

STATE OF ALASKA  
DEPARTMENT OF CORRECTIONS  
HILAND MOUNTAIN CORRECTIONAL CENTER  
CONTROL ROOM UPGRADES

---

DOT PROJECT #: 170002051  
NTP #: 22

100% CONSTRUCTION DOCUMENT SPECIFICATIONS

OCTOBER 10, 2017



**SECTION 02 41 00**  
**DEMOLITION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Selective demolition of building elements for alteration purposes.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

**1.03 REFERENCE STANDARDS**

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Schedule: Selective demolition activities with starting and ending dates for each activity.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

**1.05 PREINSTALLATION MEETINGS**

- A. Pre-demolition Conference: Conduct conference at Project site.

**PART 2 PRODUCTS -- NOT USED**

**PART 3 EXECUTION**

**3.01 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with other requirements specified in Section 01 70 00.
- B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  - 3. Provide, erect, and maintain temporary barriers and security devices.
  - 4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
  - 5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  - 6. Do not close or obstruct roadways or sidewalks without permit.
  - 7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.

8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- C. Do not begin removal until receipt of notification to proceed from Owner.
- D. Protect existing structures and other elements that are not to be removed.
  1. Provide bracing and shoring.
  2. Prevent movement or settlement of adjacent structures.
  3. Stop work immediately if adjacent structures appear to be in danger.
- E. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

### **3.02 SELECTIVE DEMOLITION FOR ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  1. Verify that construction and utility arrangements are as indicated.
  2. Report discrepancies to Architect before disturbing existing installation.
  3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
  1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 .
- C. Remove existing work as indicated and as required to accomplish new work.
  1. Remove items indicated on drawings.
  2. 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.
  3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  4. Do not use cutting torches.
  5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  6. Dispose of demolished items and materials promptly.
- D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
  1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
  2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
  3. See Section 01 10 00 for other limitations on outages and required notifications.
  4. Verify that abandoned services serve only abandoned facilities before removal.
  5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- E. Protect existing work to remain.
  1. Prevent movement of structure; provide shoring and bracing if necessary.
  2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  3. Repair adjacent construction and finishes damaged during removal work.
  4. Patch as specified for patching new work.

**3.03 DEBRIS AND WASTE REMOVAL**

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION 02 41 00**



**SECTION 04 05 11**  
**MORTAR AND MASONRY GROUT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Mortar for masonry.
- B. Grout for masonry.

**1.02 RELATED REQUIREMENTS**

- A. Section 04 20 02 - Single-Wythe Unit Masonry: Installation of mortar and grout.

**1.03 REFERENCE STANDARDS**

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.
- B. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2016a.
- C. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
- D. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.
- E. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
- F. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
- G. ASTM C476 - Standard Specification for Grout for Masonry; 2016.
- H. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2016a.
- I. ASTM C1019 - Standard Test Method for Sampling and Testing Grout; 2016.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used.
- C. Reports: Submit reports on mortar indicating conformance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.
- D. Reports: Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C1019.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

**1.06 FIELD CONDITIONS**

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

**PART 2 PRODUCTS**

**2.01 MORTAR AND GROUT APPLICATIONS**

- A. Mortar Mix Designs: ASTM C270, Property Specification.
  - 1. Interior, Loadbearing Masonry: Type N.
  - 2. Interior, Non-loadbearing Masonry: Type O.
- B. Grout Mix Designs:

**2.02 MATERIALS**

- A. Portland Cement: ASTM C150/C150M.

1. Type: Type I - Normal; ASTM C150/C150M.
  2. Color: Standard gray.
- B. Mortar Aggregate: ASTM C144.
- C. Grout Aggregate: ASTM C404.
- D. Water: Clean and potable.
- E. Bonding Agent: Latex type.

### **2.03 MORTAR MIXING**

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar.
- D. If water is lost by evaporation, re-temper only within two hours of mixing.

### **2.04 GROUT MIXING**

- A. Mix grout in accordance with ASTM C94/C94M.
- B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Apply bonding agent to existing concrete surfaces.
- B. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

### **3.02 INSTALLATION**

- A. Install mortar and grout to requirements of section(s) in which masonry is specified.

### **3.03 GROUTING**

- A. Perform all grouting by means of low-lift technique. Do not employ high-lift grouting.
- B. Low-Lift Grouting:
1. Limit height of pours to 12 inches (300 mm).
  2. Limit height of masonry to 16 inches (400 mm) above each pour.
  3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
  4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

### **3.04 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 40 00 - Quality Requirements.
- B. Test and evaluate mortar in accordance with ASTM C780 procedures.

**END OF SECTION 04 05 11**

**SECTION 04 20 02**  
**SINGLE-WYTHE UNIT MASONRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Concrete masonry units.
- B. Reinforcement, anchorage, and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 04 05 11 - Mortar and Masonry Grout: Mortar and grout for single wythe unit masonry.
- B. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

**1.03 REFERENCE STANDARDS**

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.
- C. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2016.
- D. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2014a.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for interior masonry units.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

**1.06 FIELD CONDITIONS**

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

**PART 2 PRODUCTS**

**2.01 CONCRETE MASONRY UNITS**

- A. Concrete Block: Comply with referenced standards and as follows:
  - 1. Size: Standard units with nominal face dimensions of 16 x 8 inches (400 x 200 mm) and nominal depths as indicated on the drawings for specific locations.
  - 2. Load-Bearing Units: ASTM C90, normal weight.
    - a. Hollow block.
  - 3. Non-Loadbearing Units: ASTM C129.
    - a. Hollow block.

**2.02 MORTAR AND GROUT MATERIALS**

- A. Mortar and Grout: As specified in Section 04 05 11.

**2.03 REINFORCEMENT AND ANCHORAGE**

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa) yield strength, deformed billet bars; uncoated.
- B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

- C. Expansion Bolt Anchors: double expansion anchor for horizontal application, size to achieve required loading capacity, hot dip galvanized to ASTM A153/A153M, Class B.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.

#### **3.02 COURSING**

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
  - 1. Bond: Running.
  - 2. Coursing: One unit and one mortar joint to equal 8 inches (200 mm).
  - 3. Mortar Joints: Concave.

#### **3.03 PLACING AND BONDING**

- A. Lay hollow masonry units with face shell bedding on head and bed joints.
- B. Remove excess mortar as work progresses.
- C. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

#### **3.04 REINFORCEMENT AND ANCHORAGE**

- A. Install horizontal joint reinforcement 16 inches (400 mm) on center.
- B. Place continuous joint reinforcement in first and second joint below top of walls.
- C. Lap joint reinforcement ends minimum 6 inches (150 mm).

#### **3.05 GROUTED COMPONENTS**

- A. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.
- B. Place and consolidate grout fill without displacing reinforcing.

#### **3.06 CLEANING**

- A. Remove excess mortar and mortar smears as work progresses.
- B. Use non-metallic tools in cleaning operations.

**END OF SECTION 04 20 02**

**SECTION 05 50 00**  
**METAL FABRICATIONS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Steel framing and supports for detention doors and grilles.
- B. Steel plate CMU wall reinforcement.

**1.02 RELATED REQUIREMENTS**

- A. Section 04 20 02 - Single-Wythe Unit Masonry: Placement of metal fabrications in masonry.
- B. Section 09 91 23 - Interior Painting: Paint finish.

**1.03 REFERENCE STANDARDS**

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- C. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015 (Errata 2016).
- D. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2011.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

**1.05 QUALITY ASSURANCE**

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/ D1.1M, " Structural Welding Code- Steel."
- B. Design steel framing and supports for detention doors and grilles under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- C. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

**1.06 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**

**2.01 MATERIALS - STEEL**

- 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 Sections: ASTM A36/A36M.
- C. Steel Tubing: ASTM A500/A500M, Grade B cold-formed structural tubing.
- D. Steel Plates: ASTM A 36/ A36M.

**2.02 FASTENERS**

- A. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3; with hex nuts, ASTM A 563, Grade C3; 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. 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.

### **2.03 MISCELLANEOUS MATERIALS**

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

### **2.04 FABRICATION**

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. 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.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- E. Weld corners and seams continuously to comply with the following.
  - 1. Use materials and methods that minimize distortion and continuously strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, continuously exposed welds and surfaces continuously and blended so no roughness shows after finishing.
- F. 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.

### **2.05 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.
- C. Fabricate supports for detention doors and gates from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

### **2.06 STEEL WELD PLATES AND ANGLES**

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work.

### **2.07 FINISHES - STEEL**

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool, die marks and stretch lines, blend into surrounding surfaces.
- C. Prime paint steel items.
  - 1. Shop prime with universal shop primer.
- D. Prepare surfaces to be primed in accordance with SSPC-SP3. "Power Tool Cleaning".

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

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

#### **3.02 INSTALLATION**

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS D1.1/D1.1M.
- D. Obtain approval prior to site cutting or making adjustments not scheduled.
- E. 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.

#### **3.03 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.
- B. Anchor supports for detention doors and gates securely to, and rigidly brace from, building structure.

#### **3.04 ADJUSTING AND CLEANING**

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0- mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 91 23.

**END OF SECTION 05 50 00**



**SECTION 06 41 00**  
**ARCHITECTURAL WOOD CASEWORK**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Plastic- laminate cabinets.
- B. Wood furring, blocking, shims, and hanging strips for installing plastic laminate cabinets unless concealed within other construction before cabinet installation.
- C. Cabinet hardware.

**1.02 RELATED REQUIREMENTS**

- A. Section 12 36 00 - Countertops.

**1.03 REFERENCE STANDARDS**

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. BHMA A156.9 - American National Standard for Cabinet Hardware; 2015.
- C. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

**1.04 SUBMITTALS**

- A. Product Data: For panel products, Wood Veneers, high-pressure decorative decorative laminate, adhesive for bonding plastic laminate, cabinet hardware and accessories, and finishing materials and processes.
- 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.
  - 2. Show location and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
  - 3. Show locations and sizes of cutouts and holes for items installed in architectural woodwork.
- C. Samples for Initial Selection:
  - 1. Plastic laminates.
  - 2. PVC edge material.
  - 3. Cabinet hardware.
- D. Samples for Verification:
  - 1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish.
- E. Maintenance Data: Submit manufacturer's recommended cleaning and protection instruction for each finish or exposed material.
- F. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- G. Product Data: Provide data for hardware accessories.

**1.05 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.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect units from moisture damage.
- B. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation

areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

- C. Store in original packaging away from direct sunlight

#### **1.07 FIELD CONDITIONS**

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.
- B. Environmental Limitations: Do not deliver or install woodwork 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.
- C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other constructions by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

#### **1.08 COORDINATION**

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

### **PART 2 PRODUCTS**

#### **2.01 PLASTIC-LAMINATE 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.
- C. Type of Construction: Frameless
- D. Cabinet, Door, and Drawer Front Interface Style: Reveal overlay.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
  - 1. Manufactures: 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. Wilsonart International
- F. Laminate Cladding for Exposed Surfaces:
  - 1. Horizontal Surfaces: Grade HGS
  - 2. Vertical Surfaces: Grade HGS
  - 3. Edges: PVC edge banding, 0.12 inch (3 mm) minimum thickness, matching laminate in color, pattern, and finish.
- G. Material for Laminate 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 Laminate 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. 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.
- I. 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 by laminate manufacturer's designation.

## **2.02 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: 5 to 10 percent.

## **2.03 CABINET HARDWARE AND ACCESSORIES**

- A. 5-knuckle hinges: BHMA A156.9, B01602, 135 degrees of opening, self-closing.
- B. Wire Pulls: Back mounted, solid metal, 5 inches long, 2-1/2 inches deep, and 5/16 inch in diameter.
- 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 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing sliders.
  - 2. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
  - 3. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
- F. Door and Drawers Silencers: BHMA A156.16, L03011.
- G. 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.

## **2.04 MISCELLANEOUS MATERIALS**

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Wood Glues: 30 g/L.
  - 2. Contact Adhesive: 250 g/L.

## **2.05 FABRICATION**

- A. Verification of Dimensions: Verify all approved appliance and equipment sizes prior to fabrication of cabinetwork, to avoid conflict.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Fabricate cabinets to dimensions, profiles, and details indicated.
- D. Complete fabrication, including assembly and hardware applications, to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide ample allowance for scribing, trimming and fitting.
  - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
  - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- E. Shop-cut openings to maximum extent possible to receive hardware, appliances, 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.

## **PART 3 EXECUTION**

### **3.01 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 mechanical, electrical, and building items affecting work are placed and ready to receive work.

### **3.02 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 nails or 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.

**3.03 ADJUSTING**

- 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.

**3.04 CLEANING**

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

**END OF SECTION 06 41 00**



**SECTION 07 92 00**  
**JOINT SEALANTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 08 88 53 - Security Glazing: Glazing sealants and accessories.
- B. Section 23 31 00 - HVAC Ducts and Casings: Duct sealants.

**1.03 REFERENCE STANDARDS**

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014a.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- D. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
  - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
  - 2. List of backing materials approved for use with the specific product.
  - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
  - 4. Substrates the product should not be used on.
  - 5. Substrates for which use of primer is required.
  - 6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
  - 7. Sample product warranty.
  - 8. Certification by manufacturer indicating that product complies with specification requirements.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of experience.

## 1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

## PART 2 PRODUCTS

### 2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
  - 1. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
    - a. Joints between door, window, and other frames and adjacent construction.
    - b. Other joints indicated below.
  - 2. Do not seal the following types of joints.
    - a. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
    - b. Joints where installation of sealant is specified in another section.
    - c. Joints between suspended panel ceilings/grid and walls.
- B. Interior Joints: Use non-sag silicone sealant, unless otherwise indicated.
  - 1. Wall, Ceiling, and Floor Joints Where Tamper-Resistance is Required: Non-sag epoxy sealant.
- C. Areas Where Tamper-Resistance is Required: See Schedule.

### 2.02 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. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have stained porous joint substrates for Project.
- C. Colors of Exposed Joint Sealants: As selected by Department from manufacturer's full range.

### 2.03 NONSAG JOINT SEALANTS

- A. Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus 25 percent, minimum.
  - 2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
  - 3. Color: Match adjacent finished surfaces.
  - 4. Cure Type: Single-component, neutral moisture curing
- B. Type Tamper-Resistance - Epoxy Sealant: ASTM C920, Grade NS, Uses M and A; two-part component epoxy bonding agents with fine sand; not expected to withstand continuous water immersion or traffic.
  - 1. Manufacturers:
    - a. Sikadur: 31 Hi-Mod Gel or 32 H-Mod Gel.
    - b. Master Builders Technologies: Concessive Standard Paste or Concessive Paste LPL.
    - c. Euclid Chemical Co. Product: Euco #452-P.
    - d. Pecora Corp.: Dynaflex EP-1200.
    - e. Sonnenborn Building Products: Epolith-P or G.
    - f. Sand: Graded, washed, kiln dried, bagged silica sand, low-void, mixed at the rate of two parts #12 or #16 mesh to one part #80 to #100 mesh.

## **2.04 ACCESSORIES**

- A. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- B. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- C. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

### **3.03 INSTALLATION**

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- G. Mix epoxy in accordance with manufacturer's instructions for purpose intended. Mix components in clean equipment or containers. Conform to pot life and workability limits.

### **3.04 CLEANING**

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses and with cleaning materials approved in writing by manufactureres of joint sealants and of products in which joints occur.
- B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

### **3.05 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 protetion, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

### **3.06 SCHEDULE**

- A. Without limitation and unless otherwise noted, install epoxy sealants as follows:
  - 1. Joints at perimeter of detention metal openings and concrete or masonry walls.
  - 2. Perimeter joints of surface mounted items to concrete, concrete masonry and steel walls, concrete floors and ceilings, steel ceilings, and plaster ceilings, including but not limited to lights, grilles, registers, cover plates cell mirrors, shelves, toilet paper holders, wall bumpers speaker covers, sprinkler heads etc.

**END OF SECTION 07 92 00**

**SECTION 08 34 60**  
**DETENTION DOORS AND FRAMES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Metal detention doors, sliding type.
- B. Metal detention frames.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 92 00 - Joint Sealants.
- B. Section 08 71 11 - Security Screws.
- C. Section 08 71 60 - Detention Door Hardware.
- D. Section 08 88 53 - Security Glazing.

**1.03 REFERENCE STANDARDS**

- A. ASTM A36 - Standard Specification for Carbon Structural Steel.
- B. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- C. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015
- E. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.
- F. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2015.
- G. NAAMM HMMA 863 - Guide Specifications for Detention Security Hollow Metal Doors and Frames; 2014.

**1.04 COORDINATION**

- A. Coordinate anchorage installation for detention frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors that are to be embedded in adjacent construction. Deliver such items to Project site in time for installation.

**1.05 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. Submit composite type shop drawings showing complete details of construction including door and frame elevations and sections, glazing, glazing stops, hardware and preparation for hardware and electronic components, joint connections and all other related types of construction.
  - 2. Show listing of opening descriptions including locations, gages, anchors, and finish hardware sets.
  - 3. Show fabrication and installation drawings, including anchorage and sequence of installation, where applicable.

4. Provide 1/8" scale plans showing the loose glazing stop sides intended to be set and show locations and details of all openings, including food-pass openings.
  5. When possible, take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting of the work. Otherwise, indicate field measurements on reviewed shop drawings.
  6. Details of conduits, junction boxes, and preparations for electrically operated door hardware.
- C. Submit data defining proposed primer paints; include descriptions of equivalence to types specified and written confirmation that selected primer paints are compatible with finish paints.
- D. Welding certificates.
- E. 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.
- F. Maintenance Materials: 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.

#### **1.06 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."
- C. Fabrication methods and product quality shall meet standards set by the Hollow Metal Manufacturers Association, HMMA, a division of the National Association Architectural Metal Manufacturers, NAAMM.
- D. Shop Assembly: Preassemble products in shop to greatest extent possible to minimize field splicing and assembly. Disassemble products only as necessary for shipping and handling limitations. Clearly mark products for reassembly and coordinated installation.

#### **1.07 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 non-vented 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. Repair or replace damaged products or structures as directed.
- D. Markings: Insure that all detention equipment products are tagged with markings (door schedule reference) which show proper installation locations.
- E. Defective Products: Items found to be defective either through manufacturing, transit damage, field installation, etc. shall be replaced within a three week period. Special shipment and manufacturing arrangements must be arranged to accomplish this requirement.

#### **1.08 WARRANTY**

- A. All hollow metal work shall be warranted from defect in workmanship and quality for a period of two years from date of project acceptance.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Basis-of-Design: Subject to compliance with requirements, provide Trussbilt; an ASSA
  - 1. ABLOY Group company or approved substitution.
- B. Habersham Metal Products; Cornelia, GA.
- C. Southern Steel, Co., San Antonio, TX.
- D. Source Limitations: Obtain detention doors and frames from single source from single manufacturer.

### **2.02 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. Bullet Resistance: Level 3 rated when tested according to UL 752.
  - 3. 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.

### **2.03 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 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-inchthick, 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-inchthick, 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-inchthick 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-inchthick 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. Slide-Device Hanger Attachments: As recommended by device manufacturer.
  - 2. Lock Fronts: 0.093 inch thick.
  - 3. All Other Surface-Mounted Hardware: 0.093 inch thick.
  - 4. 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 NAAMMHMMA 863 and as specified.
  - 1. Security Grade 1: Provide doors with face sheets of 0.093-inch minimum thickness, cold-rolled steel.

#### 2.04 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 minimum 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 NAAMMHMMA 863 and as specified.
  - 1. Security Grade 1: Provide frames fabricated from 0.093-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 and Transom 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. 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.

## 2.05 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 butt joints.
- B. Coordinate rabbet width between fixed and removable stops with glass or panel type and installation type indicated.

## 2.06 MATERIALS

- A. Hot-Rolled Steel Sheets: ASTM A 1011/A 1011M, CS (Commercial Steel), Type B; free of scale, pitting, or surface defects; pickled and annealed.
- B. Cold-Rolled Steel Sheets: ASTM A 1008/A 1008M, CS (Commercial Steel), Type B, pickled and annealed.
- C. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, CS (Commercial Steel), Type B; with G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating designation.
- D. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- E. Steel Tubular Products: ASTM A500, grade B; 46,000 psi yield point required.
- F. Concealed Bolts: ASTM A 307, Grade A unless otherwise indicated.
- G. Exposed Fasteners/Security Screws: Provide security screws as specified in Section 08 71 11.
- H. Post-Installed Anchors: Torque-controlled expansion anchors.
1. For Weld Studs: TRW Nelson Division 'headed' studs; weld to steel plates.
  2. For Wire Loop Anchors: ASTM A615 grade 40 deformed rebar; weld to 10 ga. galvanized steel plates formed as required.
  3. For Steel Plates: ASTM A36 steel; form as required.
  4. For Expansion Anchors: Hilti 'Kwik-Bolt', Philips Red Head self-drilling or non drilling or approved equal.
    - a. Provide each anchor complete with bolt, expansion sleeve, washer; 5/8" dia. size required with length as required for 2-3/4" minimum embedment depth except where indicated to be longer.
  5. For Steel Strap Anchors: Steel plate and spacing as detailed; weld strap to frame as required.
- I. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- J. Metal Primer Paint: Weldable metal primer equal to Tnemec Co. 10-99 tnemec primer-red color, or Tnemec Co. 15 series primer for galvanized items - No.70 light gray color.
- K. Glazing: Comply with Section 08 88 50 "Security Glazing."
- L. Grout: Comply with ASTM C 476, with a slump of not more than 4 inches as measured according to ASTM C 143/C 143M.

- M. 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. density.
- N. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- O. Electrical Conduit in Detention Frames: Provide separate conduit for each function listed below.
  - 1. Power over 24 volts.
  - 2. Power under 24 volts.
  - 3. Audio communications.
  - 4. Lighting power requirements.

## **2.07 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. Fabricate multiple-opening detention frames with mullions that have closed tubular shapes and with no visible seams or joints.
- D. 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.
- E. Factory cut openings in detention doors.
- F. 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.

## **2.08 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.

## **2.09 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".
- 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 fabricators 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.

## 2.10 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. Riteloc Company, Freeport, NY (516) 378-1020.
    - b. Holo-Krome Company, West Hartford, CT (203) 523-5235.
    - c. Tamper-Pruf Screws, Inc., Paramount, CA (213) 531-9364.
    - d. Camcar Division of Textron, Inc., Rockford, IL (815) 226-7721.
    - e. Safety Socket Screw Corporation, Chicago, IL (312) 763-2020.
    - f. Bryce Fastener Company, Inc., 2924 Western Avenue, Seattle, WA 1-800-542- 7031.
  - 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.
  - 5. Socket Flat Countersunk Head Fasteners:
    - a. Heat-treated alloy steel, ASTM F 835.
  - 6. Socket Head Cap Fasteners:
    - a. Heat-treated alloy steel, ASTM A 574.
  - 7. Protective Coatings for Heat-Treated Alloy Steel:
    - a. Zinc and clear trivalent chromium.

## 2.11 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 food-pass 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

### 3.01 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. 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.

### 3.02 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.

### 3.03 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. Post installed 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. Apply bituminous coating to backs of frames before filling with grout.
- E. 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. Post installed Anchors: Install bolt. After bolt is tightened, weld bolt head to provide non-removable condition. Grind, dress, and finish smooth welded bolt head.
  2. Install detention frames with removable stops located on non-inmate side of opening.
- F. Grout: Fully grout detention frame jambs and heads. Completely fill space between frames and adjacent substrates. Hand trowel grout and take other precautions, including bracing detention frames, to ensure that frames are not deformed or damaged by grout forces.
- G. Security Sealant: Apply epoxy security sealant at all exposed gaps between detention frames and adjacent substrates.
- H. 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.
- I. Installation Tolerances: Comply with installation tolerances indicated in NAAMMHMA 863.
- J. Glazing: Comply with installation requirements in Section 08 88 53 "Security Glazing" unless otherwise indicated.

### **3.04 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. Clean grout and other bonding material off detention doors and frames immediately after installation.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780.
- D. 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 08 34 60**



**SECTION 08 56 53**  
**BULLET RESISTANT SERVICE WINDOW**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fixed, transaction security windows

**1.02 RELATED REQUIREMENTS**

- A. Section 08 71 11 - Security Screws.

**1.03 REFERENCE STANDARDS**

- A. ASTM A627 - Standard Test Methods for Tool-Resisting Steel Bars, Flats, and Shapes for Detention and Correctional Facilities; 2003 (Reapproved 2011).
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.
- D. ASTM F1915 - Standard Test Methods for Glazing for Detention Facilities; 2005 (Reapproved 2012).

**1.04 COORDINATION**

- A. Coordinate installation of anchorages for security windows. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in adjacent construction. Deliver such items to Project site in time for installation.

**1.05 SUBMITTALS**

- A. Product Data: For each type of product 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.
  - 5. Details of deal tray and speaking aperture.
- C. Configuration Disclosure Drawing: For each type of forced-entry-resistant security window, complying with ASTM F 1233.
- D. Sample Warranty: For special warranty.

**1.06 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 D1.3, "Structural Welding Code - Sheet Steel."
  - 2. AWS D1.6, "Structural Welding Code - Stainless Steel."

**1.07 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.

## 1.08 FIELD CONDITIONS

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

## 1.09 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. 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

### 2.01 PERFORMANCE REQUIREMENTS

- A. Ballistics Resistance: Listed and labeled as Level 4 when tested according to UL 752.

### 2.02 FIXED, TRANSACTION SECURITY WINDOWS

- A. Provide fixed, framed transaction windows with operable sash or ventilator capable of allowing transfer of currency and documents.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Chicago Bullet Proof Systems, Model STW, or comparable product by one of the following:
1. Armortex.
  2. Collier Safe Company, Inc.
  3. Creative Industries, Inc.
  4. Diebold, Incorporated.
  5. Krieger Specialty Products Company.
  6. Laurence, C. R. Co. Inc.
  7. National Bullet Proof, Inc.
  8. Norshield Security Products; a division of Norment Security Group.
  9. Protective Structures, Ltd.
  10. Quikserv Corp.
  11. Ready Access.
  12. SABIC Innovative Plastics IP BV; Insulgard Security Products.
- C. Configuration: One fixed-glazed panel. Size as indicated on the Drawings.
- D. Framing: Fabricate perimeter framing, mullions, and glazing stops from stainless steel as follows:
1. Profile: Manufacturer's standard, with minimum face dimension indicated.
    - a. Minimum Face Dimension: 2 inches with applied glazing stop on the protected side.
    - b. Frame shall be three-sided with mitered and fully welded corners.
    - c. Frame shall be bolted to the deal tray/voice panel sill.
    - d. Exposed welds shall be ground smooth and finished flush with adjoining surfaces, free of holes or defects.
  2. Depth: 5 -1/2 inches
- E. Head and Jamb Framing: Designed for gasket glazing.
- F. Voice-Communication-Type Sill: Formed from stainless steel and designed to allow passage of speech at normal speaking volume without distortion.
1. Sill Depth: 3 inches deep.

2. Transaction Counter: Stainless steel, 11 inches deep by width of security window, with integral deal tray centered in opening.
- G. Glazing and Glazing Materials: 1 3/16 inch thick glass clad polycarbonate glazing with a UL Level 4 ballistic rating. Provide glass laminations on both sides of units. Clear color.
- H. Materials:
  1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304.

### **2.03 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 secure side without dismantling the non-secure side of framing.
  2. Prepare security windows for glazing unless pre-glazing at the factory is indicated.
- B. Framing: Miter or cope corners the full depth of framing; weld and dress smooth.
  1. Fabricate framing with manufacturer's standard, internal opaque armoring in thicknesses required for security windows to comply with ballistics-resistance performance indicated.
- C. Glazing Stops: Finish glazing stops to match security window framing.
  1. Secure-Side (Exterior) Glazing Stops: Welded or integral to framing.
  2. Non-secure Side (Interior) Glazing Stops: Removable, coordinated with glazing indicated.
- D. Welding: Weld components to comply with referenced AWS standard. To greatest extent possible, weld before finishing and in concealed locations to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- E. Metal Protection: Separate dissimilar metals to protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
- F. Preglazed Fabrication: Preglaze window units at factory, where required for applications indicated.
- G. Weather Stripping: Factory applied.

### **2.04 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.

### **2.05 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.
  2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
  3. Directional Satin Finish: No. 4.

### **2.06 ACCESSORIES**

- A. Recessed Deal Trays: Formed from stainless steel; fabricated in curved shape with exposed flanges for recessed installation into horizontal surface.
  1. Clear Opening Size: 12 inches wide by 11 inches deep by 1-1/2 inches high.

- B. Concealed Bolts: ASTM A 307, Grade A unless otherwise indicated.
- C. 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.
- D. 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.
- E. 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. Transparent One-way Mirror:
    - a. Product: Pilkington Mirropane
    - b. Manufacture: Pilkington North America
    - c. Thickness: 1/4 inch (6 mm)
    - d. Proper Glazing: Mirror coating toward subject-side
- F. 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.
- G. Sealants: For sealants required within fabricated security windows, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, non-shrinking, and non-migrating.

### **PART 3 EXECUTION**

#### **3.01 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. Examine roughing-in for embedded and built-in anchors to verify actual locations of security window connections before security window installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of security windows.
- D. Inspect built-in and cast-in anchor installations, before installing security windows, to verify that anchor installations comply with requirements. Prepare inspection reports.
  - 1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Re-inspect after repairs or replacements are made.
  - 2. Perform additional inspections to determine compliance of replaced or additional work. Prepare anchor inspection reports.
  - 3. For glazing materials whose orientation is critical for performance, verify installation orientation.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.02 PREPARATION**

- A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other security window anchors whose installation is specified in other Sections.

#### **3.03 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.

1. Install an attached or integral flange to secure side of security windows extending over rough-in opening gap so that gap has same ballistics-resistance performance as security window.
- B. Removable Glazing Stops and Trim: Fasten components with security fasteners.
- C. Fasteners: Install security windows using fasteners recommended by manufacturer with head style appropriate for installation requirements, strength, and finish of adjacent materials. Provide stainless-steel fasteners in stainless-steel materials.
- D. 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.

#### **3.04 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.

#### **3.05 ADJUSTING**

- A. Remove and replace defective work, including security windows that are warped, bowed, or otherwise unacceptable.

#### **3.06 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 pre-glazed security windows promptly after installation.
- C. Provide temporary protection to ensure that security windows are without damage at time of Substantial Completion.

**END OF SECTION 08 56 53**



**SECTION 08 71 11**  
**SECURITY SCREWS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. All exposed fasteners, including fasteners used in fabrication of project components, shall be Security Screws as specified herein, unless the component or location is specifically excluded as listed below.
- B. Excluded Items and Locations:
  - 1. Mechanical and electrical rooms or closets and control rooms. Above suspended ceilings, behind access panels, within pipe or duct chases and roof mounted equipment.
  - 2. Toilet partitions, standard plumbing fixtures or standard toilet accessories.
  - 3. Moveable furnishings, storage shelving, cabinet hardware.
  - 4. Wall board screws.
  - 5. Standard light fixtures, diffusers, or cover plates.

**1.02 RELATED SECTIONS:**

- A. Section 08 34 60 - Detention Doors and Frames.
- B. Section 08 56 53 - Bullet Resistant Service Window
- C. Section 08 71 60 - Detention Door Hardware.
- D. Section 08 88 53 - Security Glazing.
- E. Division 26 - Lighting: Fixtures.
- F. Division 27 - Communications: Speaker Covers, Call Button Plates.

**1.03 RESPONSIBILITY**

- A. Security screws as specified herein shall be obtained by the manufacturers, supplier or installer of each component requiring their use. It shall be their collective responsibility to assure use of proper size and type of Security Screw for each required application, and to coordinate with each other to assure that quantity of tools/wrenches required does not exceed specified maximum. Such coordination shall include sufficient provision of information to indicate tool/wrench quantities specified are not exceeded.

**1.04 QUALITY ASSURANCE**

- A. All security screws shall be operable by tools produced for use on the specified security screws by manufacturer or other fabrications licensed by them.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Security screw head style and plating shall be selected as appropriate for installation requirements, strength and finish of adjacent materials. Size and shape variation shall be such that no more than 12 different tools/wrenches are required for all security screws on project.
- B. Types Allowed:
  - 1. Type A:
    - a. Pinned "Torx" head.
  - 2. Diameter: #4 through 3/4".
  - 3. Material: Black grade 9 alloy steel or austenitic stainless steel or martensitic steel as required for particular strength or finish.
  - 4. Head Styles: Socket head cap, button, flat or low head, as required by application or as indicated.
  - 5. Plating: Cadmium, zinc, nickel, phosphate and chrome, to match adjacent materials.

## **2.02 SOURCES**

- A. Security screws may be obtained from the following:
  - 1. Riteloc Company, Freeport, NY (516) 378-1020.
  - 2. Holo-Krome Company, West Hartford, CT (203) 523-5235.
  - 3. Tamper-Pruf Screws, Inc., Paramount, CA (213) 531-9364.
  - 4. Camcar Division of Textron, Inc., Rockford, IL (815) 226-7721.
  - 5. Safety Socket Screw Corporation, Chicago, IL (312) 763-2020.
  - 6. Bryce Fastener Company, Inc., 2924 Western Avenue, Seattle, WA 1-800-542- 7031.

## **2.03 TOOLS**

- A. Provide six complete sets of tools required for all security screws on project. Package each set in an individual kit and deliver to the Owner.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Security screw installation shall be the responsibility of whomever installs the screws under normal application conditions.

**END OF SECTION 08 71 11**

**SECTION 08 71 60**  
**DETENTION DOOR HARDWARE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electrically operated and controlled hardware for sliding detention doors.
- B. Hardware for manual sliding detention doors.

**1.02 RELATED SECTIONS:**

- A. Section 08 34 60 - Detention Doors and Frames.
- B. Section 08 71 11 - Security Screws.

**1.03 REFERENCE STANDARDS**

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. UL 437 - Standard for Key Locks; Current Edition, Including All Revisions.
- C. UL 1034 - Standard for Safety Burglary-Resistant Electric Locking Mechanisms.

**1.04 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 perimeter security system, detention monitoring and control system, and fire-alarm system and detection devices.

**1.05 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.
    - e. Detail interface between electrically powered detention door hardware and perimeter security, detention monitoring and control, and fire-alarm 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. 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.
  - 3. Indicate security level of each item.

4. Submit 1 reproducible and 1 copy of each schedule type; indicate all products by name and number for each separate opening. Include all other pertinent hardware information. Door keying schedules shall include all building floor plan drawings indicating keymarks, lock types and key access sides required at each detention opening. Deliver to the Architect within six weeks of Contractor's Notice to Proceed, to review.
- D. Keys: Deliver by secure carrier (hand carried or registered mail) from manufacturer directly to authorized representative of the Owner as directed by the Architect.
- E. Qualification Data: For qualified Installer and supplier.
- F. Product Certificates: For each type of detention door hardware.
- G. 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.
- H. Examination reports documenting inspections of substrates, areas, and conditions.
- I. Sample Warranties: For special warranties.
- J. Operation and Maintenance Data: For detention door hardware to include in emergency, operation, and maintenance manuals. Include Hardware schedules, catalog cuts for all items of hardware, templates, wiring diagrams for all electric locks, locking devices etc. and Manufacturer's repair/parts manual. In addition to these items, include the following:
  1. Normal remote security operation.
  2. Normal local security operation.
  3. Emergency security operation.
- K. 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.

#### **1.06 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 with warehousing facilities in Project's vicinity 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.

#### **1.07 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.
- C. Store products at site to prevent damage; place in a room under lock and key until installation is made.

- D. Control handling and installation of hardware products which are not immediately replaceable, so that the completion of work will not be delayed by hardware losses, both before and after installation.

#### **1.08 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.
    - d. Warranty Period: Three years from date of Substantial Completion.
    - e. Warranty Period for Security Door Closers: 10 years from date of Substantial Completion.

### **PART 2 PRODUCTS**

#### **2.01 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.
  - 3. 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.
  - 4. 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 Division 26.
  - 5. Source Limitations: Obtain mechanical detention door hardware from same manufacturer as that of electrically powered or pneumatic detention door hardware.
  - 6. Regulatory Requirements: Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

#### **2.02 DETENTION HINGES**

- A. Food-Pass 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. Basis-of-Design Product: Subject to compliance with requirements, provide Southern Folger Detention Equipment Company, Southern Steel Products (SSF); Southern Steel Model 203FP or comparable product by one of the following:
    - a. Airteq Systems, a division of Norment Security Group; Airteq Systems Model No. 603FP.
    - b. Brink, R. R. Locking Systems, Inc.; Model No. 3FP.
    - c. Southern Folger Detention Equipment Company, Folger Adam Products; Folger Adam Model No. 3FP.
    - d. Leaves: Drilled for countersunk security fasteners.
    - e. Size: Minimum 3 by 4 by 0.200 inch.
    - f. Security Grade: 1 according to ASTM F 1758.
    - g. Finish: BHMA 600.

#### **2.03 MECHANICAL DETENTION LOCKS AND LATCHES**

- A. Lock Mountings:

1. Hollow-Metal Detention Doors: Mount detention lock to back of 0.179-inch nominal thickness steel cover plate for installation in lock pocket fabricated into detention door. Attach cover plate to hollow-metal detention door with security fasteners.
2. Mechanical Automatic Deadlock, Paracentric Cylinder:
  - a. Basis-of-Design Product: Subject to compliance with requirements, provide Southern Folger Detention Equipment Company, Southern Steel Products (SSF); Southern Steel Series 1030A.
  - b. Function: Automatic deadlock bolt when door is pushed closed; latchbolt retracted by paracentric cylinder; keyed both sides.
  - c. Latchbolt: 1-5/8 inch high by 1/2 inch thick;
3. Utility-Door Mechanical Snaplatches, Paracentric Cylinder:
  - a. Basis-of-Design Product: Subject to compliance with requirements, provide Southern Folger Detention Equipment Company, Southern Steel Products (SSF); Southern Steel Series 1017A or comparable product by one of the following:
    - 1) Airteq Systems, a division of Norment Security Group; Airteq Systems Series 5017.
    - 2) Brink, R. R. Locking Systems, Inc.; Series 7017.
    - 3) Southern Folger Detention Equipment Company, Folger Adam Products; Folger Adam Series 17.
  - b. Function: Automatic snaplatch when door is closed; latchbolt retracted by six-tumbler paracentric cylinder; keyed one side.
  - c. Latchbolt: 1 inch high by 7/16 inch thick; 5/16-inch throw.
  - d. Security Grade: 2 according to ASTM F 1577.

#### **2.04 DETENTION LOCK TRIM**

- A. Escutcheons for Paracentric Locks: 0.125-inchthick, 3-inchdiameter stainless steel with BHMA 630 finish. Attach with security fasteners.
  1. Style Double wing.

#### **2.05 DETENTION CYLINDERS AND KEYING**

- A. Paracentric Cylinders: Manufacturer's standard lever-tumbler type, constructed from one-piece spring-tempered brass; with tumblers activated by phosphor bronze springs; five tumblers per lock.
  1. Finish: BHMA 626.
  2. Keying System: Provide a factory-registered keying system matching existing keying.

#### **2.06 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. Basis-of-Design Product: Subject to compliance with requirements, provide Southern Folger Detention Equipment Company, Southern Steel Products (SSF); Southern Steel Series 212C or comparable product by one of the following:
    - a. Airteq Systems, a division of Norment Security Group; Airteq Systems Series 612.
    - b. Brink, R. R. Locking Systems, Inc.; Series 300021.
    - c. Stanley Security Solutions, Inc., Division of The Stanley Works; Series 2001.
    - d. Material: Cast bronze with BHMA 626 finish.

#### **2.07 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.
2. Provide sloping-top housings. Flat-top housings may be provided for operators mounted to ceiling.
3. 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.
4. Receiver: Fabricated from 0.134-inch nominal-thickness steel plate.
5. 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.
6. Finish: Factory prime painted.
7. 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.
  - a. Basis-of-Design Product: Subject to compliance with requirements, provide Southern Folger Detention Equipment Company, Southern Steel Products (SSF); Southern Steel Model 3165LX or comparable product by one of the following:
    - 1) Airteq Systems, a division of Norment Security Group; Airteq Systems Model 7320.
    - 2) Brink, R. R. Locking Systems, Inc.; Model 57700D.
    - 3) Southern Folger Detention Equipment Company, Folger Adam Products; Folger Adam Model D3B.
  - b. 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.
8. Manually Operated Sliding-Door Device:
  - a. Basis-of-Design Product: Subject to compliance with requirements, provide Southern Folger Detention Equipment Company, Southern Steel Products (SSF); Southern Steel Model 1300.

## 2.08 FABRICATION

- A. 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.
- B. 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.
  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. Spacers Bolts: For through bolting of hollow-metal detention doors.
  4. Detention Lock Construction: Fabricate detention lock case and cover plate from steel plate. Fabricate bolts from solid sections; laminated construction is unacceptable.

## **2.09 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.

## **PART 3 EXECUTION**

### **3.01 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. Verify locations of detention door hardware with those indicated on Shop Drawings.
- C. Examine roughing-in for electrical power systems to verify actual locations of connections before detention door hardware installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 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.

### **3.03 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.
  - 3. Hinge Installation:
    - a. Security Fasteners: Provide socket flat countersunk head machine screws; finish screw heads to match surface of detention hinges. Install into drilled and tapped holes.
  - 4. Install interconnecting wiring and connectors between detention door hardware devices. Terminate device wiring for detention door hardware installed in sliding doors at a junction box in door frame.
  - 5. Security Fasteners: Install detention door hardware using security fasteners with head style appropriate for installation requirements, strength, and finish of adjacent materials.

### **3.04 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.
  - b. Verify that lock bolts engage strikes with required bolt projection.
  - c. Verify that detention door hardware is installed, connected, and adjusted according to the Contract Documents.
  - d. Verify that electrical wiring installation complies with manufacturer's submittal and written installation requirements.
2. Detention work will be considered defective if it does not pass tests and inspections.
3. Perform additional inspections to determine compliance of replaced or additional work.
4. Prepare field quality-control certification that states installed products comply with requirements in the Contract Documents.
5. Prepare test and inspection reports.

### 3.05 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.

### 3.06 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.

### 3.07 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain detention door hardware and detention door hardware finishes.

### 3.08 DETENTION DOOR HARDWARE SCHEDULE

- A. General: Provide detention door hardware for each detention door to comply with requirements in this Section and with detention door hardware sets indicated below.

#### Detention Door Hardware Set No. D01

Locations: Gate Doors; each to have the following:

Qty.	Item	Manufacturer	Product	Finish
1 EA.	DOOR OPERATOR	SSF	3165LX.bP-2	600
2 EA.	PULL	SSF	212C	626
1 EA.	FOOD PASS	SSF	262	600
1 EA.	CYLINDER	SSF		626

Reuse paracentric cylinders on door.

#### Detention Door Hardware Set No. D02

Locations: Control Room; to have the following:

Qty.	Item	Manufacturer	Product	Finish
1 EA.	DOOR OPERATOR	SSF	1300	600
1 EA.	LOCK	SSF	HM-1030A-2-26	626
2 EA.	PULL	SSF	212C	626
1 EA.	PARACENTRIC CYLINDER	SSF		626

**END OF SECTION 08 71 60**

**SECTION 08 88 53**  
**SECURITY GLAZING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Glass clad laminated polycarbonate glazing.
- B. Tempered glazing.
- C. Glazing accessories required, including but not limited to: cleaners, sealers, primers, tapes, setting blocks, spacers and shims.
- D. Items Installed but not Furnished under this Section:
  - 1. Loose angle or channel stops, Section 08 34 60.
  - 2. Security screws to fasten stops to frames, Section 08 34 60, per Section 08 71 11.

**1.02 RELATED SECTIONS:**

- A. Section 08 34 60 - Detention Doors and Frames.
- B. Section 08 56 54 - Security and Detention Windows.
- C. Section 08 71 11 - Security Screws.

**1.03 REFERENCE STANDARDS**

- A. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.
- B. ASTM C1036 - Standard Specification for Flat Glass; 2016.
- C. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- D. ASTM C1349 - Standard Specification for Architectural Flat Glass Clad Polycarbonate; 2010.
- E. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
- F. ASTM D1044 - Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion.
- G. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics.
- H. ASTM F1915 - Standard Test Methods for Glazing for Detention Facilities; 2005 (Reapproved 2012).
- I. HP White TP-0500.03 Forced Entry Test Procedure.
- J. GANA (GM) - GANA Glazing Manual; 2009.
- K. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.
- L. WMFL Test Procedure.

**1.04 PERFORMANCE REQUIREMENTS**

- A. General: Installed security glazing shall withstand security-related loads and forces without damage to the glazing beyond that allowed by referenced standards.
- B. Tolerances: For each glass unit installed, maximum overall warpage tolerances shall comply with the requirements of ASTM C1349.
  - 1. Note: The term warpage shall include bow, cup and twist. Also, in measuring the amount of warp present in a glass unit, the following method shall be used:
    - a. Bow, cup and twist shall be measured by placing a straightedge, taut wire or string on the suspected concave face of the glass at any angle (i.e., horizontally, vertically, diagonally), with the glass in its installed position. The measurement of bow, cup and

twist shall be made at the point of maximum distance between the bottom of the straightedge, taut wire or string and the face of the glass.

#### **1.05 SUBMITTALS**

- A. Product Data: For each type of product indicated submit manufacturer's literature and signed statement guaranteeing that glass product will conform to Physical Attack, Flame Attack, and Ballistic Attack Retainage test levels stated in PART 2 PRODUCTS requirements set forth in this specification section. Forced entry testing shall be required to be performed for one or more of the testing standards.
- B. Security Glazing Samples: For each type of security glazing; 12 inches square.
- C. Security Glazing Schedule: List security glazing types and thicknesses for each size opening and location. Indicate coordinated dimensions of security glazing and construction that receives security glazing, including clearances and glazing channel dimensions.
- D. Certified copies of test reports which show that windows of the type and approximate size and arrangement to be provided under this section will not leak when tested according to ASTM E331 at a test pressure of 7.5 pounds per square foot.
- E. Certified copies of test reports from independent testing organization showing product meets specified ballistic and physical and flame attack tests as specified.
- F. Warranties: Sample of special warranties.
- G. Furnish extra materials that match products installed and packaged with protective covering for storage and identification with labels describing contents.
  - 1. For each size, and type of glass furnish a stock of replacement material amounting to 3% of the quantity required for the work, but not less than 1 panel of each.

#### **1.06 QUALITY ASSURANCE**

- A. Use only skilled, experienced tradespeople to install products.
- B. Source Limitations for Security Glazing: Obtain security glazing from single source from single manufacturer using the same type of lites, plies, interlayers, and spacers for each security glazing type indicated.
- C. Comply with technical reports by manufacturer of glass and glazing products as used in each glazing channel, and with recommendations of the Glass Association of North America 'GANA Manual' except where more stringent requirements are indicated.
- D. Each piece of glass shall be of domestic manufacturer, labeled with the manufacturer's name and the grade or quality grade. Labels shall remain intact until completion of work or until removal is directed.
- E. Testing shall be in the name of and wholly owned by the approved security glazing manufacturer. Supplier or round robin testing is not acceptable.
- F. Subject to meeting all testing requirements, manufacturers shall have at least 5 years of experience in manufacturing the identical glazing product with, if requested, proof of least 5 installations.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Load products in such a manner that they may be transported and unloaded without being damaged.
- B. Deliver products to project site cartoned or crated to provide protection during transit and project site storage.
- C. Do not store products on or in the structure in a manner that might cause distortion or damage to the products or the supporting structures. Repair or replace damaged products or structures as directed. Store in a protected location.
- D. Insure that all glass products are tagged with markings which show proper installation locations.

- E. Items found to be defective either through manufacturing, transit damage, field installation, etc. shall be replaced within a three week period. Special shipment and manufacturing arrangements must be made to accomplish this requirement.

#### **1.08 WARRANTY**

- A. Manufacturer's Special Warranty for Polycarbonate Sheet: Manufacturer's standard form in which glazing manufacturer agrees to replace polycarbonate sheet that deteriorates within specified warranty period. Deterioration 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: Seven years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Laminated Polycarbonate: Manufacturer's standard form in which laminated polycarbonate manufacturer agrees to replace laminated polycarbonate that deteriorates within specified warranty period. Deterioration is defined as defects developed from normal use that are not attributed to maintaining and cleaning laminated polycarbonate contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glazing, blemishes exceeding those allowed by referenced standard, yellowing, and loss of light transmission.
  - 1. Warranty Period: Five years from date of Substantial Completion.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Glass Clad Laminated Polycarbonate Manufacturers:
  - 1. Global Security Glazing.
  - 2. Dlubak Specialty Glass Corporation.
  - 3. Substitutions: Other manufacturers must provide all glass types specified in this section to qualify for consideration. In order to be considered, the following information must be included with request:
    - a. Sample of each glass type for which approval is sought.
    - b. Manufacturer's pertinent literature including comprehensive, detailed description of products, fabrication, and test results.
    - c. Certified copies of test reports indicating that glass types have undergone and passed all tests required of each as stated in PART 2 PRODUCTS requirements set forth in this specification section.

#### **2.02 SECURITY GLAZING, GENERAL**

- A. Thickness: Where thickness is indicated, it is a minimum. Provide security glazing in thicknesses as needed to comply with requirements indicated.
- B. Fire-Test-Response Characteristics of Plastic Sheets: As determined by testing plastic sheets identical to those used in security glazing products by a qualified testing agency acceptable to authorities having jurisdiction.
  - 1. Self-ignition temperature of 650 deg. F or more when tested per ASTM D 1929 on plastic sheets in thicknesses indicated for the Work.
  - 2. Smoke-developed index of 450 or less when tested according to ASTM E 84, or smoke density of 75 or less when tested per ASTM D 2843 on plastic sheets in thicknesses indicated for the Work.
  - 3. Burning extent of 1 inch or less when tested per ASTM D 635 at a nominal thickness of 0.060 inch or thickness indicated for the Work.

#### **2.03 GLASS MATERIALS**

- A. Glass Clad Polycarbonate Sheet: ASTM C 1349, Appendix X1, Type II, coated, mar-resistant, UV-stabilized polycarbonate with coating on exposed surfaces and Type I, standard, UV-stabilized polycarbonate where no surfaces are exposed.

- B. Laminated Polycarbonate: Polycarbonate sheets laminated with clear urethane interlayer that complies with ASTM C 1349, Appendix X2, and has a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation. Provide laminated units that comply with requirements of ASTM C 1349 for maximum allowable laminating process blemishes and haze.

## 2.04 SECURITY GLAZING TYPES

- A. Security Level By Type:

<u>Type</u>	<u>Level of Security</u>
SG-1	60 Minute
SG-2	1/2" Tempered Glass

- B. Security Glass Product SG-1:
1. Provide glass-clad laminated polycarbonate units. Clear glass sheets Global Security Glazing Secure Tem+Poly SP-028 basis of design or approved equal.
  2. Forced Entry:
    - a. ASTM F1915 Grade 1
    - b. WMFL Level 1 (60 minute)
    - c. H.P. White Level IV-TP-0500.03
    - d. Grade 3 per UL 752
  3. Overall Unit Thickness: 1-1/4 inch.
  4. Number of Plies: Four.
  5. Outer Plies: 0.125-inch abrasion resistant polycarbonate.
  6. Core Plies: 0.50-inch polycarbonate.
- C. Security Glass Product SG-2:
1. Provide clear tempered glass.
  2. Meet quality and strength requirements of ASTM C1048 and the safety criteria of ANSI Z97.1.
  3. Thickness: 1/2".

## 2.05 FABRICATION OF SECURITY GLAZING

- A. Fabricate security glazing in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

## 2.06 ACCESSORIES

- A. Glazing Compounds: G.E. 1200 or Tremco 'Proglaze' silicon sealant or equal.
- B. Cleaners, Sealers, Primer, Tapes: Types made by or as recommended by manufacturer of product being installed for particular conditions of installation in each case, for cleaners, sealers and primers. Tape shall be Tremco 440 or approved equal.
- C. Other Glazing Accessories: Provide setting blocks, resilient spacer shims and other accessories as required by referenced glazing standards. Use security screws to install loose glazing stops (supplied by 08 34 60 supplier).

## PART 3 EXECUTION

### 3.01 VERIFICATION OF CONDITIONS

- A. Installer must examine the areas and conditions under which work is to be installed and notify contractor of conditions detrimental to the proper and timely completion of the work. Examine framing for security glazing, for compliance with the following:
1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.

2. Minimum required face or edge clearances.
3. Effective sealing between joints of framing members.

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

### **3.02 PREPARATION**

- A. Clean glazing channels and other framing members receiving security glazing immediately before glazing. Remove coatings not firmly bonded to substrates.

### **3.03 INSTALLATION, GENERAL**

- A. Comply with combined written instructions of manufacturers of security glazing, sealants, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect edges of security glazing from damage during handling and installation. Remove damaged security glazing from Project site and legally dispose of off Project site. Damaged security glazing includes units with edge or face damage or other imperfections that, when installed, could weaken security glazing, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glazing unit manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by security glazing manufacturers for installing lites.
- F. Provide spacers for security glazing lites where the length plus width is larger than 50 inches.
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 face exterior or interior as
- J. Provide one layer of monolithic polycarbonate security glazing on each side of laminated polycarbonate glazing.

### **3.04 TAPE GLAZING**

- A. Position tapes on fixed stops so that, when compressed by security glazing, their exposed edges are flush with sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.

### **3.05 PROTECTION AND CLEANING**

- A. Protect security glazing from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with security glazing, remove substances immediately as recommended in writing by security glazing manufacturer.
- B. Remove and replace security glazing that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, or vandalism during construction period.
- C. Wash security glazing on exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash security glazing as recommended in writing by security glazing manufacturer.

**END OF SECTION 08 88 53**

**SECTION 09 51 00**  
**ACOUSTICAL CEILINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

**1.02 RELATED REQUIREMENTS**

- A. Section 21 13 00 - Fire-Suppression Sprinkler Systems: Sprinkler heads in ceiling system.
- B. Section 23 37 00 - Air Outlets and Inlets: Air diffusion devices in ceiling.
- C. Section 26 51 00 - Interior Lighting: Light fixtures in ceiling system.
- D. Section 28 46 00 - Fire Detection and Alarm: Fire alarm components in ceiling system.

**1.03 REFERENCE STANDARDS**

- A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2009a.
- B. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- C. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- D. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.
- E. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.
- F. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.
- G. UL (FRD) - Fire Resistance Directory; current edition.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning.
- C. Product Data: Provide data on suspension system components and acoustical units.
- D. Samples: Submit two samples 6 by 6 inch (150 by 150 mm) in size illustrating material and finish of acoustical units.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

**1.06 QUALITY ASSURANCE**

- A. Fire-Resistive Assemblies: Complete assembly listed and classified by UL (FRD) for the fire resistance indicated.
- B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

- C. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

## **1.07 FIELD CONDITIONS**

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Acoustic Tiles/Panels:
  - 1. Armstrong World Industries, Inc: [www.armstrong.com](http://www.armstrong.com).
  - 2. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  - 3. USG: [www.usg.com](http://www.usg.com).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Suspension Systems:
  - 1. Same as for acoustical units.

### **2.02 ACOUSTICAL UNITS**

- A. Acoustical Panels Type ACT-1: Painted mineral fiber, ASTM E1264 Type III, with the following characteristics:
  - 1. Size: 24 by 24 inches (600 by 600 mm).
  - 2. Thickness: 5/8 inches (15 mm).
  - 3. Composition: Wet felted.
  - 4. Light Reflectance: 88 percent, determined in accordance with ASTM E1264.
  - 5. Ceiling Attenuation Class (CAC): 33, determined in accordance with ASTM E1264.
  - 6. Edge: Square.
  - 7. Surface Color: White.
  - 8. Surface Pattern: Unperforated.
  - 9. Suspension System: Exposed grid Type GRID-1.
  - 10. Products: As scheduled.
    - a. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.03 SUSPENSION SYSTEM(S)**

- A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- B. Exposed Steel Suspension System Type GRID-1: Formed steel, commercial quality cold rolled; heavy-duty.
  - 1. Profile: Tee; 15/16 inch (24 mm) wide face.
  - 2. Construction: Double web.
  - 3. Finish: White painted.
  - 4. Products: As scheduled.
    - a. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.04 ACCESSORIES**

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
  - 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- C. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.

- D. Touch-up Paint: Type and color to match acoustical and grid units.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

#### **3.02 INSTALLATION - SUSPENSION SYSTEM**

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected plan.
- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches (150 mm) of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.
- J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
  - 1. Install in bed of acoustical sealant.
  - 2. Use longest practical lengths.
  - 3. Overlap and rivet corners.

#### **3.03 INSTALLATION - ACOUSTICAL UNITS**

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
  - 1. Make field cut edges of same profile as factory edges.
- G. Where round obstructions occur, provide preformed closures to match perimeter molding.
- H. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

#### **3.04 TOLERANCES**

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

**END OF SECTION 09 51 00**



**SECTION 09 65 00**  
**RESILIENT FLOORING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.

**1.02 REFERENCE STANDARDS**

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- B. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2014).
- C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).
- D. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 2011.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Shop Drawings: Indicate seaming plans and floor patterns.
- D. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- E. Verification Samples: Submit two samples, 6 by 6 inch (150 by 150 mm) in size illustrating color and pattern for each resilient flooring product specified.
- F. Concrete Testing Standard: Submit a copy of ASTM F710.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).
- D. Do not double stack pallets.

**1.05 FIELD CONDITIONS**

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).

**PART 2 PRODUCTS**

**2.01 TILE FLOORING**

- A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness.
  - 1. Manufacturers:
    - a. Armstrong World Industries, Inc; Standard Excelon: [www.armstrong.com](http://www.armstrong.com).
    - b. Johnsonite, a Tarkett Company; Standard VCT : [www.johnsonite.com](http://www.johnsonite.com).
    - c. Mannington Mills, Inc; Standard VCT : [www.mannington.com](http://www.mannington.com).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.

2. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
3. Size: 12 by 12 inch (305 by 305 mm).
4. Thickness: 0.125 inch (3.2 mm).
5. Color and Pattern: Manufacture's standard color closest match to existin gflooring outside the room.

## **2.02 RESILIENT BASE**

- A. Resilient Base: ASTM F1861, Type TP, rubber, thermoplastic; top set Style B, Cove.
  1. Manufacturers:
    - a. Burke Flooring; \_\_\_\_\_: [www.burkeflooring.com](http://www.burkeflooring.com).
    - b. Johnsonite, a Tarkett Company; \_\_\_\_\_: [www.johnsonite.com](http://www.johnsonite.com).
    - c. Roppe Corp; \_\_\_\_\_: [www.roppe.com](http://www.roppe.com).
    - d. Armstrong World Industries, Inc. .
  2. Height: 4 inch (100 mm).
  3. Thickness: 0.125 inch (3.2 mm).
  4. Finish: To match existing.
  5. Length: 4 foot (1.2 m) sections.
  6. Color: Manufacturer's standard color closest match existing base within room. .

## **2.03 ACCESSORIES**

- A. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
  1. Test in accordance with ASTM F710.
  2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

### **3.02 PREPARATION**

- A. Remove existing resilient flooring and flooring adhesives; follow the recommendations of RFCI (RWP).
- B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- C. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- D. Prohibit traffic until filler is fully cured.
- E. Clean substrate.

### **3.03 INSTALLATION - GENERAL**

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.

- D. Fit joints and butt seams tightly.
- E. Set flooring in place, press with heavy roller to attain full adhesion.
- F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

#### **3.04 INSTALLATION - TILE FLOORING**

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.

#### **3.05 INSTALLATION - RESILIENT BASE**

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) between joints.
- B. Install base on solid backing. Bond tightly to wall and floor surfaces.
- C. Scribe and fit to door frames and other interruptions.

#### **3.06 CLEANING**

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

#### **3.07 PROTECTION**

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

**END OF SECTION 09 65 00**



**SECTION 09 91 23**  
**INTERIOR PAINTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
  - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
  - 5. Floors, unless specifically indicated.
  - 6. Glass.
  - 7. Concealed pipes, ducts, and conduits.

**1.02 REFERENCE STANDARDS**

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- B. SSPC-SP 1 - Solvent Cleaning; 2015.
- C. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).
- D. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. Manufacturer's installation instructions.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
  - 2. Allow 30 days for approval process, after receipt of complete samples by Architect.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum \_\_\_\_\_ years experience and approved by manufacturer.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

#### **1.06 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F (3 degrees C) above the dew point; or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F (10 degrees C) for interiors unless required otherwise by manufacturer's instructions.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
  - 1. PPG Paints: [www.ppgpaints.com/sle](http://www.ppgpaints.com/sle).
  - 2. Rodda Paint Co: [www.rodmapaint.com](http://www.rodmapaint.com).
  - 3. Sherwin-Williams Company: [www.sherwin-williams.com](http://www.sherwin-williams.com).
- C. Primer Sealers: Same manufacturer as top coats.

#### **2.02 PAINTS AND FINISHES - GENERAL**

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
  - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
  - 3. Supply each paint material in quantity required to complete entire project's work from a single production run.
  - 4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- C. Colors: As indicated on drawings.

#### **2.03 PAINT SYSTEMS - INTERIOR**

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including concrete masonry units.
  - 1. Two top coats and one coat primer.

#### **2.04 PRIMERS**

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
  - 1. Alkali Resistant Water Based Primer; MPI #3.

## **2.05 ACCESSORY MATERIALS**

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or repair existing paints or finishes that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Masonry:
  - 1. Prepare surface as recommended by top coat manufacturer.
- G. Galvanized Surfaces:
  - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
  - 2. Prepare surface according to SSPC-SP 2.
- H. Ferrous Metal:
  - 1. Solvent clean according to SSPC-SP 1.
  - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
  - 3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- I. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

### **3.03 APPLICATION**

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### **3.04 CLEANING**

- 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.

### **3.05 PROTECTION**

- A. Protect finishes until completion of project.
- B. 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.
- C. Touch-up damaged finishes after Substantial Completion.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### **3.06 SCHEDULE - PAINT SYSTEMS**

- A. Concrete Unit Masonry: Provide the following finish systems over interior concrete masonry:
  - 1. Semigloss Acrylic-Enamel Finish: Two finish coats.
    - a. Finish Coats: Interior semigloss acrylic enamel.
      - 1) Where already painted, provide one coat only.
- B. Ferrous Metal: Provide the following finish systems over ferrous metal:
  - 1. Semigloss Acrylic Finish: Two finish coats over primer.
    - a. Primer: Interior ferrous-metal primer
    - b. Finish Coats: Interior semi-gloss acrylic enamel.
      - 1) Where already painted, provide one coat only.

**END OF SECTION 09 91 23**

**SECTION 11 28 00**  
**OFFICE EQUIPMENT**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Articulating arm for video display monitors.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 2. Include rated capacities, operating characteristics, and furnished specialties and accessories.

**1.04 WARRANTY**

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace articulating arm that fails in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

**PART 2 PRODUCTS**

**2.01 ARTICULATING ARM**

- A. Basis-of-Design: Subject to compliance with requirements, provide Egrottron Model 45-241026 by Nortek Company or comparable product by one of the following:
  - 1. Chief, a division of Milestone AV Technologies.
  - 2. Peerless Industries, Inc.
- B. Polished aluminum with six-way adjustability, designed to accommodate LCD monitors up to 24- inches, 17 lbs. capacity, minimum 12"- inch vertical lift adjustment, 13 inch range, minimum 75 degree tilt capacity, 360 degree rotation capacity, tested to 10,000 cycles, base for countertop mounting.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Mount articulating arm to existing CMU wall above window. Coordinate mounting locations with Department.

**END OF SECTION 11 28 00**



**SECTION 12 36 00**  
**COUNTERTOPS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Countertops for architectural cabinet work.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 41 00 - Architectural Wood Casework.

**1.03 REFERENCE STANDARDS**

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- B. PS 1 - Structural Plywood; 2009.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- C. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.

**1.07 FIELD CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

**PART 2 PRODUCTS**

**2.01 COUNTERTOPS**

- A. Stainless Steel Countertops: ASTM A666, Type 304, stainless steel sheet; 16 gage, 0.0625 inch (1.59 mm) nominal sheet thickness.
  - 1. Finish: 4B satin brushed finish.
  - 2. Exposed Edge Shape: Straight turndown with return; 1-1/2 inch (38 mm) high face, 1/2 inch (12 mm) return to face of case. Substrate of 3/4" and 5/8" plywood shall be bonded to underside of steel for rigidity.
  - 3. Back and End Splashes: Same material; welded 1/4 inch (6 mm) radius coved joint to countertop; square top edge with 1 inch (25 mm) wide top surface and minimum 1/2 inch (12 mm) turndown.

**2.02 MATERIALS**

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch (19 mm) thick; join lengths using metal splines.
- B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

**2.03 FABRICATION**

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.

- B. Stainless Steel: Fabricate tops up to 144 inches (3657 mm) long in one piece including nosings and back and end splashes; accurately fitted mechanical field joints in lengths over that dimension are permitted.
  - 1. Weld joints; grind smooth and polish to match.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

#### **3.02 PREPARATION**

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

#### **3.03 INSTALLATION**

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach stainless steel countertops using stainless steel fasteners and clips.
- C. Seal joint between back/end splashes and vertical surfaces.

#### **3.04 TOLERANCES**

- A. Variation From Horizontal: 1/8 inch in 10 feet (3 mm in 3 m), maximum.

#### **3.05 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

**END OF SECTION 12 36 00**

## 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.

## 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 Architect/Engineer 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 Architect/Engineer 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 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 mechanical systems, 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 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: Prefabricated fire rated sleeves including seals, 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.

### 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, Civil 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] [four] 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 than 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"

PIPE SIZE	MAX. HANGER SPACING	HANGER DIAMETER
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. Provide transverse seismic support for all piping systems.
- I. Support all piping on flat roofs using rooftop pipe supports. Install per manufacturer's instructions. Install piping minimum 6" above roof surface.

### 3.10 INSERTS

- A. Provide inserts for placement in concrete formwork.
- B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- D. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.
- E. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

### 3.11 EQUIPMENT BASES AND SUPPORTS

- A. Provide equipment bases of concrete type where shown on plans.

- B. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 6 inches beyond supported equipment. Refer to Division 03.
- C. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- D. Construct support of steel members. Brace and fasten with flanges bolted to structure.
- E. Provide rigid anchors for pipes after vibration isolation components are installed.
- F. 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.

### 3.12 FLASHING

- A. Provide flexible flashing and metal counter-flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Provide acoustical flashing around ducts and pipes penetrating equipment rooms, installed in accordance with manufacturer's instructions for sound control.
- C. Provide curbs for mechanical roof installations 16 inches minimum high above roofing surface. Flexible sheet flash and counter-flash with sheet metal; seal watertight.
- D. 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.

### 3.13 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.

### 3.14 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.

### 3.15 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.

### 3.16 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 ft<sup>2</sup> (0.55 m<sup>2</sup>).
  - 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,  $I_p$ , 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,  $I_p$ , 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.

### 3.17 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 31 00 - HVAC DUCTS AND CASINGS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Duct Materials.
2. Casings.
3. Ductwork Fabrication.

#### 1.2 RELATED SECTIONS

- A. Division 03 - Cast-In-Place Concrete: Product requirements for concrete for placement by this section.
- B. Section 23 05 00- Hangers and Supports for HVAC Piping and Equipment: Product requirements for hangers, supports and sleeves for placement by this section.
- C. Section 23 33 00 - Air Duct Accessories: Product requirements for duct accessories for placement by this section.

#### 1.3 REFERENCES

A. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A90/A90M - Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
3. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
4. ASTM A568/A568M - Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
5. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
6. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

7. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
8. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
9. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
10. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
11. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. National Fire Protection Association:

1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
2. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems.
3. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.

C. Sheet Metal and Air Conditioning Contractors:

1. SMACNA - Fibrous Glass Duct Construction Standards.
2. SMACNA - HVAC Air Duct Leakage Test Manual.
3. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

D. Underwriters Laboratories Inc.:

1. UL 181 - Factory-Made Air Ducts and Connectors.

## 1.4 DEFINITIONS

- A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain sizes inside lining.
- B. Low Pressure: Three pressure classifications: ½ inch WG positive or negative static pressure and velocities less than 2,000 fpm; 1 inch WG positive or negative static pressure and velocities less than 2,500 fpm and 2 inch WG positive or negative static pressure and velocities less than 2,500 fpm.
- C. Medium Pressure: Three pressure classifications: 3 inch WG positive or negative static pressure and velocities less than 4,000 fpm, 4 inch WG positive static pressure and velocities greater than 2,000 fpm, 6 inch WG positive static pressure and velocities greater than 2,000 fpm.

- D. High Pressure: 10 inch WG positive static pressure and velocities greater than 2,000 fpm.

## 1.5 PERFORMANCE REQUIREMENTS

- A. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

## 1.6 SUBMITTALS

- A. See General Conditions and the General Requirements in Division 01 regarding submittals.
- B. Product Data: Submit data for duct materials.
- C. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA HVAC Air Duct Leakage Test Manual.
- D. Manufacturer's Installation Instructions: Submit special procedures for glass fiber ducts.
- E. Manufacturer's Certificate: Certify installation of glass fiber ductwork meet or exceed [specified requirements] [recommended fabrication and installation requirements]. [Duct products meet or exceed specified requirements].

## 1.7 CLOSEOUT SUBMITTALS

- A. Division 01 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

## 1.8 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and flexible.
- B. Construct ductwork to [NFPA 90A] [and] [NFPA 90B] [and] [NFPA 96] standards.
- C. Maintain one copy of each document on site.

## 1.9 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].

## 1.10 ENVIRONMENTAL REQUIREMENTS

- A. Division 01 - Product Requirements.
- B. Do not install duct sealant when temperatures are less than those recommended by sealant manufacturers.
- C. Maintain temperatures during and after installation of duct sealant.

## 1.11 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

## 1.12 WARRANTY

- A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.

# PART 2 - PRODUCTS

## 2.1 DUCT MATERIALS

- A. Galvanized Steel Ducts: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having [G60] G90 zinc coating of in conformance with ASTM A90/A90M.
- B. Steel Ducts: [ASTM A1008/A1008M \*\*cold-rolled\*\*] [ASTM A1011/A1011M\*\*hot-rolled\*\*] ASTM A568/A568M.
- C. Aluminum Ducts: ASTM B209; aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T6 or of equivalent strength.
- D. Stainless Steel Ducts: ASTM A167, Type 304. [316.] [ ].
- E. Concrete Ducts: ASTM C14; hub and spigot concrete sewer pipe with ASTM C443 joints, rubber gaskets.

- F. Fasteners: Rivets, bolts, or sheet metal screws.
- G. Hanger Rod: ASTM A36/A36M; steel [, galvanized]; threaded both ends, threaded one end, or continuously threaded.

## 2.2 LOW PRESSURE DUCTWORK FABRICATION

- A. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and ASHRAE handbooks, except as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission.
- C. Construct T's, bends, and elbows with minimum radius 1-1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide airfoil turning vanes. Where acoustical lining is indicated, furnish turning vanes of perforated metal with glass fiber insulation.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30° divergence upstream of equipment and 45°convergence downstream.
- E. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- F. Provide standard 45-degree lateral wye takeoffs. When space does not allow 45-degree lateral wye takeoff, use 90-degree conical tee connections.
- G. Provide easements where low pressure ductwork conflicts with piping and structure. Where easements exceed 10 percent duct area, split into two ducts maintaining original duct area.
- H. Connect flexible ducts to metal ducts with draw bands.
- I. Use crimp joints with or without bead for joining round duct sizes 12" and smaller with crimp in direction of airflow.
- J. Use double nuts and lock washers on threaded rod supports.

## 2.3 MEDIUM PRESSURE DUCTWORK FABRICATION

- A. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and ASHRAE handbooks, except as

indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

- B. Construct T's, bends, and elbows with minimum radius 1-1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide airfoil turning vanes. Where acoustical lining is indicated, furnish turning vanes of perforated metal with glass fiber insulation.
- C. Transform duct sizes gradually, not exceeding 15° divergence and 30° convergence.
- D. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- E. Provide standard 45-degree lateral wye takeoffs. When space does not allow 45-degree lateral wye takeoff, use 90-degree conical tee connections.
- F. Plenum connections: Ensure round duct connections are welded joint bellmouth type.

## 2.4 FLEXIBLE DUCTS

### A. Manufacturers:

- 1. Thermaflex Model S-TL.[S-LD] [S-LP-10]
- 2. Hart & Cooley Model F090.
- 3. Substitutions: Division 01 - Product Requirements [Not Permitted].

### B. Product Description: UL 181, coated spring steel wire permanently bonded to a coated woven fiberglass cover. [two ply metal/polyester film supported by helical wound spring steel wire. \*\*\*Hart and Cooley\*\*\*]

- 1. Pressure Rating: 16" W.G. positive and 1.0" W.G. negative (2"-10" ID), 10" W.G. positive and 1.0" W.G. negative (12"-20" ID). [0.5" W.G. negative (14"-20" ID) \*\*\*Hart and Cooley\*\*\*]
- 2. Maximum Velocity: 6000 fpm.
- 3. Temperature Range: -20°F to 250°F.

## 2.5 INSULATED FLEXIBLE DUCTS

### A. Manufacturers:

- 1. Thermaflex Model M-KC [M-KE][G-KM][PHD \*\*\*for LEED/MRI Rooms\*\*\*].
- 2. Hart & Cooley Model F294, FB294.
- 3. Substitutions: Division 01 - Product Requirements [Not Permitted].

### B. \*\*Thermaflex\*\*Product Description: UL 181, Class 1, coated fiberglass woven fabric supported by coated helical wound spring steel wire; fiberglass insulation; aluminized

polyester [fiberglass reinforced metallized film laminate \*\*\*for M-KE\*\*\*]  
[polyethylene \*\*\*for G-KM\*\*\*] vapor barrier film. [UL 181, Class 1, 100% recyclable  
inner core and vapor barrier with no metallic components. \*\*\*for PHD\*\*\*]

1. Pressure Rating: 16" W.G. positive (4"-10"ID), 10" W.G. positive (12"-16" ID) and 2.0" W.G. negative (4"-16"ID). \*\*\*for M-KC \*\*\*
2. [Pressure Rating: 10" W.G. positive (4"-12"ID), 6" W.G. positive (14"-16" ID), 4" W.G. positive (18"-20" ID) and 1.0" W.G. negative (4"-12"ID), 0.5" W.G. negative (14"-20" ID).] \*\*\*for M-KE\*\*\*
3. [Pressure Rating: 6" W.G. positive (3"-16" ID), 4" W.G. positive (18"-20" ID) and 1.0" W.G. negative (4"-12"ID), 0.5" W.G. negative (14"-20" ID).] \*\*\*for G-KM\*\*\*
4. [Pressure Rating: 10" W.G. positive (4"-12" ID), and 0.5" W.G. negative (4"-12" ID).] \*\*\*for PHD\*\*\*
5. Maximum Velocity: 6000 fpm. [5000 fpm] \*\*\*for M-KE or G-KM or PHD\*\*\*
6. Temperature Range: -20°F to 250°F. [200°F continuous, 250°F intermittent] \*\*\*for M-KE or G-KM\*\*\*
7. Thermal Resistance: R-4.2 for 1.5" thickness. [R-6 for 2" thickness][R-8\*\*\*for PHD\*\*\*]

C. \*\*Hart & Cooley\*\* Product Description: UL 181, Class 1, Two plies consisting of a layer of metallized polyester and a layer of clear polyester encapsulating a steel wire helix.

1. Pressure Rating: 16" W.C. positive (4"-20"ID) and 1.0" W.G. negative (4"-12"ID), 0.5" W.C. negative (14"-20" ID).
2. Maximum Velocity: 6000 fpm.
3. Temperature Range: -20°F to 140°F continuous, 250°F intermittent.
4. Thermal Resistance: R-4.2

## 2.6 SINGLE WALL SPIRAL ROUND DUCTS

A. Manufacturers:

1. McGill AirFlow Corporation
2. Spiral Mfg. Co., Inc.
3. Semco Incorporated.
4. Tangent Air Corp] Model.
5. [Local Manufacturer.]
6. Substitutions: Division 01 - Product Requirements. [Not Permitted.]

B. Product Description: UL 181, Class 1, round spiral lockseam duct constructed of galvanized steel.

C. Duct Coating: Polyvinyl chloride plastic, 4 mil thick on [outside and [2] [1] mil thick on inside.] [both sides.] Temperature range: minus 30°F to 200°F.

- D. Construct duct with the following minimum gages:

Diameter	Gauge
3 inches to 14 inches	26
15 inches to 26 inches	24
28 inches to 36 inches	22
38 inches to 50 inches	20
52 inches to 84 inches	18

- E. Construct fittings with the following minimum gages:

Diameter	Gauge
3 inches to 14 inches	24
15 inches to 26 inches	22
28 inches to 36 inches	20
38 inches to 50 inches	20
52 inches to 60 inches	18
62 inches to 84 inches	16

## 2.7 SINGLE WALL SPIRAL FLAT OVAL DUCTS

- A. Manufacturers:

1. McGill AirFlow Corporation.
2. Spiral Mfg. Co., Inc.
3. Semco Incorporated.
4. Tangent Air Corp.
5. [Local Manufacturer].
6. Substitutions: Division 01 - Product Requirements. [Not Permitted.]

- B. Product Description: Machine made from round spiral lockseam duct constructed of galvanized steel; rated for 10" W.G. pressure.

- C. Joints: Either fully welded or bolted flange with gasket material in accordance with manufacturer's recommendations.

- D. Construct duct with the following minimum gauges:

Major Axis Dimension	Gauge
7 inches to 24 inches	24
25 inches to 48 inches	22
50 inches to 70 inches	20
72 inches to 82 inches	18
84 inches and larger	16

- E. Construct fittings with the following minimum gauges:

Major Axis Fitting Dimension	Gauge
7 inches to 36 inches	20
37 inches to 60 inches	18
62 inches and larger	16

## 2.8 DOUBLE WALL SPIRAL INSULATED ROUND DUCTS

### A. Manufacturers:

1. McGill AirFlow Corporation.
2. Spiral Mfg. Co., Inc.
3. Semco Incorporated Model.
4. Tangent Air Corp.
5. [Local Manufacturer.]
6. Substitutions: Division 01 - Product Requirements. [Not Permitted.]

### B. Product Description: Machine made from round spiral lockseam duct with light reinforcing corrugations, galvanized steel outer wall, 1" [2"] [3"] thick glass fiber insulation, [perforated] [solid] galvanized steel inner wall; fittings manufactured with [perforated] [solid] inner wall.

### C. Duct Coating: Polyvinyl chloride plastic, 4 mil thick on [outside and [2] [1] mil thick on inside.] [both sides.] Temperature range: minus 30°F to 200°F.

### D. Construct round duct with the following minimum gages:

Diameter	Gauge
3 inches to 14 inches	26
15 inches to 26 inches	24
28 inches to 36 inches	22
38 inches to 50 inches	20
52 inches to 84 inches	18

### E. Construct round fittings with the following minimum gages:

Diameter	Gauge
3 inches to 14 inches	24
15 inches to 26 inches	22
28 inches to 36 inches	20
38 inches to 50 inches	20
52 inches to 60 inches	18
62 inches to 84 inches	16

## 2.9 DOUBLE WALL SPIRAL INSULATED FLAT OVAL DUCTS

### A. Manufacturers:

1. McGill AirFlow Corporation.
2. Spiral Mfg. Co., Inc.
3. Semco Incorporated.
4. Tangent Air Corp.
5. [Local Manufacturer.]
6. Substitutions: Division 01 - Product Requirements. [Not Permitted.]

### B. Product Description: Machine made from round spiral lockseam duct with light reinforcing corrugations, galvanized steel outer wall, 1" [2] [3] thick glass fiber insulation, [perforated] [solid] galvanized steel inner wall; fittings manufactured with [perforated] [solid] inner wall.

### C. Construct flat oval duct with the following minimum gauges:

Major Axis Dimension	Gauge
7 inches to 24 inches	24
25 inches to 48 inches	22
50 inches to 70 inches	20
72 inches to 82 inches	18
84 inches and larger	16

### D. Construct flat oval fittings with the following minimum gauges:

Major Axis Fitting Dimension	Gauge
7 inches to 36 inches	20
37 inches to 60 inches	18
62 inches and larger	16

## 2.10 GLASS FIBER REINFORCED PLASTIC ROUND DUCTS

### A. Manufacturers:

1. Perry Fiberglass Products.
2. Spunstrand, Inc.
3. Substitutions: Division 01 - Product Requirements. [Not Permitted.]

### B. Product Description: Filament wound glass fiber reinforced plastic with fire retardant thixotropic resin with flame spread less than 25; smoke developed less than 50 when tested in accordance with ASTM E84.

### C. Construct duct and fittings with the following minimum wall thickness:

Diameter	Wall Thickness
----------	----------------

6 inches to 20 inches	0.125 inches
21 inches to 36 inches	0.187 inches
37 inches to 60 inches	0.250 inches

D. Joints: Flanged.

## 2.11 DOUBLE WALL INSULATED GLASS FIBER REINFORCED PLASTIC ROUND DUCTS

A. Manufacturers:

1. Perry Fiberglass Products.
2. Spunstrand, Inc.
3. Substitutions: Division 01 - Product Requirements. [Not Permitted.]

B. Product Description: Inner and outer wall constructed of filament wound glass fiber reinforced plastic with fire retardant thixotropic resin with flame spread less than 25; smoke developed less than 50 when tested in accordance with ASTM E84.

C. Construct duct and fittings with the following minimum wall thickness:

Diameter	Wall Thickness
6 inches to 20 inches	0.125 inches
21 inches to 36 inches	0.187 inches
37 inches to 60 inches	0.250 inches

D. Insulation: 3/4 inch thick with thermal resistance of 5.4 square feet-hour-degree F per BTU.

E. Joints: Flanged.

## 2.12 SLAB DUCT VENTILATION SYSTEM

A. Manufacturers:

1. Spunstrand, Inc.
2. Blueduct, Inc.
3. Substitutions: Division 01 - Product Requirements. [Not Permitted.]

B. Product Description: ASTM A653/A653M galvanized steel, corrugated, with support brackets, connecting couplings, elbows, end caps, spin-in-collar, wall discharge head, and soffit discharge head; designed for installation in cast-in-place concrete floor assemblies.

## 2.13 TRANSVERSE DUCT CONNECTION SYSTEM

### A. Manufacturers:

1. Ductmate Industries, Inc.
2. Substitutions: Division 01 - Product Requirements. [Not Permitted.]

### B. Product Description: [SMACNA "E" rated] [SMACNA "F" rated] [or] [SMACNA "J" rated] rigidity class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips.

## 2.14 CASINGS

- A. Fabricate casings in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and construct for operating pressures indicated.
- B. Reinforce access door frames with steel angles tied to horizontal and vertical plenum supporting angles. Furnish hinged access doors where indicated or required for access to equipment for cleaning and inspection. [Furnish clear wire glass observation ports, minimum 6 x 6 inch size.]
- C. Fabricate acoustic casings with reinforcing turned inward. Furnish 16 gage back facing and 22 gage perforated front facing with 3/32 inch diameter holes on 5/32 inch centers. Construct panels 3 inches thick packed with 4.5 lb./cu ft minimum glass fiber media, on inverted channels of 16 gage.

## 2.15 BURIED UNDERGROUND DUCT FABRICATION

- A. Construct buried ducts using the following: concrete encased sheet metal, PVC jacketed sheet metal, fiberglass reinforced plastic, or concrete.
- B. Fabricate metal ductwork in accordance with SMACNA Duct Construction Standards, except as indicated. Fabricate using two gages heavier material than indicated for 2" W.G. pressure class.

## 2.16 TYPE I KITCHEN HOOD EXHAUST DUCTWORK FABRICATION

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and NFPA 96.
- B. Construct of 18 gauge stainless steel using continuous external welded joints.
- C. Provide 18" from combustibles and 3" from non-combustibles.

## 2.17 ACOUSTICAL DUCTWORK FABRICATION

- A. Construct outer duct in accordance with low and medium pressure listed above. Provide 22 gauge perforated interior facing with 3/32" holes on 5/32" centers. Construct ductwork 1" thick packed with duct liner in accordance with Section 23 07 00. All dimensions are inside clear dimensions.

## 2.18 VITRINE PRESSURIZATION DUCT FABRICATION

- A. Constructed of UL listed plenum rated CPVC with a flame spread of 0 and a smoke generation of 0 to 25, solvent welded joints, Vesda pipe or approved equal. Final connection to the vitrine shall be made with Vesda 3/8" I.D. capillary tube or approved equal.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Division 01 - Administrative Requirements: Coordination and project conditions.
- B. Verify sizes of equipment connections before fabricating transitions.

### 3.2 INSTALLATION

- A. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Install glass fiber ducts in accordance with SMACNA Fibrous Glass Duct Construction Standards. Obtain manufacturer's inspection and acceptance of fabrication and installation at beginning of installation.
- C. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Use crimp joints with or without bead or beaded sleeve couplings for joining round duct sizes 12" and smaller.
- E. Install duct hangers and supports in accordance with Section 23 05 29 [23 05 00].
- F. Use double nuts and lock washers on threaded rod supports.
- G. Slope underground ducts to plenums or low pump out points at 1: 500. Install access doors for inspection.

- H. Paint buried metal ductwork without factory jacket with one coat and seams and joints with additional coat of asphalt base protective coating.
- I. Connect flexible ducts to metal ducts with [adhesive.] [liquid adhesive plus tape.] [draw bands.] [adhesive plus sheet metal screws.]
- J. Set plenum doors 6 to 12 inches above floor. Arrange door swing so fan static pressure holds door in closed position.
- K. Casings: Install floor mounted casings on 4" high concrete curbs. [Refer to Section 03 30 00]. At floor, rivet panels on 8 inch centers to angles. Where floors are acoustically insulated, furnish liner of 18 gage galvanized expanded metal mesh supported at 12 inch centers, turned up 12 inches at sides with sheet metal shields.
- L. Install kitchen range hoods in accordance with NFPA 96. [Refer to Section 11 40 00].
- M. Install residue traps in kitchen hood exhaust ducts at base of vertical risers with provisions for clean out.
- N. Kitchen hood exhaust ducts: Use stainless steel for ductwork exposed to view and stainless steel or carbon steel where ducts are concealed.

### 3.3 INTERFACE WITH OTHER PRODUCTS

- A. Install openings in ductwork where required to accommodate thermometers and controllers. Install pitot tube openings for testing of systems. Install pitot tube complete with metal can with spring device or screw to prevent air leakage. Where openings are provided in insulated ductwork, install insulation material inside metal ring.
- B. Connect diffusers or light troffer boots to low pressure ducts with 5 feet maximum length of flexible duct held in place with strap or clamp.
- C. Connect [air terminal units] [air outlets and inlets] to supply ducts [directly or] with five foot maximum length of flexible duct. Do not use flexible duct to change direction.

### 3.4 SCHEDULES

- A. Ductwork Material Schedule:

Air System	Material
Low Pressure Supply	Steel
Medium Pressure Supply	Steel
Medium Pressure Supply, 3'-0" Downstream of Humidifier Manifolds.	Stainless Steel
Return and Relief	Steel
General Exhaust	Steel

Air System	Material
Buried Relief	Steel, PVC Jacketed, FRP, Concrete
Kitchen Hood Exhaust	[Stainless Steel] Carbon Steel
Dishwasher Exhaust	Stainless Steel
Outside Air Intake	Steel
Combustion Air	Steel
Evaporative Condenser Intake and Exhaust	Steel

END OF SECTION

## SECTION 23 33 00 - AIR DUCT ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Back-draft Dampers.

#### 1.2 RELATED SECTIONS

- A. Section 23 09 23 - Direct-Digital Control System for HVAC: Execution and Product requirements for connection and control of Combination Smoke and Fire Dampers for placement by this section.
- C. Section 23 09 53 - Pneumatic and Electric Control System for HVAC: Execution and Product requirements for connection and control of Combination Smoke and Fire Dampers for placement by this section.
- D. Section 23 31 00 - HVAC Ducts and Casings: Requirements for duct construction and pressure classifications.
- E. Division 26 - Equipment Wiring Connections: Execution requirements for connection of electrical Combination Smoke and Fire Dampers specified by this section.

#### 1.3 REFERENCES

A. Air Movement and Control Association International, Inc.:

1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.

B. ASTM International:

1. ASTM E1 - Standard Specification for ASTM Thermometers.

C. National Fire Protection Association:

1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
2. NFPA 92A - Recommended Practice for Smoke-Control Systems.

D. Sheet Metal and Air Conditioning Contractors:

1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

E. Underwriters Laboratories Inc.:

1. UL 555 - Standard for Safety for Fire Dampers.
2. UL 555C - Standard for Safety for Ceiling Dampers.
3. UL 555S - Standard for Safety for Smoke Dampers.

#### 1.4 SUBMITTALS

A. Division 01 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers and duct access doors.

C. Product Data: Submit data for shop fabricated assemblies and hardware used.

D. Product Data: Submit for the following. Include where applicable electrical characteristics and connection requirements.

1. Backdraft dampers.

E. Product Data: For fire dampers, smoke dampers, and combination fire and smoke dampers submit the following:

1. Include UL ratings, dynamic ratings, leakage, pressure drop and maximum pressure data.
2. Indicate materials, construction, dimensions, and installation details.
3. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.

F. Manufacturer's Installation Instructions: Submit for Fire and Combination Smoke and Fire Dampers.

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

#### 1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of access doors and test holes

C. Operation and Maintenance Data: Submit for Combination Smoke and Fire Dampers.

## 1.6 QUALITY ASSURANCE

- A. Dampers tested, rated and labeled in accordance with the latest UL requirements.
- B. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.
- C. Maintain one copy of each document on site.

## 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Division 01 - Product Requirements: Product storage and handling requirements.
- B. Protect dampers from damage to operating linkages and blades.
- C. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
- D. Storage: Store materials in a dry area indoor, protected from damage.
- E. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

## 1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

## 1.10 COORDINATION

- A. Division 01 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work where appropriate with building control Work.

## 1.11 WARRANTY

- A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.

## 1.12 EXTRA MATERIALS

- A. Division 01 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two of each size and type of fusible link.

## 1.13 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. Operation and Maintenance Manuals.

## PART 2 - PRODUCTS

### 2.1 BACK-DRAFT DAMPERS

- A. Manufacturers:
  - 1. Ruskin.
  - 2. Greenheck.
  - 3. Penn.
  - 4. Substitutions: Division 01 - Product Requirements.
- B. Gravity backdraft dampers, size 18 x 18 inches or smaller, furnished with air moving equipment, may be air moving equipment manufacturer's standard construction.
- C. Fabricate multi-blade, parallel action gravity balanced backdraft dampers of 16 gauge galvanized steel, or extruded aluminum, with center pivoted blades of maximum 6" width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

## 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 in accordance with NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.
- B. Install back-draft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

### 3.3 DEMONSTRATION

- A. Division 01 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate re-setting of fire dampers to Owner's representative.

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, 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 for Division 26 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. Programmable Controller
    - c. Low-Voltage Switching System
    - d. Detention Intercom System
    - e. IP Video System
    - 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) Programmable controllers
      - c) Relay switching system
      - d) Detention intercom system
    - 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 250° 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. Branch Circuits 10 AWG and Smaller: Solid or stranded copper conductor, 600 volt insulation, THHN/THWN or XHHW-2.
- C. 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.
  - 2. For conductors 10 AWG and smaller, insulation shall be colored.
  - 3. When two or more neutrals are installed in one conduit, identify each with the proper circuit number in accordance with Section 26 05 53.
  - 4. Grounding conductors 10 AWG and smaller shall have green colored insulation.
- D. Control Circuits: Copper, stranded conductor 600 volt insulation, 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 90° 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 90° 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 90° 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 10 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.

# 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 28 23 00 – Video Surveillance System.
- H. 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 indenter fittings are not acceptable.

- C. Maximum size shall be 2". Provide factory elbows on sizes 1-1/2" 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 07 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  $\frac{3}{4}$  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 27 26 – Wiring Devices.
- D. 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. 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 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 26 – Grounding and Bonding for Electrical Systems.
- C. Section 26 05 33 – Raceway and Boxes for Electrical Systems.
- D. Section 26 05 33.16 – Boxes for Electrical Systems.
- E. 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 [ivory] nylon face.

## 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.

## 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 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 IP Video system shall be assembled and installed by the same Security Systems Integrator that installs the Security Controls system. The Security Systems 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 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 of the system by telephone, with the facility maintenance staff. If the problem cannot be resolved within 24 hours, the Security Systems 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 Security 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 Security Systems 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. At the end of the warranty period, the Owner shall have the option of entering into a maintenance contract with the Security Systems 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 Professional”. Existing site license will be used.
- B. NO SUBSTITUTIONS ALLOWED.

## 2.3 VIDEO STORAGE APPLIANCE

- A. Provide Milestone Husky “M50” series or approved equal network video recorder for all new ST unit cameras. Provide 16TB 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 1 Megapixel IP Mini-Dome (ST Cells): Axis #P3364-V-12mm 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: 1280 (H) x 960 (V), 1.3 megapixel, HDTV, 720P.
  - 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 3.3-12.0 mm range, F1.4, IR-corrected, megapixel-rated, auto-iris. Automatic IR cut filter removal in low light conditions.
  - 5. Electronic Shutter: 1/29,500 to 2 sec.
  - 6. Backlight Compensation: Automatic.
  - 7. Video Compression: H.264 and Motion JPEG, dual-stream.
  - 8. Frame Rate Using H.264: Up to 30 fps in all resolutions.
  - 9. Frame Rate Using Motion JPEG: Up to 30 fps in all resolutions.
  - 10. Video Streaming: Simultaneous H.264 and Motion JPEG, controllable frame rate and bandwidth.
  - 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/v6, HTTP, HTTPS, QoS Layer 3, FTP, SMTP, TCP, Bonjour, ICMP, SNMPv1/v2c/v3 (MIB-II), RTSP, RTP, UDP, IGMP, RTCP, DHCP, UPnP, ARP, DNS, DynDNS, SOCKS, and NTP.
  - 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 by up to 20 clients 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: 256MB 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 and Class 3.
  22. Operating Temperature: Minimum operating temperature range of 32°F to +122°F.
  23. 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 (ST Rec Yard): Axis #3367-VE or approved equal megapixel IP color camera with the following features:
1. Imaging Device: 1/3.2 inch progressive scan CMOS.
  2. Resolution: 2592 (H) x 1944 (V), 5 megapixel, HDTV, 1080P.
  3. Light Sensitivity: Minimum 0.2 lux at F1.2 for color image, 0.04 lux at F1.2 for B/W image.
  4. Lens: Vari-focal with remote zoom and focus, minimum 3-9mm range, F1.2, 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.

## 2.7 GENERAL HARDWARE AND MOUNTS

- A. Mounting: Provide mounting arm for Rec Yard camera. Cell cameras shall be installed directly to plumbing chase.
  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 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.

1. Ortronics/Superior Essex.
2. CommScope Systimax.
3. Corning Cable Systems (fiber products).
4. Hubbell/Mohawk.
5. Leviton/Berk-Tek.
6. TE Connectivity (formerly ADC/Krone/Amp).
7. Substitutions: Under provisions of Division 01.

## 2.10 CAMERA PoE FIELD CABLE AND NEW NETWORK HORIZONTAL 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, with green outer jacket.

1. Superior Essex "DataGAIN" CMP or approved equal.

## 2.11 UTP TELECOMMUNICATIONS JACKS

- A. All UTP telecommunications jacks shall be Category 6, T568A/B, 8P8C, single, green 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. All jacks shall be wired using the T568B wiring configuration.

- B. Ortronics "TracJack Clarity 6" #OR-TJ600 or approved equal.

## 2.12 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.

## 2.13 UTP MODULAR PATCH PANEL

- A. Provide and install high-density Category 6, modular patch panels where needed. 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. All patch panel ports shall be wired using the T568B wiring configuration.

1. 24-port Panel: Ortronics "Clarity6" #OR-PHD66U24 or approved equal.

## 2.14 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.

## 2.15 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.).

1. Camera Field Patch Cord: Provide Ortronics #OR-MC6xx-05 or approved equal factory-terminated Category 6 patch cables with green jacket, where the "xx" in the part number is the cable length, which shall be determined by the Contractor. Use for connection from the camera to the camera jack.
2. Gigabit Ethernet Uplink Patch Cord: Same as the Cross-Connect Patch Cords specified below.
3. Cross-Connect Patch Cords: Provide #OR-MC603-05 or approved equal factory-terminated 3-foot Category 6 patch cords with green jacket for cross-connect between the video patch panel and the network switch. Provide one patch cord for each new camera cable installed on a patch panel.

## 2.16 MULTIMODE FIBER OPTIC BACKBONE CABLE

- A. Indoor/Outdoor Multimode Fiber Cables: All multimode fiber optic backbone cables that exit the building envelope shall be UL listed, riser-rated, loose tube, 50/125 micron laser optimized OM3, indoor/outdoor, fiber optic cable meeting National Electrical

Code riser (OFNR) standards. The cable shall utilize dry water-blocking technology, have a UV-stabilized, flame-resistant PVC outer jacket, and operate in a range from -40°C to 70°C. (xx in part numbers = fiber count, as needed)

1. Superior Essex “EnduraLite” #F360-0xxU30-Eyy1 or approved equal.

## 2.17 FIBER CONNECTORS

- A. All fibers shall be terminated with duplex LC type connectors with ceramic ferrule.

1. 50 Micron Multimode: Ortronics “OptiMo” #205KAS9GA-50T or approved equal.

## 2.18 FIBER CONNECTOR PANELS

- A. All fiber connector panels shall be installed with duplex LC fiber adapters with ceramic sleeve and fiber designation strip. For multimode fibers, the quantity of adapters per panel shall be determined by the number of fibers being terminated.

1. Ortronics #OR-OFP-LCQ24LC or approved equal panel with 6 quad adapters.

## 2.19 FIBER PATCH CORDS

- A. All multimode fiber optic patch cords shall be UL listed, 50/125 micron laser optimized OM3, multimode fiber cords with flame-resistant PVC outer jacket. Cords shall have duplex LC type connectors with ceramic ferrule. Patch cords shall be factory terminated and tested to 10 Gb/s data rates.

1. Ortronics #OR-P1DF2LRGZGZ00xM or approved equal, length as needed.

## 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. 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.
- G. 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 Owner. A system of communications shall be maintained between pulling and feed locations so that pulling can be stopped instantly, when required.
- H. 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.
- I. Store a maximum of one foot of slack UTP cable for each UTP jack at each IP Video outlet.
- J. At the rack, a minimum of five feet of slack UTP cable shall be provided. Route the service loop in the cable runway above the rack. No cables shall encroach or interfere with rack equipment space. All cables shall be protected from physical damage and should not be routed on the floor. Coiling the slack cable above or adjacent to the rack is not acceptable. The intent of this installation method is to provide slack cable for future work without causing increased inductance by coiling the cables.
- K. All cabling shall be run continuous with no splices from each IP Video outlet to the patch panel in the rack. Cables shall be terminated at each end. No UTP cable run shall exceed 90 meters (295 feet) in length from the IP Video camera to the head-end equipment or intermediate closet, whichever is closer.
- L. 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:

5 inches from power lines of 2 kVA or less.

12 inches from fluorescent and HID ballasts

36 inches from 5 kVA or greater power lines

40 inches from transformers and motors

- M. The jacket of UTP cables shall be maintained to a point within one half inch of the 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.
- N. Unless otherwise noted, all IP Video cables shall be installed in raceway or J-hooks for the entire length of each cable. Provide raceway through areas that will not be accessible for future cable replacement or additions. Portions of cables installed in J-hooks shall be supported in accordance with TIA/EIA standards at intervals not exceeding four (4) feet in length. 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.
- O. 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 CABLE ACCEPTANCE TESTING

- A. Each UTP cable shall be tested for compliance with TIA/EIA 568B.2-1, Addendum 1 Category 6 standards after installation using a Fluke or approved equal Level 3 tester. 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. Equal Level Far End Cross Talk (ELFEXT)
  - 5. Power Sum Equal Level Far End Cross Talk (PS-ELFEXT)
  - 6. Attenuation to Crosstalk Ratio (ACR)
  - 7. Power Sum Attenuation to Crosstalk Ratio – Near End (PSACR-N)
  - 8. Power Sum Attenuation to Crosstalk Ratio – Far End (PSACR-F)
  - 9. Propagation Delay
  - 10. Delay Skew
  - 11. Return Loss
  - 12. Wiremap
  - 13. 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
- C. The Contractor shall provide 100% testing for each "permanent link" (i.e. from the camera outlet box to the patch panel at the opposite end. Provide test results for all tests noted above in the form of printouts from the test equipment. 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. Initially test each fiber optic cable with a light source and power meter, utilizing procedures as stated in TIA/EIA-526-14A: OFSTP-14A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant and TIA/EIA-526-7 (currently Standard Proposal Number 2974-B). Measured results shall be plus/minus 1dB of submitted loss budget calculations. If loss figures are outside this range, test cable with an Optical Time Domain Reflectometer (OTDR) in accordance with TIA/EIA 455-61 to

determine the cause of variation. Improper terminations shall be re-done and damaged cable shall be replaced at no additional cost to the Owner. The maximum acceptable signal loss through the entire fiber path, including cable, couplings, and jumpers shall not exceed TIA/EIA 568-B.3 standards. Test each multimode cable in both directions for signal attenuation at 850 and 1300 nm, using "Method B" – One jumper reference.

- E. 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.
- F. Provide three working days advance notice of tests. The Owner's Representative shall reserve the right to be present during the testing of any or all cables in the system. Submit a copy of the test report for each cable prior to substantial completion of the project.
- G. Acceptance of the video system shall be based on the results of the above tests, functionality, and the receipt of documentation.

### 3.5 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.

### 3.6 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 a complete and operating 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.
- C. Provide associated circuitry to operate and/or monitor all existing intercoms, lights, door locks, and door position switches that are currently controlled/monitored by the existing control panels in the Control Rooms. The Contractor shall field verify the power and control requirements of all devices and provide all materials and labor required to accomplish intended function.

#### 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 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.

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 (i.e. "Attorney Conference", "Control Room Sallyport", etc.) 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. In accordance with the requirements of Division 01 this section, and other Division 26 sections, include all costs for the following training on the security system:
  1. Train operation and maintenance personnel in use and operation of the security system provided in Division 26, including hands-on training for touchscreen, relay control, intercom, and PLC system operation.
- B. Training sessions for the security system shall be conducted on-site by certified representatives of the Security System Integrator, including installers and programmers who are directly responsible for and familiar with this specific project.
  1. Conduct sessions for not less than four-hour periods during normal working hours, i.e., Monday through Friday, 8:00 AM to 4:30 PM.
  2. Training session schedules shall conform to the requirements of the Owner.
  3. Submit schedules to Owner for approval not less than two weeks prior to training session.
  4. Do not schedule different types of training (i.e. maintenance and operation) concurrently without Owner approval.
  5. Training sessions shall be conducted by qualified personnel, i.e., maintenance training shall be conducted by the system installer rather than the programmer (unless a single installer/programmer is qualified to do both types of training).

6. The training period shall consist of thirty-two (32) hours of on-site instruction to be apportioned by the Owner to assure that facility personnel are fully trained. If the Contractor is able to complete all training to the satisfaction of the Owner in less than the 40 hours, the balance of the training time may be used (at the Owner's discretion) for post-occupancy programming changes to be done either on-site at the end of the training session or from the Security Integrator's principal location at 90 days after Final Completion.
- C. Make a video recording of all training sessions, including but not limited to classroom instruction, operational and hands-on training, and maintenance/troubleshooting training. Provide two copies of the recorded material to the Owner upon completion of all training.
- D. 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. Intercom/Security Cabinet: Provide additional touchscreen controller as specified above in the main Intercom/Security cabinet to provide firewall protection and interface for remote connection to security system for maintenance and software uploading.
- C. Programmable Controller and Networking Equipment - Refer to Section 28 46 19.

## 2.6 DATA LOGGING/ARCHIVING SERVER

- A. Provide archiving server for data logging. Server shall be:
  - 1. Rack-mounted for locating in the fence security system rack.
  - 2. Provided with full SQL server. Minimum requirements per Microsoft are 1GB RAM, 2.0GHz or faster processor, x64 processor.
  - 3. Provide hard drive space for all installed software and 30 days minimum of logging of all door control and status functions, interlock overrides, intercom call-in status.

## 2.7 ACCEPTABLE MANUFACTURERS – UNINTERRUPTABLE POWER SUPPLIES

- A. American Power Conversion (APC).
- B. Eaton.
- C. Tripp-Lite.
- D. Substitutions: Under provisions of Division 01.

## 2.8 UNINTERRUPTABLE POWER SUPPLIES

- A. Control Rooms: 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. Intercom cabinet: APC #Smart-UPS or approved equal rack-mounted UPS with sufficient output power capacity to provide a half-load backup time of 30 minutes. (1) UPS shall be mounted in the existing fence security system rack and connected to the intercom equipment. The other shall be mounted in the sliding/rotating rack in the ST Control Room for local equipment. Exact VA rating of the UPS shall be determined by the Contractor.

- D. At the Contractor's option, the UPS in the intercom cabinet may be sized to provide UPS outlets in the Control Room for the equipment listed above, instead of individual UPS units.

## 2.9 ACCEPTABLE MANUFACTURERS - TOUCHSCREEN SOFTWARE

- A. Schneider Electric "Vijeo Citect", latest published version, or approved equal.
- B. Allen-Bradley.
- C. Siemens.
- D. GE Fanuc.
- E. Substitutions: Under provisions of Division 01.

## 2.10 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, dayrooms, etc. as currently configured in the existing ST Control Room.
- 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.

## 2.11 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.

## 2.12 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. 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.

- D. 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.

E. Intercom Control

1. An interface with the intercom system shall be provided to include all existing 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.

F. Video System Control

1. The Video system shall be interfaced with the touchscreen system and shall include all cameras and monitors connected to the new IP Video system installed as part of this contract, as well as the existing analog cameras shown on the drawings. 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 system shall be programmed with up to ten (10) camera groups for call-up on the designated monitor(s). The Owner will identify all cameras to be assigned to each group.
3. The display on the spot monitor shall be as follows:
  - a. Default View: Quad display of whatever camera group (as specified above) has been selected. When an event-driven camera is activated, it shall bring up the view of a camera associated with a door, intercom, or other controlled point in the upper left quadrant of the monitor. If there are two cameras associated with a specific door or intercom, they shall appear in the upper left/right quadrants. The event-driven camera(s) shall be set to dwell until the associated door lock, intercom channel, etc. is closed, after which time the system reverts back to the previously selected quad view.
  - b. Full-size view: Fully selectable for any camera using a 1-touch operation from any graphic map. Touching the camera icon on any map brings up the full-size view on the monitor. This view shall remain visible until either the camera icon is touched again or until event-driven camera(s) are automatically activated.
  - c. All event-driven camera call-ups and associated points shall be determined by the Owner.
4. 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.
  - c. The "Camera Selection" screen shall be used to select groups of four cameras to be viewed on the monitors. The specific cameras in each 4-camera group shall be determined by the Owner during the submittal and programming phase of the project.
5. For existing analog cameras controlled by the system, the existing matrix switch may be controlled, or the encoded channel for the cameras in the area of work utilized on the IP Video side of the system.

G. Lighting Control

1. An interface with the lighting system shall be provided to include the existing lighting circuits controlled by the existing lighting switches located in the ST

Control Room. 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.

#### H. 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.

#### I. 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

- B. 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.
- C. 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 (ST Control Room):

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. Middle Atlantic "SRSR-Series" or approved equal 19"W x 23"D x 28"H slide-out, rotating rack with 12 RMU of vertical mounting space and 23" of useable depth, suitable for EIA 19" rack-mount equipment.
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 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
- 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. Extend all lighting, door control, and other circuits from the existing terminal cabinets to the new relay cabinets.
- K. Existing Door Lock Circuits: Re-use existing 120V door lock circuits for new system. Do not consolidate circuits, which can cause problems with circuit overload during group unlock functions.
- L. 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 incorporate all functions in the existing control panels, as well as all other specified functions. There shall be a single touchscreen interface program to provide seamless integration between all equipment.

## 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 55° 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. 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 #BMXDDOxx02K 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 55° 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. New intercom system shall be compatible with existing intercom field stations in the facility. The Contractor shall verify the exact make/model of field stations.

- C. 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.
- D. 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.
- E. 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.
- F. 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.

- G. Talkback Expander: Provide talkback expander for bi-directional communication using paging speakers.
- H. Mounting Brackets: Provide mounting brackets for DCC controller and expander enclosures as required to mount in security cabinet. Refer to Section 28 46 16.
- I. 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, gasketed 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  $\frac{3}{4}$ " 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  $\frac{1}{2}$  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.

## 2.9 ARCHIVING SERVER

- A. Connect the intercom system to the archiving server provided under 284000 for recording all intercom traffic. Provide storage capacity for a minimum of 30 days, based on the number of intercom stations present and the assumption that at least one channel will be open 50% of the time, either active or for control room personnel to listen.

# 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