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ISSUED: FOR BIDS **DATE: DECEMBER 11, 2018**

SECTION 10155
TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

1.2 This Section includes solid color reinforced composite toilet partitions.

A. units as follows:

1. Toilet Enclosures: Floor Mounted and wall anchored.

1.3 SUBMITTALS

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

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

C. Samples: For each exposed finish.

PART 2 - PRODUCTS

2.1 UNITS

A. Bobrick Floor Mounted (Sierra Series- Custom Color to be selected by Architect).

B. Bobrick to provide all floor mounting supports and accessories for configurations.

2.2 SOLID COLOR REINFORCED COMPOSITE TOILET PARTITIONS

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

B. Manufacturer: Subject to compliance with requirements, provide products by following:
1. Bobrick Washroom Equipment, Inc.

C. Door, Panel and stile Construction: Solid color reinforced composite panel material.

D. Pilaster Shoes and Sleeves (Caps): Stainless steel, ASTM A 666, Type 302 or 304.

E. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets, stainless steel.
2. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

2.3 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: Chrome-plated brass.

B. Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

D. Floor Mounted Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters for connection to slab. Provide assemblies that support pilasters.

E. Doors: Unless otherwise indicated, provide 24-inch wide in-swinging doors for standard toilet compartments and 36-inch wide out-swinging doors with a minimum 32-inch wide clear opening for compartments indicated to be accessible to people with disabilities.

1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
2. Latch and Keeper: Manufacturer's standard recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.
3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
4. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
5. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with accessibility requirements of authorities having jurisdiction. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

a. Pilasters and Panels: 3/8 inch.
b. Panels and Walls: 1/2 inch.

2. Stirrup Brackets: Secure panels to walls and to pilasters with not less than two brackets attached near top and bottom of panel.

a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
b. Align brackets at pilasters with brackets at walls.

3.2 FABRICATION

A. Floor Mounted Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.

3.3 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION10155

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SECTION 064020
INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
1. Solid Surface countertops, backsplash and sinks. Refer to finish schedule & drawings.
2. Plastic laminate cabinets. Refer to finish schedule & drawings.
3. Cabinet hardware.
4. Flush paneling. Refer to finish schedule & drawings.
5. Flush wall paneling. Refer to finish schedule & drawings.
6. Shop finishing of interior woodwork.
7. Installation of door hardware.

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 6 Section "Rough Carpentry" for furring, blocking, shims, and hanging strips for installing interior woodwork.
2. Division 1Alternates Section 01230.

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction prior to woodwork installation.

B. Identification of Parts: Comply with AWI Section 400 and as follows:
1. Exposed Parts: Surfaces visible when:
a. Drawer fronts and doors are closed.
b. Cabinets and shelving are open-type or behind clear glass doors.
c. Bottoms of cabinets are seen 42” or more above finish floor.
d. Tops of cabinets are seen below 78” above finish floor, or are visible from an upper floor or staircase after installation.
e. Portions of cabinets are visible when fixed appliances are installed.
f. Front edges of cabinet body members are visible or seen through a gap of greater than 1/8 inch with doors and drawers closed.
2. Semi-Exposed Parts: Surfaces visible when:
a. Drawer/Doors are in open position.
b. Bottoms of cabinets are between 30” and up to 42” above finish floor.
c. All front edges of shelving behind doors.
3. Concealed Surfaces: Surfaces are concealed when:
a. Surfaces are not visible after installation.
b. Bottoms of cabinets are less than 30” above finish floor.
c. Tops of cabinets are over 78” above finish floor and are not visible from an upper level.
d. Stretchers, blocking and/or components are concealed by drawers.

1.4 SUBMITTALS

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

B. Product data for each type of product and process specified and incorporated into items of architectural woodwork during fabrication, finishing, and installation.

C. Shop drawings showing location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
   1. Show plans, elevations, details at full scale.
   2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcing specified in other Sections.
   3. Show locations and sizes of cutouts and holes for hardware, plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.

D. Samples for verification of the following:
   1. Lumber with or for transparent finish, 50 sq. in., for each species and cut, finished on one side and one edge.
   2. Submit samples to Architect for review.

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

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work.

B. Installer Qualifications: Arrange for interior architectural woodwork installation by a firm that can demonstrate successful experience in installing architectural woodwork items similar in type and quality to those required for this Project.

C. Single-Source Responsibility for Fabrication and Installation: Engage a qualified woodworking firm to assume undivided responsibility for fabricating, finishing, and installing woodwork specified in this Section.

D. Quality Standard: Except as otherwise indicated, comply with the following standard:
   1. AWI Quality Standard: "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute for grades of interior architectural woodwork, construction, finishes, and other requirements.
   2. When an AWI quality grade is not specified, fabricate items in accordance with requirements of AWI “Custom” Grade, where applicable.

E. Standards: Architectural Woodwork Institute (AWI) “Architectural Woodwork Quality Standards.”

F. Fire-Retardant Treatment:
   1. Lumber: AWPA C20, non-corrosive interior type.
   2. Plywood: AWPA C27, non-corrosive interior type.
   3. Hardwood Plywood: HPMA FE compliance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, spoilage, and deterioration.

B. Do not deliver woodwork until painting and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in "Project Conditions."

1.7 PROJECT CONDITIONS

A. Environmental Limitations:
1. Do not deliver or install woodwork until building is enclosed, wet-work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
2. Obtain and comply with woodwork fabricator's and Installer's coordinated advice for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained and stabilized so that woodwork will be within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.

B. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
1. Verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork by accurate field measurements before being enclosed. Record measurements on final shop drawings.
2. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site and coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions.

1.8 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

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Species and Cut for Transparent Finish: Select white hard maple, plain sawn or sliced.

C. Wood Species for Opaque Finish: Any closed-grain hardwood.

D. Wood Products: Comply with the following:
1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no

urea formaldehyde.
3. Particleboard: ANSI A208.1, Grade M-2 and M-2-Exterior Glue.
4. Softwood Plywood: DOC PS 1, MDO (Medium Density Overlay).
5. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.

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

F. Wood-Preservative-Treated Lumber:
1. Preservative Treatment by Pressure Process: AWPA C2.
2. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
3. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
4. Application: Treat the following:
a. Wood in contact with concrete slabs.

G. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

H. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated.
1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
a. Formica Corporation; Formica.
b. Nevamar Company, LLC; Decorative Products Div.; Nevamar.
c. Laminart Corp.
d. Ralph Wilson Plastics Company

I. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
1. Manufacturers: Subject to compliance with requirements, provide the following:
a. Corian Palladio Series; E. I. du Pont de Nemours and Company.
2. Type: Standard type.
3. Thickness: 1/2 inch.
4. Colors and Patterns: As indicated in Room Finish Schedule on Drawings.
5. Provide manufacturer’s recommended joint adhesive.

J. Solid-Surfacing Material Sinks: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2, rectangular undermount type with 3-1/2 inch diameter drain hole and without overflow vents.
1. Manufacturers: Subject to compliance with requirements, provide the following:
a. Model 859 Large Single Sink; Corian; E. I. du Pont de Nemours and Company.
2. Size (Inside Dimensions): 17-1/4 inches wide by 13-3/8 inches wide by 7-7/8 inches deep.
3. Provide adhesives required to undermount sink bowls to solid surfacing material countertops.
4. Color: Refer to finish schedule.

K. Silicone Sealant for Solid-Surfacing Material:
1. Product: DuPont Silicone Sealant for Corian; E. I. du Pont de Nemours and Company.

N. Fabric-Faced Tackable Panels: Tackable panels shall have fabric facing on 5/8 inch thick, Class

A rated fiberboard sheet. Fabric shall be 100 percent polyester 16 oz./sq. yd. with a flame spread rating of 25 or less when tested in accordance with ASTM E 84. Provide color and texture as scheduled.

1. Fabricate panels to sizes and configurations indicated; adhere fabric to cores to produce installed panels with visible surfaces fully covered, free from waves in fabric weave, wrinkles, sags, blisters, seams, adhesive or other foreign matter.
2. Fabric: As indicated in Room Finish Schedule on Drawings.

O. Stainless-Steel Sheet: ASTM A 240 or ASTM A 666, Type 304, stretcher-leveled standard of flatness.
1. Thickness: 16 gage (0.0595 inch).
2. Finish: No. 4 directional satin finish.
a. Run grain of directionally textured finishes with long dimension of each piece.

2.1 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Door Hardware (Scheduled by naming Products)."

B. Hardware Standard: Comply with BHMA A 156.9 for items indicated by referencing BHMA number or items referenced in this standard.

C. Frameless Concealed Hinges (Self Closing): BHMA A 156.9, opening minimum 120 degrees.

D. Concealed Pulls: Back Mounted: Hafele 151.35.207, Chromium Plated Matt.

E. Recessed Pulls: Similar to Hafele, H 151-35.264.

F. Catches: Magnetic type with adjustment slots for screw attachment.

G. Adjustable shelf standards and supports: BHMA A 156.9, B04071: with shelf rest, B04081.

Provide heavy duty, nylon clips designed to be inserted into pre-drilled holes spaced at 1 inch vertically.

H. Drawer slides: Heavy duty, bottom mounted, epoxy coated with minimum load of 100 lbs, full extension, zinc plated steel drawer slides with steel ball bearings, BHMA A 156.9, B05091, and rated for the following loads:
1. Box drawers Slides: 100 lbs; or as required for task indicated.

I. Door Locks: BHMA A 156.11, E07121: National Lock, #C8173, C8174, C8178 or C8179.
Cores and Keying will be provided and installed by Contractor.

J. Grommets and Cable Passage through Countertops: 1-1/2 inch OD, matte chrome, molded plastic grommets and matching plastic caps with slot for wire passage.
1. Product: Subject to compliance with requirements, provide "SG Series" by Doug Mockett and Hafela Co., Inc.

K. Casters: Hafela 660.44.34.

L. Counter Supports: Extruded aluminum, satin anodized, Rakks/Rangine Corporation, Needham, Massachusetts, 800.826.6006, "Rakks EH-1818". Coordinate with countertop depth.

M. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A 156.18 for BHMA finish number indicated.
1. Matte Chrome Plated: BHMA 626 for brass or bronze bass: BHMA 652 for steel base.

N. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A 156.9.

2.2 INSTALLATION MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Screws: Select material, type, size, and finish required for each use. Comply with ASME B18.6.1 for applicable requirements.
1. For metal framing supports, provide screws as recommended by metal-framing manufacturer.

C. Nails: Select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.

D. 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 bolt devices for drilled-in-place anchors.

2.3 FABRICATION, GENERAL

A. Interior Woodwork Grade: Provide interior woodwork complying with the referenced quality standard and of the following grade:
1. Grade: Custom, flush overlay.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content to ambient humidity during fabrication and in installation areas.

C. Fabricate woodwork to dimensions, profiles and details indicated. Ease edges to radius indicated for the following:
1. Corners of Cabinets and edges of solid Wood (Lumber) Members ¾ Inch Thick or less: 1/16 inch.
2. Edges of Rails and similar Members More Than ¾ inch Thick: 1/8 inch.

D. Complete fabrication, including assembly, finishing and hardware application, to maximum extent possible, before shipment to Project Site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming and fitting.
1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors and other fastening devices that can be removed after trail fitting. Verify that various parts fit as intended and check measurements of assemblies against field verified measurements indicated on Shop drawings before disassembling for shipment.

E. Shop cut openings, to maximize extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or rough in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burns.
1. Seal edges of openings in countertops with coat of varnish.

F. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to relative humidity conditions existing during time of fabrication and in installation areas.

G. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius.

2.4 SOLID-SURFACING-MATERIAL COUNTERTOPS AND BACKSPLASHES

A. Grade: Premium.

B. Solid-Surfacing-Material Thickness: 1/2 inch solid surfacing material over 3/4 inch thick exterior grade hardwood veneer plywood.
   1. Solid Surfacing Material Edges: Drip nosing as Detailed.

C. Colors: As indicated in Room Finish Schedule on Drawings.

D. Fabricate tops in one piece. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

E. Cut openings in countertops and install undermount solid surfacing sink bowls in shop using manufacturers recommended joint adhesive. Fabricate tops and install sinks so that sink bowl is flush with edge of countertop cutout for smooth inconspicuous seam.

E. Drill holes in countertops for plumbing fittings in shop.

2.5 COUNTERTOPS

A. Quality Standard: Comply with AWI Section 400 requirements for countertops.
   1. Grade: Custom.
   2. Colors, Patterns, and Finishes: refer to drawings.
   3. Core Material: provide veneer core plywood.

2.6 PLASTIC LAMINATE CABINETS

A. Quality Standard: Comply with AWI Section 400 requirements for laminate cabinets.

B. Grade: Custom.

C. AWI Type of Cabinet Construction: Flush Overlay.

D. Laminate Cladding of Exposed Surfaces: High pressure decorative laminate complying with the following requirements:
   1. Horizontal surfaces Other Than Tops: HGS.
   2. Vertical Surfaces: HGS.
   3. Edges: PVS tape, **3 mm** minimum thickness, matching laminate in color, pattern and finish.

E. Materials for semi-exposed Surfaces: provide surface materials indicated below:
   1. Surfaces Other Than drawer Bodies: Thermoset Decorative Overlay.
   2. Drawer sides and Backs: Thermoset Decorative Overlay.
   3. Drawer Bottoms: Thermoset Decorative Overlay.

F. Colors, Patterns and Finishes: Provide materials and products that result in colors and textures of exposed laminated surfaces complying with the following manufacturer’s designations for these characteristics.

1. Solid Colors.

2.7 SHOP FINISHING

A. Quality Standard: Comply with AWI Section 1500 unless otherwise indicated.

B. Grade: provide finishes of same grade as items to be finished.

C. General: Shop finish transparent finished architectural woodwork at fabrication shop as specified in this Section.

D. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces for woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic laminate clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper or thermoset decorative overlay.

E. Transparent Finish: Comply with requirements indicated below for grade, finish system, staining and sheen, with sheen measured on a 60 degree gloss meter per ASTM D 523:
1. Grade: Custom.
2. AWI Finish System TR-2: Precatalyzed lacquer.
3. Staining: Match existing finishes. Verify with Owner.
a. Graham factory prefinished stain; 600 Wheat.
4. Sheen: satin, 30-50 glass units.

PART 3 - PART 3 - EXECUTION

3.1 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas before installing.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including back priming and removal of packing.

3.2 INSTALLATION

A. Install woodwork level, plumb, true and straight. Shim as required with concealed shims. Install level and plumb (including tops) to tolerance of 1/8 inch in 96 inches.

B. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish cuts.

C. Anchor woodwork to anchors or blocking built into or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching finish if transparent finish is indicated.

D. Standing and Running Trim: Install with minimum number of joints possible, using full length pieces (from maximum length lumber available) to greatest extent possible. Do not use pieces less than 36 inches long, except where shorter single length pieces are necessary.

1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base, if finished.
2. Install standing and running trim with "PL-400" construction adhesive by ChemRex Incorporated, Shakopee, MN.
3. Install standing and running trim with no more variation from a straight line than 1/8 inch to 96 inches.

E. Cabinets: Install cabinets without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center of 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 inches sag, bow or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with no. 10 wafer head screws sized for I1 inch penetration into wood framing, blocking or hanging strips.

F. Provide work to sizes, shapes and profiles indicated. Install work to comply with quality standards referenced. Conceal fasteners to the greatest extent practical. Back prime work and install plumb, level and straight with tight joints; scribe work to fit.

G. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections.

H. Comply with manufacturer's requirements for cutting, handling, fastening and working treated materials.

I. Install siding with concealed fastener system. Locate end joints over supports and join with biscuit splines.

J. Repair minor damage, clean and protect.

3.3 ADJUSTING AND CLEANING

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

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

3.4 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to fabricator and Installer that ensures that woodwork is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 064020

SECTION 081100
STEEL DOORS AND FRAMES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Steel Doors.

2. Steel Door Frames.

B. Related Sections include the following work:

1. Division 4 Section “Unit Masonry Assemblies” for frames.

1. Division 8 Section “Door Hardware” for door.

2. Division 8 Section “Glazing” for doors.

3. Division 9 Section “Painting” for field applied factory primed doors and frames.

4. Division 16 Section “Electrical”.

1.2 REFERENCES

A. National Fire Protection Associations (NFPA):

1. NFPA 101-1999, "Life Safety Code"

2. NFPA 80-1999, "Installation of Fire Doors and Windows"

B. International Building Code – 2003 Edition

C. Underwriters Laboratories Inc., for fire rate door and frame assemblies. (U.L.).

1.4 SYSTEM DESCRIPTION

A. Design Requirements:

1. Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8 are minimums as defined in referenced ASTM standards for both uncoated steel sheet and uncoated base metal metallic-coated steel sheet.

1.5 SUBMITTALS

A. Product data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire resistance ratings,

and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door , door frame and hardware, as well as procedures and diagrams. Coordinate the final door Hardware Schedule with doors, frames and related work to ensure proper size, thickness, hand, function and finish of door hardware.

1. Initial submittal of the proposed " Steel Doors and Frames" in the following format:

a. Organized into "hardware sets", indicating complete designations of every item required for each door or opening. Include the following information for each item of finish hardware:
(1) Manufacturer
(2) Type- Elevation of doors and frames.
(3) Frame details for each frame type including dimensional profiles.
(4) Function
(5) Size
(6) Degree and direction of opening swing (“hand”)
(7) Finish
(8) Fasteners: Details and locations of reinforcement and preparations for hardware.
(9) Location of hardware set cross-referenced to indications on floor plans, door, schedule, and frame schedule.
(10) Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
(11) Mounting heights and locations for hardware.
(12) Door and frame sizes and materials.
(13) Keying information.
(14) Coordination of glazing frames, stops with glass and glazing requirements.

2. Submit Final Shop Drawings immediately following receipt of the Architect’s approval of the initial submittal.

3. Electrical equipment schedule: Riser and installation drawings for electrically-controlled or operated hardware equipment, including:

a. Relationship of related equipment;

b. Mounting locations;

c. Wire type and size;

d. Voltage and current requirements;

e. Function and operation characteristics of equipment.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Use skilled installers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the requirements and the methods needed for proper performance of the work of this Section and have successful in service performance record.

B. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

C. Fire Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled Underwriters Laboratories, Inc. (UL), FM Global, Factory Mutual (FM), or Intertek Testing service/ Warnock Hersey (WH), for fire protection ratings indicated on testing according to NFPA 252.

1. Test Pressure: Test at atmospheric pressure.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Product identification: Tag and mark each item separately in manufacturers unopened package, identifying it by product number and architectural opening number, as listed in the approved Finish Hardware Schedule.

B. Include instructions, templates, and fasteners needed for installation.

C. Deliver individually packaged hardware items on a vehicle operated by a direct employee of the Hardware Supplier. Contractor shall immediately, inventory the contents of the delivery. Remove and replace damaged items that can not be repaired as directed.

1.8 PROJECT CONDITIONS

A. Provide a secure, dry storage area for the sole purpose of storing doors and frames. Prohibit access to all jobsite personnel, except those employed by the installing contractor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Requirements for design, grade, function, finish, size, and other distinctive qualities of each door and frame assembly item is indicated in the Door and Frame Schedule on drawings.

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

1. Amweld Building products, Inc.

2. Ceco Door Products; a United Dominion Company.

3. Curries Company.

4. Kewanee Corporation.

5. Pioneer Industries Inc.

6. Steelcraft; a Division of Ingersoll Rand.

2.2 MATERIALS

A. Hot Rolled Steel Sheets: ASTM A 569, Commercial Steel (CS), Type B; free from scale, pitting, or surface defects; pickled and oiled

B. Cold Rolled Steel Sheets: ASTM A 366, Commercial Steel (CS), or ASTM A 620, Drawing Steel (DS), Type B; Stretcher leveled standard of flatness.

2.3 DOORS

A. General: Provide 1-3/4 inches thick, of sizes and design indicated.

B. Interior doors; Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical endurance level:

1. Level 2 and physical performance Level B (Heavy Duty), Model 2 (Seamless), 16 gage face sheets, no seams on faces or vertical edges.

2.4 FRAMES

A. General: Provide steel frames for doors, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.

B. Frames of 14 gage thick steel sheet for:

1. Interior Doors.

2. Exterior Frames: Welded type, 0.067 inch (14 gage) galvanized sheet steel, mitered or coped corners.

C. Door Silencers: Fabricate stops to receive three silencers on jamb strikes of single door frames and two silencers on the heads of double door frames.

D. Plaster Guards: Provide 24 gage thick, steel sheet plaster guards or mortar boxes to close off interior openings; place at back of hardware cutouts where mortar or other materials may obstruct hardware operation.

E. Supports and Anchors: Fabricated from not less than 16 gage thick, electrolytic zinc coated or metallic coated steel sheet.

F. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc coated items are to be built into exterior walls, comply with ASTM A 153, Class C or D as applicable.

2.5 FABRICATION

A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle.

1. Join door faces to vertical edges by continuous weld extending full height of door. Grind, fill and dress smooth all welds to make them invisible and provide smooth flush surfaces.

2. Reinforce door frames and door edges to accommodate heavy use and hardware.

B. Interior Door faces: Fabricate exposed faces of doors from the following material:

1. Cold Rolled steel sheet.

C Interior Door Core Construction: Manufacturer's standard core construction that produces a door complying with SDI standards.

D. Clearances for Fire rated Doors: As required by NFPA 80.

E. Single Acting, Door Edge profile: Square edge, unless bevel in indicated.

F. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames".

G. Fabricated concealed stiffeners, reinforcement, edge channels, from either cold or hot rolled steel sheet.

H. Exposed fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and

bolts.

I. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation hardware.

1. The use of universal hinge preparations and adapter plates is not allowed, door hinge preparation must be hand specific.

2. Undercut door to suit threshold. If no threshold is indicated, provide not more than 3/ 4 inch at bottom.

J. Frame Construction: Fabricate frames to shape shown.

1. Fabricate frames with mitered or coped welded corners and seamless faces joints.

2. Provide welded frames with temporary spreader bars.

K. Reinforce doors and frames to receive surface applied hardware. Drilling and tapping for surface applied hardware may be done at Project Site.

L. Locate hardware as indicated on shop drawings or, if not indicated, according to ANSI A250.8.

M. Glazing Stops: Manufacturer's standard, formed from 20 gage thick steel sheet.

1. Provide non removable stops on secure side of interior doors.

2. Provide glazing stops with tightly butted hairline joints at corners and secure to frame with countersunk screws.

2.6 FABRICATION

A. Prime Finish: Manufacturer's standard, factory applied coat of rust inhibiting primer complying with ANSI A250.10 for acceptance criteria.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install steel doors, frames and accessories according to Shop Drawings, manufacturer's data and as specified

B. Fabricate work to be rigid, neat and free from seams, defects, dents, warp, buckle, and exposed fasteners. Install doors and frames in compliance with SDI-100, NFPA 80, and requirements of authorities having jurisdiction.

C. Provide thermally improved doors with maximum U-value of 0.24 BTU/hr.sq.ft.degree F (ASTM C 236) for all exterior doors and elsewhere as noted.

D. Place Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, braced securely until permanent anchors are set. After wall construction in completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Install fire rated frames according to NFPA 80.

E. Door Installation: Comply with ANSI A250.8. Fit hollow metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/ DHI A115.1.G.

1. Fire Rated Doors: Install within clearances specified in NFPA 80.

3.2 ADJUSTING AND CLEANING

A. Prime Coated Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air drying primer.

END OF SECTION 081100

SECTION 081416
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Solid core veneer-faced doors with a transparent finish.
   2. Fire-resistance rated doors.
   3. Factory finishing.
   4. Glazing stops and preparation of flush doors to receive glazing; glazing specified elsewhere.
   5. Pre-fitting by manufacturer.
   6. Pre-machining by manufacturer.

1.02 REFERENCES

A. Architectural Woodwork Quality Standards; Architectural Woodwork Institute (AWI), 8th Edition Version 2.0; 2005.

B. ASTM E 2074 -- Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies; 2000.

C. NFPA 80 -- Standard for Fire Doors and Windows; National Fire Protection Association; 2007.

D. WDMA (HOW)-- How to Store, Handle, Finish, Install, and Maintain Wood Doors; Wood Flush Doors; National Wood Window and Door Association; 2004.

E. WDMA I.S. 1A -- Architectural Wood Flush Doors; National Wood Window and Door Association; 2004.

1.03 SUBMITTALS

A. Product Data: Submit detailed technical information for each distinct product specified in this section. Include complete data for factory finished doors.

B. LEED Documentation: Submit information required by Section 01115 for the following targeted credits:
   1. Credit MR 4: Materials and Resources - Recycled Content.
   2. Credit MR 5: Materials and Resources - Regional Materials.
   3. Credit MR 7: Materials and Resources - Certified Wood.
   4. Credit EQ 4.1: Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants.
   5. Credit EQ 4.4: Indoor Environmental Quality - Low-Emitting Materials - Composite Wood and Agrifiber Products.

C. Shop Drawings: Prepare and submit shop drawings showing relevant information, including:
   1. Construction details for each distinct product type.
   2. Dimensions and location of blocking for hardware.
   3. Fire ratings.
   4. Factory finishing details.

D. Samples: Submit samples for the following:

1. Veneer verification samples: Minimum 8-1/2 by 11 inches.
2. Factory finishes:
3. Glazing assemblies: For each type and finish, provide minimum 12-inch-long sample.

E. Certificates:
1. Submit certification that manufacturer's construction standards and tested fire door assembly requirements comply with contract requirements indicated for doors, hardware, hardware templating, size of lights, and other design characteristics.
a. Clearly note any exceptions to certification, citing door number and hardware set. Exceptions shall be subject to the approval of the Architect.

1.04 QUALITY ASSURANCE

A. Manufacturer: Member of AWI Quality Certification Program (QCP).

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products as required to prevent damage or deterioration. Conform to manufacturer's recommendations, requirements of referenced standard, and recommendations of WDMA I.S.1A, Appendix, "How to Store, Handle, Finish, Install, and Maintain Wood Doors."

B. Clearly label each door with opening number where door will be installed. Use removable, temporary labels or mark on door surface which will be concealed from view after installation.
1. Coordinate door identification with shop drawing designations.

C. Environmental Requirements: Do not deliver, store, or install products of this section before building's design temperature and humidity levels have been achieved and will be maintained at those levels.

1.06 WARRANTIES

A. Manufacturer's Warranty (Interior Doors):
1. Submit a written warranty signed by the manufacturer guaranteeing to correct failures in products which occur within the warranty period indicated below, without reducing or otherwise limiting any other rights to correction which the Owner may have under the contract documents. Failures are defined to include:
a. Faulty workmanship.
b. Delamination.
c. Stile, rail, or core show-through (telegraphing) visible to the naked eye to any degree when viewed from a horizontal distance of 3 to 4 feet.
d. Warp (including bow, cup, and twist) in excess of 1/4 inch when measured in accordance with WDMA I.S. 1A.
2. Correction includes repair or replacement at the option of the Architect. Correct failures which occur within the following warranty periods after Substantial Completion:
a. Solid core interior doors: Life of original installation.

B. If, for any reason, the Contractor's work results in nullification of manufacturer's warranty, the Contractor shall correct failures and pay for such correction.

PART 2 PRODUCTS

2.01 LEED REQUIREMENTS

A. Materials and Resources - Recycled Content.

B. Materials and Resources - Certified Wood: Provide wood-based materials and products which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for wood based building components.

C. Indoor Environmental Quality - Low-Emitting Materials - Adhesives and Sealants.
   1. Multipurpose Construction Adhesives: 70 g/l.

D. Indoor Environmental Quality - Low-Emitting Materials - Composite Wood & Agri-fiber Products.
   1. Composite Wood and Agri-fiber Products: Composite wood and agri-fiber products used on the inside of the building (inside of the weatherproofing system) shall contain no added urea formaldehyde resins.
      a. Laminating adhesives used to fabricate on-site and shop applied composite wood and agri-fiber assemblies shall contain no added urea-formaldehyde resins.

2.02 WOOD DOORS - GENERAL REQUIREMENTS

A. Flush Doors: Conform to the following, hereinafter referred to as referenced standard(s):
   1. "Architectural Woodwork Quality Standards" including Section 1300, "Architectural Flush Doors".
      a. Where the AWI standard indicates requirements that conflict with WDMA standards, comply with AWI.

B. Fire-Rated Doors:
   1. Provide doors that comply with NFPA 80 and that are precise duplicates of doors tested as part of fire-rated assemblies in accordance with requirements of ASTM E 2074 and without seals being visible when door is open.
   2. Acceptable testing and inspection agencies:
      a. Underwriters Laboratories Inc.
      b. Warnock Hersey International Inc.
   3. Construction: Conform to testing agency requirements for indicated fire rating.
      a. Ratings of 45 minutes or more: Mineral core.
      b. Ratings of 20 minutes: Particleboard core.
      c. Temperature rise rating: For fire-rated doors in stairwell enclosures, provide door construction tested and certified to limit temperature rise in thirty minutes to 450 degrees, F.
   4. Edges: Laminated edge (stile) designed for use with mortise hinges and appropriate for indicated fire resistance rating.
   5. Rails and blocking: Laminated material designed for use as blocking or rails and appropriate for indicated fire resistance rating.
      a. Provide the following for fire rated doors with 45-minute or greater rating:
      b. All doors: Provide 5-inch-wide top and bottom rails; provide lock blocking.
      c. Doors with exit devices: Provide lock blocking both sides or continuous intermediate rail.
      d. Doors with flush or surface bolts: Provide blocking for bolts.
      e. Doors, transoms, or side panels with strikes: Provide blocking for strikes.
   6. Acceptable products for edges, rails, and blocking:
      a. "Firestop I" for blocking and rails, "Firestop II" for stiles; Georgia-Pacific.
      b. "SLM" for blocking and rails, "SLM II" for stiles; Timberland Components.
      c. "Triple-Ply"; Weyerhauser.

d. Other products acceptable to manufacturer, subject to the approval of the Architect.

7. Through-bolted hardware: Blocking specified in this section shall not relieve the requirement for through-bolted closers, exit devices, and similar hardware. Through-bolted closers, exit devices, and similar hardware specified shall not relieve the requirement for solid blocking. Provide through-bolted hardware and solid blocking.
8. Pairs of fire rated doors: Where required to meet fire rating, provide metal meeting edges at pairs of vertical rod exit devices, and astragals and metal edges elsewhere.
   a. At veneered doors with transparent finish, cover metal with matching veneer.
   b. At opaque field finished doors, provide metal primed for painting.
   c. At doors with opaque factory finish (paint or HPDL), apply baked enamel factory finish to metal to match door finish.
9. Testing laboratory labels: Permanently affixed to hinge stile.
   a. Construction labeling is not an acceptable to standard labeling unless requested in accordance with the substitution procedures specified in Division 1 and approved in writing by the Architect.

2.03 CONSTRUCTION

A. Faces:
   1. Veneer species, cut, and grade for transparent finish (NWWDA, AWI, HPVA standards):
      a. Red Oak, Rift Cut, Grade A.

B. Construction: PC-5 or PC-7 (6 or 7 ply).

C. Core, Non-Fire-Rated Doors: Particleboard, bonded to stiles and rails, sanded.

D. Core, Fire Rated Doors: As specified above.

E. Core, Glass Light Doors: Where stile width is less than 10 inches, or where glass height is over 1/2 of the height of the door, or where other required features do not qualify for manufacturer's standard construction, provide specially reinforced core construction utilizing laminated strand lumber or other materials approved by the Architect.

F. Glue: Type I at exterior doors and at interior doors subject to wetness or humidity such as at toilets, kitchens, showers, etc. Type I or II at other interior doors.

2.04 ACCESSORIES

A. Stops for Glazing: Provide flush style glazing stops.
   1. For non-fire-rated doors: Solid stock of species to match door face veneer; finish to match door.
   2. For fire rated doors 45 minutes and over: Cold-rolled sheet steel of gage approved by testing agency for installation in fire-rated doors indicated. Cover exposed surfaces of glazing stops with wood veneer to match door faces. Finish veneer to match door.
   3. For 20 minute fire-rated doors: Solid stock fire-retardant treated wood of species to match door face veneer; finish to match door.

2.05 FABRICATION

A. General:
   1. Fabricate to provide consistent clearances as indicated.
   2. Hinge and lock edges:
      a. Provide 1/8-inch standard bevel at edges, unless standard bevel would not precisely

match hardware bevel; provide proper bevel for hardware.
b. Predrill pilot holes for hinges on fire doors with laminated hinge stiles.
3. Make neat mortises and cutouts for door hardware indicated.
4. Pre-fitting: Fabricate and trim doors to size at factory to coordinate with frame shop drawings and floor finishes as indicated in the finish schedule.
a. Provide non-standard clearances and tolerances indicated in Part 3.
5. Pre-machining: Make all mortises and cutouts required for hardware at the factory to conform to approved hardware schedule, hardware templates, and door frame shop drawings.

B. Openings: Cut, trim, and seal openings in doors at the factory.

2.06 FACTORY FINISHING

A. Comply with AWI Section 1500, "Factory Finishing".

B. Transparent Finish:
1. Premium Grade Type (1500-T-11): Conversion varnish, catalyzed vinyl, catalyzed polyurethane, polyester, UV cured epoxy, UV cured polyester, or UV cured urethane.
2. Satin sheen.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect door frames and doors before beginning door installation.
1. Verify that frames are properly installed and aligned and are capable of providing trouble free support for doors throughout range of door swing.

B. Correct unsatisfactory conditions before installing products of this section. Commencement of installation indicates acceptance of conditions.

3.02 INSTALLATION

A. Hardware Installation: Elsewhere in Division 8.

B. Install doors in accordance with manufacturer's recommended procedures and requirements of referenced standard.
1. Fire-rated doors: Comply with NFPA 80 requirements.

C. Pre-fit Doors: Minimize field fitting to those procedures which are necessary to complete work unfinished during factory pre-fitting and to provide trouble free operation.
1. Accurately align and fit doors for trouble free operation throughout range of door swing.

D. Pre-fitting Clearances:
1. Door edge and head: 1/8 inch.
2. Door edge and jamb: 1/8 inch.
3. Door bottom edge and top surface of threshold: 1/4 inch.
4. Door bottom edge and floor covering surface or finish (where threshold is not indicated): 1/8 inch.
5. Meeting edges at pairs of doors: 1/8 inch total.

E. Installation Clearances: Install doors so as to maintain pre-fitting clearances specified.

F. Factory-Finished Doors: Before installing doors, restore finish at door edges cut during field

fitting.

3.03 ADJUSTING

A. Adjust doors for proper operation; coordinate with hardware adjustment; replace doors that cannot be properly adjusted.

B. Where door finishes are damaged during installation, restore in a manner that results in the door showing no evidence of the restoration. If refinished door cannot be made to match other doors, remove refinished door and replace with new conforming work at the Contractor's expense.

C. Protect installed work.

END OF SECTION 081416

SECTION 087100
FINISH HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Work included:
1. Furnish hardware required to complete the work as shown on the drawings and as specified herein;
2. Furnish trim attachments and fastenings, specified or otherwise required, for proper and complete installation.
3. Deliver to the job site those items of finish hardware scheduled to be installed at the job site; and delivered to other points of installation those items of finish hardware scheduled to be factory installed, including:
   a. Butt Hinges
   b. Continuous Hinges
   c. Lock cylinders and keys
   d. Lock and latch sets
   e. Bolts
   f. Power Supplies
   g. Push/pull units
   h. Closers
   i. Miscellaneous door control devices
   j. Door trim units
   k. Protection plates
   l. Weather-stripping (except where provided with aluminum entrance doors)
   m. Thresholds
   n. Security products
   o. Wall or floor stops

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 08100: Metal doors and frames
3. Section 08210: Wood doors
4. Section 08800: Glazing
5. Division 16: Electrical

1.02 REFERENCES

A. National Fire Protection Associations (NFPA):
1. NFPA 101, "Life Safety Code"
2. NFPA 80, "Installation of Fire Doors and Windows"

B. Michigan Building Code – Refer to sheet T-1 for current code.

C. American National Standards Institute (ANSI):
1. ANSI A 156 Standards series.
2. ANSI A117.1 Accessible and Usable Buildings and Facilities

D. National Electric Code – Refer to sheet T-1 for current code.

1.03 DEFINITIONS

A. "Finish Hardware": Items required for swinging, sliding and folding doors, except special types of unique and non-matching hardware specified under door and frame Sections of these Specifications.

1.04 SYSTEM DESCRIPTION

A. Design requirements:
   1. Review of hardware requirements:
      a. Thoroughly review finish hardware schedule, comparing it with the floor plan, door schedule, and door details to verify hardware requirements, quantities, door swings, finishes, and sizes.
      b. If an inconsistency or error in the proposed construction documents is suspected, the hardware supplier is to bring it immediately to the attention of the Architect. If the quantity of items is questioned, for bidding purposes, assume the higher quantity is required and price accordingly.
      c. Architect's review of Submittals is for design concept only, and does not relieve the Contractor of the responsibility to furnish sufficient material and functions required for a complete, and code-worthy installation. Determination of all quantities is the responsibility of the Contractor.

B. Performance requirements:
   1. Furnish finish hardware complying with the requirements of laws, codes, ordinances and guidelines of governmental authorities having jurisdiction:
      a. NFPA 101, "Life Safety Code"
      b. NFPA 80, "Installation of Fire Doors and Windows"
      c. Michigan Building Code – Refer to sheet T-1 for current code.
      d. ANSI A117.1 Accessible and Usable Buildings and Facilities

1.02 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Product data:
   1. Initial submittal of the proposed "Finish Hardware Schedule" in the following format:
      a. Vertically-typed, double-spaced;
      b. Organized into "hardware sets", indicating complete designations of every item required for each door or opening. Include the following information for each item of finish hardware:
         (1) Manufacturer
         (2) Type
         (3) Style
         (4) Function
         (5) Size
         (6) Degree and direction of opening swing ("hand")
         (7) Finish
         (8) Fasteners
         (9) Location of hardware set cross-referenced to indications on floor plans, door, schedule, and frame schedule.
         (10) Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
         (11) Mounting heights and locations for hardware.
         (12) Door and frame sizes and materials.
         (13) Keying information.

   2. Final Finish Hardware Schedule immediately following receipt of the Architect's approval of the initial submittal.

   3. Electrical equipment schedule: Riser and installation drawings for electrically-controlled or operated hardware equipment, including:
      a. Relationship of related equipment;
      b. Mounting locations;
      c. Wire type and size;
      d. Voltage and current requirements;
      e. Function and operation characteristics of equipment.

C. Samples:
   1. When requested by the Architect or Owner, submit one sample of each type of exposed hardware unit, finished as required, and tagged with a full description for coordination with schedule.
   2. Samples will be returned to the supplier.
   3. Units which are acceptable and remain undamaged through submittal, review and field comparison procedures may, after final check of operation, be built into the Work, within limitations of keying coordination requirements.

D. Templates: Furnish hardware templates with final submittal of Finish Hardware Schedule.

E. Contract closeout submittals:
   1. Operation and maintenance data: Comply with pertinent provisions of Section 01730.
   2. Provide two complete sets of finish hardware schedules, and two complete copies of manufacturer's catalog cuts and maintenance instructions for each item furnished under the Work of this Section.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the requirements and the methods needed for proper performance of the work of this Section.

B. Supplier qualifications:
   1. A recognized architectural finish hardware supplier with warehousing facilities within a 100 mile radius of the project site and a direct distributor of all products listed on the approved finish hardware schedule.
   2. Continuously in business of finish hardware supply for not less than 5 years.

C. Provide the service of a qualified Architectural Hardware Specialist to:
   1. Be available for consultation with the Architect at no additional cost to the Owner during progress of construction, and:
      a. Inspect installation of all finish hardware items;
      b. Make all minor adjustments required; and
      c. Report to the Architect on completeness of the installation.
   2. The hardware consultant may be an employee of the supplier.

D. Installer qualifications: Employ a competent hardware installer with at least five (5) years experience installing commercial grade hardware similar to that proposed for the Work.

E. Source limitations: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.

F. Mandatory pre-construction meeting:
   1. Immediately following the Architect’s final approval of the submittals, convene a mandatory pre-installation meeting to be attended by the Architect, Contractor, Installer, Supplier, and the Architect’s hardware consultant.
   2. Proposed agenda to include review of:
      a. The Contract Documents;
      b. Installation schedule;
      c. Hardware Specifications;
      d. Hardware locations and opening descriptions;
      e. Special installation instructions;
      f. Other items of pertinence to the Work.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Section 01620.

B. Product identification:
1. Tag and mark each item separately in manufacturers unopened package, identifying it by product number and architectural opening number, as listed in the approved Finish Hardware Schedule.
2. Include instructions, templates, and fasteners needed for installation.

C. Deliver individually packaged hardware items on a vehicle operated by a direct employee of the Hardware Supplier. Contractor shall immediately, and in the presence of the Hardware Supplier, inventory the contents of the delivery.

D. Hardware supplier: Furnish finish hardware items directly to the factory or mill for factory-installation, where required.

1.05 PROJECT CONDITIONS

A. Provide a secure, dry storage area for the sole purpose of storing finish hardware. Prohibit access to all jobsite personnel, except those employed by the installing contractor.

1.06 WARRANTY

A. Manufacturer's warranty:
1. Warrant all finish hardware items against defects in materials and workmanship for one year.
2. Extended warranty: Extend the above warranty on certain items of finish hardware as follows:
a. Door closers: To ten years
b. Continuous hinges: To ten years
d. Locks and latch sets: To limited lifetime warranty
3. Manufacturer agrees to promptly replace (including installation by a factory representative) defective products at no additional cost to the Owner, for the duration of the warranty period.
4. The terms of such warranties extend from the Date of Substantial Completion as that date is defined by the General Conditions.

B. Failures due to defective materials or workmanship is deemed to include, but not to be limited to:
1. Failures in operation of any operating component;
2. Defects which contribute to unsightly appearance, potential safety hazard, or potential untimely failure of the products furnished under this Section.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Requirements for design, grade, function, finish, size, and other distinctive qualities of each finish hardware item are indicated in the Finish Hardware Schedule at the end of this Section.

B. Product designations:
1. One or more manufacturers are listed for each hardware type required. Provide the product designated or the comparable product listed in this Section.

C. ANSI/BHMA designations:
1. Used to describe hardware items, or to define quality or function. Provide products complying with these standards in addition to additional requirements of this Section.

D. Hand of door: Drawings show direction of slide, swing ("hand") of door leafs.

E. Hardware: Use hardware manufactured to conform to published templates and, generally, prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.

2.02 MATERIALS

A. Base metals:
1. Manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially-recognized) quality than that specified for applicable hardware units by applicable ANSI A156 series standard for each type hardware item and with ANSI A156.18 for finish designations indicated.
2. Do not furnish "optional" materials for those indicated, except as otherwise specified.

B. Fasteners:
1. Furnish Phillips flat-head screws with each hardware item, unless otherwise indicated.
2. Exposed screws: Match finish of hardware (even where noted to be "prepared for paint").
3. Use concealed fasteners for hardware units which are exposed when door is closed, except where no standard units of type specified are available with concealed fasteners.
4. Do not use thru-bolts where bolt head or nut on opposite face would be exposed.
5. Where adequate reinforcement is not feasible, thru-bolting would only be acceptable if through sleeves, or if sex-screw fasteners are used.

C. Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of finish hardware.

2.03 MANUFACTURED UNITS, GENERAL

A. Reference standards:

Item:	Comply with:
1. Butts and hinges:	ANSI A156.1-1988 (BHMA 101)
2. Locks and lock trim:	ANSI A156.2-1987 (BHMA 601)
3. Exit devices:	ANSI A156.3-1989, Grade 1 BHMA 701)
4. Door controls-closers:	ANSI A156.4-1986,Grade 1 BHMA 301)
5. Architectural door trim:	ANSI A156.6 (BHMA 1001)
6. Template hinge dimensions:	ANSI A156.7
7. Door controls-overhead holders:	ANSI A156.8 (BHMA 311)
8. Mortise locks and latches:	ANSI A156.13-1987, Grade 1
9. Auxiliary hardware:	ANSI A156.16-1989(BHMA 1201)

B. Hardware finishes:
1. Materials and Finishes Standard: Comply with ANSI A156.18 (BHMA 1301). Finish designations used in schedules are listed, therein.
2. Provide US32D or US26D at all finish hardware exposed to view.
3. Provide matching finishes for hardware units at each door, unless otherwise indicated.
4. Match the color and texture of hardware items to manufacturer's standard finish for the latchset, lockset, or push-pull unit.
5. Provide quality of finish, including thickness of plating or coating, composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than that specified or described by referenced standards.

C. Hardware for fire-rated openings:
1. Comply with NFPA 80
2. Tested and listed by Underwriters Laboratory (UL), or Factory Mutual (FM) for type, size and use of door, and complying with requirements of door and door frame label.

3. Provide UL or FM label on door indicating "Fire door to be equipped with fire-exit hardware".
4. Provide UL or FM label on exit device indicating "Fire Exit Hardware".

2.04 PRODUCTS

A. Hinges, butts and pivots:
   1. General:
      a. ANSI A156.1 - 1988 for commercial quality.
      b. Provide only template-produced units.
      c. All hinges to be concealed bearing-type.
      d. Hinges at exterior doors shall be of non-ferrous material.
   2. Screws:
      a. At metal doors and frames: Machine screws.
      b. At wood doors and frames: Phillips flat-head wood screws.
      c. Finish screw heads to match surface of hinges or pivots.
   3. Pins:
      a. Steel hinges: Steel
      b. Non-ferrous hinges: Stainless Steel
      c. Hinges at exterior doors: Non-removable (NRP)
      d. Hinges at out-swing corridor doors: Non-removable (NRP)
      e. Hinges at interior doors: Non-rising
   4. Tips:
      a. Flat button with matching plug
      b. Finish to match leaves, except where hospital tip (HT) indicated.
   5. Number of hinges: Provide number of hinges indicated but not less than 3 hinges.
   6. Hinge sizing:
      a. According to hinge manufacturer’s recommendation for door size and weight, unless otherwise specified.
      b. Hinges for door widths 3 feet, or less: Standard-weight (.134)
      c. Hinges for door widths over 3 feet: Heavy-weight (.180) hinges
   7. Acceptable products:
      a. For interior/exterior standard weight hinges:
         (1) Stanley CB179/CB191*
         (2) Hager AB700/AB800
      b. For interior/exterior heavy weight hinges:
         (1) Stanley CB168/CB199*
         (2) Hager AB750/AB850

B. Continuous Hinges:
   1. Geared type Hinges
   2. Fire-rating: "WHI-listed" and "UL-listed”
   3. Capacity: Doors weighing up to 600 lbs.
   4. Fasteners: As required by door and frame condition, and as recommended by hinge manufacturer.
   5. Acceptable manufacturer's:
      a. Stanley
      b. Markar

C. Lock Cylinders and Keying:
   1. General:
      a. All keying, keys and cylinders by owner

D. Locksets:
   1. Mortise Locks
      a. Comply with ANSI A156.13 - 1987, Grade 1 criteria for mortise locks
      b. Function: Lockset case shall have the capability to be multi-functional and

non-handed or manufacture will exchange case at no charge to the owner.
c. Provide appropriate fasteners for lock and strike.
d. Trim: 15H lever-type equal to Best Lock
e. Acceptable products: Best 45H series

2. Electrified Mortise Locks
a. Comply with ANSI A156.13 - 1987, Grade 1 criteria for mortise locks
b. Function: Indicated in the hardware sets.
c. Lockset case shall have the capability to be non-handed.
d. Lockset shall have a RQE switch on both inside and outside lever hubs.
f. Provide appropriate fasteners for lock and strike.
g. Trim: 15H lever-type equal to Best Lock
h. Acceptable products: Best 45H series / Schlage L9000 SDC MOD

3. Aluminum Door Deadlock:

a. Adams-Rite MS1850S & 4710 Series with Armor faceplate to suit door edge.

E. Power Supplies:
1. General:
a. Comply with ANSI A156.5, Grade 1 for products supplied.
b. All products to be stainless steel for corrosion resistance and strength.
c. All products shall be tamper resistant and provide horizontal keeper adjustment for door and frame misalignment.
d. At fire doors:
(1) Provide Labeled UL 10B, Fire Door Accessories, 3 hour.
2. Type: 12 or 24 V as required.
3. Function:
a. Indicated in the hardware sets.
b. Provide failsafe, constant duty solenoids and fail-secure devices as required.
4. Acceptable products:
a. Provide SDC 600 series Power Supply with required amp rating for load.

F. Push-pull bars:
1. General:
a. ANSI A156.16 - 1989 Grade 1 criteria.
2. Description: 1-1/4" in diameter x length required by door width.
3. Mounting:
a. Mount push-pull bars with thru-bolts and 12HD at free ends.
b. Mount offset pulls so as to avoid conflict with vertical rod, when used in conjunction with vertical rod exit devices.
4. Acceptable products:
a. Rockwood RM251 x 2 ea. 12HD with 12" CTC 90 degree offset pulls.
b. Lanco
c. Baldwin

G. Door closers:
1. General:
a. ANSI A156.4 - 1986 Grade 1 criteria.
b. All closers shall be the products of one manufacturer.
c. Description:
(1) Full rack-and-pinion type
(2) Cast aluminum R14 alloy or cast iron shell.
(3) Hydraulic fluid: Non-gumming and non-freezing.

(4) Closer body: Non-handed, with sized-, or multi-size spring power adjustment to permit setting of spring power. (See hardware sets indicating when sized or multi-size closers are required.)
(5) With two non-critical valves and hex key adjustment to independently regulate sweep and latch speed.
(6) Provide mounting brackets necessary to clear sound seals and weatherstrip.
(7) Enclose in a full, molded cover.
(8) Provide drop plates or special brackets for proper mounting.
(9) Presure Relief Valves will NOT be accepted on Door Closers.

d. Acceptable products:
(1) Stanley D-4550 series
(2) LCN 4000 Series Smoothie

e. Provide drop brackets as required.
f. Provide BF (Barrier Free) closers only where scheduled.
g. Provide thru-bolts for closers mounting on fire-rated wood or metal doors unless doors are reinforced to receive wood or machine screws, in accordance with Section 08100 or Section 08210. In all cases, provide fasteners required to meet "UL" requirements.

H. Kick plates, mop plates and armor plates:
1. General: ANSI A156.16 - 1989 criteria.
2. Description:
a. Minimum .050" thick.
b. Dimensions:
(1) Width: 1-1/2" less than door width to which they are to be applied.
(2) Kick plate height: 10"
(3) Armor plates: 48" for non-labeled doors, unless scheduled otherwise.
3. Mounting:
a. **Install kick plates and armor plates flush to bottom edge of door.**
b. Notch armor plates for lock or exit device trim or active case.
c. When armor plate is used on doors with touch bar type exit devices, determine height of plate by measuring from bottom of door to 1" below bottom of touch bar, and notch for active case.
4. Acceptable manufacturers:
a. Rockwood
b. Baldwin

I. Stops:
1. General:
a. ANSI A156.16 - 1989 Grade 1 criteria.
b. Provide stops where scheduled, wall or floor, as opening conditions dictate, utilizing wall stops wherever possible.
2. Description:
a. Wall stops: Wrought brass, bronze or stainless steel
b. Floor stops: Cast brass or bronze, and plated as required.
c. Make selection of floor stop height based upon floor conditions and door undercut.
3. Acceptable products:
a. Rockwood 487

J. Thresholds:
1. General:
a. ANSI A156.21 - 1989, Grade 1 criteria.
b. Comply with A.D.A. requirements, unless otherwise scheduled.
2. Description:
a. Flat profile
b. Installation locations are scheduled.
c. Provide templates for thresholds to related door suppliers to coordinate proper undercut.
3. Acceptable products:

a. Durable Products C-200 series.
b. Reese

K. Door Seal:
1. General:
a. ANSI A156.21 - 1989, Grade 1 criteria.
2. Description:
a. Flat profile.
b. Dimensions: Appropriate to door opening size.
c. Installation locations are scheduled.
d. Provide templates for thresholds to related door suppliers to coordinate proper undercut.
3. Mounting:
a. Apply related hardware (closer, foot bracket, strike, etc.) on top of weatherstrip.
b. Do not notch or splice weather strip.
c. Adjust related template hardware locations, as required.
4. Acceptable products:
a. Durable Products 306 with vinyl insert for jamb and head
b. Reese
c. Zero

2.05 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

2.06 HARDWARE FINISHES

A. General:
1. Provide matching finishes for hardware units at each door or opening, to the greatest extent possible and except as otherwise indicated.
2. Reduce differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of hardware exposed at the same door or opening.
3. In general, match items to the manufacturer's standard finish for the latch and lock set (or push/pull units if no latch/lock sets) for color and texture.
4. Provide finishes matching those established by BHMA or, if none established, match the Architect's sample.
5. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standards, but in no case less than that specified for the applicable units of hardware by referenced standards.
6. Finish designations used in schedules and elsewhere listed in ANSI A156.18 "Materials and Finishes Standard", including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

B. Provide the following hardware finishes, unless otherwise scheduled:

1.	Hinge	US26D - Satin Chrome or US32D - Satin Stainless Steel
2.	Exit device	US32D - Satin Stainless Steel
3.	Lock	US26D - Satin Chrome
4.	Cylinder	To match surrounding hardware
5.	Closer	AL - Sprayed Aluminum
6.	Push/pull bar	US32D - Satin Stainless Steel
7.	Kick/mop/armor plate	US32D - Satin Stainless Steel
8.	Wall stops	US32D - Satin Stainless Steel

9.	Floor stops	US26D - Satin Chrome
10.	Heavy duty stops	US26D - Satin Chrome
11.	Overhead stops	US32D - Satin Stainless Steel
12.	Thresholds/door seals	AL - Anodized Aluminum

C. Base material: Manufacturer's standard high-carbon steel, brass, or bronze.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 COORDINATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
B. Coordinate all hardware with owner or owner's construction manager for any additional security tie-in prior to construction.

3.03 INSTALLATION

A. General:
1. Install each item in its proper location firmly anchored into position, level and plumb, and in accordance with the manufacturer's recommendations.
2. Handing, hardware heights, locations, and degree of opening swing are indicated in the Drawings and Finish Hardware Schedule.
3. Mount finish hardware units:
   a. At recommended heights and locations as shown in approved finish hardware schedule, complying with requirements of the A.D.A., and pertinent provisions of the Building Code.
   b. To function at proper degree of opening of doors as indicated on approved finish hardware schedule.
   c. By manufacturer's template.
   d. Prior to final finishing of the door. Remove hardware to allow finishing of door, and permanently reinstall hardware upon completion of finishing operation.
3. Reinforce, where necessary, the substrate to assure proper attachment.
4. Drill and countersink units which are not factory-prepared for anchorage fasteners.
5. Space fasteners and anchors in accordance with industry standards.

B. Installing closers:

1. Mount closers per manufacturer's template, and secure the Architect's approval of the closer installation.
2. The Contractor will be required to **REPLACE** doors onto which closers are improperly mounted at no additional cost to the Owner. Repair or patching of such doors will not be acceptable.

C. Installing thresholds at exterior doors: Set in full bed of butyl-rubber, or polyisobutylene mastic sealant.

3.04 FIELD QUALITY CONTROL

A. Inspection of final hardware installation: The Contractor, hardware suppliers, and Architectural Hardware Consultant (AHC) shall thoroughly check the quality of the installation and the functionality of each unit of finish hardware at all openings in the Work. The Hardware Supplier shall forward a detailed written report of all operational or installation deficiencies to the Architect and Contractor.

3.05 CLEANING AND ADJUSTING

A. Check and adjust each item of hardware and each door upon completion of final installation. Verify proper function, and replace units which cannot be made to operate freely and smoothly, as intended for the application.

B. Clean adjacent surfaces soiled by hardware installation.

3.06 FINISH HARDWARE SCHEDULE

Hardware Sets – **REFER TO DOOR SCHEDULE DRAWING**

END SECTION 087100

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SECTION 088000
GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Doors.
2. Window Assembly.

1.2 DEFINITIONS

A. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal movement and impact loads (where applicable) without failure, including glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

a. Specified Design Loads: As required by building code.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
2. For laminated-glass lites, properties are based on products of construction indicated.

1.4 SUBMITTALS

A. Product Data: For glass product and glazing material indicated.

B. Samples: 12-inch square, for glass product indicated.

C. Glazing Schedule: Use same designations indicated on Drawings.

1.5 QUALITY ASSURANCE

A. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

B. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and, for wired glass, ANSI Z97.1.

C. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA Laminated Division's "Laminated Glass Design Guide" and GANA's "Glazing Manual."

1.6 WARRANTY

A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer agreeing to replace laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following manufacturers:
1. AGC Flat Glass North America.
2. Guardian Industries Corp.
3. Oldcastle Glass Group
4. Viracon, Inc.

B. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
1. Products: Subject to compliance with requirements, provide one of the products specified.
2. Product: Subject to compliance with requirements, provide product specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 GLASS PRODUCTS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.

B. Heat-Treated Float Glass (Tempered): ASTM C 1048; Type I (transparent flat glass)
1. minimum thickness: 1/4”

C. Pyrolytic-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide coating applied by pyrolytic deposition process during initial manufacture, and complying with other requirements specified.

D. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or –nitride coating deposited by vacuum deposition process after manufacture and heat treatment and complying with other requirements specified.

E. Mirrors: Silvering and protective coatings.

2.3 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

1. Neoprene, ASTM C 864.
2. EPDM, ASTM C 864.
3. Silicone, ASTM C 1115.
4. Thermoplastic polyolefin rubber, ASTM C 1115.
5. Any material indicated above.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:

1. Neoprene.
2. EPDM.
3. Silicone.
4. Thermoplastic polyolefin rubber.
5. Any material indicated above.

2.4 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

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

a. Uses Related to Glazing Substrates: G, A, and, as applicable to glazing substrates indicated, O.

C. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

2.5 GLAZING TAPES

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

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

1. Type 1, for glazing applications in which tape acts as the primary sealant.
2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.7 FABRICATION OF GLAZING UNITS

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

PART 3 - EXECUTION

3.1 GLAZING

A. General: Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

1. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

2. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

3. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

4. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

5. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

6. Provide spacers for glass lites.

7. Provide edge blocking where indicated or needed to prevent glass lites from moving.

B. Tape Glazing: Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

1. 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.

2. 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.

3. Apply heel bead of elastomeric sealant.

4. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

5. Apply cap bead of elastomeric sealant over exposed edge of tape.

C. Gasket Glazing: Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

3.2 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

B. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

3.3 GLASS SCHEDULE:

A. Glass Type, **VNE1-63** 1" Neutral Low-E Insulated Glass.

a) Exterior Glass Ply: Clear Tempered
b) Ceramic Frit: None
c) Pattern: None
d) Orientation: None
e) Coating:
f) Airspace:1/2 "airspace – mill finish
g) Silicone: Light Grey
h) Interior Glass Ply: 3/16" Clear Tempered

Performance Requirements not including the Interior Glass Interlayers.

i) Visible Light transmittance 62%
j) Ultravoilet: 5%
k) Winter U Value: 0.29
l) Summer U-Value0.26
m) Shading Coefficient: 0.33
n) Solar Heat Gain Coefficient: 0.29
o) Light to Solar Gain Ratio:2.14

END OF SECTION 088000

SECTION 124600
WINDOW SHADE SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manually-operated window shades and accessories.

1.02 REFERENCES

A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 1996 (Reapproved 2002).

B. NFPA 70 - Fire Tests for Flame-Resistant Textiles; 2004.

1.03 SUBMITTALS

A. Product Data: Manufacturer's catalog data, product descriptions, installation instructions, detail sheets, and specifications for each type system specified.

B. Samples for Verification: Shade fabric sample and paint finish as selected.

C. Shop Drawings: Show dimensions and interface with other products.
   1. Room schedule including field-verified dimensions of each opening to receive window shade system.
   2. Indicate model number, operator, fabric selection, and mounting type.
   3. Indicate control type and provide zone schedule if necessary.

D. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, and instructions for operating hardware and controls.

E. Roller Shade Schedule: Use same room designations as indicated on Drawings and include opening sizes and key to typical mounting details.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience installing products comparable to those specified in this section.

B. Mock-up: Provide a mock-up of each window shade system for evaluation of mounting, appearance and accessories.
   1. Mock-up may remain as part of the work.
   2. Locate mock-up in window designated by Architect.
   3. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.05 WARRANTY

A. Roller shade hardware, chain and shade fabric: Manufacturer's standard warranty.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for project when occupied for its intended use.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in manufacturer's original cartons.

B. Individually package and mark shades with room number and opening number.

C. Inspect the materials upon delivery to assure that specified products have been received.

D. Store and handle shades to prevent damage to fabrics, finishes, and operators prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Mechoshade: www.mechoshade.com.

B. HunterDouglas. www.hunterdouglasarchitectural.com

2.02 SHADE SYSTEMS

System 1: Manual window shade, Fabric 1, regular roll direction, mounted inside window frame, chain operated control.

2.03 FABRIC

A. Fabric 1: Solar Control.
   1. Mechoshade, Classic Blackout:
   2. HunterDouglas, Avila Twilight:

2.04 MANUALLY OPERATED WINDOW SHADE SYSTEM

A. Products:
   1. Mechoshade; M/5 System.
   2. HunterDouglas; RB 500 Roller Series.

B. Chain Operation: Bi-directional wrap spring clutch shall allow for shade to stop and hold at any position.

C. Chain Operator Position: Right-hand side, unless otherwise noted on drawings.

D. Bead Chain: No. 10 stainless steel.

E. Clutch mechanism: Fabricated from high carbon steel.
   1. Components fabricated from styrene based plastics, polyester or reinforced polyester are not acceptable.

2.05 SHADE COMPONENTS

A. Rollers:
   1. Shade roller tube shall be extruded aluminum of diameter and wall thickness required to support shade fabric. Maximum allowable deflection L/700.
   2. Rollers shall be easy to remove from support brackets.

B. Mounting Brackets: Stamped steel, custom fabricated as required for mounting style indicated.

C. Hembar: Concealed.

2.06 ACCESSORIES

A. Finish for accessories, unless otherwise noted: Clear anodized aluminum.

B. Fascia: L-shaped extruded aluminum shall conceal mounting hardware, roller tube, and fabric rolled on tube.

C. Pocket: Extruded aluminum shall conceal mounting hardware, roller tube, and fabric rolled on tube.

2.07 SHADE FABRICATION

A. Shades mounted inside window frame: Window shade system shall completely fill opening from head to sill. Provide 1/4 inch clearance between each side of the shade and jamb, unless indicated otherwise.

B. Shade fabric shall hang flat without buckling or distortion and in the same direction.

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 contractor of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Verify that blocking and framing necessary to carry shade assembly hardware is properly installed and secure.

3.03 INSTALLATION

A. Install window shade systems level, plumb, square and true according to manufacturer's written instructions and these specifications.

B. Adjust and balance roller shades to operate smoothly, safely and free from binding or malfunction throughout entire operational range.

C. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

D. Installer to train owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.04 PROTECTION

A. Protect installed products until completion of project.

3.05 SCHEDULE

A. Install on all exterior windows but those in stair wells.

END OF SECTION

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SECTION 28 31 01
FIRE ALARM AND DETECTION SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fire alarm and detection systems

1.2 RELATED WORK

A. Section 26 05 53 – Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

1.3 QUALITY ASSURANCE

A. Manufacturer: Company specializing in smoke detection and fire alarm systems with ten years' experience.

B. Installer: A factory-authorized Electrical or Security Contractor licensed with the State and local jurisdiction with five years' experience in the design, installation, and maintenance of fire alarm systems by that manufacturer.

C. Qualifications: The person managing/overseeing the preparation of shop drawings and the system installation/programming/testing shall be trained and certified by the system manufacturer and shall be Fire Alarm Certified by NICET, minimum Level 2. This person's name and certification number shall appear on the start-up and testing reports.

1.4 REFERENCES

A. ASME A17.1 - Safety Code for Elevators and Escalators
B. NFPA 70 - National Electrical Code
C. NFPA 72 - National Fire Alarm and Signaling Code
D. NFPA 101 - Life Safety Code
E. UL 2017 – General Purpose Signaling Devices and Systems

1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 26 05 00 and as noted below.

1. Failure to comply with all the following and all the provisions in 26 05 00 will result in the shop drawing submittal being rejected without review.

2. Failure to submit the fire alarm without all requirements fulfilled in a single comprehensive submittal will be grounds to require a complete resubmittal.

B. Provide product catalog data sheets as shop drawings.

1. Provide a product catalog data sheet for each item shown on the Electrical Symbols List and for each piece of equipment that is not shown on the drawings but required for the operation of the system.

2. Where a particular Electrical Symbols List item has one or more variations (such as those denoted by subscripts, etc.) a separate additional product catalog data sheet shall be

provided for each variation that requires a different part number to be ordered. The corresponding Electrical Symbols List symbol shall be shown on the top of each sheet.

3. Where multiple items and options are shown on one data sheet, the part number and options of the item to be used shall be clearly denoted.

C. Submit CAD floor plans as shop drawings:

1. The complete layout of the entire system, device addresses, auxiliary equipment, and manufacturer’s wiring requirements shall be shown.

2. Indicate the precise routing of notification appliance circuits under the provisions of circuit survivability. Refer to "Wiring" under Part 3 - Execution of this specification section for requirements.

3. A legend or key shall be provided to show which symbols shown on the submittal floor plans correspond with symbols shown on the Contract Documents.

D. About all fire alarm circuits, provide the following: manufacturer’s wiring requirements (manufacturer, type, size, etc.) and voltage drop calculations.

E. Provide installation and maintenance manuals under provisions of Section 26 05 00.

F. Submit manufacturer's certificate that system meets or exceeds specified requirements.

G. Provide information on the system batteries as follows: total battery capacity, total capacity used by all devices on this project, total available future capacity.

H. Voice Alarm Communication System: Submit equipment rack or console layout, grounding schematic, amplifier power calculations, and wiring diagram.

I. Submit photocopy proof of NICET certification of the person overseeing the preparation of drawings and installation/testing.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 26 05 00.

B. Store and protect products under provisions of Section 26 05 00.

1.7 REGULATORY REQUIREMENTS

A. System: UL or FM Global listed.

B. Conform to requirements of NFPA 101.

C. Conform to requirements of Americans with Disabilities Act (ADA).

D. Conform to UL 864 Fire Alarm, UL 1076 Security, UL2017 General Signaling, and UL 2572 Mass Notification Communications.

1.8 SYSTEM DESCRIPTION

A. Performance Statement: This specification section and the accompanying fire alarm specific design documents describe the minimum material quality, required features, and operational requirements of the system. These documents do not convey every wire that must be installed and every

equipment connection that must be made. Based on the equipment described and the performance required of the system, as presented in these documents, the Vendor and the Contractor are solely responsible for determining all wiring, programming and miscellaneous equipment required for a complete and operational system.

~~B.~~ ~~This section of the specifications includes the furnishing, installation and connection of the microprocessor controlled, intelligent reporting, fire alarm equipment required to form a complete coordinated system that is ready for operation. It shall include, but is not limited to, alarm initiating devices, voice evacuation equipment, control panels, auxiliary control devices, annunciators, power supplies, and wiring as indicated on the drawings and specified herein.~~

C. Extending the existing Simplex fire alarm system: The existing control panel shall remain and shall be operational throughout construction. The system shall only be disabled to make new connections and to modify the programming. A fire watch shall be provided for all areas affected during outages. All system outages must be scheduled with the Owner at least one week prior. Individual devices may be disabled as needed based on construction activities to reduce the potential for false alarms, but all devices must be operational when the Contractor is not physically on site. New initiating devices may be connected to the existing signaling line circuits where capacity is available. Provide additional signaling line circuits as needed based on existing and new device quantity, including replacement of existing panel components. Provide new notification circuits to serve the new devices, including all necessary power supplies, amplifiers, batteries, and 120-volt input circuits. All new devices shall be programmed to provide the same sequence of operation as the existing devices of the same type, unless noted otherwise.

~~D.~~ ~~Fire Alarm System: NFPA 72; Automatic and manual fire alarm system, non-coded, analog-addressable with automatic sensitivity control of certain detectors, multiplexed signal transmission.~~

~~E.~~ ~~Campus Ethernet IP Network: A complete fire alarm and mass notification Ethernet network shall be provided. The network shall be Class X, Resilient Ethernet Protocol (REP) 100BaseTX / 100 Mbps that shall be able to operate with any single break and self-restoring network communications. Each building shall contain an independent building fire alarm / voice communications system, with full command and control from the campus command center. In no case shall read only network annunciation be acceptable as the only networking function.~~

~~F.~~ ~~Voice Communication: The facility shall have an emergency voice alarm communication system. The digitized recorded voice message shall notify occupants that a fire condition has been reported. Emergency manual voice override shall be provided.~~

G. System Supervision: Provide electrically supervised system, with supervised Signal Line Circuit (SLC) and Notification Appliance Circuit (NAC). Occurrence of single ground or open condition in initiating or signaling circuit places circuit in TROUBLE mode. Component or power supply failure places system in TROUBLE mode.

~~H.~~ ~~Alarm Reset: Key-accessible RESET function resets alarm system out of ALARM if alarm initiating circuits have cleared.~~

~~I.~~ ~~Lamp Test: Manual LAMP TEST function causes alarm indication at each zone at fire alarm control panel and at annunciator panels.~~

J. Drawings: Only device layouts and some equipment have been shown on the contract drawings. Wiring and additional equipment to make a complete and functioning system has not been shown but shall be submitted on the shop drawings.

1.9 PROJECT RECORD DOCUMENTS

A. Submit documents under the provisions of Section 26 05 00.

B. Include location of end-of-line devices.

C. Provide a CAD drawing of each area of the building (minimum scale of 1/16" = 1'-0") showing each device on the project and its address. The devices shall be shown in their installed location and shall be labeled with the same nomenclature as is used in the fire alarm panel programming.

D. Submit test results of sound pressure level (dBA) and intelligibility (STI) with the rooms tested designated on the floor plan. Notification devices shall have the tap wattage designated.

1.10 OPERATION AND MAINTENANCE DATA

A. Submit data under provisions of Section 26 05 00.

B. Include operating instructions, and maintenance and repair procedures.

C. Include results of testing of all devices and functions.

D. Include manufacturer's representative's letter stating that system is operational.

E. Include the CAD floor plan drawings.

F. Include shop drawings as reviewed by the Architect/Engineer and the local Authority Having Jurisdiction.

1.11 WARRANTY

A. Provide one (1) year warranty on all materials and labor from Date of Substantial Completion.

B. Warranty requirements shall include furnishing and installing all software upgrades issued by the manufacturer during the one (1) year warranty period.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

~~A.~~ ~~National Time and Signal~~
B. Simplex
~~C.~~ ~~Siemens Fire Safety~~

~~2.2~~ ~~**[FAP-1]:** FIRE ALARM CONTROL PANEL (FAP)~~

~~A.~~ ~~Control Panel: Modular, power-limited electronic design. Provide flush or surface wall-mounted enclosure as shown on plans. Enclosure shall be minimum 0.060 steel with provisions for electrical conduit connections into the sides and top. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.~~

~~B.~~ ~~Each Signaling Line Circuit (SLC loop) shall not be loaded over 80% of the maximum device capacity. For example, in the minimum system capacity column listed below, if the fire alarm manufacturer's system capacity of analog sensors per loop is 99 devices, then no more than 79 devices shall be wired on that loop. The minimum system capacity shall be as follows:~~

~~Minimum Total Addressable Points:~~	~~250~~	~~500~~	~~2000~~
~~Minimum Total SLC loops (including board, ready for field connections):~~	~~5~~	~~2~~	~~4~~
~~Panel Expansion Capability, Minimum Total SLC loops:~~	~~10~~		

~~C. Signal Line Circuit (SLC) and Notification Appliance Circuit (NAC) Boards:~~

~~1. Each board shall communicate directly with each addressable analog sensor and binary input to determine normal, alarm, or trouble conditions. Analog signals would be used for automatic test and determination of maintenance requirements.~~

~~2. Each board shall contain its own microprocessor and shall be provided to monitor addressable inputs and to control addressable outputs (addressable relays). The board shall communicate and provide power to all devices on its loop over a single pair of wires, except where 4-wire devices require a separate power circuit.~~

~~3. Pathway Class A: Circuits capable of transmitting an alarm signal during an open or a non-simultaneous single ground fault on a circuit conductor wiring system. Wiring of outgoing and return conductors shall be physically separated by a minimum of 50 feet or by a two-hour rated enclosure.~~

~~4. Pathway Survivability Level 2: Pathway survivability includes one or more of the following:~~

~~a. Listed 2-hour fire-rated circuit integrity (CI) or fire-resistive cable.~~
~~b. Pathway installed in a 2-hour fire-rated enclosure or assembly.~~

~~D. Central Processing Unit:~~

~~1. The central processing unit (CPU) shall communicate with the monitor and control all other modules in the panel. Removal, disconnection or failure of any control panel module shall be detected and reported to the CPU.~~

~~2. The CPU shall execute all control-by-event programs for specific action to be taken if a designated situation is detected in the system. A real-time system clock for time annotations on the display and printer shall be included.~~

~~3. All power for the unit shall be supervised and supplied by the FAP.~~

~~E. Display:~~

~~1. The board shall provide all controls and indicators used by the system operator and may also be used to program all control panel parameters.~~

~~2. The board shall provide an alphanumeric array for display of custom alphanumeric labels for all addressable points. It shall also provide indicators for AC Power, System Alarm, System Trouble, Display Trouble and Signal Silence.~~

~~3. Displayed descriptions of addressable points shall include actual room names/numbers selected by the Owner. This information shall be obtained prior to programming. Room names/numbers shown on floor plans shall not be used.~~

4. The board shall provide a touch key-pad with control capability to command all system functions and entry of any alphanumeric information. Twenty different passwords with four levels of security shall be supported to prevent unauthorized manual control or programming.

F. Memory: The CPU and display interface board shall be augmented by non-volatile field programmable memory. EPROM memory will also be allowed provided the memory is burned in with minimum expansion capability equal to the total system capacity of the panel. Memory shall not be lost upon primary and secondary power failure.

G. Power Supply:

1. Input power shall be 120 VAC, 60 Hertz. Output power shall be as noted on the device specifications and drawings. Each component of the fire alarm system requiring 120 VAC input power shall be served from a dedicated emergency branch circuit. Provide two #12 conductors and one #12 ground in 3/4" conduit to a dedicated 20A/1P circuit breaker with a red handle and a manufacturer's standard handle lock-on device. Identify/label breaker and branch circuit in accordance with NFPA requirements and Specification Section 26 05 53.

2. Adequate to supply 125% of all control panel and peripheral power needs as well as 125% of power required for all external audio-visual devices. The power supply may be increased as needed by adding additional modular expansion power supplies. Over-current protections shall be provided on all power outputs.

3. All power supplies shall be designed and installed to meet UL and NFPA requirements for power-limited operation on all external initiating and indicating circuits.

4. The power supply shall provide integral charger for use with internal batteries. Battery capacity shall be sufficient for operation of the entire system for 24 hours in a non-alarm state followed by alarm mode for 15 minutes, plus 25% spare capacity for future devices.

H. Surge Protection:

1. All fire alarm control panels, NAC panels, etc. shall be provided with a surge protection device (SPD). The SPD shall be UL listed to Standard 1449 Rev 3. The unit should be clearly labeled in accordance with Identification Section 26 05 53. The SPD shall have thermal fuses to protect against fire in short circuit conditions. The unit shall provide visual indication that the unit is protecting and functioning.

2. Any communications or signaling circuits associated with the fire alarm system, which leave or enter a facility, shall be provided with a surge protection device. The devices shall be as recommended by the fire alarm system manufacturer.

I. **[VCC-1]:** Digitized Voice Command Center (VCC):

1. The Digitized Voice Command Center (VCC) shall contain all equipment required for all audio control, signaling, and supervisory functions. This shall include digital voice units, speaker zone indication, microphones.

2. Function: The Voice Command Center equipment shall perform the following functions:

a. Operate as a supervised single dual channel automatic digitized voice evacuation system with manual emergency voice communication system.

b. Dual channel speaker circuits shall be arranged such that there is a minimum of one (1) speaker circuit per floor of the building or smoke zone, whichever is greater.

c. Audibly and visually annunciate the active or trouble condition of every signal circuit.

d. Audibly and visually annunciate any trouble condition of tone generators and digital voice units required for normal operation of the system.

e. Provide all-call activities through activation of a single control switch.

f. Provide automatic, digitally recorded voice messages and tones.

3. Audio Amplifiers:

a. The audio amplifiers will provide a single dual channel audio power at 25/70 volts RMS for distribution to speaker circuits.

b. Provide multiple audio amplifiers mounted in the transponder or in the main fire alarm control panel, either to supply incremental audio power, or to function as an automatically switched backup amplifier(s).

c. The audio amplifier shall include an integral power supply, and shall provide the following controls and indicators:

1) Normal Audio Level LED
2) Incorrect Audio Level LED
3) Battery Trouble LED
4) Amplifier Trouble LED
5) Audio Amplifier Gain Adjust

d. Includes audio input and amplified output supervision backup input and automatic switchover function, if primary amplifier should fail.

e. Amplifier shall be backed up in groups (one amplifier backs up several). Failure of any one amplifier in the system shall not degrade system performance in any way.

4. Audio Message Generator (Digitized Voice):

a. Each initiating zone or intelligent device shall interface with an emergency voice communication system capable of transmitting a digitized voice message to all speakers in the building.

b. Actuation of any alarm initiating device shall cause a digitized message to sound over the speakers. The message shall be repeated four (4) times.

c. A built-in microphone shall be provided to allow paging through speaker circuits.

d. The audio message generator shall have the following controls and indicators to allow for proper operator understanding and control:

1) All Call LED
2) On-Line LED
3) All Call Switch

~~5. Voice Messages:~~

~~a. A pre-programmed custom digital voice message shall be used for notification appliance speaker circuits. The messages shall be approved by the Authority Having Jurisdiction (AHJ).~~

~~b. Message shall be preceded by a tone and message shall be repeated four times until silenced.~~

~~c. Primary messages shall be annunciated in the zone of fire alarm and adjoining areas' evacuation signaling zones, and the secondary message in all other evacuation signaling zones.~~

~~d. Message shall be as shown in the following table. These messages are not intended to specify the exact wording required, but to specify the minimum information conveyed by the message:~~

2.3 SIGNALING LINE CIRCUIT DEVICES

A. **[FA-120]:** Smoke Detectors:

1. Analog Photoelectric Type Sensor: Shall use the photoelectric principle to measure smoke density and send data to the control panel representing the analog level of smoke density measured.

2. Each smoke detector shall connect directly to an SLC loop.

3. Each detector shall be mounted, where shown on the drawings, on a twist-lock base with all mounting hardware provided. Provide a two-piece head/base design.

4. Each detector shall have a manual switching means to set the internal identifying code (address) of that detector, which the control panel shall use to identify its address with the type of sensor connected.

5. Dual alarm and power indicators shall be provided that flash under normal conditions and remain continuous under alarm or trouble conditions. Remote indicator terminals shall be provided. Provide a remote LED indicator device if detector is not visible from a floor standing position.

6. A test means shall be provided to simulate an alarm condition.

7. Where operation is noted as required below 32ºF and/or above 120ºF, a conventional device shall be installed with a unique monitor module located in the nearest available location with maintained temperatures between 32ºF and 120ºF.

8. Audible sounder detector base for sleeping room applications:

   a. The audible base shall sound an alarm in the local room in UL2017 operation and UL484 for general evacuation. The unit shall be programmable by the main control panel for the duration of operation.

   b. The audible sounder base shall sound Temporal 3 (fire) or Temporal 4 (CO alarm) and be at 75 dB at 10 feet.

9. A subscript is used to identify the device with a specific sequence of operation as follows: E=Elevator Recall, S=Sleeping/Patient Room, D=HVAC Control, A=Atrium,

SW=Stairwell, CR=Computer Room, SD=Smoke Dampers, DH=Door Hold Release, FD= Fire Door Release, MP=Medical Procedure Room.

B. Manual Pull Stations:

1. Manual stations shall match the description on the drawings (refer to the General Electrical Equipment Schedule). The stations shall be mounted where shown on the drawings and be provided with all necessary mounting hardware. Use surface mount only on precast concrete or structure.

2. **[FA-130]**: Addressable, double action, reset key lock, semi-flush mount, red high abuse plastic or cast metal construction with white lettering.

3. Manual stations shall connect directly to an SLC loop. Stations shall provide address setting means using rotary decimal or DIP switches.

4. Where operation is noted as required below 32ºF and/or above 120ºF, a conventional device shall be installed with a unique monitor module located in the nearest available location, with maintained temperatures between 32ºF and 120ºF.

C. Heat Detectors:

1. **[FA-140]:** Combination rate of rise and 135°F fixed temperature analog thermal type sensor. Factory programmed to alarm at 135ºF and at 15ºF per minute rate-of-rise. Sensor shall measure heat level and send data to the control panel representing the analog level of thermal measurement and rate-of-rise.

   a. A subscript is used to identify the device with a specific sequence of operation as follows: E=Elevator Shutdown.

2. Provide a two-piece head/base design, with a manual switching means to set the internal identifying code (address) of that detector, which the control panel shall use to identify its address with the type of sensor connected.

3. Heat detectors shall connect directly to SLC loops. Where fixed temperature or explosion proof detectors are used, one monitor module may be used to monitor all detectors in one room/area as shown on the drawings.

4. Detectors shall be mounted, where shown on the drawings, on a twist-lock base with all mounting hardware provided.

5. Provide a remote LED indicator device if detector is not visible from a floor-standing position.

6. Dual alarm and power indicators shall be provided that flash under normal conditions and remain continuous under alarm or trouble conditions. A connection for attachment of a remote indicator shall be provided.

7. A test means shall be provided to simulate an alarm condition.

8. Where operation is noted as required below 32°F and/or above 120°F, a conventional device shall be installed with a unique monitor module located in the nearest available location with maintained temperatures between 32°F and 120°F.

D. **[FA-160]:** Monitor Modules:

1. Monitor Module shall connect directly to an SLC loop and receive power from a separate 24 VDC circuit. It shall interface initiating devices with the control panel using Style D or Style B circuits. Contractor option: Use an interface module (2-wire operation) for Style B circuits connected to normally-open dry contacts, such as a flow switch.

2. The module shall be mounted in an enclosure located in an accessible service location as near as possible to the device(s) being monitored, or where shown on the drawings. All mounting hardware shall be provided.

3. The module shall supply the required power to operate the monitored device(s).

4. The module shall provide address setting means using rotary decimal or DIP switches.

E. **[FA-161]:** Addressable Relays:

1. Relay that represents an addressable control point used primarily for the control of auxiliary devices as indicated on the drawings. Contractor to provide additional slave relay(s), as required, rated for the electrical load being controlled (contractor to match voltage, amps, etc.).

2. Relay shall connect directly to an SLC loop and receive power from a separate 24 VDC circuit.

3. The relay shall be mounted in an enclosure located in an accessible service location as near as possible to the device(s) being controlled, unless otherwise shown on the drawings. All mounting hardware shall be provided.

4. The relay shall supply 24 VDC power to the device(s) being controlled, unless otherwise indicated on the drawings.

2.4 NOTIFICATION APPLIANCE DEVICES

A. Device Color:

1. Wall Mounted: White housing with red lettering or pictogram.

2. Ceiling Mounted: White housing with red lettering or pictogram.

B. Visual Alarm Devices:

1. **[FA-200]:** Wall mounted.

2. **[FA-201]:** Ceiling mounted.

3. High intensity (candela rating as scheduled on the drawings) xenon strobe or equivalent under a lens. Candela rating shall be visible from exterior of the device.

   a. Candela Ratings: V1=15, V3=30, V7=75, VH=110, VS=177.

4. The maximum pulse duration shall be 0.2 seconds with a maximum duty cycle of 40%. The flash rate shall be 1 Hz. Where more than two strobes are visible from any one location, the fire alarm visual devices shall be synchronized.

5. Device, housing, and backbox shall be UL listed for fire alarm/emergency applications.

C. **[FA-210]:** Audio (Speaker) Alarm Devices - Wall Mounted:

1. Sound rating shall be dependent on the tap (wattage) setting. Tap settings shall be available in 3 dBA increments. A minimum of four (4) tap settings should be available to allow field adjustment of the sound output across a minimum range of 78 to 87 dBA, 400Hz to 4KHz (6 dBA cutoff) frequency range.

2. Speakers shall operate on a 25V RMS system, unless otherwise noted on drawings.

3. Speakers shall clearly reproduce a signal consisting of a live or prerecorded human voice with voice intelligibility.

4. Speaker, housing, and backbox shall be UL listed for fire alarm/emergency applications.

D. **[FA-230]:** Audio (Speaker) Alarm Devices - Ceiling Mounted

1. 4” speaker, round housing, flush mounted (provide tile bridge where applicable).

2. Sound rating shall be dependent on the tap (wattage) setting. Tap settings shall be available in 3 dBA increments. A minimum of four (4) tap settings should be available to allow field adjustment of the sound output across a minimum range of 78 to 87 dBA, 400Hz to 4KHz (6 dBA cutoff) frequency range. Speakers shall operate on a 25V RMS system, unless otherwise noted on drawings.

3. Speakers shall clearly reproduce a signal consisting of a live or prerecorded human voice and background music with voice intelligibility.

4. Speaker, housing, and backbox shall be UL listed for fire alarm/emergency applications.

E. Combination Audio (Voice) and Visual Notification Device:

1. **[FA-211]**: Wall mounted.

2. **[FA-231]**: Ceiling mounted.

3. Combine speaker and visual components into a single device. Refer to the corresponding paragraphs above for requirements of each component.

2.5 **[NEP-#]:** NAC EXTENDER PANELS (NEP)

A. As shown on the plans or as a Contractor’s option if not shown, furnish and install NAC extender panels as necessary to provide remote power supply for notification appliance circuits (NAC). Contractor shall indicate quantity and locations of each NEP on the shop drawing submittals.

B. Each NEP shall be self-contained remote power supply with batteries, and battery charger mounted in a surface lockable cabinet. Battery capacity shall be sufficient for operation for 24 60 hours in a non-alarm state followed by alarm for 15 minutes, plus 25% spare capacity for future devices. Each NEP provides a minimum of up to 4 outputs, 2A continuous, or 6A full load total capacity.

C. Power for each NEP shall be from a local 120 VAC emergency circuit. Provide two #12 conductors and one #12 ground in 1/2" conduit to each NEP from a dedicated 20A/1P circuit breaker with a red handle and a manufacturer’s standard handle lock-on device. Coordinate panel and circuit number with Architect/Engineer prior to installation.

D. NAC extender panels may be installed only in locations coordinated with the Architect/Engineer.

E. Mounting: Surface.

2.6 ANNUNCIATION

~~A. **[FAA-1]:** Remote LCD Annunciators:~~

~~1. Auxiliary annunciators shall indicate alarm and trouble conditions visually and audibly as shown on the drawings. Provide local TROUBLE ACKNOWLEDGE, TEST, and ALARM SILENCE capability. Minimum 80-character display.~~

~~2. Communications and power to the annunciators shall be supervised. The annunciator shall receive power from the fire alarm control panel.~~

~~3. A single key switch shall enable all switches on the annunciator.~~

~~4. Mounting: Surface.~~

B. **[FA-241]**: Fire Alarm Remote Indicator:

1. Red LED type.
2. Mounts flush to a single gang box.

C. **[FA-242]**: Fire Alarm Remote Indicator and Test Switch:

1. Red LED type.
2. Key switch test selector.
3. Mounts flush to a single gang box.

~~2.7 ETHERNET NETWORK~~

~~A. Campus Ethernet IP Network: A complete fire alarm and mass notification Ethernet network shall be provided. The network shall be Class X wiring, Resilient Ethernet Protocol (REP) 100BaseTX / 100 Mbps that shall be able to operate with any single break and restore network communications.~~

~~B. The IP network shall be fiber optic cable, single or multi-mode fiber. The TCP/IP network switches shall be industrial grade managed switching hubs. Network switches shall be UL864 listed, shall provide a minimum of four (4) or a maximum of eight (8) 10/100 Mbps shielded RF-45 connectors for Ethernet connections, and selectable multi-mode or single-mode fiber ports. The switches shall operate on a nominal 24 VDC supplied from a battery backed up fire alarm control panel or booster power supply to ensure power to the switch is always available. Switches shall provide LED indicators for data rate, activity/link integrity, power, and loop detection.~~

~~C. IP Monitor and Relay Module: The IP relay/input module shall have a minimum of four (4) dry contact inputs and four (4) dry contact outputs. The relay output shall be rated at 0.5 amps at 24 VDC. This unit shall be monitored and controlled by the graphics workstation to operate functions and/or operations/activations on any fire alarm network system connected to the GEGW. The module shall be UL2572 and UL864 listed.~~

~~D. Voice Over IP Module Encoder/Decoder: Each control panel audio source connected to the LAN/WAN network interface shall consist of a supervised audio decoder capable of decoding MP3, WMA, G.700, and PCM data streams in HTTP, UDP, or RTP format. Audio decoder shall operate on filtered-regulated 24 VDC power derived from the panel power supply. Power shall be supplied directly from the FACP to ensure reliable and monitored power. UL 2572 and UL864 listed.~~

2.8 CONNECTIONS TO AUXILIARY DEVICES PROVIDED BY OTHERS

A. **[FA-260]**: Flow Switch:

1. Connection to flow switch to monitor fire protection flow switch or discharge output contacts. Normally open dry contacts for fire alarm interface. Furnished and installed by MC; wired by EC.

B. **[FA-261]**: Monitor Switch:

1. Connection to monitor switch to monitor fire protection system supervisory switches or output contacts. Normally open dry contacts for fire alarm interface. Furnished and installed by MC; wired by EC.

2.9 WIRING

A. Fire alarm wiring/cabling shall be furnished and installed by the Contractor in accordance with the manufacturer's recommendations and pursuant to National Fire Codes. Cabling shall be UL listed and labeled as complying with NFPA 70, Article 760 for power-limited fire alarm signal service.

B. Approved manufacturers of fire alarm cable:

1. Comtran Corp.
2. Helix/HiTemp Cables, Inc.
3. Rockbestos-Suprenant Cable Corp.
4. West Penn Wire/CDT.
5. Radix.

PART 3 - EXECUTION

~~3.1 SEQUENCES OF FIRE ALARM OPERATION~~

~~A. General:~~

~~1. Refer to the Fire Alarm Operation Matrix on the drawings for basic requirements and system operation.~~

~~2. All system output programs assigned via control-by-event equations to be activated by the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.~~

~~B. Panel/Annunciator Alarm, Trouble, Supervisory Indication:~~

~~1. Appropriate system Alarm, Trouble, or Supervisory LED shall flash at the control panel, transponder, and annunciator locations.~~

~~2. A local signal in the control panel shall sound.~~

~~3. The LCD display shall indicate all information associated with the condition, including the name of the item, type of device and its location within the protected premises.~~

~~4. History storage equipment shall log the information associated with the fire alarm control panel (FAP) condition, along with the time and date.~~

5. Transmit the appropriate signal (supervisory, trouble, alarm) to the central station via the digital communicator.

6. Transmit the appropriate signal (supervisory, trouble, alarm) to the building automation system via addressable relays tied to contact monitors on the system.

C. Audible Alarms Sequence:

1. Audible alarms within the floor or fire/smoke compartment where the emergency signal originated and in adjacent areas floors shall sound.

D. Visual Alarms Sequence:

1. Visual alarms within the floor or fire/smoke compartment where the emergency signal originated and in adjacent areas floors shall flash.

E. Elevator Recall Sequence:

1. Elevator recall sequences shall meet the requirements of ASME/ANSI A17.1 and NFPA 72.

2. Upon signal from a smoke detector in the machine room, hoistway, or any elevator lobby other than the "designated level" the fire alarm shall utilize an addressable relay to signal the elevator to recall to the designated level as determined by the Authority Having Jurisdiction.

3. Upon signal from a smoke detector in the elevator lobby of the "designated level," the fire alarm system shall utilize an addressable relay to signal the elevator to recall to the "alternate level" as determined by the Authority Having Jurisdiction.

4. All elevators, throughout the building, shall be recalled simultaneously.

F. Elevator Shutdown Sequence:

1. Elevator shutdown shall meet the requirements of ASME/ANSI A17.1.

2. All elevators that share the same hoistway, machine room, or lobby shall be shut down simultaneously. Elevators served by different machine rooms, hoistways, and lobbies shall continue to operate.

3. The fire alarm system shall utilize an addressable relay to energize the shunt trip of the main elevator breaker, disconnecting power to the elevator.

3.2 INSTALLATION

A. Install system in accordance with manufacturer's instructions and referenced codes.

B. Fire Alarm Control Panel:

1. Install the control panel where shown on the drawings.

2. All expansion compartments, if required, shall be located at the control panel.

3. Install the voice command center in the location as indicated on the drawings. This location should be primary fire department "attack" location. Coordinate with the local fire department prior to submitting shop drawings.

4. ~~The fire alarm voice prerecorded messages shall be verified by the Contractor, as approved by the Owner, prior to the shop drawing submittal process.~~

C. Devices:

1. General:

a. All ceiling-mounted devices shall be located where shown on the reflected ceiling and floor plans. If not shown on the reflected ceiling or reflected floor drawings, the devices shall be installed in the relative locations shown on the floor drawings in a neat and uniform pattern.

b. All devices shall be coordinated with luminaires, diffusers, sprinkler heads, piping and other obstructions to maintain a neat and operable installation. Mounting locations and spacing shall not exceed the requirements of NFPA 72.

c. Where the devices are to be installed in a grid type ceiling system, the detectors shall be centered in the ceiling tile.

d. The location of all fire alarm devices shall be coordinated with other devices mounted in the proximity. Where a conflict arises with other items or with architectural elements that will not allow the device to be mounted at the location or height shown, the Contractor shall adjust location of device so that new location meets all requirements in NFPA 72 and all applicable building codes.

2. Per the requirements of NFPA, detector heads shall not be installed until after the final construction cleaning unless required by the local Authority Having Jurisdiction (AHJ). If detector heads must be installed prior to final cleaning (for partial occupancy, to monitor finished areas or as otherwise required by the AHJ), they shall not be installed until after the fire alarm panel is installed, with wires terminated, ready for operation. Any detector head installed prior to the final construction cleaning shall be removed and cleaned prior to closeout.

3. Protection of Fire Alarm System:

a. A smoke detector shall be installed within the vicinity of the main fire alarm panel and every NAC extender panel per NFPA 72. A heat detector may be substituted when a smoke detector is not appropriate for the environment of installation.

4. Analog Smoke and Heat Detectors:

a. In elevator shafts and elevator equipment rooms, provide a heat detector for elevator shutdown within 2' of every sprinkler head. Coordinate with fire protection contractor.

5. Manual Pull Stations:

a. Stations shall be located where shown and at the height noted on the drawings.

6. Addressable Relays and Monitor Modules:

a. Modules shall be located as near to the respective monitor or control devices as possible, unless otherwise indicated on the drawings.

b. All modules shall be mounted in or on a junction box in an accessible location.

c. Where not visible from a floor standing position, a remote indicator shall be installed to allow inspection of the device status from a local floor standing location.

7. SLC Loop Isolation Modules:

a. Isolation modules shall be installed to limit the number of addressable devices that are incapacitated by a circuit fault.

b. Install all Isolation Modules within the fire alarm control panel, unless otherwise indicated on the drawings. Refer to the fire alarm riser diagram for requirements. Refer to the floor plans for areas served by separate isolation modules.

8. Notification Appliance Devices:

a. Devices shall be located where shown on the drawings.

b. Wall-mounted audio, visual and audio/visual alarm devices shall be mounted as denoted on the drawings.

~~D. Annunciators:~~

~~1. Remote Annunciators: The annunciators shall be located where shown on the drawings and approved by the fire marshal.~~

E. Wiring:

1. Fire alarm wiring/cabling shall be provided by the Contractor in accordance with the manufacturer's recommendations and pursuant to National Fire Codes.

2. Wiring shall be installed in conduit. Refer to Identification Section 26 05 13 for color and identification requirements.

3. All junction boxes with SLC and NAC circuits shall be identified on cover. Refer to Identification Section 26 05 13 for color and identification requirements.

4. Partial evacuation or relocation of occupants is the standard operating procedure for this facility in the event of an alarm. Therefore, all notification appliance circuits (NAC), including circuits serving NAC extender panels (NEP) and other network communication circuits, must be installed and protected in accordance with the "circuit survivability" requirements described in NFPA 72. The contractor shall maintain the following:

a. NACs serving separate evacuation signaling zones shall be routed separately such that they are no less than 4 feet apart when run horizontally and 1 foot apart when run vertically. They may come simultaneously only within 10 feet of the control panel.

b. NACs passing through other evacuation signaling zone(s) shall be installed in conduit and routed through the 2-hour fire-rated chase(s) or enclosure(s) identified on the drawings or shall be NEC classified CIC cable (Fire Alarm Circuit Integrity) installed in conduit. Provide CIC cable meeting UL requirements for 2-hour listing.

1) The CIC cable system shall be installed in a conduit system meeting all requirements of its UL-listed installation system (conduit, boxes, connectors, etc.).

5. Fire Alarm Power Branch Circuits: Building wiring as specified in Section 26 05 13.

6. Notification Appliance Circuits shall provide the features listed below. These requirements may require separate circuits for visual and audible devices.

   a. Fire alarm temporal audible notification for all audio appliances.

   b. Synchronization of all visual devices where two or more devices are visible from the same location.

   c. Ability to silence audible alarm while maintaining visual device operation.

7. Notification Appliance Circuits shall not span floors.

8. Signal line circuits connecting devices shall not span floors.

9. No wiring other than that directly associated with fire alarm detection, alarm or auxiliary fire protection functions shall be in fire alarm conduits. Wiring splices shall be avoided to the extent possible, and if needed, they shall be made only in junction boxes, and enclosed by plastic wire nut type connectors. Transposing or changing color coding of wires shall not be permitted. All conductors in conduit containing more than one wire shall be labeled on each end, in all junction boxes, and at each device with “E-Z Markers” or equivalent. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal. Cabinet terminals shall be numbered and coded, and no unterminated conductors are permitted in cabinets or control panels. All controls, function switches, etc. shall be clearly labeled on all equipment panels.

F. Fire Alarm Cabling Color Code: Provide circuit conductors with insulation color coding as follows, or using colored tape at each conductor termination and in each junction box.

1. Power branch circuit conductors: In accordance with Section 26 05 53.
2. Signaling line circuit: Overall red jacket with black and red conductors.
3. DC power supply circuit: Overall red jacket with violet and brown conductors.
4. Notification appliance circuit: Overall red jacket with blue and white conductors.
5. Central station trip circuit: Orange conductors.
6. Central station fire alarm loop: Black and white conductors.

G. Devices surface mounted in finished areas shall be mounted on surface backboxes furnished by fire alarm equipment supplier. Backboxes shall be painted to match device, shall be the same shape and size as the device shall not have visible knockouts.

H. Make conduit and wiring connections to door release devices, sprinkler flow and pressure switches, sprinkler valve monitor switches, fire suppression system control panels, duct analog smoke detectors and all other system devices shown or noted on the Contract Documents or required in the manufacturer's product data and shop drawings.

3.3 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 26 05 00.

B. Test in accordance with NFPA 72, Chapter 14 and local fire department requirements. Submit documentation with O & M manuals in accordance with Section 14.6 of the Code.

C. Contractor shall test and adjust the fire alarm system as follows:

1. Speaker taps shall be adjusted to the lowest tap setting which achieves a sound level higher than or equal to the greatest of the following:

a. 70dBA.

b. 15 dBA above ambient levels as indicated in NFPA 72 Table A.18.4.3.

c. 15 dBA above measured ambient. 5 dBA above the maximum measured sound level with duration of more than 60 seconds.

d. As specified on the drawings.

2. Sound level measurement procedure shall meet the following requirements:

a. All measurements shall use the 'A' weighted, dBA, sound measurement scale.

b. All measurements shall be taken after furnishings, wall coverings and floor coverings are in place.

c. All measurements shall be taken after fixed equipment (HVAC units, etc.) producing ambient noise is installed and is in operation.

d. Final ambient sound measurements shall be taken during occupancy and the units shall be re-adjusted at that time, if necessary.

e. All sound level measurements shall be taken at a height of 5' above the finished floor level.

f. Measurements shall be taken in every unique room. If there are multiple rooms, which have the identical dimensions and function, 10%, or a minimum of 2 rooms shall be tested. The results from the rooms tested shall be averaged and the remaining rooms may be adjusted per the average.

g. Measurements shall be taken on a 20' x 20' grid and the results for all points taken shall be averaged. If the room is smaller than 20' x 20' a minimum of two measurements are required.

h. Measurements shall be taken halfway between speakers or halfway between a speaker and the wall. No measurements shall be taken at the extreme edges of the room, nor directly under speakers.

D. Additionally, test the voice alarm communication system intelligibility per IEC 60849:

1. The following acoustically distinguishable spaces shall be tested: All unique rooms shall be tested. If there are multiple rooms with the identical dimensions and function, 10%, or a minimum of two (2) rooms, shall be tested. The results from the rooms tested shall be averaged, and the remaining rooms may be adjusted per the average.

2. Utilize equipment designed to test per IEC 60849 per the equipment manufacturer's instructions. This equipment includes a signal generator, which is input to the fire alarm system and a portable measurement device. This equipment is available from Simplex Grinnell or Gold Line.

3. When testing for intelligibility, the quantity and location of the measurement points shall be the same as the points used for measurement of dBA level.

4. Provide a room by room report, showing the average dBA level and STI for each room tested, the number and location of. The report shall be presented to the Architect/Engineer in an Excel .xls file.

3.4 MANUFACTURER'S FIELD SERVICES

A. Provide manufacturer's field services under provisions of Section 26 05 00.

B. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.

C. Note that room numbers depicted on the architectural/engineering drawings will not necessarily reflect the actual room (signage) numbers that the Owner selects. The Contractor and fire alarm manufacturer shall coordinate the actual room numbers as the Owner directs to identify each device. This list shall be a part of the floor plan record drawing to be turned in at the project closeout.

~~3.5 SYSTEM TRAINING~~

~~A. System training shall be performed under provisions of Section 26 05 00.~~

~~B. Minimum on-site training times shall be:~~

~~1. System Operators: One (1) day.~~

END OF SECTION

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