

Missouri  
Department  
of Transportation



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Pete K. Rahn, Director

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February 8, 2010

**Addendum No. 1  
9-100217**

To: Plans and Specifications Holders List for:

Missouri Department of Transportation – Central Office Warehouse Renovation – Phase II,  
Jefferson City, MO

**The bid opening date and time are hereby changed to: February 18, 2010 at 11:00 AM local time.**

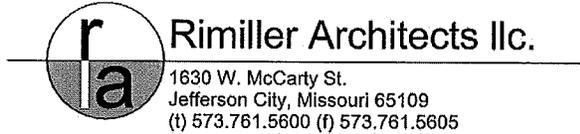
Changes to the plans and specifications as identified under the letterhead from Rimiller Architects llc. shall be considered in addition to the following:

General

The Alternate Bid for asphalt pavement on the South Parking Lot and Entrance Drive will no longer be considered. This is referenced on the following plans sheets:

- C040 Detail 1 - South Parking Lot – Asphalt Pavement (Alternate Bid)
- C090 Detail 5 - Parking Lot – Asphaltic Concrete (Alternate Bid)
- C100 Detail 2 – Street Section – Asphaltic Concrete (Alternate Bid)

An allowance of \$875 will be given for signs identified in Section 10431 - Signs, paragraph 1.4.C.1 (b,c,d & e.).



February 05, 2010

Clayton Hanks  
Senior GS Specialists  
P.O. Box 270  
Jefferson City, MO. 65102

**RE: ADDENDUM #1**

**830 MoDOT Drive – Warehouse Renovation – Phase II, Jefferson City, MO.**

**A. ARCHITECTURAL REVISIONS**

1. Item #1.

Sheet A0.4 has been modified to show the addition of emergency lighting.

2. Item #2.

Sheet D1.2 has been modified to show the demolition of the cmu wall behind the metal wall panels to accept storefront windows.

3. Item #3.

Wall section has been revised as shown on 1/A5.1, revision 1 (dated 02-05-2010).

- a. Purlin and eave strut have been modified to show existing conditions.
- b. Window sill has been modified to show the removal of additional course of block and re-frame with metal studs.

4. Item #4.

Wall section has been revised as shown on 2/A5.1, revision 1 (dated 02-05-2010).

- a. Purlin and eave strut have been modified to show existing conditions.
- b. Show new HSS6x4x5/16 framing @ second floor window as indicated on structural drawings (re: detail 3/S203).
- c. Add new HSS6x4x5/16 framing @ first floor window head. See also structural detail 3/S203, revision 1 (dated 02-05-2010), for the addition of this tube framing.
- d. Window sill has been modified to show the removal of additional course of block and re-frame with metal studs.

5. Item #5.

Wall section has been revised as shown on 1/A5.2, revision 1 (dated 02-05-2010).

- a. Purlin and eave strut have been modified to show existing conditions.

6. Item #6.

Wall section has been revised as shown on 1/A5.3, revision 1 (dated 02-05-2010).

- a. Purlin has been modified to show existing conditions.
- b. Show new HSS6x4x5/16 framing @ second floor window as indicated on structural drawings (re: detail 4/S203).

7. Item #7.

Wall section has been revised as shown on 2/A5.3, revision 1 (dated 02-05-2010).

- a. Purlin has been modified to show existing conditions.
- b. Show new HSS6x4x5/16 framing @ second floor window as indicated on structural drawings (re: detail 4/S203).

8. Item #8.

Details 4, 5 and 6 have been added to Sheet A5.4, revision 1 (dated 02-05-2010). These details are referenced from Sheet A6.2.

9. Item #9.

Sheet A5.5 has been revised to expand on new window jamb, head and sill details. These details are referenced from Sheet A6.2.

10. Item #10.

Sheet A6.2 has been revised to include additional section references to storefront head, sill and jamb details.

11. Item #11.

Door hardware schedule has been revised. See attached specification section.

12. Item #12.

Sheet A0.1 has been revised to update sheet index.

**B. STRUCTURAL REVISIONS**

1. Item #1.

Location of grid N5.1 has been revised as shown on 1/S102, revision 1 dated 02/05/2010.

2. Item #2.

Location of grid N5.1 has been revised as shown on 1/S103, revision 1 dated 02/05/2010.

3. Item #3.

Horizontal bracing and reference details have been added as shown on 4/S201, revision 1 dated 02/05/2010.

4. Item #4.

Dimension at elevator door opening has been revised as shown on 5/S201 and 6/S201, revision 1 dated 02/05/2010.

5. Item #5.

HSS window framing has been added between grid 13 and 15 as shown on 3/S203, revision 1 dated 02/05/2010.

6. Item #6.

Location of grid N5.1 has been revised as shown on 1 and 3/S204, revision 1 dated 02/05/2010.

7. Item #7.

Edge of slab condition has been revised as shown on 1/S301, revision 1 dated 02/05/2010.

8. Item #8.

Details 7 and 8 have been added to S502, as shown by revision 1 dated 02/05/2010.

9. Item #9.

Window framing details have been revised as shown on 1, 6 and 7/S504, revision 1 dated 02/05/2010.

10. Item #10.

Detail 8 has been added to S504 as shown by revision 1 dated 02/05/2010.

11. Item #11.

HSS window frame has been added between grid N and L as shown on 4/S203, revision 1 dated 02/05/2010.

## **C. CIVIL REVISIONS**

1. Item #1.

Sheet C100 Street Details has been revised, see Revision 1, dated 02-05-2010.

2. Item #2.

Sheet C070 and C020 have been revised to include note on fiber optics. See Revision 1, dated 02-05-2010.

**D. MECHANICAL REVISIONS**

1. Item #1.

Clarification of Temperature Control Specifications

2. Item #2.

HVAC and Piping Demolition Plan

3. Item #3.

Heat Pumps shall be fed by a fused disconnect not a twist lock receptacle.

4. Item #4.

Power poles from the ceiling to the cubicles shall be 4" x 4" - 2 compartment furnished and installed by electrical contractor. Color to match cubicles. Coordinate with owner's installer.

5. Item #5.

Panel EP shall be changed to a 200 amp 3 pole shunt – trip breaker fed by 4 #3/0,1#6.

6. Item #6.

Panel FCP1 is for the fluid cooler and will have 2 - 20 amp 3 pole breakers 1 - 40 amp 3 pole breaker and 1- 50 amp 3 pole breaker. Coordinate wiring with fluid cooler manufacturer.

7. Item #7.

Replace the existing fire alarm control panel with a new addressable panel. Existing devices to remain will be fed from a new addressable out put module.

8. Item #8.

Electrical Demolition Plan

9. Item #9.

Ceiling SA registers shall be 24" x 24" layin, all aluminum perforated with adjustable air pattern-Carnes SLAB or equal. Ceiling return air grilles shall be 24" x 24" layin, all aluminum perforated. Carnes SLJB or equal. Side wall SA registers shall be double deflection, all aluminum Carnes RNDB or equal. Side wall RA grilles shall be all aluminum Carnes RADB or equal.

10. Item #10

The 2 size 060 heat pumps previously shown on 1/M3 have been divided into 2 size 030 units each.

- a. Size 060 have been deleted as shown on Heat Pump Schedule on Sheet ME3, revision 1 (dated 02-05-2010).
- b. System GPM has been adjusted slightly as shown on 1/ME3, revision 1 (dated 02-05-2010).
- c. Ductwork and air terminals have been added, deleted, rerouted, and resized as shown on 1/M3 and 1/M4, revision 1 (dated 02-05-2010).
- d. Heat pump piping has been added, deleted, rerouted, and resized as shown on 1/M5 and 1/M6, revision 1 (dated 02-05-2010).
- e. Circuits have been added and wires resized as shown on 1/E1, revision 1 (dated 02-05-2010).
- f. Circuits have been added and breakers resized as shown on Panel Schedules on Sheet ME3, revision 1 (dated 02-05-2010).

11. Item #11

Emergency, exit, and egress light fixtures with associated wires have been added, deleted, and adjusted as shown on 1/E3 and 1/E4, revision 1 (dated 02-05-2010).

12. Item #12

Insulate all AC condensate piping with 1/2" ARMAFLEX or approved equal.

Respectfully Submitted,



Matthew J. Rimiller

Rimiller Architects LLC



02/05/2010

## SECTION 08710 - DOOR HARDWARE

### 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. Commercial door hardware for the following:
  - a. Swinging doors.
  - b. Other doors to the extent indicated.
- 2. Cylinders for doors specified in other Sections.
- 3. Electrified door hardware.

- B. Related Sections include the following:

- 1. Division 8 Section "Standard Steel Doors and Frames" for door silencers provided as part of hollow-metal frames.
- 2. Division 8 Section "Flush Wood Doors" for astragals and integral intumescent seals provided as part of fire-rated labeled assemblies.
- 3. Division 8 Section "Aluminum-Framed Entrances and Storefronts" for entrance door hardware, including cylinders.
- 4. Division 13 Section "Security Access" for access control devices installed at door openings and provided as part of a security access system.
- 5. Division 13 Section "Fire Alarm" for connections to building fire alarm system.
- 6. Division 16 Sections for connections to electrical power system and for low-voltage wiring work.

- C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

- 1. Pivots, thresholds, weather stripping and cylinders for locks specified in other Sections.
- 2. Permanent cores to be installed by Owner.

#### 1.3 SUBMITTALS

- A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

- B. Samples for Initial Selection: For each finish, color, and texture required for each type of door hardware indicated.
- C. Samples for Verification: For exposed door hardware of each type, in specified finish, full size. Tag with full description for coordination with the door hardware sets. Submit Samples before, or concurrent with, submission of the final door hardware sets.
  - 1. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.
- D. Qualification Data: For Installer.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for locks, latches, delayed-egress locks and closers.
- F. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.
- G. Warranty: Special warranty specified in this Section.
- H. Other Action Submittals:
  - 1. Door Hardware Sets: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
    - a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
    - b. Content: Include the following information:
      - 1) Identification number, location, hand, fire rating, and material of each door and frame.
      - 2) Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
      - 3) Complete designations of every item required for each door or opening including name and manufacturer.
      - 4) Fastenings and other pertinent information.
      - 5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
      - 6) Explanation of abbreviations, symbols, and codes contained in schedule.
      - 7) Mounting locations for door hardware.
      - 8) Door and frame sizes and materials.
      - 9) Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
    - a) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.

- 10) List of related door devices specified in other Sections for each door and frame.
  - c. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.
  - d. Submittal Sequence: Submit initial draft of final schedule along with essential Product Data to facilitate the fabrication of other work that is critical in Project construction schedule. Submit the final door hardware sets after Samples, Product Data, coordination with Shop Drawings of other work, delivery schedules, and similar information has been completed and accepted.
2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.
  1. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
  2. Installer shall have warehousing facilities in Project's vicinity.
  3. Scheduling Responsibility: Preparation of door hardware and keying schedules.
  4. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
  1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
  1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches (1016 mm) or less above the sill.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

## 1.6 COORDINATION

- A. Coordinate layout and installation of recessed pivots and closers with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 3.
- B. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Existing Openings: Where new hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide for proper operation.

## 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including excessive deflection, cracking, or breakage.
    - b. Faulty operation of operators and door hardware.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
  - 2. Warranty Period: Three years from date of Substantial Completion, except as follows:
    - a. Exit Devices: Two years from date of Substantial Completion.
    - b. Manual Closers: 10 years from date of Substantial Completion.

## 1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Maintenance Service: Beginning at Substantial Completion, provide **six** months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies same as those used in the manufacture and installation of original products.

## PART 2 - PRODUCTS

### 2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated in Part 3 "Door Hardware Sets" Article.
  - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article. Products are identified by using door hardware designations, as follows:
  - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Sets" Article.
- C. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
  - 2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

### 2.2 HINGES, GENERAL

- A. Quantity: Provide the following, unless otherwise indicated:
  - 1. Two Hinges: For doors with heights up to 60 inches (1524 mm).
  - 2. Three Hinges: For doors with heights 61 to 90 inches (1549 to 2286 mm).
  - 3. Four Hinges: For doors with heights 91 to 120 inches (2311 to 3048 mm).
  - 4. For doors with heights more than 120 inches (3048 mm), provide 4 hinges, plus 1 hinge for every 30 inches (750 mm) of door height greater than 120 inches (3048 mm).

- B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- C. Hinge Weight: Unless otherwise indicated, provide the following:
  - 1. Entrance Doors: Heavy-weight hinges.
  - 2. Doors with Closers: Antifriction-bearing hinges.
  - 3. Interior Doors: Standard-weight hinges.
- D. Hinge Base Metal: Unless otherwise indicated, provide the following:
  - 1. Exterior Hinges: Stainless steel, with stainless-steel pin.
  - 2. Interior Hinges: Stainless steel, with stainless-steel pin.
  - 3. Hinges for Fire-Rated Assemblies: Stainless steel, with stainless-steel pin.
- E. Fasteners: Comply with the following:
  - 1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
  - 2. Wood Screws: For wood doors and frames.
  - 3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
  - 4. Screws: Phillips flat-head; Finish screw heads to match surface of hinges.

## 2.3 HINGES

- A. Butts and Hinges: BHMA A156.1. Listed under Category A in BHMA's "Certified Product Directory."
- B. Template Hinge Dimensions: BHMA A156.7.
- C. Available Manufacturers:
  - 1. Baldwin Hardware Corporation (BH).
  - 2. Hager Companies (HAG).
  - 3. Stanley Commercial Hardware; Div. of The Stanley Works (STH).

## 2.4 LOCKS AND LATCHES, GENERAL

- A. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." And FED-STD-795, "Uniform Federal Accessibility Standards."
  - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22 N).
- B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf (67 N) to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

- C. Lock Trim:
  - 1. Levers: Wrought stainless steel.
  - 2. Escutcheons (Roses): Wrought stainless steel.
  - 3. Dummy Trim: Match lever lock trim and escutcheons.
  - 4. Lockset Designs: Hagar Companies, Inc. Whitnell Design or, if sets are provided by another manufacturer, provide designs that match those designated.
  
- D. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
  - 1. Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.
  - 2. Mortise Locks: Minimum 3/4-inch (19-mm) latchbolt throw.
  - 3. Deadbolts: Minimum 1-inch (25-mm) bolt throw.
  
- E. Rabbeted Meeting Doors: Provide special rabbeted front and strike on locksets for rabbeted meeting stiles.
  
- F. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.
  
- G. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:
  - 1. Strikes for Bored Locks and Latches: BHMA A156.2.
  - 2. Strikes for Mortise Locks and Latches: BHMA A156.13.
  - 3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
  - 4. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
  - 5. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.

## 2.5 EXIT DEVICES

- A. Exit Devices: BHMA A156.3, Grade 1 unless Grade 2 is indicated.
  
- B. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." and FED-STD-795, "Uniform Federal Accessibility Standards."
  - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22 N).
  
- C. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 lbf (67 N) to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.
  
- D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

- E. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.
- F. Available Manufacturers:
  - 1. Adams Rite Manufacturing Co. (ARM).
  - 2. Arrow USA; an ASSA ABLOY Group company (ARW).
  - 3. Cal-Royal Products, Inc. (CRP).
  - 4. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company (CR).
  - 5. Detex Corporation (DTX).
  - 6. Door Controls International (DCI).
  - 7. DORMA Architectural Hardware; Member of The DORMA Group North America (DAH).
  - 8. Dor-O-Matic; an Ingersoll-Rand Company (DOR).
  - 9. Locknetics; an Ingersoll-Rand Company (LSE).
  - 10. Monarch Exit Devices & Door Hardware; an Ingersoll-Rand Company (MON).
  - 11. Precision Hardware, Inc. (PH).
  - 12. Rutherford Controls Int'l. Corp. (RCI).
  - 13. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
  - 14. Von Duprin; an Ingersoll-Rand Company (VD).
  - 15. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YAL).

## 2.6 LOCK CYLINDERS

- A. Standard Lock Cylinders: BHMA A156.5, Grade 2.
- B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
  - 1. Number of Pins: Six.
  - 2. Bored-Lock Type: Cylinders with tailpieces to suit locks.
- C. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
  - 1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- D. Construction Keying: Comply with the following:
  - 1. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.
    - a. Replace construction cores with permanent cores as directed by Owner.
- E. Manufacturer: Same manufacturer as for locks and latches.
- F. Available Manufacturers:

1. ABLOY Security, Inc.; an ASSA ABLOY Group company (ABL).
2. Arrow USA; an ASSA ABLOY Group company (ARW).
3. ASSA, Inc.; an ASSA ABLOY Group company (ASA).
4. Best Access Systems; Div. of The Stanley Works (BAS).
5. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company (CR).
6. Falcon Lock; an Ingersoll-Rand Company (FAL).
7. Medeco Security Locks, Inc.; an ASSA ABLOY Group company (MED).
8. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
9. Schlage Commercial Lock Division; an Ingersoll-Rand Company (SCH).
10. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YAL).
11. Hagar Companies, Inc. (HAG).

## 2.7 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:
- B. Keys: Nickel silver.
  1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
    - a. Notation: **"DO NOT DUPLICATE."**
  2. Quantity: In addition to one extra key blank for each lock, provide the following:
    - a. Cylinder Change Keys: Three.
    - b. Master Keys: Five.

## 2.8 OPERATING TRIM

- A. Standard: BHMA A156.6.
- B. Materials: Fabricate from stainless steel, unless otherwise indicated.
- C. Available Manufacturers:
  1. Burns Manufacturing Incorporated (BM).
  2. Don-Jo Mfg., Inc. (DJO).
  3. Forms + Surfaces (FS).
  4. Hager Companies (HAG).
  5. Hiawatha, Inc. (HIA).
  6. IVES Hardware; an Ingersoll-Rand Company (IVS).
  7. Rockwood Manufacturing Company (RM).
  8. Trimco (TBM).

## 2.9 CLOSERS

- A. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)" and FED-STD-795, "Uniform Federal Accessibility Standards."
  - 1. Comply with the following maximum opening-force requirements:
    - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
    - b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
- B. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.
- C. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
- D. Surface Closers: BHMA A156.4 Grade 1 unless Grade 2 is indicated. Listed under Category C in BHMA's "Certified Product Directory." Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.
  - 1. Available Manufacturers:
    - a. Arrow USA; an ASSA ABLOY Group company (ARW).
    - b. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company (CR).
    - c. DORMA Architectural Hardware; Member of The DORMA Group North America (DAH).
    - d. Dor-O-Matic; an Ingersoll-Rand Company (DOR).
    - e. LCN Closers; an Ingersoll-Rand Company (LCN).
    - f. Norton Door Controls; an ASSA ABLOY Group company (NDC).
    - g. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RIX).
    - h. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
    - i. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YAL).
    - j. Hagar Companies, Inc. (HAG).

## 2.10 PROTECTIVE TRIM UNITS

- A. Size: 1-1/2 inches (38 mm) less than door width on push side and 1/2 inch (13 mm) less than door width on pull side, by height specified in door hardware sets, unless otherwise indicated.
- B. Fasteners: Manufacturer's standard machine or self-tapping screws.

C. Metal Protective Trim Units: BHMA A156.6; beveled top and 2 sides; fabricated from material indicated in door hardware sets.

1. Available Manufacturers:

- a. American Floor Products Co., Inc. (AFP).
- b. Baldwin Hardware Corporation (BH).
- c. Burns Manufacturing Incorporated (BM).
- d. Don-Jo Mfg., Inc. (DJO).
- e. Hager Companies (HAG).
- f. Hiawatha, Inc. (HIA).
- g. IPC Door and Wall Protection Systems, Inc.; Div. of InPro Corporation (IPC).
- h. IVES Hardware; an Ingersoll-Rand Company (IVS).
- i. Pawling Corporation (PAW).
- j. Rockwood Manufacturing Company (RM).
- k. Trimco (TBM).

## 2.11 STOPS AND HOLDERS

A. Stops and Bumpers: BHMA A156.16 Grade 1 unless Grade 2 is indicated.

1. Provide floor stops for doors unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.

B. Silencers for Metal Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum diameter 1/2 inch (13 mm); fabricated for drilled-in application to frame.

C. Available Manufacturers:

1. Architectural Builders Hardware Mfg., Inc. (ABH).
2. Baldwin Hardware Corporation (BH).
3. Hager Companies (HAG).
4. Stanley Commercial Hardware; Div. of The Stanley Works (STH).

## 2.12 DOOR GASKETING

A. Standard: BHMA A156.22.

B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

- C. Air Leakage: Not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.
- D. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- E. Gasketing Materials: ASTM D 2000 and AAMA 701/702.
- F. Available Manufacturers:
  1. Hager Companies (HAG).
  2. M-D Building Products, Inc. (MD).
  3. National Guard Products (NGP).
  4. Pemko Manufacturing Co. (PEM).
  5. Reese Enterprises (RE).
  6. Sealeze; a unit of Jason Incorporated (SEL).
  7. Zero International (ZRO).

## 2.13 THRESHOLDS

- A. Standard: BHMA A156.21.
- B. Accessibility Requirements: Where thresholds are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." and FED-STD-795, "Uniform Federal Accessibility Standards."
  1. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
- C. Thresholds for Means of Egress Doors: Comply with NFPA 101. Maximum 1/2 inch (13 mm) high.
- D. Available Manufacturers:
  1. Hager Companies (HAG).
  2. M-D Building Products, Inc. (MD).
  3. National Guard Products (NGP).
  4. Pemko Manufacturing Co. (PEM).
  5. Reese Enterprises (RE).
  6. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RIX).
  7. Sealeze; a unit of Jason Incorporated (SEL).
  8. Zero International (ZRO).

## 2.14 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.
- C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
  2. Steel Machine or Wood Screws: For the following fire-rated applications:
    - a. Mortise hinges to doors.
    - b. Strike plates to frames.
    - c. Closers to doors and frames.
  3. Steel Through Bolts: For the following fire-rated applications unless door blocking is provided:
    - a. Surface hinges to doors.
    - b. Closers to doors and frames.
    - c. Surface-mounted exit devices.
  4. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
  5. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

## 2.15 FINISHES

- A. Standard: BHMA A156.18, as indicated in door hardware sets.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Steel Doors and Frames: Comply with DHI A115 Series.
  - 1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.
- B. Wood Doors: Comply with DHI A115-W Series.

### 3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
  - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.

- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

### 3.4 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
  - 1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

### 3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.
- B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

### 3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

### 3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 1 Section "Demonstration and Training."

### 3.8 DOOR HARDWARE SETS

#### Door Hardware Set No. 1 (Office)

Door No. 204,220a,222,224,227-240,242,249,251-253; each to have the following:

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Model #1191 (4 ½"x4 ½")	Hagar Companies	US26D
[1]	Operating Trim	Model #93k7AB-15D-S3-626	Best	US26D
[1]	Stops and Holders	Model #236W	Hagar Companies	US26D

#### Door Hardware Set No. 2 (Bathroom)

Door No. 214,215,247,248; each to have the following:

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Model #1191 (4 ½"x4 ½")	Hagar Companies	US26D
[1 ea.]	Operating Trim	Pull Plate Model #102G (4"x16")	Hagar Companies	US26D
		Push Plate Model #100T (4"x16")	Hagar Companies	US26D
[1]	Closing Devices	Model #5200 PAR 25 US26D HD SLC with DLY	Hagar Companies	US26D
[2]	Protective Trim Units	Kick Plate Model # 193S	Hagar Companies	US26D
[1]	Stops and Holders	Model #236W	Hagar Companies	US26D
[1]	Signage	368M or 368W	Hagar Companies	B/W

#### Door Hardware Set No. 3 (Passage)

Door No. 203,205,207-209,211,213,218,220b,221,225,226,241,243-246,250; each to have the following:

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Model #1191 (4 ½"x4 ½")	Hagar Companies	US26D
[1]	Operating Trim	Model #93KON-15D-S3-626	Best	US26D
[1]	Stops and Holders	Model #236W	Hagar Companies	US26D

Door Hardware Set No. 4 (Entry-Aluminum Storefront)

Door No. 201,202; each to have the following:

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Model #1191 (4 1/2"x4 1/2")	Hagar Companies	US26D
[2]	Operating Trim / Exit Device	Model #4501 SVR 0 36" US19 1 3/4" Trim: 45 CE WTN US19 1 3/4"	Hagar Companies	US19
[1]	Automatic Operator	SW100	Besam	Bronze
	Weather Stripping	Manufacturer's Standard		
[2]	Door Sweeps	Manufacturer's Standard		
[1]	Threshold	Manufacturer's ADA Standard		

Door Hardware Set No. 5 (Entry – Insulated Steel)

Door No. 206,219; each to have the following:

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Model #1191 (4 1/2"x4 1/2")	Hagar Companies	US26D
[1]	Operating Trim / Exit Device	Model #4501 SVR 0 36" US26D 1 3/4" Trim: 45 CE WTN US26D 1 3/4"	Hagar Companies	US26D
[1]	Closing Devices	Model #5200 PAR 25 US26D HD SLC with DLY	Hagar Companies	US26D
	Weather Stripping	785S	Hagar Companies	
[1]	Door Sweep	806S	Hagar Companies	MIL.
[1]	Threshold	Model #403s	Hagar Companies	MIL.

Door Hardware Set No. 6 (Exit)

Door No. 212,255; each to have the following:

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Model #1191 (4 1/2"x4 1/2")	Hagar Companies	US26D
[1]	Operating Trim / Exit Device	Model #4501 SVR F 36" US26D 1 3/4" Trim: 45 BE WTN US26D 1 3/4"	Hagar Companies	US26D
[1]	Closing Devices	Model #5200 PAR 25 US26D HD SLC with DLY	Hagar Companies	US26D

Door Hardware Set No. 7 (Bath)

Door No. 216,217; each to have the following:

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Model #1191 (4 1/2"x4 1/2")	Hagar Companies	US26D
[1]	Operating Trim	Model #93KOL-15D-S3-626	Best	US26D
[1]	Stops and Holders	Model #236W	Hagar Companies	US26D
[1]	Closing Devices	Model #5200 PAR 25 US26D HD SLC with DLY	Hagar Companies	US26D

Door Hardware Set No. 8 (Passage)

Door No. 210 to have the following:

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Model #1191 (4 1/2"x4 1/2")	Hagar Companies	US26D
[1]	Operating Trim	Model #93KON-15D-S3-626	Best	US26D
[1]	Closing Device	Model #5200 PAR 25 US26D HD SLC with DLY	Hagar Companies	US26D

Door Hardware Set No. 9 (Exit)

Door No. 254; to have the following:

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Model #1191 (4 1/2"x4 1/2")	Hagar Companies	US26D
[2]	Operating Trim / Exit Device	Model #4501 RIM F 36" US26D 1 3/4" Trim: 45 BE WTN US26D 1 3/4"	Hagar Companies	US26D
[2]	Closing Devices	Model #5200 PAR 25 US26D HD SLC with DLY	Hagar Companies	US26D
[1]	Gravity Coordinator	Model # 298D	Hagar Companies	US26D

END OF SECTION 08710

## Temperature Control clarification:

3.1 The control system shall be Honeywell Invensys(similar to Central Office System) and have the capability of performing the following functions:

1. Anticipatory Start-Up Program;

The anticipatory start-up time of assigned equipment shall be determined based on a software calculation which takes into consideration outdoor air conditions, space conditions and building R factor. All zones and their associated control shall be capable of being controlled by their own unique anticipatory start up program.

The software program shall be capable of precisely determining the ideal start-up time in the heating and cooling season. Each zone being controlled shall have its own unique set of variables, such as temperature, occupancy time and actual start time.

The anticipatory start-up program shall control the start-up of the cooling and heating equipment to achieve the individual zone's target occupancy space temperature at the precise time of building occupancy, plus or minus fifteen minutes.

By use of the keyboard, Internet, facility LAN/WAN, and, telephone modem the system operator shall have the ability to program the occupancy time and temperature for each zone to be controlled.

A unique built-in "learning" technique shall allow the CONTROL system to automatically adjust itself to the most efficient time to start equipment in order to achieve the desired occupancy target temperature. Each temperature control zone being controlled shall have its own "smart" start-up table.

Programs that do not have unique individual temperature control zone anticipatory capability are unacceptable and shall be rejected. The CONTROL system shall also have the capability of using the average recovery time. This option shall be system operator selected for each unit.

The system operator shall be able to establish a maximum recovery time for either individual temperature control zones or the entire facility. Should a zone fail to recover the

CONTROL system shall enter the alarm status and inform the system operator of the failure of the zone to recover and save all applicable zone data related to recovery.

2. Time Control Program;

The CONTROL system shall provide automatic start-up and/or shutdown of selected remote equipment designated by the Owner and automatic adjustment of the setpoint data according to preset schedules stored in the computer. The CONTROL system shall have the capability of having each control point have its own unique start-up and/or shutdown program.

The timing program shall operate in accordance with a seven-day calendar and a yearly calendar with automatic adjustment for daylight savings time and leap year when applicable.

The time control program shall incorporate holiday scheduling capability with holiday scheduling with up to twelve months in advance and shall be capable of a minimum of twenty-five holidays per year.

The time control program shall have the capability of changing setpoints such as temperatures based upon time and have minimums of two setpoint temperatures for each control point. The scheduling for the setpoint shall be unique for each day of the week.

The system operator shall be capable of reading and/or changing all stored setpoints pertaining to time-of-day, day-of-the-week, on/off time, setpoint values and holiday scheduling.

3. Electrical Demand Limiting;

The CONTROL system shall be capable of monitoring and limiting the electrical demand.

4. Temperature Control;

The CONTROL systems shall perform temperature control on the specified building mechanical equipment based upon the adjustable temperature setpoint transmitter located on each zone temperature sensor or four system operator programmable temperatures.

The temperature setpoint transmitter shall be adjustable by the zone occupant and calibrated in degrees Fahrenheit from 65° to

80°. This temperature setpoint will only be used during the occupied period of the zone. Should a temperature control zone serve two or more areas or rooms, each area or room shall have one temperature sensor and setpoint transmitter. Each temperature control zone with more than one setpoint transmitter shall be averaged with the other setpoint transmitter in the common temperature control zone. The averaging shall be performed on a weighted averaging basis. The system operator shall have the capability at the CONTROL system computer of assigning a weight from zero to five to each zone setpoint transmitter to be averaged. If no weight is assigned to a setpoint transmitter by the system operator, the CONTROL system computer shall default the weight assigned to the setpoint transmitter to one. The CONTROL system software shall multiply each setpoint by its assigned weight. The product of each setpoint's weight and temperature shall be summed and divided by the sum of the setpoint's weights to obtain an equivalent weighted average setpoint temperature. These averaged temperatures shall be used by the CONTROL system as the temperature and setpoint temperature for the entire zone for control purposes.

Using the central computer, the system operator shall have the capability of restricting the setting of the temperature setpoint transmitter to a limited range, override the setpoint to a fixed value within the adjustable range or ignore the single temperature setpoint and use the four system operator programmable temperatures as follows:

1. Cooling occupied temperatures;
2. Cooling unoccupied temperatures;
3. Heating unoccupied temperatures;
4. Heating occupied temperatures.

Each temperature control zone shall have its own discrete set of occupied and unoccupied temperatures separate and distinct from all other zones. The CONTROL system shall not allow inversion of the heating and cooling temperatures. The CONTROL system shall restrict the value of the four temperatures that the system operator may set to occupied between 65° and 78° and unoccupied between 50° and 90°, with default values of occupied cooling temperature to 74°, unoccupied cooling to 90°, unoccupied heat to 55° and occupied heat to 72°. The CONTROL system shall not allow the system operator to set the cooling

occupied and heating occupied temperature closer than 2° of each other and the cooling unoccupied and heating unoccupied temperatures closer than 15° of each other.

The CONTROL system computer shall sense the zone temperatures using the serial data buss hardware system and compare the zone temperatures with the current target temperature located in the computer software. Based upon the target temperature and the actual zone temperature, the computer shall command the heating and air-conditioning equipment to satisfy the target temperature. The commands shall be sent over the CONTROL system serial data buss to the serial hardware module connected to the mechanical heating and air conditioning equipment. The current zone temperature, target temperatures, and mechanical equipment status related to the zone shall be displayed on the video screen at the CONTROL system computer. Said display shall be automatically updated to indicate the correct status of all zone temperatures and equipment.

The CONTROL system temperature control program shall establish a priority zone for any boiler heat and system control and operation as referred to in these specifications as follows:

1. Any heat zone during night setback that will not maintain the night setback setpoint within a system operator settable temperature above or below the night setback temperature of between 5° and 10° with a default difference of 8° for at least a system operator settable time of ten to thirty minutes with a default time of thirty minutes;
  2. Any heat zone during occupied time that will not maintain the occupied setpoint within a system operator settable temperature below the occupied temperature of between 4° and 8° with a default difference of 6° and at least below 68° for the heating temperature for at least a system operator settable time of ten to thirty minutes with a default time of fifteen minutes;
  3. Specific or groups of temperature control zones for night setback override purposes as set at the CONTROL system computer by the system operator.
5. Holiday Scheduling;

The CONTROL system shall be capable of modifying programming schedules and temperature based upon holidays throughout the year. The CONTROL system shall be capable of observing a minimum of twenty-five holidays each year. The holidays shall be of two types. The first is a temporary holiday and when this holiday has been passed the computer will automatically delete the holiday from the holiday scheduling. The second is a permanent holiday and the holiday will always be remembered by the CONTROL system until such time as the holiday is deleted by the system operator.

#### 6. Alarm Report;

The CONTROL system shall be capable of sensing and reporting various alarms as defined by these specifications. The alarms shall be any combination of high/low temperature, high/low pressure, unauthorized intrusion, equipment failure, and other alarm conditions that maybe designated appropriate by the engineer. Said alarm shall be visually prompted at the CONTROL system video screen, sound an on/off-site audio alarm, be capable of dialing and communicating with a remote computer, cellular telephone and/or pager through the facility LAN/WAN, Internet and the telephone modem.

The system operator shall set the type, category and class of the alarm that can initiate the remote call. The system operator shall be able to interrogate the CONTROL system computer at the keyboard, over the facility LAN/WAN, over the Internet and over the telephone modem to determine the type, nature and time of occurrence of any and all alarms. Once the system operator has recognized the alarm, the system operator may terminate the alarm condition and the video indication of the alarm condition shall remain. The termination of the alarm condition shall not disable the automatic reporting of any new alarm condition.

The alarm reporting through the telephone modem telephone interface shall be capable of dialing up to ten predetermined emergency telephone numbers, as entered by the system operator. The CONTROL system computer shall dial each telephone number in the order as designated by the system operator. If the telephone number called has computer modem capabilities, but is normally a voice phone number, each number shall be called twice. The first call from the CONTROL system shall give a tone signal to the called party. After disconnecting, the CONTROL system shall wait five minutes and repeat the call. During this second call the CONTROL system shall search for a

computer modem at the called parties location. If the CONTROL system is successful in connecting with the remote modem/computer, the CONTROL system shall communicate the category, class and time of occurrence of the alarm. If communication cannot be established with the remote modem/computer, the CONTROL system shall immediately call the next party on the call list and repeat the above sequence. If the computer reaches the last number to be dialed without receiving an acknowledgment, then the computer shall reset to the beginning of the order and continue dialing until the alarm condition has been acknowledged by the called party. The password assigned to the acknowledging the computer shall retain party and the time of acknowledgment.

The Bidder shall maintain a twenty four hour a day and seven day of the week engineer on duty program. Such program shall include the capability to receive emergency calls from installed CONTROL systems. Should the Owner's CONTROL system detect an alarm and be unable to contact designated Owner's representatives, the CONTROL system shall notify the Bidders engineer-on-duty. Such notification shall include the location, time, date and nature of the alarm responsible for the notification. The Bidder shall not charge an access fee for the engineer-on-duty services, but will charge his normal hourly service fee with billing in 15-minute increments and minimum fee of 15 minutes. Bidders without such existing engineer on duty program shall be disqualified.

#### **4.0 HEAT PUMP LOOP CIRCULATING PUMPS, WATER SOURCE HEAT PUMPS, BOILER AND COOLING TOWER SYSTEM CONTROL**

4.1 The CONTROL system shall sense the following conditions for the heat pump loop, boiler and cooling tower system.

1. Heat pump loop supply and return water temperature;
2. Water source heat pump supply and return water pressure and temperature.
3. Boiler vessel temperature;
4. Cooling tower sump water temperature;
5. Boiler supply and return water temperature;

6. Cooling tower supply and return water temperature;
7. Circulating pump operation
8. Cooling tower fan percentage of operation for fan motors with variable frequency drives.
9. Cooling tower sump level.

4.2 The CONTROL system shall provide both numerical and graphical histories of the temperatures and conditions described in these specifications. Said histories shall be every ten minutes for the past twenty-four hours, hourly for the past seven days and on a four-hour basis for the past thirty days.

4.3 The CONTROL system shall allow the heat pump water loop system to operate if the required minimum water loop load of water loop compressors for heat pump water loop operation are calling for heating and cooling. The minimum operating load of heat pump water loop compressors shall be settable by the system operator between 50,000 BTU and 200,000 BTU of combined loop heating and cooling load. If the system operator fails to set the minimum heat pump water loop load, the CONTROL system shall default to a minimum heat pump water loop load of 100,000 BTU. In addition to the minimum heat pump water loop load, should a priority zone compressor, as established by these specifications, generate a call for heat or cool, the CONTROL system shall operate the heat pump water loop as if the minimum heat pump loop load has been established. When the heat pump water loop system is active all heat pump and refrigeration units calling for heating or cooling shall operate regardless if the unit was responsible for initiation of the heat pump water loop activation.

Once operating the heat pump water loop system shall remain operating until only the heat pump water loop load has dropped below the required heat pump water loop load set to terminate the heat pump water loop system operation. The heat pump water loop load required to terminate the heat pump water loop system operation shall be system operator settable between 12,000 BTU and 100,000 BTU. The CONTROL system shall restrict the value of the heat pump water loop load termination setting to no greater than 75% of the minimum heat pump water loop load necessary for initiation of operation. The last heat pump water loop load set by the system operator shall have priority.

If the last heat pump water loop load set by the system operator violates the operation and termination load separation, the load setpoint not set shall automatically be adjusted by the CONTROL system to conform to the separation requirements. The CONTROL system shall notify the system operation of this automatic operation.

Should the operation of the heat pump water loop system be initiated by a priority zone compressor, the heat pump water loop shall terminate its operation at the termination of the call for heat or cooling from the priority zone compressor, as long as the required heat pump water loop load set to terminate the heat pump water loop system operation has been met.

- 4.4 The system operator can designate a primary circulating pump or pumps. If not, the system operator sets the minimum number of pumps required to operate and the CONTROL system shall alternate the operation of the circulating pumps based on accumulated running hours settable between 50 and 1000 hours with a default of 100 hours. If the operating circulating pump fails to respond properly to the CONTROL system's commands, the CONTROL system shall turn the circulating pump "off", turn "on" the standby circulating pump and enter the alarm mode as defined in these specifications. Such failure shall terminated the run time alternating of the pumps until such time that the failure has been cleared by the operator at the CONTROL system. The operation of the circulating pumps shall lead and lag the operation of the heat pump and refrigeration compressors, boiler and cooling tower by an adjustable time of between 1 and 5 minutes, with a default time of 1 minute.
- 4.5 The CONTROL system shall allow the boiler system to operate if the heat pump water loop system is active and a call for heat pump water loop heat is established. When the boiler system is operating the boilers shall be cycled as directed by the engineer to maintain a system operator settable heat pump loop supply water temperature. The system operator shall be able to set the boiler heating heat pump loop supply water temperature between 60° and 80°. The system operator shall be able to set two heating heat pump loop supply temperatures. The first temperature shall be used during heat pump occupied times and the second temperature used during night setback recovery. The heating night setback recovery loop temperature shall be automatically restricted by the CONTROL system to a value equal to or greater than the occupied heat pump water loop heating temperature. If the system operator does not set a loop night setback recovery heating temperature, this temperature shall

revert to the heat pump water loop occupied heating temperature. If the system operator does not set the heat pump water loop occupied heating temperature the CONTROL system shall use a default temperature of 60°.

During heat pump water loop boiler system operation, the CONTROL system shall automatically close the valves to the cooling tower to prevent heat loss. After heat pump water loop system operation, the cooling tower and boiler valves shall remain in the last valve position.

- 4.6 The CONTROL system shall allow the cooling tower system to operate if the heat pump water loop system is active and a call for heat pump water loop cooling is established. When the cooling tower is operating it shall maintain a system operator settable cooling heat pump water loop supply water temperature. The system operator shall be able to set the cooling tower heat pump loop cooling supply water temperature between 80° and 100°. If the system operator does not set the cooling heat pump water loop supply temperature, the CONTROL system shall use a default temperature of 90°.

The CONTROL system shall restrict the heating and cooling heat pump water loop supply temperature to a minimum separation of 10°. Should the system operator set either the heating or cooling temperature closer than the 10° separation, the CONTROL system shall automatically change the heat pump water loop supply temperature not set by the system operator to observe the 10° separation. The CONTROL system shall notify the system operation of this automatic operation.

On a call for heat pump water loop cooling tower cooling, the CONTROL system shall sequence the cooling tower and related equipment to maintain the cooling heat pump water loop supply temperature as follows:

1. Cooling tower damper "open";
2. Cooling tower sump pump "on";
3. Cooling tower fan "on".

The cooling tower sump water level and temperature shall be controlled by the CONTROL system. The CONTROL system shall use a solid state sensor to sense the level of the cooling tower water level. The level of the water shall be controlled to eliminate over flowing caused by termination of the cooling

tower sump pump. The solid state system shall cycle the cooling tower make-up water fill valve to meet these requirements. Said make-up water valve shall be provided by the control contractor and installed by the owner. The existing mechanical fill valve shall remain as a safety should the electric fill valve fail.

Tower fans with variable frequency drives shall be controlled by the CONTROL system to maintain the water loop temperature.

If the sump is drained or the level sensor is reading empty, the sump pump shall not be turned "on" and the tower fan shall run.

- 4.7 Should the water loop lower and upper setpoints not be maintainable due to boiler or tower operation, the CONTROL system shall initiate temperature based demand limiting. Said demand limiting shall be identical to temperature based electric demand limiting except the controlling feature shall be the water loop temperature. The CONTROL system shall turn off the heat pump compressors closest to their setpoints responsible for the water loop temperature extreme. As with temperature based demand limiting, the loop temperature heat pump load demand limiting shall be dynamic not requiring CONTROL system operator intervention.
- 4.8 The CONTROL system hardware and software shall replace the complete heat pump water loop control systems, except high voltage controls and contactors, water valves and equipment safeties.

## **5.0 WATER LOOP HEAT PUMP UNITS**

- 5.1 The CONTROL system shall individually sense the temperature in each of the water loop heat pump zones or classroom with at least one sensor for every 1000 square feet of zone floor area. Each zone with more than one zone sensor shall be averaged with the other sensors in the common zone. The averaging shall be performed on a weighted averaging basis. The system operator shall have the capability at the CONTROL system computer of assigning a weight from zero to five to each zone sensor to be averaged. Said averaging shall be done as a weighted average as described in subsection 3.1.4 of these specifications. This temperature shall be used by the CONTROL system as the existing temperature for the entire zone for control purposes.

Unless otherwise specified each zone temperature sensor shall be equipped with an adjustable temperature transmitter. The CONTROL system shall read the temperature set on the transmitter. The system operator shall have the ability to restrict the temperature range of the temperature transmitter or ignore it completely and use the four temperatures set at the CONTROL system central computer as provided for in these specifications.

If a unit serves more than one area, each area shall be equipped with a temperature sensor. With a unit that has more than one area, the temperature sensors and temperature setpoint transmitters shall be averaged. Said averaging shall be done as a weighted average as described in subsection 3.1.4 of these specifications and shall be both the zone temperature and setpoint temperature for the heat pump zone. Said weighted average temperature shall be used for control purpose by the CONTROL system to control the operation of the common heat pump system. The sensors shall be used by the CONTROL system to perform the following control of the heat pump system.

- 5.2 The CONTROL system shall replace the controller controlling each heat pump. Also, the existing discharge air and water out sensors shall be replaced. The CONTROL system shall accept inputs currently connected to the existing controller including but not limited to new discharge water temperature, new discharge air temperature, new return air temperature, new CO<sub>2</sub> sensor, existing low freon suction limit temperature, existing high freon supply limit pressure and existing condenser overflow.
- 5.3 The CONTROL system shall provide both numerical and graphical histories of the temperatures and conditions described in these specifications. Said histories shall be every ten minutes for the past seven days, hourly for the past thirty days and on a four-hour basis for the past ninety days.
- 5.4 The CONTROL system shall directly control the heat pump supply fan, compressor/condenser and reversing valve to provide the proper temperature control to the zone as provided for in these specifications.
- 5.5 The air handler for the heat pump units shall have the capability of running continuously during the occupied period or being turned "on" only when a call for heating or cooling exists. This is selectable at the CONTROL system central computer. If intermittent or automatic operation is selected,

the air handler fan shall cycle "on" with the call for heating or cooling and at the termination of the call for heating or cooling lag "off" by one minute. Should the system operator select the continuous operation of the fans, fans shall run continuously during the occupied period. During the occupied mode, if the override button on the zone temperature sensor is pressed and held for thirty seconds, the fan shall toggle to and from the continuous and intermittent mode.

- 5.6 On a call for heat, the CONTROL system shall turn "on" the heat pump air handler fan, if in the intermittent mode, open the fresh air damper, if applicable, and turn "on" the heat pump compressor. Should the heat pump damper be controlled by an existing damper CO<sub>2</sub> sensor, the sensor shall be replaced by a digital CO<sub>2</sub> sensor and the damper opened on a call for heat or cooling if the CO<sub>2</sub> level exceeds a default value of 1000 parts per million. The CO<sub>2</sub> levels shall be settable at the CONTROL system computer. A call for heat from the heat pump zone will only be recognized by the CONTROL system if sufficient heating and cooling load as defined by these specifications exist in the water loop heat pump system.

If the heat pump compressor system consists of more than one stage, the CONTROL system shall stage the compressor system to maintain a system operator entered supply air temperature. The compressors shall observe minimum "off" times of 5 minutes, staging times of 2 minutes and minimum "on" times of 2 minutes. Said times shall be contained in the CONTROL system computer and shall be changeable with the entry of a special password.

The heat pump unit shall be turned "on" 2° below the heat setpoint temperature and remain "on" until the zone temperature rises to the heat setpoint temperature, unless the call for heat is terminated by the load on the water loop heat pump system falling below the load necessary to allow heat pump operation or are turned "off" by the CONTROL system electric or water loop temperature demand limiting programs.

- 5.7 The CONTROL system hardware and software shall replace the complete heat pump and preheater unit control systems, except sensors as defined in Section 3.0, high voltage contactors, water valves and equipment safeties.

- 5.9 The heat pumps shall be physically interlocked by hard electrical wiring and not electronic or software interlock with the water loop circulating system. Should the water loop pumps fail to

maintain minimum circulation the heat pumps shall be turned off.

## **6.0 FRESH AIR/EXHAUST AIR SYSTEMS**

6.1 The CONTROL system shall provide a digital "run" - "off" signal to the internal automation of the Fresh Air/Exhaust Air System. The schedule of operation of the Fresh Air/Exhaust Air System shall be tied to the normal operating schedule of the water loop heat pump systems. Should the CO2 level in the fresh air system area exceed a user settable level with a default of 1000 parts per million, and the other conditions call for operation, the fresh air system serving the area shall run. The system operator shall be able to set a minimum number of heat pumps scheduled "on" to allow the Fresh Air/Exhaust Air System to operate. Also, the system operator shall have the capability of providing a separate schedule of operation for the Fresh Air/Exhaust Air Systems independent of the water loop heat pump systems.

6.2 The CONTROL system shall monitor the operation of the Fresh Air/Exhaust Air System including the following:

1. Fresh air input temperature;
2. Fresh air input dew point temperature;
3. Fresh air discharge temperature;
4. Fresh air discharge dew point temperature;
5. Exhaust air input temperature;
6. Exhaust air input dew point temperature;
7. Exhaust air discharge temperature;
8. Exhaust air discharge dew point temperature.

Should the differential input and discharge temperatures and input and discharge dew point temperatures exceed acceptable levels as defined by the engineer, the CONTROL system shall enter the alarm mode.