GENERAL NOTES

1. BUILDING AUTOMATION SYSTEM (BAS) INSTALLER SHALL FURNISH AND INSTALL A DIRECT DIGITAL CONTROL BAS THAT CONNECTS TO THE EXISTING BAS FRONT-END. THE SAME BAS MANUFACTURER SHALL BE USED THROUGHOUT A PARTICULAR BUILDING. THE NEW BAS SHALL UTILIZE ELECTRONIC SENSING, MICROPROCESSOR-BASED DIGITAL CONTROL, AND ELECTRONIC ACTUATION OF DAMPERS, VALVES AND DEVICES TO PERFORM CONTROL SEQUENCES AND FUNCTIONS SPECIFIED. REFER ALSO TO CONTROL DRAWINGS, SEQUENCES OF OPERATION, AND POINT LISTS ELSEWHERE IN THE CONTRACT DOCUMENTS.

2. ALL MATERIALS SHALL BE NEW, THE BEST OF THEIR RESPECTIVE KINDS WITHOUT IMPERFECTIONS OR BLEMISHES AND SHALL NOT BE DAMAGED IN ANY WAY, AND SHALL CONSIST OF THE MANUFACTURER'S LATEST PROVEN TECHNOLOGY AT THE TIME OF EQUIPMENT SUBMITTAL. USED EQUIPMENT SHALL NOT BE USED IN ANY WAY FOR THE PERMANENT INSTALLATION EXCEPT WHERE DRAWINGS OR SPECS SPECIFICALLY ALLOW EXISTING MATERIALS TO REMAIN IN PLACE.

3. THE SYSTEM MUST BE FULLY BACNET (ASHRAE 135-LATEST EDITION) COMPLIANT AT THE TIME OF INSTALLATION. THE SYSTEM MUST USE BACNET AS THE NATIVE COMMUNICATION PROTOCOL BETWEEN THE BAS DEVICES AND UNIVERSITY NETWORK SERVERS.

4. THE FOLLOWING ARE THE ONLY ACCEPTABLE MANUFACTURERS FOR BUILDING AUTOMATION SYSTEM EQUIPMENT: AUTOMATED LOGIC CORPORATION (WEBCTRL), JOHNSON CONTROLS, INC. (METASYS).

5. ALL CONTROLS WORK SHALL BE INSTALLED BY THE BAS INSTALLER, UNLESS SPECIFIED OTHERWISE. ALL EQUIPMENT SHALL BE DIRECTLY CONTROLLED BY THE BAS WHERE POSSIBLE IN LIEU OF THIRD-PARTY OR FACTORY CONTROLS.

6. THE INSTALLATION OF ALL EQUIPMENT SHALL BE IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND INSTALLATION BOOK.

7. CRITICAL SAFETY INTERLOCKS, SUCH AS FREEZESTATS, HIGH LIMIT PROTECTORS, END SWITCHES ETC., SHALL BE DIRECTLY CONNECTED, THROUGH WIRE OR PNEUMATIC TUBING, SO AS NOT TO DEPEND ON ANY DIGITAL CONTROL SYSTEM "SEQUENCE OF OPERATION" TO PERFORM THEIR SAFETY FUNCTION. CONTACTS SHALL BE PROVIDED SO THE SAFETY CAN BE MONITORED BY THE BAS.

8. LAMINATED CONTROL DRAWINGS INCLUDING SYSTEM CONTROL SCHEMATICS, SEQUENCES OF OPERATION AND PANEL TERMINATION DRAWINGS, SHALL BE PROVIDED IN EACH PANEL FOR THE EQUIPMENT SERVED BY THAT PANEL. TERMINAL UNIT DRAWINGS SHALL BE LOCATED IN THE CENTRAL PLANT EQUIPMENT PANEL OR MECHANICAL ROOM PANEL. THE DRAWINGS SHALL ACCURATELY RECORD THE ACTUAL CONTROLLER PROGRAMMING AND SETTINGS AT THE TIME OF BUILDING TURNOVER.

9. ELECTRONIC COPIES, INCLUDING EDITABLE AUTOCAD OR VISIO FILES, OF THE RECORD DRAWINGS SHALL BE PROVIDED TO THE INSTRUMENTATION & CONTROLS DEPARTMENT AND SHALL INCLUDE COPIES OF THE ABOVE NOTED SCHEMATICS, CONTROLLER SCHEMATICS, AS WELL AS INDIVIDUAL FLOOR PLANS WITH CONTROLLER LOCATIONS WITH ALL INTERCONNECTING ROUTING WIRING, SPACE SENSORS, LAN WIRING, POWER WIRING, AND LOW VOLTAGE POWER WIRING.

10. CONTROLS INSTALLER SHALL PROVIDE UNIVERSITY WITH ALL PRODUCT LINE TECHNICAL MANUALS AND TECHNICAL BULLETINS, TO INCLUDE NEW AND UPGRADED PRODUCTS, BY THE SAME DISTRIBUTION CHANNEL AS TO DEALERS OR BRANCHES THROUGHOUT THE WARRANTY PERIOD OF THE PROJECT.

11. THE SYSTEM PROVIDED SHALL INCORPORATE HARDWARE RESOURCES SUFFICIENT TO MEET THE FUNCTIONAL REQUIREMENTS OF THE PROJECT PLUS 10% ADDITIONAL CAPACITY. THIS ADDITIONAL CAPACITY SHALL BE SPECIFICALLY REFLECTED IN ADDITIONAL CONTROLLER UNIVERSAL INPUTS/OUTPUTS.

12. THE UNIVERSITY RESERVES THE RIGHT TO MAKE CHANGES TO THE BAS DURING THE WARRANTY PERIOD. SUCH CHANGES DO NOT CONSTITUTE A WAIVER OF WARRANTY. THE INSTALLER SHALL WARRANT PARTS AND INSTALLATION WORK REGARDLESS OF ANY SUCH CHANGES MADE BY THE UNIVERSITY, UNLESS THE INSTALLER PROVIDES CLEAR AND INDISPUTABLE EVIDENCE THAT A SPECIFIC PROBLEM IS THE RESULT OF SUCH CHANGES TO THE BAS. ANY DISAGREEMENT BETWEEN THE UNIVERSITY AND THE INSTALLER ON SUCH MATTERS SHALL BE SUBJECT TO RESOLUTION THROUGH THE CONTRACT 'DISPUTES'

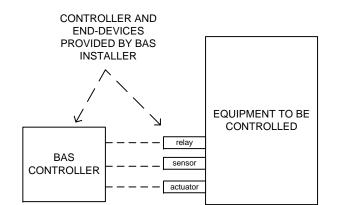
3. FOR METERING INTEGRATION WITH BAS, REQUEST METERING/BAS INSTALLATION SHEET FROM UVA METERING DEPARTMENT PRIOR TO SOFTWARE DEVELOPMENT.

PRODUCT SHALL BE EQUIVALENT TO VAISALA HMT331/HMT/333 DISPLAYED ABOVE

1 VIVARIUM LABORATORY TEMPERATURE AND HUMIDITY SENSOR

1. A NIST TRACEABLE TEMPERATURE AND HUMIDITY DISPLAY WITH A NEMA TYPE 2 OR HIGHER ENCLOSURE, AS REQUIRED BY THE ROOMS APPLICATION, SHALL BE PROVIDED FOR EACH ANIMAL HOLDING ROOM AND OTHER ROOMS AS SPECIFIED BY THE UNIVERSITY. 2. IF SENSOR IS LOCATED INSIDE THE ANIMAL ROOMS THEY SHALL HAVE A WATER PROOF ENCLOSURE SUITABLE FOR PERIODIC WASH DOWNS.

3. THE SENSORS FOR THESE DISPLAYS SHALL BE THE CONTROLLING SENSORS AND SHOULD BE SUITABLE FOR HIGH HUMIDITY ENVIRONMENTS WITH QUICK RECOVERY FOR SATURATION EVENTS, EQUIVALENT TO HMT337 SERIES.



2 THIRD-PARTY INTEGRATION

1. THE BAS INSTALLER SHALL BE RESPONSIBLE FOR DIRECTLY CONNECTING AND CONTROLLING ALL EQUIPMENT AND ASSOCIATED SYSTEMS WITH THE BUILDING AUTOMATION SYSTEM. EQUIPMENT MANUFACTURER PROVIDED CONTROL OF EQUIOPMENT IS NOT ACCEPTABLE UNLESS PRE-APPROVED BY

2. WHERE A THIRD-PARTY INTERFACE IS APPROVED FOR THE EQUIPMENT CONTROL AND SEQUENCING, THE INTERFACE SHALL BE NATIVE BACNET AS PROVIDED BY THE MANUFACTURER AND SHALL BE WIRED TO THE BAS ON AN MS/TP COMMUNICATION TRUNK LOCAL TO THE BUILDING CONTROL NETWORK. ALL CONTROL AND MONITORING POINTS SHALL BE MADE AVAILABLE TO THE

BAS WITH READ AND WRITE AUTHORIZATION AS APPLICABLE.

3 WIRING

NOTES: 1. ALL CONTROL WIRING SHALL BE PLENUM RATED SHIELDED CABLE. 2. THE TERM "CONTROL WIRING" IS DEFINED TO INCLUDE THE PROVIDING OF WIRE.

BASIS OF DESIGN IS WAGO 222 SERIES CONNECTORS.

REQUIRED OTHERWISE BY MANUFACTURER.

CONDUIT, AND MISCELLANEOUS MATERIALS AS REQUIRED FOR MOUNTING AND CONNECTING ELECTRIC OR ELECTRONIC CONTROL DEVICES IN PILOT CIRCUITS OF CONTACTORS, STARTERS, RELAYS, ETC., AND WIRING FOR VALVE AND DAMPER ACTUATORS AND METERS.

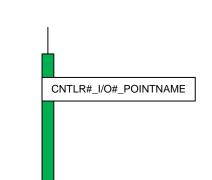
3. WIRE TERMINATIONS AND JOINTS SHALL BE MADE VIA SCREW TERMINALS. TERMINATIONS AND JOINTS AT COMMON JUNCTION BOX AREAS SHALL BE MADE UTILIZING DIN RAIL MOUNTED TERMINAL STRIPS WITH SCREW TERMINALS, DOUBLE STACKING OF CONNECTIONS MUST BE APPROVED IN WRITING BY THE UVA AUTOMATION SERVICES

4. WIRE NUTS ARE NOT ACCEPTABLE. A SPLICING CONNECTOR WITH A CLAMPING MECHANISM MAY BE USED WITHIN 6 INCHES OF AN END DEVICE AND WHERE THE END DEVICE IS NOT AVAILABLE WITH SCREW TERMINALS FOR TERMINATING FIELD WIRING.

ELECTRICAL, TELEPHONE, AND SIMILAR ROOMS SHALL BE INSTALLED IN RACEWAYS. ALL

OTHER WIRING SHALL BE INSTALLED NEATLY AND INCONSPICUOUSLY ABOVE CEILINGS. 6. #22 OR #18 GAGE WIRING SHALL BE USED FOR ALL 4-20MA AND PULSE SIGNALS, UNLESS

5. ALL EXPOSED CONTROL WIRING AND CONTROL WIRING IN THE MECHANICAL,

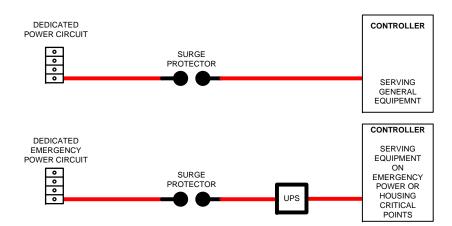


4 CONTROL WIRE LABELING

1. ALL CONTROL WIRING SHALL BE LABELED INSIDE THE CONTROL PANEL AND AT THE END-DEVICES USING VINYL TAPE.

2. LABELING AT REMOTE DEVICES SHALL INCLUDE, THE CONTROLLER NAME ABBREVIATION WITH ADDRESS. THE POINT TYPE (AI, AO, BI, BO), THE CONTROLLER INPUT/OUTPUT NUMBER, AND THE POINT ABBREVIATION. EXAMPLE: CTRL-1 _AI-1 _RA-T (CONTROLLER ADDRESS 1, ANALOG INPUT 1, RETURN AIR

A BUILDING LEVEL GRAPHIC SHALL BE PROVIDED THAT DISPLAYS ALL FLOORS AND AREAS SERVED ON ONE SCREEN. FLOOR PLANS SHALL DYNAMICALLY LIPDATE TO VISUALLY DEPICT THE ZONE ALARM (EVENT)



SOFTWARE, COMMUNICATIONS OR DATA STORAGE.

5 POWER WIRING

Designated Network and Device Address Ranges

1. ALL CONTROL PANELS SHALL BE SERVED BY DEDICATED POWER CIRCUITS FROM THE SAME SOURCE AND SERVICE LEVEL PROVIDED TO THE EQUIPMENT CONTROLLED. THE CONTROL PANEL SHALL BE LABELED WITH THE ELECTRICAL PANEL NAME AND CIRCUIT

2. BAS INSTALLER SHALL FURNISH AND INSTALL ANY POWER SUPPLY SURGE PROTECTION, FILTERS, ETC. AS NECESSARY FOR PROPER OPERATION AND PROTECTION OF ALL CONTROLLERS. ALL CONTROL EQUIPMENT MUST BE TOLERANT OF VOLTAGE VARIATIONS 10% ABOVE OR BELOW SCHEDULED NOMINAL WITH NO IMPACT ON HARDWARE.

3. FOR EQUIPMENT ON EMERGENCY OR STANDBY POWER THE BAS CONTROLLER SERVING THAT EQUIPMENT SHALL BE PROVIDED WITH AN EXTERNAL UNINTERRUPTABLE POWER SUPPLY (UPS). ADDITIONALLY A UPS SHALL BE PROVIDED FOR EACH CONTROLLER REQUIRED TO MAINTAIN COMMUNICATION BETWEEN THE EQUIPMENT CONTROLLER AND THE BAS SERVER. THE UPS SHALL BE CONFIGURED TO PROVIDE UNINTERRUPTED SERVICE TO THE CONTROLLERS DURING TRANSITION TO/FROM NORMAL AND EMERGENCY/ STANDBY POWER. THE UPS SHALL HAVE A LOW BATTERY ALARM WIRED TO THE BAS FOR NOTIFICATION AND SHALL PASS POWER THROUGH ON BATTERY FAILURE.

PPNNNDD

BACNET Device:

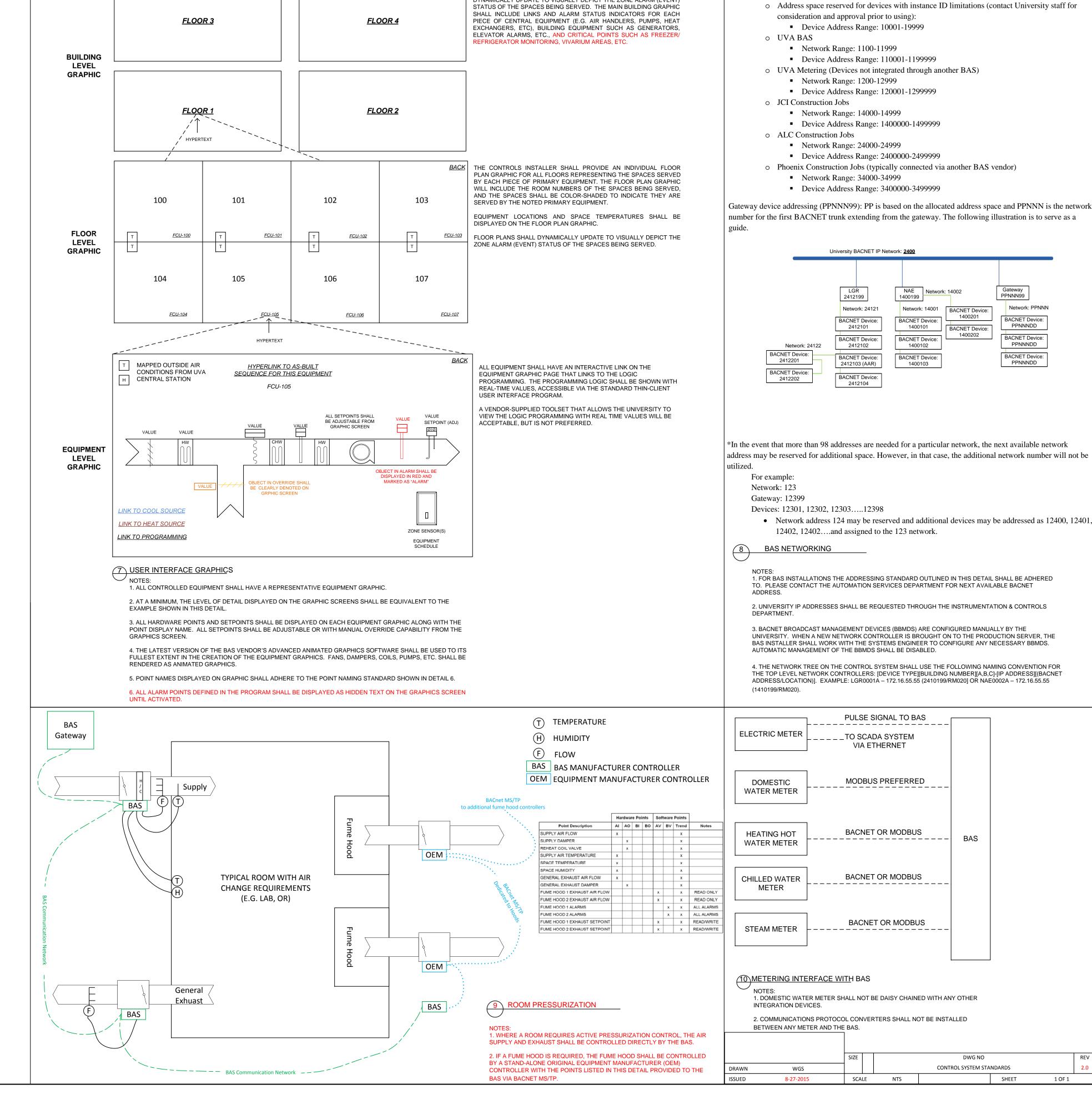
SHEET

4. A CENTRAL ONLINE UPS MAY BE USED IN PLACE OF INDIVIDUAL UPS'S FOR BAS

<u>Abbreviation</u>	<u>Description</u>
A	Air
AB	"A" - "B" Phase
AC	"A" - "C" Phase
ACC	Accumulator
ADJ AHU	Adjust Air Handling Unit
ALA	Alarm
AMPS	Amperage
AN	"A" - "N" Phase (N is Neutral)
ANG	Angle
APH	A Phase
APP	Application
ATMZR	Atomizer
AUTO	Auto
AVAL AVG	Average
B	Average Basement
BA	"B" - "A" Phase
BATT	Battery
BATT-L-VOLTS	Battery low voltage
BATT-OPRT	Battery operational
ВС	"B" - "C" Phase
BD	Blowdown
BLD-D	Bleed Damper
BLDG	Building Boiler
BLR BN	"B" - "N" Phase (N is Neutral)
BPH	B Phase
BRDG	Bridge
ВҮР	Bypass
С	Command
CA	"C" - "A" Phase
CAP	Capacity
СВ	"C" - "B" Phase
CC	Cooling Coil
CD	Cold Deck
CDTVTY CDW	Conductivity Condenser Water
CHLR	Chiller
CHW	Chilled Water
CHWUVXXXXY	Chilled Water Meter
CL	Closed
CLG	Cooling
CLN	Clean
CLN-STM-GEN	Clean Steam Generator
CMN	Common
CMPR CN	"C" - "N" Phase (N is Neutral)
CNT	Count
CO2	Carbon Dioxide
СОМВ	Combustion
СОММ	Communication
COND	Condensate
CORR	Corridor
СРН	C Phase
CR CRAC	Credit
CRAC CT	Conjugation Conditioner
CUH	Cooling Tower Cabinet Unit Heater
CYC	Cycle
D	Damper
DC	Direct Current
DCPL	Decouple
DD	Down Duct
DEL	Delta
DEWPT	Dew Point
DH	Dehumidification Dehumidifier
DHUM DIFF	Dehumidifier Differential
DLVRY	Delivery
DLY	Delay
DMD	Demand
DOM	Domestic Water
DP	Differential Pressure
DRNPN	Drain Pan
DTW	Dual Temperature Water
E	East
ECON	Economize
EFF EFFI	Effective
EFFI EGEN	Efficiency Emergency Generator
egen Ele	Emergency Generator Electric
ELEUVXXXXY	Electric Meter
ELVTR	Elevator
EMP	Empty
ENA	Enable
ENT	Entering
EOL	End Of Line
LOL	
EVAP EX	Evaporator Excitation

Description
Flow Face
Failure
Fault
Feedback
Fan Coil Unit
Final
Flame
Filter
Fan
Frequency
Protocol Converter (Field Server, Data Station)
Fuel
Ground
Gas
Gas Meter
Generator
Glycol
Ground (electrical)
Humidity
Hand
Hot Deck
High
Heat Recovery Coil
Heat Trace
Heating
Heater
Humidifier
Hot Water
Heat Exchanger
ID
In or Input
Interval
Inverter
Isolation
Kilo Volt Amps
Kilo Volt Amps Reactive
Kilowatts
Kilowatt Hours
Low
Lag
Lead
Length
Limit
Limit Line Line
Line Line
Line Line Line to Neutral
Line Line Line to Neutral Load
Line Line Line to Neutral Load Load on bypass
Line Line Line to Neutral Load Load on bypass Load on inverter Local
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss Latch
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss Latch Low Temp Meter
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss Latch Low Temp Meter Level
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss Latch Low Temp Meter Level Leaving
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss Latch Low Temp Meter Level Leaving Mixed Air
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss Latch Low Temp Meter Level Leaving Mixed Air Maximum
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss Latch Low Temp Meter Level Leaving Mixed Air Maximum Medical
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss Latch Low Temp Meter Level Leaving Mixed Air Maximum Medical Mechanical Room
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss Latch Low Temp Meter Level Leaving Mixed Air Maximum Medical Mechanical Room Minimum
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Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss Latch Low Temp Meter Level Leaving Mixed Air Maximum Medical Mechanical Room Minimum Mode Moisture Motor Medium Pressure Maintenance Switch Medium Temp Meter Meter Meter Meter Meter Make Up Make Up Valve Negative N Phase
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss Latch Low Temp Meter Level Leaving Mixed Air Maximum Medical Mechanical Room Minimum Mode Moisture Motor Medium Pressure Maintenance Switch Medium Temp Hot Water Meter Meter Meter Meter Meter Make Up Make Up Valve Negative N Phase Out or Output
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss Latch Low Temp Meter Level Leaving Mixed Air Maximum Medical Mechanical Room Minimum Mode Moisture Motor Medium Pressure Maintenance Switch Medium Temp Hot Water Meter Meter Meter Make Up Make Up Make Up Valve Negative N Phase Out or Output Oxygen
Line Line Line to Neutral Load Load on bypass Load on inverter Local Loop Loss Latch Low Temp Meter Level Leaving Mixed Air Maximum Medical Mechanical Room Minimum Mode Moisture Motor Medium Pressure Maintenance Switch Medium Temp Hot Water Meter Medium Temp Meter Meter Medium Temp Meter Meter Meter Meximum Temp Meter Meximum Medium Temp Meter Medium Temp Meter Medium Temp Meter Meter Meter Meximum Temp Meter Meter Meximum Temp Meter Meter Meximum Temp Meter Motor Motor Motor Meximum Temp Meter Meximum Temp Meter Meximum Temp Meter Meximum Temp Meter Motor M
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PIL	Pilot
PK	Peak
PLANT	Plant
PMP	Pump
PNL	Panel
PNTHSE	Pent House
POS	Positive
PRCS	Process
PRE	Pre
PRM	Parameter
PRVS	Previous
PWR	Power
Q	Heat Transfer (BTU/Hr)
R	Return
RA	Return Air
RAD	Radiation
RCFYR	Rectifier operational
RCFYR-OPRT	Rectifier operational
	·
RCVR	Receiver
RDGS	Readings
REFG	Refrigerant
REM	Remote
RES	Reserve
REV	Reversal
RLF-FN	Relief Fan
RMS	Root Mean Square
ROT	Rotate
RST	Reset
RTU	Roof Top Unit
RUNT	Run Time
S	Supply
SA	Supply Air
SCHED	Schedule
SCHW	Secondary Chilled Water
SEC	·
	Secondary
SEQ	Sequence/Order
SEW	Sewage
SEWUVBDXXXXY	CDW Blowdown Meter
SEWUVCRXXXXY	Sewer Credit Meter
SEWUVMUXXXXY	CDW Make Up Meter
SFTNR	Softener
SHW	Secondary Hot Water
SLR	Solar
SMK	Smoke
SN	Serial Number
SP	Set Point
SPD	Speed
START	Start
STBY	Standby
STEUVXXXXY	Steam Meter
STG	Stage
STM	Steam
STN	Station
STOP	Stop
STP	Static Pressure
STS	Status
SUB	Sub
SUMP	Sump or Basin etc.
SUPP	Supplemental
SW	Switch
SYS	System
Т	Temperature
TCHW	Tertiary Chilled Water
TK	Tank
TOL	Tolerance
TONS	Tonnage
TOT	Total
TST	Test
TWR	Tower
U	Unit
UH	Unit Heater
UNBLC	
	Unbalanced Uninterruptable Power Supply
UPS	Uninterruptable Power Supply
V	Valve
VAC	Vaccum
VAL	Value
VEL	Velocity
VFD	Variable Frequency Drive or Variable Speed Drive
VIB	Vibration
VOLTS	Voltage
W	West
WAT	Water
WATUVIRXXXXY	Irrigation Meter
WATUVIRXXXXY	Irrigation Meter Make Un Meter
WATUVMUXXXXY	Make Up Meter
WATUVMUXXXXY WATUVXXXXY	Make Up Meter Domestic Water Meter
WATUVMUXXXXY WATUVXXXXY WRLSS	Make Up Meter Domestic Water Meter Wireless
WATUVMUXXXXY WATUVXXXXY WRLSS XFMR	Make Up Meter Domestic Water Meter Wireless Transformer
WATUVMUXXXXY WATUVXXXXY WRLSS XFMR XMTR	Make Up Meter Domestic Water Meter Wireless Transformer Transmitter
WATUVMUXXXXY WATUVXXXXY WRLSS XFMR	Make Up Meter Domestic Water Meter Wireless Transformer



6 POINT NAMING STANDARD

1.ALL POINT NAMES, INCLUDING DISPLAY NAMES, REFERENCE NAMES, AND BACNET OBJECT NAMES, SHALL USE A COMBINATION OF THE ABBREVIATIONS SHOWN IN THIS DETAIL WITH A DASH (-) SEPARATING THE ABBREVIATIONS. FOR EXAMPLE, A SUPPLY AIR TEMPERATURE SENSOR WOULD BE INDICATED AS SA-T (SEE THE "BAS POINT NAME CONVENTION" REFERENCE DOCUMENT FOR ADDITIONAL CLARIFICATION). ALL FULLY QUALIFIED OBJECT NAME, WHERE APPLICABLE, SHALL INCLUDE THE RESPECTIVE BUILDING NUMBER, CONTROLLER IDENTIFICATION, AND APPROPRIATE POINT ABBREVIATION SEPARATED BY A PERIOD. FOR EXAMPLE, "0001.VAV-01.SA-T" WOULD REPRESENT A SUPPLY AIR

2. THE DETAILS/DESCRIPTION FIELD, WHERE APPLICABLE, SHOULD CONTAIN FLOOR, ROOM, AND ASSOCIATED COOLING/HEATING SOURCE IN THAT ORDER. FOR EXAMPLE, ROOM ZONE TEMPERATURE - "FLR 3 : RM 321 : AHU-06" THIS WOULD INDICATE THE LOCATION OF THE POINT AND ITS RESPECTIVE HEATING/COOLING SOURCE, WHICH IS AIR HANDLER 06.

TEMPERATURE ASSOCIATED WITH VARIABLE AIR VOLUME CONTROLLER NUMBER 01 IN BUILDING NUMBER 0001.