control shall be capable of mounting to a standard electrical box and shall include operator controls and display for controlling the fan's power and speed. Communication with the fan drive and controller shall be by a standard (14 Ga/3 wire with ground), line voltage cable that is field installed and provided by the installer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify [roof curbs] [and] [exhaust hoods] are installed and dimensions are as [shown on shop drawings] [instructed by manufacturer].

3.2 PREPARATION

A. [Coordinate with other trades for installation of] [Furnish and install] roof curbs. Refer to requirements of Division 07 for installation.

3.3 INSTALLATION

A. Secure [roof] [wall] fans [and] [gravity ventilators] with [cadmium plated steel] [aluminum] [stainless steel] lag screws to [roof curb] [structure].

B. Suspended [Cabinet] Fans: Install flexible connections specified in Section [23 33 00] between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

C. Install backdraft dampers on inlet to [roof] [and] [wall] exhaust fans [and] [gravity ventilators used in relief air applications].

D. Provide backdraft dampers on outlet from cabinet and ceiling fans and as indicated on Drawings.

E. Install safety screen where inlet or outlet is exposed.

F. Pipe scroll drains to nearest floor drain.

G. Install backdraft dampers on discharge of exhaust fans [and as indicated on Drawings.] [Refer to Section 23 33 00].

H. Provide sheaves required for final air balance for belt driven fans. Refer to requirements Section 23 05 93.

3.4 MANUFACTURER'S FIELD SERVICES

A. Division 01 - Quality Requirements: Requirements for manufacturer’s field services.

B. Furnish services of factory trained representative for minimum of [one] [_____] days to start-up, calibrate controls, and instruct Owner on operation and maintenance.

3.5 CLEANING

A. Vacuum clean inside of fan cabinet.

3.6 DEMONSTRATION

A. Demonstrate fan operation and maintenance procedures.

3.7 PROTECTION OF FINISHED WORK

A. Do not operate fans for until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

SECTION 23 37 00 - AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Diffusers.

B. Registers/Grilles.

1.2 REFERENCES

A. ADC 1062 - Certification, Rating and Test Manual.

B. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

C. ARI 650 - Air Outlets and Inlets.

D. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.

E. SMACNA - HVAC Duct Construction Standard.

1.3 QUALITY ASSURANCE

A. Test and rate performance of air outlets and inlets in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.

B. Test and rate performance of louvers in accordance with AMCA 500.

1.4 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 90A.

B. Earthquake tabs, in seismic zones, in accordance with IBC Standards.

1.5 SUBMITTALS

A. Submit product data under provisions of Division 01.

B. Provide product data for items required for this project.

C. Review requirements of outlets and inlets as to size, finish, and type of mounting prior to submitting product data.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS – DIFFUSERS AND GRILLES

A. Titus.

B. Price.

C. Substitutions: Under provisions of Division 01.

2.2 DIFFUSER AND GRILLES

A. See drawings for scheduled grilles and diffusers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install items in accordance with manufacturers' instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

C. Install diffusers to ductwork with air tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.

E. Paint ductwork visible behind air outlets and inlets matte black.

END OF SECTION

SECTION 23 74 00 - PACKAGED OUTDOOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Packaged Roof Top Unit.

B. Unit Controls.

C. Roof Mounting Frame and Base.

1.2 RELATED SECTIONS

A. Section 23 05 00 - Common Work Results For HVAC.

B. Section 26 05 03 - Equipment Wiring Connections: Electrical supply to units.

1.3 REFERENCES

A. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

B. ARI 210 - Unitary Air-Conditioning Equipment.

1.4 SUBMITTALS

A. Submit product data for manufactured products and assemblies required for this project.

B. Indicate electrical service and duct connections on product data.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Division 01.

B. Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division 01.

B. Store and protect products under provisions of Division 01.

C. Protect units from physical damage by storing off site until roof mounting frames are in place, ready for immediate installation of units.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Trane.

B. York.

C. Daikin

D. Substitutions: Under provisions of Division 01.

2.2 MANUFACTURED UNITS

A. Provide roof-mounted units having gas burner and electric refrigeration.

B. Unit shall be self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, heat exchanger and burner controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.

2.3 FABRICATION

A. Cabinet: Steel with baked enamel finish, access doors or removable access panels with quick fasteners screwdriver operated flush cam type. Structural members shall be minimum 18 gauge, with access doors or removable panels of minimum 20 gauge.

B. Insulation: One inch thick neoprene coated glass fiber on surfaces where conditioned air is handled. Protect edges from erosion.

C. Heat Exchangers: Stainless steel, of welded construction.

D. Supply Fan: Forward curved centrifugal type, resiliently mounted with direct drive as indicated.

E. Air Filters: 2 inch thick glass fiber disposable media in metal frames.

F. Roof Mounting Frame: 24 inches high galvanized steel, channel frame with gaskets, nailer strips.

2.4 BURNER

A. Gas Burner: Induced draft type burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shut-off pilot.

B. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after air flow proven and slight delay, allow gas valve to open.

C. High Limit Control: Temperature sensor with fixed stop at maximum permissible setting, de-energize burner on excessive bonnet temperature and energize burner when temperature drops to lower safe value.

D. Supply Fan Control: Temperature sensor sensing bonnet temperatures and independent of burner controls, or adjustable time delay relays with switch for continuous fan operation.

2.5 EVAPORATOR COIL

A. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection.

B. Provide capillary tubes or thermostatic expansion valves for units of 6 tons capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons cooling capacity and larger.

2.6 COMPRESSOR

A. Provide hermetic or semi-hermetic compressor, 3600 rev/min. maximum, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gauge ports, and filter drier.

B. Five minute timed off circuit shall delay compressor start.

2.7 CONDENSER

A. Provide copper aluminum fin coil assembly with subcooling rows.

B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor.

2.8 SUPPLY/RETURN CASING

A. Dampers: Provide outside, return, and relief dampers with damper operator and control package to automatically vary outside air quantity. Outside air damper shall fail to closed position.

B. Gaskets: Provide tight fitting dampers with edge gaskets, maximum leakage 5 percent at 2 inches pressure differential.

C. Damper Operator: 24 volt with gear train sealed in oil, with spring return on units 7.5 ton cooling capacity and larger.

2.9 OPERATING CONTROLS

A. Electric solid state microcomputer based room thermostat, located as indicated in service area with remote sensor located as indicated.

B. Room thermostat shall incorporate:

1. Automatic switching from heating to cooling.
2. Preferential rate control to minimize overshoot and deviation from set point.
3. Set-up for four separate temperatures per day.
4. Instant override of setpoint for continuous or timed period from one hour to 31 days.
5. Short cycle protection.
6. Programming based on weekdays, Saturday and Sunday.
7. Switch selection features including imperial or metric display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.

C. Room thermostat display shall include:

1. Time of day.
2. Actual room temperature.
3. Programmed temperature.
4. Programmed time.
5. Duration of timed override.
6. Day of week.
7. System model indication: heating, cooling, auto, off, fan auto, fan on.
8. Stage (heating or cooling) operation.

D. Provide low limit thermostat in supply air to close outside air dampers and stop supply fan.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that roof is ready to receive work and opening dimensions are as illustrated by the manufacturer.

B. Verify that proper power supply is available.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Mount units on factory built roof mounting frame providing watertight enclosure to protect ductwork and utility services. Install roof mounting frame level.

3.3 MANUFACTURER'S FIELD SERVICES

A. Provide initial start-up and shut-down during first year of operation, including routine servicing and check-out.

END OF SECTION

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. General Requirements specifically applicable to Division 26, 27, and 28, in addition to Division 01 provisions.

1.2 WORK SEQUENCE

A. Construct Work in sequence under provisions of Division 01.

1.3 COORDINATION

A. Coordinate the Work specified in this Division under provisions of Division 01.

B. Prepare drawings showing proposed rearrangement of Work to meet job conditions, including changes to Work specified under other Sections. Obtain permission of Owner/Engineer prior to proceeding.

1.4 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code, latest adopted edition including all state and local amendments.

B. NECA - Standard of Installation.

1.5 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 70.

B. Conform to the latest adopted edition of the International Building Code and the International Fire Code including all state and local amendments thereto.

C. Obtain electrical permits, plan review, and inspections from authority having jurisdiction.

1.6 SUBMITTALS

A. Submit inspection and permit certificates under provisions of Division 01.

B. Include certificate of final inspection and acceptance from authority having jurisdiction.

C. Submittal review is for general design and arrangement only and does not relieve the Contractor from any requirements of Contract Documents. Submittal not checked for quantity,

dimension, fit or proper operation. Where deviations of substitute product or system performance have not been specifically noted in the submittal by the Contractor, provisions of a complete and satisfactory working installation is the sole responsibility of the Contractor.

D. In addition to requirements referenced in Division 01, the following is required for work provided under this division of the specification.

1. Provide material and equipment submittals containing complete listings of material and equipment shown on Electrical Drawings and specified herein, bound in hard cover, loose-leaf binders separate from work furnished under other divisions. Index and clearly identify all material and equipment by item, name or designation used on drawings and in specifications.
2. Submit only pages which are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, and capacities; wiring diagrams and controls; component parts; finishes; dimensions; and required clearances.
3. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the work. Delete information not applicable.
4. Review submittals prior to transmittal; determine and verify field measurements, field construction criteria, manufacturer's catalog numbers, and conformance of submittal with requirements of Contract Documents.
5. Coordinate submittals with requirements of work and of Contract Documents.
6. Sign or initial each sheet of shop drawings and product data, and each sample label to certify compliance with requirements of Contract Documents. Notify Owner/Engineer in writing at time of submittal, of any deviations from requirements of Contract Documents.
7. Electronic submittals in PDF format are acceptable. All indexing and identification requirements hold for organization of submittals.
8. Do not fabricate products or begin work which requires submittals until return of submittal with Engineer acceptance.
9. Equipment scheduled by manufacturer's name and catalog designations, manufacturer's published data and/or specification for that item, in effect on bid date, are considered part of this specification. Approval of other manufacturer's item proposed is contingent upon compliance therewith.
10. Submittals each Division shall be complete and submitted at one time. Unless given prior approval, partial submittals will be returned unreviewed.

1.7 PROJECT RECORD DRAWINGS

A. Maintain project record drawings in accordance with Division 01.

B. In addition to the other requirements, mark up a clean set of drawings as the work progresses to show the dimensioned location and routing of all electrical work which will become permanently concealed. Show routing of work in permanently concealed blind spaces within the building. Show complete routing and sizing of any significant revisions to the systems shown.

C. Record drawing field mark-ups shall be maintained on-site and shall be available for examination of the Owner’s Representative at all times.

1.8 OPERATION AND MAINTENANCE MANUALS

A. Provide operation and maintenance manuals for training of Owner's Representative in operation and maintenance of systems and related equipment. In addition to requirements referenced in Division 01, the following is required for work provided under this section of the specifications.

B. Manuals shall be hard cover, loose-leaf binders with pages reinforced to prevent pullout and shall be separate from work furnished under other divisions. Prepare a separate chapter for instruction of each class of equipment or system. Index and clearly identify each chapter and provide a table of contents.

C. Unless otherwise noted in Division 01, provide one copy of all material for approval. After approval, provide five corrected approved copies, unless directed otherwise by the Owner. Initial submittal for approval may be electronic.

D. The following is the suggested outline for operation and maintenance manuals and is presented to indicate the extent of items required in manuals.

1. List chapters of information comprising the text. The following is a typical Table of Contents:

    a. Touchscreen Security System
    b. Detention Intercom System
    c. IP Video System
    d. Lighting
    e. Power Distribution
    f. Other chapters as necessary

2. Provide the following items in sequence for each chapter shown in Table of Contents:

    a. Describe the procedures necessary for personnel to operate the system including start-up, operation, emergency operation and shutdown.

        1) Give complete instructions for energizing equipment and making initial settings and adjustments whenever applicable.
        2) Give step-by-step instructions for shutdown procedure if a particular sequence is required.
        3) Include test results of all tests required by this and other sections of the specifications.

    b. Maintenance Instructions:

        1) Provide instructions and a schedule of preventive maintenance, in tabular form, for all routine cleaning and inspection with recommended lubricants if required for the following:

            a) Touchscreen computer
            b) Detention intercom system
            c) Lighting
            d) Power Distribution

2) Provide instructions for minor repair or adjustments required for preventive maintenance routines, limited to repairs and adjustments which may be performed without special tools or test equipment and which requires no special training or skills.
3) Provide manufacturers' descriptive literature including approved shop drawings covering devices used in system, together with illustrations, exploded views, etc. Also include special devices provided by the Contractor.
4) Provide any information of a maintenance nature covering warranty items, etc., which have not been discussed elsewhere.
5) Include list of all equipment furnished for project, where purchased, technical representative if applicable and a local parts source with a tabulation of descriptive data of all electrical-electronic spare parts and all mechanical spare parts proposed for each type of equipment or system. Properly identify each part by part number and manufacturer.

1.9 DEMONSTRATION OF ELECTRICAL SYSTEMS

A. During substantial completion inspection:

1. Conduct operating test for approval under provisions of Division 01.
2. Demonstrate installation to operate satisfactorily in accordance with requirements of Contract Documents.
3. Should any portion of installation fail to meet requirements of Contract Documents, repair or replace items failing to meet requirements until items can be demonstrated to comply.
4. Have instruments available for measuring light intensities, voltage and current values, and for demonstration of continuity, grounds, or open circuit conditions.
5. Provide personnel to assist in taking measurements and making tests.

1.10 INSTRUCTION OF OPERATING PERSONNEL

A. In accordance with the requirements of Division 01, this section, and other Division 26 sections, provide services of qualified representative of supplier of each item or system listed below to instruct designated personnel of Owner in operation and maintenance of item or system.

B. Make instruction when system is complete, of number of hours indicated, and performed at time mutually agreeable.

System or Equipment	Hours of Instruction
Intercom/Security/PLC system	As specified in 28 40 00

1.11 EXTRA MATERIALS

A. As specified in individual sections.

1.12 WARRANTY AND MAINTENANCE CONTRACT

A. Warrant all materials and equipment to be new and free from defects in material and workmanship for a period of one year under provisions of Division 01.

B. Copies of manufacturer product warranties for all equipment shall be included in the operation and installation manuals.

C. Provide a maintenance contract to maintain the security system for one year from the date of substantial completion for the project. At the end of one year, the Owner shall have the option of extending or canceling the contract.

1.13 ELECTRICAL REFERENCE SYMBOLS

A. The Electrical "Legend" on drawings is standardized version for this project. All symbols shown may not be used on drawings. Use legend as reference for symbols used on plans.

1.14 ELECTRICAL DRAWINGS

A. Drawings are diagrammatic and not intended to show all features of work. Install material not dimensioned on drawings in a manner to provide a symmetrical appearance. Do not scale drawings for exact equipment locations. Field verification of dimensions, locations and levels is directed.

1.15 DEFINITIONS

A. “BASIS OF DESIGN” - Particular specialized products around which a system was designed. In such cases, the products specified may be critical with regard to physical sizes and performance characteristics. Where variations or substitutions to products are made, the Contractor is solely responsible for resolving all impacts of such a deviation. Approval of a substitution and/or variation request does not relieve the Contractor of responsibility for complying with the design intent.

B. “EQUAL” - A product, system or installation which:

1. Meets or exceeds all ratings, performance characteristics, standard features and denoted options of specified item.
2. Includes primary characteristics identified in the drawings and specifications.
3. Complies with requirements similar to the “Basis of Design.”
4. Is produced by a manufacturer specifically listed as an acceptable manufacturer on the drawings, or in the specifications.
5. Is acceptable and approved to the Engineer specifically addressed in writing.

C. “EXPOSED” - Exposed to view after construction is completed.

D. “FURNISH” - Purchase materials as shown and specified. Deliver to project site at location shown to be installed by supporting crafts.

E. “INSTALL” - Set in place and connect equipment furnished by others for a complete and ready to use installation.

F. “PRODUCT” - Term which includes materials, equipment, fixtures, devices for any tangible item used on the project.

G. “PROVIDE” - Furnish all products, equipment, subcontracts, labor, testing, etc., required and install for a complete ready to use installation.

H. “SHOP DRAWING” - Detailed, dimensioned working construction drawing drawn to a particular scale adequately showing installation intent, details and coordination of interrelated trades.

I. “SUBSTITUTION” - A product, system or installation which is not listed as an acceptable manufacturer, but the Contractor warrants meets or exceeds specified equipment denoted in the contract documents. Approval through submittal process is required to establish product or system is “equal”.

J. “WIRING” - Electrical conductors, raceway, devices, connections and associated accessories, or any combination of labor and material thereof in order to provide a complete and operable system.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All Materials and Equipment shall be new and shall be listed by Underwriter's Laboratories or equivalent third party listing agency for the use intended.

B. Materials and Equipment shall be acceptable to the authority having jurisdiction as suitable for the use intended when installed per listing and labeling instructions.

C. No materials or equipment containing asbestos in any form shall be used. Where materials or equipment provided by this Contractor are found to contain asbestos such items shall be removed and replaced with non-asbestos containing materials and equipment at no cost to the Owner.

D. In describing the various items of equipment, in general, each item will be described singularly, even though there may be numerous similar items.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. Install Work using procedures defined in NECA Standard of Installation and/or the manufacturer's installation instructions.

3.2 TESTS

A. Notify Contracting Officer at least 72 hours prior to conducting any tests.

B. Perform additional tests required under other sections of these specifications.

C. Perform all tests in the presence of the Owner's authorized representative.

3.3 PENETRATIONS OF FIRE BARRIERS

A. All holes or voids created to extend electrical systems through fire rated floors, walls or ceiling shall be sealed with an asbestos-free intumescent fire stopping material capable of expanding 8 to 10 times when exposed to temperatures 250º F or higher.

B. Materials shall be suitable for the fire stopping of penetrations made by steel, glass, plastic and shall be capable of maintaining an effective barrier against flame, smoke and gases in compliance with the requirements of ASTM E814 and UL 1479.

C. The rating of the fire stops shall be the same as the time-rated floor, wall or ceiling assembly.

D. Install fire stopping materials in accordance with the manufacturer's instructions.

END OF SECTION

SECTION 26 05 05 - SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electrical demolition.

1.2 RELATED SECTIONS

A. Division 01 - Alteration Project Procedures.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify field measurements and circuiting arrangements are as shown on Drawings.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Owner/Engineer before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

A. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Demolish and extend existing electrical work under provisions of Division 01 and this Division.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Remove exposed abandoned wire and cable, including abandoned wire and cable above accessible ceiling finishes. Patch and paint surfaces where removed cables pass through building finishes that are existing to remain.

F. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

H. Repair adjacent construction and finishes damaged during demolition and extension work. T-bar ceiling tiles damaged under normal construction conditions or having voids where junction boxes were removed shall be replaced by the Contractor.

I. Maintain access to existing electrical installations which remain active.

J. Extend existing installations using materials and methods as specified.

3.4 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

3.5 INSTALLATION

A. Install relocated materials and equipment under the provisions of Division 01.

END OF SECTION

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Building wire.

B. Cable.

C. Wiring connections and terminations.

1.2 REFERENCES

A. ANSI/NEMA WC 70-2009 – Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Thermoplastic-insulated Building Wire: NEMA WC 70.

B. Feeders and Branch Circuits Larger Than 6 AWG: Copper, stranded conductor, 600 volt insulation, THW, THHN/THWN or XHHW-2 as indicated.

C. Feeders and Branch Circuits 6 AWG and Smaller: Copper conductor, 600 volt insulation, THHN/THWN or XHHW-2. 6 and 8 AWG, stranded conductor; smaller than 8 AWG, solid or stranded conductor.

D. Branch Circuit Wire Color Code:

1. Color code wires by line or phase as follows:

a. Black, red, blue and white for 120/208V systems.

b. Brown, orange, yellow and gray for 277/480V systems.

2. For conductors 6 AWG and smaller, insulation shall be colored. For conductors 4 AWG and larger, identify with colored phase tape at all terminals, splices, and boxes.

3. Grounding conductors 6 AWG and smaller shall have green colored insulation. For 4 AWG and larger, use green tape at both ends and at all other visible points in between, including pull and junction boxes.

E. Control Circuits: Copper, stranded conductor 600 volt insulation, THHN/THNN or XHHW-2.

F. Fire Alarm Notification Appliance Circuits: Copper, solid or stranded conductor 600 volt insulation, THHN/THNN or XHHW-2.

2.2 REMOTE CONTROL AND SIGNAL CABLE

A. Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor, 600 volt insulation, rated 90º C, individual conductors twisted together, shielded, and covered with an overall PVC jacket; UL listed.

B. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300 volt insulation, rated 90º C, individual conductors twisted together, unshielded and covered with a PVC jacket; UL listed.

C. Plenum Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300 volt insulation, rated 90º C, individual conductors twisted together, unshielded and covered with a nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts, and plenums.

2.3 WIRING CONNECTIONS AND TERMINATIONS

A. For conductors 8 AWG and smaller:

1. Dry interior areas: Spring wire connectors, pre-insulated “twist-on” rated 105 degrees C per UL 468C. Where stranded conductors are terminated on screw type terminals, install crimp insulated fork or ring terminals. Thomas & Betts Sta-Kon or equal.

2. Motor connections: Spring wire connectors, pre-insulated “twist-on” rated 105 degrees C per UL 468C. Provide a minimum of 8 wraps of Scotch 33+ electrical tape around conductors and connector to eliminate connector back off.

3. Wet or exterior: Spring wire connectors, pre-insulated “twist-on”, resin filled rated for direct burial per UL 486D.

4. Luminaires: UL listed, 4A, 600V, luminaire disconnect with tin-plated brass contacts, finger-safe polycarbonate female housing, 105º C temperature rating, and two or three-pole configuration to match load served.

B. For conductors 6 AWG and larger:

1. Bus lugs and bolted connections: 600 V, 90 degrees C., two hole long barrel irreversible compression copper tin plated. Thomas & Betts or approved equal.

2. Motor connection: 600 V, 90 degrees C., copper tin plated compression motor pigtail connector, quick connect/disconnect, slip on insulator. Thomas & Betts or approved equal.

3. Two way connector for splices or taps: 600 V, 90 degrees C., compression long barrel, copper tin plated. Thomas & Betts or approved equal. Insulate with Scotch 23 rubber insulating base covering and Scotch 33+ outer wrap.

PART 3 - EXECUTION

3.1 GENERAL WIRING METHODS

A. Use no wire smaller than 12 AWG for power circuits, and no smaller than 18 AWG for control wiring.

B. Splice only in junction or outlet boxes.

C. Do not share neutral conductors. Provide a dedicated neutral conductor for each branch circuit that requires a neutral.

3.2 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time.

B. Conductors shall be carefully inspected for insulation defects and protected from damage as they are installed in the raceway. Where the insulation is defective or damaged, the cable section shall be repaired or replaced at the discretion of the Owner and at no additional cost to the Owner.

C. Route conductors from each system in independent raceway system and not intermix in the same raceway, enclosure, junction box, wireway, or gutter as another system unless otherwise shown on the plans.

D. Completely and thoroughly swab raceway system before installing conductors.

3.3 CABLE INSTALLATION

A. Provide protection for exposed cables where subject to damage.

B. Support cables above accessible ceilings; do not rest on ceiling tiles. Use spring metal clips or cable ties to support cables from structure. Do not support cables from ceiling suspension system. Include bridle rings or drive rings.

C. Use suitable cable fittings and connectors.

3.4 WIRING CONNECTIONS AND TERMINATIONS

A. Splice only in accessible junction boxes.

B. Thoroughly clean wires before installing lugs and connectors.

C. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

D. Terminate spare conductors with wire nuts.

E. Do not exceed manufacturer's recommended pull tensions.

3.5 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 01.

B. Inspect wire and cable for physical damage and proper connection.

C. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

3.6 WIRE AND CABLE INSTALLATION SCHEDULE

A. All Locations: Building wire and/or remote control and signal cable in conduit.

END OF SECTION

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Conduit and equipment supports.

B. Fastening hardware.

1.2 REFERENCES

A. International Building Code (IBC), Chapter 16 – Structural Design.

1.3 SUBMITTALS

A. Submit shop drawings under the provisions of Division 01.

B. Provide structurally engineered shop drawings for seismic restraint of all electrical equipment required by the International Building Code (IBC), Chapters 16, 17, and the Authority Having Jurisdiction. Structural design shall be based on the Seismic Use Category and Seismic Design Category as designated in these chapters.

C. Shop drawings shall be stamped by a professional engineer registered in the State of Alaska.

1.4 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 - PRODUCTS

2.1 CONDUIT SUPPORTS

A. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.

B. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.

C. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.

D. Conduit clamps - general purpose: As specified in Section 26 05 33.

2.2 FORMED STEEL CHANNEL

A. U-Channel Strut: 12-gauge steel.

B. Dry Interior Areas: Zinc or Cadmium-plated.

2.3 SPRING STEEL CLIPS

A. "Caddy" spring steel electrical support systems, suitable and listed for use for intended application.

B. Provide only where concealed in walls or above ceilings.

2.4 SEISMIC SUPPORT WIRE AND CABLE

A. #12 gauge ceiling support wire where concealed. Aircraft stainless steel cable where exposed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using precast insert system, expansion anchors, preset inserts, beam clamps, or spring steel clips. Conduit support plates shall not be used to support conduits entering junction or outlet boxes.

B. Use toggle bolts or hollow wall fasteners in hollow masonry partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.

C. Do not support raceways, low voltage pathways, cables, telecommunication pathways or boxes from ceiling suspension wires or suspended ceiling systems. Provide support from building structure independently to allow ceiling removal and replacement without removal of electrical system. If dedicated support wires are used, wires and wire clips must be painted or color-coded.

D. Do not fasten supports to piping, ductwork, mechanical equipment, conduit, or ceiling suspension system.

E. Power-driven fasteners are prohibited for tension load applications (such as supporting luminaries or conduit racks from ceiling above). Use drilled-in expansion anchors, or drilled and screw-in anchors such as Kwik-Con II or Tapcon.

F. Do not penetrate by drilling or screwing into metal roof decking. All penetrations into metal roof decking must be approved by the Project Manager in writing.

G. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

H. Install surface-mounted cabinets and panelboards with minimum of four anchors.

I. Securely fasten fixtures and equipment to building structure in accordance with manufacturer's recommendations and to provide necessary earthquake anchorage.

J. Provide wall attached fixtures and equipment weighing less than 50 pounds with backing plates of at least 1/8" x 10" sheet steel or 2" x 10" fire retardant treated wood securely built into the structural walls. Submit attachment details of heavier equipment for approval.

K. Earthquake Anchorages:

1. Equipment weighing more than 50 pounds shall be adequately anchored to the building structure to resist lateral earthquake forces.
2. Total lateral (earthquake) forces shall be 1.5 times the equipment weight acting laterally in any direction through the equipment center of gravity. Provide adequate backing at structural attachment points to accept the forces involved.

L. Replace or repair any fireproofing damaged by the installation of supporting equipment or devices.

END OF SECTION

SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal conduit.

B. Flexible metal conduit.

C. Liquidtight metal conduit.

D. Electrical metallic tubing.

E. Fittings and conduit bodies.

F. Wall and ceiling outlet boxes.

G. Pull and junction boxes.

1.2 RELATED SECTIONS

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions,

B. Division 01 - General Requirements, Summary, Administrative Requirements

C. Section 26 05 00 – Common Work Results for Electrical.

D. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.

E. Section 26 05 53 – Identification for Electrical Systems.

F. Section 26 27 26 – Wiring Devices.

G. Section 27 10 00 – Structured Cabling.

H. Section 28 23 00 – Video Surveillance System.

I. Section 28 40 00 – Detention Monitoring and Control System.

1.3 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
2. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.

B. American Society for Testing and Materials (ASTM):

1. ASTM A 123 – Specification for Zinc Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strip.

C. National Electrical Manufacturers Association (NEMA):

1. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
2. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
3. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
4. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

D. Underwriters Laboratory (UL):

1. UL 6 - Rigid Steel Conduit, Zinc Coated.
2. UL 514B – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

E. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code.

F. Telecommunications Industry Association (TIA) and Electronics Industries Association (EIA)

1. ANSI/TIA/EIA 568-B Commercial Building Telecommunications Cabling Standard

G. Building Industry Consulting Service International (BICSI):

1. BICSI Telecommunication Design Methods Manual

H. International Building Code (IBC):

1. IBC chapters 16 and 17 seismic requirements.

1.4 RACEWAY AND BOX INSTALLATION SCHEDULE

A. Raceway Minimum Size:

1. Provide 1/2 inch minimum. Size all raceways not shown on the drawings to not exceed the percentage fill specified in the NEC Table 1, Chapter 9 using the conduit dimensions of the NEC Table 4, Chapter 9 and conductor properties of the NEC Table 5, Chapter 9. Where specific cable is not listed, use cable diameter provided by the manufacturer.

B. Through CMU walls:

1. Raceway: Provide rigid steel conduit or intermediate metal conduit. EMT conduit may penetrate through CMU walls where the EMT is installed in a sleeve and does not come in direct contact with the CMU.
2. Boxes and Enclosures: Provide sheet-metal boxes.

C. Outdoor Above Grade, Damp or Wet Interior Locations:

1. Raceway: Provide rigid steel conduit or intermediate metal conduit.
2. Boxes and Enclosures: Provide weatherproof malleable iron for branch circuit junction and outlet boxes. Provide weatherproof NEMA 3R sheet metal enclosures for safety and disconnect switches and NEMA 4 sheet metal enclosures with gaskets for motor controllers and control panels.
3. Fittings: Provide galvanized malleable iron with gaskets. Provide Myers threaded hubs for all conduit entries into top and side of sheet metal enclosures.

D. Concealed Dry Locations:

1. Raceway: Provide rigid steel conduit, intermediate metal conduit, or electrical metallic tubing.
2. Boxes and Enclosures: Provide sheet-metal boxes.
3. Fittings: Provide galvanized malleable iron and steel.

E. Exposed Dry Locations Not Accessible to Inmates:

1. Raceway: Provide rigid steel conduit or intermediate metal conduit. EMT conduit may be used where exposed conduit is allowed, where it is not subject to physical damage, or where installed on the ceiling or a minimum of ten feet above the floor or adjacent platforms.
2. Boxes and Enclosures: Provide sheet-metal boxes with raised steel covers.
3. Fittings: Provide galvanized malleable iron and steel.
4. Surface Raceway and Boxes. Where specifically noted on the Drawings, provide surface raceway and boxes.

F. Exposed Dry Locations in Inmate-Accessible Areas:

1. Raceway: Provide rigid steel conduit or intermediate metal conduit.
2. Boxes and Enclosures: Provide cast boxes with no pre-punched knockouts.
3. Fittings: Provide galvanized malleable iron and steel. Conduit straps shall be 2-hole type and installed at half the distance shown in NEC table 344.30(B)(2) to allow conduit to be secured to wall without any gaps between conduit and wall.
4. Fasteners: Provide center-pin torx plus screws for all exposed fasteners.

1.5 DESIGN REQUIREMENTS

A. Raceway Minimum Size:

1. Line Voltage Circuits: Raceway is sized on the drawings for copper conductors with 600-Volt type XHHW insulation, unless otherwise noted. Where a raceway size is not shown on the drawings, it shall be calculated to not exceed the percentage fill specified in the NEC Table 1, Chapter 9 using the conduit dimensions of the NEC Table 4, Chapter 9 and conductor properties of the NEC Table 5, Chapter 9.
2. Intercom and other Low-Voltage Circuits: Raceway size shall be calculated to not exceed the percentage fill specified in the NEC Table 1, Chapter 9, using the conduit dimensions of the NEC Table 4, Chapter 9, and cable diameter provided by the manufacturer.

B. Box Minimum Size: Provide all boxes sized and configured per NEC Article 370 and as specified in this section.

C. Seismic Support: Provide support in accordance with section 260529.

D. Telecommunication Pathways Layout and Configuration: BICSI Telecommunication Design Methods Manual and ANSI/TIA/EIA 568-B Commercial Building Telecommunications Cabling Standard.

1.6 SUBMITTALS

A. Submit product data under provisions of Division 01.

B. Product Data: Submit data for products to be provided.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

PART 2 - PRODUCTS

2.1 RIGID METAL CONDUIT (RMC)

A. Rigid Steel Conduit: ANSI C80.1, UL 6.

B. Fittings and Conduit Bodies: NEMA FB 1, UL 514B; Galvanized malleable iron with threaded hubs for all conduit entries. Provide threaded connections and couplings only. Set Screw and running thread fittings are not permitted.

C. Provide insulated throat bushings at all conduit terminations.

2.2 INTERMEDIATE METAL CONDUIT (IMC)

A. Product Description: ANSI C80.6, UL 1242; Galvanized Steel Conduit.

B. Fittings and Conduit Bodies: NEMA FB 1, UL 514B; use fittings and conduit bodies specified above for rigid steel conduit.

2.3 FLEXIBLE METAL CONDUIT (FMC)

A. Product Description: UL 1, FS WW-C-566; galvanized or zinc-coated flexible steel, full-wall or reduced-wall thickness.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel or malleable iron with insulated throat bushings. Die cast zinc or threaded inside throat fittings are not acceptable.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Product Description: UL 360, flexible metal conduit with interlocked steel construction and PVC jacket.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; liquid tight steel or malleable iron with insulated throat bushings. Die cast fittings are not acceptable.

2.5 ELECTRICAL METALLIC TUBING (EMT)

A. Product Description: ANSI C80.3, UL 797; galvanized steel tubing.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel or malleable iron, compression or set screw type with insulated throat bushings. Zinc die cast or indentor fittings are not acceptable.

C. Maximum size shall be 2". Provide factory elbows on sizes 1-½" and larger.

2.6 OUTLET BOXES

A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, UL514A galvanized steel, with plaster ring where applicable.

1. Minimum Size: 4 inches square or octagonal, 1-1/2 inches deep, unless otherwise noted.
2. Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required. Minimum Size: 4 inches square or octagonal, 2-1/8 inches deep.
3. Telecommunications Outlets: Minimum size 4-11/16 inches square, 2-1/8 inches deep.
4. Cut-In Boxes: Minimum size 2” x 3” x 2-1/2” deep. Provide cut-in outlet boxes where required for installation in existing hollow walls.

B. Cast Boxes: NEMA FB 1, Type FD, galvanized malleable iron. Furnish gasketed cover by box manufacturer. Furnish threaded hubs. “Bell” boxes are not acceptable.

C. Wall Plates: As specified in Section 26 27 26.

2.7 PULL AND JUNCTION BOXES

A. Sheet Metal Pull and Junction Boxes: ANSI/NEMA OS 1, UL514A galvanized steel.

1. Minimum Size: 4 inches square or octagonal, 1-1/2 inches deep, unless otherwise noted.

B. Sheet Metal Boxes Larger Than 12 Inches in Any Dimension: Hinged enclosure.

C. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250, Type 4; flat-flanged, surface mounted junction box, UL listed as raintight:

1. Material: Galvanized cast iron.
2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover and screws.

2.8 EXPANSION FITTINGS

A. Galvanized malleable iron, galvanized with grounding bond jumper.

2.9 BUSHINGS

A. Non-grounding: Threaded impact resistant plastic.

B. Grounding: Insulated galvanized malleable iron/steel with hardened screw bond to raceway and conductor lug.

2.10 LOCKNUTS

A. Threaded Electro Zinc Plated Steel designed to cut through protective coatings for ground continuity.

2.11 WIREWAY

A. Product Description: General purpose type wireway. Size per NEC minimum fill capacity required.

B. Knockouts: Field-installed, no factory knockouts acceptable.

C. Cover: Screw cover.

D. Fittings and Accessories: Include factory couplings, offsets, elbows, adapters and support straps required for a complete system. Provide internal ground bonding jumper bonded to each section.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Ground and bond raceway and boxes in accordance with NEC Requirements.

B. Provide seismic support and fasten raceway and box supports to structure and finishes in accordance with Section 26 09 23.

C. Identify raceway and boxes with origin and destination in accordance with Section 26 05 53.

D. Unless otherwise noted, do not inter-mix conductors from separate panelboards or any other system in the same raceway system or junction boxes.

3.2 INSTALLATION - GENERAL RACEWAY

A. Install raceway for all systems, unless otherwise noted.

B. Install an equipment grounding conductor inside of all raceways containing line voltage conductors.

C. Provide raceways concealed in construction unless specifically noted otherwise, or where installed at surface cabinets, motor and equipment connections and in Mechanical and

Electrical Equipment rooms. Do not route conduits on roofs, outside of exterior walls, or along the surface of interior finished walls unless specifically noted on the plans.

D. Raceway routing and boxes are shown in approximate locations unless dimensioned. Where raceway routing is not denoted, field-coordinate to provide complete wiring system.

E. Do not route raceways on floor. Arrange raceway and boxes to maintain a minimum of 6 feet 6 inches of headroom and present a neat appearance. Install raceways level and square to a tolerance of 1/8" per 10 feet. Route exposed raceways and raceways above accessible ceilings parallel and perpendicular to walls, ceiling, and adjacent piping.

F. Maintain minimum 6-inch clearance between raceway and mechanical and piping and ductwork. Maintain 12-inch clearance between raceway and heat sources such as flues, steam pipes, heating pipes, heating appliances, and other surfaces with temperatures exceeding 104 degrees F.

G. Seal raceway penetrations of fire-rated walls, ceilings, floors in accordance with the requirements of Section 26 05 00.

H. Where raceway penetrates fire-rated walls and floors, provide firestopping with UL listed fire rating equal to wall or floor rating. Seal opening around conduit with UL listed firestop sealant or intumescent firestop, preserving the fire time rating of the construction. Install in accordance with manufacturer requirements.

I. No cutting of reinforcing bars shall be permitted unless specifically approved. Should structural members prevent the installation of conduit or equipment, notify the Contracting Officer before proceeding.

J. Arrange raceway supports to prevent misalignment during wiring installation. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

K. Do not attach raceway to ceiling support wires or other piping systems and do not fasten raceway with wire or perforated pipe straps. Remove all wire used for temporary raceway support during construction, before conductors are pulled. Raceway shall be installed to permit ready removal of equipment, piping, ductwork, or ceiling tiles.

L. Group raceway in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps, as specified in Section 26 09 23. Provide space on each rack for 25 percent additional raceway.

M. Cut conduit square; de-burr cut ends. Bring conduit to the shoulder of fittings and couplings and fasten securely. Where locknuts are used, install with one inside box and one outside with dished part against box

N. Use threaded raintight conduit hubs for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations. Sealing locknuts are not acceptable.

O. Install no more than the equivalent of three 90-degree bends between boxes.

P. Install conduit bodies to make sharp changes in direction, such as around beams. "Goosenecks" in conduits are not acceptable.

Q. Provide protective plastic bushings or insulated throat bushings at each raceway termination not installed to an enclosure. Bushings shall be threaded to the raceway end or connector.

R. Avoid moisture traps; install junction box with drain fitting at low points in raceway system.

S. Install fittings and flexible metal conduit to accommodate 3-axis movements where raceway crosses seismic joints

T. Install fittings designed and listed to accommodate expansion and contraction where raceway crosses control and expansion joints.

U. Use cable sealing fittings forming a watertight non-slip connection to pass cords and cables into conduit. Size cable sealing fitting for the conductor outside diameter. Use Appleton CG series or equal cable sealing fittings.

V. Use suitable caps to protect installed raceway against entrance of dirt and moisture.

W. Provide nylon "jet-line" or approved equal pull string in empty raceway, except sleeves and nipples. Where an existing pull string is used to pull cables into an existing raceway, it shall be replaced with a new pull string that is pulled in with new cables.

X. Paint all exposed conduit to match surface to which it is attached or crosses. Clean greasy or dirty conduit prior to painting in accordance with paint manufacturer's instructions. Where raceway penetrates non-rated ceilings, floors or walls, provide patching, paint and trim to retain architectural aesthetics similar to surroundings

3.3 INSTALLATION – GENERAL BOXES

A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance. All electrical box locations shown on Drawings are approximate unless dimensioned.

B. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only. Where installation is inaccessible, install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaries. Coordinate locations and sizes of required access doors.

C. Coordinate layout and installation of boxes to provide adequate headroom and working clearance. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

D. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

E. Use multiple-gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems and where normal and emergency power circuits occur in the same box.

F. Adjust box location up to 6 feet prior to rough-in to accommodate intended purpose.

G. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.

H. Locate and install boxes to maintain headroom and to present a neat appearance.

I. Provide knockout closures for unused openings.

J. Install boxes in walls without damaging wall insulation or reducing its effectiveness.

K. Install with minimum 24 inches separation in fire rated walls. Limit penetrations in fire rated walls to 16 square inches each and a maximum total combined penetration area of 100 square inches in any given 100 square feet of wall. Where penetrations are in excess of these requirements provided UL listed fire stop wrap acceptable to Authority having Jurisdiction.

L. Do not fasten boxes to ceiling support wires or other piping systems.

M. Support boxes independently of conduit.

N. Clean interior of boxes to remove dust, debris, and other material and clean exposed surfaces and restore finish

O. Provide blank covers or plates for all boxes that do not contain devices.

3.4 INSTALLATION – TELECOMMUNICATION RACEWAYS AND SLEEVES

A. Provide continuous pathway system for all telecommunication cables.

B. Install the telecommunication pathways in accordance with requirements for Installation of General Conduit and General Boxes above unless superceded by more stringent requirements of this section or ANSI/EIA/TIA568-B and the latest published edition of the BICSI Telecommunication Distribution Methods Manual guidelines and recommendations.

C. Provide pathways for all telecommunication cables with Conduit and chases for the entire length of each cable.

D. Conduit Pathways:

1. Install pull boxes in continuous straight runs of conduit longer than 100 feet.
2. Maximum allowable continuous conduit section length of 100 feet between pull boxes.
3. Contain no more than two 90-degree bends or de-rate conduit capacity 15% for up to one additional 90-degree bend. Conduits less than 33 feet long, oversized one trade size or with one of the 90-degree bends within 12 inches of a pull box may have up to three 90 degree bends without de-rating.
4. Rate each offset as a 90-degree bend.
5. Bond each conduit to telecommunication ground system.
6. Condulets (LB fittings) shall not be installed in any telecommunications raceway.
7. Do not use flexible metal conduit unless specifically noted on the plans or approved by the engineer where it is the only practical alternative. Increase raceway one trade size above required size where flexible metal conduit is used.
8. Terminate conduits and chases that protrude through floor in telecommunication rooms to 3 inches above finished floor. Terminate conduits and chases that protrude through finished ceiling or above within 12 inches of ladder rack, distribution frame or cable organizer.
9. Provide bend radius of 6 times of the internal conduit diameter of conduits up to 2 inches; 10 times of the internal conduit diameter of conduits above 2 inches and for all fiber optic raceways.
10. Provide conduit pathways through walls with insulated bushings on each end for all wall penetrations of cables.

11. Provide minimum conduit size of ¾ inch. Size all other conduits, sleeves and chases according to the following table:

Conduit Trade size	Conduit Maximum Cable Capacity Based on two 90 degree bends and < 100 ft (Inches OD of Cable)									
	(0.13")	(0.18")	(0.22")	(0.24")	(0.29")	(0.31")	(0.37")	(0.53")	(0.62")	(0.70")
0.75"	6	5	4	3	2	2	1	0	0	0
1"	8	8	7	6	3	3	2	1	0	0
1.25"	16	14	12	10	6	4	3	1	1	1
1.5"	20	18	16	15	7	6	4	2	1	1
2"	30	26	22	20	14	12	7	4	3	2
2.5"	45	40	36	30	17	14	12	6	3	3
3"	70	60	50	40	20	20	17	7	6	6
3.5"							22	12	7	6
4"							30	14	12	7

3.5 INSTALLATION – TELECOMMUNICATION BOXES

A. Boxes:

1. All boxes shall be readily accessible.
2. Do not use boxes for angle pulls or change pathway direction. Locate pull boxes in straight through sections of horizontal conduit pathways.
3. Provide pull boxes for 3/4-inch and 1-inch through pull for horizontal UTP cabling. Provide all other boxes sized per the following table:

Maximum Trade Size Conduit	Minimum Size of Pull Box in Inches			For each additional conduit increase width in inches
	Width	Length (direction of conduit)	Depth	
0.75"	4	12	3	2
1"	4	16	3	2
1.25"	6	20	3	3
1.5"	8	27	4	4
2"	8	36	4	5
2.5"	10	42	5	6
3"	12	48	5	6
3.5"	12	54	6	6
4"	15	60	8	8

END OF SECTION

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Nameplates and tape labels.

B. Wire and cable markers.

1.2 RELATED WORK

A. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.

B. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

C. Section 26 22 00 – Low-Voltage Transformers.

D. Section 26 24 16 – Panelboards.

E. Section 26 27 26 – Wiring Devices.

F. Section 28 46 16 – Detention Relay Logic System.

1.3 SUBMITTALS

A. None required.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

PART 2 - PRODUCTS

2.1 NAMEPLATES

A. Product Description: Laminated three-layer plastic with engraved white letters on black background.

B. Letter Size:

1. 1/4-inch high letters for identifying individual panel or equipment.
2. 1/8-inch high letters for remaining lines with 1/8 inch spacing between lines.

C. Minimum nameplate size: 1/8 inch thick with a consistent length and height for each type of nameplate wherever installed on the project.

2.2 TAPE LABELS

A. Product Description: Adhesive tape labels, with 3/16 inch Bold Black letters on clear background.

B. Embossed adhesive tape will not be permitted for any application.

2.3 WIRE MARKERS

A. Power and Lighting Description: Cloth tape type wire markers for all neutrals and Phase conductors.

B. Low Voltage System Description: Self-adhesive machine printed label with unique wire number that is shown on shop drawing for system.

C. Telecommunications Cable Markers: Self-laminating vinyl with translucent band and minimum 1”W x .5”H printable area with matte white finish.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Degrease and clean surfaces to receive nameplates and tape labels.

B. Install nameplates and tape labels parallel to equipment lines.

3.2 NAMEPLATE INSTALLATION

A. Secure nameplates to equipment fronts using machine screws tapped and threaded into panelboard, using adhesives, or using rivets. Machine screws to not protrude more than 1/16 inch on back side.

B. Branch Panelboard Nameplates:

1. Provide nameplate for each panelboard with the following information:

    a. Line 1: Panelboard name.
    b. Line 2: Source from which the panelboard is fed.
    c. Line 3: Voltage, phase and wire configuration.
    d. Line 4: AIC rating of the panelboard.

C. Transformers:

1. Provide nameplate for each transformer with the following information:

    a. Line 1: Transformer name.

b. Line 2: Source from which the transformer is fed.

c. Line 3: Primary and secondary voltage, phase and wire configuration.

d. Line 4: Secondary load and location.

D. Control or Low Voltage System Panels:

1. Provide nameplate for each control panel with the following information:

a. Line 1: Unique panel name as shown on the shop drawings.
b. Line 2: System description such as Intercom, Door Control, etc.
c. Line 3: Panelboard and circuit number from which the panel is fed if applicable.

3.3 LABEL INSTALLATION

A. Low-Voltage System Device Labels: Provide label on each device, denoting device ID or address where applicable. Affix label to device faceplate for ceiling-mounted devices or wall-mounted devices above 8'-0" AFF. Affix label inside backbox for exterior devices.

3.4 WIRE IDENTIFICATION

A. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identification shall be as follows:

1. Markers shall be located within one inch of each cable end, except at panelboards, where markers for branch circuit conductors shall be visible without removing panel deadfront.
2. Each wire and cable shall carry the same labeled designation over its entire run, regardless of intermediate terminations.
3. Color code phases, neutral, and ground per NEC requirements and Section 26 05 19.
4. Color-code all low-voltage system wires and cables in accordance with the individual sections in which they are specified.
5. For power circuits, identify with branch circuit or feeder number.
6. Control Circuits: Control wire number as indicated on schematic and shop drawings.
7. Provide cable markers on each cable, indicating device designation for all security, intercom, door control and IP Video systems. Cables shall be labeled at each end, as well as at any intermediate junction boxes or pullboxes.

B. Provide wire markers on each conductor on all new and existing terminal backboards and security cabinets. Identify with door number for locks and intercoms, room name for lights, camera number for IP Video cameras, or other unique identifier for other equipment as required. All identification tags on all wire markers shall match what is shown on the security system shop drawings.

C. Security Device Identification: All doors, locks, intercoms, cameras, lights, etc. shall be identified on the shop drawings using the existing naming/numbering scheme already in use at the facility. Do not re-number or re-name any devices without prior approval from the Owner.

D. Where a wire color code is used (i.e. white/brown) for multi-conductor control cables, individual wire markers shall not be required but the wire color-code and cable ID shall be shown on the security system shop drawings.

E. Provide pull string markers at each end of all pull strings. Marker shall identify the location of the opposite end of the pull string.

F. At the end of the project, all conductors entering or leaving the main terminal cabinets in the Crawlspace or Control Room shall be identified as specified above. Where existing wires are not identified, the Contractor shall trace the circuits as necessary to determine where the wire is terminated at the opposite end. If a wire cannot be identified using these means, the Contractor shall notify the Project Manager for possible assistance from the facility maintenance personnel.

3.5 JUNCTION BOX IDENTIFICATION

A. Label each power junction box with the panelboard name and circuit number.

B. Label all junction boxes for intercom, security, and IP Video systems with the type of system cables contained in the box.

C. For junction boxes above ceilings, mark the box cover with the circuit or system designation using permanent black marker. For junction boxes in finished areas, mark the inside of the cover with the circuit or system designation using permanent black marker.

3.6 DEVICE PLATE IDENTIFICATION

A. Label each receptacle device plate or point of connection denoting the panelboard name and circuit number.

B. Install adhesive label on the top of each plate.

3.7 LOW-VOLTAGE SYSTEM IDENTIFICATION

A. Install all labeling in accordance with the requirements of this section and of each section where the individual systems are specified.

END OF SECTION

SECTION 26 22 00 – LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Dry Type Two Winding Transformers.

1.2 RELATED SECTIONS

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements and Section 26 05 00 – Common Work Results for Electrical.

B. Section 26 05 26 – Grounding and Bonding for Electrical System.

C. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

D. Section 26 05 53 – Identifications for Electrical Systems.

1.3 REFERENCES

A. ANSI/NEMA - ST 1 - Specialty Transformers.

B. ANSI/NEMA ST 20 - Dry Type Transformers for General Applications.

1.4 SUBMITTALS

A. Submit product data under provisions of Division 01.

B. Include outline and support point dimensions of enclosures and accessories, unit weight, voltage, KVA, and impedance ratings and characteristics, loss data, efficiency at 25, 50, 75 and 100 percent rated load, sound level, tap configurations, insulation system type, and rated temperature rise.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store and protect products under provisions of Division 01.

B. Store in a warm, dry location with uniform temperature. Cover ventilating openings to keep out dust.

C. Handle transformers using only lifting eyes and brackets provided for that purpose. Protect units against entrance of rain, sleet, or snow if handled in inclement weather.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - DRY TYPE TWO WINDING TRANSFORMERS

A. Square D.

B. General Electric.

C. Acme.

D. Substitutions: Under provisions of Division 01.

2.2 DRY TYPE TWO WINDING TRANSFORMERS

A. Dry Type Transformers: ANSI/NEMA ST 20; factory-assembled, air cooled dry type transformers; ratings as shown on the Drawings.

B. Insulation system and average winding temperature rise for rated KVA as follows:

Rating	Class	Rise (º C)
1-15	185	115
16-500	220	150

C. Case temperature shall not exceed 35ºC rise above ambient at its warmest point.

D. Winding Taps, Transformers Less than 15 KVA: Two 5 percent below rated voltage, full capacity taps on primary winding.

E. Winding Taps, Transformers 15 KVA and Larger: ANSI/NEMA ST 20.

F. Sound Levels: per ANSI/NEMA ST 20 as follows:

KVA Rating	Sound Level
1-9	40 dB
10-50	45 dB
51-150	50 dB
151-300	55 dB
301-500	60 dB
501-700	62 dB

G. Sound Levels: Maximum sound levels are as follows:

KVA Rating	Sound Level
1-5	30 dB
6-25	40 dB
26-150	42 dB
151-225	43 dB
226-300	47 dB
301-500	51 dB

H. Basic Impulse Level: 10 KV.

I. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

J. Mounting: Transformers 75 KVA and less shall be suitable for wall, floor, or trapeze mounting; transformers larger than 75 KVA shall be suitable for floor or trapeze mounting.

K. Coil Conductors: Continuous aluminum windings with terminations brazed or welded.

L. Enclosure: ANSI/NEMA ST 20; Type 1. Provide lifting eyes or brackets.

M. Isolate core and coil from enclosure using vibration- absorbing mounts.

N. Nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set transformer plumb and level.

B. Use flexible conduit, 2 ft. minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

C. Mount transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure.

D. Provide seismic restraints.

E. All dry type transformers shall have signage for arc hazard installed. The marking shall be located to be clearly visible to qualified personnel before examination, adjustment, servicing or maintenance of the equipment. At a minimum the signage shall state the following:

Warning

Arc Flash and Shock Hazard

Appropriate PPE Required

3.2 FIELD QUALITY CONTROL

A. Check for damage and tight connections prior to energizing transformer.

B. Measure primary and secondary voltages under normal building and make appropriate tap adjustments.

END OF SECTION

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Lighting and Appliance Branch Circuit Panelboards.

1.2 RELATED SECTIONS

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements, and Section 26 05 00 – Common Work Results for Electrical.

B. Section 26 05 26 – Grounding and Bonding for Electrical Systems.

C. Section 26 05 53 – Identification for Electrical Systems.

1.3 REFERENCES

A. NEMA AB 1 - Molded Case Circuit Breakers.

B. NEMA KS 1 - Enclosed Switches.

C. NEMA PB 1 - Panelboards.

D. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

E. NEMA PB 2.2 - Application Guide for Ground-fault Protective Devices for Equipment.

F. UL 50 – Enclosures for Electrical Equipment.

G. UL 67 – Panelboards.

H. UL 98 - Enclosed and Dead-front Switches.

I. UL 489 – Molded Case Circuit Breakers and Circuit Breaker Enclosures.

J. Federal Specification W-C-375B/Gen – Circuit Breakers, Molded Case, Branch Circuit and Service.

1.4 SUBMITTALS

A. Submit data under provisions of Division 01 and Section 26 05 00.

B. Product Data: Submit product data for all components provided which fall under this section showing configurations, finishes, and dimensions. Each catalog sheet should be clearly marked to indicate exact part number provided, including all options and accessories.

C. Shop drawings: Submit shop drawings for each panelboard indicating features and device arrangement and size. Include outline and support point dimensions, voltage, main bus ampacity, and integrated short circuit ampere rating.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Drawings: Accurately record actual locations of panelboards. Submit final record panel schedules as hardcopy and in Microsoft Excel format. Submit under Section 26 05 00.

B. Operation and Maintenance Manuals: Provide product data and shop drawing information including replacement parts list. Provide installation, operation and maintenance information per manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Division 01.

B. Upon arrival at the site inspect equipment and report on any damage.

C. Handle carefully on site to avoid any damage to internal components, enclosures and finishes.

D. Store in a clean, dry environment. Maintain factory packaging and provide an additional heavy canvas or plastic cover to protect enclosures from dirt, water, construction debris and traffic.

1.7 WARRANTY

A. Manufacturer shall warrant specified equipment to be free of defects for a period of one year from the date of installation.

1.8 SPARE PARTS

A. Keys: Furnish 2 each to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - PANELBOARDS

A. Square D.

B. Cutler Hammer.

C. General Electric.

D. Siemens.

E. Substitutions: Under provisions of Division 01.

2.2 BRANCH CIRCUIT PANELBOARDS

A. Lighting and Appliance Branch Circuit Panelboards: NEMA PB 1; circuit breaker type.

B. Enclosure: NEMA PB 1; Type 1 or 3R as indicated on Drawings. Boxes shall be galvanized steel constructed in accordance with UL50 requirements. Interiors shall be field convertible for top or bottom incoming feed. Main lug interiors up to 400 amperes shall be field convertible to main breaker. Interior leveling provisions shall be provided for flush mounted applications.

C. Cabinet Size: 6 inches deep; 20 inches wide minimum.

D. Provide flush or surface cabinet front as indicated on the Drawings with [door-in-door cover] concealed trim clamps, concealed hinge and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

E. Provide panelboards with copper bus, ratings as scheduled on Drawings. Provide one continuous bus bar per phase each. Panelboards shall have sequentially phased branch circuit connectors suitable for bolt-on branch circuit breakers. Bussing shall be fully rated.

F. Integrated Short Circuit Rating: Provide panelboards with short circuit ratings as shown on the Drawings. Minimum ratings shall be 10,000 amperes RMS symmetrical for 250 volt panelboards; 14,000 amperes RMS symmetrical for 600 volt panelboards.

G. Main/Sub Feed Circuit Breakers: NEMA AB 1; Provide vertical mount main and/or sub feed circuit breaker in panelboards as shown on the drawings.

1. Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make, quick-break over-center switching mechanism that is mechanically trip-free. Automatic tripping of the breaker shall be clearly indicated by the handle position. Contacts shall be nonwelding silver alloy and arc extinction shall be accomplished by means of DE-ION arc chutes. A push-to-trip button on the front of the circuit breaker shall provide a local manual means to exercise the trip mechanism.
2. Lugs shall be UL Listed to accept copper and aluminum conductors and shall be suitable for 90^{o}C rated wire, sized according to the 75 ^{o}C temperature rating per NEC Table 310-16. Lug body shall be bolted in place.

H. Branch Circuit Breakers: NEMA AB 1; Provide panelboards with bolt-on type thermal magnetic trip circuit breakers.

1. Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make, quick-break over-center switching mechanism that is mechanically trip-free with common trip handle for all poles.
2. Lugs shall be UL Listed to accept copper and aluminum conductors and shall be suitable for 90^{o}C rated wire, sized according to the 75 ^{o}C temperature rating per NEC Table 310-16. Lug body shall be bolted in place.
3. Provide circuit breakers UL listed as Type SWD for lighting circuits.
4. Provide circuit breakers UL listed as type HACR for use with heating, air conditioning and refrigeration equipment.
5. Provide UL Class A ground fault interrupter circuit breakers where scheduled on Drawings.

2.3 PANELBOARD IDENTIFICATION

A. For each new panelboard and each existing panelboard where circuits are added or modified, provide typed schedule denoting each circuit load by the load type and final name and room number actually in use in the facility. Schedule shall not be typed with names shown on the Contract Drawings unless names are acceptable to the Owner.

B. Provide panel schedule in O&M manual for every new panelboard and every existing panelboard where circuits are added or modified.

C. Where more than one nominal voltage system is present on the premises, the conductor color-coding legend shall be permanently posted at each branch circuit and distribution panelboard per NEC requirements.

D. All panelboards shall have signage for arc hazard installed. The marking shall be located to be clearly visible to qualified personnel before examination, adjustment, servicing or maintenance of the equipment. At a minimum the signage shall state the following:

Warning

Arc Flash and Shock Hazard

Appropriate PPE Required

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards plumb and flush with wall finishes, in conformance with NEMA PB 1.1.

B. Height: 6 feet, 6 inches to top of panelboard.

C. Provide filler plates for unused spaces in panelboards.

D. Panel Schedules: Revise schedules to reflect circuiting changes required to balance phase loads.

E. Stub 5 empty one inch conduits to accessible location above ceiling out of each recessed panelboard.

3.2 FIELD QUALITY CONTROL

A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.

B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers.

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wall Switches.

B. Wall Dimmers.

C. Receptacles.

D. Device Plates and Box Covers.

1.2 RELATED SECTIONS

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 - General Requirements and Section 26 05 00 – Common Work Results for Electrical.

B. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

C. Section 26 05 53 – Identification for Electrical Systems.

1.3 REFERENCE STANDARDS

A. FS W-C-596 – Federal Specification for Electrical Power Connector, Plug, Receptacle, and Cable Outlet.

B. FS W-S-896 – Federal Specification for Switches, Toggle (Toggle and Lock), Flush Mounted.

C. NEMA WD 1 - General Color Requirements for Wiring Devices.

D. ANSI/NEMA WD 6 – Wiring Devices – Dimensional Requirement.

E. UL 20 – General-Use Snap Switches.

F. UL 498 - Attachment Plugs and Receptacles.

G. UL 943 – Ground-Fault-Circuit-Interrupters.

1.4 SUBMITTALS

A. Product Data: Submit product data for all components provided that are specified in this section showing configurations, finishes, and dimensions. Each catalog sheet should be clearly marked to indicate exact part number provided, including all options and accessories.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Drawings: Indicate actual locations and mounting heights of all wiring devices on the project record drawings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - WALL SWITCHES

A. Hubbell.

B. Leviton.

C. Pass & Seymour.

D. Arrow Hart

E. Substitutions: Under provisions of Division 01.

2.2 WALL SWITCHES

A. Wall Switches for Lighting Circuits: UL 20; NEMA WD 1; and Federal Specification FS W-S-896 AC industrial grade snap switch with toggle handle, rated 20 amperes and 120-277 volts AC. Handle: White nylon. Provide single-pole switches as indicated on Plans.

2.3 ACCEPTABLE MANUFACTURERS - WALL DIMMERS

A. Sensor Switch

B. Lutron.

C. Leviton.

D. Substitutions: Under provisions of Division 01.

2.4 WALL DIMMERS

A. Wall Dimmers for 0-10V Loads: UL 1472; NEMA WD 1; Decora-style, commercial grade preset wall dimmer switch, 0-10V control for LED drivers with no power pack required to switch line voltage load (8 A, 120-277 V); adjustable high-end and low-end trim. Color: White. Handle: Paddle switch for on/off operation with small, discrete, captive linear slide for dimmer adjustment. Provide single pole unless otherwise indicated on Plans. Dimmer shall be fully compatible with all loads connected for smooth, flicker-free dimming operation.

2.5 ACCEPTABLE MANUFACTURERS - RECEPTACLES

A. Hubbell.

B. Leviton.

C. Pass & Seymour.

D. Arrow Hart

E. Substitutions: Under provisions of Division 01.

2.6 RECEPTACLES

A. Convenience and Straight-blade Receptacles: UL 498, NEMA WD 1 and Federal Specification FS W-C-596 industrial grade receptacle.

B. Convenience Receptacle Configuration: NEMA WD 1; Type 5-20R, white nylon face.

C. Specific-use Receptacle Configuration: NEMA WD 1 or WD 5; type as indicated on Drawings, black phenolic face.

D. GFCI Receptacles: 20A, duplex convenience receptacle with integral class 'A' ground fault current interrupter, LED indicator lamp and integral lockout.

E. Tamper-Resistant Receptacles: Complying with the requirements of UL 498 (section 131) and NEC 406.12-14.

F. Weather-Resistant Receptacles: Listed to the weather-resistant supplement of UL498 and complying with the requirements of NEC 406.9.

2.7 DEVICE PLATES

A. Decorative Cover Plate: Smooth 430 or 302 stainless steel with metal, counter sunk screws to match device plate.

B. Exposed Work Cover Plate: ½ inch raised, square, pressed, galvanized or cadmium plated steel cover plate supporting devices independent of the outlet box.

C. Inmate-Accessible Areas: Provide cover for receptacles with center-pin torx screws.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wall switches 48 inches above floor, OFF position down.

B. Unless otherwise noted install wall switches within 6 inches of the door jamb on the strike side.

C. Install wall dimmers 48 inches above floor;

D. Install convenience receptacles 18 inches above floor, 4 inches above counters or backsplash, grounding pole on bottom.

E. Unless otherwise noted, mounting heights are for finished floor to center line of outlet.

F. Install decorative plates on switch, receptacle, and blank outlets in finished areas. Use midsize or jumbo plates for outlets installed in masonry walls, where required to cover up imperfections in the wall opening.

G. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.

H. Install devices and wall plates flush and level.

I. Ground receptacles to boxes with a grounding wire. Grounding through the yoke or screw contact is not an acceptable alternate to the ground wire.

J. Install circuit label on each receptacle and light switch in accordance with Section 26 05 53.

END OF SECTION

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Interior Luminaires and Accessories.

1.2 RELATED WORK

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements, and Section 26 05 00 – Common Work Results for Electrical.

B. Section 26 05 29 - Hangers And Supports For Electrical Systems.

1.3 REFERENCES

A. ANSI C62.41 – Specification for Surge Voltages in AC Power Circuits Rated up to 600V.

1.4 SUBMITTALS

A. Product Data: Submit the following:

1. Luminaires: Include manufacturer's product data sheets and/or shop drawings including outline drawings showing support points, weights, and accessory information for each luminaire type.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site, store and protect under provisions of Division 01.

PART 2 - PRODUCTS

2.1 INTERIOR LUMINAIRES AND ACCESSORIES

A. Luminaires: Provide UL listed luminaires as scheduled on the drawings or as approved equal.

B. Listing: Luminaires shall be listed for use in the environment in which they are installed. For example, luminaires installed in return air plenums, direct contact with insulation, or in hazardous, wet, damp, or corrosive locations shall be UL listed for such application.

C. Accessories: Provide all mounting kits, supports, interconnecting wiring, power supplies, trim kits, gaskets, etc. for a complete installation.

2.2 LAMPS – LED

A. Light Emitting Diode (LED): 4000K, with minimum 75CRI and a minimum rated life of 50,000 hours at 75 degrees F average indoor ambient temperature.

2.3 POWER SUPPLY – LED

A. Provide UL listed power supply as recommended by the LED fixture manufacturer for operation of the specified LED lamps. Power supply shall be integral to the luminaire unless otherwise noted on the Plans. Power supply shall operate at the supply voltage indicated on the Plans.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Unless otherwise noted on Plans, provide driver integral to luminaires, pre-wired and installed at the factory, suitable for use with the selected fixture.

B. Install recessed luminaires to permit removal from below.

C. Support luminaries in suspended ceilings from structure above in accordance with Section 26 05 29.

D. LED Power Supplies: Install power supplies to be readily accessible. Where power supplies are installed in plenum areas, provide plenum rated listing.

END OF SECTION

SECTION 26 52 00 - EMERGENCY LIGHTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Emergency Lighting Units.

B. Emergency Exit Signs.

C. Emergency Driver Power Supplies.

1.2 RELATED SECTIONS

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements, and Section 26 05 00 – Common Work Results for Electrical.

B. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.

C. Section 26 05 33 - Raceway and Boxes for Electrical Systems.

D. Section 26 05 53 – Identification for Electrical Systems.

E. Section 26 51 00 – Interior Lighting.

1.3 REFERENCE STANDARDS

A. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.

B. NECA/IESNA 500 – Recommended Practice for Installation Indoor Commercial Lighting System.

C. UL 924 - Emergency Lighting and Power Equipment.

1.4 DEFINITIONS

A. Driver: LED power supply.

B. Fixture: See "Luminaire."

C. IES: Illuminating Engineering Society of North America.

D. Lamp Module: Replaceable LED board array/light engine including a plug-in connector.

E. LED: Light-emitting diode.

F. Luminaire: Complete lighting unit, including lamp or lamp module, driver, reflector, and housing.

1.5 SUBMITTALS

A. Product Data: Include manufacturer's product data sheets and/or shop drawings including outline drawings showing support points, weights, and accessory information for all equipment. Clearly indicate all options being provided. Arrange data for luminaires in the order of fixture designation.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Drawings: Indicate actual locations and uniquely identify of all emergency lighting units, exit signs, luminaires with emergency power supplies and accessories on the project record drawings. Submit under Section 26 05 00.

B. Operation and Maintenance Manuals:

1. Provide step-by-step installation instructions for testing of each emergency power supply.
2. Provide detailed bill of materials for all items purchased in this section including distributor's contact name, phone number and pertinent information.
3. Provide luminaire manufacturer's installation instructions.
4. Provide step-by-step installation instructions showing how to replace the LED lamp modules and emergency drivers for each luminaire.
5. Include any specific warranty information provided by the manufacturer for equipment furnished under this section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site, store and protect under provisions of Division 01.

1.8 REGULATORY REQUIREMENTS

A. Conform to State and local building code and NFPA 101 for installation requirements.

B. Furnish emergency lighting units and exit signs that are UL 924 listed and labeled for their indicated use and location on this project.

1.9 WARRANTY

A. Emergency Lighting Units: Submit a warranty, mutually executed by the manufacturer and the installer, agreeing to replace emergency lighting units that fail in materials or workmanship within five years, beginning on the date of manufacturer.

B. LED Exit Signs: Submit a warranty, mutually executed by the manufacturer and the installed, agreeing to replace LED exit signs that fail in materials or workmanship within five years, beginning on the date of substantial completion.

C. Emergency Drivers: Three year warranty minimum.

1.10 EXTRA MATERIALS

A. Emergency Drivers: One of each size and type installed. Label box indicating the fixture type it is installed in (i.e. Type A-EM).

PART 2 - PRODUCTS

2.1 EMERGENCY LIGHTING UNITS

A. Provide emergency lighting units as scheduled on the Plans or approved equal.

2.2 EXIT SIGNS

A. Provide exit signs as scheduled on the Plans or approved equal.

2.3 ACCEPTABLE MANUFACTURERS –EMERGENCY DRIVERS

A. Bodine.

B. Iota.

C. Substitutions: Under provisions of Division 01.

2.4 EMERGENCY DRIVERS

A. LED Unit: UL listed self-contained emergency LED driver with automatic transfer to battery supply on power failure, optional test switch, AC ON pilot light, fully-automatic two-rate charger, Ni-cad battery, and power supply capable of operating an LED load of up to the rated fixture wattage (as shown on the Plans) at rated current (700mA) for a minimum of 90 minutes. Bodine #BSL series or approved equal.

B. Test Switches:

1. Standard and Low-Profile Units:

    a. Recessed Linear led Fixtures: Mount test switch in driver channel so that it is accessible from below. Affix red driver identification label (supplied with driver) to door trim on fixture to denote location of emergency driver.
    b. Pendant Fixtures: Mount test switch in end cap of fixture, at end closest to driver. Affix red driver identification label (supplied with driver) to bottom of fixture housing below test switch to denote location of emergency driver.

2. High Output Unit: Self-testing, as specified above.
3. Recessed Downlights: Mount test switch in ceiling, in recessed single-gang box adjacent to downlight.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units plumb and level.

B. Aim directional lampheads to illuminate the path of egress.

C. Install emergency driver {or single fixture emergency transfer device} in the driver channel of the fixtures or the mounting tray of downlight fixtures indicated on the drawings. Provide an unswitched source of power to the emergency driver from the same circuit that powers the fixture the driver is installed in.

D. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including luminaires, occupancy sensors, HVAC equipment, smoke detectors, fire-suppression system, IP video cameras, and partition assemblies. Adjust locations as required.

E. Coordinate location of wall mounted emergency lighting units with mechanical equipment, ductwork, piping, etc.

F. Wiring installed between a luminaire and an emergency lighting inverter or remote emergency driver is considered “emergency” wiring and shall be separated from the normal wiring and installed in a dedicated raceway per NEC 700.9.

3.2 FIELD QUALITY CONTROL

A. Tests: Perform tests listed below according to manufacturer’s written instructions. Test unit functions, operations, and protective features. Adjust to ensure operation complies with Specifications. Perform tests required by NFPA 70, Articles 700 and 701. Perform tests on completion of unit installation and after building circuits have been energized. Provide instruments to permit accurate observation of tests. Include the following tests:

1. Simulate power outage: Verify proper operation of each individual emergency power supply.
2. Verify emergency supply duration.
3. Verify operation of remote test switches.
4. Provide reports for load test conducted on individual batteries.

B. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

3.3 ADJUSTING

A. Aim lamp on wall-mounted emergency lighting units to obtain the following illumination of egress pathway:

1. An average of 1 foot-candle.
2. A minimum at any point of 0.1 foot-candle measured along the path of egress at floor level.
3. Maximum-to-minimum illumination uniformity ratio of 40 to 1 shall not be exceeded.

B. Test emergency lighting equipment in accordance with the manufacturer’s instructions and NECA/IESNA 500.

3.4 CLEANING

A. On completion of installation, inspect unit components. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and abrasions in finish to match original finish. Clean unit internally using methods and materials recommended by manufacturer.

3.5 DEMONSTRATION

A. Walk owner's representative through the emergency lighting system. Note how to maintain, test and troubleshoot all units. Provide maintenance schedule for NFPA required testing and note locations of remote test switches, and which units have self-diagnostic features.

END OF SECTION

SECTION 27 10 00 - STRUCTURED CABLING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements for the design and installation of an extension to the existing telecommunications cabling system including communications cable, patch panels, telecommunications jacks, raceways, and other equipment or components as required to achieve the specified function.

1.2 RELATED SECTIONS

A. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

B. Section 26 05 29 – Hangers and Supports for Electrical Systems.

C. Section 26 05 53 – Identification for Electrical Systems.

1.3 PROJECT RECORD DOCUMENTS

A. Submit documents under the provisions of Division 01.

B. Accurately record location of jacks, pull boxes and equipment racks, routing of all telecommunications raceways and cables, numbering scheme and identification number of all cables and jacks.

C. Submit test results for all cables prior to Substantial Completion.

1.4 LISTINGS AND STANDARDS

A. Furnish products listed and classified by Underwriters Laboratories, Inc. and suitable for purpose specified and indicated.

B. Where a UL Standard is in effect equipment shall meet that standard and shall bear the UL label.

1.5 REFERENCE CODES AND STANDARDS

A. The publications listed below form a part of the specification to the extent referenced. The publications are referred to in the text by basic designation only. The reference codes and standards are minimum requirements:

1. ANSI/NFPA 70 National Electrical Code, latest adopted version.
2. BICSI Telecommunications Distributions Methods Manual, current version.
3. TIA/EIA 568-C Commercial Building Telecommunications Cable Standard, current version.

4. TIA/EIA 569-C Commercial Building Standard for Telecommunications Pathways and Spaces, current version.
5. TIA/EIA 606-A Administration Standards for the Telecommunications Infrastructure of Commercial Buildings, current version.
6. J-STD-607-A Commercial Building Grounding and Bonding Requirements for Telecommunications, current version.

1.6 QUALITY ASSURANCE

A. Install all work in accordance with the above reference standards and codes. The Owner reserves the right to reject all or a portion of the work performed either on technical or aesthetic grounds.

B. All workmen employed for installation of equipment and cabling specified under this section shall be specifically trained and certified in the installation of the specified Category 6 UTP systems, and shall have at least three years' experience installing, terminating, and testing Category 6 UTP on this size and complexity of project.

C. The intended function of the telecommunications cable system is to transmit voice and data signals from a central location to individual telecommunications outlet locations. Upon completion of the work, the UTP cable system shall be capable of transmitting a data signal that meets and exceeds the following requirements:

1. Category 6: Supports data rates up to and including 1 Gb/s.

1.7 SUBMITTALS

A. Submit product data under provisions of Division 01. Provide factory test results for cables and connectors. Provide product data for the following products:

1. UTP Telecommunications Cable.
2. UTP Telecommunications Jacks and Faceplates.
3. UTP Modular Patch Panel.
4. UTP Patch Cables.
5. Cable Management Panels.
6. UTP Telecommunications Cable Tester.
7. UTP Sample Test Report (with all required testing parameters shown).

1.8 PROJECT RECORD DRAWINGS

A. Submit documents under provisions of Division 01.

B. The approved shop drawings shall be updated to reflect any field changes made during construction.

C. Include one 11"x17" set of the project record drawings in the Operation and Maintenance Manual.

1.9 LABELING SYSTEM

A. Labeling shall conform to ANSI/TIA/EIA-606 standards, Section 26 05 53, and this Section.

B. Telecommunications Outlets:

1. Labels on all outlets shall have minimum 1/8-in. high characters and shall be installed behind recessed clear plastic covers on faceplate.
2. Label room outlets with two labels on the faceplate as follows:

   a. Top Label: Shows the telecommunication room the cable is run to (TR1, TR2, etc), followed by rack number (1, 2, etc.) followed by patch panel identification expressed as a letter (A), followed by port in patch panel the outlet is located (xx). Example: TR1-2B:38 (where TR1 indicates closet, 2 is the second rack, B is the second patch panel in the rack, 38 is the port in patch panel).
   b. Bottom Label: Shows the room number (room 103), followed by the jack/outlet number (J2) from the left when entering the room, followed by the quantity of ports within the outlet faceplate (1-6). Example: 103 J2:1 (where 103 is the room number, J2 is the 2nd jack/outlet from the left in the room, and 1 is the single port in the faceplate). Where the faceplate has multiple ports, the last part of the ID shall indicate the quantity. Example: 103 J2:1-4 (where 103 is the room number, J2 is the 2nd jack/outlet from the left in the room, and 1-4 represents the four ports in the faceplate).

C. Copper Patch Panels:

1. Label each patch panel with each unique patch panel name, expressed as a letter. Example: A for 1st patch panel, B for 2nd, C for third, etc.
2. Label each port on the patch panels with a 1-line identifier as follows:

   a. Show the room number (room 103), followed by the jack/outlet number (J2) from the left when entering the room, followed by the port number within the outlet faceplate (1-6). Example: 103 J2:3 (where 103 is the room number, J2 is the 2nd jack/outlet from the left in the room, and 3 is the 3rd port in the faceplate).

D. Telecommunications Closet:

1. Label cable with wire number to denote the station outlet with appended cable number at each end. Cable ID tags shall be attached within 2 inches of cable end so that ID tag is visible within box.
2. Provide an updated floor plan and list of telecommunication outlets cross-referenced to the rack, patch panel and port. Mount behind Plexiglas cover as specified in Section 26 05 53.

E. Copper Horizontal Cable:

1. Label the end of each cable with the same designation used on the equipment where the cable is terminated (i.e. the patch panel or telecommunications outlet). Labels shall be installed within one inch of the end of the cable insulation, after the insulation has been cut back to allow for termination.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS – STRUCTURED CABLING SYSTEM

A. Throughout this specification, specific manufacturers and manufacturer's catalog numbers are cited. These citations are for the purpose of establishing quality and performance criteria and are not intended to be proprietary. All products in the structured cabling system shall be provided from one of the approved manufacturing partnerships listed below, or an alternate system shall be substituted under the provisions of Division 01.

1. Ortronics/Superior Essex.
2. CommScope Uniprise.
3. Hubbell/Mohawk.
4. Leviton/Berk-Tek.
5. TE Connectivity (formerly ADC/Krone/Amp).
6. Substitutions: Under provisions of Division 01.

B. Structured Category 6 cabling systems shall include, but not be limited to, UTP telecommunications cable, UTP jacks, faceplates, modular patch panels, and UTP patch cables.

2.2 TELEPHONE PUNCHDOWN BLOCKS

A. Wall-mounted type 110 wiring block with 100-pair capacity and standoff legs for cross-connect of intra-building telephone backbone cables. Use 5-pair connecting blocks.

1. Ortronics #OR-30200145 or approved equal.

2.3 UTP TELECOMMUNICATIONS CABLE

A. All UTP telecommunications cables that stay within the building envelope shall be UL listed, plenum-rated CL2P, Category 6, 4 pair, 23-24 AWG, solid copper conductor.

1. Superior Essex "DataGAIN" CMP or approved equal.

2.4 UTP TELECOMMUNICATIONS JACKS

A. All UTP telecommunications jacks shall be Category 6, T568A/B, 8P8C, single, white finish, telecommunications jack with flush exit. Unless otherwise noted on the drawings, install each telecommunications jack in a single gang faceplate at each telecommunications outlet. The quantity of faceplate openings shall match the quantity of jacks at each location. The Contractor shall verify the actual wiring configuration (T568A or 568B) with the Owner prior to submittal.

B. UTP Jacks:

1. Ortronics "TracJack Clarity 6" #OR-TJ600 or approved equal.

2.5 TELECOMMUNICATIONS OUTLET FACEPLATES

A. Unless otherwise noted, all faceplates shall be single-gang plastic faceplates with white finish. The number of openings in each faceplate shall match the jack count of each outlet shown on the Drawings. (x in part numbers = designation for number of openings in faceplate).

1. Ortronics “TracJack” #OR-4030054x or approved equal.

2.6 UTP MODULAR PATCH PANEL

A. Provide and install high-density Category 6, modular patch panels. The front of the patch panels shall be equipped with T568A/B, 8P8C Category 6 compliant jacks. The jacks shall be factory wired to a 110 type IDC connector. The complete assembly shall exceed the requirements of TIA/EIA 568-B (Category 6), and be factory tested to 1000 Mbps data rates. Install the number of patch panels in each equipment rack as shown on the drawings or as required to terminate all UTP cables at the rack plus 25% spare capacity. The Contractor shall verify the actual wiring configuration (T568A or 568B) with the Owner prior to submittal.

1. 24-port Panel: Ortronics “Clarity6” #OR-PHD66U24 or approved equal.

2.7 UTP CABLE MANAGEMENT PANELS

A. Horizontal cable management panels shall have five metal horizontal cable rings. Unless otherwise noted on the drawings, install one cable management panel between each patch panel and below the last patch panel.

1. 1 RMU Panel: Ortronics #OR-60400131 or approved equal.

2.8 UTP PATCH CABLES

A. All patch cables shall be factory manufactured to match the applicable cable/connectivity solution (i.e. the Ortronics/Superior Essex system shall use Ortronics manufactured patch cords, etc.).

B. Network Equipment Connections: Provide Category 6 patch cables with blue jacket for installation between network equipment in the rack and dedicated data ports in the telecommunications patch panels. Provide one patch cable for each port in all the telecommunications patch panels. Where the patch panels and switches are in the same rack, provide 7’ cables. Where the patch panels and switches are in different racks, provide 15’ (14’ for CommScope) cables. (xx in part numbers = cable length).

1. Ortronics #OR-MC6xx-06 or approved equal.

2.9 VOICE BACKBONE CABLE

A. Unless otherwise noted on the drawings provide and install plenum-rated CL2P Category 5e, 24 AWG, solid copper conductor multi-pair backbone cable, pair count as shown on Drawings.

2.10 CABLE SUPPORT

A. All cables not installed in conduit shall be supported in accordance with Section 27 05 28.

B. All cables not installed in conduit shall be supported using J-hooks, Caddy CableCat series or approved equal, with a minimum J-hook size equivalent to Caddy #Cat32 or approved equal. Size all J-hooks to support the quantity of cables installed, plus a minimum of 25% spare capacity. Fiber optic cables shall be routed in 1" innerduct that is supported on a separate J-hook above the J-hook supporting the copper cables.

C. Cables shall be bundled using Velcro "One-Wrap" or approved equal reusable straps with a minimum ¾ inch width. Plastic tie-wraps or cinch-straps are not allowed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work.

3.2 GENERAL INSTALLATION

A. Follow cable manufacturer's specification regarding handling methods, retaining/support methods, bending radius and maximum pulling tension limitations. Where manufacturer does not provide bending radius information, minimum bending radius shall be 10 times the diameter of the cable. Use a tension-monitoring device to ensure that the maximum pulling tension that may be applied to the cable to be pulled into a conduit section is not exceeded. Provide replacement cable if cable manufacturer's maximum pulling tension is exceeded at any time during a pull.

B. Cable shall be carefully inspected for sheath defects or other irregularities as it is paid out from the reel. When defects are detected, pulling shall stop immediately and the cable section shall be repaired or replaced at the discretion of the Contracting Agency. A system of communications shall be maintained between pulling and feed locations so that pulling can be stopped instantly, when required.

C. Adequate care shall be exercised when handling and storing reels of cable to prevent damage to the cable. Cable with dents, flat spots, or other sheath distortions shall not be installed.

D. Store a maximum of one foot of slack UTP cable for each UTP jack at each telecommunications outlet.

E. All cabling shall be run continuous with no splices from each telecommunications jack to the cable connector at the patch panels. Telecommunications cables shall be terminated at each end on their respective jack. No cable run shall exceed 90 meters (295 feet) in length from the jack on the peripheral end to the patch panel.

F. All cable shall be routed in such a way as to minimize EMI and RFI interference. Cables shall be routed to maintain the following minimum distances from noise producing devices:

1. Open or Nonmetallic Communications Pathways:

a. 12 inches from electrical equipment and power lines of 3 kVA or less.
b. 18 inches from fluorescent and HID ballasts.
c. 36 from electrical equipment and power lines greater than 5 kVA.
d. 48 inches from transformers and motors.

2. Grounded Metal Conduit Communications Pathways:

a. 3 inches from electrical equipment and power lines of 2 kVA or less.
b. 6 inches from electrical equipment and power lines of 2 kVA to 5 kVA.
c. 12 inches from 5 kVA or greater power lines.

3.3 TERMINATIONS

A. The jacket of UTP cables shall be maintained to a point within one inch of the telecommunications jack. The twists on the individual pairs shall be maintained as close as possible to the contacts of the termination points but shall in no case exceed 1/2 inch.

B. Pairs from each cable shall be terminated sequentially from left to right, top to bottom starting with the lowest assigned number at the upper left-hand corner of the panel.

3.4 PATHWAYS AND RACEWAYS

A. Unless otherwise noted, all cables shall be installed in conduit from the telecommunications jack to the space above the accessible ceiling, within 18” of the J-hook pathway. Portions of cables not installed in conduit shall be supported in accordance with TIA/EIA standards at intervals not exceeding four (4) feet in length using J-hooks. The cable shall not be supported from ducts, pipes, conduits, ceiling grid hangar wires, etc. At any point where the cable changes direction, slack shall be provided to prevent rubbing or binding on the corner supports. Extreme care shall be taken to ensure that the cable is not compressed, kinked or otherwise deformed during installation. Any cable that is stretched, compressed, kinked or otherwise deformed shall be replaced at no cost to the Owner.

B. Cables to be installed in raceway, cable tray, continuous cable support system or J-hooks (as specified above) for the entire length of each cable. Provide raceway through areas that will not be accessible for future cable replacement or additions.

C. Provide pathway capacity throughout entire system for each telecommunication outlet served, sized to accommodate a minimum of four 4-pair cables from each outlet location to the designated telecommunication room, as shown on the plans.

D. Telecommunication cables shall not be installed in the same raceway or pathway as power cables.

E. Install polyethylene pulling string in each empty conduit containing a bend or over 10 feet in length.

F. Install all telecommunications outlets in outlet boxes under the provisions of Section 26 05 33. Unless otherwise noted on the Drawings or in the Specifications, outlets shall be mounted at 18 inches above floor, 4 inches above counters or backsplash, with the jacks oriented in the standard “pins down” position.

G. Support raceways, outlet boxes, and junction boxes under the provisions of Section 26 05 29.

3.5 LABELING

A. Label equipment racks as noted here-in and under the provisions of Section 26 05 53.

B. Furnish and install labels and documentation to identify all cables, jacks, and connections in accordance with TIA/EIA standards, as shown on the Drawings, and under the provisions of Section 26 05 53. As a minimum each jack in each faceplate shall have a unique identifier that matches the identifier at the patch panel. Identifiers shall be installed on the front of the telecommunications faceplate, on the cable behind the faceplate, and on the front of the patch panel at the associated jack.

3.6 CABLE ACCEPTANCE TESTING

A. Each UTP cable shall be tested for compliance with TIA/EIA 568C Category 6 standards after installation using a Fluke #DTX or approved equal tester that has been calibrated within the last 30 days. At a minimum, the Contractor shall perform the following tests with the maximum frequency of the tester set at 350MHz:

1. Signal Attenuation / Insertion Loss.
2. Near End Cross Talk (NEXT).
3. Power Sum Near End Cross Talk (PS-NEXT).
4. Attenuation to Crosstalk Ratio – Near End (ACR-N)
5. Attenuation to Crosstalk Ratio – Far End (ACR-F).
6. Power Sum Attenuation to Crosstalk Ratio – Near End (PSACR-N).
7. Power Sum Attenuation to Crosstalk Ratio – Far End (PSACR-F).
8. Propagation Delay.
9. Delay Skew.
10. Return Loss.
11. Wiremap.
12. Overall Cable Length.

B. Test, analyze, and record compliance for the following network protocols:

1. 10 Base-T.
2. 100 Base-T.
3. 1000 Base-T (1 Gb/s).

C. The Contractor shall provide 100% testing for each “permanent link” (i.e. from the work area outlet to the patch panel). Provide test results for all tests noted above in the form of printouts from the test equipment and provide an electronic copy of the test data for each cable on CD. If proprietary software is used, the submitted CD shall include any necessary software required to view test results. If the results are delivered in a standard format such as Excel or Access, the viewing software need not be provided. At the front of the test report, the Contractor shall provide an index showing the pass/fail results of each cable, along with the cable length and a corresponding cable label.

D. Where any portion of the system does not meet the Specifications, the Contractor shall correct the deviation and repeat any applicable testing at no additional cost to the Owner.

E. Submit a copy of the test report for each cable prior to substantial completion of the project.

F. Acceptance of the telecommunications system shall be based on the results of the above tests, functionality, and the receipt of documentation.

END OF SECTION

SECTION 28 23 00 - VIDEO SURVEILLANCE SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Video Management Software.

B. Video Storage Appliance.

C. Fixed cameras.

D. PoE Network Switch.

E. Video Cable.

F. UTP Components.

1.2 RELATED SECTIONS

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements and Section 26 05 00 – Basic Electrical Requirements.

B. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

C. Section 26 05 53 – Identification for Electrical Systems.

D. Section 28 40 00 - Detention Monitoring and Control System.

1.3 REFERENCE CODES AND STANDARDS

A. The publications listed below form a part of the specification to the extent referenced. The publications are referred to in the text by basic designation only, latest edition. The reference codes and standards are minimum requirements:

1.	ANSI/NFPA 70	National Electrical Code, latest adopted edition.
2.	BICSI	Telecommunications Distributions Methods Manual
3.	TIA/EIA 568-B.1	Commercial Building Telecommunications Cable Standard, Part 1: General Cabling System Requirements (including Addendums).
4.	TIA/EIA 568-B.2	Commercial Building Telecommunications Cable Standard, Part 2: Balanced Twisted-Pair Cabling Components (including Addendums).
5.	TIA/EIA 569-A	Commercial Building Standard for Telecommunications Pathways and Spaces
6.	TIA/EIA 606	Administration Standards for the Telecommunications Infrastructure of Commercial Buildings

1.4 SYSTEM DESCRIPTION

A. Provide an extension of the existing IP Video system in the facility, interior and exterior IP color cameras, additional storage for the existing IP Video storage appliance, IP Video workstation computers, network switches, and UTP cabling/components. All new cameras shall be connected to the IP video storage appliance and shall use the existing VMS software to provide video communications between points of surveillance and the monitoring stations, as indicated on the Drawings. The IP Video system shall be compatible with the Detention Monitoring and Control System to display camera views on monitors when called for either via call-up or manual control.

B. All new equipment and assemblies shall be Underwriters Laboratories approved if applicable.

C. Remote Access: The system has the capability for secure remote access BUT this functionality shall be disabled.

D. The Video System shall be assembled and installed by a qualified Integrator, but does not need to be the same as the Security System Integrator. If different, close coordination is required for integration of systems, drawings, and warranty requirements. The Video System Integrator shall have a minimum of three years documented experience assembling and installing these types of systems within the State of Alaska.

1. Where the system installer is a branch office or other division of a larger organization, the qualifications of the branch office or other division shall meet the requirements of the Contract Documents.
2. Contractor shall have local technician(s) who have attended training and hold relevant certificates from the manufacturer of the specified system.
3. Maintenance Service and Support: The Video System Integrator shall be able to provide initial contact on warranty service and/or service contract requests from their principal location within four (4) hours of notification. During the warranty period, the Contractor may choose to attempt troubleshooting of the system by telephone, with the facility maintenance staff. If the problem cannot be resolved within 24 hours, the Video System Integrator shall travel to the facility on the next business day to repair the system.

E. Technical Support: All new systems and components shall be provided with the availability of a toll free 24-hour technical support phone number from the manufacturer. The phone number shall allow for immediate technical assistance for either the dealer/installer or the end user at no charge.

F. IP Video System Manufacturers: Companies specializing in the specified systems with a minimum of three years documented experience.

G. IP Video System Suppliers: Companies specializing in supplying the products specified in this Division with minimum three years documented experience, and authorized by product manufacturers.

H. All systems and components shall be provided with an explicit manufacturer warranty.

1.5 SUBMITTALS

A. Product Data: Submit data for each component specified, showing electrical characteristics and connection requirements.

B. Electronic AutoCAD® drawings of the facility are available upon request for preparation of the shop drawings.

C. Provide contract-size shop drawings that include the following information:

1. One-line diagrams for the IP Video system that show the signal relationships of all devices within the system.
2. Floor plan drawings showing the locations of all cameras, along with camera name, camera type and mounting (i.e. wall or ceiling), lens selection, conduit routing, and telecom closet/rack assignment.
3. Floor plan drawings shall show entire cable pathway, including existing sections of pathway (i.e. conduit, cable tray, or J-hooks) that are used for the IP Video system. Show sizes of all conduit sleeves along the pathway.
4. Drawings shall be done in a scale that allows the smallest text on the drawing to be legible when the drawing is reduced to 11” x 17”.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

E. Camera Names: All camera names that are displayed on the IP Video monitors and programmed into the VMS system shall be approved by the Owner prior to programming.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site, store and protect under provisions of Division 01.

B. Store products in clean, dry area; maintain temperature to NEMA ICS 1.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Maintain area free of dirt and dust during and after installation of products. Protect other surfaces against damage and discoloration caused by work of this section.

1.8 COORDINATION

A. The necessity to coordinate this work with the Owner is emphasized. The Contractor shall be responsible for any omissions, delays and additional cost due to lack of coordination or approval from the same.

B. Coordinate all IP Video work with existing lighting, power, ventilation, sprinklers and other systems in the areas of work to avoid interferences.

C. Continuity of Service:

1. Take no action that will interfere with, or interrupt, any existing building services unless previous arrangements have been made with the Owner. If system shutdown is required arrange the work to minimize shutdown time.
2. Owner's personnel will perform shutdown of operating systems. The contractor shall give three (3) days advance notice for systems shutdown.

D. Should services be inadvertently interrupted, immediately furnish labor, including overtime, material, and equipment necessary for prompt restoration of interrupted service.

E. Use of site:

1. Use of the site shall be at the Owner's direction in matters in which the Owner deems it necessary to place restriction.
2. Access to building wherein the work is performed shall be as directed by the Owner.
3. The Owner will occupy all of the facilities during the entire period of construction for conducting normal business operations. Cooperate with the Owner to minimize conflict and to facilitate the Owner's operations.

1.9 QUALITY ASSURANCE

A. Provide complete testing of the IP Video system in accordance with this Section.

B. After installation, and before termination, all wiring shall be checked and tested to ensure there are no grounds, opens, or shorts on any conductors or shields. The Contractor shall maintain a complete log of all such quality assurance tests and make them available for inspection by the Owner at any time during the construction phase. At the completion of the installation all test results shall become part of the maintenance documentation.

C. Inspection:

1. The Contractor shall carry out the inspection requirements of the Contract and shall provide the Owner with documentation to the effect that off-site work is being properly fabricated, and in accordance with the contract documents.
2. The Contractor shall notify the Owner sufficiently in advance of the time when quality control tests are to be performed so that the Owner or their designee may witness such tests, if desired. The presence or absence of the Owner from these tests shall not relieve the Contractor from completing the tests in accordance with the contract documents. Contractors QA documentation and practices shall be subject to Engineer or Owner inspection at any time. The field-certified installer must be present during final testing and calibration.

1.10 CLOSEOUT SUBMITTALS

A. Project Record Drawings:

1. Accurately indicate actual locations of all cameras, power supplies, etc.
2. Show the actual installed cable pathway route, including type and size of pathway.
3. Include a reduced set (11" x 17") set of the IP Video system project record drawings in the operation and maintenance manual.

B. Operation and Maintenance Manuals:

1. Document ratings of system and of each major component.
2. Identify operating limits, which may result in hazardous or unsafe conditions, or in equipment damage.
3. Include routine preventive maintenance schedule.
4. List special tools, maintenance materials, and replacement parts.

5. Include repair instructions for procedures to check, repair, and test equipment during typical malfunctions.
6. Include copies of manufacturer product warranties for all equipment.

1.11 SYSTEM DEMONSTRATION AND ACCEPTANCE

A. Provide systems demonstration under provisions of Division 01 and this Section.

B. At the time of the Substantial Completion Inspection, the Contractor and Video System Integrator shall be on-site to demonstrate the operation of the IP Video system to the Owner's Representatives and Engineer. All IP Video system components shall be installed and fully operational at the time of the system demonstration.

C. The Engineer shall review the demonstration with the Owner's Representatives and provide the Contractor with a list of modifications and/or adjustments deemed appropriate for the proper operation of the system. The Contractor shall make all modifications prior to final completion and at no additional cost to the Owner.

D. System demonstration shall be conducted as directed by the Owner and Engineer but generally described as follows:

1. Call up each camera on the Client Workstations in the Control Rooms, using the VMS software.
2. Call up cameras on the monitors in the Control Room using the touchscreen monitor.

1.12 WARRANTY

A. Warrant all materials and equipment to be new and free from defects in material and workmanship for a period of one year under provisions of Division 01.

B. Thirty days prior to the expiration of the warranty period, the Video System Integrator shall contact the Owner's Representative to determine if any adjustments or reprogramming are necessary to maintain proper operation of the security system. If any adjustments or reprogramming are necessary, they shall be done at no cost to the Owner.

C. Provide (2) additional years of software maintenance/support for the video system, for a total of (3) years from substantial completion.

D. At the end of the period designated above, the Owner shall have the option of entering into a maintenance contract with the Video System Integrator.

PART 2 - PRODUCTS

2.1 PRODUCT SPECIFICATIONS

A. Throughout this specification, specific manufacturers and manufacturer's catalog numbers are cited. Unless otherwise noted, these citations are for the purpose of establishing quality and performance criteria and are not intended to be proprietary.

B. Where no manufacturer is specified, provide products of manufacturers in compliance with requirements. Any item of equipment or material not specifically addressed on the drawings or in this document and required to provide a complete installation shall be provided in a level of quality consistent with other specified items.

C. The Contractor shall provide the latest product model and software version available from each manufacturer at the time of installation. No “beta version” or “test software” products will be accepted. All proposed and provided equipment and products shall be from the specified and approved manufacturers only, unless previously approved by the Engineer or Owner.

D. All products and materials are to be new and free of defects, damage and corrosion. All materials shall be in compliance to all applicable codes and designed specifically for the function intended.

E. Quantity and location of all devices and equipment shall be as specified in Contract Documents or as required for a complete and operable system.

2.2 MANUFACTURERS – VIDEO MANAGEMENT SYSTEM (VMS) SOFTWARE

A. Milestone “XProtect Expert”. New camera licenses shall be provided with new cameras.

B. NO SUBSTITUTIONS ALLOWED.

2.3 VIDEO STORAGE APPLIANCE

A. Provide Milestone Husky “M550A” series or approved equal network video recorder for all new cameras. Provide 32TB option, RAID 5.

2.4 CLIENT WORKSTATION COMPUTER

A. Client Workstation Computer: Where indicated on the Drawings, new Client Workstation Computer shall be a Dell “XPS 8900” or approved equal computer that is approved by the system manufacturer and is compatible with the installed system. The computer shall include:

1. Processor: Intel® Core i7 6700 processor, 8MB Cache, up to 4.0 GHz.
2. Memory: 16GB, 2133MHz.
3. Operating System: Microsoft® Windows 7 Professional, 64-bit, or newer.
4. Additional Software: The most recent versions (at time of Substantial Completion) of Norton Anti-Virus.
5. Chassis: Tower.
6. Boot Hard Drive: 2TB, 7,200 RPM.
7. Video Card: NVidia GeForce GTX 750Ti or equal, 2GB.
8. Optical Drive: CD/DVD Burner.
9. Keyboard: USB Keyboard.
10. Mouse: USB optical mouse.
11. Monitors – Widescreen: Dell “UltraSharp” #U2417H or approved equal 24-inch, VESA compatible, widescreen flat panel LCD color monitor with 1920 x 1200 resolution and adjustable height desktop stand.
12. Documentation: Users Manual, Installation and Trouble Shooting Guide on CD.
13. Warranty: 3-year Basic Limited Warranty and 3-year next business day on-site service.

2.5 MANUFACTURERS – FIXED IP VIDEO CAMERAS

A. Axis.

B. Bosch.

C. Vicon.

D. Sony.

E. Substitutions: Under provisions of Division 01.

2.6 FIXED IP VIDEO CAMERAS

A. Type 'A' – Indoor Day/Night Vandal-Resistant 2 Megapixel IP Mini-Dome: Axis #P3225-LV-or approved equal high-resolution, day/night IP color camera with the following features:

1. Imaging Device: IR-sensitive 1/3 inch progressive scan RGB CMOS.
2. Resolution: 2 megapixel, HDTV, 1080P.
3. Light Sensitivity: Minimum 0.18 lux at F1.4 in color mode, 0.04 lux at F1.4 in B/W mode, 0 lux – IR illuminators ON.
4. Lens: Vari-focal with remote zoom and focus, minimum 3.0-9.0 mm range, F1.4, IR-corrected, megapixel-rated, auto-iris. Automatic IR cut filter removal in low light conditions.
5. Input Power: PoE IEEE 802.3af and Class 3.
6. Operating Temperature: Minimum operating temperature range of 32°F to +122°F.
7. Housing: Impact-resistant metal housing with tamperproof fasteners and clear polycarbonate dome with shroud to conceal camera position inside the dome.

B. Type 'B' – Outdoor Day/Night Vandal-Resistant 5 Megapixel IP Mini-Dome (Rec Yard): Axis #3227-LVE or approved equal megapixel IP color camera with the following features:

1. Imaging Device: 1/2.5 inch progressive scan CMOS.
2. Resolution: 3072 (H) x 1728 (V), 5 megapixel.
3. Light Sensitivity: Minimum 0.18 lux at F1.7 for color image, 0.04 lux at F1.7 for B/W image. 0 lux – IR illuminators ON.
4. Lens: Vari-focal with remote zoom and focus, minimum 3.5-10mm range, F1.7, IR-corrected, megapixel-rated, auto-iris. Automatic IR cut filter removal in low light conditions.
5. Electronic Shutter: 1/28,000 to 2 sec.
6. Backlight Compensation: Automatic.
7. Video Compression: H.264, Motion JPEG.
8. Frame Rate Using H.264: Up to 20 fps in 3MP resolution, 30 fps in lower resolutions.
9. Frame Rate Using Motion JPEG: Up to 20 fps in 3MP resolution, 30 fps in lower resolutions.
10. Video Streaming: Simultaneous H.264 and Motion JPEG, controllable frame rate and bandwidth, supporting both unicast and multicast streaming.
11. Image Settings: Compression, color, brightness, sharpness, white balance, exposure control, rotation, low-light adjustment, text and image overlay, privacy mask.
12. Security: Password protection, IP address filtering, HTTPS encryption, IEEE 802.1X network access control, digest authentication, user access log.
13. Supported Protocols: IPv4, IPv6, HTTP, TCP, ICMP, IGMP, SNMP, RARP, UDP, SMTP, FTP, DHCP, ARP.

14. Web Server: The camera shall contain a built-in web server, making video and configuration available in a standard browser environment using HTTP, without the need for additional software. The camera shall support full functionality with the Windows XP operating system and MS Explorer 6.x or higher browser. The camera shall support simultaneous viewing from the web server.
15. Software: Provide with one user license.
16. Intelligent Video: Video motion detection, active tampering alarm, audio detection.
17. Alarm Triggers: Intelligent video and external input.
18. Video Buffer: 48MB pre- and post-alarm.
19. Memory: 512MB RAM, 128MB Flash.
20. Connectors: Ethernet RJ-45 (PoE), DC jack, terminal block for 1 alarm input and 1 output, 3.5 mm mic/line in, 3.5 mm line out.
21. Input Power: PoE IEEE 802.3af, Class 3.
22. Operating Temperature: Minimum operating temperature range of -40°F to +131°F.
23. Housing: Impact-resistant IP-66 aluminum housing with tamperproof fasteners and camera shroud to conceal camera position inside the dome. Camera enclosure shall have thermostat, heater, dehumidifying membrane, and fan.

C. Type 'C' – Corner-Mounted Cell Cameras: Vicon V-Cell-HD, NO SUBSTITUTIONS ALLOWED.

2.7 GENERAL HARDWARE AND MOUNTS

A. Mounting: Provide mounting arm for Rec Yard camera.
1. Wall-Mount: Axis #T91A61 or approved equal mounting arm.

B. Anchoring:

1. Anchoring shall be rated for the load and mounting surface.
2. All anchoring sets shall be installed per manufacturers' instructions and be appropriate for the surface to which they are mounted.
3. All manufacturers' torque specifications shall be adhered to as applicable and be appropriate for the surface to which the anchoring sets are mounted.
4. Mounts shall be rated for the weight, external weight (i.e., snow or rain), twist, and wind loading of the equipment used.
5. All hardware shall be installed so that it cannot be removed without the use of hand tools.

2.8 NETWORK SWITCH

A. PoE Switch: Transition Networks #SM24TAT4XA or approved equal 24-port 10/100/1000, Gigabit Ethernet PoE+ network switch with IEEE 802.3af PoE (15.4W of power) on all ports simultaneously or 30W on 12 ports simultaneously, 370W overall power budget, and (4) 1 Gigabit Ethernet SPF uplink ports. Provide RJ-45 transceivers for uplink ports used.

2.9 UTP COMPONENTS: Per Section 27 10 00.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Prior to beginning equipment installation, examine areas to receive equipment. Verify that all conditions are acceptable.

B. Environmental Conditions: Components mounted in locations exposed to weather shall be housed in corrosion resistant enclosures with appropriate environmental protection. Component performance shall not degrade because of improper housing design. Components in enclosures shall meet manufacturer's performance requirements when exposed to the ambient conditions beyond manufacturer's limits. If required, Contractor shall provide heaters in enclosures

C. Install all equipment in accordance with the manufacturer's instructions.

D. Keep up to date "As-built" record drawings at each job site detailing the layout and field modifications to the Shop Drawings.

E. Provide boxes for mounting devices, cable pulling, and splicing cables under provisions of Section 26 05 33.

F. Cabling installation shall be per Section 27 10 00.

G. No wiring other than that directly associated with video system shall be permitted in video system conduits and pathways.

3.2 INTERFACE WITH OTHER WORK

A. Coordinate all camera locations with Facility Representative prior to rough-in and avoid conflicts with existing equipment and objects that may obstruct the field of view or, in the case of light fixtures, may affect the camera performance and quality of the video image.

B. Coordinate all camera, outlet box, J-hook, and conduit locations to avoid conflicts with mechanical piping and ductwork, structural members, and other materials above the accessible ceilings and along the entire cable pathway.

C. Any camera that is located so that camera performance or field of view is adversely affected shall be relocated by the Contractor at no additional cost to the Owner.

3.3 LABELING

A. Furnish and install labels and documentation to identify all cables, jacks, and connections in accordance with TIA/EIA standards, as shown on the Drawings, and under the provisions of Section 260553 and this Section. As a minimum, each video jack in each outlet box shall have a unique identifier that matches the identifier at the opposite end and matches the naming scheme on the camera schedule. Identifiers shall be installed on the cable at both ends.

B. Label all video junction boxes. For junction boxes above ceilings, mark the box cover with “IP Video” using permanent black marker. For junction boxes in finished areas, mark the inside of the cover.

3.4 ADJUSTING, PROGRAMMING, AND CONFIGURATION

A. Fixed Cameras: The Contractor shall coordinate with the Owner to obtain the desired field of view for each new camera. This includes, but is not limited to, adjusting camera aiming point, white balance, backlight compensation, AGC, iris control, viewing angle, and adjusting vari-focal lenses.

B. VMS Software: The Contractor shall completely configure each video input for camera title, frame rate, resolution, compression, motion detection, alarms, pre/post event recording, macros, and all other features of the software. The software shall be initially configured with the following parameters:

1. Camera Title: Coordinate with Owner for approval of camera title.
2. Resolution: High for all cameras.
3. Record Rate: 1-2 FPS continuous, 15 FPS upon motion for all cameras.
4. Record Mode: Continuous.
5. Motion Detection: ON. Coordinate with Owner for which areas within each camera view will be masked.
6. Pre/Post Event Recording: 5 seconds pre-event, 15 seconds post-event.
7. Ethernet Settings: All settings shall be programmed at the system. Contact Owner for proper IP address, subnet mask, host, and gateway settings.
8. Password: Unit shall utilize three levels of password protection (Installer, Operator, Administrator).
9. Clock: Set software clock to 12-hour format, MM/DD/YY calendar. Synchronize with NSB primary and backup servers and update clock once per day. Contact Owner for server information.
10. Notification: Notify upon video loss. Contact Owner for email address to send notification.

3.5 DEMONSTRATION

A. Provide systems demonstration under provisions of Division 01.

B. Provide the Owner's authorized personnel with operation and maintenance training for the video system, as specified in this section.

C. Conduct walking tour of project and briefly describe function, operation, and maintenance of each component.

END OF SECTION

SECTION 28 40 00 - DETENTION MONITORING AND CONTROL SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Touchscreen Security Control System.

1.2 RELATED SECTIONS

A. Section 26 05 00 – Common Work Results for Electrical.

B. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.

C. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

D. Section 26 05 53 – Identification for Electrical Systems.

E. Section 28 23 00 – Video Surveillance System.

F. Section 28 46 16 – Detention Relay Logic System.

G. Section 28 46 19 – Detention PLC Control System.

H. Section 28 46 32 – Detention Intercom System.

1.3 SYSTEM DESCRIPTION

A. Provide an extension of the facility's touchscreen control system consisting of touchscreen computers, a programmable logic controller, and relay interface.

B. The system shall integrate the lighting control, door control, intercom, and IP Video systems. System configuration shall be such that failure of a single component shall not render the system inoperative. Provide all labor, equipment, materials and supervision to install, calibrate, adjust, document and test the total system as required herein and as indicated on the drawings.

1.4 REGULATORY REQUIREMENTS

A. All systems shall comply with applicable federal, state, and local building codes. Conduit and wire installation shall comply with all of the provisions of Division 26. All equipment and assemblies shall be Underwriters Laboratories approved if applicable.

1.5 QUALIFICATIONS

A. The Security Systems Integrator shall submit qualifications in accordance with Division 01. Qualifications shall include the following:

1. The entire security system shall be assembled, programmed, and installed by a single Security Systems Integrator. The Security Systems Integrator shall have a minimum of five years documented experience assembling, programming, and installing these types of touchscreen security systems in correctional facilities. Documentation of previous experience shall include at least five (5) similar projects where a touchscreen security system of this type and complexity has been retrofitted into an existing correctional facility.
2. Where the system installer is a branch office or other division of a larger organization, the qualifications of the branch office or other division shall meet the requirements of the Contract Documents.
3. Maintenance Service and Software Support: The Security Systems Integrator shall be able to provide initial contact on warranty service and/or service contract requests from their principal location within four (4) hours of notification. During the warranty period, the Contractor may choose to attempt troubleshooting and/or repair of the system by telephone, either with the facility maintenance staff or by using the touchscreen remote access software. If the problem cannot be resolved within 24 hours, the Security Systems Integrator shall travel to the facility on the next available flight to repair the system.

1.6 SUBMITTALS

A. Submit under provisions of Division 01 and Division 26.

B. Product Data: Provide data for each component specified showing electrical characteristics and connection requirements.

C. Electronic AutoCad® drawings of the building floor plans are available upon request for preparation of the shop drawings. All device locations shall be field verified by the Contractor prior to completion of the shop drawings.

D. Provide contract-size shop drawings that include the following information:

1. One-line diagram for each system (i.e. door control, intercom, IP Video, etc.) that shows the signal relationships of all devices within the system.
2. Indicate electrical characteristics and connection requirements, including line voltage and low voltage wiring, and logic diagrams or block diagrams where required.
3. Show scaled, pictorial layout drawings of relay and PLC cabinets, including wire/cable designations as shown on the one-line diagrams or elsewhere in the shop drawings. The cabinet layout drawings shall include completed assemblies, interconnecting cabling, dimensions, weight, and external power requirements. Layout drawings shall be done in a scale allows the smallest text on the drawing to be legible when the drawing is reduced to 11” x 17”.
4. Show an overall riser diagram of the facility security system, including all terminal cabinets, major pull and junction boxes or gutters, and the touchscreen workstation. The riser diagram shall include conduit sizing and routing with the number and size of conductors in each conduit. Locations of all terminal cabinets, relay cabinets, major pullboxes, and workstations shall be identified on the Drawings. Include conductor labels to be used by the installer during construction.
5. For each custom assembly, such as a relay panel, provide an assembly drawing illustrating the appearance of the assembled device including dimensions, assembly components and functional attributes (i.e. relay type, wire color-code, etc.).

6. Security Device Identification: All doors, locks, cameras, lights, etc. shall be identified on the shop drawings using the naming/numbering scheme in use at the facility. Do not re-number or re-name any devices without prior approval from the Owner.

E. Touchscreen Control System Submittal

1. System Graphic Maps: Graphic maps of the facility shall be programmed into the system. The graphic maps shall have the following characteristics:

   a. Map Layout: All background floor plans shall be imported from the scaled AutoCAD plans used to develop the shop drawings. All room names shall match the actual names being used in the facility. For the initial submittal, use the room names shown on the Contract Drawings. The screen colors for walls, background, and other elements shall be initially based on recommendations from the Contractor, but all colors are subject to change pending Owner approval.
   b. Map Size: Maps shall be partitioned into separate screens either by section or security zones to maintain a minimum scale of 1/16”=1’-0”. Additional screens may be necessary where there are multiple field devices concentrated in one area of the building. Icons shall not be crowded or overlapped on the screen and shall appear on the map at approximately the same location where they are physically installed. All graphic maps shall be viewable on the screen without requiring the use of scroll bars.
   c. Final layout of all graphic screens shall be approved by the Owner during the submittal review process. The Contractor shall make any necessary changes to the screens at no additional cost to the Owner.

2. Initial Touchscreen Submittal: Provide the following items.

   a. Provide 8.5” x 11” color printouts of each touchscreen graphic map, including all facility maps, control screens, popup windows, alarm popups, login screens, etc.
   b. Graphic maps shall clearly show samples of all colors and positions of items such as intercoms or doors that change color and/or position on the screen when activated.
   c. Submit a list of suggested system enhancements and suggested modifications to the specified system. After reviewing the list with the Owner’s Representative, the Engineer will provide the Contractor with a written response to all suggestions. Any suggestions that are accepted by the Owner shall be incorporated into the touchscreen system (as a change order) prior to the Final Submittal.

3. Final Touchscreen Submittal: After making all required changes specified in the Initial Touchscreen Submittal, the Contractor shall resubmit color printouts of any screen maps that were modified. After the Engineer and Owner have completed the review, the Engineer will provide the Contractor with a list of modifications and/or adjustments deemed appropriate for the proper operation of the system. The Contractor shall make all modifications at no additional cost to the Owner.
4. Substantial Completion: At the time of the substantial completion inspection, the Contractor shall have the system fully operational, with all previous modifications incorporated into the system and all points and events identified as specified. At that time, the Engineer and on-site Owner’s Representatives will review the system operation and provide the Contractor with a list of modifications and/or adjustments deemed appropriate for the proper operation of the system. The Contractor shall make all modifications at no additional cost to the Owner.
5. After all programming changes noted during substantial completion have been made, the Contractor shall commence with Owner training. During the training period, the facility

staff may request changes to the layout of the graphic screens or to any identification labels used on the maps. The Contractor shall review these changes with the designated Owner's Representative for concurrence and the resulting list shall be incorporated into the touchscreen system at no additional cost to the Owner. Any suggested changes that the Contractor feels will reduce the level of facility security or negatively affect system operation shall be brought to the attention of the Engineer and the Facility Superintendent prior to being programmed.

6. Final Completion: At the time of final completion, the Contractor shall have incorporated all previous modifications noted during the Engineer's previous reviews and during Owner training. The Engineer shall review the demonstration with the Owner's Representative and provide the Contractor with a list of modifications and/or adjustments deemed appropriate for the proper operation of the system. The Contractor shall make all modifications at no additional cost to the Owner.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site, store and protect under provisions of Division 01.

B. Store products in clean, dry area; maintain temperature to NEMA ICS 1.

C. Maintain area free of dirt and dust during and after installation of products. Protect other surfaces against damage and discoloration caused by work of this section.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Maintain area free of dirt and dust during and after installation of products. Protect other surfaces against damage and discoloration caused by work of this section.

1.9 SYSTEM DEMONSTRATION AND ACCEPTANCE

A. Provide systems demonstration under provisions of Division 01 and Division 26.

B. At the time of the Substantial Completion Inspection, the Contractor and Security System Integrator shall be on-site to demonstrate the operation of the security system to the Owner's Representatives and Engineer. All security system components shall be installed and fully operational at the time of the system demonstration.

C. The Engineer shall review the demonstration with the Owner's Representatives and provide the Contractor with a list of modifications and/or adjustments deemed appropriate for the proper operation of the system. The Contractor shall make all modifications at no additional cost to the Owner.

D. After all changes have been made to the system, the contractor shall provide the Owner's authorized personnel with operation and maintenance training for the Detention Monitoring and Control system, as specified in this Section.

E. System demonstration shall be conducted as directed by the Engineer but generally described as follows:

1. Test each door lock to verify correct operation, status and notification.

2. Test the door interlock and interlock override functions (where applicable) of designated doors that are grouped together.
3. Test each intercom station by initiating a call from either end and verifying proper operation on the master stations, as well as automatic camera call-up with selected doors.
4. Test all lighting control functions.
5. Test camera selection and automatic camera call-up on spot monitors.
6. Test all other functions as specified herein and as required for a complete and operable system.

1.10 CLOSEOUT SUBMITTALS

A. Project Record Drawings

1. Submit documents under provisions of Division 01 and Division 26.
2. Accurately indicate actual location of all security devices, including door position switches, relays, electric door locks, cameras, intercoms, etc.
3. Show the location and routing of all conduit and cable, including locations of major pull and junction boxes.
4. Include a reduced set (11" x 17") set of the project record drawings in the operation and maintenance manual.

B. Operation & Maintenance Manuals

1. Submit documents under provisions of Division 01 and Division 26.
2. Operation and Maintenance Data: Include bound copies of operating and maintenance data.
3. Provide operation and maintenance instructions including detailed electronic schematic drawings, detailed parts list and exploded view of all equipment, detailed troubleshooting instructions and a reduced set of the project record drawings.
4. Provide detailed instructions on system start-up, including instructions on re-starting the touchscreen computer after a system failure/lock-up.
5. Provide detailed instructions on replacement of a defective touchscreen computer with a new touchscreen computer.

C. Security System Software Documentation

1. Provide an electronic copy of the PLC Program and Touchscreen Security Program to aid in future maintenance, troubleshooting and modification of the security system.
2. The hard copy shall include a complete printout including the ladder diagram, program flow control instructions, function block instructions, etc., as required.
3. Meaningful names shall be assigned to each input, output and internal address used with comments explaining the purpose and function of each rung.
4. Provide point references and function descriptions in the comment fields of the program where applicable. The intent of this requirement is that the function of each rung or line of code can be clearly understood by the facility maintenance staff for troubleshooting and system maintenance.
5. Provide a global overview of the system design and operation. Include brief descriptions of all system functions including, but not limited to, intercom and door control, door interlocks and override, system enable/disable, lighting control, and standby power monitoring.

D. Security System Hardware Documentation

1. Provide a complete terminal block schedule for the entire system, including terminal block layout drawings and schedules for the main relay cabinet and all system cabinets. The terminal block schedule for each cabinet shall include the following data for each point:

    a. Point description (i.e. “Medical Dayroom lights”) and/or location.
    b. Type of point (i.e. input, output, etc.).
    c. Terminal block and point number.
    d. Cross-reference to specific code section in PLC program.

2. Provide detailed schematic drawings with riser diagrams showing all relays, power supplies, PLC components, and any other equipment in the PLC/relay cabinet. The drawings shall show all wiring connections (with wire color codes) for all equipment and shall accurately reflect the actual installation.

1.11 SECURITY SYSTEM TRAINING

A. Provide (8) hours of training for users and maintenance personnel. Assume (2) sessions with up to (5) people in each.

B. Have approved operation and maintenance manuals and parts lists for all equipment on hand at time of instruction.

1.12 EXTRA MATERIALS

A. All touchscreen software: Three full backup copies of the final touchscreen program on CD or flash drive. Prior to the final copies being made, provide one interim backup copy of the touchscreen program to the Owner whenever changes are made to the system during the inspection and training stage of the project

1.13 WARRANTY AND MAINTENANCE CONTRACT

A. As specified in Section 26 05 00.

PART 2 - PRODUCTS

2.1 PRODUCT SPECIFICATIONS

A. Throughout this specification, specific manufacturers and manufacturer’s catalog numbers are cited. Unless otherwise noted, these citations are for the purpose of establishing quality and performance criteria and are not intended to be proprietary.

B. Where no manufacturer is specified, provide products of manufacturers in compliance with requirements. Any item of equipment or material not specifically addressed on the drawings or in this document and required to provide a complete installation shall be provided in a level of quality consistent with other specified items.

C. The Contractor shall provide the latest product model and software version available from each manufacturer at the time of installation. No “beta version” or “test software” products will be

accepted. All proposed and provided equipment and products shall be from the specified and approved manufacturers only, unless previously approved by the Engineer or Owner.

D. All products and materials are to be new and free of defects, damage and corrosion. All materials shall be in compliance to all applicable codes and designed specifically for the function intended.

E. Quantity and location of all devices and equipment shall be as specified in Contract Documents or as required for a complete and operable system.

2.2 ACCEPTABLE MANUFACTURERS - TOUCHSCREEN MONITOR

A. EloTouch “IntelliTouch 3000 Series” or approved equal.

B. Dell.

C. Viewsonic.

D. Substitutions: Under provisions of Division 01.

2.3 TOUCHSCREEN MONITOR

A. Control Room Monitors:

1. Monitor - 22" Active matrix, TFT, LCD color flat panel touchmonitor.
2. Useful Screen Area: 18.7” horizontal, 11.7” vertical
3. Maximum Resolution - 1680 x 1050 at 60 Hz.
4. Brightness with Touchscreen: 270 cd/m2.
5. Viewing Angle: +/- 80° horizontal and vertical.
6. Touchscreen Technology - Surface Acoustic Wave.
7. Mounting: VESA-compatible rear mount.
8. Warranty: Minimum 3 years.

2.4 ACCEPTABLE MANUFACTURERS - TOUCHSCREEN CONTROLLER

A. Dell “Optiplex XE” or approved equal.

B. Hewlett Packard (HP).

C. Compaq.

D. Substitutions: Under provisions of Division 01.

2.5 TOUCHSCREEN CONTROLLER

A. Control Room Computers:

1. Intel® Core 2 Duo (2.8GHz, 3MB L2 cache) dual-core processor.
2. Operating System: Microsoft Windows 7 Professional.
3. 4GB DDR2 SDRAM Memory, 1.33GHz, (2 DIMM).

4. 250GB 2.5” SATA Drive, 3.0 Gb/s and 8MB DataBurst cache.
5. Integrated video, ATI Radeon, VGA/DVI.
6. Communications: Dell 1397 wireless half-mini PCIe card.
7. External Drive: ATAPI interface for DVD-ROM.

B. Programmable Controller and Networking Equipment - Refer to Section 28 46 19.

2.6 ACCEPTABLE MANUFACTURERS – UNINTERRUPTABLE POWER SUPPLIES

A. American Power Conversion (APC).

B. Eaton.

C. Tripp-Lite.

D. Substitutions: Under provisions of Division 01.

2.7 UNINTERRUPTABLE POWER SUPPLIES

A. Touchscreen Controllers and Monitors:

1. APC #Back-UPS series or approved equal desktop UPS with sufficient output power capacity to provide a half-load backup time of 30 minutes. UPS shall be mounted on the casework with the computer. Exact VA rating of the UPS shall be determined by the Contractor.

B. Relay/PLC Cabinets:

1. APC #Back-UPS series approved equal desktop UPS with sufficient output power capacity to provide a half-load backup time of 30 minutes. The UPS shall be mounted in the PLC cabinet and connected to the PLC and touchscreen controller. Exact VA rating of the UPS shall be determined by the Contractor.

C. Equipment Rack: APC #Smart-UPS or approved equal rack-mounted UPS with sufficient output power capacity to provide a half-load backup time of 30 minutes.

2.8 TOUCHSCREEN SOFTWARE

A. All touchscreen software shall be a non-proprietary, off-the-shelf package that is readily available for purchase directly from multiple sources. This software shall be programmed and tailored to the specified functions and features described herein and shown on the Drawings.

B. All touchscreen software licenses shall be transferred to the Owner at completion of the project. This shall include but not be limited to all original installation disks, software manuals, software development packages, runtime licenses, etc. All project-specific application software shall be transferred at the end of the warranty period.

C. Touchscreen operations shall be configured as follows:

1. One-Touch: Touching the icon executes the function. Typical uses are movement and “Go To” icons, cell doors, lights, alarm acknowledge, etc.

2. Two-Touch: First touch generates a separate popup window with function icon. Second touch executes function. Typical uses are camera selection, interlock override, group release, group exclude, etc.
3. Three-Touch: First touch generates a separate popup window with function icon. Second touch generates separate “Are You Sure?” popup window with function icon. Third touch executes function. Typical uses are perimeter security doors, group release in ST, etc.

D. All functions of the touchscreen system shall also be able to be performed using a mouse.

E. Input/Output response and screen refresh shall be less than 250ms. No increase in reaction time for the system shall be acceptable due to number of screens, functions, or functional areas in the system.

F. All control icons used shall be of size that will facilitate a positive touch point. The minimum size shall be .5 inch square. All status indicators shall be a minimum of .1875 inch in diameter, or equivalent square or rectangle.

G. Background of display shall be black.

H. All events shall be queued according to priority.

I. Graphic Map Orientation: Coordinate map orientation to match the orientation of the control room operator sitting at the desk.

J. Touchscreen graphic displays shall be created to display accurate floor plans for all areas of the facility. These shall include, but not be limited to, the following:

1. Building screens shall include building floor plan with directional arrows to move between the main functional areas (if needed based on scale). Screens shall include icons to bring up enlarged views of all sallyports.

K. Graphic map hierarchy and access shall be both operator and event driven. The system shall allow the operator to move between functional area maps by touching the area of the map that is desired. The system shall also allow events to drive the map movement when the event is acknowledged by the operator.

L. Video surveillance system: Automatic video call-up, video select, selection of full or quad scenes where quad displays are used, setup of sequences and quad displays.

M. Detention Intercom System: Intercom call-up, all call, and paging functions. Intercom calls shall be separate from door control, so that the facility can leave an intercom channel open while controlling other doors. Any associated intercom call will close when the door is closed.

N. Lighting Control: Toggle lighting in cells, rec yard, showers, etc.

O. Additional functions: Monitor PLC status.

P. System Maintenance: The most current version (at the time of substantial completion) of Symantec pcAnywhere® or approved equal remote access software shall be provided on all touchscreen computers to enable the Contractor to provide software support from a remote location.

Q. System Database: All database management and reporting functions shall utilize Microsoft Excel or approved equal database software to organize, output, and archive all system alarms, events, and actions. The database shall be automatically backed up on CD, with the schedule of backups selectable by the Owner.

2.9 TOUCHSCREEN SYSTEM EQUIPMENT CAPACITIES

A. The system shall include means for setting up to six levels of priority for each alarm and device input. The priority levels shall be as follows:

1. Level One: Staff alarms (e.g., duress, panic).
2. Level Two: Security alarms (e.g., exit or security barrier doors, unauthorized access, intrusion).
3. Level Three: Door status (e.g., door prop and door unsecured alarms).
4. Level Four: Intercoms.
5. Level Five: System alarms (e.g., PLC low battery).
6. Level Six: Undefined at this time but included in the software.

B. Priority levels may vary by time of day. Allow a minimum of three time periods per day, corresponding to shifts.

C. Provide audio links.

D. Provide video links.

E. Provide control of various building functions, including lighting.

F. Unlock doors.

G. Monitor doors and door position switches.

H. Site graphic map.

I. Local graphic map.

J. Interlocking doors.

2.10 TOUCHSCREEN SYSTEM OPERATION

A. All functions specified below shall be provided for both touchscreen workstations.

B. General Functions

1. A "Clean Screen" icon shall be provided on the main graphic screen. Touching this icon shall clear the screen (except for this icon) to allow cleaning. Touching the icon a second time shall return the system to normal operation. The cleaning function shall not affect any other functions of the system.
2. A “Calibrate Screen” function shall be programmed into the system but shall be initially password-protected at the “Administrator” level. This function shall allow the user to adjust the pointing cursor to account for parallax.

3. The system shall have a calendar, a clock with 24-hour time, and shall automatically account for daylight savings time and leap years. The clock and calendar shall be visible on all graphic screens.

C. Duress/Failover

1. Main Control Room shall have option of taking control of Unit touchscreen at any time via on-screen button in Main.

2. Duress activation on-screen in Unit shall lock out Unit controls, turn control over to Main, and activate duress alarm in Main Control Room on touchscreen.

3. Unit can turn control over to Main through on-screen button to allow for unstaffed Unit control station.

4. All intercom calls normally routed to Unit shall be routed to Main when control is transferred.

D. System Modification

1. Modifications to the layout of the touchscreen system shall be performed either on-site or from a remote location using the remote access software.
2. The remote access function shall have two levels of password protection. When this function is activated, a “Remote Communication Access Enabled” alarm shall appear on the touchscreen.
3. The remote access function shall remain active until the user logs off or until the countdown timer reaches zero. When either of these actions occurs, the connection shall be disabled and access shall be made impossible.

E. Door Control

1. The system shall monitor the call-in activity of all the controlled doors and provide a point or door call-in status to the touchscreen monitor. The system shall provide for the control of all doors from the touchscreen with no mechanical switch being utilized for this control.
2. All doors controlled by the touchscreen shall be illustrated in different colors to indicate the status of the doors. Secured points shall be green and the unsecured points shall be red. All door icons shall change orientation to simulate the operation of the door. Swing doors or gates shall be represented by a green line when closed and a red line that is pivoted away from the wall when open. Sliding doors shall be represented by offset parallel green bars when closed and aligned parallel red bars when open.
3. Activation of the fire alarm system in the building shall not affect the operation of the touchscreen security system or automatically release any doors controlled by the system.
4. Each door shall be capable of being assigned an adjustable period of time delay, after which an alarm will sound. Allow a minimum of three time periods per day corresponding to shifts. This “door prop” alarm shall be initially set on all shifts to zero for exterior doors or other security barriers and 30 seconds for all movement doors. Cell doors shall be configured for this feature but shall not be initially set for any maximum time delay.
5. All controlled exterior doors and other security barrier doors (as defined by the Owner) shall have an “Unauthorized Access” function, which will generate an alarm if the door position sensor senses the door has been opened (i.e., from the outside) prior to or without an “Unlock” command being issued by the touchscreen. This alarm shall generate an alarm popup window with “Acknowledge” and “Reset” icons. Acknowledging the event shall silence the audible alarm and the event shall remain in the Events Queue until it is reset. If the event has not been reset within five minutes, the popup window with

the “Reset” icon shall re-appear on the screen (without audible tone) for the operator to reset the door.

6. A "Group Release" function shall be provided as a 2-touch operation. When the "Group Release Enable" icon is touched, the "Group Release" icon shall appear adjacent to the corresponding group. When this icon is touched, all doors in the group shall unlock and their indicator icons shall all change from green to red on the graphic map. All door icons and the "Group Release" icon shall remain red until all doors in the group are secured, after which the icons shall change from red to green. The release of individual doors within a group shall be staggered by 0.25 seconds, or as necessary, to prevent overload of the door control circuit.
7. A “Group Exclude” or “Double-Lock” function shall be provided as a 2-touch operation. Selected cell doors within each group may be excluded from a “Group Release” function so that they do not unlock when the “Group Release” function is activated. When the Group Exclude” icon for a particular wing is touched, a window showing all cell doors in the wing shall appear and allow the operator to select which cells will remain locked. If a cell is selected for the “Group Exclude” function, it shall not be included in “Group Release” function until de-selected using the same process. If a cell door is included in the “Group Exclude” function, it shall appear on the wing screen with a dark outline or some other means to clearly indicate that the function is active for the cell.
8. For doors with positive locking latches, the latchbolt position sensor senses when the lock is activated and the door position sensor senses when the door is opened. Either of these events shall provide an unsecured door status signal to the touchscreen, and the door indicator icon shall change from green to red. After the requesting party passes through the door and the door is closed and locked, as indicated by sensors, the door indicator icon shall change from red to green. This will indicate that the door is secure.
9. An “Interlock Alert” function shall be provided on multiple sets of doors in the facility (as specified by the Owner), such as sallyport doors. When an attempt is made to open an interlocked door while another door of the interlock group is not secured, a popup window shall appear with a “Interlocked Doors” banner. A 2-touch interlock override function shall be provided to defeat the interlock. For bidding purposes, assume (10) sets of interlocked doors, with the exact quantity to be determined by the Owner.

F. Intercom Control

1. An interface with the intercom system shall be provided to include all intercom stations, paging speakers, and call-in buttons shown on the plans. A call originating from any intercom field station within the building shall generate a tone on the associated master station in the Control Room, after which the operator will acknowledge the desired station and initiate communication. Incoming calls may be answered by specifically selecting the desired station.
2. When a call is initiated by a field intercom station, any camera associated with that door shall appear on the spot monitor and the screen shall display the associated graphic map of the functional area where the call is originating. The status of all points within the functional area shall also be shown. The screen shall display icons for controlling the active point or exiting the displayed screen. The operator may change the active point by touching any other point shown on the active display.
3. The touchscreen system shall include an "Events List" screen that shows a list of all incoming calls in the queue, in the order which they are received. Any call on the list may be answered from this screen. Priority intercom stations (as designated by the Owner) shall appear in red on the list and shall precede those of a lower priority level. Selecting a specific call from the list shall display the graphic for the associated functional area. This screen shall also include a "Main" icon to return to the main map.
4. Reset of the call shall be accomplished by touching the intercom icon a second time or response to another event. If an intercom call-in associated with a door is activated, the

call shall be reset automatically after the door is opened and then re-secured, regardless of whether the intercom channel was actually opened.

5. All intercom functions except "speaker volume" and “push-to-talk” shall be performed on the touchscreen. A 1-touch operation shall be used to open or close any specific channel and a 2-touch operation shall be used for "All Call" functions.
6. Outgoing calls to all dayrooms and other stations (as determined by the Owner) shall not have a pre-announce tone. The intent is to allow the staff to monitor conversations in the rooms without the inmates being aware. The intercom system shall be capable of monitoring multiple simultaneous conversations.
7. Intercom and door control functions shall be separate, such that control of a door will not automatically open the associated intercom channel. Closing a door will close the associated intercom call, whether answered or not. Any intercom channel open for monitoring will be left open when door control actions are performed.

G. Video System Control

1. The Video system shall be interfaced with the touchscreen system and shall include all cameras and monitors connected to the IP Video system installed as part of this contract. Any view from any camera in the system shall be able to be called up on the spot monitor adjacent to the touchscreen. The system shall automatically call up cameras associated with activated doors, door position switches, intercoms, or other points in the system and display them on the spot monitor.

2. The Video system shall be controlled by the touchscreen as follows:

   a. The “Camera Selection” screen shall be used to bring up full-screen views of any connected camera on one of the monitors in the control rooms.
   b. The “Camera Selection” screen shall be used to select any camera to be viewed in any quadrant of the monitors.

H. Lighting Control

1. An interface with the lighting system shall be provided. The graphic maps of various functional areas in the building shall show the status of all lights in the areas controlled by the touchscreen system. Touching the "Light" icon for a specific room shall toggle the light on/off. This shall be noted on the screen by a change in the color of the icon. The “Light” icons shall be incorporated into the floor plans, instead of having a dedicated Lighting Control screen.

I. Alarm Announcement System

1. An alarm announcement system shall be incorporated into the paging intercom system to annunciate separate distinct tones for functions such as inmate count, medical call, and meal call. Separate icons for each announcement shall be provided on a “Utilities” popup screen. The tones shall be annunciated through all field intercoms and paging speakers in the building.

J. System Alarms:

1. The status of system alarms shall annunciate on the touchscreen as a 1-touch operation with an “Acknowledge” icon. The alarms to be monitored are as follows:

   a. UPS Alarms: Low battery, trouble, etc.

b. PLC Alarms: PLC failure, processor failure, communications failure, low battery, etc.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install all new wiring associated with the Detention Monitoring and Control System in a dedicated conduit system separate from other systems. Low-voltage wiring shall not be intermixed with 120 Volt wiring.

C. Label all wires and cables under provisions of Section 26 05 53.

D. Circuits shall be configured as "fail secure". A wire break or component failure shall prevent a security breach rather than cause one.

E. Connect input and output devices as indicated. In some cases a single output device (camera, lock, etc.) may be controlled by two or more subsystems. Full functioning of all subsystems shall be maintained at all times. Isolation of the multiple systems involved shall be provided as necessary to achieve the results specified herein.

3.2 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 01 and Division 26.

B. Perform operational testing on control systems to verify proper operation of hardware and software.

END OF SECTION

SECTION 28 46 16 - DETENTION RELAY LOGIC SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Relays.

B. Power supplies.

C. Control equipment and enclosures.

1.2 RELATED SECTIONS

A. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.

B. Section 26 05 53 – Identification for Electrical Systems.

C. Section 28 40 00 – Detention Monitoring and Control System.

D. Section 28 46 19 – Detention PLC Control System.

1.3 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

C. ANSI/NEMA ICS 1 - Industrial Control and Systems.

D. ANSI/NEMA ICS 4 - Terminal Blocks for Industrial Control Equipment and Systems.

E. ANSI/NEMA ICS 6 - Enclosures for Industrial Control Equipment and Systems

1.4 REGULATORY REQUIREMENTS

A. All systems shall comply with applicable federal, state, and local building codes. All equipment shall be Underwriters Laboratories approved if applicable. All assemblies of approved electrical components that are subject to the adopted National Electrical Code shall be third-party certified by an approved installer, in accordance with the State of Alaska Mechanical Inspection Policy Letter (MIPL 94). This includes each assembly of relays, line and low-voltage conductors, power supplies, and other equipment in each security cabinet. The UL label shall be visible either on the outside or inside of the cabinet without removing any devices or equipment from the cabinet.

1.5 SYSTEM DESCRIPTION

A. Provide all relay logic and interconnecting wiring for a complete and operable interface with the security control system specified in the Contract Documents. Provide all labor, equipment, materials and supervision to install, calibrate, adjust, document and test the total system as required herein and as specified in section 28 40 00.

B. Performance Requirements

1. On/Off Control Functions: On/Off control of individual relays, or groups of relays, from single or multiple locations.
2. System shall provide dry momentary, maintained contact or interface with the PLC and touchscreen computers.
3. Controls:

   a. Operating Temperature – 0 to 40° C.
   b. Transient Immunity – 6KV spikes.

1.6 QUALIFICATIONS

A. The entire low voltage switching system shall be supplied, assembled, installed, and commissioned by the Security Systems Integrator as specified in Section 28 40 00.

1.7 SUBMITTALS

A. Submit product data under provisions of Division 01 and Division 26.

B. Submit product data showing dimensions and ratings for power supplies, relays, and switches.

C. Show all equipment and interconnecting wiring on the security system shop drawings as specified in Section 28 40 00.

1.8 PROJECT RECORD DOCUMENTS

A. Submit project record documents under provisions of Division 01 and Division 26.

B. Accurately record location of relays, power supplies, cabinets, etc. as part of the security system project record documents as specified in Section 28 40 00. Include description of switching and circuiting arrangements for all relays.

1.9 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Division 01 and Division 26.

1.10 EXTRA MATERIALS

A. No additional spare parts. Install extra relays for future expansion as specified.

1.11 WARRANTY

A. Warrant all materials and equipment to be new and free from defects in material and workmanship for a period of one year under provisions of Division 01.

PART 2 - PRODUCTS

2.1 PRODUCT SPECIFICATIONS

A. Throughout this specification, specific manufacturers and manufacturer's catalog numbers are cited. Unless otherwise noted, these citations are for the purpose of establishing quality and performance criteria and are not intended to be proprietary.

B. Where no manufacturer is specified, provide products of manufacturers in compliance with requirements. Any item of equipment or material not specifically addressed on the drawings or in this document and required to provide a complete installation shall be provided in a level of quality consistent with other specified items.

C. The Contractor shall provide the latest product model and software version available from each manufacturer at the time of installation. No "beta version" or "test software" products will be accepted. All proposed and provided equipment and products shall be from the specified and approved manufacturers only, unless previously approved by the Engineer or Owner.

D. All products and materials are to be new and free of defects, damage and corrosion. All materials shall be in compliance to all applicable codes and designed specifically for the function intended.

E. Quantity and location of all devices and equipment shall be as specified in Contract Documents or as required for a complete and operable system.

2.2 ACCEPTABLE MANUFACTURERS – RELAY SWITCHING SYSTEM

A. Phoenix Contact.

B. General Electric.

C. IDEC.

D. Panduit.

E. Sola.

F. Substitutions: Under provisions of Division 01.

2.3 RELAY SWITCHING SYSTEM COMPONENTS

A. Relay Power Supply: Sola "SDP Series" or approved equal UL 508 listed, 24-volt DC power supply with DIN rail mount. Size power supplies to control all existing connected security system devices, including door locks, intercoms, etc. plus 10 percent capacity to allow future

system load growth. Size power supplies to account for inrush current on solenoid locks where applicable. Provide separate power supplies for the following groups of devices:

1. PLC components.
2. Low-current switching relays.
3. High-current switching relays.

B. Low-Current Switching Relays: Plug-in, SPDT miniature relay with integral terminal block, damping diode, screw-type terminal connections, and operation indicator light. Relay contacts shall be rated at 6 amperes continuous current and 30 amperes inrush current at 24 volts DC. Phoenix Contact #PLC-RSC-24DC/21 or approved equal. Provide DIN mounting rails as necessary. Use for 24V door locks/strikes, cell lights, etc.

C. High-Current Switching Relays: Plug-in, SPDT miniature relay with integral terminal block, damping diode, screw-type terminal connections, and operation indicator light. Relay contacts shall be rated at 10 amperes continuous current and 16 amperes inrush current at 120 volts AC. Phoenix Contact #PLC-RSC-24DC/21HC or approved equal. Provide DIN mounting rails as necessary. Use for 120V door locks, dayroom lights, etc.

D. Low Voltage Intercom Switching Relays: Plug-in, DPDT miniature relay with integral terminal block, damping diode, screw-type terminal connections, and operation indicator light. Relay contacts shall be rated at 6 amperes continuous current and 8 amperes inrush current at 24 volts DC. Phoenix Contact #PLC-RSC-24DC/21-21 or approved equal. Provide DIN mounting rails, sockets, hold-down clips, terminal blocks, and fuse holders as necessary.

E. Power Circuit Breaker: Miniature circuit breaker for protecting 120VAC inputs for incoming circuits to the relay backplane, power supplies, transformers, solenoid door locks, and also for 24VDC output of power supplies rated over 100VA. Phoenix Contact #TCP-xxA or approved equal, where “xx” is the current rating of the breaker. Current ratings of all breakers shall be determined by the Contractor.

F. Terminal Blocks: ANSI/NEMA ICS 4; UL listed terminal blocks with tubular pressure screw connectors, rated 300 volts. Provide DIN mounting rails and hold-down clips as necessary.

1. Door Lock Circuits: Phoenix Contact #UKK 5-TG or approved equal 2-level terminal block.
2. Intercom Circuits: Phoenix Contact #UK-5-N or approved equal.
3. Power Circuit Breakers: Mount power circuit breakers on Phoenix Contact #UK-6-FSI/C or approved equal flat-type fuse terminal block.

G. Fuse Holder For Door Locks: Fuse plug with LED light indicator for cartridge fuse inserts, designed to plug into top of Door Lock Terminal Blocks as specified above. Individually fuse all door locks. Phoenix Contact #ST-SILA250-UK-4 or approved equal.

H. Wiring Duct: Rigid PVC slotted wall wiring duct with non-slip cover, rounded edges on all slots, and breakaway fingers. Panduit “Panduct Type G” or approved equal.

2.4 ACCEPTABLE MANUFACTURERS – SECURITY SYSTEM CABINETS AND ACCESSORIES

A. Hoffman.

B. B-Line.

C. Black Box

D. Chatsworth.

E. American Power Systems (APC)

F. Substitutions: Under provisions of Division 01.

2.5 SECURITY SYSTEM CABINETS AND ACCESSORIES

A. PLC/Relay Cabinet:

1. NEMA 4 single-door gasketed steel enclosure with locking hasp, sized as required for the installed equipment, and able to fit in the intended space within the room. Hoffman or approved equal.
2. Provide positive pressure ventilation using fans and filters as required to maintain all equipment within normal operating temperature ranges. If fans are installed, they shall be listed for use in the cabinet.
3. Include appropriate barrier strips for mounting relays and separating energy-limited wiring from line voltage wiring.
4. Future Expansion: Provide 10 percent additional lighting, intercom, and door control relays on the relay backplane for future expansion of security system. Relays shall be mounted on the DIN rail with their respective group and labeled as “Future”. Provide space for one additional power supply in the cabinet.

B. Intercom Rack

1. The following cabinet is specified for bidding purposes only. The Contractor shall field verify the exact mounting method and available space and propose an alternate cabinet if appropriate.
2. Chatsworth “Cube-It” Series or equal wall-mounted, enclosed cabinet with 18U of usable mounting space.
3. Provide additional mounting brackets, rack rails, shelves, or other accessories as required to mount the new intercom and security equipment.
4. Power Distribution Unit: APC #AP9551 or approved equal vertically-mounted power distribution unit with 14 NEMA 5-15R outlets, and 20-amp, 12-foot power cord. Contractor shall determine exact mounting location of strip in cabinet in order to avoid conflicts with equipment.
5. UPS Unit: As specified in Section 28 40 00.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Field verify final location of relay cabinet to allow door to be opened to 90°.

B. Ensure that conduit sizes wire quantity, size and type are suitable for installed system. Review proper installation of each type of device per UL requirements.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install relay cabinet level and plumb.

C. Install low-voltage wiring as specified in Section 26 05 19.

D. Label all wires and cables under provisions of Section 26 05 53.

E. Install relays to be accessible. Allow space for adequate ventilation and circulation of air.

F. Neatly train all wires, cables, and cable bundles within cabinet, including all wires and cables in center section between relay backplanes. Provide a service loop of slack wire and cable to remove and/or swing out relay backplane for maintenance and troubleshooting.

G. Dress, lace or harness all wire and cable to prevent mechanical stress on electrical connections. No wire or cable shall be supported by a connection point.

H. Security Device Identification: All doors, locks, intercoms, cameras, lights, etc. shall be identified on the shop drawings using the naming/numbering scheme in use at the facility. Do not re-number or re-name any devices without prior approval from the Owner

I. Terminate all non-coaxial connections (except microphone or line level) to screw-type terminal blocks, with a maximum of two wires per screw. Wire nuts, electrical tape, or “free” (i.e. stak-on) splices shall not be used for any connections.

J. Provide protective pocket inside front cover of relay cabinet for 11”x17” full copy of approved security system project record drawings and flowsheets.

3.3 DEMONSTRATION

A. Provide systems demonstration under the provisions of Division 01 and Division 26.

B. Demonstrate proper operation of entire security system.

END OF SECTION

SECTION 28 46 19 - DETENTION PLC CONTROL SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Programmable controller central processing unit.

B. Remote input/output modules.

C. Programming Accessories.

1.2 RELATED SECTIONS

A. Section 26 05 53 – Identification for Electrical Systems.

B. Section 28 40 00 – Detention Monitoring and Control System.

C. Section 28 46 16 – Detention Relay Logic System.

D. Section 28 46 32 – Detention Intercom System.

1.3 REFERENCES

A. NEMA ICS 1 - General Standards for Industrial Control and Systems.

B. NEMA ICS 3 - Industrial Systems.

C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

D. NFPA 70 - National Electrical Code.

1.4 SYSTEM DESCRIPTION – PROGRAMMABLE CONTROLLER (PLC)

A. Provide a Programmable Controller consisting of the following:

1. Central Processing Unit (CPU) capable of processing inputs and outputs from all modules in one or more chassis as required.
2. Modular chassis, sized to accommodate all input and output modules.
3. Power supply capable of providing power to all modules in the chassis, including the CPU. Separate power supplies shall be provided for each chassis.
4. Input and Output (I/O) modules as required to perform all functions to provide a complete and operable system. The PLC shall support an open communication architecture, which enables it to be connected to other networked PLC's and to the touchscreen computer via Ethernet TCP/IP protocol with a minimum speed of 10Mbps.
5. Ladder logic software with Windows interface capable of programming all required functions for a complete and operable system.

B. The PLC shall have built-in comprehensive self-test and self-diagnostic capabilities. All controllers shall be equipped with built-in status indication of the following information:

1. Power applied to the system.
2. DC power valid.
3. Watchdog contacts.
4. Serial port(s) active.
5. CPU battery failure.
6. EEPROM program failure.

C. All PLC equipment shall be from a single manufacturer. The PLC shall be general purpose in nature and not custom designed for specific application. The PLC shall become location and operation specific upon installation of I/O modules and programming.

D. Interface with Existing Equipment:

1. The new security system shall be connected to the existing system in use at the facility for control by the Main Control Room and failover/duress capabilities, as well as all other specified functions.

1.5 REGULATORY REQUIREMENTS

A. The PLC system shall comply with applicable federal, state, and local building codes. All equipment and assemblies shall be Underwriters Laboratories approved if applicable.

1.6 QUALIFICATIONS

A. The entire programmable controller system shall be supplied, assembled, installed, and commissioned by the Security Systems Integrator as specified in Section 28 40 00.

1.7 SUBMITTALS

A. Submit product data under provisions of Division 01 and Division 26.

B. Product Data: Provide data for each component specified showing electrical characteristics and connection requirements.

C. Shop Drawings: Indicate electrical characteristics and connection requirements, including layout of completed assemblies, interconnecting cabling, dimensions, weights, and external power requirements. Show all equipment and interconnecting wiring on the security system shop drawings as specified in Section 28 40 00.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division 01.

B. All PLC equipment, wiring, etc. shall be stored in an enclosed area, maintained at a minimum of 55º F and shall be protected from weather.

C. Maintain area free of dirt and dust during and after installation of products. Protect other surfaces against damage and discoloration caused by work of this section.

1.9 SYSTEM DEMONSTRATION AND ACCEPTANCE

A. Provide systems demonstration under provisions of Division 01, Section 26 05 00, Section 28 40 00, and this section.

B. System demonstration shall be conducted as directed by the Engineer but generally described as follows:

1. Test a random sample of input and output points to show that a specific function or action in the system generates the correct response on the touchscreen and illuminates the corresponding LED on the I/O module.
2. Verify remote PLC access for troubleshooting.
3. Verify all PLC-related internal alarms, including CPU battery failure, processor failure, communication failure, etc.
4. Verify all PLC control functions related to the Detention Monitoring and Control System, as specified in Section 28 40 00.

1.10 CLOSEOUT SUBMITTALS

A. Project Record Drawings:

1. Submit documents under provisions of Division 01 and Section 26 05 00.
2. Accurately record PLC equipment elevations, as-built wiring diagrams, etc. as part of the security system project record documents as specified in Section 28 40 00.

B. Operation and Maintenance Manuals:

1. Submit documents under provisions of Division 01 and Section 26 05 00.

1.11 PLC SYSTEM TRAINING

A. As specified in Section 28 40 00.

1.12 EXTRA MATERIALS

A. All PLC software: Three full backup copies of the final PLC program on CD or flash drive. Prior to the final copies being made, provide one interim backup copy of the PLC program to the Owner whenever changes are made to the system during the inspection and training stage of the project

1.13 WARRANTY AND MAINTENANCE CONTRACT

A. As specified in Section 26 05 00.

PART 2 - PRODUCTS

2.1 PRODUCT SPECIFICATIONS

A. Throughout this specification, specific manufacturers and manufacturer's catalog numbers are cited. Unless otherwise noted, these citations are for the purpose of establishing quality and performance criteria and are not intended to be proprietary.

B. Where no manufacturer is specified, provide products of manufacturers in compliance with requirements. Any item of equipment or material not specifically addressed on the drawings or in this document and required to provide a complete installation shall be provided in a level of quality consistent with other specified items.

C. The Contractor shall provide the latest product model and software version available from each manufacturer at the time of installation. No "beta version" or "test software" products will be accepted. All proposed and provided equipment and products shall be from the specified and approved manufacturers only, unless previously approved by the Engineer or Owner.

D. All products and materials are to be new and free of defects, damage and corrosion. All materials shall be in compliance to all applicable codes and designed specifically for the function intended.

E. Quantity and location of all devices and equipment shall be as specified in Contract Documents or as required for a complete and operable system.

2.2 ACCEPTABLE MANUFACTURERS - PROGRAMMABLE CONTROLLER

A. Schneider Electric/Modicon "M340" Series or approved equal.

B. Allen-Bradley.

C. Siemens.

D. GE Fanuc.

E. Omron.

F. Substitutions: Under provisions of Division 01.

2.3 PROGRAMMABLE CONTROLLER

A. Provide new PLC/relay system to control all points as shown on the Drawings.

B. PLC Backplane: Modicon M340 #BMXXBPxx00 or approved equal backplane, where the "xx" in the part number is the quantity of slots on the backplane. Provide either 8-slot or 12-slot backplane, as required for the number of modules.

C. Power Supply: Modicon M340 #BMXCPS2000 or approved equal 20W power supply.

D. Processor Module: Modicon M340 #BMXP342000 or approved equal CPU with 4096kB RAM, 8MB SD flash memory card for application backup, and on-board USB, Ethernet TCP/IP, and RS-485 ports.

E. Ethernet TCP/IP Communications Module: Modicon M340 #BMXNOE0100 or approved equal communications adapter with 10BASE-T Ethernet port.

F. I/O Modules: Modicon M340 #BMXDDIxx02K and #BMXDDIxx02K series or approved equal discrete input and output modules, where the "xx" in the part number is the quantity of input or output points. Provide modules with point counts and quantities as required to obtain the specified sequence of operation

G. Universal Communications Base: NR&D #MUCM or approved equal programmable serial communications module for the Momentum PLC. Module includes two selectable and individually configurable serial ports for RS-232/422/485 protocol.

H. Ethernet Switch: N-Tron #308TX or approved equal unmanaged industrial Ethernet switch with eight 10/100 RJ-45 ports.

2.4 PROGRAMMING ACCESSORIES

A. Software: Modicon "Unity" or approved equal programming software, latest published version. The software shall have the following features:

1. 32-bit ladder logic programming with a Windows interface.
2. Online editing of the PLC processor.
3. Consolidated Project View: All information is displayed as a "project tree".
4. Diagnostic and Troubleshooting Tools: The software shall be able to diagnose the interaction of output instructions within a section of the program by viewing them at the same time.
5. The software shall be able to move instructions from one rung to another within a project using drag and drop editing.

B. Communications cable:

1. Provide a Superior Essex "DataGain" or approved equal Category 6 cable and jack to connect each touchscreen computer to the PLC. Cable should be the same manufacturer provided for horizontal UTP cabling of other systems.
2. PLC I/O Cable: West Penn #275 or approved equal 20-conductor, 22 AWG cable with PVC outer jacket.

2.5 EQUIPMENT CABINET

A. Mount PLC in PLC/Relay cabinet as specified in Section 28 46 16.

2.6 INTERFACE WITH EXISTING EQUIPMENT

A. Provide all necessary software, hardware, programming, and labor to interface with all existing field devices in the building, as indicated on the Contract Drawings, and as field-verified by the Contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install PLC in relay cabinet where indicated on the Drawings.

C. Connect all input and output devices as required to control systems as specified herein and elsewhere in the Contract Documents.

D. Extend I/O cables from PLC I/O modules to new and existing field terminals and relays.

3.2 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 01 and Division 26.

B. Perform operational testing on control systems to verify proper operation and field wiring connections.

END OF SECTION

SECTION 28 46 32 - DETENTION INTERCOM SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Master intercom system

1.2 RELATED WORK

A. Section 26 05 00 – Common Work Results for Electrical.

B. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

C. Section 128 46 16 – Detention Relay Logic System

D. Section 26 05 53 – Identification for Electrical Systems.

E. Section 28 40 00 – Detention Monitoring and Control System

F. Section 28 46 19 – Detention PLC Control System

1.3 SYSTEM DESCRIPTION

A. Provide complete intra-communications systems for two-way voice communication between the master station in the Control Room and all associated call-in buttons, paging speakers, and field stations.

B. Provide an interface with the Detention Monitoring and Control System for operational features as indicated.

C. Systems shall be interconnected and shall be custom designed to accomplish and comply with the operation description, as noted on the drawings and described herein.

D. All systems shall be complete with all required components, equipment and wiring to provide the communications system and perform the functions outlined.

E. Some systems included in the work of this section are referred to as hands-free intercoms. This application is intended to mean that the person at the remote location need not use his hands to communicate with the person at the staff location. The person at the staff location must use the push-to-talk switch in order to have a two-way conversation.

F. Provide all conduit, raceways, shelves, equipment, backboards, etc. as required for a complete and operable system.

1.4 QUALIFICATIONS

A. The entire intercom system shall be supplied, assembled, installed, and commissioned by the Security Systems Integrator as specified in Section 28 40 00.

B. Manufacturer: Company specializing in detention intercom systems with a minimum three years documented experience in Correctional Facilities.

1.5 SUBMITTALS

A. Submit product data under provisions of Division 01 and Division 26.

B. Product Data: Provide data for each component specified showing electrical characteristics and connection requirements.

C. Provide intercom system shop drawings as part of the security system shop drawings as specified in Section 284000.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site, store and protect under provisions of Division 01.

B. All intercom equipment, wiring, etc. shall be stored in an enclosed area, maintained at a minimum of 55º F and shall be protected from weather.

C. Maintain area free of dirt and dust during and after installation of products. Protect other surfaces against damage and discoloration caused by work of this section.

1.7 SYSTEM DEMONSTRATION AND ACCEPTANCE

A. Provide systems demonstration under provisions of Division 01, Section 26 05 00, Section 28 40 00, and this section.

B. System demonstration shall be conducted as directed by the Engineer but generally described as follows:

1. Test each field intercom station by initiating a call from either end and verifying proper voice intelligibility at both the field station and new master station. Adjust volume levels to Owner satisfaction.
2. Verify all intercom control functions related to the Detention Monitoring and Control System, as specified in Section 28 40 00.

1.8 CLOSEOUT SUBMITTALS

A. Project Record Drawings:

1. Submit documents under provisions of Division 01, Section 26 05 00, and this Section.
2. Accurately record location of field intercoms, master station, etc. as part of the security system project record documents as specified in Section 28 40 00.

3. Include a reduced set (11" x 17") set of the security system project record drawings in the operation and maintenance manual.

B. Operation and Maintenance Manuals:

1. Submit documents under provisions of Division 01, Section 26 05 00, and this Section.
2. Operation and Maintenance Data: Include bound copies of operating and maintenance data with programming instructions.
3. Include routine preventive maintenance schedule.
4. List special tools, maintenance materials, and replacement parts.
5. Provide operation and maintenance instructions including detailed electronic schematic drawings, detailed parts list with exploded view of all equipment, and detailed troubleshooting instructions.
6. Include copies of manufacturer product warranties for all equipment.

1.9 INTERCOM SYSTEM TRAINING

A. As specified in Section 28 40 00.

1.10 EXTRA MATERIALS

A. None required. Provide spare relays as specified in 28 40 00.

1.11 WARRANTY

A. As specified in Section 26 05 00.

PART 2 - PRODUCTS

2.1 PRODUCT SPECIFICATIONS

A. Throughout this specification, specific manufacturers and manufacturer's catalog numbers are cited. Unless otherwise noted, these citations are for the purpose of establishing quality and performance criteria and are not intended to be proprietary.

B. Where no manufacturer is specified, provide products of manufacturers in compliance with requirements. Any item of equipment or material not specifically addressed on the drawings or in this document and required to provide a complete installation shall be provided in a level of quality consistent with other specified items.

C. The Contractor shall provide the latest product model and software version available from each manufacturer at the time of installation. No "beta version" or "test software" products will be accepted. All proposed and provided equipment and products shall be from the specified and approved manufacturers only, unless previously approved by the Engineer or Owner.

D. All products and materials are to be new and free of defects, damage and corrosion. All materials shall be in compliance to all applicable codes and designed specifically for the function intended.

E. Quantity and location of all devices and equipment shall be as specified in Contract Documents or as required for a complete and operable system.

2.2 MANUFACTURERS – DETENTION INTERCOM SYSTEM

A. Basis of Design: Harding Instruments Co. “MicroComm DXL” series.

B. Tech Works “ICA202”.

C. Zenetel “Stentofon”.

D. Substitutions: Under provisions of Division 01.

2.3 CENTRAL SWITCHING EXCHANGE

A. Intercom communication functionality shall be as specified in Section 28 40 00.

B. The security intercom system exchange mainframe shall be modular, expandable for optimum station configuration and capable of future expansion by adding expander modules as required. Each exchange shall have the following capacities and features:

1. Master Stations: One master station for each touchscreen workstation, expandable to 16 total.
2. Field Stations: System shall be expandable to 160 stations per exchange, 5120 stations per system. Initial capacity as required for all stations indicated on the Drawings.
3. Chassis capacity for holding all necessary control and line cards.

C. The Digital Communication Controller (DCC) shall have the following components:

1. Process Control Card (PCC): Contains system configuration and data, controls exchange operations and switching, and provides exchange network port. Each PCC has USB ports, Ethernet ports, fiber/copper digital audio trunk ports, serial ports, and internal modem.
2. Master Control Card (MCC): Converts incoming audio signals to digital format and outgoing signals to analog format. Includes two line level audio inputs and outputs with status and control. If Voice over IP (VoIP) master station is used, MCC may be excluded if not needed for system operation.
3. Station Control Card (SCC): Provides an interface for intercom Field Stations by converting incoming audio signals to digital format and outgoing signals to analog format. Each card provides sixteen (16) half-duplex intercom station ports which can be employed in adjacent pairs for full duplex devices. Each channel includes a separate audio power amplifier for non-blocking call operation and sixteen (16) independent software-controlled volume settings.
4. Front panel keypad display.
5. On-board power supply.

D. The Digital Communication Expander (DCE) shall provide intercom features similar to the DCC and shall facilitate exchange expansion. Each DCE shall have the following components:

1. Slave Process Control Card (PCC): Same as standard PCC but without exchange control or network functions.
2. Master Control Card (MCC): Same as in DCC.

3. Station Control Card (SCC): Same as in DCC.
4. On-board power supply.

E. Paging Amplifier: Solid-state amplifier with audio output wattage rating as required to drive all intercom speakers shown on the plans for an "All Call" function, as specified in Section 28 40 00. Speaker load shall represent no more than 80% of the total amplifier load, at less than 3% distortion. Frequency response shall be flat from 40 to 15,000 Hz and noise level shall be at least 84 dB below rated output.

F. Talkback Expander: Provide talkback expander for bi-directional communication using paging speakers.

G. Mounting Brackets: Provide mounting brackets for DCC controller and expander enclosures as required to mount in security cabinet. Refer to Section 28 46 16.

H. Switching Relays: Provide additional switching relays as required to provide the operation specified herein, in Section 28 40 00, and as shown on the Drawings. All relays that are not part of the manufactured intercom system shall be as specified in Section 28 46 16.

2.4 SYSTEM SOFTWARE

A. Administrator Software shall function on a standard PC to support system configuration, diagnostics, maintenance, and logging but shall not be required for system operation. Software shall employ Windows features, including views of system tree structure, tables of devices, screens for system settings and adjustments, and tables of operational data.

2.5 TOUCHSCREEN INTERCOM MASTER STATION

A. Desktop intercom master station with push-to-talk (PTT) switch, built-in speaker with volume adjustment, and 12" gooseneck electret microphone. Master station shall have a line level output jack for driving an external speaker. Harding #TMM-440 or approved equal.

B. VoIP version of master station is acceptable at Contractor's option.

C. Switching relays shall be provided as required to provide the operation specified herein and as shown on the drawings.

D. The master control station shall provide the following features and functions:

1. Direct two-way voice communication between the master control station and any field intercom station connected to the system.
2. After selection at the touchscreen, communication through the speaker is amplified via the intercom amplifier in the relay cabinet.

2.6 SPEAKERS AND ACCESSORIES

A. Intercom Field Stations: Harding # ICS-4X(0 or 1, to match Station Control Card) or approved equal round recessed intercom station with 11-gauge brushed stainless steel faceplate, center-pin Torx fasteners, and vandal-resistant, waterproof, gasketted call-in switch mounted on the faceplate. Speakers shall be 2.5 inch diameter, seamless cone type with a ceramic magnet. Speaker shall mount on 4" octagonal box. .

B. Paging speakers: Dukane # 5A606 or approved equal eight-inch diameter, seamless cone type with a ceramic magnet weighting at least 4.8 ounces. The voice coil shall be ¾" diameter and shall have an 8 ohm impedance. The speakers shall have a normal wattage rating of 10 Watts, a program rating of 16 Watts and a frequency range of 90 Hz-15 KHz. The speaker shall have a sound power output of 91 dB at 3.3' on axis with 1-Watt input.

C. Speaker matching transformers shall be provided for all speakers with a speaker line voltage of 25 or 70 Volts and a secondary impedance to match the speaker input impedance. The matching transformer shall have a capacity of 4 Watts and shall have power taps of 4, 2, 1 and ½ Watts. The frequency response shall be within a 2 dB envelope from 50 to 10,000 Hz, induced distortion less than 1% and insertion loss of not more than 1.5 dB. The transformer shall mount directly to the speaker.

2.7 INTERCOM CABLE

A. #18 AWG minimum cable with one twisted shielded pair with a bare drain wire and one twisted unshielded pair minimum. West Penn #360 or approved equal.

2.8 INTERCOM CABINET

A. Mount the intercom system head-end equipment in the new cabinet specified in 28 46 16.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Intercom system wiring shall not be intermixed with 120V power wiring or door control wiring and shall be run in a dedicated conduit system.

B. Control systems wiring in conjunction with intercom master station to be identified in accordance with wiring diagrams furnished with equipment.

C. Pre-Announce Tone: Disable the pre-announce tone for intercom stations in dayrooms and other areas as directed by the Owner.

3.2 FIELD QUALITY CONTROL

A. The final connections, start-up, check-out and owner instruction on the system shall be done by a manufacturer's certified and authorized technician.

B. Under provisions of Division 01 and this Section, the manufacturer's certified technician shall make a thorough inspection of the complete installation including all components to ensure the following:

1. The system is complete and functional and complies with all requirements of the specifications.
2. All equipment meets Underwriter's Laboratories requirements.
3. The system is installed in accordance with the manufacturer's instructions.
4. Project record drawings are complete and up to date.

5. Make changes necessary to conform to Items 1, 2, 3 and 4 with technical assistance from the manufacturer as required.

END OF SECTION