CITY OF NAPLES
PURCHASING DIVISION
CITY HALL, 735 8TH STREET SOUTH
NAPLES, FLORIDA 34102
PH: 239-213-7100 FX: 239-213-7105

ADDENDUM NUMBER 1

NOTIFICATION DATE:	BID TITLE:	BID NUMBER:	BID OPENING DATE & TIME:
02/27/18	Geothermal Cooling Water Supply and Facility Improvements	18-035	03/20/2018 2:00PM

THE FOLLOWING INFORMATION IS HEREBY INCORPORATED INTO, AND MADE AN OFFICIAL PART OF THE ABOVE REFERENCED BID.

The following clarification is issued as an addendum identifying the following changes for the referenced solicitation:

- Attached find Exhibit A that replaces existing drawings M-000, M-001, M-002, M-003 from the original bid document with revised drawings M-000, M-001, M-002, and M-003.

Exhibit A – Replacement Drawings

IMPORTANT MESSAGE

PLEASE ACKNOWLEDGE RECEIPT OF THIS ADDENDUM ON THE BID COVER SHEET.

Exhibit A – Replacement Drawings

STANDARD ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
AP	ACCESS PANEL
A/C	AIR CONDITIONING UNIT
ACCU	AIR COOLED CONDENSING UNIT
ACC	AIR COOLED CONDENSER
AHU	AIR HANDLING UNIT
ARCH	ARCHITECTURAL
AIH	AIR INTAKE HOOD
BD	BACKDRAFT DAMPER
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
B	BOILER
B/A	BY–PASS AIR
BTU	BRITISH THERMAL UNIT
CLG	CEILING
CD	CEILING DIFFUSER
CG	CEILING GRILLE
CR	CEILING REGISTER
CHWP	CHILLED WATER PUMP
CWP	CONDENSER WATER PUMP
CU	CONDENSING UNIT
CT	COOLING TOWER
CFM	CUBIC FEET PER MINUTE
CH	CABINET HEATER
CCP	CHILLER CONTROL PANEL
DA	DIRECT ACTING
DB	DRY BULB
DCP	DISTRIBUTED CONTROL PROCESSOR
DG	DOOR GRILLE
DGP	DATA GATHERING PANEL
DI	DUCTILE IRON
DIFF	DIFFUSER
DN	DOWN
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DWG	DRAWING
EA	EACH
EAT	ENTERING AIR TEMPERATURE
ECH	ELECTRIC CHILLER
EF	EXHAUST FAN
EL	ELEVATION
ELEC	ELECTRICAL
EP	ELECTRIC–PNEUMATIC SWITCH
EQ	EQUAL
ESP	EXTERNAL STATIC PRESSURE
ETR	EXISTING TO REMAIN
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
E/A	EXHAUST AIR
FCU	FAN COIL UNIT
FPM	FEET PER MINUTE
FD	FIRE DAMPER
FC	FLEXIBLE CONNECTION
FM	FLOWMETER
GPM	GALLONS PER MINUTE
GCH	GLYCOL CHILLER
HD	HALON DAMPER
HDPE	HIGH DENSITY POLYETHYLENE
HV	HEATING VENTILATING UNIT
HWP	HOT WATER PUMP
IR	INFRARED HEATER
KW	KILOWATT
LVG	LEAVING
LAT	LEAVING AIR TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
LF	LINEAR FEET
LG	LONG
M/A	MAKE–UP AIR
MVD	MANUAL VOLUME DAMPER
MAX.	MAXIMUM
MECH	MECHANICAL
MER	MECHANICAL EQUIPMENT ROOM
MEZZ	MEZZANINE
MOD	MOTOR OPERATED DAMPER
MOV	MOTOR OPERATED VALVE
MBH	THOUSAND BRITISH THERMAL UNITS PER HOUR
NPSH	NET POSITIVE SUCTION HEAD
NC	NOISE CRITERIA
NIC	NOT IN CONTRACT
OPNG	OPENING
OBD	OPPOSED BLADE DAMPER
O/A	OUTSIDE AIR
OSA	OUTSIDE SUPPLY AIR
OIP	OPENING IN PARTITION ABOVE CEILING
PE	PNEUMATIC–ELECTRIC SWITCH
PSI	POUNDS PER SQUARE INCH
QTY.	QUANTITY
QF	QUICK FILL
R/A	RETURN AIR
RG	RETURN GRILLE
RR	RETURN REGISTER
RA	REVERSE ACTING
RPM	REVOLUTIONS PER MINUTE
RM	ROOM
S/D	SMOKE DAMPER
SEF	SMOKE EVACUATION FAN
SA	SOUND ATTENUATOR
SD	SPLITTER DAMPER
SP	STATIC PRESSURE
S/A	SUPPLY AIR
SF	SUPPLY FAN
SG	SUPPLY GRILLE
SR	SUPPLY REGISTER
TR	TOP REGISTER
TP	TOTAL PRESSURE
TG	TRANSFER GRILLE
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UV	UNIT VENTILATOR
VAV	VARIABLE AIR VOLUME\
VIF	VERIFY IN FIELD
WB	WET BULB TEMPERATURE, °F
WP	WORKING PRESSURE
WCC	WATER COOLED CONDENSER
WCCU	WATER COOLED CONDENSING UNIT

BID NOTE

PRIOR TO SUBMITTING A BID FOR THIS WORK THE CONTRACTOR SHALL VISIT THE SITE TO DETERMINE THE COST IMPACT OF EXISTING CONDITIONS ON THE SCOPE OF WORK HEREIN. THE BID SHALL INCLUDE ANY COST ASSOCIATED WITH AN EXISTING CONDITION THAT IS MODIFIED, OR AFFECTED BY THE WORK IN THESE DOCUMENTS. FAILURE TO VISIT THE SITE OR DETERMINE THESE COSTS PRIOR TO BID SHALL NOT ABSOLVE THE CONTRACTOR OF THIS RESPONSIBILITY.

SUBMITTALS

CONTRACTOR SUBMITTALS SHALL BE MADE IN COMPLIANCE WITH THE FOLLOWING STATEMENT:

IT IS HEREBY CERTIFIED THAT THE MATERIAL/EQUIPMENT PRESENTED IN THIS SUBMITTAL/SHOP DRAWING/CATALOG CUT SHEET, ETC. HAS BEEN REVIEWED AND IS APPROVED FOR USE ON THIS PROJECT BY THIS CONTRACTOR AS BEING IN CONFORMANCE TO THE DESIGN AS SHOWN ON THE CONTRACT DOCUMENTS AND CAN BE INSTALLED IN THE ALLOCATED SPACES, IS OF THE CORRECT ELECTRICAL CHARACTERISTICS AND IS SUBMITTED FOR REVIEW AND APPROVAL BY THE ARCHITECT/ENGINEER.

THE SUBMITTAL WILL BE SIGNED AND DATED BY AN AUTHORIZED AGENT OF THIS CONTRACTOR.

MECHANICAL SYMBOL SCHEDULE

SYMBOL — DESCRIPTION

- MVD — MANUAL VOLUME DAMPER
- FD — FIRE DAMPER
- SD — SMOKE DAMPER
- BD — BACKDRAFT DAMPER
- MOD — MOTOR OPERATED DAMPER
- FD/SD — COMBINATION FIRE/SMOKE DAMPER
- P — S — SMOKE DETECTOR
- T — THERMOSTAT
- Ts — TEMPERATURE SENSOR
- T — N — NIGHT SETBACK THERMOSTAT
- H — HUMIDISTAT
- ₵ OR CFM — CUBIC FEET PER MINUTE
- CAPPED END
- ROUND DUCT
- FLAT OVAL DUCT
- UD — UNDERCUT DOOR
- VAV–1–1 — VARIABLE AIR VOLUME TERMINAL UNIT (VAV–) SYMBOL; VAV No.; AHU No.
- VAV–1 — VARIABLE AIR VOLUME TERMINAL UNIT WITH ELECTRICAL HEATER
- VAV–1 — VARIABLE AIR VOLUME TERMINAL UNIT WITHOUT ELECTRICAL HEATER
- SECTION SYMBOL SECTION No.
- SHEET WHERE SHOWN
- SUPPLY OR PRECONDITIONED OUTSIDE AIR DUCT
- RETURN OR EXHAUST AIRDUCT
- VANED ELBOW
- R — D — R=1.5Dia. — RADIUS ELBOW
- SOUND ATTENUATORS
- CEILING DIFFUSER,–4–WAY UNLESS SHOWN OTHERWISE
- CEILING OR SIDEWALL LINEAR DIFFUSER
- NEW DUCTWORK
- R — RISE IN DUCT IN THE DIRECTION OF AIRFLOW
- D — DROP IN DUCT IN THE DIRECTION OF AIRFLOW
- FLEXIBLE CONNECTION
- HOT WATER COIL
- ELECTRIC DUCT HEATER
- 90 BRANCH TAKE–OFF W/MVD
- FLEXIBLE DUCTWORK
- REDUCER
- DIRECTION OF FLOW IN DUCT OR PIPE
- SQUARE TO ROUND TRANSITION
- SS — SANITARY SEWER
- RW — RECLAIM WATER
- CLS — CLOSED LOOP SUPPLY
- CLR — CLOSED LOOP RETURN
- R — REJECTION WATER
- A — ABSORPTION WATER
- W — POTABLE MAKE UP WATER

NOTES:

1. THIS IS A MASTER SHEET: FOR SYMBOLS APPLICABLE TO THIS PROJECT REFER TO THE DRAWINGS.
2. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR ACTUAL LOCATION OF ALL AIR DISTRIBUTION DEVICES AND ACCESS PANELS.
3. ALL DUCT DIMENSIONS ARE CLEAR INSIDE DIMENSIONS.

SHEET INDEX — REV. LOG

SHEET	DESCRIPTION	DATE 11/7/17 (1)	02/23/18 (2)	
M–000	SYMBOL LEGEND, SCHEDULES & GENERAL NOTES			
M–001	CONTROLS – HEAT PUMPS – NEW WORK		X	
M–002	CONTROLS – HEAT PUMPS – NEW WORK		X	
M–003	CONTROL DIAGRAMS – CONDENSER WATER SYSTEMS		X	
M–100	SITE PLAN			
M–101	1ST FLOOR PLAN – NEW WORK			
M–201	2ND FLOOR PLAN – NEW WORK			
M–301	ENLARGED PLANS – NEW WORK			
M–302	MECHANICAL YARD – ENLARGED PLANS – NEW WORK	X		
M–303	ELEVATION VIEWS & ENLARGED PLANS			
M–304	ELEVATION VIEWS			
M–401	DETAILS			
M–601	SPECIFICATIONS			

GENERAL NOTES

1. CONNECTION TO EQUIPMENT SHALL BE VERIFIED WITH MANUFACTURER'S CERTIFIED DRAWINGS.
2. DIMENSIONS SHALL BE FIELD VERIFIED AND COORDINATED PRIOR TO PROCUREMENT OR FABRICATION. COORDINATE THE WORK WITH OTHER TRADES INVOLVED. FIELD MODIFICATIONS SUCH AS OFFSETS IN PIPING AND DUCTWORK (INCLUDING DIVIDED DUCTWORK) NEEDED DUE TO OBSTRUCTIONS OR INTERFERENCES SHALL BE PROVIDED AT NO ADDITIONAL COST. FOR PRODUCTS INVOLVING RENOVATION, COORDINATE NEW WORK WITH EXISTING ELEMENTS SUCH AS THE BUILDING STRUCTURE AND ARCHITECTURAL FEATURES, SPRINKLER PIPING, LIGHTS, PLUMBING AND ELECTRICAL CONDUIT.
3. DUCT CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE SMACNA HVAC DUCT CONSTRUCTION STANDARD.
4. PROVIDE AIR TURNING VANES IN ALL 90 DEGREE RECTANGULAR DUCT ELBOWS.
5. DUCT SIZES AND ALL OPENINGS THROUGH BUILDING CONSTRUCTION SHALL BE COORDINATED TO SUIT EQUIPMENT FURNISHED.
6. COORDINATE DIFFUSER, GRILLE AND REGISTER LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS AND EQUIPMENT OF ALL TRADES.
7. LOCATE THERMOSTATS, TEMPERATURE SENSORS, HUMIDISTATS, AND HUMIDITY SENSORS AT 48" AFF UNLES NOTED OTHERWISE. COORDINATE LOCATIONS WITH OTHER EQUIPMENT, FURNITURE AND DOOR SWINGS.
8. ALL EQUIPMENT DUCTWORK, ETC. SHALL BE SUPPORTED AS DETAILED AND/OR SPECIFIED. PROVIDE ADDITIONAL SUPPORTS AS REQUIRED TO PROVIDE A VIBRATION FREE, RIGID INSTALLATION.
9. ALL DUCT SIZES SHOWN ARE INSIDE CLEAR DIMENSIONS.
10. DAMPERS AND INSIDES OF DUCTS VISIBLE THROUGH GRILLES, REGISTERS AND DIFFUSERS SHALL BE PAINTED FLAT BLACK
11. REFER TO TYPICAL DETAILS FOR PIPING AND INSTALLATION OF EQUIPMENT.
12. TRAPPED CONDENSATE DRAINS FROM ALL MECHANICAL EQUIPMENT SHALL BE PROVIDED FOR PROPER DRAINAGE TO SUIT EQUIPMENT FURNISHED.
13. ACCESS PANELS IN DUCTWORK AND CEILINGS SHALL BE PROVIDED WHERE REQUIRED FOR OPERATION, BALANCING OR MAINTENANCE OF ALL MECHANICAL EQUIPMENT.
14. ALL DUCTWORK AND PIPING IS SHOWN SCHEMATICALLY. PROVIDE ALL TRANSITIONS, VANES, ELBOWS FITTINGS, ETC. TO ALLOW SMOOTH FLOWS. ALL SPLIT DUCT FITTINGS SHALL TRANSITION TO FULL SIZE OF THE SUM OF BOTH BRANCHES, UPSTREAM OF SPLIT.
15. VERIFY FINISH WITH OWNER PRIOR TO PURCHASING GRILLES, REGISTERS, DIFFUSERS, LOUVERS AND OTHER AIR DISTRIBUTION DEVICES.
16. THE CONTRACTOR SHALL BE RESPONSIBLE TO PREPARE AND SUBMIT FOR ALL REQUIRED PERMITS. THE CONTRACTOR MAY SEEK REIMBURSEMENT FOR PERMIT FEES FROM THE CITY.
17. NOT USED.
18. INTERRUPTIONS TO EXISTING SERVICES SHALL BE SCHEDULED WITH THE BUILDING OFFICIAL AT ALL TIMES. SUCH INTERRUPTIONS TO SERVICES SHALL NOT BE MADE WITHOUT THE PRIOR WRITTEN CONSENT OF THE OWNER'S REPRESENTATIVE AND PROPER COORDINATION WITH OTHER TRADES. PRE–WORK SHALL BE PERFORMED TO MAKE THE SHUTDOWN PERIOD AS BRIEF AS POSSIBLE.
19. ALL EQUIPMENT, DUCTWORK, ETC. TO BE REMOVED SHALL BE DISPOSED OF BY CONTRACTOR.
20. MAINTAIN CLEARANCE OF A MINIMUM OF 6" BETWEEN DUCTWORK, PIPING, EQUIPMENT, ETC., AND ALL FIRE RATED AND FIRE /SMOKE RATED PARTITIONS, TO ALLOW FOR INSPECTIONS OF RATED WALLS.
21. DUCT RUNOUTS TO DIFFUSERS SHALL MATCH THE SIZE OF THE DIFFUSER NECK.
22. UNLESS OTHERWISE NOTED, ALL EQUIPMENT AND VALVE DRAINS SHALL BE INDEPENDENTLY PIPED FULL SIZE TO THE NEAREST PLUMBING DRAIN.
23. SLEEVE AND SEAL ALL PIPING PENETRATIONS THROUGH BUILDING PARTITIONS.
24. ALL NEW DUCTWORK SHALL BE INTERNALLY INSULATED.
25. ALL MATERIALS AND EQUIPMENT SHALL BE PROPERLY AND EFFECTIVELY PROTECTED BY THE CONTRACTOR DURING TGE EXECUTION OF THE WORK.
26. ALL EQUIPMENT AND MATERIAL SUBSTITUTIONS MUST BE APPROVED A MINIMUM OF 8 BUSINESS DAYS PRIOR TO BID DATE.

HEAT EXCHANGER SCHEDULE

UNIT NO. (MARK)	HOT SIDE				COLD SIDE				DESIGN MANUFACTURER	MODEL	REMARKS
	FLOW RATE (GPM)	INLET TEMPERATURE (°F)	OUTLET TEMPERATURE (°F)	MAX. PRESS. DROP (FT. OF H20)	FLOW RATE (GPM)	INLET TEMPERATURE (°F)	OUTLET TEMPERATURE (°F)	MAX. PRESS. DROP (FT. OF H20)			
HEX–1	267	96	86	23	267	70	80	23	BELL & GOSSETT	GPX	
HEX–2	267	96	86	23	267	70	80	23	BELL & GOSSETT	GPX	

NOTES:
1. BASIS OF DESIGN IS BELL & GOSSETT GASKETED PLATE AND FRAME HEAT EXCHANGER
2. REFER TO SPECIFICATIONS FOR EQUIPMENT SPECIALTIES.
3. SUBSTITUTIONS MUST BE APPROVED A MINIMUM OF 8 BUSINESS DAYS PRIOR TO BID DATE.

PUMP SCHEDULE

MARK NO. (UNIT)	GPM	HEAD FT.	RPM	HP/BHP	MIN. % EFF.	ELECTRICAL DATA (V/PH/HZ)	MIN. NPSH	TYPE	DESIGN MANUFACTURER	SERIES/SIZE	REMARKS
P–1	267	120	1750	10.0/9.2	74	208/3/60	N/A	END SUCTION	BELL & GOSSETT	E–1510/2.5EB	PROVIDE WITH VARIABLE FREQUENCY DRIVE BY AQUAVAR MODEL # AVB20010D0B0D0X1 OR APPROVED EQUAL. SEE NOTES 1,2,3.
P–2	267	120	1750	10.0/9.2	74	208/3/60	N/A	END SUCTION	BELL & GOSSETT	E–1510/2.5EB	PROVIDE WITH VARIABLE FREQUENCY DRIVE BY AQUAVAR MODEL # AVB20010D0B0D0X1 OR APPROVED EQUAL. SEE NOTES 1,2,3.
SUPPLY WELL PUMP	320	200	–	15	74	208/3/60	N/A	VERTICAL SUBMERSIBLE	GOULDS	320L15	PROVIDE WITH VARIABLE FREQUENCY DRIVE BY AQUAVAR MODEL # AVB20015D0B0D0X1 OR APPROVED EQUAL. SEE NOTES 1,2,3,4 & 5.

NOTES:

1. PUMPS SHALL BE CAPABLE OF BEING SERVICED WITHOUT DISTURBING PIPING CONNECTION OR MOTORS.
2. PROVIDE VIBRATION ISOLATION.
3. FLOW (GPM) SHALL BE CONTROLLED BY THE HEAT PUMP CONTROLLER LOCATED IN THE RECLAIM WATER ROOM.
4. PROVIDE 6 INCH STAINLESS STEEL (304) PUMP END WITH 4 INC DISCHARGE.
5. WELL PUMP VFD TO SET 100% CAPACITY AT 275 GPM.

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ARCHITECT OF RECORD

REVISION SCHEDULE

No.	DESCRIPTION	DATE
A	50% SUBMITTAL	4/18/17
B	90% Review Set	5/24/17
0	Permit Set	8/17/17

AW Solutions

300 CROWN OAK CENTRE DRIVE,
LONGWOOD, FL 32750
TEL: 407.260.0231
FAX: 407.260.0749

GREGORY ALAN JOHNSON — LICENSE — No. 57783 — STATE OF FLORIDA — PROFESSIONAL ENGINEER

GREGORY A. JOHNSON
PE-57783

PROJECT TEAM

DESIGNER
GJ

BIM / DRAWINGS BY:
GP

CHECKED BY:
GJ

Community Development Bldg. Renovations

295 Riverside Circle
Naples, FL 34102

6788-16-2867
100% CD - 08-17-17

PROJECT NUMBER | STATUS | ISSUE DATE

SYMBOL LEGEND, SCHEDULES & GENERAL NOTES

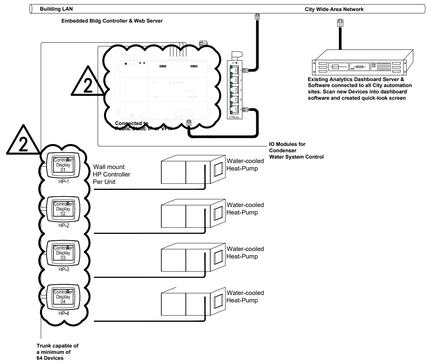
SCALE: –

M-000

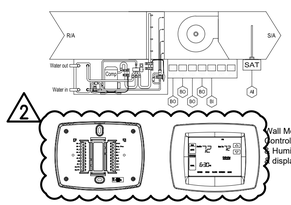
SHEET NUMBER

S:\AWS\17002 AMC CCD Remediation MEP\CAD\M-000.dwg Feb 23, 2018 - 3:12pm GILBERT

Partial Building Automation Network Architecture



Water-cooled Heat-Pumps are selected for Southern Climate where refrigerant circuit defaults to cooling Reversing Valve energized for Heating



Sequence of Operation Heat Pumps

Based on a user–defined Schedule in the Global Graphical Engine, If water flow has been proven in the condenser water plant, the system will run as Scheduled. Once a water flow status is received proving water flow, Any Heat–pump scheduled to be on will operate as locally adjusted.

Each heat pump shall be controlled and connected to a Wall mounted space controller, with LCD display equipped with an adjustment keypad. The LCD screen will display Space temperature & Humidity, as well as the active set point, and indicate through screen icons, it's mode of operation, cooling or heating.

In cooling as the space temperature rises to ½° over the cooling set point, the controller will activate the fan, and energize the compressor, if the Reversing Valve is Normally Pipe for cooling. If normally closed to cooling the Reversing valve shall be activate simultaneous to compressor operation.

As the space temperature drops to ½° below the room set point cooling will be staged off. Depending upon the Ventilation requirements the unit may operate the fan in continuous operation while scheduled in the occupied mode.

Should the room temperature drop 1° below set point, The Reversing valve will be activated and the compressor will be staged on. Should the unit be equipped with auxiliary electric heat, it will be locked out by the Building operator, but may be selected to run if the space temperature drops to a minimum of 2° below the heating set point.

Cooling and heating shall be separated by minimum and maximum set points, set by the Building Operator from a screen through the JAVA Application Control Engine Global Building Controller.

DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

1.01 DIRECT DIGITAL CONTROL (DDC) SYSTEM DESCRIPTION

A. Intent. DDC Contractor is familiar with the systems in all City of Naples buildings, regularly engaged by the City and shall supply and install a complete Direct Digital Control (DDC) system as required to accomplish the specified sequences of operation for control as indicated on the plans, as well as tie into the Cities Energy Dashboard

1.02 DDC SYSTEM REQUIREMENTS

A. BACnet. The control system shall consist of a high–speed, network of ANSI/ASHRAE 135 native BACnet DDC devices. The City presently has several buildings using the Niagara Platform/Framework and wishes to remain compatible with this system.

B. Utilize the Niagara 4 platform & framework for the global and graphic interfaces for the supervisory control, mechanical/electrical automatic temperature control devices, enclosures, interconnecting conduit and cabling.

1. Each Controller must be a Native BACnet device for each individual DDC device and the system access over similar level.
2. Provide Stand–Alone fully programmable controllers capable of being wall mounted with a full display and the required point density to carry out the control sequence
3. Utilize controllers that may be obtained from local sources such as Alerton, EASY IO, or Honeywell.
4. Basis of design is the Alerton VLD–362 or Honeywell, Easy IO equivalent with on board Temperature & Humidity sensing, and a touchpad display similar to the Vision pro thermostat with MSTP communications trunk

C. Modularity. The DDC system shall be modular in nature and implemented in such a manner that it can be expanded in both capacity and functionality through the addition of controllers, devices and wiring.

D. Local Database. All logic required to perform the specified sequences of operation, specification shall reside in each individual DDC device.

1.03 DDC SYSTEM ARCHITECTURE

A. The system will use a combination BACnet Building controller & Embedded Niagara JACE with BACnet and graphical drivers for a Web User Interface. It is to be mounted near an IP Network connection, capable of holding all Graphic Screens, executing all Plant control, and communicate with as many BACnet devices on a MSTP communications trunk, that is standard with the controller

B. The successful bidder must be able to connect the new system to the City of Naples Existing energy dashboard level, to allow for remote access of the Servicing contractor, and City of Naples employees

C. Field Level Communication Networks shall be comprised of BACnet networks of unitary BACnet controllers and devices using the BACnet data link Master Slave/Token Passing (MS/TP).

D. The JAVA Application control Engine shall hold the graphics and programming for all operator Web user interface over high speed TCP/IP and shall have at least one, but expandable to 4 MS/TP communications port capable of 64 devices per trunk.

1.04 PROVISION OF UNITARY EQUIPMENT NOT INSTALLED UNDER THIS SECTION

A. Provide, and coordinate the installation of components supplied under this Section but installed under other divisions of the specification.

B. Automatic control valves, thermowells, liquid flow switches, liquid flow meters are to be installed by the mechanical or piping contractor responsible for the installation of the applicable piping system.

C. Water Cooled Heat Pump equipment being used to replace the existing system suitable for tying into with standard thermostat terminal strips.

1.05 QUALITY ASSURANCE

A. DDC System Manufacturer shall be engaged full–time in the manufacture of equipment and devices of the scope, size and service required.

B. The DDC System Manufacturer shall be a company represented locally where parts and service may be obtained from local sources

C. The DDC system Contractor shall specialize and have a minimum of five (10) years of experience in the design, installation, programming and operation of DDC systems of the scope, size and service specified; and shall:

1. Be an officially authorized representative of the DDC, with a base of Operations employing no less than 10 Engineering, Project Management, Programmers and as well as a minimum of 10 Field employees
2. Use and Assign to the project technicians and engineers who are officially trained and certified by manufacturer in the design, installation, programming and operation of the DDC System components.
3. Mechanical Contractor shall secure pricing local sources who are representatives of the approved products.

1.02 CODES AND STANDARDS

A. All workmanship, materials and equipment will be of commercial grade, and conform to applicable codes, the prevailing applicable local, state building codes as well as the plans & specifications, Including:

1. ANSI/ASHRAE Standard 135: BACnet
2. National Electric Code (NEC).
3. Florida Building Code (FBC).
4. Southern Standard Building Code
5. Underwriters Laboratories (UL). (UL–916 Energy Management)

1.03 SYSTEM PERFORMANCE

A. Graphic Display. Provide Graphic Screens that are accessed from an Internet Browser

1. Floorplan Graphics delineating the specific areas conditioned by each system
2. Mechanical Graphics for each Heat Pump showing system operation, Min/Max set points allowed, Space temperature & Humidity, and animated graphics for Fan and compressor status.
3. Condenser Water Plant showing entire plant on one screen with sub screens for individual equipment features such as override to Back–up, Level–1 & Level–2

B. Operator Command. Provide the operator with the capacity to make commands or adjustments & changes to the set points & schedules, Alarm Response. Provide Alarms on all Motors and loop temperature, when system is overridden into Level–1 back–up as well as Level–2 Back–up, Program Execution. All programs in all DDC devices shall be able to execute at a minimum of at least one time every second. Program execution time shall be configurable to be consistent with the process under control.

C. All submittals and documentation including complete DDC System engineering design shall be submitted in electronic form

D. DDC System Hardware Submittals.

1. Control drawings: 11" x 17 with a table of contents, Network topology, Floor plan delineating MSTP trunk routing through the building, System flow diagrams detailing all control components in each system, a wiring diagram showing the connection of communication, all inputs and outputs, including any power supplies . Control panel layouts consistent with how they are to be constructed. Provide a complete "Bill of Materials" and finally a control point list.
2. Cut Sheets: Provide for every device in the control system a specification sheet indicating all physical dimensions, and performance data. This includes all DDC hardware, All Sensors, Control valves, Flow Meters, Power supplies, Control transformers, Control relays, Energy Metering, and so on.
3. For Valves and Dampers: Provide Schedules indicating Valve Size for each unit, Pressure drop, Line size, on page with Project name included in submittal package
4. All Programming shall adhere to the sequence of operation of the plans as indicated by each system.
5. A schedule of all control valves including the unique equipment identifier, valve size, dimensions and installation/maintenance clearance, model number (including pattern and connections), close–off rating, flow, CV, pressure drop, pressure rating and location. The valve schedule shall also contain actuator selection data

E. Project Record Documentation.

1. Upon completion of installation and systems commissioning submit record (as–built) documents for review to include:
   a. Operation and Maintenance (O&M) manual. As–built revisions of all submittal data updated to reflect actual field conditions, architecture and execution, Names and 24–hour contact information for installing contractors and service representatives. Operator's manual with administrator and operator level credentials and procedures

1.04 ACCEPTABLE MANUFACTURER–BIDDERS

A. The system has been designed and prepared using the Niagara framework using the BACnet Protocol and communication. All products are required to communicate using BACnet.

B. Provide a responsible quote from any of the following manufacturers

1. Niagara Framework under the Alerton (AIE 8000), EASY IO (EIO–8000), or Honeywell Webs OEM Brand
2. Heat Pumps shall be controlled by BACnet Controllers with Wall mounted display as indicated or suitable listed mfr. equivalent.

1.05 COMMUNICATION

A. BACnet ANSI/ASHRAE Standard 135, BACnet®.

B. BACnet over IP & BACnet over MSTP

1.06 EMBEDDED OPERATOR WORKSTATION (INTERNET SERVER)

A. The embedded Workstation shall provide day–to–day monitoring and basic operation of the DDC System. The embedded Operator Workstations shall be equivalent to a Niagara Vykon/AIE J–8050 with suitable upgrade software packs to handle the number of Heat pump controllers.

B. The J–8000 Embedded Server shall reside on the Wide area network of the City using the BACnet/IP data link as specified in ANSI/ASHRAE Standard 135 Annex J. Contact Mark Jackson, IT Director for Connection & Static IP.

C. The embedded BACnet® Operator Workstation shall store the entire device database and all necessary Graphical User Interface (GUI) resources including animations locally on the device.

D. Security. Each operator shall be required to log on to the system with a unique user name and password in order to view, edit, add or delete data.

1. System security permissions shall be multilayered and defined for each individual operator to restrict/permit day–to–day operations and system configuration.
2. Security data shall be stored and transmitted in an encrypted format.

E. Graphical User Interface (GUI). The operator interface shall be graphically oriented.

1. All color graphic displays shall be dynamic with current point data automatically updated from the BACnet network to the embedded workstation without operator intervention. The operator with the proper credentials shall be able to manually adjust all data point values (hardware or software) in the system, adjust values of control loops, and command points to manual override, timed override and automatic mode. Operators shall have the ability to dynamically create messages saved a text files on the embedded B–OWS associated with individual objects on a display or the display itself. These text files may be viewed and modified by other operators during other sessions.

F. Alarm Processing. The City dashboard shall be modified to allow any alarm from the system to be transferred and displayed at the Owners user interface or directly from the JACE within the City Local Area Network.

1. Alarm Classification. System shall provide configurable Alarms for each mechanical system, and may be added to if the owner decides other variable need monitoring and alarm.
2. Alarm and Event Log. The operator shall be able to view all system alarms from any location in the City Wide Are Network. With the proper credentials, an operator shall be able to acknowledge and clear alarms. Alarm and Event Log shall display at a minimum alarm time, received time, state, notification class, priority, message, source, time acknowledged, acknowledged by user and action.
3. Alarm Messages. Alarm messages shall use the English language name for the object in alarm in such a way that the source, location and nature of the alarm is easily understood without relying upon mnemonics or object instances.
   a. Alarm messages shall be fully customizable in size, content and behavior.
4. Alarm Actions. The operator shall be able to configure any of the following automatic alarm actions per workstation: Logging, Printing, Starting programs or routines, displaying messages, Paging, Audible annunciation, Displaying specific graphical displays or files.

1.07 SPACE MOUNTED HEAT PUMP CONTROLLERS

A. Space Mounted Terminal Unit Controllers. As required, one (1) dedicated space mounted terminal controller shall be provided for each Heat Pump Unit(s) a controller similar to an Alerton VLD–362 BACnet Thermostat, Honeywell, or EASY IO equivalent. Controller shall be furnished with LCD display

1. Provide each Heat–Pump as zoned with specified controller that emulates thermostat features, while communicating with the overall system. Each will have the Humidity feature, a minimum of 3 additional Inputs with the onboad Humidity & Temperature Sensing, Sufficient Binary & Analog outputs to control the mechanical equipment
2. The MSTP device shall communicate effectively at a baud of 76.8 Kbps under normal network operational conditions with all devices executing the specified sequences of operation at the specified performance criteria.

1.08 AUTOMATIC CONTROL VALVES

A. Automatic Control Valves. Provide control valves from :

1. Belimo Air Controls
2. Bray Controls
3. Honeywell International

B. All Butterfly valves shall come with EPDM wafer seals and close off without leaks

1. Two–way water valves: 150% of total system (pump) head.
2. Three–way water valves: 100% of pressure differential between ports A and B at design flow or 100% of total system (pump) head (whichever is greater).

1.09 AUTOMATIC VALVE ACTUATORS

A. Electric Actuation. Electric, all butterfly valves shall be capable of 110 or 24 VAC power.
   1. The actuator shall have electronic overload or stall protection to prevent damage to the actuator throughout rotation. Maintain their last commanded position when power is lost to the actuator.

B. Clutch/Gear Release. All Valve actuators shall have an external manual clutch/gear release to allow manual positioning of the damper when the actuator is not powered.

C. End Switch: Valve actuators shall have either an adjustable End Switch to verify port position reversal, or an analog position feedback, using 4–20mA of 0–10vdc.

D. Enclosure. Actuator casing and/or enclosures shall be appropriate to the application. If inside the case shall be a minimum rating of NEMA–1, for outside application use NEMA–4 rated enclosures.

1.10 FLOW CONTROL VALVES–ENERGY VALVE

A. Flow control valves as shown on the plans shall be equal to the Belimo Intelligent Energy valve with BACnet MSTP communications. Provide & Control Flow rate, Measure water temperature, and Actuator commands and performance data

1.11 CURRENT SWITCHES

A. Current Switches. Current–operated switches shall be self–powered, solid–state, split or solid core type with adjustable trip current, status LED and dry–contact output.

1.12 FLOW METERS WATER

A. Provide an inline flow meter using either Turbine Pulse to analog, or Magnetic analog. Flow meter generates a signal for the DDC system to scale as Water flow in Gallons per minute. Shall be weather proof, or have a weather enclosure is mounted outdoors. Provide Flow meters from Flomec (GPI TM Series), or the Onicon insertion type with turbine Analog output

1.13 POWER SUPPLIES AND LINE FILTERING

A. Power Supplies & Control Transformers. Control transformers and power supplies shall be UL–Listed. Provide Class 2 current–limiting type or over–current protection in both primary and secondary circuits for Class 2 service. Shall have built in Service receptacle, switches for both 110vac and 24vac.

1.14 INTERCONNECTING WIRING & RACEWAYS

A. Wiring & Cable. All wiring regardless of service and/or voltage shall comply with the Contract Document Electrical System Specifications, the National Electric Code (NEC), CSA C22.1–12 and any/all applicable local codes and/or Authorities Having Jurisdiction (AHJ).

1.15 WARRANTY

A. The DDC System Manufacturer shall provide a warranty certificate covering all Reliable DDC Hardware for a period of 5 Years from date of purchase..

1.16 ENGINEERED ORIGINAL EQUIPMENT CONTROLLERS

A. The main controller provided shall be a Niagara framework powered embedded Building controller and will be loaded with BACnet drivers. Provide BACnet communications directly with all devices on the BMS network.

B. All JAVA Application Control Engine embedded Graphical engines provided under this specification shall be required to provide the following simultaneous intrinsic and enabled physical communication networks at a minimum:
   1. One (2) RJ–45 Ethernet port @ 100 Mbps.
   2. One (1) EIA–232 port @ 115.2 Kbps.
   3. Two (2) EIA–485 ports @ 76.8 Kbps. MSTP Trunks expandable to 4

E. All Embedded Controllers, and field level controllers shall be native BACnet, and be capable of allowing the addition of protocol drivers for communication to .
   1. ANSI/ASHRAE Standard 135: BACnet.
   2. Modbus.
   3. Specific protocols for integration purposes in the future
   4. Shall be capable of Text or email messages for Alarms & maintenance reminders.

F. Embedded Graphical Engine (JACE) shall provide graphically–oriented thin–client web user interface.
   1. The current versions of the following standard web browsers shall be supported at a minimum: Microsoft Internet Explorer, Google Chrome, Mozilla Firefox, and Apple Safari.
   2. A customizable navigation/file tree shall be provided.
   3. Individual user home pages as determined by the user credentials shall be supported. Each user's ability to navigate the B–OWS shall be determined by their log–in credentials.

G. Each embedded Graphic Engine (JACE) shall support unlimited access for a minimum of five (5) simultaneous web clients.

H. The Graphic engine shall provide an Audit Trail feature that automatically records the date, time, user, and action associated with all user access and changes made via web browser clients.

1.17 SPACE MOUNTED TERMINAL UNIT CONTROLLERS

A. The space mounted terminal controllers provided shall comply with all relevant sections of this specification.

B. All space mounted terminal controllers series under this specification shall be available with the following the integral hardware sensors at a minimum: Temperature, Setpoint and Adjustment, Relative Humidity.

C. Each space mounted terminal controller shall be provided with a keypad and display to permit low–level operator interface with following features at a minimum:
   1. Configurable back–lighting. Configurable to display icons, time, point names and engineering units. Configurable to display and modify object values from any device on the Cities local area network. Provide access to a minimum of ten (10) total object values.

1.18 TEMPERATURE SENSORS

A. All sensors shall be installed in accordance with the manufacturer's recommendations consistent with acceptable industry standards for performance compliant with the requirements of this specification. All duct sensors shall be 12" rigid averaging

B. All pipe–mounted sensors shall be installed in wells. Install all liquid temperature sensors with heat–conducting fluid in thermal wells.

C. Outdoor air sensors shall be mounted outside on a northern exposure as high as serviceable on the building. The sensor shall be mounted within a ventilated enclosure to shield the sensor from the effects of the sun. The sensor location shall be selected such that it may not be affected by artificial and/or mechanical airstreams (i.e., building exhaust, building relief, &c.).

1.19 TEMPERATURE CONTROL PANELS

A. Unless otherwise directed by the AHJ, all temperature control panels and enclosures shall be located as indicated such that visual observation and adjustment can be accomplished while standing flatfooted on the floor in a convenient location adjacent to the equipment served.

B. All temperature control panels shall have keyed, locking latches and shall be keyed commonly such that one key shall open all enclosures.

C. Provide each DDC panel with a power supply that is NEMA–2 rated, Disconnect switches for 110vac & 24vac, both sides fused, and a Service receptacle in the power supply.

1.20 WIRING

A. DDC System control wiring shall be performed by professionals in a workmanlike manner consistent with acceptable industry standards for performance and in compliance with the contract documents, Project Electrical System Specifications, the National Electric Code (NEC), CSA C22.1–12 and any/all applicable local codes and/or Authorities Having Jurisdiction (AHJ).

B. Unless otherwise specified it shall be the responsibility of the DDC System Contractor to provide all of the wiring necessary to provide a complete DDC System in compliance with the requirements of this specification.

C. Any exposed wiring in the mechanical space shall be in Blue Conduit, and any exposed wiring in concealed locations shall be plenum rated, bundled neatly and tie–wrapped every 3'

1.21 PROGRAMMING

A. Provide sufficient internal memory for the specified sequences of operation and data logging with a minimum of 25% of available memory remaining free for future use.

B. Provide a printed copy in the O&M manual, of the programming in each controller

1.22 DDC SYSTEM CHECK–OUT AND TESTING

A. All testing listed in this article shall be performed by the DDC System Contractor. This testing shall be completed before system demonstration is initiated.
   1. The DDC System Contractor shall furnish all of the necessary labor and test and calibration apparatus required to calibrate and prepare for service all instruments, controls, and accessory equipment provided under this specification.
   2. Verify that all control terminations are tight and all control wiring is proper and free from shorts and faults.
   3. Enable normal operational control and verify calibration of all input devices individually according to manufacturer's recommendations.

1.23 START–UP & CHECK OUT DOCUMENTATION

A. During start–up, the DDC technicians shall use a start–up sheet listing the inputs and outputs of each controller. A line next to each control point shall be initialed and dated by the technician after points are shown operational

B. As each device is tested a log shall be completed showing the date, technician's initials and any corrective action taken as a result of operational failures.
   1. Any tests that cannot be performed due to circumstances beyond the control of the DDC System Contractor may be performed at the discretion of the Owner after acceptance and as a part of the warranty period.

1.24 CLEANING

A. The DDC System Contractor shall clean up all debris resulting from his/her activities daily. The contractor shall remove all cartons, containers, crates, etc. under his/her control as soon as their contents have been removed. At the completion of work in any area the DDC System Contractor shall clean all work, equipment, etc. keeping it free from dust, dirt, debris, etc.

1.25 TRAINING

A. The DDC System Contractor shall provide instruction on the adjustment, operation and maintenance of the DDC System including all hardware and software provided and installed in compliance with the requirements of this specification.
   1. Provide a minimum of 4 Hours of instruction to at least 3 City Employees post equipment start–up. Provide an additional 4 Hours prior to the one year installation warranty.
   2. Provide the owner a Warranty Certificate and training at the initial 4 hour orientation & training.
   3. Turn over to the owner two database back–ups on identical flash drives. One shall be placed in the control panel where the JAVA Application Building Controller is mounted, and the other to the owners representative along with a copy of the operations and Maintenance manual.

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ARCHITECT OF RECORD

REVISION SCHEDULE

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A	50% SUBMITTAL	4/18/17
B	90% Review Set	5/24/17
0	Permit Set	8/17/17
2	Rev. 2	02/23/18

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6788-16-2867
100% CD - 08-17-17

PROJECT NUMBER | STATUS | ISSUE DATE

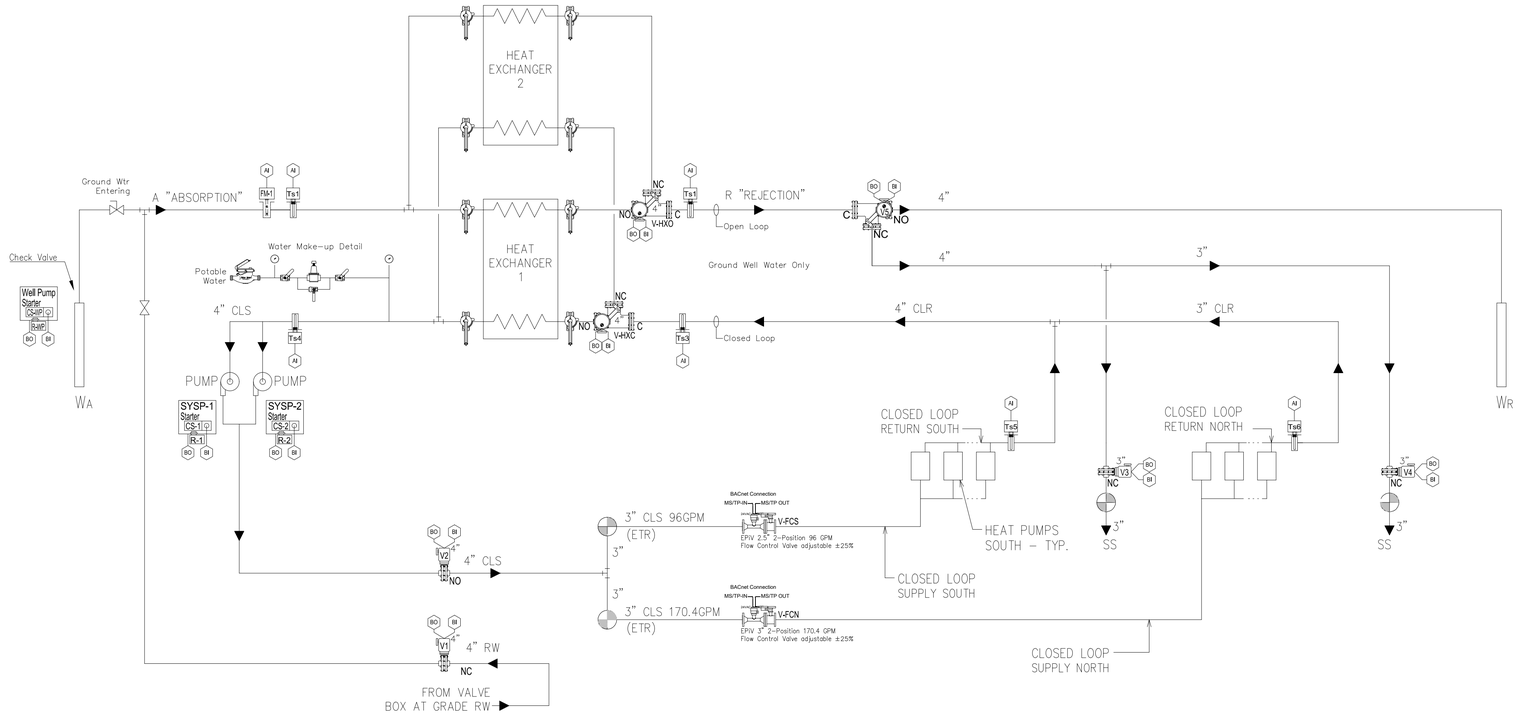
CONTROLS - HEAT PUMPS - NEW WORK

SCALE: **NOT TO SCALE**

M-001

SHEET NUMBER

S:\AWS\17002 AMC CDD Remediation MEP\CAD\M-001,2,3 R2.dwg Feb 23, 2018 - 3:11pm GILBERT



SEQUENCE OF OPERATION CONDENSER WATER SYSTEM

The normal sequence of the system is to allow well water to absorb & reject heat from the closed loop side generated by the Heat Pumps. In the event of a Pump failure, the system will be able to use Recycled secondary effluent to back up the open side of the system.

The System will use a combination BTL level 6 rated BACnet Building Controller & an embedded BACnet Operator workstation (BOWS) with one MSTP trunk Connection, and one Auxiliary I/O expansion that allows the entire plant to run inside one controller with one program file. The Building Controller will be connected to the owners Building Network, and will be connected to the existing City Analytics Dashboard for remote access.

The plant shall run on a user–defined schedule, set on the graphic screen in the BACnet Embedded Building controller. As the system starts or upon start–up from a power interruption, the Submerged well pump will start, and provide run status by a current switch at the Pump Starter. Water flow proof for the open loop shall be made when the current switch is made and the Flow meter FM–1 is within 80% (adjustable)of the Well Pump gpm.

After open loop flow proof, The lead pump for the Closed loop will be activated and a current switch will verify operation, If the current switch is made and the total flow rate between Flow Control valves V–FCN & V–FCS are within 80% (adjustable) of the specified flow rate, The system will execute all programming for control and send a flow signal to the building Heat Pumps allowing them to run.

During normal operation, The building operator shall be able to select which Plate & Frame Heat exchanger is in use through the mechanical system graphic screen. It is recommended that this selection be made prior to system start–up.

CLOSED LOOP PUMPS

The system loop pumps will alternate each time the system is activated or scheduled on, but no less than weekly to even the runtime. Should the system lose detection of flow for the lead pump in operation, the programming will shift the system to the lag pump automatically, and send a text or email alarm to the building operator.

All valves are selected to operate in the default position of primary operation for Well water use, through the Plate & frame heat exchanger into the injection well. All butterfly valves shall come with a manual wheel that may be engaged to connect directly to the motor shaft and reposition the valve in the event of a failure.

During normal operation water flow volume shall be metered and displayed for the Open side as well as the closed loop side. The closed building loop will show Flow to each Building, North & South through a BACnet Connection from each Flow Control Valve.

BACK–UP

Should the Well Pump require servicing, To continue system operation, The system valves can automatically change position for Back–up. This may be set to work automatically or manually in the event of pump failure, or as needed. When Back–up is selected, The Well Pump starter is deactivated, Valve V5 will be activated to close off the injection well, and divert water towards the Sanitary sewers, and valves V1, V3, & V4 shall be activated to Open.

Once valve V1 is open, Recycled Waste Water will flow from its source of origination, into, and through the selected Heat exchanger, then be directed to drain out of the system to each respective Sanitary Sewer. The closed loop will function normally with either the Lead or lag Pump being activated. An historical trend on FM–1 will show the open loop flow rate duringBack–up.

The MachProWebCom BACnet Building controller, will provide all the control logic for the Mach ProPoint I/O modules, so all programming for the plant is carried out in one larger controller. Provide sufficient modules to allow for a minimum of 10% spare points.

Set up Alarms to send text messages or emails for the following conditions:

- Well pump fails to make status
- System pumps fail to make status
- Flow meter 1 drops below 80% flow
- Valve V–FCS drops below 80% flow
- Valve V–FCN drops below 80% flow
- Any Valve fails to show activated position
- Entering Closed Loop water temp rises to 90˚
- Leaving Closed loop water temp rises to 110˚
- Heat Pump lock out due to no flow
- Communication loss or any Network Device

Minimum Control Points displayed on Graphics for Heat Pumps and Plant

Heat Pump Status	Plant Mode of Operation	V–FCN Communication status
Communication status	Normal/Level–1 Back–up/Level–2 Back–up	V–FCS Communication status
Display Cooling or Heating Mode	Entering HX Temperature	V1 Command
Compressor Command	Leaving HX Temperature	V1 Status
Zone–Space Temperature	Open Loop Water flow	V2 Command
Zone Space Humidity	Closed Loop Entering Temperature South	V2 Status
Indoor Coil Leaving Air Temperature	Closed Loop Leaving Temperature South	V3 Command
Current Set point	Closed Loop Water flow South	V3 Status
Max Cooling Set point	Closed Loop Entering Temperature North	V4 Command
Min Cooling Set point	Closed Loop Leaving Temperature North	V4 Status
Max Heating Set point	Closed Loop Water flow South	V5 Command
Min Heating Set point	Well Pump Motor command	V5 Status
Controller Communication status	Well Pump Motor status	V6 Command
Heat Pump Alarm (if provided)	SYSP–1 pump motor command	V6 Status
Unit Room Number or Area	SYSP–1 pump motor Status	V7 Command
Blower Command	SYSP–2 pump motor command	V7 Status
Blower Status	SYSP–2 pump motor Status	V8 Command
		V8 Status

2 DIAGRAM UPDATED.

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CONTROLS - HEAT PUMPS - NEW WORK

SCALE: **NOT TO SCALE**

M-002

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CONTROL DIAGRAMS - CONDENSER WATER SYSTEMS

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M-003

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