

ADDENDA

TO ALL BIDDERS OF THE
WOODROW WILSON HIGH SCHOOL HOME ECONOMICS CLASSROOM RENOVATIONS
FOR
CAMDEN CITY BOARD OF EDUCATION
CAMDEN COUNTY, NEW JERSEY

ADDENDUM NO. 1

You are hereby notified in accordance with the paragraph entitled "Interpretation and Addenda" of the above captioned project that the following has been issued to clarify the meaning of the specifications and the conditions and specifications set forth in said addendum are to be considered as binding as if the same was set forth in the original contract documents.

ATTACH THIS ADDENDUM TO THE SPECIFICATIONS WHEN SUBMITTING BID.

A. General

1. The Bid Opening has been changed from Wednesday, March 23, 2022 at 10:00AM to ***Wednesday, March 23, 2022 at 11:00AM Via Zoom.***
2. Item # 26-E on sheets A-2.0, A-2.1, and A-3.0 shall be ADD ALTERNATE A3 – NEW LIGHTING FIXTURE. MODEL # LCAT24 AS MANUFACTURED BY COLUMBIA LIGHTING, OR APPROVED EQUAL. SEE ELECTRICAL SPECIFICATIONS.

B. Specifications

1. The attached specification section "15733 - VARIABLE REFRIGERANT SYSTEM" is hereby amended to the contract specifications.
2. The attached specification section "15940 - SEQUENCE OF OPERATIONS" is hereby amended to the contract specifications.

C. Drawings

1. The below drawings have been re-issued and is attached to this addendum.
 - M-2.1 (Mechanical Floor Plan)
 - M-4.1 (Mechanical Schedules)

I acknowledge receipt of this Addendum:

Signature

Company

SECTION 15733 – VRF EQUIPMENT AND CONTROLS

PART 1 – GENERAL

1.01 SYSTEM DESCRIPTION DOAS HEATING/COOLING HEAT PUMP WITH REHEAT

The split system (DOAS) shall consist of one VRF (Variable Refrigerant Flow) outside unit connected to one BC Controller (or comparable branch device), and one ducted indoor unit. The DOAS shall be provided with the capability to reheat air using recovered energy from the primary cooling coil or provide a primary cooling coil only. The DOAS shall be of a split system type.

Per the equipment schedule, the VRF DOAS system basis of design is Mitsubishi Electric CITY MULTI VRF (Variable Refrigerant Flow) zoning system(s). Acceptable alternative manufacturers, assuming compliance with these equipment specifications, are Daikin, Panasonic, and Hitachi. Contractor bidding an alternate manufacturer does so with full knowledge that that manufactures product may not be acceptable or approved and that contractor is responsible for all specified items and intents of this document without further compensation.

1.02 QUALITY ASSURANCE

1. The units shall be listed by Electrical Testing Laboratories (ETL) and bear the ETL label.
2. All wiring shall be in accordance with the National Electrical Code (N.E.C.).
3. The units shall be manufactured in a facility registered to ISO 9001 and ISO14001 which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).
4. All units must meet or exceed the 2010 Federal minimum efficiency requirements and the ASHRAE 90.1 efficiency requirements for VRF systems. Efficiency shall be published in accordance with the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Standard 1230.
5. System start-up supervision shall be a required service to be completed by the manufacturer or a duly authorized, competent representative that has been factory trained in system configuration and operation. The representative shall provide proof of manufacturer certification indicating successful completion within no more than two (2) years prior to system installation. This certification shall be included as part of the equipment and/or controls submittals.

1.03 DELIVERY, STORAGE AND HANDLING

1. Unit shall be stored and handled according to the manufacturer's recommendation.

Part 2 - Warranty

The CITY MULTI units shall be covered by the manufacturer's limited warranty for a period of one (1) year parts and seven (7) year compressor to the original owner from date of installation.

Installing contractor shall meet manufacturer requirements to obtain extended manufacturer's limited parts and compressor warranty for a period of ten (10) years to the original owner from date of installation. This warranty shall not include labor.

Manufacturer shall have a minimum of fifteen (15) years continuous experience providing VRF systems in the U.S. market.

All manufacturer technical and service manuals must be readily available for download by any local contractor should emergency service be required. Registering and sign-in requirements which may delay emergency service reference are not allowed.

The CITY MULTI VRF system shall be installed by a contractor with extensive CITY MULTI install and service training. The mandatory contractor service and install training should be performed by the manufacturer.

Part 3 - Controls

3.01 OVERVIEW

The control system shall consist of a low voltage communication network and a web-based interface. The controls system shall gather data and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.

Furnish energy conservation features such as optimal start, request-based logic, and demand level adjustment of overall system capacity as specified in the sequence.

System shall be capable of email generation for remote alarm annunciation.

3.02 ELECTRICAL CHARACTERISTICS

General:

1. Controller power and communications shall be via a common non-polar communications bus and shall operate at 30VDC.

Wiring:

1. Control wiring shall be installed in a daisy chain configuration from indoor unit to indoor unit, to the BC controller (main and subs, if applicable) and to the outdoor unit. Control wiring to remote controllers shall be run from the indoor unit terminal block to the controller associated with that unit.
2. Control wiring for centralized controllers shall be installed in a daisy chain configuration from outdoor unit to outdoor unit, to the system controllers (centralized controllers and/or integrated web based interface), to the power supply.

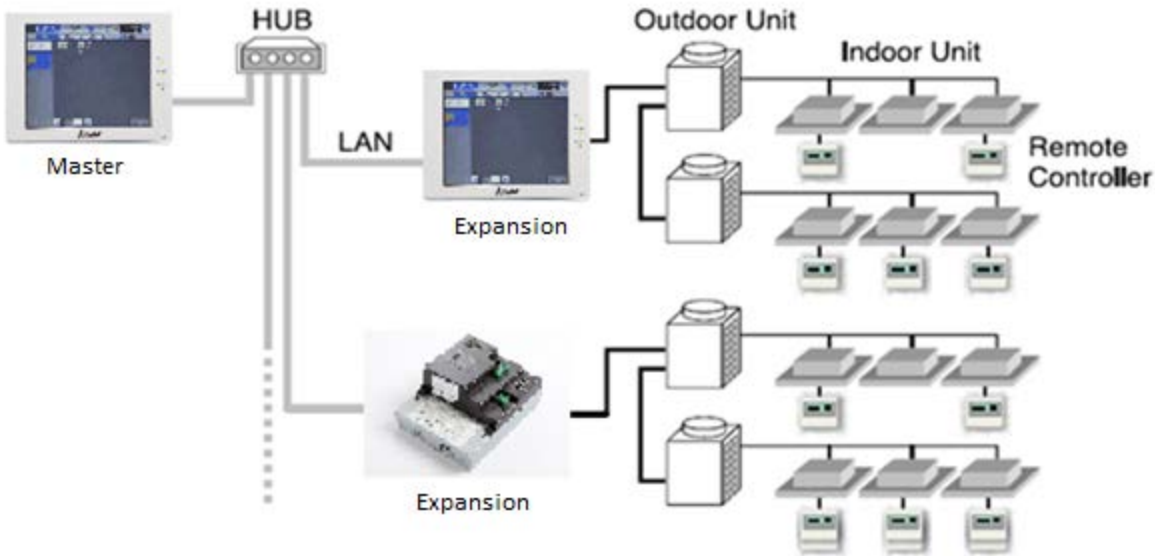
Wiring type:

1. Wiring shall be 2-conductor (16 AWG), twisted, stranded, shielded wire as defined by the Diamond System Builder output.
2. Network wiring shall be CAT-5 with RJ-45 connection.

3.03 CITY MULTI CONTROLS NETWORK

1. The CITY MULTI Controls Network (CMCN) consists of remote controllers, centralized controllers, and/or integrated web based interface communicating over a high-speed communication bus. The CITY MULTI Controls Network shall support operation monitoring, scheduling, occupancy, error email distribution, personal web browsers, tenant billing, online maintenance support, and integration with Building Management Systems (BMS) using either LonWorks® or BACnet® interfaces. The below figure illustrates a sample CMCN System Configuration.

CMCN System Configuration



3.04 CENTRALIZED CONTROLLER (WEB-ENABLED)

Master Centralized Controller:

1. The Master Centralized Controller shall be capable of controlling a maximum of two hundred (200) indoor units across multiple CITY MULTI outdoor units with the use of three expansion controllers. The Master Centralized Controller shall be approximately 11-5/32" x 7-55/64" x 2-17/32" in size and shall be powered with an integrated 100-240 VAC power supply. The Master Centralized Controller shall support system configuration, daily/weekly scheduling, monitoring of operation status, night setback settings, free contact interlock configuration and malfunction monitoring. When being used alone without the expansion controllers, the Master Centralized Controller shall have five basic operation controls which can be applied to an individual indoor unit, a collection of indoor units (up to 50 indoor units), or all indoor units (collective batch operation). This basic set of operation controls for the Master Centralized Controller shall include on/off, operation mode selection (cool, heat, auto (R2/WR2-Series only), dry, setback (R2/WR2-Series only) and fan), temperature setting, fan speed setting, and airflow direction setting. Since the master provides centralized control it shall be able to enable or disable operation of local remote controllers. In terms of scheduling, the Master Centralized Controller shall allow the user to define both daily and weekly schedules (up to 24 scheduled events per day) with operations consisting of ON/OFF, mode selection, temperature setting, air flow (vane) direction, fan speed, and permit/prohibit of remote controllers.

Master Centralized Controller			
Item	Description	Operation	Display
ON/OFF	Run and stop operation.	Each Block, Group or Collective	Each Group or Collective

Master Centralized Controller			
Item	Description	Operation	Display
Operation Mode	Switches between Cool/Dry/Auto/Fan/Heat. (Group of Lossnay unit: automatic ventilation/vent-heat/interchange/normal ventilation) Operation modes vary depending on the air conditioner unit. Auto mode is available for the R2/WR2-Series only.	Each Block, Group or Collective	Each Group
Temperature Setting	Sets the temperature from 57°F – 87°F depending on operation mode and indoor unit.	Each Block, Group or Collective	Each Group
Fan Speed Setting	Available fan speed settings depending on indoor unit.	Each Block, Group or Collective	Each Group
Air Flow Direction Setting	Air flow direction settings vary depending on the indoor unit model. *1. Louver cannot be set.	*1 Each Block, Group or Collective	Each Group
Schedule Operation	Annual/weekly/today schedule can be set for each group of air conditioning units. Optimized start setting is also available. *1. The system follows either the current day, annual schedule, or weekly, which are in the descending order of overriding priority. Twenty-four events can be scheduled per day, including ON/OFF, Mode, Temperature Setting, Air Direction, Fan Speed and Operation Prohibition. Five types of weekly schedule (seasonal) can be set. Settable items depend on the functions that a given air conditioning unit supports.	*2 Each Block, Group or Collective	Each Group
Optimized Start	Unit starts 5 - 60 minutes before the scheduled time based on the operation data history in order to reach the scheduled temperature at the scheduled time.	Each Block, Group or Collective	Each Block, Group or Collective
Night Setback Setting	The function helps keep the indoor temperature in the temperature range while the units are stopped and during the time this function is effective.	Each Group	Each Group
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Reset filter). *3. Centrally Controlled is displayed on the remote controller for prohibited functions.	Each Block, Group or Collective	*3 Each Group

Master Centralized Controller			
Item	Description	Operation	Display
Room Temp	Displays the room temperature of the group. Space temperature displayed on the indoor unit icon on the touch screen interface.	N/A	Each Group
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed *4. When an error occurs, the LED flashes. The operation monitor screen shows the abnormal unit by flashing it. The error monitor screen shows the abnormal unit address, error code and source of detection. The error log monitor screen shows the time and date, the abnormal unit address, error code and source of detection	N/A	*4 Each Unit or Collective
Outdoor Unit Status	Compressor capacity percentage and system pressure (high and low) pressure (excludes S-Series)	Each ODU	Each ODU
Connected Unit Information	MNET addresses of all connected systems	Each IDU, ODU and BC	Each IDU, ODU and BC
Ventilation Equipment	This interlocked system settings can be performed by the master system controller. When setting the interlocked system, use the ventilation switch the free plan LOSSNAY settings between “Hi”, “Low” and “Stop”. When setting a group of only free plan LOSSNAY units, you can switch between “Normal ventilation”, “Interchange ventilation” and “Automatic ventilation”.	Each Group	Each Group
Multiple Language	Other than English, the following languages can be selected: Spanish, French, Japanese, Dutch, Italian, Russian, Chinese, and Portuguese.	N/A	Collective
External Input / Output	By using accessory cables you can set and monitor the following. Input By level: “Batch start/stop”, “Batch emergency stop” By pulse: “batch start/stop”, “Enable/disable remote controller” Output: “start/stop”, “error/Normal” *5. Requires the external I/O cables (PAC-YG10HA-E) sold separately.	*5 Collective	*5 Collective

2. All Master Centralized Controllers shall be equipped with two RJ-45 Ethernet ports to support interconnection with a network PC via a closed/direct Local Area Network (LAN) or to a network switch for IP communication to up to three expansion controllers for display of up to two hundred (200) indoor units on the main master centralized controller interface.
3. The Master Centralized Controller shall be capable of performing initial settings via the high-resolution, backlit, color touch panel on the controller or via a PC browser using the initial settings.
4. Standard software functions shall be available so that the building manager can securely log into each master centralized controller via the PC's web browser to support operation monitoring, scheduling, error email, interlocking and online maintenance diagnostics. Additional optional software functions of personal browser for PCs and MACs and Energy shall be available but are not included. The Energy Apportionment function shall require a LIC-Charge software license

Expansion Controller:

1. The Expansion Controller shall serve as a standalone centralized controller or as an expansion module to the Master Centralized Controller for the purpose of adding up to 50 indoor units to either the main touch screen interface of the master centralized controller. Up to three (3) expansion controllers can be connected to the master via a local IP network (and their IP addresses assigned on the master) to the master to allow for up to two hundred (200) indoor units to be monitored and controlled from the master interface.
2. The expansion controllers have all of the same capabilities to monitor and control their associated indoor units as the features specified above. Even when connected to the master and configured to display their units on the main controller, the individual indoor units connected to the expansion can still be monitored and controlled from the interface of the expansion. The last command entered will take precedence, whether at the wall controller, the expansion or the master Centralized Controller.

Non Touch Screen, Networked Centralized Controller:

- The Non Touch Screen, Networked Centralized Controller shall be capable of controlling a maximum of 50 indoor units across multiple CITY MULTI outdoor units. The controller shall be approximately 8-1/2"x10" in size and shall be powered by its internal power supply. The controller shall support system configuration, daily/weekly scheduling, monitoring of operation status, free contact interlock configuration and malfunction monitoring. The controller shall have five basic operation controls which can be applied to an individual indoor unit, a group of indoor units (up to 50 indoor units), or all indoor units (collective batch operation). This basic set of operation controls for the controller shall include on/off, operation mode selection (cool, heat, auto (R2/WR2-Series only), dry, temperature setting, fan speed setting, and airflow direction setting. Since the controller provides centralized control it shall be able to enable or disable operation of local remote controllers. In terms of scheduling, the controller shall allow the user to define both daily and weekly schedules with operations consisting of ON/OFF, mode selection, temperature setting, air flow (vane) direction, fan speed, and permit/prohibit of remote controllers.

Non Touch Screen, Networked Centralized Controller			
Item	Description	Operation	Display
ON/OFF	Run and stop operation.	Each Block, Group or Collective	Each Group or Collective
Operation Mode	Indoor unit modes: COOL/DRY/FAN/AUTO/HEAT. Lossnay unit modes: HEAT RECOVERY/BYPASS/AUTO Air to water (PWFY) modes: HEATING/HEATING ECO/HOT WATER/ANTI-FREEZE/COOLING *Operation modes vary depending on the unit model connected. ** Auto mode is available for the R2/WR2-Series only.	Each Block, Group or Collective	Each Group
Temperature Setting	Sets the temperature from 40°F – 95°F depending on operation mode and indoor unit model. Separate COOL and HEAT mode set points available depending on remote controller and connected mechanical equipment.	Each Block, Group or Collective	Each Group
Set Temperature Range Limit	The range of room temperature setting can be limited by the initial setting depending on the indoor unit connected.	Each Group	Each Group
Fan Speed Setting	Available fan speed settings depend on indoor unit model.	Each Block, Group or Collective	Each Group
Air Flow Direction Setting	*Air flow direction settings vary depending on the indoor unit model. *1. Louver cannot be set.	*1 Each Block, Group or Collective	Each Group

Non Touch Screen, Networked Centralized Controller			
Item	Description	Operation	Display
Schedule Operation	Annual/weekly/today schedule can be set for each group of air conditioning units. Optimized start setting is also available. *2. The system follows either the current day, annual schedule, or weekly, which are in the descending order of overriding priority. Twenty-four events can be scheduled per day, including ON/OFF, Mode, Temperature Setting, Air Direction, Fan Speed and Operation Prohibition. Five types of weekly schedule (seasonal) can be set. Settable items depend on the functions that a given air conditioning unit supports.	*2 Each Block, Group or Collective	Each Group
Hold	Disables scheduled functions for indoor unit groups and their associated remote controller timers. *not available for general equipment	Each Block, Group or Collective	Each Group
Optimized Start	Unit starts 5 - 60 minutes before the scheduled time based on the operation data history in order to reach the scheduled temperature at the scheduled time.	Each Block, Group or Collective	Each Block, Group or Collective
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Fan Speed, Air Direction and Reset filter). *3. Centrally Controlled is displayed on the remote controller for prohibited functions.	Each Block, Group or Collective	*3 Each Group
Room Temp	Displays the room temperature of the group.	N/A	Each Group
Room Humidity	Displays the percent relative humidity in the space as sensed by the Smart ME Remote Controller	N/A	Each Group
Occupancy Sensor	Displays the occupancy icon on the group icon in the condition list page when the room is occupied (blue) or vacant (gray). *The Smart ME Remote Controller Occupancy sensor is required.	N/A	Each Group
Brightness Sensor	Displays the brightness icon on the group icon in the condition list when the space is determined to be bright (yellow) or dark (gray). *The Smart ME Remote Controller Brightness sensor is required.	N/A	Each Group
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed *4. When an error occurs, the LED flashes. The operation monitor screen shows the abnormal unit by flashing it. The error monitor screen shows the abnormal unit address, error code and source of detection. The error log monitor	N/A	*4 Each Unit or Collective

Non Touch Screen, Networked Centralized Controller			
Item	Description	Operation	Display
	screen shows the time and date, the abnormal unit address, error code and source of detection		
Ventilation Equipment	This interlocked system settings can be performed by the master system controller. When setting the interlocked system, use the ventilation switch the free plan LOSSNAY settings between “Hi”, “Low” and “Stop”. When setting a group of only free plan LOSSNAY units, you can switch between “Normal ventilation”, “Interchange ventilation” and “Automatic ventilation”.	Each Group	Each Group
Multiple Language	Other than English, the following languages can be selected: Spanish, French, Japanese, German, Italian, Russian, Chinese, and Portuguese.	N/A	N/A
External Input / Output	By using accessory cables you can set and monitor the following. Input: By level: “Batch start/stop”, “Batch emergency stop”; By pulse: “batch start/stop”, “Enable/disable remote controller” Output: “start/stop”, “error/Normal” *5. Requires the external I/O cables (PAC-YG10HA-E) sold separately.	*5 Collective	*5 Collective
M-Net	The "M-NET" LED lights, when AC power supply is turned ON. The LED blinks while M-NET is communicating.	N/A	Each Group (LED)
Collective ON/OFF	All the units can be operated / stopped with a DIP switch.	Collective	N/A
Measurement	Displays the Temperature and Humidity inputs of the AI Board. Supports graph display and data export.	N/A	Each Unit
AHC Status	Displays the status of the of the inputs and outputs of each Advanced HVAC Controller (DC-A2IO)	N/A	Each Unit
Free Contact Status	Displays the input/output status of the Free Contacts on the indoor units	N/A	Each Unit
Free Contact Interlock Control	Operation of indoor groups, general equipment or free contact outputs based on group(s) conditions or free contact(s) input states.	Each Group, Output or Collective	N/A
Data Back-up (PC)	Initial setting data can be exported to a PC.	Collective	N/A

2. All Non Touch Screen, Networked Centralized Controller shall be equipped with two RJ-45 Ethernet port to support interconnection with a network PC and BACnet/IP communication via a closed/direct Local Area Network (LAN). The controller shall be capable of performing initial settings online via a PC using the controller's initial setting browser or online/offline with the Initial Setting Tool.
3. Standard software functions shall be available so that the building manager can securely log into each controller via the PC's web browser to support operation monitoring, scheduling, error email, interlocking and online maintenance diagnostics. Standard software functions shall not expire. Additional optional software functions of personal browser for PCs and MACs and Energy Allocation shall be available. The Energy Allocation function shall require Master Centralized Controller Energy Allocation Integrated System in conjunction with Non Touch Screen, Networked Centralized Controller.

3.05 GRAPHICAL USER INTERFACE

The Graphical User Interface (Integrated Centralized Control Web) shall require a field supplied PC or Tablet.

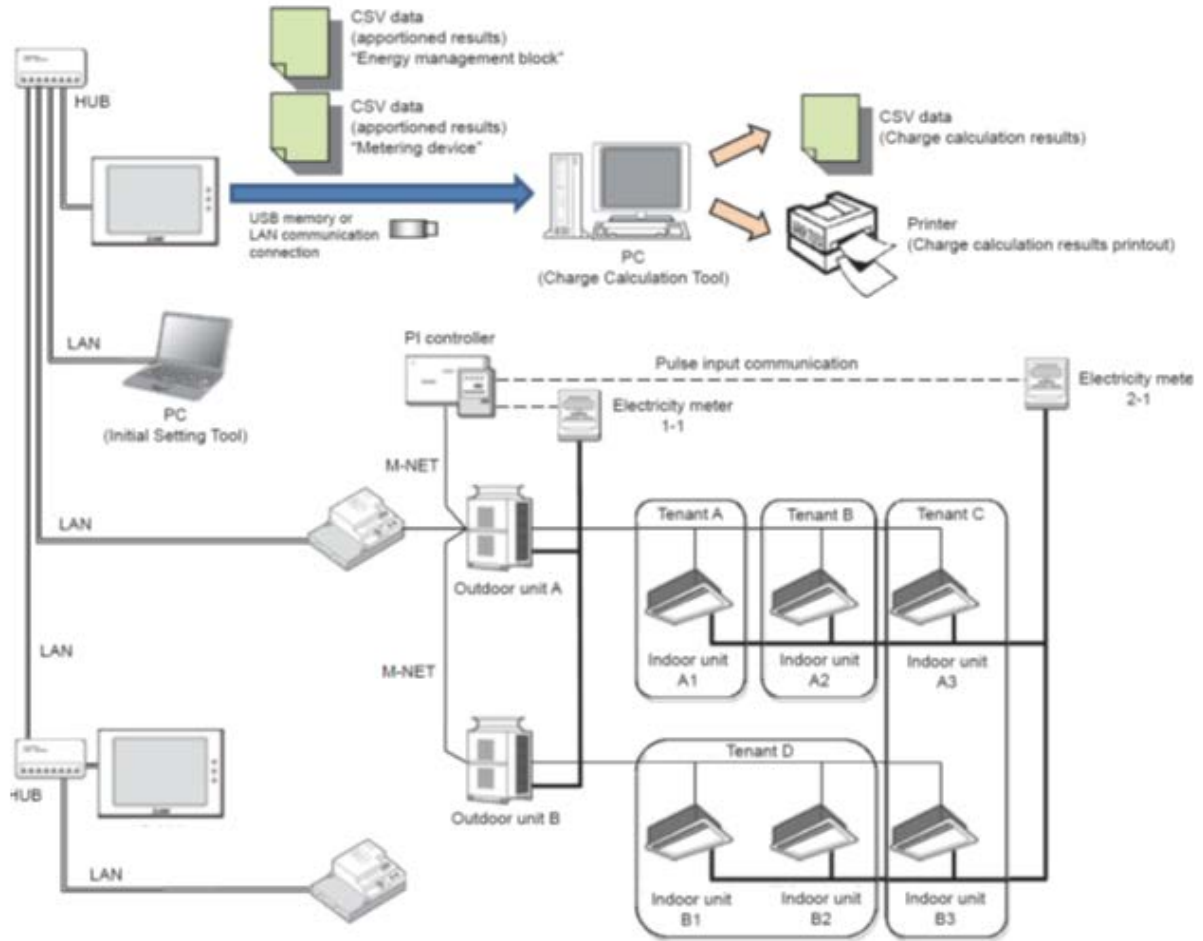
ICCW

1. The Integrated Centralized Control Web System (ICCW) interface shall enable the user to control multiple networked central controllers and shall provide additional functions such as energy apportionment from a single network PC configured with the Charge Calculation Tool. The ICCW shall be capable of controlling up to forty networked Centralized Controllers with a maximum of 2,000 indoor units across multiple CITY MULTI outdoor units. The ICCW shall be required if the user wants to simultaneously control more than 1 Centralized Controllers from a single PC or tablet using a single web browser session. Licensing per function, per Centralized Controller shall be required for the ICCW. Optional software features shall be available through the ICCW including energy apportionment and personalized web. These optional software features shall require the ICCW, advance purchase from the customer, and licensing from ICCW.

ICCW (Integrated System Software)	
Item	Details
ON/OFF	The units can turn ON and OFF for all floors or in a block, floor, or group of units.
Operation Modes	The operation mode can be switched between COOL, DRY, FAN, AUTO, and HEAT for all floors or in a block, floor, or group of units
Temperature Setting	Sets the temperature for a single group. Range of Temperature setting from 57°F – 87°F depending on operation mode and indoor unit model. Separate COOL and HEAT mode set points available depending on remote controller and connected mechanical equipment.

ICCW (Integrated System Software)	
Item	Details
Fan Speed	The fan speed can be set to four stages for all floors or in a block, floor, or group of units
Air Direction	The air direction can be set in four vertical directions or to swing for all floors or in block, floor, or group of units. (The selectable air direction differs according to the model.)
Interlocked Unit ON/OFF LOSSNAY	If there is an interlocked unit (LOSSNAY), then the unit can be turned ON (strong/weak) or OFF for all floors or in a block, floor, or group of units. (Note that the ventilation mode cannot be selected for interlocked units.)
Local Operation Prohibit	The items for which operation with the local remote controller are to be prohibited can be selected for all floors or in a block, floor, or group of units. (The items that can be prohibited are ON/OFF, operation mode, set temperature and filter sign reset.)
Annual / Weekly Schedule	The annual/weekly schedule function can be used by registering the license. Two settings, such as seasonal settings for summer and winter, can be saved.
Power Rate Apportionment Charging	A watt-hour meter (WHM) with kWh pulse output is connected to calculate the air conditioning charges based on the amount each tenant's air-conditioner has operated. Five charging rates can be applied per day. ***OPTIONAL ENERGY APPORTIONMENT SOFTWARE (LIC-CHARGE) and PI Controller (PAC-Y60MCA) REQUIRED
History	Up to 3,000 items for the error history and up to 10,000 items for operation history can be saved. Each history file can be output as a daily report or monthly report in CSV format. (The operation history consists only of the operations carried out with the ICCW and is limited to some limited operation items.)
Operation Time Monitor	The cumulative operation time of each indoor unit can be viewed or output as a CSV format file. (This function is valid only when the charging function license is registered.)
Filter Sign Display Mask	The filter sign display at the remote controllers can be disabled.
Set Temperature Limit	The set temperature lower limit can be set for cooling and the upper limit for heating. (ME remote controller required)

3.06 ENERGY APPOINTMENT METHOD FOR CITY MULTI CENTRALIZED CONTROLLERS



CMCN System Configuration

System Overview

1. For centralized systems serving multiple tenants for which one-to-one electricity metering is not possible, an apportioned electricity billing function that attributes just the electrical energy consumed by each individual tenant's air conditioner is required. The Energy Apportionment function takes the information on the electrical energy usage gathered from Watt Hour Meters (WHM) connected to dedicated breaker panels serving the system's outdoor units and synthesizes it with the information on the operating status of the indoor units that is collected by the CITY MULTI centralized controller(s).

Watt Hour Meters

1. Requirements:
 - The Watt Hour Meters (WHMs) to be used to read the electrical energy consumption of the outdoor units must be capable of a pulse output, which would be configured based on the current rating of the units. The associated current transformers/ transducers (CTs) must also be sized based on the current rating of either the individual outdoor units or the dedicated air conditioning electrical panels they are to be reading. The proper quantity of meters for a particular sized system must be selected in order to ensure sufficient resolution and hysteresis in the unit pulse output of the meters so as to ascribe an acceptable level of accuracy to the apportionment of energy usage for each tenant's system. The system is designed to work with any WHM capable of a pulse output that meets ANSI C12.20 class 0.2% or 0.5% accuracy standards.
2. Connection:
 - The WHMs are to be physically connected to the integrated pulse input module or an external Mitsubishi Electric PI Controller if such an input is not available or if there is a wiring length limitation or installation hardship. The cable type of the interconnecting wiring shall be according to the wiring specifications of the WHM manufacturer.

CITY MULTI Centralized Controller Requirements

1. Licensing:
 - Each centralized controller to which units are assigned that require the energy apportionment function must have the "LIC-Charge" software license purchased and properly unlocked in order to enable the operating status of the indoor units to be passed to the energy apportionment tool. The procedure for licensing the centralized controllers with this function and the necessary forms can be found on Mitsubishi Electric's technical documentation repository, mylinkdrive.com. Purchase Order information for the licenses will be required at the time of submission of the licensing request forms.
2. Dedicated master centralized controller for apportionment (no MNET connection)
 - A dedicated master centralized controller, for which the LIC-Charge license is purchased and the energy apportionment function enabled, must be provided in order to serve as the portal for exporting metering device and energy management data to a USB drive or to a PC via LAN connection. This means that by virtue of selecting this master centralized controller to serve this function, the MNET capability of this particular centralized controller will be disabled. All indoor units must be physically wired via MNET to other expansion centralized controllers, which must be physically wired via LAN with Static IP addresses and a network hub or switch to the master apportionment controller.

PC for collecting charge calculation results

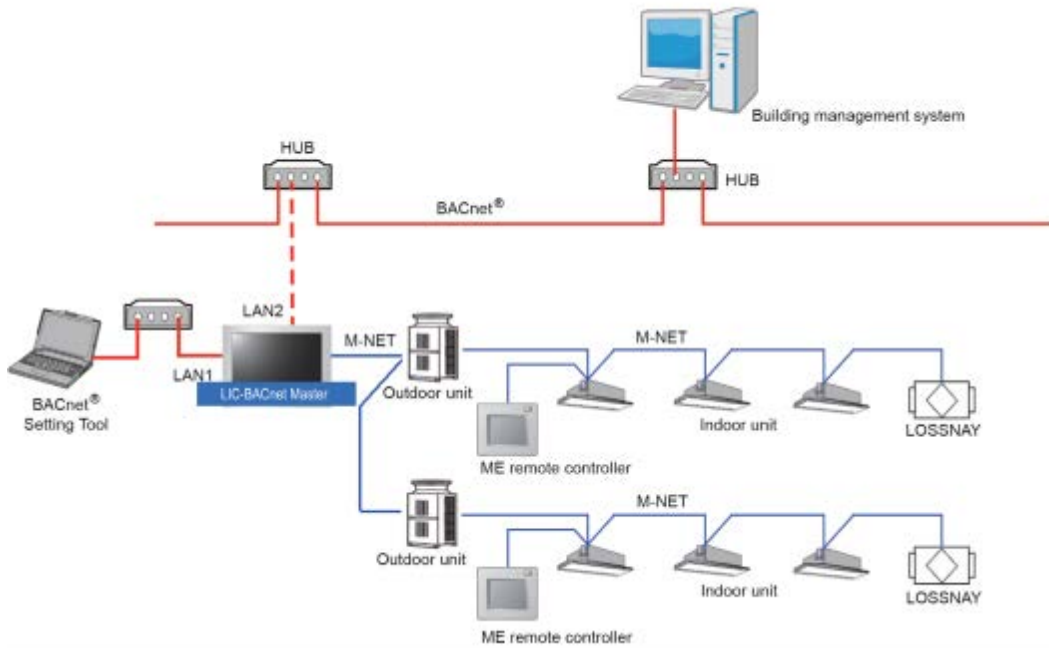
- A networked PC, which does not necessarily have to be dedicated to the task of collecting energy apportionment data, can be provided and loaded with the Charge Calculation Tool software for exporting data necessary to generate billing documentation to be performed by a third party. The system requirements of the PC are as follows:

Item	Requirements
CPU	1 GHz or better (at least 2 GHz recommended)
Memory	2GB or more
Screen Resolution	1024 x 768 or better
OS	Windows 7, Windows 8.1 (32bit/64bit)
System requirements	The system should meet the minimum requirement for Windows 7 or Windows 8.1 <ul style="list-style-type: none">• Net Framework 4.5 or later
Internal LAN port or LAN card	100 BASE-TX or better
Porting device	Mouse, etc.

3.07 CMCN: SYSTEM INTEGRATION

BACnet® Integration:

1. The Mitsubishi Electric Cooling & Heating BACnet® hardware, which is built into all networked central controllers, shall be compliant with BACnet® Protocol (ANSI/ASHRAE 135-2010) and be Certified by the (BTL) BACnet® Testing Laboratories. The BACnet® interface shall support BACnet Broadcast Management (BBMD). The BACnet® interface shall support a maximum of 50 indoor units. Operation and monitoring points include, but are not limited to, on/off, operation mode, fan speed, prohibit remote controller, filter sign reset, alarm state, error code, and error address.
2. Licenses:
 - LIC-BACnet Master: Master Controller license for Master Centralized Controller and Non Touch Screen, Networked Centralized Controller
 - LIC-BACnet Expansion: Expansion Controller license for Expansion Controller and Non Touch Screen, Networked Centralized Controller
3. LIC-BACnet Specifications:
 - Control up to 50 groups
 - 1 to 16 indoor units can be collectively controlled in a group
 - Supports dual set point functionality (connected model dependant)
 - BTL Compliant
 - BACnet communication specifications are based on ANSI/ASHRAE Standards 135-2010
4. PC Requirements:
 - CPU: 1GHz or higher
 - Memory: 1GB or more
 - HDD Space: 100 MB or more
 - Screen Resolution: 1024 x 768 or higher
 - OS: Microsoft Windows 7 32-bit/64-bit, Microsoft 8.1 32-bit/64-bit. Not compatible with Windows Vista
 - Execution Environment: Microsoft .NET Framework 4.5 or later
 - Others: Pointing device such as a mouse, internet connection (required when installing a .NET Framework)
5. LIC-BACnet – System Example



6. BACnet Point List

<u>Object List</u>
On Off Setup
On Off State, Number of ON/OFF, Cumulative operation time
Alarm Signal (4-digit error code)
Error Code
Operational Mode Setup
Operational Mode State
Fan Speed Setup
Fan Speed State
Room Temp [Water Temp]
Set Temp [Set Water Temp]
Set Temp Cool
Set Temp Heat
Set Temp Auto

Filter Sign [Circulating Water Exchange Sign]
Filter Sign Reset [Circulating Water Exchange Sign Reset]
Prohibition On Off
Prohibition Mode
Prohibition Filter Sign Reset [Prohibition Circulating Water Exchange Sign Reset]
Prohibition Set Temperature
M-NET Communication State
System Forced Off
Air Direction Setup
Air Direction State
Set High Limit Setback Temp
Set Low Limit Setback Temp
Ventilation Mode Setup
Ventilation Mode State
Air To Water Mode Setup
System Alarm Signal (4-digit error code)
PI Controller Alarm Signal (4-digit error code)
Group Apportioned Electric Energy
Interlocked Units Apportioned Electric Energy
PI controller Electric Energy 1-4
Pulse Input Electric Energy 1-4
Group Apportionment Parameter
Interlocked Units Apportionment Parameter
Night Purge State
Thermo On Off State

Trend Log Room Temp
Trend Log Group Apportioned Electric Energy
Trend Log Interlocked Units Apportioned Electric Energy
Trend Log PI controller Electric Energy 1-4
Trend Log Pulse Input Electric Energy 1-4
Trend Log Group Apportionment Parameter
Trend Log Interlocked Units Apportionment Parameter

Part 4 - Ventilation Options

4.01 DOAS HEATING/COOLING (HEAT PUMP) WITH REHEAT, AIR-COOLED OUTDOOR UNITS

General:

1. The outdoor unit module shall be air-cooled, direct expansion (DX), unit used specifically with VRF DOAS split system indoor unit described in this section. The outdoor unit modules shall be equipped with a single compressor which is inverter-driven and multiple circuit boards—all of which must be manufactured by the branded VRF manufacturer. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.
2. Outdoor unit shall have a sound rating no higher than 62 dB(A) individually or 62 dB(A) twinned. Units shall have a sound rating no higher than 51 dB(A) individually or 54 dB(A) twinned while in night mode operation. If an alternate manufacturer is selected, any additional material, cost, and labor to meet published sound levels shall be incurred by the contractor.
3. Refrigerant lines from the outdoor unit to the indoor units shall be insulated in accordance with the installation manual.
4. The outdoor unit shall have the capability of installing the main refrigerant piping through the bottom of the unit.
5. The outdoor unit shall have an accumulator with refrigerant level sensors and controls.
6. The outdoor unit shall have a high pressure safety switch, over-current protection, crankcase heater and DC bus protection.
7. VRF system shall meet performance requirements per schedule and be within piping limitations & acceptable ambient temperature ranges as described in respective manufacturers' published product catalogs. Non-published product capabilities or performance data are not acceptable.
8. The outdoor unit shall be capable of guaranteed operation in heating mode down to -4°F ambient temperatures and cooling mode up to 109°F without additional restrictions on line length & vertical separation beyond those published in respective product catalogs. Models with capacity data for required temperature range published as “for reference only” are not considered capable of guaranteed operation and are not acceptable. If an alternate manufacturer is selected, any additional material, cost, and labor to meet ambient operating range and performance shall be incurred by the contractor.

9. The outdoor unit shall have a high efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained. Oil return sequences must be enabled only during extended periods of reduced refrigerant flow to ensure no disruption to correct refrigerant flow to individual zones during peak loads. Systems which might engage oil return sequence based on hours of operation risk oil return during inopportune periods are not allowed. Systems which rely on sensors (which may fail) to engage oil return sequence are not allowed.
10. Unit must defrost all circuits simultaneously in order to resume full heating more quickly during extreme low ambient temperatures (below 23F). Partial defrost, also known as hot gas defrost which allows reduced heating output during defrost, is permissible only when ambient temperature is above 23F.

Unit Cabinet:

1. The casing(s) shall be fabricated of galvanized steel, bonderized and finished.

Fan:

1. Each outdoor unit module shall be furnished with direct drive, variable speed propeller type fan(s) only. Fans shall be factory set for operation at 0 in. WG external static pressure, but capable of normal operation with a maximum of 0.24 in. WG external static pressure via dipswitch.
2. All fan motors shall have inherent protection, have permanently lubricated bearings, and be completely variable speed.
3. All fan motors shall be mounted for quiet operation.
4. All fans shall be provided with a raised guard to prevent contact with moving parts.

Refrigerant and Refrigerant Piping

1. R410A refrigerant shall be required for systems.
2. Polyolester (POE) oil—widely available and used in conventional domestic systems—shall be required. Prior to bidding, manufacturers using alternate oil types shall submit material safety data sheets (MSDS) and comparison of hygroscopic properties for alternate oil with list of local suppliers stocking alternate oil for approval at least two weeks prior to bidding.
3. Refrigerant piping shall be phosphorus deoxidized copper (copper and copper alloy seamless pipes) of sufficient radial thickness as defined by the VRF equipment manufacturer and installed in accordance with manufacturer recommendations.
4. All refrigerant piping must be insulated with ½” closed cell, CFC-free foam insulation with flame-Spread Index of less than 25 and a smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102. R value of insulation must be at least 3.
5. Refrigerant line sizing shall be in accordance with manufacturer specifications.

Coil:

1. The outdoor coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing. The coil fins shall have a factory applied corrosion resistant blue-fin finish. Uncoated aluminum coils/fins are not allowed
2. Unit must defrost all circuits simultaneously in order to resume full heating more quickly. Partial defrost which may extend “no or reduced heating” periods shall not be allowed. The coil shall be protected with an integral metal guard.

Compressor:

1. Each outdoor unit module shall be equipped with only inverter driven scroll hermetic compressors. Non inverter-driven compressors, which may cause inrush current (demand charges) and require larger generators for temporary power shall not be allowed.
2. Crankcase heat shall be provided via induction-type heater utilizing eddy currents from motor windings. Energy-wasting “belly-band” type crankcase heaters are not allowed.
3. Compressor shall have an inverter to modulate capacity. The capacity for each compressor shall be variable with a minimum turndown not greater than 20%.
4. The compressor shall be equipped with an internal thermal overload.

Controls:

1. The unit shall be an integral part of the system & control network and react to heating/cooling demand as communicated from indoor unit over the control circuit. Required field-installed control voltage transformers and/or signal boosters shall be provided by the manufacturer.
2. The outdoor unit shall have the capability of 4 levels of demand control for each refrigerant system based on external input.

Electrical:

1. The outdoor unit electrical power shall be 208/230 volts, 3-phase, 60 hertz or 460 volts, 3-phase, 60 hertz per equipment schedule.
2. The outdoor unit shall be controlled by integral microprocessors.
3. The control circuit between the indoor units and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system controls.

4.02 BRANCH CIRCUIT (BC) CONTROLLERS AS REQUIRED FOR SIMULTANEOUS HEAT/COOL SYSTEMS

General

1. BC (Branch Circuit) Controller (or comparable branch devices) shall allow heating, cooling, or cooling with hot gas reheat at DOAS indoor unit
2. BC Controllers (or comparable branch devices) shall be equipped with a circuit board that interfaces to the controls system and shall perform all functions necessary for operation. The unit shall have a galvanized steel finish and be completely factory assembled, piped and wired. This unit shall be mounted indoors, with access and service clearance provided for each controller.

BC Unit Cabinet:

1. BC Controllers (or comparable branch devices) shall be suitable for use in plenums in accordance with UL1995 ed 4.
2. The casing shall be fabricated of galvanized steel.

Condensate Management:

1. BC Controller (or comparable branch device) must have integral resin drain pan or insulate refrigeration components with removable insulation that allows easy access for future service needs. Cabinets filled with solid foam insulation do not allow for future service and are not allowed.

Electrical:

1. The unit electrical power shall be 208/230 volts, 1 phase, 60 Hertz. The unit shall be capable of satisfactory operation within voltage limits of 187-228 (208V/60Hz) or 207-253 (230/60Hz).
2. The BC Controller shall be controlled by integral microprocessors
3. The control circuit between the indoor units and outdoor units shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

4.03 DOAS VRF DUCTED INDOOR UNIT WITH MODULATING HOT GAS REHEAT

General:

1. The DOAS indoor unit shall be a ducted indoor fan coil that mounts with a fixed rear return and a horizontal discharge supply, primary coil, and three modulating linear expansion devices. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.
2. The indoor unit shall be factory assembled, wired and run tested. Indoor units which require field-mounted and/or configured controllers which are not tested as an assembly are not allowed. Contained within the unit shall be all factory wiring, cooling/heating coil, temperature and humidity sensors, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

Unit Cabinet:

1. The cabinet shall be ducted on both the supply and return
2. The cabinet panel shall have provisions for a field installed filtered outside air intake.

Fan:

1. The indoor unit fan shall be a statically and dynamically balanced assembly with two Sirocco fan(s) direct driven by a single motor with permanently lubricated bearings.
2. To allow for proper balancing, indoor unit shall include multiple external static pressure settings up to 0.80 in. WG.

Filter:

1. Outside air shall be filtered by a field-supplied filter. Unit shall have sufficient external static pressure to operate with a MERV-13 filter installed.

Coil:

1. The indoor coils shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange and all tube joints shall be brazed with phos-copper or silver alloy.
2. The coils shall be pressure tested at the factory.
3. A sloped condensate pan and drain shall be provided under the coil. Units without sloped condensate pan which must be installed cockeyed to ensure proper drainage are not allowed.
4. A condensate lift mechanism shall be factory installed capable of providing up to 21-11/16" of lift.

Electrical:

1. The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.

Controls:

1. The system shall utilize VRF heating/cooling with intake air temperature ranging from -4° F WB up to 95° F WB (109° F DB).
2. In order to maximize efficiency of VRF (reverse cycle) heating operation, unit shall be capable of intake of unmixed or untreated -4° F WB air directly to the primary coil.
3. Leaving air temperature set point range shall be adjustable from 50° F to 83° F in one degree increments. The unit shall be capable of providing active coil operation in cooling mode down to 50° F WB. Unit must not allow for fan mode or thermal off operation when the entering air is more than 2° F off the primary coil cooling mode set point; thermal off range between active cooling and active heating operation shall vary based on LAT set point.

4. Dehumidification (cooling) coil shall have adjustable settings to allow for target air temperature of 50, 55, or 60° F DB or converted temperature from the leaving air temperature set point and relative humidity of 45% (45% RH Control)
5. Indoor unit shall be shipped with a wall-mountable controller to define set point control. Unit shall also be capable of scheduling and set point control via manufacturer centralized controllers or BACnet interfaces.

Part 5 - HVAC Equipment Alternate (General Information)

The alternate equipment supplier shall provide to the bidding mechanical contractor a complete equipment data package. This package shall include, but is not limited to, equipment capacities at the design condition, power requirements, indoor units CFM/static pressures, fan curves, installation requirements, and physical dimensions. Nominal performance data is not acceptable.

The mechanical contractor shall request and receive the equipment data package 15 days prior to bid date and submit this package with the alternate bid.

The mechanical contractor shall list the equipment supplier and submit the required data package with the bid detailing a complete comparison of the proposed alternate equipment to the specified equipment and the associated cost reduction of the alternate equipment. The contractor bids an alternate manufacturer with full knowledge that that manufactures product may not be acceptable or approved.

The alternate equipment supplier shall furnish a complete drawing package to the mechanical contractor 15 days prior to bid day for bidding and installation. The drawing format shall be .dxf or equivalent, on 30"x42" sheets. The HVAC and electrical series design documents will be made available in electronic format for use by the equipment supplier in preparing their drawings. The alternate equipment supplier shall prepare the following drawings:

- XXX HVAC Floor Plan
- XXX HVAC Refrigerant Piping Plan
- XXX HVAC Refrigerant Piping/Controls Details
- XXX HVAC Details
- XXX HVAC Schedules

The alternate equipment supplier shall draft all piping circuits, components, overall building control schematic, detailed control wiring diagrams, system details and schedules for their

system. The drawings shall convey all requirements to successfully install the alternate equipment suppliers system.

Provide (2) drawing package sets plotted on 20 lb. vellum. Provide (1) drawing package in electronic format (.dxf files) on CD.

The submitted documents shall be complete system designs and show no less information than the HVAC equipment/controls contract bid documents.

Provide the following scorecard(s) with the bid proposal for review by the bid selection committee for their respective system(s).

Part 6 - EXECUTION

6.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide for connection to electrical service.
- C. Install units on vibration isolation.
- D. Install units on concrete base as indicated.
- E. Install all field accessories, including condensate pumps and field fabricated filter box for the DOAS
- F. Provide connection to refrigeration piping system and evaporators. Installing contractor to supply and install all refrigerant specialties required (solenoids, filter driers, sight glass, isolation valves, etc). Connect all piping and charge with nitrogen, leak test, clean, and field charge with appropriate refrigerant and oil.
- G. Provide field-measured line lengths schematic to the manufacturer for piping verification and required charge amount.
- H. Provide start up by manufacturer.

SECTION 15940 – SEQUENCE OF OPERATIONS

When the outside air temperature is below 50F:

- DOAS will be deactivated
- Unit ventilators will be active and OA dampers will control to OA set point.

Building Automation System Interface:

If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints

Occupied:

During occupied periods, the supply fan shall run continuously.

Unoccupied:

When the space temperature is below the unoccupied heating setpoint of 60.0 deg. F (adj.) the supply fan shall start, the face & bypass damper shall modulate and the heating isolation valve shall open. When the space temperature rises above the unoccupied heating setpoint of 60.0 deg. F (adj.) plus the unoccupied differential of 2.0 deg. F (adj.) the supply fan shall stop and the face & bypass damper shall modulate to normal position and the heating isolation valve shall close.

Optimal Start:

The BAS shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Morning Warm-Up Mode

During optimal start, if the space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Optimal Stop:

The BAS shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint.

Occupied Bypass:

The BAS shall monitor the status of the ON and CANCEL buttons of the space temperature sensor. When an occupied bypass request is received from a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Space Temperature Control:

Cascade zone control shall be used in the occupied, occupied bypass, and occupied standby modes. It maintains zone temperature by controlling the discharge air temperature to control the zone temperature while minimizing the fan speed. The space temperature shall be maintained at the occupied heating setpoint of 71.0 deg. F (adj.).

Supply Fan Operation:

The supply fan shall cycle on demand during the unoccupied mode. When the controller transitions to the occupied mode, the supply fan shall start at high speed before transitioning to continuous operation at the selected speed. The supply fan status shall be monitored by a differential pressure switch. If the supply fan fails the fan shall be commanded off and an alarm shall annunciate at the BAS. A manual reset shall be required to restart the fan.

Filter Timer:

The fan-run time (hrs) shall be compared to the filter maintenance timer setpoint. Once the setpoint is reached a filter timer alarm diagnostic shall annunciate at the BAS. When the diagnostic is cleared, the filter-maintenance timer is reset to zero, and the timer begins accumulating fan-run time again.

When the outside air temperature is above 50F and below 70F (adj):

- Unit ventilators will be deactivated
- DOAS will be active
 - DOAS will be set for neutral air utilizing DX cooling and Hot Gas Reheat
 - Separate BAS controller will interface with the DOAS and monitor space temperature and space humidity.

When the outside air temperature is above 70F (adj):

- Unit ventilators will remain deactivated
- DOAS will be active
 - Separate BAS controller will interface with the DOAS and monitor space temperature and space humidity.
 - BAS will monitor space temperature and reset the DOAS supply temp to satisfy room loading to maintain space temperature setpoint of 75F (adj)



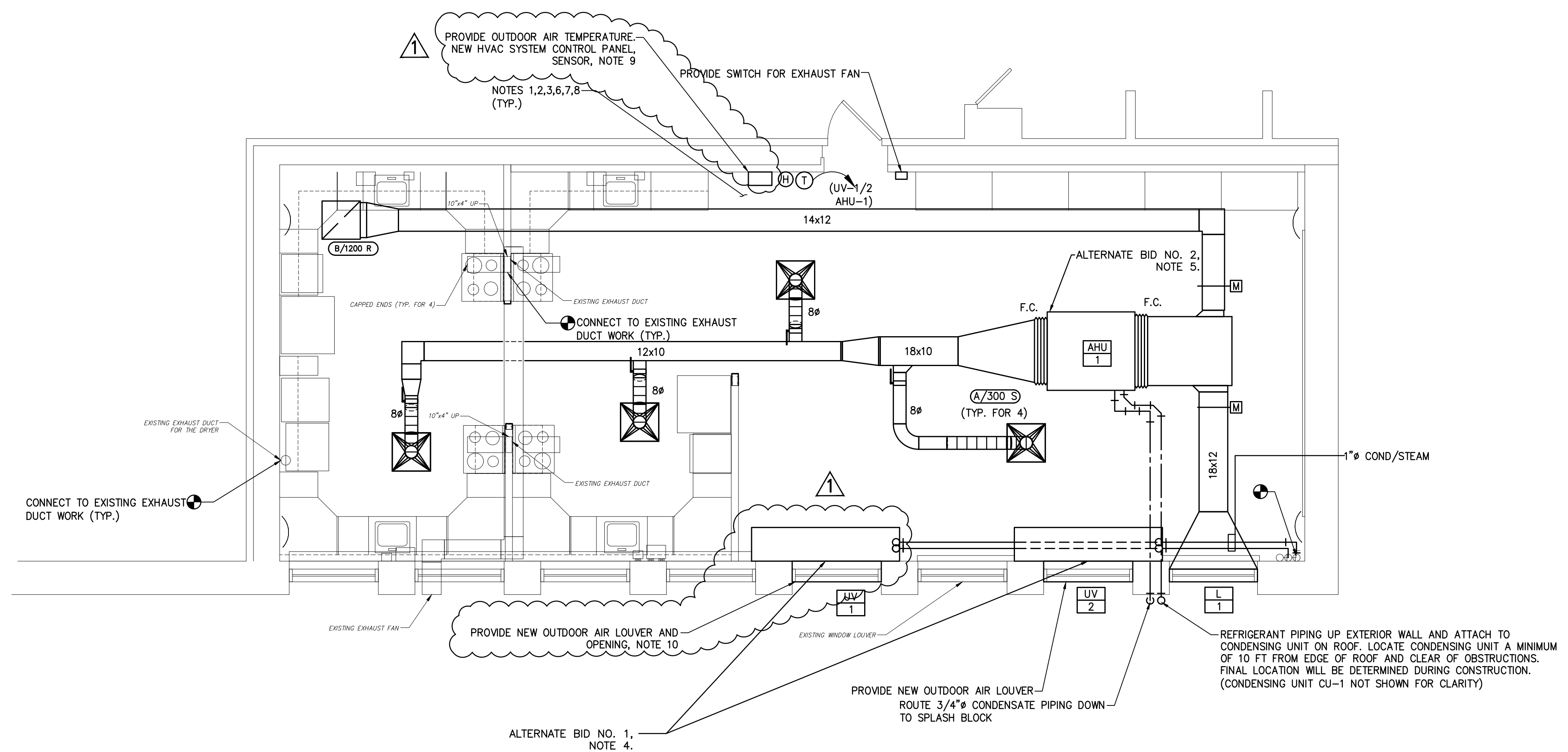
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NO.	REVISION	DATE	BY	CHK
1		03-12-22	AD	MG



1 MECHANICAL FLOOR PLAN
 SCALE: 1/4" = 1'-0"

NOTES:

1. ALL NOTES, SYMBOLS, AND ABBREVIATIONS ON DRAWING M-1.0 APPLY TO THIS DRAWING.
2. DUCTWORK ROUTINGS SHOWN ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL ROUTINGS IN THE FIELD TO AVOID INTERFERENCES. CONTRACTOR TO COORDINATE DUCTWORK/UNIT INSTALLATION WITH ALL STRUCTURAL STEEL, ELECTRICAL CONDUIT, SYSTEMS WIRING/CABLE, FIRE PROTECTION PIPING, PLUMBING PIPING (SANITARY DRAINAGE, ROOF DRAINAGE, DOMESTIC HOT/COLD WATER AND GAS PIPING), ETC. AS REQUIRED. ALL MODIFICATIONS MADE TO THE NEW DUCTWORK OR PIPING TO RESOLVE INTERFERENCES SHALL BE PROVIDED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. SEE DIVISION 16 DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
3. NOT ALL INLINE DEVICES (VALVES, DAMPERS, REDUCERS, ETC.) HAVE BEEN SHOWN ON THE PLANS FOR CLARITY. SEE PIPING DETAILS ON MECHANICAL DETAIL DRAWINGS FOR ADDITIONAL INFORMATION. PROVIDE ALL INLINE DEVICES (VALVES, DAMPERS, REDUCERS, GAUGES, ETC.) AS REQUIRED TO COMPLETE THE INSTALLATION EVEN IF NOT SPECIFICALLY SHOWN ON THE PLANS OR DETAILS.
4. ALTERNATE BID NO. 1 SHALL INCLUDE THE PROVISION OF NEW UNIT VENTILATORS AND STEAM/CONDENSING PIPING.
5. ALTERNATE BID NO. 2 SHALL INCLUDE THE PROVISION OF NEW AHU-1, DUCTWORK, AND TERMINALS AND THERMOSTAT.
6. REMOVE EXISTING CEILING TO ALLOW FOR NEW WORK, ONCE NEW WORK HAS BEEN COMPLETED. RE-INSTALL EXISTING CEILING TO A CONDITION EQUAL TO OR BETTER THEN ORIGINAL CONDITION. TILES OR CEILING GRID DAMAGED DURING REMOVAL OR REINSTALLATION SHALL BE REPLACED WITH NEW AT NO ADDITIONAL COST TO THE OWNER.
7. ALL EXISTING LIGHT FIXTURES SHALL REMAIN IN PLACE. LIGHT FIXTURES SHALL BE TEMPORARILY SUPPORTED UNTIL NEW CEILING IS PROVIDED.
8. CONTRACTOR SHALL TEMPORARILY REMOVE ALL EXISTING FIRE ALARM DEVICES. REINSTALL IN ORIGINAL LOCATION AFTER NEW CEILINGS HAVE BEEN INSTALLED THE FIRE ALARM SYSTEM SHALL BE KEPT IN SERVICE DURING CONSTRUCTION. PROVIDE A FIRE WATCH FOR AREAS WHERE DETECTION IS TEMPORARILY REMOVED. (INCLUDING CIRCUIT BREAKER, CONDUIT, CONDUCTORS, ETC.).
9. PROVIDE 120V-1PH-60HZ ELECTRICAL CIRCUIT FOR NEW HVAC SYSTEM PANEL FROM NEAREST AVAILABLE ELECTRICAL PANEL. COORDINATE NEW POWER CIRCUIT WITH THE ELECTRICAL CONTRACTOR.
10. PROVIDE NEW OUTDOOR AIR LOUVER. PROVIDE NEW OPENING AND STEEL LINTEL.

PROGRESS REVIEW
NOT FOR CONSTRUCTION
 DATE: 03-01-2022

MECHANICAL FLOOR PLAN
 CAMDEN CITY BOARD OF EDUCATION
 WOODROW WILSON HIGH SCHOOL
 HOME ECONOMICS CLASSROOM RENOVATIONS
 CAMDEN CITY CAMDEN COUNTY NEW JERSEY

DRAWN BY:	DESIGN BY:	CHECKED BY:	SCALE:
MZ	MZ	WJ/AH	AS NOTED
DATE:	SHEET No.:		
03-2022			M-2.1
JOB No.:			
0408C048			

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NO.	REVISION	DATE	BY	CHK
1		03-12-21	AD	MS

MECHANICAL SCHEDULES
 CAMDEN CITY BOARD OF EDUCATION
 WOODROW WILSON HIGH SCHOOL
 HOME ECONOMICS CLASSROOM RENOVATIONS
 CAMDEN CITY CAMDEN COUNTY NEW JERSEY

DRAWN BY:	DESIGN BY:	CHECKED BY:	SCALE:
MZ	MZ	WJ/AH	AS NOTED
DATE:	SHEET No.:		
03-2022			
JOB No.:			M-4.1
0408C048			

PROGRESS REVIEW
NOT FOR CONSTRUCTION
 DATE: 03-01-2022

VENTILATION SCHEDULE

ROOM NAME	APPROX. AREA (SF)	OCCUPANT DENSITY # PEOPLE/1000 SF	NUMBER OF PEOPLE & / OR FIXTURES	VENTILATION AIR REQUIREMENTS (ASHRAE 62, INTERNATIONAL MECH CODE 2018)										OUTDOOR AIR CORRECTED DESIGN TOTAL (CFM) Vot	EXHAUST AIR DESIGN TOTAL (CFM)	RETURN AIR DESIGN TOTAL (CFM)	SUPPLY AIR DESIGN TOTAL (CFM)	
				PEOPLE OUTDOOR AIRFLOW RATE Rp	TOTAL PEOPLE OUTDOOR AIRFLOW (CFM)	AREA OUTDOOR AIRFLOW RATE Ra	TOTAL AREA OUTDOOR AIRFLOW (CFM)	BREATHING ZONE OUTDOOR AIRFLOW (CFM) Vz	ZONE AIR DISTRIBUTION EFFECTIVENESS (COOLING) Ez	ZONE AIR DISTRIBUTION EFFECTIVENESS (HEATING) Ez	ZONE OUTDOOR AIRFLOW (CFM) Vz	PRIMARY OUTDOOR AIR FRACTION Zp	EXHAUST AIRFLOW RATE					TOTAL EXHAUST AIRFLOW (CFM)
HOME ECONOMICS CLASSROOM	1,100	20	16.0 PEOPLE	7.5 CFM/PERSON	120	0.12 CFM/SQ.FT.	132	252	1.0	1.0	252	0.2	N/A	1200	260	1,200	1,740	2,000

NOTES:
 1. OCCUPANCY IS BASED UPON ACTUAL AVAILABLE SEATING.

AIR HANDLING UNIT

TAG	ROOM(S) SERVED	MOUNTING LOCATION	SERVED BY CONDENSING UNIT	SUPPLY AIRFLOW (CFM)	DESIGN OUTDOOR AIRFLOW (CFM)	RETURN AIRFLOW (CFM)	E.S.P. (in WC)	SUPPLY FAN MOTOR KW	DESIGN TONS (NOMINAL)	COOLING DATA								HEATING DATA				APPROXIMATE DIMENSIONS (H x W x D)	WEIGHT (LBS)	BASIS OF DESIGN	ELECTRICAL DATA			NOTES
										TOTAL COOLING CAPACITY (MBH)	SENS COOLING CAPACITY (MBH)	E.A.T. (OF DB)	E.A.T. (OF WB)	L.A.T. (OF DB)	L.A.T. (OF WB)	MAX. HEATING CAPACITY (BTU/H)	E.A.T. (OF)	L.A.T. (OF)	MAX. HEATING CAPACITY (BTU/H)	E.A.T. (OF)	L.A.T. (OF)				V/PH/Hz	MCA	MOPD	
AHU-1	HOME ECONOMICS	CEILING	CU-1	1200	1,200	0	0.80	1	10	111	49	92.0	74	52.7	52.0	41	52.7	80	18.56' x 49.25' x 55.12'	309	TRANE TPEFYPI20AR140A	208/1/60	4.31	15	SEE BELOW			

NOTES:
 1. PROVIDE SYSTEM WITH TEMPERATURE & HUMIDITY SENSORS, CONTROLLERS, REFRIGERANT PIPING AND CHARGE, AUXILIARY DRAIN PAN, AND ALL REQUIRED MOUNTING ACCESSORIES. PROVIDE ALL CONTROL DEVICES REQUIRED TO OPERATE EQUIPMENT IN ACCORDANCE WITH THE SEQUENCE OF OPERATIONS.
 2. PROVIDE ALL UNITS WITH CONDENSATE PUMP.
 3. PROVIDE WITH AUXILIARY DRAIN PAN AND WATER LEVEL ALARM.
 4. COOLING CAPACITY IS AT 92 DEG. F DB AND 74 DEG WB.
 5. HEATING CAPACITY IS RATED AT 32 DEG F.
 6. INSTALLING CONTRACTOR TO FIELD FABRICATE AND INSTALL FILTER BOX UPSTREAM OF THE AHU. INSTALL TO ALLOW ENOUGH ACCESS TO CHANGE FILTERS.
 7. PROVIDE HOT GAS REHEAT COIL FOR DEHUMIDIFICATION CONTROL. SYSTEM SHALL BE ABLE TO PROVIDE SIMULTANEOUS COOLING AND HEATING USING REFRIGERATION WASTE HEAT.

OUTDOOR CONDENSING UNIT SCHEDULE

TAG	UNITS SERVED	M-NET Address	MODEL NUMBER	NOMINAL COOLING CAPACITY (BTU/H)	NOMINAL HEATING CAPACITY (BTU/H)	COOLING EFFICIENCY EER/IEER	HEATING COP @ 47°F	NDM SYSTEM CONNECT CAPACITY (% OF NDM)	DESIGN COOLING OUTDOOR AIR DB (°F)	DESIGN HEATING OUTDOOR AIR WB (°F)	MAX PIPE LENGTH FROM BD OR 1ST JOINT (FT)	REFRIG PIPE DIM HIGH/LOW PRESSURE (INCH)	CORRECTED COOLING TOTAL CAPACITY (BTU/h)	CORRECTED HEATING CAPACITY (BTU/h)	SOUND PRESSURE (dBA)	INVERTER DRIVEN COMPRESSOR TYPE/QUANTITY	PRELIMINARY ADDED FIELD CHARGE	Electrical-Per Module			NOTES/OPTIONS	
																		208/230	208/230	RFS		MOPD
CU-1	AHU-1	51	TURYPI203AN40AN	120,000	135,000	12.1 / 23.3	3.61	100%	92	45	0	3/4 / 1 1/8 (NOTE 4)	117,457	88,131	60/62	SCROLL/1	23.2 (NOTE 5)	208/230V / 3-phase 3-wire	43/40	50/50	70/60	SEE BELOW

NOTES:
 1 Nominal cooling capacities are based on indoor coil EAT of 80/67°F (DB/WB), outdoor of 95°F (DB).
 2 Nominal heating capacities are based on indoor coil EAT of 70°F (DB), outdoor of 43°F (WB).
 3 Efficiency values for EER, IEER, COP are based on AHRI 1230 test method for mixture of ducted & non-ducted indoor units.
 4 For systems with multiple modules, refrigerant pipe dimensions indicate total system combined piping downstream of module twinning.
 5 Added field charge listed is in addition to factory charge, this must be updated based upon final as-built piping layout.
 6 Factory representatives shall review the project prior to and throughout the installation of CITY MULTI equipment.
 7 Factory representatives shall startup and commission CITY MULTI equipment upon completion of equipment installations.
 8 Factory representatives shall provide on-site assistance for the BMS integration of the CITY MULTI equipment.
 9 Factory representatives shall provide end-user training on the CITY MULTI equipment upon completion of the installation of equipment.
 10 Provide Panel Heater Kit to Prevent Ice Buildup on Outdoor Drain Pan.

UNIT VENTILATOR SCHEDULE

UNIT TAG	ORIENTATION	AREA(S) SERVED	RATED DRY COIL AIRFLOW (CFM)	RETURN AIRFLOW (CFM)	MIN. OUTDOOR AIRFLOW (CFM)	ESP IN WC	STEAM HEATING COIL				NO. OF FAN MOTORS	MOTOR HP / EA	ELECTRICAL DATA			OUTDOOR AIR LOUVER SIZE	BASIS OF DESIGN			NOTES
							MBH	EAT	LAT	STEAM PRESSURE (PSIG)			V/PH/Hz	FLA (AMPS)	MCA (AMPS)		MOPD (AMPS)	MANUFACTURER	MODEL No.	
UV-1	VERTICAL	HOME ECONOMICS CLASSROOM	1,000	1,000	600	N/A	91.98	47.2	124.57	2.0	1	1/4	115/1/60	7.2	9	15	39"x18"	TRANE	VUV1250	SEE BELOW
UV-2	VERTICAL	HOME ECONOMICS CLASSROOM	1,000	1,000	600	N/A	91.98	47.2	124.57	2.0	1	1/4	115/1/60	7.2	9	15	EXISTING	TRANE	VUV1250	SEE BELOW

NOTES:
 1. DISCONNECT SWITCH, DOUBLE DEFLECTION DISCHARGE, FALSEBACK SECTIONS, END CAPS, MODULATING OUTSIDE/RETURN AIR DAMPERS (FOR USE WITH ECONOMIZER CYCLE), PIPING PACKAGE, PIPE ENCLOSURES, INSULATED DRAIN PAN AND 1" MERV 13 FILTERS.
 2. FULL SHEETMETAL BACK TO CLOSE OFF THE BACK OF THE UNIT VENTILATOR.
 3. COORDINATE ALL MANUFACTURER SUPPLIED DEVICES WITH THE DIVISION 15 HVAC CONTROL SYSTEM CONTRACTOR.
 4. UNIT SHALL BE UL LISTED.
 5. 21-1/2 INCH DEEP INSULATED CABINET.
 6. UNIT SHALL BE 30" HIGH.
 7. INSULATED SHEET METAL WALL SLEEVE (OUTDOOR AIR DUCT) TO CONNECT THE NEW UNIT VENTILATOR TO THE EXISTING OUTDOOR AIR LOUVER. THE WALL SLEEVE SHALL BE SEALED WATERTIGHT.
 8. A FIELD CUT OPENING IN THE BACK OF THE UNIT VENTILATOR FOR OUTDOOR AIR INTAKE.
 9. PROVIDE WITH FACE AND BYPASS DAMPER.

LOUVER SCHEDULE

TAG	UNIT SERVED	SERVICE	AIRFLOW (CFM)	SIZE (W x H)	FREE AREA (FT ²)	MATERIAL	FINISH	BASIS OF DESIGN	NOTES
L-1	AHU-1	INTAKE	1,200	39" X 18"	1.88	ALUMINUM	BAKED ENAMEL	RUSKIN ELF811DD	SEE BELOW

NOTES:
 1. PROVIDE WITH BIRD SCREEN, REAR SECURITY BARS, INTEGRAL FLANGE, AND BAKED ENAMEL FINISH (COORDINATE COLOR WITH ENGINEER).
 2. COORDINATE FINAL LOUVER AND OPENING DIMENSIONS WITH EXISTING FIELD CONDITIONS.
 3. VERIFY EXISTING CLEARANCE ABOVE GRADE PRIOR TO PURCHASING LOUVERS.

DIFFUSER, REGISTER & GRILLE SCHEDULE

TAG	DESCRIPTION	FACE/ LENGTH	NECK	DIRECTION	BASIS OF DESIGN			NOTES
					MANUFACTURER	MODEL		
A	DIFFUSER	24" x 24"	8" DIA.	SUPPLY	TITUS	TMS-AA		1,2,3 & 4
B	REGISTER	24" x 24"	24" X 24"	RETURN	TITUS	350L		1,2,3 & 4

NOTES:
 1. COORDINATE MOUNTING FRAME WITH CEILING/WALL TYPE.
 2. COORDINATE COLOR & FINISH WITH OWNER.
 3. NC (NOISE CRITERIA) LEVEL SHALL NOT EXCEED 25.
 4. PROVIDE WITH ALUMINUM OPPOSED BLADE DAMPER.

