

**ADDENDUM**

<b>PROJECT</b>	NKU New Residence Hall	<b>ADDENDUM NO.</b>	2
<b>PROJECT NO.</b>	18237.01	<b>DATE</b>	02/18/2020
<b>TO</b>	Brian Groneck	<b>FROM</b>	Dan Bossenbroek

**DESCRIPTION:****I) DRAWING REVISIONS:****VOLUME 1**

- 1) G002 CODE DATA**  
A) Revised Sleeping Unit Types schedule.
- 2) A103 LEVEL 03 FLOOR PLAN - OVERAL**  
A) Revised Unit 361.
- 3) A301 EXTERIOR ELEVATIONS – OVERALL**  
A) Added Mock-Up Wall Elevation.
- 4) A701 DOOR SCHEDULE**  
A) Removed Doors 21821 and 21822 from the door schedule – in Addendum #1.
- 5) A801 UNIT A1**  
A) Revised to include toilet paper holders in all residential unit toilet rooms.
- 6) A802 UNIT A2**  
A) Revised to include toilet paper holders in all residential unit toilet rooms.
- 7) A804 UNIT A4 (ROLL-IN)**  
A) Revised to include toilet paper holders in all residential unit toilet rooms.
- 8) A805 UNIT B1**  
A) Revised to include toilet paper holders in all residential unit toilet rooms.
- 9) A806 UNIT B2**  
A) Revised to include toilet paper holders in all residential unit toilet rooms.
- 10) A807 UNIT C1**  
A) Revised to include toilet paper holders in all residential unit toilet rooms.
- 11) A808 UNIT C2**  
A) Revised to include toilet paper holders in all residential unit toilet rooms.
- 12) A809 UNIT C4 (ROLL-IN)**  
A) Revised to include toilet paper holders in all residential unit toilet rooms.
- 13) A810 UNIT D1**  
A) Revised to include toilet paper holders in all residential unit toilet rooms.
- 14) A812 RM APPARTMENT**  
A) Revised to include toilet paper holders in all residential unit toilet rooms.
- 15) A900 FINISH SCHEDULE**  
A) Revised Miscellaneous material PL1 in the Finish Legend. Comments = Countertops at Units.



**VOLUME 2****16) P101 LEVEL 1 – FIRST FLOOR PLAN – PLUMBING**

- A) Added gas regulator specs
- B) Added geothermal water system fill.

**17) M101 LEVEL 0/1 – AIR DISTRIBUTION PLAN**

- A) Refer to Laundry 111 - Add two (2) 4'-8"W x 8"T exterior louvers to be centered under windows above. Bottom of louver to be at 12'-6". Louver to be Ruskin ELF-375DX – finish/color to be selected by architect. Provide with 8" deep full size plenum box on back of each louver. Install motorized damper in each plenum box that is open to space above ceiling. Insulate plenum with 2" insulation. Add two (2) R-13 grilles with plenum canopy box painted out black to allow make-up air transfer.
- B) Refer to Laundry 111 – Add one (1) E-2 grille at 150 CFM. Route 8"x6" from riser located in Kitchen 115 and transition to E-2 grille as required. Apply tagged note M4 to exposed ductwork as required.

**18) M102, M103, M104, M105 – AIR DISTRIBUTION PLANS**

- A) Add one (1) 24x24 radiant panel at the end of each corridor adjacent to exterior window. Radiant panel to be Markel CP123, 375W, 120V/1/60. Provide silk screening on the exposed surface to match ceiling tiles. Applies to floors 2-5 for a total of 8 panels. Each panel to be provided with wall temperature sensor. Control per spec section 250400 Part 23. Coordinate with electrical contractor to provide the 120v circuit.

**19) M132 ENLARGED MECHANICAL PLANS**

- A) Refer to 'HVAC FILL SYSTEM PIPING SCHEMATIC.' Update the pipe size to 1" in lieu of ¾".
- B) Refer to 'GEOTHERMAL PIPING SCHEMATIC – MECHANICAL ROOM HEADER.' Add BTUH meter as shown.

**20) E100 LEVEL 0 – LIGHTING PLAN**

- A) Moved exterior lighting to emergency panel ELS1.

**21) E101 LEVEL 1 – LIGHTING PLAN**

- A) Moved exterior lighting to emergency panel ELS1.

**22) E601 ELECTRICAL SCHEDULES**

- A) Added approved equals to light fixture types F, L1, P2, P3, R2B, R4A, R4B, R6A, WB2, OP3, AND OWP5.

**23) E602 PANEL SCHEDULES**

- A) Removed circuits and replaces with spares in panel RP1B.

**24) E604 PANEL SCHEDULES**

- A) Added (2) 20A/ 1P circuit breakers for exterior lighting in panel ELS1.

**25) E701 ELECTRICAL RISER DIAGRAM**

- A) Add surge protection device to elevator disconnect.

**26) LV401 ONE-LINE DIAGRAM – VIDEO SURVEILLANCE**

- A) Revised Coded Note #6.

**II) SPECIFICATION REVISIONS:****VOLUME 1****1) TABLE OF CONTENTS**

- A) Added Section 31 31 16 Termite Treatment
- B) Added Section 32 31 31 Trash Dumpster Enclosure

**2) 01 22 00 UNIT PRICES**

- A) Made numerous revisions throughout the Section. New Section provided.



**3) 08 51 13 ALUMINUM WINDOWS**

A) Added paragraph 2.01 B. 7. to read: "7. BOYD ALUMINUM"

**4) 08 71 00 DOOR HARDWARE**

A) Made numerous changes throughout the section. New Section provided.

**5) 10 14 00 SIGNAGE**

A) Added paragraph 2.01 A. 5. to read: "5. Fastsigns: <https://www.fastsigns.com/>"

**6) 10 28 00 TOILET, BATH, AND LAUNDRY ACCESSORIES**

A) Deleted paragraphs 2.08 A. 4. a.: "Excel Dryer Inc; XLERATOR: [www.exceldryer.com/#sle](http://www.exceldryer.com/#sle).", & b.: "American Specialties; Turbo-Dri, #0197."

**VOLUME 2****7) 20 13 00 PIPE, PIPE FITTINGS, & PIPE SUPPORTS**

A) Refer to Part 8.1 – Geothermal/Heat pump loop piping:

- In lieu of flanged components, contractor may elect to use Victaulic style 380/381 pump drops. Drops must be pre-assembled and rated for working pressure to 300psi. Contractor must transition back to HDPE via Victaulic style 907 (applies to Pumps P-1A and P-1B).
- Victaulic style 26 factory-fabricated grooved end headers are acceptable where geothermal well field piping enters the building. Contractor must transition back to HDPE via Victaulic style 907

**8) 20 21 00 VALVES**

Refer to Part 3.8 – Butterfly valves (4" and larger):

Contractor may elect to utilize Vic-300/W761 butterfly valves with Victaulic HDPE system. Victaulic 907 direct stab transition couplings are acceptable. Product shall be rated to pressures and temperatures exceeding the pipe.

**9) 22 02 00 PLUMBING FIXTURES FITTINGS AND TRIM**

- A) Part 3 – Delete floor drains FD-4 and FS-1
- B) Part 4 – Delete this section in its entirety.

**10) 22 02 00 PLUMBING FIXTURES, FITTINGS AND TRIM**

A) Delete plumbing fixture P-10

**11) 23 02 00 HVAC EQUIPMENT**

Refer to Part 3 – Outside Air Units. Replace with attached specification.

**12) 25 04 00 CONTROLS – DIRECT DIGITAL**

A) Added Part 35, Part 36, Part 37, and Part 38. See attached specification for these parts.

**ATTACHMENTS:****DRAWINGS**

**VOLUME 1: G002, A103, A301, A801, A802, A804, A805, A806, A807, A808, A809, A810, A812, & A900**

**VOLUME 2: P101, M132, E100, E101, E601, E602, E604, E701, & LV401**

**SPECIFICATIONS**

**VOLUME 1: 01 22 00, 08 71 00**

**VOLUME 2: 23 02 00, 25 04 00, 31 31 16, 32 31 31**



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**DISTRIBUTION:**

Elizabeth Birkenhauer

Mary Paula Schuh

Blaine Gilmore

David Berland

Nick Rosian

Yanitza Brongers-Marrero

Mike Albers



## **SECTION 01 22 00 - UNIT PRICES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for unit prices.

#### **1.2 DEFINITIONS**

- A. Unit price is an amount proposed by Bidder, applicable during the duration of the Work, as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.
- B. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- C. Unit prices shall apply whether the Work described is performed by the Subcontractor or by a lower-tier subcontractor.

#### **1.3 PROCEDURES**

- A. The Contractor reserves the right, prior to an award of Subcontract, to evaluate the Unit Prices submitted and seek adjustment and/or reject any Unit Price that is determined by the Contractor to be unreasonable.
- B. The Subcontractor shall keep a daily log of actual quantities of specified work unit encountered, consumed or expended and submit copies of such logs to the Contractor weekly.
- C. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

### **PART 2 - SCHEDULE OF UNIT PRICES**

- 2.1 Provide separate attachment to the 00 41 00 Bid Form that include pricing for the following:

- A. Floor Filling/Leveling
  - 1. Description: Provide self-leveling cementitious material to level floors and fill floor voids.
  - 2. Unit Cost: Include material and labor. Include all floor preparation, aggregate and surface finishing.
  - 3. Unit of Measure: 400 Square Foot: ¼" deep
  - 4. Specification Reference: Section 03 62 13

- B. Provide separate pricing for the following cubic yard of material assuming each truck hauls 12CY's of material:
1. Spoils import per cubic yard: \$ \_\_\_\_\_
  2. Spoils export per cubic yard: \$ \_\_\_\_\_

- C. ***Provide a unit price credit per cubic yard of spoils meeting the requirements below that will be allowed to dump on NKU property at the following location:***

***Dump site is located at Frank Ignatius Grein Softball Field located at the corner of RT2345 and Kenton Drive. Contractors would be required to use Norse Blvd in lieu of Kenton Drive through campus to access the dump site.***

***Contractor(s) may stockpile up to 3,000 cubic yards of excavated material to be used by Softball Field Project. Stockpiled material should consist of non-organic, clayey soils that are relatively free of topsoil, vegetation, trash, construction or demolition debris, frozen materials, particles over 6 inches in maximum dimension, or other deleterious materials. Any and all limestone floaters shall be removed from the soil material prior to stockpiling for use by the Softball Field Project." Dump location will be available beginning 04/23/20 unit approximately 08/07/20***

1. ***Spoils exported to NKU dump site per cubic yard: (\$ \_\_\_\_\_)***

**END OF SECTION 01 22 00**

## SECTION 087100 – 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 commercial door hardware for the following:
  - 1. Swinging doors.
  - 2. Sliding doors.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Electromechanical door hardware.
  - 3. Automatic operators.
- C. Related Sections:
  - 1. Division 08 Section “Hollow Metal Doors and Frames”.
  - 2. Division 08 Section “Flush Wood Doors”.
  - 3. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
  - 4. Division 08 Section “Automatic Door Operators”.
  - 5. Division 28 Section “Access Control”.
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
  - 2. ICC/IBC - International Building Code.
  - 3. NFPA 70 - National Electrical Code.
  - 4. NFPA 80 - Fire Doors and Windows.
  - 5. NFPA 101 - Life Safety Code.
  - 6. NFPA 105 - Installation of Smoke Door Assemblies.
  - 7. UL/ULC and CSA C22.2 – Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
  - 8. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

### 1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door 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. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
  2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
  3. Content: Include the following information:
    - a. Type, style, function, size, label, hand, and finish of each door hardware item.
    - b. Manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    - e. Explanation of abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for door hardware.
    - g. Door and frame sizes and materials.
    - h. Warranty information for each product.
  4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the 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 Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
  1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:



- a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
  - b. Complete (risers, point-to-point) access control system block wiring diagrams.
  - c. Wiring instructions for each electronic component scheduled herein.
2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- E. Informational Submittals:
  1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
  2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
1. Function of building, purpose of each area and degree of security required.
  2. Plans for existing and future key system expansion.
  3. Requirements for key control storage and software.
  4. Installation of permanent keys, cylinder cores and software.
  5. Address and requirements for delivery of keys.
- G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
  2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
  3. Review sequence of operation narratives for each unique access controlled opening.
  4. Review and finalize construction schedule and verify availability of materials.
  5. Review the required inspecting, testing, commissioning, and demonstration procedures
- H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

#### 1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

#### 1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of the hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
  - 1. Ten years for mortise locks and latches.
  - 2. Five years for exit hardware.
  - 3. Twenty five years for manual surface door closer bodies.
  - 4. Five years for motorized electric latch retraction exit devices.
  - 5. Two years for electromechanical door hardware.

## 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.

## PART 2 - PRODUCTS

### 2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
  - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

### 2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
  - 1. Quantity: Provide the following hinge quantity:
    - a. Two Hinges: For doors with heights up to 60 inches.
    - b. Three Hinges: For doors with heights 61 to 90 inches.
    - c. Four Hinges: For doors with heights 91 to 120 inches.
    - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
  - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
    - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
  - 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

- a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
  - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
- 4. Hinge Options: Comply with the following:
  - a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
- 5. Manufacturers:
  - a. Bommer Industries (BOM) - LB Series.
  - b. Hager Companies (HAG) - CB Series.
  - c. McKinney Products; ASSA ABLOY Architectural Door Accessories (MCK) - TA Series.
  - d. Stanley Hardware (STA) - CB Series.
- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
  - 1. Manufacturers:
    - a. **Select Products Limited (SEL)**
    - b. Pemko Products; ASSA ABLOY Architectural Door Accessories (PEM).
- C. Sliding and Folding Door Hardware: Hardware is to be of type and design as specified and should comply with ANSI/BHMA A156.14.
  - 1. Sliding Bi-Passing Pocket Door Hardware: Provide complete sets consisting of track, hangers, stops, bumpers, floor channel, guides, and accessories indicated.
  - 2. Manufacturers:
    - a. Hager Companies (HAG).
    - b. Johnson Hardware (JOH).
    - c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PEM).

## 2.3 POWER TRANSFER DEVICES

- A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug

directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:

- a. Pemko Products; ASSA ABLOY Architectural Door Accessories (PEM) – EL-CEPT Series.
- b. Securitron (SUC) - EL-CEPT Series.
- c. Von Duprin (VON) - EPT-10 Series.

- B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:

- a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MCK) - Electrical Connecting Kit: QC-R001.
- b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MCK) - Connector Hand Tool: QC-R003.

2. Manufacturers:

- a. Hager Companies (HAG) - Quick Connect.
- b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MCK) – QC-C Series.
- c. Stanley Hardware (STA) – WH Series.

2.4 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

- 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
- 2. Furnish dust proof strikes for bottom bolts.
- 3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
- 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Manufacturers:

- a. Ives (IVE).
- b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (ROC).

- c. Trimco (TRI).
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
- 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
  - 2. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
  - 3. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
  - 4. Manufacturers:
    - a. Ives (IVE).
    - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (ROC).
    - c. Trimco (TRI).

## 2.5 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years' experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
- C. Cylinders: Original manufacturer cylinders complying with the following:
- 1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
  - 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  - 3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
  - 4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
  - 5. Keyway: Match Facility Standard.

~~D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified patented cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents. Cylinders are to be factory keyed with owner having the ability for on site original key cutting.~~

~~1. Manufacturers:~~

- ~~a. Resident Rooms Medeco (MED) X4 Series.~~
- ~~b. Common Areas BEST SFIC as listed in Hdw sets where applied.~~
- ~~c. No substitution~~

~~E. Keying System: Each type of lock and cylinders to be factory keyed.~~

- ~~1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.~~
- ~~2. Furnish factory cut, nickel silver large bow permanently inscribed with a visual key control number as directed by Owner.~~
- ~~3. Existing System: Key locks to Owner's existing system.~~

~~F. Key Quantity: Provide the following minimum number of keys:~~

- ~~1. Change Keys per Cylinder: Two (2)~~
- ~~2. Master Keys (per Master Key Level/Group): Five (5).~~
- ~~3. Construction Keys (where required): Ten (10).~~

G. Construction Keying: Provide construction master keyed cylinders.

~~H. Key Registration List (Bitting List):~~

- ~~1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.~~
- ~~2. Provide transcript list in writing or electronic file as directed by the Owner.~~

## 2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Manufacturers:

- a. Schlage (SCH) – L9000 Series.
- b. Sargent Manufacturing (SAR) – 8200 Series.
- c. Stanley Best (BES) – 40H-UN Series.

## 2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latch bolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.



B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
5. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
6. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.
7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
  - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
  - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
8. Vertical Rod Exit Devices: **NKU Uses Concealed Vertical Cables in place of Vertical Rods.** Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

9. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
  10. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
  11. Rail Sizing: Provide exit device rails factory sized for proper door width application.
  12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Manufacturers:
    - a. Von Duprin (VON) - 35A/98 XP Series.
    - b. Sargent Manufacturing (SAR) - 80 Series.

## 2.9 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
  2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
  3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
  4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
  5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
  7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:

- a. LCN Closers (LCN) - 4040 Series.
- b. Sargent Manufacturing (SAR) - 351 Series.

2.10 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
  - a. Stainless Steel: 300 grade, .050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
  - a. Ives (IVE).
  - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (ROC).
  - c. Trimco (TRI).

2.11 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
  - 1. Manufacturers:
    - a. Ives (IVE).
    - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (ROC).
    - c. Trimco (TRI).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
  - 1. Manufacturers:
    - a. Architectural Builders Hardware (ABH).
    - b. Rixson Door Controls (RIX).

## 2.12 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
  - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
  - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. Pemko Products; ASSA ABLOY Architectural Door Accessories (PEM).
2. Reese Enterprises, Inc. (REE).

2.13 ELECTRONIC ACCESSORIES

- A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

1. Manufacturers:

- a. Security Door Controls (SDC) - DPS Series.
- b. Securitron (SUC) - DPS Series.

- B. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Manufacturers:

- a. Sargent Manufacturing (SAR) - 3500 Series.
- b. Securitron (SUC) - BPS Series.
- c. Von Duprin (VON) - PS.

2.14 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.15 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. 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 specified by referenced standards for the applicable units of hardware

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine scheduled openings, 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. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

### 3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

### 3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically 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. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
  - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
  - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and 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.

- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

### 3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating 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.

### 3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

### 3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

### 3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with

corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

- B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

### Hardware Sets

#### Set: 1.0

Description: Exterior - Alum / Card Reader / Exit Device (nightlatch) / Closers w.stops / DPS

1 Continuous Hinge	SEL SL11HD or SL24HD EPT prep (type as applicable)	CL AN	
1 Rim Exit Device, Nightlatch	VON EL LX RX 99NL OP	US32D	⚡
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26	
1 Cylinder Housing	SCH 80-XXX series (type as applicable)	US32D	
1 Door Pull	IVE 8190-0 10" CTC	US32D	
1 Door Closer w/stop	LCN 4040XP SCUSH	EN	
1 Blade Stop Spacer	LCN 4040 61	EN	
1 Threshold	PEM 171A FHSL14		
1 Sweep	PEM 345ANB		
1 ElectroLynx Harness	VON CON-X (length as required for device to hinge)		⚡
1 Card Reader	Card Reader by Others		
1 ElectroLynx Harness	VON CON-X (length as required for hinge to power supply)		⚡
1 Electric Power Transfer	VON EPT-10		⚡
1 Wiring Diagram	Riser and Point-to-Point Wiring Diagrams		
1 Position Switch	Honeywell 947-75TWH		⚡
1 Junction Box	VON JB7		
1 <b>Power Supply. Not required, power from DSX system.</b>	<b>VON 90X series as needed for devices and mode operation</b>		⚡

Notes: \* Weatherstrip supplied with aluminum frame & door.

\* Coordinate all wiring & conduit with the electrical contractor.

\* Door contacts monitor the position of the doors and reports status to the security system.

\* Operation Description: Doors would be locked and secure. When the correct credential is presented to the card reader the exit device latch will release for entry. Entry would be allowed by mechanical key at all times. Manual egress is allowed at all times.



**Set: 2.0**

Description: Exterior - Alum / Pair / EL Exit Device (nightlatch) / Auto Oper / Ovhd Stops / DPS

2	Continuous Hinge	SEL SL11HD or SL24HD EPT prep (type as applicable)	CL AN	
	Concealed Vert Rod Exit, Night latch.			
1	Concealed Vertical Cable , not vertical rods	VON EL LX RX 9949NL-OP	US26D	⚡
	Concealed Vert Rod Exit, Dummy Pull.			
1	Concealed Vertical Cable, not vertical rods.	VON LX RX 9949EO	US32D	⚡
1	Small Format Inter Core.	BEST SFIC	26	
1	Cylinder Housing	SCH 80-XXX series (type as applicable)	US32D	
2	Door Pull	IVE 8190-0 10" CTC	US32D	
2	Conc Overhead Stop	ABH 102_ series (size as needed)	630	
1	Door Closer w/stop	LCN 4040XP SCUSH	EN	
1	Automatic Opener. Only needs to open one leaf not both	LCN 9540 series	ALUM	⚡
1	Threshold	PEM 171A FHSL14		
2	Sweep	PEM 345ANB		
2	Astragal	PEM 305CN		
2	ElectroLynx Harness	VON CON-X (length as required for device to hinge)		⚡
2	ElectroLynx Harness	VON CON-X (lenth as required for hinge to power supply)		⚡
1	Electric Power Transfer	VON EPT-10		⚡
1	Wiring Diagram	Riser and Point-to-Point Wiring Diagrams		
2	Door Switch Actuators	BEA 10 PBR1		⚡
2	Position Switch	Honeywell 947-75TWH		⚡
1	Junction Box	VON JB7		
1	Power Supply. Not required , gets power from DSX system	VON 90X series as needed for devices and mode operation		⚡
1	Relay	All required relays needed to meet mode of operation		


Notes: \* Weatherstrip supplied with aluminum frame & door.  
 \* Coordinate all wiring & conduit with the electrical contractor.  
 \* Door contacts monitor the position of the doors and reports status to the security system.  
 \* Operation Description:

Locked Mode - Doors would be locked and secure. Entry would be allowed by mechanical key at all times. Manual egress is allowed at all times or interior door switch actuator is pressed, exit device latches will release and automatic operator at the active leaf will open the door.

Unlocked Mode: Doors can be programmed through the access control system to be electronically dogged down (push/pull mode) at the active leaf and both door switch actuators active. Doors can be manually opened or egress or either door switch actuator can be pressed for the automatic operator to open the door at active leaf.

**Set: 3.0**

Description: Exterior - Exit Device (exit only) / Closer w.stop / DPS


1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Rim Exit Device, Exit Only	VON 99EO x less dogging	US26D
1 Door Closer w/stop	LCN 4040XP SCUSH	EN
1 Threshold	PEM 171A FHSL14	
1 Rain Guard	PEM 346C	
1 Gasketing	PEM 18041CNB	
1 Sweep	PEM 345ANB	
1 Position Switch	Honeywell 947-75TWH	

Notes: \* Coordinate all wiring & conduit with the electrical contractor.

\* Door contacts monitor the position of the doors and reports status to the security system.

**Set: 4.0**

Description: Exterior - Dormitory with Deadbolt Lock / Closer w.stop / DPS

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Dormitory/Exit Lock	SCH L9473 B 06A x 09-509 x L583-363	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Door Closer w/stop	LCN 4040XP SCUSH	EN
1 Threshold	PEM 171A FHSL14	
1 Rain Guard	PEM 346C	
1 Gasketing	PEM 18041CNB	
1 Sweep	PEM 345ANB	
1 Position Switch	Honeywell 947-75TWH	

Notes: \* Coordinate all wiring & conduit with the electrical contractor.

\* Door contacts monitor the position of the doors and reports status to the security system.

**Set: 5.0**

Description: Exterior - Storeroom Lock / Closer w.stop / DPS

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Storeroom/Closet Lock	SCH L9080 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Door Closer w/stop	LCN 4040XP SCUSH	EN
1 Threshold	PEM 171A FHSL14	
1 Rain Guard	PEM 346C	
1 Gasketing	PEM 18041CNB	
1 Sweep	PEM 345ANB	
1 Position Switch	Honeywell 947-75TWH	



Notes: \* At roof deck door - key side is stair side of door. Free egress from the roof at all times.  
\* Coordinate all wiring & conduit with the electrical contractor.  
\* Door contacts monitor the position of the doors and reports status to the security system.

**Set: 6.0**

Description: Exterior - Pair / Storeroom Lock with Deadbolt / Closer w.stop / DPS

2 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
2 Flush Bolt (Manual)	IVE FB458 / FB258 (type as required)	US26D
1 Dust Proof Strike	IVE DP2	US26D
1 Storeroom Deadbolt Lock	SCH L9480 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
2 Door Closer w/stop	LCN 4040XP SCUSH	EN
1 Threshold	PEM 171A FHSL14	
1 Rain Guard	PEM 346C	
1 Gasketing	PEM 18041CNB	
2 Sweep	PEM 345ANB	
2 Astragal	PEM 305CN	
2 Position Switch	Honeywell 947-75TWH	



Notes: \* Coordinate all wiring & conduit with the electrical contractor.  
\* Door contacts monitor the position of the doors and reports status to the security system.

**Set: 7.0**

Description: Exterior - Storeroom Lock with Deadbolt / Closer w.stop / DPS

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN	
1 Storeroom Deadbolt Lock	SCH L9480 B 06A	US26D	
1 Small Format Inter Core.	BEST SFIC	26	
1 Door Closer w/stop	LCN 4040XP SCUSH	EN	
1 Threshold	PEM 171A FHSL14		
1 Rain Guard	PEM 346C		
1 Gasketing	PEM 18041CNB		
1 Sweep	PEM 345ANB		
1 Position Switch	Honeywell 947-75TWH		⚡

Notes: \* At roof deck door - key side is stair side of door. Free egress from the roof at all times.  
\* Coordinate all wiring & conduit with the electrical contractor.  
\* Door contacts monitor the position of the doors and reports status to the security system.

**Set: 8.0**

Description: Interior - Alum / Pair / Card Reader / Exit Device (nightlatch) / Auto Oper / Ovhd Stops / DPS

2 Continuous Hinge	SEL SL11HD or SL24HD EPT prep (type as applicable)	CL AN	
1 Concealed Vert Rod Exit, Nightlatch	VON EL LX RX 9949NL-OP	US26D	⚡
1 Concealed Vert Rod Exit, Dummy Pull NKU uses concealed vertical cables	VON LX RX 9949EO	US32D	⚡
1 Small Format Inter Core.	BEST SFIC	26	
1 Cylinder Housing	SCH 80-XXX series (type as applicable)	US32D	
2 Door Pull	IVE 8190-0 10" CTC	US32D	
2 Conc Overhead Stop	ABH 102_ series (size as needed)	630	
1 Door Closer w/stop	LCN 4040XP SCUSH	EN	
1 Automatic Opener. Only needs to open one leaf not both	LCN 9540 series	ALUM	⚡
1 ElectroLynx Harness	VON CON-X (length as required for device to hinge)		⚡
1 Card Reader	Card Reader by Others		

1 ElectroLynx Harness	VON CON-X (length as required for hinge to power supply)	⚡
1 Electric Power Transfer	VON EPT-10	⚡
1 Wiring Diagram	Riser and Point-to-Point Wiring Diagrams	
2 Door Switch Actuators	BEA 10 PBR1	⚡
2 Position Switch	Honeywell 947-75TWH	⚡
1 Junction Box	VON JB7	
1 Power Supply. Not required	VON 90X series as needed for devices and mode operation	⚡
1 Relay	All required relays needed to meet mode of operation	

Notes: \* Coordinate all wiring & conduit with the electrical contractor.

\* Door contacts monitor the position of the doors and reports status to the security system.

\* Operation Description:

Locked Mode - Doors would be locked and secure. Entry would be allowed by mechanical key at all times. Manual egress is allowed at all times or interior door switch actuator is pressed, exit device latches will release and automatic operator at the active leaf will open the door.

Unlocked Mode: Doors can be programmed through the access control system to be electronically dogged down (push/pull mode) at the active leaf and both door switch actuators active. Doors can be manually opened or egress or either door switch actuator can be pressed for the automatic operator to open the door at active leaf.

### Set: 9.0

Description: Interior - Rated / Exit Device (passage) / Closer / Wall Stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Rim Exit Device, Passage	VON 99L-BE-F 06	US26D
1 Door Closer	LCN 4040XP EDA / REG (arm type as applicable)	EN
1 Kick Plate	IVE 8400 8" x 1 or 2" LDW (as applicable) x BEV x CSK	US32D
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
1 Gasketing	PEM S88_ (owner & architect to select color)	

Notes: \* Provide Intumescent Gasket as required by the door manufacturer.

**Set: 10.0**

Description: Interior - Push.Pull Set / Closer / Wall Stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Push Plate	IVE 8200 4" x 16"	US32D
1 Pull Plate	IVE 8103-0 10" CTC	US32D
1 Door Closer	LCN 4040XP EDA / REG (arm type as applicable)	EN
1 Kick Plate	IVE 8400 8" x 1 or 2" LDW (as applicable) x BEV x CSK	US32D
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
3 Silencer	IVE SR64 / SR65 (type as applicable)	

**Set: 11.0**

Description: Interior - Pair / Dummy Levers / Roller Latches / Ovhd Stops (Inner Unit Closet)

6 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
2 Roller Latch	IVE RL32	US26D
2 Single Dummy Trim	SCH L9170 06A	US26D
2 Surf Overhead Stop	ABH 902_ series (size as needed)	652
2 Silencer	IVE SR64 / SR65 (type as applicable)	

**Set: 12.0**

Description: Interior - Alum / Passage Set / Ovhd Stop

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Passage Latch	SCH L9010 06A	US26D
1 Surf Overhead Stop	ABH 902_ series (size as needed)	652

**Set: 13.0**

Description: Interior - Privacy Set / Ovhd Stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Privacy Lock w/occupancy indicator	SCH L9040 06A x L283-722 x 09-509 x L583-363	US26D
1 Surf Overhead Stop	ABH 902_ series (size as needed)	652

1 Mop Plate	IVE 8400 4" x 1" LDW x BEV x CSK	US32D
1 Gasketing	PEM S88_ (owner & architect to select color)	
1 Coat Hook	IVE 574	626

**Set: 14.0**

Description: Interior - Privacy Set / Ovhd Stop (Inner Suite Bathroom)

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Privacy Lock. BEST cylindrical 9K series	BEST 9K37L Series	US26D
1 Surf Overhead Stop	ABH 902_ series (size as needed)	652
1 Gasketing	PEM S88_ (owner & architect to select color)	
1 Coat Hook	IVE 574	626

Notes:

**Set: 15.0**

Description: Interior – Privacy Set / Wall Stop (Inner Suite Bathroom)

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Privacy Lock. BEST cylindrical 9K series	BEST 9K37L Series	US26D
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
1 Gasketing	PEM S88_ (owner & architect to select color)	
1 Coat Hook	IVE 574	626

Notes:

**Set: 16.0**

Description: Interior – Alum / Office Lock / Wall Stop

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Office/Entry Lock	SCH L9050 B 06A x 09-509 x L583-363	US26D

1	Small Format Inter Core.	BEST SFIC	26
1	Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D

**Set: 17.0**

Description: Interior - Rated / Dormitory Lock / Closer w.stop (Suite Entry Door)

3	Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1	Dormitory/Exit Lock.	SCH L9473 B 06A x 09-509 x L583-363	US26D
1	Small Format Inter Core.	BEST SFIC	26
1	Door Closer w/stop	LCN 4040XP SCUSH	EN
1	Kick Plate	IVE 8400 8" x 1 or 2" LDW (as applicable) x BEV x CSK	US32D
1	Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
1	Gasketing	PEM S88_ (owner & architect to select color)	
1	Viewer	IVE U698	626

Notes: \* Provide Intumescent Gasket as required by the door manufacturer.

\* Provide thru-bolts for closers and/or exit device on all rated openings if doors are not being supplied with blocking. Coordinate with door specifications.

\* At openings where a wall stop will work delete stop in closer and provide a wall stop.

\* Provide (2) door viewers at accessible units.

**Set: 18.0**

Description: Interior - Dormitory Lock / Wall (Inner Suite Unit Bedrooms)

3	Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1	Dormitory Lock. BEST cylindrical 9K series	BEST 9K37 (T) or (A) Series (Verify T or A function with owner prior to supply)	US26D
1	Small Format Inter Core.	BEST SFIC	26
1	Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
1	Gasketing	PEM S88_ (owner & architect to select color)	

Notes:



**Set: 19.0**

Description: Interior – Alum / Classroom Lock / Wall Stop

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Classroom Lock	SCH L9070 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D

Notes: \* Doors 91" to 120" provide (4) hinges.

**Set: 20.0**

Description: Interior - Alum / Classroom Lock / Ovhd Stop

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Classroom Lock	SCH L9070 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Surf Overhead Stop	ABH 902_ series (size as needed)	652

Notes: \* Doors 91" to 120" provide (4) hinges.

**Set: 21.0**

Description: Interior - Classroom Lock / Ovhd Stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Classroom Lock	SCH L9070 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Surf Overhead Stop	ABH 902_ series (size as needed)	652
3 Silencer	IVE SR64 / SR65 (type as applicable)	

**Set: 22.0**

Description: Interior - Alum / Classroom Lock / Closer w.stop

1 Continuous Hinge	SEL SL11HD or SL24HD (type as applicable)	CL AN
1 Classroom Lock	SCH L9070 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Door Closer w/stop	LCN 4040XP SCUSH	EN

Notes: \* Doors 91" to 120" provide (4) hinges.

**Set: 23.0**

Description: Interior – Storeroom Lock / Wall Stop (Unit Mech)

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Storeroom/Closet Lock	SCH L9080 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
3 Silencer	IVE SR64 / SR65 (type as applicable)	

**Set: 24.0**

Description: Interior - Storeroom Lock / Ovhd Stop (Unit Mech)

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Storeroom/Closet Lock	SCH L9080 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Surf Overhead Stop	ABH 902_ series (size as needed)	652
3 Silencer	IVE SR64 / SR65 (type as applicable)	

**Set: 25.0**

Description: Interior – Rated / Storeroom Lock (knurling) / Closer / Wall Stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Storeroom/Closet Lock	SCH L9080 B 8(knurling) 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Door Closer	LCN 4040XP EDA / REG (arm type as applicable)	EN
1 Kick Plate	IVE 8400 8" x 1 or 2" LDW (as applicable) x BEV x CSK	US32D
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
1 Gasketing	PEM S88_ (owner & architect to select color)	

Notes: \* Provide Intumescent Gasket as required by the door manufacturer.

**Set: 26.0**

Description: Interior - Rated / Storeroom Lock / Closer w.stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Storeroom/Closet Lock	SCH L9080 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Door Closer w/stop	LCN 4040XP SCUSH	EN
1 Kick Plate	IVE 8400 8" x 1 or 2" LDW (as applicable) x BEV x CSK	US32D
1 Gasketing	PEM S88_ (owner & architect to select color)	

Notes: \* Provide Intumescent Gasket as required by the door manufacturer.

**Set: 27.0**

Description: Interior - Rated / Storeroom Lock / Closer / Wall Stop

3 Hinge	STA FBB179 x size per spec (NRP as required)	US26D
1 Storeroom/Closet Lock	SCH L9080 B 06A	US26D
1 <b>Small Format Inter Core.</b>	<b>BEST SFIC</b>	26
1 Door Closer	LCN 4040XP EDA / REG (arm type as applicable)	EN
1 Kick Plate	IVE 8400 8" x 1 or 2" LDW (as applicable) x BEV x CSK	US32D
1 Wall Stop	IVE WS401 / WS402 CVX or CCV (type as needed)	US26D
1 Gasketing	PEM S88_ (owner & architect to select color)	

Notes: \* Provide Intumescent Gasket as required by the door manufacturer.

**Set: 28.0**

Description: Interior - Sliding Track Set / Flush Pulls

1 Sliding Door Hdwe	PEM HBP200A	
2 Flush Pull	IVE 962	US26D

**Set: 29.0**

Description: All by Others

1 Note

All Hardware by Others

END OF SECTION 087100

## **SECTION 23 02 00**

### **HVAC EQUIPMENT**

#### **PART 1 – GENERAL:**

- 1.1 The Contractor's attention is directed to the General and Special Conditions, GENERAL PROVISIONS - MECHANICAL and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.
- 1.2 The Contractor shall provide in complete working order the heating, ventilation and air conditioning equipment located as indicated and installed, connected and placed in operation in strict accordance with the manufacturer's recommendations. All equipment shall be factory painted and, where applicable, factory insulated and shall, where such standards exist, bear the label of the Underwriters Laboratory.
- 1.3 All Contractors and Vendors providing a bid for this project shall review the Plans and Specifications and determine any modifications and/or adjustments necessary relative to the proposed equipment and materials with specific manufacturer's installation requirements. Include in the bid any necessary installation methods, features, options, accessories, etc. necessary to install the proposed equipment and materials, regardless of whether used as basis of design or being offered as a substitution in accordance with the specific manufacturer's installation requirements whether specifically detailed or not within the Plans and Specifications.
- 1.4 All equipment, material and labor warranties shall be furnished by the equipment supplier/vendor. All warranties begin on the date of Substantial Completion. Refer to Specification Section GENERAL PROVISIONS – MECHANICAL for special warranty requirements.
- 1.5 Refer to Specification Section GENERAL PROVISIONS – MECHANICAL for minimum required Schedule of Values breakdown.
- 1.6 Review the Specification Section – REQUIRED SHOP DRAWINGS, ETC., and provide all documentations called for therein.
- 1.7 Each subcontractor shall be responsible for their own completion of System Verification Checklists/Manufacturer's Checklists. Refer to Specification Section GENERAL PROVISIONS – MECHANICAL for additional requirements. Factory startup is required for all HVAC equipment. In general, as part of the verification process, equipment suppliers shall perform start-up by their factory authorized technicians and shall complete and submit start-up reports/checklists. This shall include the following:
  - Heat Pumps
  - Packaged Outside Air Units
  - Variable Frequency Drives
  - Ductless Split Systems

- 1.8 All HVAC equipment shall comply with the latest provisions of ASHRAE Standard 90.1 and all provisions of the International Energy Conservation Code.
- 1.9 Ensure that the equipment that is proposed to be furnish may be installed, connected, placed in operation and easily maintained at the location and in the space allocated for it.
- 1.10 The contractor and vendor shall confirm connection sides for each piece of equipment specific to this project.
- 1.11 Determine from the Bid Documents the date of completion of this project and insure that equipment delivery schedules can be met so as to allow this completion date to be met.
- 1.12 Through coordination with other Contractors, Vendors and Suppliers associated with this Project, this Contractor shall insure a complete, 100% functional, tested, inspected and approved systems. Claims for additional cost or change orders will immediately be rejected. Refer to Specification Section - ELECTRIC MOTORS, ETC. for additional requirements. All equipment shall be furnished for a single point electrical connection unless specifically excluded as a requirement.
- 1.13 Review the Specification Section - CONTROLS to determine controls, including variable frequency drives, to be furnished. Where manufacturer's temperature controls are specified, they shall be in full compliance with NFPA 90A including automatic smoke shut down provisions.
- 1.14 Review the Specification Section – TESTING, BALANCING, LUBRICATION AND ADJUSTMENTS. For all belt driven equipment, provide final fan and motor sheaves as determined by the air balance contractor during project balancing phase. The mechanical contractor shall install any new sheaves and belts as required for balancing.

## **PART 2 – GEOTHERMAL HEAT PUMPS:**

- 2.1 ACCEPTABLE MANUFACTURERS: Daikin, McQuay, Climate Master, Trane, FHP
- 2.2 A 100% complete mockup installation shall be required for a typical unit. This mockup shall be inspected/reviewed by the Engineer prior to installation of other units.
- 2.3 Any mechanical closet dimension modifications or access requirements due to the manufacturer specifics shall be the burden of the approved manufacturer.
- 2.4 Equipment shall be specifically designed for applications within conditioned interior areas. Capacities shall be rated in accordance with ARI for geothermal applications. Equipment shall be ETL or CSA approved. All equipment shall have decals and labels to aid in servicing and indicate caution areas.
- 2.5 Equipment shall be completely factory assembled and tested, piped, internally wired and fully charged with Refrigerant R-410A. Threaded female water inlet and outlet

connections, threaded female condensate connection, duct collars and all safety controls shall be furnished and factory installed.

- 2.6 A terminal block with screw terminals shall be provided for control wiring. A condensate overflow device shall be factory installed to stop compressor operation if drain pan overflow is imminent. An energy management relay to allow unit control by an external source shall be factory installed.
- 2.7 Refer to Specification Section GENERAL PROVISIONS – MECHANICAL for special warranty requirements.
- 2.8 CASING AND CABINET: The cabinet shall be constructed of galvanized steel and factory painted with ½" fiberglass on interior, discharge duct collar and return collar. Lift-out removable access panels shall be provided for access to the compressor and blower assembly compartments.
- 2.9 DRAIN PAN: The drain pan shall be constructed of stainless steel and insulated to prevent sweating. The bottom of the drain pan shall be sloped on two planes which will direct the condensate to the drain connection. When the unit is installed per the manufacturer's instructions, the drain pan shall be tested as follows: (1) Temporarily plug the drain pan, (2) fill the drain pan with 2" of water or the maximum allowed by the drain pan depth, whichever is smaller, (3) remove the temporary plug and verify the drain pan removes the water within 3 minutes.
- 2.10 COMPRESSOR: The compressor or compressors shall be high-efficiency, hermetically sealed scroll type with internal vibration isolation. Compressor motors shall be equipped with overload protection. Refer to the drawing schedules as multiple compressor types shall be utilized.
- 2.11 AIR-TO-REFRIGERANT HEAT EXCHANGER: The air-to-refrigerant heat exchanger shall be constructed of staggered copper tubes with die formed corrugated aluminum fins mechanically bonded to the tubes. The air-to-refrigerant heat exchanger shall have a working pressure rating of 400 PSIG. Multiple compressor equipment shall provide a single air-to-refrigerant heat exchanger for each compressor.
- 2.12 WATER-TO-REFRIGERANT HEAT EXCHANGER: The water-to-refrigerant heat exchanger shall be of a high quality co-axial coil for maximum heat transfer and insulated to prevent condensation at low temperatures. The copper coil shall be fluted to enhance heat transfer and minimize fouling and scaling. The coil shall have a working pressure of 600 psig on the refrigerant side and 400 psig on the water side.
- 2.13 REVERSING VALVE: The reversing valve shall be a pilot operated sliding piston type with replaceable encapsulated magnetic coil. The reversing valve shall be energized in the cooling cycle.
- 2.14 REFRIGERANT TUBING: Refrigerant tubing shall be constructed of copper. All low temperature refrigerant lines shall be insulated with an elastomeric insulation that has a 3/8" thick wall, flame spread rating of less than 25 and smoke density rating of less than

50, as tested in accordance with ASTM-84. The elastomeric insulation shall have a UL 94V-5 rating.

- 2.15 REFRIGERANT METERING: The equipment shall be provided with a thermal expansion valve. This device shall allow operation of the equipment in the range of 25 to 110° F entering fluid temperatures and 40 to 95° F entering air temperatures. The equipment shall only operate with one variable (enter water temperature, entering air temperature, cfm or gpm) at an extreme condition. All other variables must be within the nominal range of operation.
- 2.16 REFRIGERANT SYSTEM SERVICE ACCESS: The equipment shall be provided with factory supplied high- and low-pressure Schrader ports for easy refrigerant pressure or temperature testing.
- 2.17 BLOWER AND MOTOR ASSEMBLY: See Schedules for motor type. The motor shall have permanently lubricated and sealed bearings. All motors shall have internal thermal overload protection. The fan assembly shall be arranged for back, left, or right discharge. The discharge must also be capable of being changed in the field. Removal of the motor and fan wheel shall be made with the assistance of a factory provided orifice ring assembly. This assembly shall attach the wheel and motor to the fan housing providing single service access. Where available, provide one hand-held motor programming module to the Owner to utilize for startup and test and balance.
- 2.18 UNIT CONTROLS – SAFETIES: A factory tested and installed control box shall contain all necessary devices to allow heating and cooling operation of the equipment to occur. These devices shall be as follows: (1) 24 Vac, energy limiting class II transformer. (2) Blower motor controller shall be a 24 Vac relay. (3) Compressor controller shall be a 24 Vac contactor. All three-phase operated equipment shall have a contactor that interrupts all three-phases providing power to the compressor. (4) Electrically operated safety lockout relay. This device shall prevent operation and anti-short cycling of the compressor during adverse conditions of operation. This device may be reset by either a remote thermostat or momentary interruption of power. (5) High pressure switch shall protect the compressor against operation at refrigerant system pressures in excess of 395 PSIG. (6) Low pressure switch shall prevent compressor operation underneath low charge or catastrophic loss of charge situations.
- 2.19 AIR FILTER SYSTEM: The Contractor shall completely assemble an Air Filter System for each unit and install ready to use. Heat pumps 1.5 ton and smaller require one 16"x20"x2" air filter system. 2 ton Heat pumps require one 24"x24"x2" air filter system. 6 ton Heat Pumps require one 48"x24"x2" air filter system (two 24 X 24 filters). Refer to Specification Section GENERAL PROVISIONS – MECHANICAL for Temporary Use of Equipment Requirements and filter quantities.
- 2.19.1 Side Access Filter Housing: Housings shall accommodate required filter sizes listed above x 2" deep flat filters as noted above. Housings shall be factory assembled, have one hinged access door with quick access latches (operable without special tools), and be constructed on 18-gauge aluminized steel minimum.



- 2.19.2 Filters shall be 30% efficient Merv 8, pleated and disposable. Provide Flanders/FFI Pre Pleat 40, 16"x20"x2" and 24"x24"x2" thick or approved equal. The filter pressure drop shall be 0.28" at 500 fpm face velocity. Each filter shall consist of a non-woven cotton and synthetic fabric media, media support grid and enclosing frame. The filter shall be listed by Underwriters' Laboratories as Class 2.
- 2.20 HOSE KIT & PIPING PACKAGE: Hose kits and piping package shall be as scheduled on the drawings. Single piece hose kits shall be provided for hose kits that are 1-1/2" or less in size. Two-piece hose kits shall be provided for hose kits that are 2" and larger in size. Hose kits shall be the pipe runout size, not heat pump connection sizes. No exceptions!
- 2.20.1 Provide a factory-assembled hose kit/piping package for supply and return connections for each heat pump. Kits may be mounted in any direction and shall not require straight sections of pipe either upstream or downstream for proper operation. All hoses shall be equipped with end connections at terminal unit and shall be 24" long. All end connections shall be either permanently crimped swivel ends or butt welded to carbon steel end fittings to meet stated pressure ratings. Operational temperature shall be rated from fluid freezing to 200 degrees F. Minimum burst pressure shall be four times the working pressure. Furnish with field flushing connection fitting. Up to 1-1/4" shall be reinforced, fire retardant EPDM rubber, bonded to the inside wall of braiding. 1 1/2" and larger shall be a corrugated type 321 stainless steel tube.
- 2.20.2 Each supply side (water inlet) hose kit/piping package shall include a single piece Y - valve body for sizes up to 1-1/2" and shall be constructed of hot forged brass with threaded inlets and outlets. 2" and larger sizes shall be two-piece and constructed of ductile iron with threaded inlets and outlets. All valve bodies are suitable for a minimum of 400 PSIG working pressure. Include single pressure/temperature test ports for verifying the pressure differential and system temperature. Include full flow design ball valve with blow out stems for shut off. Strainer shall be Y-type configuration furnished with hose connector blow down valve. Strainer screen shall be stainless steel mesh and easily accessible for cleaning without disconnecting hoses. All valves shall be labeled with flow direction, manufacturer and model number, unit tagging.
- 2.20.3 Each return side (water outlet) hose kit/piping package shall include a single piece Y - valve body for sizes up to 1-1/2" and shall be constructed of hot forged brass with threaded inlets and outlets. 2" and larger sizes shall be two-piece and constructed of ductile iron with threaded inlets and outlets. All valve bodies are suitable for a minimum of 400 PSIG working pressure. Include single pressure/temperature test ports for verifying the pressure differential and system temperature. Include full flow design ball valve with blow out proof stems for shut off. All valves shall be labeled with flow direction, manufacturer and model number, unit tagging. Include automatic flow control valves which shall be factory set to rated flow and shall automatically control the flow to within 10% of the rated value subject to the operating parameters of 2-80 psid, fluid freezing to 225°F, 2-7 fps. Also provide a three-wire, two-way, two-position control valve with actuator. Actuator shall be field installed by the TCC.
- 2.21 EQUIPMENT START-UP: Prior to utilization of equipment, start-up service shall be performed by factory authorized representative. Utilize startup sheets included in the

Specification Section GENERAL PROVISIONS - MECHANICAL. Refer to Specification Section GENERAL PROVISIONS – MECHANICAL for additional requirements.

- 2.22 Provide eight (8) hours of onsite training for this system. All training shall occur after building completion. Systems shall function properly and O&M staff shall be able to operate the system prior to turnover.

### **PART 3 – OUTSIDE AIR UNITS (OA-1 & OA-2)**

#### **3.1 SPARE PARTS**

- 3.1.1 Furnish to Owner, with receipt, the following spare parts for each energy recovery unit (place in a location determined by the Owner):

3.1.1.1 One set of matched fan belts for each belt-driven fan

3.1.1.2 One set of wheel belts for each energy recovery wheel

3.1.1.3 Three sets of replacement filters.

#### **3.2 ACCEPTABLE MANUFACTURERS**

- 3.2.1 Subject to compliance with requirements, provide energy recovery units of one of the following:

3.2.1.1 Greenheck, Aeon, Innovent, Daikin, Valent, Trane, Xetex

#### **3.3 ENERGY RECOVERY UNITS**

- 3.3.1 General Description: Energy Recovery Ventilator shall be as manufactured by Daikin or approved equal. Provided all specifications are met. Daikin Model DPS equipment is used as basis of design. Performance shall be as scheduled on plans. Units shall be ETL listed and bear the ETL label. Energy transfer ratings shall be ARI Certified. Supply fans shall bear the AMCA Certified Rating Seal for air and sound performance. Performance shall be as scheduled on plans. Outdoor air shall not mix with exhaust air in a common plenum. Exhaust discharge and outside air intake shall not be located on the same side of the roof top units.

- 3.3.2 Casing and Frames: Unit shall consist of a formed and punched integral frame made of G90 galvanized steel. Interior and exterior panels shall be constructed to create a two-inch double wall. All exterior panels exposed to weather shall be a minimum of 10 gage G90 galvanized steel and coated with a polyester urethane powder coat finish. Interior panels will be 18 gage uncoated G90 galvanized steel. Where top panels are joined there shall be an overlapping standing seam to ensure positive weather protection. All metal-to-metal seams shall be factory sealed requiring no caulking at job site. Unit base to be designed for curb mounting and shall overhang the curb for a positive seal against water run-off.

- 3.3.3 Weatherhoods: Weatherhoods shall be of the same finish as the unit. Outdoor air weatherhood shall incorporate a downturned design. Air velocity into the weatherhood shall not exceed a maximum of 500 fpm to prevent water being pulled into the unit. Louvered design - weatherhoods shall be tested in accordance with AMCA Standard 500-L to prevent water penetration up to 3 in/hr at 29 mph. Exhaust air weatherhood shall include an integral backdraft damper and aluminum bird screen.
- 3.3.4 Insulation: Unit casing to be insulated with two-inch-thick foam for a R value of 13.0. Insulation shall meet requirements of NFPA 90A and tested to meet UL 181 erosion requirements. Insulation shall be enclosed in double wall construction and no insulation shall be exposed.
- 3.3.5 Energy Recovery Wheel: Total energy wheel shall provide both sensible and latent energy recovery. Energy transfer ratings must be ARI Certified to Standard 1060 and bear the ARI certification symbol for ARI Air-to Air Energy Recovery Ventilation Equipment Certification Program based on ARI 1060. Ratings "in accordance with 1060" or "through a certification program conducted in accordance to ARI 1060" without certification or bearing the ARI certification symbol are not acceptable. Desiccant shall be silica gel for maximum latent energy transfer. Wheel shall be constructed of lightweight polymer media to minimize shaft and bearing loads. Polymer media shall be mounted in a stainless-steel rotor for corrosion resistance. Because of weight and maintenance issues, single piece aluminum wheel construction not allowed. Wheel bearing shall have a minimum life rating of L(10) 400,000 hrs, equivalent to L(50) 2,000,000 hrs.
- Silica gel desiccant shall be permanently bonded to wheel media to retain latent heat capability after cleaning. Wheels with sprayed on desiccant coatings or with desiccant applied after wheel formation shall not be acceptable. Energy Recovery wheel shall transfer moisture entirely in the vapor phase. Energy Recovery wheel shall be in the upright position.
  - Wheel design shall consist of removable segments (on diameters 36 inches and greater) for ease of service and/or cleaning. Energy Recovery drive belt material shall be high strength urethane and shall be factory installed in a pre-stretched state, eliminating the need for field belt tension adjustment. Link style belts are not acceptable.
- 3.3.6 Access Doors: All components shall be easily accessible through removable doors for exhaust, supply, filter and damper compartments. Energy Recovery wheels (smaller than 58 inches) shall be mounted in a slide-out track for ease of inspection, removal and cleaning.
- 3.3.7 Fans Sections: Exhaust fans shall be a direct drive single width, single inlet (SWSI) airfoil centrifugal fan. Bearing shall be selected for a minimum L(10) life in excess of 100,000 hours, equivalent to L(50) 500,000 hours, at maximum cataloged operating speeds.
- Supply fans shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.

- All blower wheels shall be statically and dynamically balanced. Ground and polished steel fan shafts shall be mounted in pillow block housing. Bearing shall be selected for a minimum L (10) life in excess of 80,000 hours, equivalent to L (50) 400,000 hours at maximum cataloged operating speeds.
- Separate motors for exhaust and supply blowers shall be provided. Adjustable sheaves on belt-driven fans with motors less than 10hp shall allow independent balancing of exhaust and supply airflow. Exhaust fan and motor assemblies are mounted to unit base with 1-inch deflection free standing spring isolators. Fans shall be located in draw-through position in reference to the Energy Recovery wheel.
- Supply and exhaust fans shall be direct drive.

3.3.8 Motors and Drives: The exhaust fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency. The unit DDC controller shall provide building static pressure control. The unit controller shall provide proportional control of the exhaust fans from 25% to 100% of the supply air fan designed airflow to maintain the adjustable building pressure setpoint. The field shall mount the required sensing tubing from the building to the factory mounted building static pressure sensor.

The supply fan motor shall be T Frame and open drip proof. Overload protection and speed control is provided by the factory installed VFD and rooftop unit controller. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase.

3.3.9 Filters: Supply and exhaust air filters shall be 2-inch-thick pleated fiberglass, MERV 8, 30% efficient and tested to meet UL Class 2. Filter racks shall be die-formed galvanized steel. Both airstreams must be filtered upstream of energy wheel.

3.3.10 Electrical: All internal electrical components shall be factory wired for single point power connection. Units with electric post-wheel heat will be wired with independent power supply. All electrical components shall be UL Listed, Approved or Classified where applicable and wired in compliance with UL1995.

- Weatherproof, integral door interlocking disconnect switch, motor starters, control circuit fusing, control transformer for 24 VAC circuit, and terminal strip shall be supplied as standard components in the control center. Motor starters shall be provided for all fan motors and consist of a contactor with a Class 20 adjustable electronic overload protection.

3.3.11 Roof Curb: An insulated roof curb to be supplied by unit manufacturer for field assembly. Curb shall consist of die formed galvanized steel sections. Curb shall be full perimeter type with gasketing provided for field installation between curb and unit base. Curb capable of accepting field installed isolation (by others). Slope shall be as required to match roof surface. Curb height is as required to leave 12" of curb exposed *above* the finished roof surface.

- 3.3.12 Electric heat shall be ETL listed and fused per NEC over 48 amps. Electric post heater includes separate non-fused disconnect for field wiring. SCR controls operate to maintain discharge temperature. Electric heater shall be included air flow switch to shut down heater if air ceases to flow across heater.
- 3.3.13 Unit shall be equipped with a pre-piped and wired air-cooled condensing unit. There shall be no field piping required. System shall be equipped with a liquid-line filter drier, high-pressure manual reset cutout, low-pressure auto-reset cutout, time delay relays for compressor protection, service/charging valves, on-off 3-way valve for hot-gas reheat, and moisture indicating sight glass in addition to items specified below:
- 3.3.14 Evaporator coils shall have copper tubes with permanently expanded aluminum fins, 12 fpi or less. Coils shall be tested in accordance with ARI 410. Evaporator coils shall be placed on stainless steel drain pans with external drain connections.
- 3.3.15 The unit shall have scroll compressor. One of the compressors shall be an inverter compressor providing proportional control. The unit controller shall control the speed of the compressor to maintain the discharge air temperature. The inverter compressor shall have a separate oil pump and low oil safety protection.
- 3.3.16 The system shall come equipped with two thermal expansion valves to control refrigerant flow.
- 3.3.17 Condensing fans shall be direct drive, statically and dynamically balanced, and AMCA Licensed for Air Performance. Multiple condensing fans shall be supplied to allow fan cycling for head pressure control.
- 3.3.18 Condensing coils shall be included as part of integral refrigeration system.
- 3.3.19 Integral DX cooling shall include single row hot-gas reheat coil for neutral air discharge. Coil shall be rated in accordance with ARI 410.
- 3.3.20 The cooling section shall utilize R410a refrigerant.
- 3.4 Controls:
- 3.4.1 Energy recovery ventilator shall include DDC controller and all sensors required for discharge air temperature and dew point control. DDC controller shall include internal time clock to energize unit when occupied or can be controlled from a signal from others. Controller shall have LCD readout for changing set points and monitoring unit operation at the control center.
- 3.4.2 DDC controller shall interface with BMS system through Lon works FFT-10A, Modbus-RTU (over RS-485), BACnet IP, BACnet MS/TP. When in economizer mode, energy wheel shall stop rotating to allow free cooling based on outdoor air temperature, enthalpy.
- 3.4.3 A timed exhaust sequence shall be preprogrammed to defrost energy wheel. Outdoor air temperature sensor and pressure switch across energy wheel shall be provided by unit

manufacturer to engage frost control. Both sensors are to be satisfied to employ frost control. Frost control strategies employed via outdoor air temperature sensor only are not acceptable.

3.4.4 Pressure sensors shall be provided on both return air and outdoor air [pre-filters, final filters, both pre-filters and final filters.

3.4.5 Rotation sensor shall be included to monitor wheel rotation.

3.4.6 Factory mounted and wired current sensor shall be provided to signal an increase in current draw above set point is detected in exhaust fan circuit.

3.4.7 Factory mounted and wired current sensor shall be provided to signal an increase in current draw above set point is detected in supply fan circuit.

### 3.5 START UP

3.5.1 Provide services of a factory-trained representative to start-up equipment. Contractor shall assist and cooperate with factory representative as required. Coordinate start-up with TAB and bas contractors. Start-up equipment in accordance with manufacturer's instructions. Refer to Section 200100, "General Provisions-Mechanical" for additional start-up procedures.

- Ensure filters are installed prior to initial start-up; do not start-up or operate equipment without filters in place. Filters shall remain in place through the duration of construction.
- Provide and install new filters upon turn over to Owner.

3.5.2 Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

### 3.6 TRAINING

3.6.1 Provide services of manufacturer's service representative to instruct owner's personnel in operation and maintenance of rooftop air handling units. Training to include start-up and shut-down, servicing and preventative maintenance schedules and procedures, and troubleshooting procedures, and procedures for obtaining replacement parts and technical assistance. Review operating and maintenance data contained in the operating and maintenance manuals specified in Division One. Allow up to 4 hours of training with owner; schedule at least 7 days prior notice.

## **PART 4 - AIR FLOW DAMPERS:**

4.1 ACCEPTABLE MANUFACTURERS: Greenheck or approved equal.

4.2 LEAKAGE: Dampers shall have a maximum leakage of 6 cfm/ sq. ft. @ 4 in. wg or 3 cfm/ sq. ft. @ 1 in. wg. Damper shall meet or exceed the IECC (International Energy Conservation Code) requirements for damper leakage ratings of 3 cfm per sq. ft. @ 1 in. wg or 8 cfm per sq. ft @ 4 in. wg or less when integral to the building envelope.

- 4.3 DIFFERENTIAL PRESSURE: Dampers shall have a maximum differential pressure rating of 4 in. wg. (1kPa)
- 4.4 VELOCITY: Dampers shall have a maximum velocity rating of 3000 fpm (15.2 m/s).
- 4.5 FRAME: On AMD-42 damper frame shall be galvanized steel formed into a 5" x 1" structural hat channel with a 16 ga. thickness.
- 4.6 BLADES: Damper blades shall be a fabricated airfoil shape with metal blade to blade overlay. Each blade shall be symmetrical relative to its axle pivot point, presenting identical performance characteristics with air flowing in either direction through the damper. Blade orientation is horizontal, and operation is parallel.
- 4.7 BLADE STOPS: Each blade stop (at top and bottom of damper frame) shall occupy no more than ½" of the damper opening area to allow for maximum free area and to minimize pressure loss across the damper.
- 4.8 SEALS: Blade Edge: TPE blade seals come standard which are mechanically fastened to each blade. Jamb: 304 stainless steel.
- 4.9 LINKAGE: Concealed in frame out of the airstream, plated steel material.
- 4.10 AXLES: Minimum ½ inch dia. plated steel. Stainless steel axle is optional. Removable control shaft extends 6" beyond the damper frame.
- 4.11 BEARINGS: Synthetic bearings are provided standard.
- 4.12 SLEEVE: 12 inch 20 gauge sleeve provided standard with air straightener mounted in the sleeve.
- 4.13 CONTROLLER: Lon based programmable controller provides
- 0-10 VDC feedback for airflow, temperature, and positions of the blade
  - 0-10 VDC for setpoints
  - 2-10 VDC or 4-20 mAdc is available as an option.
- 4.14 Air straightener contained in sleeve attached to the damper frame.
- 4.15 FINISH: Mill Galvanized finish is standard.
- 4.16 TEMPERATURE RATING: -20° F to 180° F (-29° C to 82° C).
- 4.17 MOUNTING: The AMD-42 is suitable for horizontal airflow applications.
- 4.18 ACTUATORS: Type: Electric, 24V AC, modulating, fail close; Mounting: External
- 4.19 FLANGES: 1-1/2 inches, rolled formed as part of the sleeve.

- 4.20 Examine areas to receive dampers. Notify the Engineer of conditions that would adversely affect installation or subsequent utilization of dampers. Do not proceed with installation until unsatisfactory conditions are corrected.
- 4.21 Install dampers in accordance with manufacturer's Installation Instructions.
- 4.22 Dampers must be accessible to allow inspection, adjustment, and replacement of components. The sheet metal contractor shall furnish any access doors in ductwork or plenums required to provide this access. The general contractor shall furnish any access doors required in walls, ceilings, or other general building construction.
- 4.23 Install dampers square and free from racking.
- 4.24 The installing contractor shall provide and install bracing for multiple section assemblies to support assembly weight and to hold against system pressure.
- 4.25 Do not compress or stretch the damper frame into the duct or opening.
- 4.26 Attach multiple damper section assemblies together in accordance with manufacturer's instructions. Install support mullions as reinforcement between assemblies as required.
- 4.27 Handle dampers using the frame or sleeve. Do not lift or move dampers using blades, actuator or jackshaft.
- 4.28 Install connections to electric actuators as specified in section CONTROLS.

**END OF SECTION**



Point Name	Hardware Points				Software Points					Show on Graphic
	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	
Total Hardware ( 0 )					Total Software ( 15 )					

### **PART 33 – SUMP PUMP**

33.1 The DDC System shall monitor elevator drainage status and alarm.

### **PART 34 – UTILITY CONSUMPTION METERS (REFER TO ELECTRICAL SPECIFICATIONS):**

34.1 All new building projects shall include consumption meters for all incoming utilizes serving that particular building. All meters shall be IP addressable and shall be connected via TC/IP to the central campus BMS system at the Central Plant Coordinate with the NKU project manager on any direct connection/integration desired with the Intelligent Building System. Coordinate level of expectation and acceptable quality/brands of meters with NKU project manager.

### **PART 35 – AIR FLOW DAMPERS (AFDs) OUTSIDE AIR CONTROL**

35.1 Outside air for floors 3,4, and 5 shall maintain a constant flow via the airflow dampers.

- AFD-O1-3 (910 cfm)
- AFD-O1-4 (910 cfm)
- AFD-O1-5 (910 cfm)
- AFD-O2-3 (955 cfm)
- AFD-O2-3 (955 cfm)
- AFD-O2-5 (955 cfm)

35.2 Coordinate CFM settings with Test and Balance Contractor and power requirements with electrical contractor

35.3 All air flow dampers shall be displayed and adjustable through the individual graphic pages.

### **PART 36 – UTILITY METERS:**

36.1 Provide gas meter and monitor gas building usage and totalize consumption at the BAS.

36.2 Provide domestic water meter and monitor water usage and totalize consumption.

### **PART 37 – GEOTHERMAL LOOP ENERGY MONITORING:**

37.1 Install temperature sensors on the supply and return of the geothermal loop to the building to be trended at the BAS.

37.2 Install flow meters in the returns of the geothermal loop from the building to be trended at the BAS. Coordinate pipe diameters required before and after the flow meter with manufacturer.

- 37.3 Provide and install a packaged BTUH meter system for the geothermal loop serving the building. The BAS shall measure and record gpm, "peek" gpm with time and date, BTUs, instantaneous BTUH, "peek" BTUH with time and date & OA temperature.

***PART 38 – DRYER VENTILATION DAMPERS***

- 38.1 Provide a motorized damper in each make-up air plenum (2 total) for the owner provided dryers (9 total). Interlock the damper when any of the dryers is in operation (One (1) OA damper interlocks to four (4) dryers. One (1) OA damper interlocks to five (5) dryers). Indicate damper status on the building automation graphics.

**END OF SECTION**