MECHANICAL GENERAL NOTES

SEE SPECIFICATIONS FOR ADDITIONAL PROJECT REQUIREMENTS. THESE GENERAL NOTES ARE INTENDED TO SUPPLEMENT THE SPECIFICATIONS. IN THE EVENT THAT THE VERBIAGE IS IN CONFLICT OR CONTRADICTS THE REQUIREMENTS LISTED HERE, THE QUESTION SHALL BE ASKED PRIOR TO BIDDING OR THE MORE STRINGENT SHALL APPLY AT THE ENGINEER'S DISCRETION.

1. DO NOT SCALE DRAWINGS. SEE ARCHITECTURAL DRAWINGS AND REFLECTED CEILING PLANS FOR EXACT LOCATION OF DOORS, WINDOWS, CEILING DIFFUSERS, ETC.
2. ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, PIPING, SHEET METAL, ELECTRICAL, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED DURING CONSTRUCTION AND ALL COST WILL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR. THIS INCLUDES ANY MODIFICATIONS TO ANY ASSOCIATED MECHANICAL, PLUMBING, OR ELECTRICAL SYSTEMS REQUIRED BY THIS SPECIFIC MANUFACTURER'S INSTALLATION INSTRUCTIONS.
3. UPON PROJECT COMPLETION, THE MECHANICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE OWNER INSTALLATION INFORMATION INCLUDING RECORD SUBMITTALS (WITH ANY SUBMITTAL REVIEW COMMENTS ADDRESSED) AND O&M MANUALS FOR EACH PIECE OF EQUIPMENT INCLUDING ALL SELECTED OPTIONS, THE NAME AND ADDRESS OF AT LEAST ONE SERVICE AGENCY, FULL CONTROL SYSTEM O&M AND CALIBRATION INFORMATION INCLUDING WIRING DIAGRAMS, SCHEMATICS, FULL SEQUENCE OF OPERATION, AND PROGRAMMED SETPOINTS.
4. PROVIDE A ONE YEAR WARRANTY FOR ALL WORK PERFORMED BEGINNING ON THE DAY THE SYSTEM IS COMPLETELY OPERATIONAL AND ACCEPTABLE BY THE OWNER.
5. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND ALL EQUIPMENT FOR MAINTENANCE.
6. ANY DEVICE REQUIRING A THERMOSTAT FOR CONTROL SHALL BE FURNISHED WITH A THERMOSTAT WHETHER INDICATED ON THE DRAWINGS OR NOT.
7. INSTALL THE TOP OF ALL THERMOSTATS, SENSORS, AND SWITCHES AT 4'-0" (MAXIMUM) ABOVE FINISH FLOOR. COORDINATE EXACT THERMOSTAT LOCATION WITH OWNER PRIOR TO INSTALLATION. ANY DEVICE ON A PERIMETER WALL SHALL BE MOUNTED ON A FOAM-FILLED ELECTRICAL BOX, WITH ALL GAPS BETWEEN BOX AND WALL SEALED TO PREVENT INFILTRATION.
8. ALL MECHANICAL EQUIPMENT SHALL BE U.L. LISTED AND LABELED AS A COMPLETE PACKAGE, NOT THROUGH INDIVIDUAL COMPONENTS OR PARTS. PROVIDE REQUIRED 3RD PARTY FIELD UL LISTING SERVICES AS REQUIRED TO COMPLY.
9. IT IS THE CONTRACTORS RESPONSIBILITY TO COORDINATE THE ACCURACY OF THE ROOM NAMES SHOWN ON THE DRAWINGS WITH THE ACTUAL NUMBERING SYSTEM USED BY BUTLER HIGH SCHOOL. IF ANY IRREGULARITIES EXIST THE CONTRACTOR SHALL UPDATE THE DRAWING NUMBERING, BAS GRAPHICS AND EQUIPMENT TAGGING AS NECESSARY.

MECHANICAL DEMOLITION NOTES

1. THE MECHANICAL CONTRACTOR SHALL VISIT SITE PRIOR TO BEGINNING WORK TO DETERMINE THE LEVEL OF DEMOLITION REQUIRED AND INCLUDE ALL NECESSARY PRICING IN THEIR BID.
2. IT IS THE MECHANICAL CONTRACTORS RESPONSIBILITY TO FIELD VERIFY ALL EXISTING DUCTWORK AND PIPING. ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND MECHANICAL PLANS SHOULD BE BROUGHT TO THE ATTENTION OF THE MECHANICAL ENGINEER.
3. THE MECHANICAL CONTRACTOR SHALL FIELD VERIFY ALL EXISTING SMOKE DAMPERS ARE LOCATED WHERE INDICATED ON DRAWINGS.
4. FOR ALL EXISTING HVAC EQUIPMENT AND DUCTWORK NOTED TO REMAIN AND SERVING AREA OF RENOVATION, MECHANICAL CONTRACTOR SHALL INSPECT EQUIPMENT (AND ANY ASSOCIATED CONTROLS, VALVES, DAMPERS, ETC.) TO VERIFY PROPER WORKING ORDER. MECHANICAL CONTRACTOR TO SERVICE AND CLEAN EXISTING HVAC UNITS TO ENSURE DESIGN AIRFLOW AND COOLING/HEATING CAPACITIES ARE OBTAINED. ANY EQUIPMENT FOUND TO BE INOPERABLE OR SHORT OF DESIGN CAPACITIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PROJECT COMPLETION. PROVIDE CLEAN FILTERS IN ALL UNITS AT COMPLETION OF PROJECT.
5. THE MECHANICAL CONTRACTOR IS RESPONSIBLE FOR PAINTING AND PATCHING EXISTING WALLS AFFECTED BY THE REMOVAL OF ANY EXISTING CONTROL DEVICES, IE. WALL SWITCHES, SPEED SELECTORS, THERMOSTAT, ETC...

2018 NORTH CAROLINA ENERGY CONSERVATION CODE

COMMERCIAL ENERGY EFFICIENCY – MECHANICAL SUMMARY

C401 METHOD OF COMPLIANCE

- [x] 2018 NCECC CHAPTER 5
- [ ] ASHRAE 90.1–2013 PRESCRIPTIVE
- [ ] ASHRAE 90.1–2013 PERFORMANCE
- [ ] N/A (EXISTING LIGHTING, HVAC, AND DOM. WATER HEATING SYSTEMS TO REMAIN)
- [ ] COMCHECK PROVIDED (2018 NCECC)
- [ ] COMCHECK PROVIDED (90.1–2013)
- [ ] ENERGY MODELING DATA PROVIDED

C406 ADDITIONAL EFFICIENCY PACKAGE OPTIONS

NOT APPLICABLE
MECHANICAL WORK WITHIN AN EXISTING BUILDING. BUILDING AUTOMATION SYSTEM RENOVATION, CHANGEOUT OF EXISTING PNEUMATIC CONTROLS WITH ELECTRONIC DDC.

C301 CLIMATE ZONE

3A – MECKLENBURG COUNTY, NORTH CAROLINA

DESIGN CONDITIONS

EXTERIOR (ASHRAE 90.1–2013 TABLE D–1)

winter dry bulb	18° F.
summer dry bulb	91° F.
summer wet bulb	74° F.

INTERIOR (2018 NCECC SECTION C302.1)

winter dry bulb	72° F.
summer dry bulb	75° F.

C403.2 HEATING & COOLING LOADS AND EQUIPMENT & SYSTEM SIZING

BUILDING HEATING LOAD	EXISTING TO REMAIN
BUILDING COOLING LOAD	EXISTING TO REMAIN
INSTALLED HEATING CAPACITY	EXISTING TO REMAIN
INSTALLED COOLING CAPACITY	EXISTING TO REMAIN

C403.2.3 & C406.2 – REQUIRED & INCREASED HVAC EQUIPMENT PERFORMANCE

SYSTEM DESCRIPTION – BUILDING AUTOMATION SYSTEM RENOVATION, CHANGEOUT OF EXISTING PNEUMATIC CONTROLS WITH ELECTRONIC DDC.

C403.2.4 THRU C403.2.11

- [x] NOT APPLICABLE THIS PROJECT

C403.2.12 – AIR SYSTEM DESIGN AND CONTROL

- [x] NOT APPLICABLE THIS PROJECT

C403.3 – ECONOMIZERS (PRESCRIPTIVE)

- [x] NOT APPLICABLE THIS PROJECT

C403.4 – HYDRONIC AND MULTIPLE–ZONE HVAC SYSTEMS CONTROL AND EQUIPMENT (PRESCRIPTIVE)

- [x] NOT APPLICABLE THIS PROJECT

C405.8 – ELECTRICAL MOTORS (MANDATORY REQUIREMENTS).

- [x] NOT APPLICABLE THIS PROJECT

C408 – SYSTEM COMMISSIONING

- [ ] BUILDING IS LESS THAN 10,000 SQUARE FEET AND IS EXEMPT FROM THE SYSTEM COMMISSIONING REQUIREMENTS OF SECTION C408.
- [x] BUILDING IS GREATER THAN 10,000 SQUARE FEET AND REQUIRES SYSTEM COMMISSIONING PER SECTION C408.

COMMISSIONING NOTE

THIS PROJECT INCLUDES A THIRD PARTY COMMISSIONING AGENT CONTRACTED BY THE OWNER. THE MECHANICAL CONTRACTOR SHALL COORDINATE WITH OWNER'S COMMISSIONING AGENT AND PROVIDE ALL NECESSARY TIME, MATERIALS, AND PROCEDURES REQUIRED FOR A FULLY COMMISSIONED PROJECT. SEE COMMISSIONING REQUIREMENTS IN THE PROJECT MANUAL FOR FURTHER INFORMATION.

EQUIVALENT MANUFACTURERS LISTING

LISTING OF MANUFACTURER'S NAME DOES NOT GUARANTEE APPROVAL. ALL EQUIPMENT MUST MEET OR EXCEED QUALITY AND CAPACITIES OF SPECIFIED EQUIPMENT. FINAL APPROVAL WILL BE BASED ON EQUIPMENT SUBMITTALS. ANY MANUFACTURER NOT LISTED BUT WISHING TO BID THIS PROJECT SHALL SUBMIT A WRITTEN REQUEST A MINIMUM OF 7 DAYS PRIOR TO BID DATE OR AS INDICATED IN THE SPECIFICATIONS, PRIOR APPROVAL IS REQUIRED FOR ALL MANUFACTURERS NOT LISTED.

(ALPHABETICAL ORDER)

DDC CONTROLS: AUTOMATED LOGIC, TRANE TRACER, JOHNSON CONTROLS METASYS, NIAGARA N4 SCHNEIDER, NIAGARA N4 PLATINUM, NIAGARA N4 WITH UNITED AUTOMATION.

NOTE:
ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, PIPING, SHEET METAL, ELECTRICAL, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED DURING CONSTRUCTION AND ALL COST WILL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR.

MECHANICAL LEGEND

SYMBOL	DESCRIPTION	ABBR.
CHS	EX CHILLED WATER SUPPLY	CHS
CHR	EX CHILLED WATER RETURN	CHR
HWS	EX HOT WATER SUPPLY	HWS
HWR	EX HOT WATER RETURN	HWR
CS	EX CONDENSER WATER SUPPLY	CS
CR	EX CONDENSER WATER RETURN	CR
CW	EX COLD WATER MAKE–UP	CW
	EX BUTTERFLY VALVE	
	EX 3–PIECE BALL VALVE	
	EX CHECK VALVE	
	EX STRAINER WITH BLOWDOWN	
	EX BALANCING VALVE	
	EX B&G CIRCUIT SETTER	
	EX UNION	
	EX THERMOMETER	
	EX PRESSURE GAGE & COCK	
	EX GAGE COCK	
	EX FLOW SWITCH	
	EX SUPPLY AIR DIFFUSER	
	EX RETURN AIR GRILLE	
	EX EXHAUST AIR GRILLE	
	EXISTING DOUBLE LINE DUCTWORK	
	EXISTING SINGLE LINE DUCTWORK	
	EXISTING MECHANICAL TO BE REMOVED	
20/14ø	20"x14" FLAT OVAL DUCT	
20x14	20"x14" RECTANGULAR DUCT	
8"ø	8" DIAMETER ROUND DUCT	
	POINT OF EXISTING TO NEW CONNECTION	
FD	EX FIRE DAMPER	
FS/D	EX COMBINATION FIRE/SMOKE DAMPER	
SD	EX SMOKE DAMPER	
S	SWITCH (4'–0" AFF TO TOP)	
M	MOTORIZED DAMPER	
DD	EX RETURN AIR DUCT DETECTOR	
T	SPACE TEMPERATURE SENSOR	
H	SPACE HUMIDITY SENSOR	
DDC	STAND ALONE CONTROL ELEMENT	
T1	DISCHARGE AIR SENSOR	
T2	MIXED AIR SENSOR	
T3	RETURN AIR SENSOR	
A1	ELECTRONIC ACTUATOR	
F1	FILTER STATUS	
CCV1	CHW CONTROL VALVE	
HCV1	HW CONTROL VALVE	
Y1	COOLING ACTUATOR (0–10V)	
Y2	HEATING ACTUATOR (0–10V)	
F2	FREEZE STAT	
FSS	FAN S/S	
FSP	SPEED	
FPR	FAN PROOF	
SFS1	SUPPLY FAN S/S LOW SPEED+ RELAY IN STARTER	
SFS2	SUPPLY FAN S/S HIGH SPEED+ RELAY IN STARTER	
CO2	RETURN AIR CO2 SENSOR	
OAF	OUTSIDE AIRFLOW MONITOR	
SP	STATIC PRESSURE SENSOR	
BP	BUILDING PRESSURE SENSOR	
VFD	EX VARIABLE FREQUENCY DRIVE	
COOL1	COMPRESSOR #1 RELAY	
COOL2	COMPRESSOR #2 RELAY	
COOL3	COMPRESSOR #3 RELAY	
COOL4	COMPRESSOR #4 RELAY	
	CARBON MONOXIDE DETECTOR	
	CONTROL VALVE	
M.C.	MECHANICAL CONTRACTOR	
E.C.	ELECTRICAL CONTRACTOR	
P.C.	PLUMBING CONTRACTOR	
N.I.C.	NOT IN CONTRACT	
EX	EXISTING	
AFF	ABOVE FINISHED FLOOR	
DN	DOWN	
UP	UP	

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN

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9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

3861 DAVID BUTLER HIGH SCHOOL
3861 DAVID BUTLER HIGH SCHOOL ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL SYMBOLS, LEGEND AND GENERAL NOTES

DWG #:
M101

SHEET NO: 1 OF 23

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HOT WATER UNIT HEATER (UH)	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Zone Temp	x								x		x
Zone Setpoint Adjustment (where required)	x								x		x
Fan Status			x						x		x
Fan Start/Stop				x					x		x
Hot Water Valve (where required)			x						x		x
Fan Failure										x	x

Fire Alarm Interface	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
FA Remote Relay Status*			x						x	x	x
FA Remote Relay shutdown command**						x			x	x	x

MSC (1 sensor per bldg)	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
OA CO2	x								x		x
OA RH	x								x		x
OA Temp	x								x	x	x
Dew Point	x								x		x

Smoke Detector Operation	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Smoke Detector Status*			x						x	x	x
Smoke shutdown command						x			x	x	x

Indoor Lighting	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
TLO Input			x						x		x
Lighting Output				x					x		x
Schedule***								x			x

***"SCHEDULE" POINTS SHALL BE ASSOCIATED WITH A ZONE AS SHOWN ON GRAPHICAL PAGE.

Split System - DX

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Mixed Air Temp	x								x		x
Outside Air Humidity	x								x		x
Outside Air Temp	x								x		x
Return Air Humidity	x								x		x
Return Air Temp	x								x		x
Supply Air Temp	x								x		x
Zone Setpoint Adjust	x										x
Zone Temp	x								x		x
Outside Air Damper		x							x		x
Smoke Detector			x						x	x	x
Fan Status						x			x		x
Zone Override			x						x		x
Cooling Stage 1				x					x		x
Cooling Stage 2				x							x
Cooling Stage 3				x					x		x
Cooling Stage 4				x					x		x
Supply Fan Start/Stop				x					x		x
Cooling Setpoint					x				x		x
Emergency Shutdown						x				x	x
Supply Fan Failure										x	

MULTI-ZONE CV AHU - CHAHW

	Hardware Points				Software Points							
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics	Remarks
Space Humidity (3)	x								x		x	
Outside Air Temp	x				x				x		x	
Mixed Air Temp Sensor Low Limit	x								x		x	
Mixed Air Temp Sensor	x								x		x	
Return Air Temp	x								x		x	
Supply Air Static Pressure	x								x	x	x	
Supply Air Temp	x								x		x	
Supply Air Temp Transmitter											x	
Hot Water Valve		x							x		x	
Chilled Water Valve		x							x		x	
Return Air Damper		x							x		x	
Outside Air Damper		x							x		x	
Control Zone Damper		x							x		x	
Control Zone Temperature											x	
Pressostat			x						x	x	x	
High Static Shutdown			x						x	x	x	
Smoke Detector			x						x	x	x	
Supply Fan Status			x						x		x	
Supply Fan Start/Stop				x					x		x	
Building Static Pressure Setpoint					x						x	
Supply Air Static Pressure Setpoint					x				x		x	
Supply Air Temp Setpoint					x				x		x	
High Supply Air Temp										x	x	
High Supply Air Temp										x	x	
Supply Fan Failure										x	x	
Supply Fan in Hand										x	x	
Air Purification System (Future Device)			x							x	x	

***"SCHEDULE" POINTS SHALL BE ASSOCIATED WITH A ZONE AS SHOWN ON GRAPHICAL PAGE.

UNIT VENTILATOR FCU

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Discharge Air Temp	x								x		x
Zone Temp	x								x		x
Zone Setpoint Adjustment (where required)	x								x		x
Zone Override (where required)			x						x		x
Fan Status			x						x		x
Fan Start/Stop				x					x		x
Chilled Water Valve (where required)		x							x		x
Hot Water Valve (where required)		x							x		x
Percent of Time Satisfied					x				x		x
Schedule***								x			x
Fan Failure										x	x
Mixed Air Damper		x									x

VARIABLE FREQ DRIVE INTERFACE

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Start / Stop*				x					x		x
Speed*		x							x		x
Motor Current Amps					x				x		x
Motor Frequency Hertz					x				x		x
Motor Runtime					x						x
Motor Speed RPM					x				x		x
In Fault Condition						x			x	x	x
VFD Status				x		x			x		x

TOILET,UNIT KITCHEN EXHAUST/SUPPLY

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Fan Status			x						x		x
Fan Start/Stop				x					x		x
Schedule***								x			x
Fan Failure										x	x

BOILER PLANT

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Boiler 1 Hot Water Return Temp	x								x		x
Boiler 1 Hot Water Supply Temp	x								x		x
Boiler 2 Hot Water Return Temp	x								x		x
Boiler 2 Hot Water Supply Temp	x								x		x
Primary Hot Water Return Temp	x								x		x
Primary Hot Water Supply Temp	x								x		x
Secondary Hot Water Supply Temp	x								x		x
Secondary Hot Water Return Temp		x							x		x
Boiler 1 Hot Water Supply Temp Setpoint Reset		x							x		x
Boiler 2 Hot Water Supply Temp Setpoint Reset		x							x		x
Boiler 1 Alarm Status			x						x	x	x
Boiler 1 Status			x						x		x
Boiler 2 Alarm Status			x						x	x	x
Boiler 2 Status			x						x		x
Circulation Pump BR-1 Status			x						x		x
Circulation Pump BR-2 Status			x						x		x
Hot Water Pump BBR-1 Status			x						x		x
Hot Water Pump BBR-1A Status			x						x		x
Boiler 1 Enable				x					x		x
Boiler 2 Enable				x					x		x
Circulation Pump BR-1 Start/Stop				x					x		x
Circulation Pump BR-2 Start/Stop				x					x		x
Hot Water Pump BBR-1 Start/Stop				x					x		x
Hot Water Pump BBR-1A Start/Stop				x					x		x
Outside Air Temp (alarm for out of range)					x				x	x	x
Boiler 1 Failure										x	x
Boiler 1 High Hot Water Supply Temp										x	x
Boiler 1 Low Hot Water Supply Temp										x	x
Boiler 1 Running in Hand										x	x
Boiler 2 Failure										x	x
Boiler 2 High Hot Water Supply Temp										x	x
Boiler 2 Low Hot Water Supply Temp										x	x
Boiler 2 Running in Hand										x	x
Circulation Pump BR-1 Failure										x	x
Circulation Pump BR-1 Running in Hand										x	x
Circulation Pump BR-2 Failure										x	x
Circulation Pump BR-2 Running in Hand										x	x
Boiler Reset Control Valve		x							x		x
High Hot Water Differential Pressure										x	x
High Primary Hot Water Supply Temp										x	x
Hot Water Pump BBR-1 Failure										x	x
Hot Water Pump BBR-1 Running in Hand										x	x
Hot Water Pump BBR-1A Failure										x	x
Hot Water Pump BBR-1A Running in Hand										x	x
Lead Boiler Failure										x	x
Low Primary Hot Water Supply Temp										x	x
Pump Delay Status			x								
Carbon Monoxide Detector			x								
Emergency Shutdown			x			x				x	x
Hot Water Pump BBR-1 VFD Fault				x					x	x	x
Hot Water Pump BBR-1A VFD Fault				x					x	x	x
Hot Water Pump BBR-1 VFD Speed		x							x		x
Hot Water Pump BBR-1A VFD Speed		x							x		x

CHILLED WATER PLANT

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Main Chilled Water Return Temp	x								x		x
Main Chilled Water Supply Temp	x								x		x
Chiller 1 Water Return Temp	x								x		x
Chiller 1 Water Supply Temp	x								x		x
Chiller 1 Setpoint		x							x		x
Chiller 1 Status			x						x		x
Chiller 1 Fault			x						x	x	x
Chiller 2 Water Return Temp	x								x		x
Chiller 2 Water Supply Temp	x								x		x
Chiller 2 Setpoint		x							x		x
Chiller 2 Status			x						x		x
Chiller 2 Fault			x						x	x	x
Primary Chilled Water Pump CHP 1 Status			x						x		x
Primary Chilled Water Pump CHP 2 Status			x						x		x
Secondary Chilled Water Pump CHBP-1 Status			x						x		x
Secondary Chilled Water Pump CHBP-1A Status			x						x		x
Chiller 1 Enable/Disable				x					x		x
Primary Chilled Water Pump CHP 1 Start/Stop				x					x		x
Primary Chilled Water Pump CHP 2 Start/Stop				x					x		x
Secondary Chilled Water Pump CHBP-1 Start/Stop				x					x		x
Secondary Chilled Water Pump CHBP-1A Start/Stop				x					x		x
Minimum Flow Bypass Valve				x							x
Outside Air Temp					x				x		x
High Main Chilled Water Return Temp										x	x
High Main Chilled Water Supply Temp										x	x
Chiller Failure										x	x
Low Main Chilled Water Return Temp										x	x
Low Main Chilled Water Supply Temp										x	x
Secondary Chilled Water Pump CHBP-1 Failure										x	x
Secondary Chilled Water Pump CHBP-1 Running in Hand										x	x
Secondary Chilled Water Pump CHBP-1A Failure										x	x
Secondary Chilled Water Pump CHBP-1A Running in Hand										x	x
High Chilled Water Supply Temp										x	
* Chiller 1 Operating Mode						x					x
* Chiller 1 Operating Status						x					x
* Chiller 1 RLA Percent						x					x
* Chiller 1 RLA (Amps)						x					x
* Chiller 1 Entering Water Temperature						x					x
* Chiller 1 Leaving Water Temperature						x					x
* Chiller 1 Evaporator Flow Rate						x					x
* Chiller 1 Evaporator Flow Status						x					x
* Chiller 1 kW						x					x
* Chiller 1 Tons						x					x
* Chiller 1 kW/Ton						x					x
* Chiller 2 Operating Mode						x					x
* Chiller 2 Operating Status						x					x
* Chiller 2 RLA Percent						x					x
* Chiller 2 RLA (Amps)						x					x
* Chiller 2 Entering Water Temperature						x					x
* Chiller 2 Leaving Water Temperature						x					x
* Chiller 2 Evaporator Flow Rate						x					x
* Chiller 2 Evaporator Flow Status						x					x
* Chiller 2 kW						x					x
* Chiller 2 Tons						x					x
* Chiller 2 kW/Ton						x					x
Cooling Tower Bypass Valve		x							x		x
Condenser Flow Control Valve		x							x		x
Chiller Bypass Valve		x							x		x
Condenser Water Pump CWP-1 Status			x						x		x
Condenser Water Pump CWP-2 Status			x						x		x
Condenser Water Pump CWP-1 Start/Stop				x							x
Condenser Water Pump CWP-2 Start/Stop				x							x
Condenser Water Supply Temp						x					x
Condenser Water Return Temp						x					x
Heat Exchanger CHW In Temp						x					x
Heat Exchanger CHW Out Temp						x					x
Heat Exchanger CW In Temp						x					x
Heat Exchanger CW Out Temp						x					x
Cooling Tower Operating Mode						x					x
Cooling Tower Fans – High						x					x
Cooling Tower Fans - Low						x					x
Cooling Tower Basin Temp	x									x	x
Emergency Shutdown							x			x	x

SINGLE ZONE CV - CHAHW

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Building Static Pressure	x								x		x
Mixed Air Temp	x								x		x
Outside Air Humidity (*can be one for building)	x*				x*				x		x
Outside Air Temp (*can be one for building)	x*				x*				x		x
Return Air Humidity	x								x		x
Return Air Temp	x								x		x
Supply Air Temp	x								x		x
Zone Setpoint Adjust	x										x
Zone Temp	x								x		x
Cooling Valve		x							x		x
Mixed Air Dampers		x							x		x
Preheating Valve		x							x		x
Reheating Valve		x							x		x
Freezestat			x						x	x	x
Smoke Detector			x						x	x	x
Supply Fan Status			x						x		x
Zone Override			x						x		x
Supply Fan Start/Stop				x					x		x
Cooling Setpoint					x				x		x
Dehumidification Setpoint					x				x		x
Heating Setpoint					x				x		x
Reheating Mixed Air Temp Setpoint					x				x		x
Schedule***								x			x
High Return Air Humidity										x	x
Supply Fan Failure										x	x
Supply Fan in Hand										x	x
Air Purification System (Future)			x							x	x

GENERATOR,BOILER, CHILLER, ELEC. MECH ROOM EXHAUST

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Zone Temp					x				x	x	x
Fan Status			x						x		x

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9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
361 DAVID BUTLER HIGH SCHOOL ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE: 09-29-2022
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DRAWN BY: JMF
DESIGNED BY: JMF
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SHEET TITLE:
MECHANICAL POINTS LIST BUILDING #1

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SHEET NO: 2 OF 23

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GENERATOR/BOILER, CHILLER ROOM EXHAUST	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Zone Temp					x				x	x	x
Fan Status			x						x		x

DUCTLESS SPLIT SYSTEM	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Space Temperature	x									x	

VARIABLE FREQ. DRIVE INTERFACE	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Start / Stop*				x					x		x
Speed*		x							x		x
Motor Current Amps					x				x		x
Motor Frequency Hertz					x				x		x
Motor Runtime					x						x
Motor Speed RPM					x				x		x
In Fault Condition						x			x	x	x
VFD Status				x		x			x		x

TOILET, JANITOR, GENERAL EXHAUST	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Fan Status			x						x		x
Fan Start/Stop				x					x		x
Schedule***								x			x
Fan Failure										x	x

Fire Alarm Interface	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
FA Remote Relay Status*			x						x	x	x
FA Remote Relay shutdown command*						x			x	x	x

Smoke Detector Operation	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Smoke Detector Status*			x						x	x	x
Smoke shutdown command						x			x	x	x

Indoor Lighting	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
TLO Input			x						x		x
Lighting Output				x					x		x
Schedule***								x			x

AIR TERMINAL UNIT	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Airflow	x								x		x
Discharge Air Temp	x								x		x
Zone Temp	x								x		x
Zone Setpoint Adjustment (w here required)	x								x		x
Zone Override (w here required)			x						x		x
Reheating Valve (w hen required)		x							x		x
Zone Damper		x							x		x
Airflow Setpoint					x				x		x
Cooling Setpoint					x				x		x
DAT Heating Limit					x						
Heating Setpoint					x				x		x
Percent of Time Satisfied					x				x		x
Heating Mode						x			x		x
Schedule ***								x			x

Gas Meter	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics
Gas Flow Rate			x						x	x	x
Peak Month-to-Date									x		x
Peak Today									x		x
Peak Year-to-Date									x		x
Usage Month-to-Date									x		x
Usage Today									x		x
Usage Year-to-Date									x		x
Meter Failure										x	

Electric Meter	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics
kW Power			x						x	x	x
kW Demand									x		x
kW Peak Month-to-Date									x		x
kW Peak Today									x		x
kW Peak Year-to-Date									x		x
kWh Today									x		x
kWh Month-to-Date									x		x
kWh Year-to-Date									x		x
Meter Failure										x	

***"SCHEDULE" POINTS SHALL BE ASSOCIATED WITH A ZONE AS SHOWN ON GRAPHICAL PAGE.

BOILER PLANT	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Boiler 1 Hot Water Return Temp	x								x		x
Boiler 1 Hot Water Supply Temp	x								x		x
Boiler 2 Hot Water Return Temp	x								x		x
Boiler 2 Hot Water Supply Temp	x								x		x
Hot Water Differential Pressure 1	x								x		x
Primary Hot Water Return Temp	x								x		x
Primary Hot Water Supply Temp	x								x		x
Secondary Hot Water Supply Temp	x								x		x
Secondary Hot Water Return Temp		x							x		x
Boiler 1 Hot Water Supply Temp Setpoint Reset		x							x		x
Boiler 2 Hot Water Supply Temp Setpoint Reset		x							x		x
Hot Water Pump BBP-1 VFD Speed		x							x		x
Hot Water Pump BBP-2 VFD Speed		x							x		x
Boiler 1 Alarm Status			x						x	x	x
Boiler 1 Status			x						x		x
Boiler 2 Alarm Status			x						x	x	x
Boiler 2 Status			x						x		x
Hot Water Pump BBP-1 VFD Status			x						x		x
Hot Water Pump BBP-2 VFD Status			x						x		x
Boiler 1 Enable				x					x		x
Boiler 2 Enable				x					x		x
Hot Water Pump BBP-1 VFD Fault				x					x	x	x
Hot Water Pump BBP-2 VFD Fault				x					x	x	x
Hot Water Differential Pressure Setpoint					x				x		x
Outside Air Temp (alarm for out of range)					x				x	x	x
Boiler 1 Failure										x	x
Boiler 1 High Hot Water Supply Temp										x	x
Boiler 1 Low Hot Water Supply Temp										x	x
Boiler 1 Running in Hand										x	x
Boiler 2 Failure										x	x
Boiler 2 High Hot Water Supply Temp										x	x
Boiler 2 Low Hot Water Supply Temp										x	x
Boiler 2 Running in Hand										x	x
Hot Water Pump BBP-1 Failure										x	x
Hot Water Pump BBP-1 Running in Hand										x	x
High Hot Water Differential Pressure										x	x
High Primary Hot Water Supply Temp										x	x
Hot Water Pump BBP-2 Failure										x	x
Hot Water Pump BBP-2 Running in Hand										x	x
Lead Boiler Failure										x	x
Low Primary Hot Water Supply Temp										x	x
Emergency Shutdown						x				x	x
Automatic Isolation Valve (typ 2)			x	x						x	x

VAV AHU - DX	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Mixed Air Temp					x				x		x
Outside Air Humidity	x								x		x
Outside Air Temp	x								x		x
Return Air Carbon Dioxide PPM					x				x		x
Return Air Humidity					x				x		x
Return Air Temp					x				x		x
Supply Air Temp					x				x		x
Zone Setpoint Adjust	x										x
Outside Air Dampers (qty 2)		x							x		x
Zone Temp	x				x				x		x
Supply Air Dampers (qty 2)		x							x		x
Mixed Air Dampers (qty 2)		x							x		x
Return Air Dampers (qty 2)		x							x		x
Building Static Pressure	x										x
Smoke Detector			x						x	x	x
Fan Status (depended on number/ type of fans)						x			x		x
Zone Override			x						x		x
Cooling Stage 1					x				x		x
Cooling Stage 2					x				x		x
Cooling Stage 3					x				x		x
Cooling Stage 4					x				x		x
Supply Fan Start/Stop					x				x		x
Cooling Setpoint					x				x		x
Economizer Zone Temp Setpoint					x				x		x
Return Air Carbon Dioxide PPM Setpoint					x	x			x		x
Emergency Shutdown						x				o	x
High Return Air Carbon Dioxide Concentration					x					x	x
High Return Air Humidity										x	x
Dehumidification Setpoint					x				x		x
Supply Fan Failure					x					x	x
Supply Fan in Hand					x					x	x
Exhaust Air Damper (qty 2)					x						x
Return Fan VFD Speed					x				x		x
Return Fan Status					x				x		x
Return Fan Start/Stop					x				x		x
Supply Fan Start/Stop					x				x		x
Supply Fan VFD Fault					x					x	x
Supply Fan Status					x				x		x
VFD Interface					x				x		x
Supply Fan VFD Speed					x				x		x
Airflow Monitor Station (qty 6)					x				x		x
RA/SA or Static Pressure (qty 6)					x				x	x	x

HSCC (1 sensor per bldg)	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
OA CO2	x								x		x
OA RH	x								x		x
OA Temp	x								x	x	x
Dew Point											x

***"SCHEDULE" POINTS SHALL BE ASSOCIATED WITH A ZONE AS SHOWN ON GRAPHICAL PAGE.

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9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

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REV #	DATE	DESCRIPTION

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DAVID BUTLER HIGH SCHOOL BUILDING #2 SEQUENCE OF OPERATIONS

VARIABLE AIR VOLUME DX AIR HANDLING UNIT (RTU-1,2)

RTU-1 and RTU-2 will normally operate as one unit. The DDC system can shut-down either RTU-1 or RTU-2. If an RTU is shut down, the other RTU will operate in accordance with the following sequence.
Note: Whenever one RTU is shut down, the minimum outdoor ventilation cut flowrate will increase to 7,228 CFM.

A. Each VAV Commercial Rooftop Unit shall have a microprocessor-based controller which shall monitor and control the rooftop unit in a stand-alone mode or as directed by the building automation system.
The rooftop unit shall have a Bacnet interface to enable incorporation to a building automation system (BAS).
The controller shall have a human interface panel with a 2-line by 40-character clear English LCD display and a 16-button keypad for monitoring, setting, editing and controlling.

B. The BAS shall perform the following rooftop control strategies, provide the points listed on the panel list and provide the specified monitoring and diagnostics.

1. Unoccupied Mode
When the BAS initiates the Unoccupied mode, the rooftop unit shall be off. If the unoccupied setpoints are exceeded, the unit shall circulate air for heating by the VAV boxes with hydronic heat or cool until the zone temperature is within the unoccupied setpoints.

2. Transition from Unooccupied to Occupied
When the unit transitions from the unoccupied operation to occupied operation, start-up or morning warm-up or cool down mode shall be activated.

a. Startup Mode
The rooftop unit can be controlled to the Startup mode by the BAS for Optimal Start purposes. The outdoor air damper shall remain closed, unless economizing, until the zone's scheduled occupied time. If CO2 levels rise above setpoint, unit shall open outside air and relief air dampers and close return air dampers in proportion to outside air and relief air.

b. Morning Warmup
When the Rooftop shall change from the Unoccupied to the Occupied mode, the unit may enter the Morning Warmup mode. The Morning Warm up mode shall be initiated if the Return Air Temperature value is less than the Morning Warmup setpoint of 70 F (adjustable) sent from the BAS. The outside air damper shall be kept closed and the selected zone VAV boxes shall operate at the maximum occupied setpoints.

c. Morning Cooldown
When the Rooftop shall change from the Unoccupied to the Occupied mode, the unit may enter the Morning Cooldown mode. The Morning Cooldown mode shall be initiated if the Return Air Temperature value & more than the Morning Cooldown setpoint of 75 F (adjustable) sent from the BAS. The outside air damper shall be kept closed and the selected zone VAV boxes shall operate at the occupied setpoints.

3. Occupied Operation
When the rooftop unit is controlled to the Occupied mode, all rooftop unit functions shall be enabled and shall operate in supply air temperature control mode. The rooftop unit shall default to this mode in the event that communications with the BAS are lost.

a. Cooling/Economizer
During the occupied cooling mode of operation, the economizer, if available, and mechanical cooling is used to control the supply air temperature. If the enthalpy of the outdoor air is less than the enthalpy of the return air, then the economizer shall be used to satisfy the supply air setpoint through a mixed air low limit. If more cooling is then required, compressors shall be staged on as necessary. Minimum on/off timing of the compressors shall prevent rapid cycling. At outdoor air conditions above the enthalpy control setting, mechanical cooling only shall be used and the fresh air dampers shall remain at minimum position.

b. Dehumidification (Occupied and Unoccupied operation)
Should the return air relative humidity reach 60% (adjustable), the supply air temperature reset program shall be suspended and the supply air temperature shall be decreased (adjustable) until the return air relative humidity falls to 50% (adjustable).

Shutdown
The following shall alarm the BAS, once reset the BAS may resume its intended control sequence: Duct detector, low limit thermostat activation, high Pressure switch (4"-6" adjustable).
The BAS should have no lockouts or resets that would require operator intervention to correct but shall only alarm.

3. Space Pressure Control
relief dampers D-3 and D-4 will relieve excess pressure.

4. Supply Air Pressure Control
The BAS shall send supply air pressure setpoints to the rooftop to modulate the Variable Frequency Drives (VFD) based on the static pressure sensors located in the supply air duct. The BAS shall also read the status on the supply air sensor and display the pressure reading on the operator's graphic interface screen. Supply fan's VFDs will be controlled by either SPT-1 or SPT-2. The static pressure transmitter that senses the lowest pressure will control the speed of the VFDs. Static pressure transmitters will alarm the DDC system whenever measured pressure is too high or too low (adj). A high static pressure measured by SPT-3 or SPT-4 will shut down the supply fans. Supply fans shall not start until the supply and return dampers are open. Provide demand side static pressure control. Should a demand for cooling exist as sensed through VAV box damper positions greater than minimum,
the supply air pressure setpoint shall be reset upward from setpoint (adjustable) toward the maximum setpoint (adjustable). Should all boxes' dampers be at minimum position, the static pressure setpoint shall reset toward the minimum setpoint. (Static Pressure Setpoint Reset).

5. Return Air Control
Airflow monitor AM-3 will control the speed of RTU-3's return air fan. Airflow through AM-3 will match the airflow through AM-1. Airflow monitor AM-4 will control the speed of RTU-2's return air fan. AM-4 will match the airflow through AM-6. Static pressure sensors will alarm the DDC system whenever measured airflow is too low. A low static pressure measured by SPT-5 or SPT-6 will de-energize the return air fans. Return air fans will not energize until both supply and return air dampers are open.

6. Outdoor Air Control
The Ventilation Control Module shall be linked to the rooftop microprocessor-based unit controller. Using a thermal displacement type airflow monitor, the ventilation control module shall monitor and control the quantity of fresh air entering the building to maintain the ventilation setpoint. If the ventilation setpoint is not met, automation system shall send the CFM setpoint to the unit and shall then monitor that setpoint to ensure that it is maintained.
The fresh outdoor air shall enter the rooftop unit through the air flow monitoring /damper sensor assembly. Outdoor air CFM will be controlled at the indicated minimum airflow.
If the return air CO2 concentration increases above the CO2 Reset Start Value of 1100 ppm (adjustable), unit shall open outside air and relief air dampers and close return air dampers in proportion to outside air and relief air.

8. Rooftop Sequencing Control
With only the lead rooftop unit running, should the compressor capacity or the supply fan speed exceed 95% (adjustable) for 30 minutes (adjustable), the lead unit fan speed shall be reduced to minimum, the lag unit shall allow its outdoor air, return, and discharge damper vanes, the lag unit shall be started at minimum speed, and the minimum outside air CFM setpoint shall be halved for each unit from the total required. After a time, delay (adjustable), the fan speeds shall be raised to the required value to maintain the common duct static setpoint.

With both units running, should both compressor capacity and supply fan speed fall below 40% (adjustable) for 30 minutes (adjustable), the lag unit shall be stopped, the lag unit discharge, outdoor air and return dampers closed, the minimum outside air CFM setpoint shall be the total required, and the lead unit shall carry the load.

10. Emergency Shutdown
A high-pressure alarm (Mounted by SPS-3 or SPS-4) or a low-pressure alarm (Mounted by SPS-5 OR SPS-6) will de-energize the unit. Activation of the Emergency Off Switch will de-energize the unit.
Duct mounted smoke detector activation will de-energize the unit and close dampers D-1, D-2, D-9 & D-10.

AIR TERMINAL UNIT CONTROLS (VAV)

Direct Digital Controls: DDC controls, actuators and costs to mount, calibrate and test the system shall be the responsibility of controls Contractor.

Terminal Unit Control:

The terminal box units shall be individually controlled by a DDC terminal controller per terminal unit.
The BAS shall perform the following terminal unit control strategies and provide the points as listed on the DDC terminal point list and the specified monitoring and diagnostics.

Set point Control: The BAS shall edit the zone space temperature set-point of each terminal box. The zone temperature set-point shall be operator adjustable. Individual zone set-point and control logic shall reside at the zone level and shall not be dependent upon the BAS for control. In the event of communication loss, the box shall continue to control to current set-points.
Cooling Valve Control: The BAS shall control the cooling air valve to a fully open, fully closed, maximum CFM or minimum CFM position based on operator commands. The operator shall also have the capability to adjust the maximum and minimum airflow limits of the air valve through the BAS.
Operating Mode: The BAS shall place the box in either the occupied or unoccupied mode based on an operator adjustable time schedule. Separate heating and cooling set-points shall be provided for each mode through the BAS. Other modes available for over-ride shall include full open, full closed, minimum flow and minimum flow.
Occupied Mode: As the space temperature rises above the cooling set-point, the terminal unit shall modulate to its maximum CFM set-point. As the space temperature falls below cooling set-point, the terminal unit shall modulate to its minimum CFM set-point. Upon a further decrease in space temperature, the terminal unit shall modulate to heating CFM and the heating coil (when provided) shall modulate.
Unoccupied Mode: During this mode, the air valve on the terminal unit shall be closed. When required by the unoccupied set-point, the heat shall cycle to maintain a reduced space temperature. Unit shall be at minimum heating CFM when heat is energized.
Monitoring: The BAS shall monitor the air valve on the terminal unit shall modulate to their maximum heating CFM and the heating coil shall cycle to maintain the occupied heating set-point.
The building automation system shall provide the ability to automatically commission and calibrate the terminal Air System. The following tests shall be performed, at a minimum: Calibration of the air valve/damper, Verification of air flow through the terminal box, Verification of local reheat performance.
The building automation system (BAS) shall provide the ability to initiate the auto-commissioning/auto-calibration command directly from the user interface. Special service tools shall not be required. The terminal boxes shall allow the operator to perform on an individual or group basis auto-commissioning report for the terminal Air System which contains the results of the auto-commissioning/auto-calibration tests which is printable and
remain in memory until the next auto-commissioning test is initiated. This report shall contain, at a minimum, the following information for each terminal box in the system. Name of terminal box. Date and time the terminal box was tested. Presence of any alarms. Space temperature and set-point. Active airflow (in CFM). Air valve/damper position at every 5% increment. Discharge air temperature of the terminal box when the hot heat is active.

Zone Thermostats:

The zone thermostats shall be accurate to within 1.0 degrees F. The thermostats shall be provided by the controls contractor and shall be as noted in section 230900 space thermostats (2.12G).
The zone thermostats shall be installed to avoid relaying false temperatures (i.e. not close to heating/cooling sources).

HEATING HOT WATER BOILER SYSTEM (with Variable Primary Pumps)

The boiler shall have a minimum of two (2) independent, but synchronized combustion systems. Boiler staging shall equalize boiler run time by rotating lead boiler on a weekly basis. Boiler Heat Exchanger 1 combustion system shall fire first. When the demand cannot be met by one (1) combustion system, the same sequence of operation shall be followed to bring the Boiler Heat Exchanger 2 system on-line. Each boiler has a dedicated automatic isolation valve. Enabling the boiler valve shall open (this valve is normally CLOSED, fail spring CLOSED), once open the end switch shall enable each dedicated boiler pump VFD followed by activation of the lead boiler. this is a parallel variable primary pumping system, each primary pump (BBP-1, BBP-2) will pump thru the boiler and system, controlled by a dp sensor (see below)
The heating system shall be enabled when there is a call for heat or an a command for dehumidification. When enabled, the BAS controller shall enable the lead boiler opening its associated isolation valve (see boiler integration detail 5.M104). The boiler history control shall operate the boiler to maintain its lead supply setpoint. In addition a LOW minimum flow time each boiler shall be set to TAB to 10 GPM for each boiler (20 GPM total). The boiler pump VFDs shall be set internally to not allow the operating pump to fall below this GPM (Hz). Contractor to verify the minimum Hz setting on the boiler pump VFD to allow for a minimum of 10 GPM flow at each pump.
Heating shall be disabled when no space is calling for heat and there is no command for dehumidification. When heating is disabled, the hot water pumps and boilers shall be commanded to OFF and the boiler automatic isolation valve shall modulate closed. The BAS controller human-interface panel shall be able to individually enable the boilers. Boilers shall also be capable of remotely manually with the boiler BIB enable Relay (IGA switch on "hand" during a BAS failure.
Upon the boilers cycling off, continue running the hot water pumps for 15 minutes (adj.). Boiler pumps shall remain running 10 minutes (adj) after enable is released from the BAS via the integral timer on the VFD starter (see boiler integration detail 5.M104) Status for the boiler pump VFD shall come directly from the VFD run output rather than CT, a dry output interlock on the VFD shall be wired in series with the boiler enable relay (the same as shown for AC3, on motor starter) to prevent the boiler from enabling without proof from VFD.

Boiler Control:

The boiler lead/lag sequence shall be based on an automatic weekly schedule. From the BAS controller human-interface panel or a BAS workstation, an operator shall be able to manually change the lead/lag sequence.
If the enabled hot water boiler system supply temperature falls more than 5.0 deg. F (adj.) below setpoint for a period longer than 15 minutes (adj.), or if an active boiler signals a failure alarm, the BAS controller shall enable the lag boiler. The BAS controller shall send an alarm to the BAS workstation. When a boiler failure exists, lead/lag automation shall be disabled and the currently running boiler shall become the lead boiler. Once the problem is corrected, lastly, the BAS controller shall re-enable the lead/lag sequence.
Once the lead boiler is enabled, the add sequence of additional boilers shall be disabled for a period of 30 minutes (adj.). Additional boilers are added if the hot water distribution system supply temperature falls 5.0 deg. F (adj.) below the hot water setpoint for a period of 10 minutes (adj.) or more.
The last boiler enabled shall be disabled when the distribution system hot water temperature reaches the hot water setpoint for a period of 10 minutes (adj.) or more.

Contractor shall enlist the services of the Fulton Boiler Factory to integrate boilers into the BAS as per specifications.

Hot Water Reset:

Upon outside air temperature rising above 40 deg F (adj.), the hot water distribution system supply temperature setpoint shall linearly reset from 160.0 deg. F (adj.) to 120.0 deg. F (adj.) at 60 deg F (adj.) and above, based on hot water distribution return temperature. Reset shall occur either directly from the Fulton boiler or integrated via the BAS.

Hot Water Boiler Pump Status:

The BAS controller shall detect hot water pump run status by a VFD output.

Hot Water Boiler Pump Lead/Lag:

The hot water pump lead/lag sequence shall follow the boiler lead/lag sequence. pumps shall be dedicated to the respective boilers.

Hot Water Boiler Pump Failure:

If the lead boiler HDA enable start/stop is enabled and the boiler automatic isolation switch status is open for more than 30 seconds (adj.) and run status indication is OFF, the BAS controller shall enable the lag boiler pump failure alarm to the BAS workstation and enable the lag boiler. When a boiler pump VFD failure exists, lead/lag boiler automation shall be disabled and the lag boiler becomes the lead. Once the problem has been corrected, the system shall reset automatically. This action shall re-enable the lead/lag sequence, if the boiler has not been enabled via the BAS and pump is showing status as running is "pump in hand" operation shall be indicated on the BAS.

Hot Water Distribution Pump Speed:

The BAS controller shall monitor the hot water system differential pressure sensor. When the pump VFD is enabled, the BAS controller shall control the analog speed signal sent to the pump VFD to maintain a hot water differential pressure setpoint of 15.0 psig (adj.), minimum flow for each pump is 18 gpm.

Freeze Protection:

When the outdoor air temperature falls below 35.0 deg. F (adj.), the hot water lead boiler shall operate continuously to provide hot water circulation to all associated hot water coils.
The BAS should have no lockouts or resets that would require operator intervention to correct but shall only alarm. Field equipment with manual resets shall alarm to the BAS and when reset shall allow the BAS to resume the intended control sequence. Trend logs shall be created to record and retain all boiler alarms.

DAVID BUTLER HIGH SCHOOL BUILDING #1 SEQUENCE OF OPERATIONS

SINGLE ZONE CONSTANT VOLUME CHILLED WATER AIR HANDLING UNIT OPERATION (AHU-1,2-3,4,5,6,7-9,10,11,12,13,14,15,16)

The Building Automation System (BAS) shall perform the following Single Zone Air System (CV) control strategies, appropriate to the given occupancy mode of the system, as determined by the user-adjustable time-of-day schedule for the system. Optimal start and unoccupied mode applies only to HVAC(1) with time of day scheduled operation. Verify time schedule during Owner's training.

Optimal Start Mode:

The BAS shall initiate the Optimal Start mode such that the CV air handler is started prior to when the space being served by the CV is scheduled to be occupied, to allow the zone temperature to reach the pending occupied heating or cooling set-point. The system shall wait as long as possible before initiating the Optimal Start mode such that the space temperature will just reach the occupied set-point at time for scheduled occupancy. Ventilation functions shall be disabled when the AHU is in Optimal Start mode and outside air dampers shall be closed.
The BAS shall use a self-adjusting algorithm to calculate the actual time to initiate Optimal Start for the CV Air System based on the occupied set-point, space temperature, outside air temperature, historical optimal start performance data and the associated heating or cooling optimal start rate.
An early start limit shall be provided to prevent the CV from starting prior to 120 minutes (adjustable) before scheduled occupancy.
The AHU shall transition from Optimal Start mode to occupied mode when the current time is equal to the scheduled start time.

1. Cooling:
   a. The BAS shall initiate the Optimal Start - Cooling mode when Optimal Start mode for the CV AHU has been initiated and the temperature of the space is warmer than its occupied cooling set-point. All ventilation functions are disabled while operating in Optimal Start mode and the outside air dampers shall be closed.
   b. The BAS shall determine the length of time required to lower the space temperature to the occupied cooling set-point when the mode of the CV AHU is cooling and the space temperature is above the occupied cooling set-point.
   c. The cooling coil control valve shall fully open and the air handler fan shall energize until the space temperature is satisfied.
2. Heating:
   a. The BAS shall initiate the Optimal Start - Heating mode when Optimal Start mode has been initiated and the space temperature is cooler than its occupied heating set-point. All ventilation functions are disabled while operating in Optimal Start mode and the outside air dampers shall be closed.
   b. The BAS shall determine the length of time required to raise the space temperature to the occupied heating set-point when the mode of the CV AHU is heating and the space temperature is below the set-point.
   c. The reheat coil control valve shall fully open and the air handler fan shall energize. Upon a further drop in space temperature, the reheat coil control valve shall modulate open.

Occupied Mode:

The BAS shall place the members of the CV AHU Air System into Off/Standby mode as determined by the user-adjustable time-of-day schedule for the system. The AHU shall control to the individual unoccupied temperature set-point, and all ventilation functions shall be disabled and outside air dampers shall be closed.
After the zone has been commanded to unoccupied, the CV AHU shall command the associated AHU to Unoccupied mode. Supply fan shall be shut down, heating coil control valve shall close, cooling coil control valve shall close, outdoor air damper shall be closed, and all ventilation functions shall be disabled.

Night Setback Mode: During scheduled unoccupied hours, the CV AHU Air System shall be controlled by the BAS to maintain the unoccupied heating and cooling set-points, as appropriate. Ventilation functions are disabled, the outdoor air damper shall remain closed. Unless otherwise stated, the AHU supply fan shall operate in the automatic control mode, cycling on only when heating or cooling is needed.

Heating:

1. AHU supply fan energized, reheat coil control valve shall fully open.
2. The BAS shall initiate the Night Heating mode when the temperature for the space being served by the CV AHU is less than 55 degrees F (adjustable). Night heating shall terminate when the space temperature rises above the Unoccupied Heating set-point plus the unoccupied heating differential (4 degrees F, adjustable).

Cooling:

1. AHU supply fan energized, cooling coil control valve shall fully open.
2. The BAS shall initiate the Night Cooling mode when the temperature for the space being served by the CV AHU is greater than 85 degrees F, (adjustable). Night cooling shall terminate when the space temperature falls below the Unoccupied Cooling set-point plus the unoccupied cooling differential (4 degrees F, adjustable).

Occupied Mode Cooling Control: The cooling coil control valve shall modulate open, and the fan shall energize to maintain the space temperature.

Occupied Mode Heating Control: The reheat coil control valve shall modulate open, and the fan shall energize to maintain the space temperature. Upon a further drop in space temperature, the reheat coil control valve shall modulate open.

Dehumidification:

Provide all necessary sensors for dehumidification control at each air handler.
The controller shall measure the return air humidity and override the cooling sequence to maintain a return air humidity setpoint of 60% rh (adj.). The dehumidification shall turn off whenever the return air humidity drops below 55% rh (adj.).

1. When dehumidification mode is engaged per the requirements above, the cooling coil control valve shall be drive fully open, and the reheat coil control valve shall modulate to maintain space temperature control. **AHU-3 will enable duct electric heater (EDH-317) in lieu of HW reheat coil. Duct coil shall stage to maintain space setpoint.**

Dehumidification shall be enabled whenever:

1. Fan status is on.
2. Zone humidity exceeds 60% (adj.) relative humidity in occupied or unoccupied mode.

Alarms shall be provided as follows:

1. High Return Air Humidity: If the return air humidity is 10% rh (adj.) greater than setpoint.

Damper and Valve Fail Positions:

1. OSA damper shall fail OPEN
2. CHW valve shall fail 50%
3. Outside and Relief air dampers shall fail closed.
4. Return air dampers shall fail open.

Freeze Protection:

A freeze stat shall be located upstream of the cooling coil, and shall alarm the central BAS if the temperature is below 38° F.
Once the freeze stat is reset the BAS may resume its intended control sequence.
The outside air damper shall close.
The secondary hot water pumps shall start, and the heating coil valve shall modulate to maintain 70 degrees. hot water valve fail position 100% open.
The unit shall only be reset manually. The manual reset button shall be located as such to be easily accessible by the technician.
Safety Interlock: The following shall alarm the BAS, once reset the BAS may resume its intended control sequence: Duct detector, low limit thermostat activation, high Pressure switch (4"-6" adjustable).
The BAS should have no lockouts or resets that would require operator intervention to correct but shall only alarm.

HEATING HOT WATER BOILER SYSTEM (with Primary/Secondary Pumps)

The boiler shall have a minimum of two (2) independent, but synchronized combustion systems. Heat Exchanger 1 combustion system shall fire first. When the demand cannot be met by one (1) combustion system, the same sequence of operation shall be followed to bring the Heat Exchanger 2 system on-line. Each heat exchanger has a dedicated primary boiler pump (BP-1 AND BP-2).
The heating system shall be enabled when there is a call for heat or an a command for dehumidification. When enabled, the BAS controller shall start the lead hot water distribution (secondary) pumps (BBP-1 AND BBP-1A), the lead boiler circulating primary pump, and enable the lead boiler. The boiler history control shall operate the boiler to maintain its local supply setpoint.
Heating shall be disabled when no space is calling for heat and there is no command for dehumidification. When heating is disabled, the hot water pumps and boilers shall be commanded to OFF. The BAS controller human-interface panel shall be able to individually enable the hot water distribution pumps or the boilers. Boiler pumps shall be enabled via the associated boiler enable relay integration detail (see detail 5.M105).
Upon the boilers being enabled, the boiler pumps shall run 5 minutes (adj) via a timer in the motor starter and continue running the hot water (primary) pumps for 15 minutes (adj.) (see detail 5.M105).

Boiler Control:

The boiler lead/lag sequence shall be based on a weekly schedule. From the BAS controller human-interface panel or a BAS workstation, an operator shall be able to manually change the lead/lag sequence.
If the hot water distribution system supply temperature falls more than 5.0 deg. F (adj.) below setpoint for a period longer than 15 minutes (adj.), or if an active boiler signals a failure alarm, the BAS controller shall enable the lag boiler. In addition, the BAS controller shall send an alarm to the BAS workstation. When a boiler failure exists, lead/lag automation shall be disabled and the currently running boiler shall become the lead boiler. Once the problem is corrected locally, the BAS shall clear the alarm failure from the BAS controller. This shall re-enable the lead/lag sequence.
Once the lead boiler is enabled, the add sequence of additional boilers shall be disabled for a period of 30 minutes (adj.). Additional boilers are added if the hot water distribution system supply temperature falls 5.0 deg. F (adj.) below the hot water setpoint for a period of 10 minutes (adj.) or more.
The last boiler enabled shall be disabled when the hot water temperature rises to the hot water setpoint for a period of 10 minutes (adj.) or more.

Cooling Tower:

Cooling Tower shall be enabled by the BAS, once condenser water pump startup is confirmed. Condenser water pumps (CWP-1 and CWP-2) shall be interlocked with their respective chiller. The cooling tower basin temperature shall be sequenced by 2 condenser water temperature sensors located in the individual basins, during chiller operation these sensors will enable both cooling tower fans on and off as well as modulate the speed as necessary to maintain 80-degree (adj) basin water temperature during chiller operation and 45F basin temperature during Plate Exchanger operation.

Freeze Protection:

The tower basin heaters shall activate when OA temperature reaches 40F (adj) to provide freeze protection in the tower. A basin water supply temperature sensor shall be provided for each cooling tower cell (2 required). If the water temperature from either cell falls below 35F (adj) an alarm shall be sounded at the central DDC and condenser water pump CWP-2 shall be stopped. Central DDC shall have the capability to override (stop/start) operation of cooling tower with place heat exchanger.

Plate and Frame Heat Exchanger

Plate and Frame Heat Exchange only works in conjunction with Chiller CHP-1 Pump and Condenser CWP-1, with Chiller #1 locked out. Chiller #2, CHP-2 Pump and CWP-2 shall also be locked out during plate and frame operation.
When the BAS has cooling requested and outside air temperature is below 48° F, both chillers shall be off. The 3-Way Plate Exchanger Control Valves #1 and #2 shall be positioned to bypass condenser water and chilled water around chiller and direct water to plate heat exchanger. Pumps CHP-1 & CWP-1 shall be manually overridden from Chiller Control to operate. Tower fans shall be enabled and sequenced on, and condenser water Tower bypass V-3 shall be fixed open to cooling tower basin. As the water temperature begins to rise, both tower fan VFD's shall be activated. On a continued rise in water temperature, both fan VFD's shall increase speed. On a fall in condenser water temperature the reverse sequence shall occur. The chilled water supply temperature shall be maintained at 45°F (adj.) As the chilled water supply temperature falls below 45°F, the cooling tower by-pass valve V-3 shall close to the tower and the condenser return water shall be diverted around the cooling tower. As the chilled water supply temperature rises above 48°F (adj.) The cooling tower bypass shall be open to the tower.
When outside air temperature rises above 50° F the Plate Exchanger 3-Way Control Valves #1 and #2 shall bypass condenser and chilled water around the plate and frame heat exchanger and begin the chiller sequence described above.
All Chiller and Cooling Tower field equipment shall be available in a fail-safe mode for the chillers, pumps and towers via a local HOA controls. Three-way valves V-1 and V2 shall fail to the Chiller and V-4 fail to the Towers.

PARALLEL CHILLERS WITH PRIMARY/SECONDARY FLOW

General: The chiller plant control system shall monitor and control the chilled water system including the chillers, pumps, cooling tower, heat exchanger and variable speed drives as appropriate.
The chiller plant control system shall have a fully editable user interface set-up via point and click on a standard windows screen. It shall not require special software tools or a building automation system technician to operate.
The chiller plant control system shall include the following features:
Operator interface.
System Start/Stop.
Chiller and pump sequencing.
Chiller minimum flow by-pass valve control.
System soft start.
Automatic rotation of chillers and pumps.
Failure recovery diagnostics/protection.
Energy optimization routines.
System and chiller status reports.
Demand limiting.

System Control Configuration Overview – Control of the system components shall be as follows:
This skilled-level remote enable and disable signal shall be through a command via a communication link with the BAS.
A chiller binary output shall control the operation of the chiller evaporator isolation valve and/or call for pump operation. The call for pump operation shall work in conjunction with the BAS to sequence pump and isolation valve opening/closing for smooth startup operation.
The system minimum flow by-pass valve shall be a normally open valve.
The system minimum flow by-pass valve shall be modulated to the fully open position whenever the system is shutdown to ensure minimum flow and prevent the possibility of water hammer upon pump start-up. Control shall be based on flow through the chiller evaporator direct measurement using a calibrated evaporator water flow meter.

Operator interface – The chiller plant control system shall include the following operator interface elements:
Operational status screen to include:
Chiller System Status (Off/Soft, Start/Normal/Ambient, Lockout/Shutdown, In Progress).
Chiller Plant Supply Water Set-point.
Chilled Water System Supply Water Temperature.
Chilled Water System Return Water Temperature.
Predictive chiller addition / subtraction status messages (i.e. "Next Chiller shall be added when the system supply water temperature (42 degrees F) exceeds 44 degrees F degrees for 10 minutes.").
Individual Chiller Failure Reset (Push Button).
All Chiller Failure Reset (Push Button).
System Pump Failure Reset (Push Button).
Manual Addition of Chiller (Push Button).
Manual Subtraction of Chiller (Push Button).
Manual Revision of Chiller Sequence (Push Button).
Screen that allows editing of the following data (to be performed without entering program code editor):
Supply Water Set-point.
System Soft Loading Parameters.
Ambient Lockout Parameters.
Chiller Addition Parameters.
Chiller Subtraction Parameters.
Auto Rotation Parameters.
Alarm Handling Setup.
Security Setup.
Individual Chiller Employs to include all data listed on the supplementary Chiller System Point List, including:
Chiller Name.
Chiller Operating Mode.
Chilled Water Set-point.
Chiller RLA percent.
Entering Chiller Water Temperature.
Leaving Chilled Water Temperature.
Evaporator Flow Rate.
Evaporator Flow status.

Automatic rotation of chillers and pumps:
Chiller rotation shall be initiated based on an operator entered day interval or by the cycling of a binary point. The method of sequence shall be operator selectable.
Chiller cycling caused by normal system load fluctuations shall cause the chillers to change rotation sequence or at the operator's option chillers may be forced into the new rotation sequence at the time of sequence change.
Pump rotation shall be initiated by the BAS, 7-day cycle (adj.).

Diagnostics/Protection: The Building Automation System shall be able to alarm from all sensed points and diagnostic alarms monitored by the chiller controller. The BAS shall have no lockouts or resets that would require operator intervention to correct but shall only alarm.

When an individual chiller's failure is reset, that chiller is re-inserted into the sequence of chillers. When a system failure reset is performed, all chillers that were marked as failed are re-inserted into the sequence. Chiller Plant Control may or may not immediately enable and disable chillers to bring the plant into compliance with the new sequence. An operator-specified value determines whether Chiller Plant Control continues the sequence immediately or waits for normal plant cycling (cycle shutdown and subtract) synchronize the plant with the sequence. Failure resets can be performed several ways: All failures can be reset from a button on a status screen or Individual chiller failures can be reset from a button on a status screen.

Chiller Status Report: Provide an operating status report for each chiller. The report shall provide the preset for the following information to provide the operator with critical chiller operating data.
Compressor On/Off Status.
Compressor Starts/Run hours.
Compressor Phase 1/2/3 Percent RLA – separate for each compressor.
Compressor Current Draw – RLA Percent.
Active Chiller Diagnostics or Alarms.
Leaving Chilled Water Temperature.
Entering Chilled Water Temperature.
Evaporator Flow Rate.
Chilled Water Set-point.
Refrigerant Temperature Evaporator/Condenser - Separate for each circuit.
Operating Mode.
Chiller Model and Serial Number.
Outside Air Dry Bulb.
Outside Air Wet Bulb.

The BAS should have no lockouts or resets that would require operator intervention to correct but shall only alarm.

Chiller Sequence:

Chillers (CH-1 and CH-2) and chilled water pumps (CHP-1 and CHP-2) shall be stopped/started by individual enable RB Relays mounted on the Trane chiller control panel. Chilled water Building Pumps CHBP-1 or CHBP-1A shall be started when any one is in the occupied mode and whenever the outside air temperature is above 50°F (adj.) For Chiller (s) and any pump has a demand for cooling. Pumps [CHBP-1 & CHBP-1A] Variable Frequency Drives (VFD) shall be controlled by differential pressure sensor located across piping mains at remote points in the system (locations Shown on Plan and Schematic). Lead Building Pump shall be started and shall be ramped up by the VFD as required to maintain system pressure. As 2-way valves are opened and system pressure falls below setpoints, lag pump shall be started. As 2-way valves close and system pressure increases above setpoint, lead pump shall be ramped down. Lead pump assignment shall be set by the BAS and shall alternate weekly.
Chillers shall be provided with HOA enable RB relays and enabled through chiller control panel. Chiller flow switch shall energize chiller control circuit and start lead chiller. BAS shall prevent both chillers from starting simultaneously. Lag chiller and chilled water pump shall be started when lead chiller is loaded 85% of capacity. During lag chiller start sequence, the lead chiller shall be indexed to un-load or "ramp-down" to 30%. From this low point both chillers are allowed to load simultaneously to maintain chilled water supply temperature. As the building load decreases, the lead chiller shall ramp when load falls below 35% of capacity and lag chiller shall continue to operate while any zone is in the occupied mode. Lead pump assignment shall be set by the chiller control panel and shall alternate weekly. Condenser Water Pumps CWP-1 and CWP-2 shall be interlocked with their respective chiller.

Cooling Tower:

Cooling Tower shall be enabled by the BAS, once condenser water pump startup is confirmed. Condenser water pumps (CWP-1 and CWP-2) shall be interlocked with their respective chiller. The cooling tower basin temperature shall be sequenced by 2 condenser water temperature sensors located in the individual basins, during chiller operation these sensors will enable both cooling tower fans on and off as well as modulate the speed as necessary to maintain 80-degree (adj) basin water temperature during chiller operation and 45F basin temperature during Plate Exchanger operation.

Freeze Protection:

The tower basin heaters shall activate when OA temperature reaches 40F (adj) to provide freeze protection in the tower. A basin water supply temperature sensor shall be provided for each cooling tower cell (2 required). If the water temperature from either cell falls below 35F (adj) an alarm shall be sounded at the central DDC and condenser water pump CWP-2 shall be stopped. Central DDC shall have the capability to override (stop/start) operation of cooling tower with place heat exchanger.

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When outside air temperature rises above 50° F the Plate Exchanger 3-Way Control Valves #1 and #2 shall bypass condenser and chilled water around the plate and frame heat exchanger and begin the chiller sequence described above.
All Chiller and Cooling Tower field equipment shall be available in a fail-safe mode for the chillers, pumps and towers via a local HOA controls. Three-way valves V-1 and V2 shall fail to the Chiller and V-4 fail to the Towers.

UNIT VENTILADORES/FAN COILS

FAN COIL UNITS SHALL BE STOPPED/STARTED ON A PROGRAMMED BASIS BY THE BAS. A TEMPERATURE SENSOR SHALL BE UTILIZED TO MAINTAIN SPACE TEMPERATURE. SET POINTS SHALL BE SET BY THE BAS AND SHALL NOT BE ADJUSTABLE FROM THE SPACE SENSOR. OCCUPANCY AND ZONE REQUESTS SHALL ALSO START CHILLER AND/OR BOILER SYSTEM AS REQUIRED TO MAINTAIN SETPOINT. UNITS SHALL NOT BE PROVIDED WITH WALL SPEED SWITCHES. EXISTING SWITCHES SHALL BE DEMOLISHED. UNIT SPEED SELECTIONS MAY ONLY BE MADE VIA THE BAS. ON A RISE IN SPACE TEMPERATURE ABOVE SETPOINT, THE CHILLED WATER CONTROL VALVE SHALL OPEN TO THE FAN COIL UNIT. ON A FALL IN SPACE TEMPERATURE BELOW SETPOINT, THE CHILLED WATER CONTROL VALVE SHALL CLOSE. ON A RISE IN SPACE TEMPERATURE BELOW SETPOINT, THE CHILLED WATER CONTROL VALVE SHALL OPEN TO THE HEATING COIL. DURING OCCUPIED HOURS THE MAIN OA DAMPER AT SHARED OA HOOD INTAKE SHALL OPEN TO SUPPLY OUTSIDE AIR TO ITS RESPECTIVE FCU'S/UV'S.

DUCTLESS SPLIT SYSTEMS

Computer rooms and data rooms provided with only a ductless split system shall utilize this sequence.
Ductless split system indoor unit fan shall be started and stopped with thermostat call for cooling. Upon a rise in space temperature above thermostat setpoint, unit compressor shall activate to satisfy space conditions. If space temperature rises above 78°, an alarm shall be sent to the central BAS. No occupied or unoccupied settings shall be used.

FIN TUBE RADIATION

Upon a drop in space temperature the associated hot water control valve shall modulate open until space temperature setpoint is satisfied. Once space temperature is satisfied the hot water control valve shall close. If space temperature drops below 60°, an alarm shall be sent to the central BAS. locate new control valves above ceiling.

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
optima
1327 E Trinity St - Suite 300 Greensboro NC 28401
323 Cayuga Rd - Suite 31 | Raleigh NC 27603
PHONE: 336.854.0309 | FAX: 336.854.0301
NORTH CAROLINA LICENSE NUMBER C-0914

SEAL:

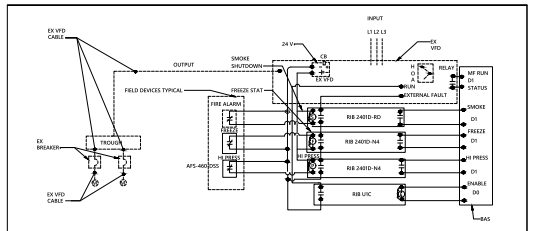
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL
9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE
3611 DAVID BUTLER HIGH SCHOOL
7500 PLEASANT GROVE ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

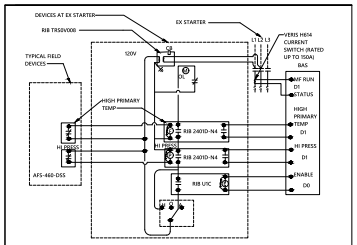
DATE: 09-29-2022
PROJECT #: 22-0151
DRAWN BY: JMF
DESIGNED BY: JMF
CHECKED BY: SRD

SHEET TITLE:
MECHANICA



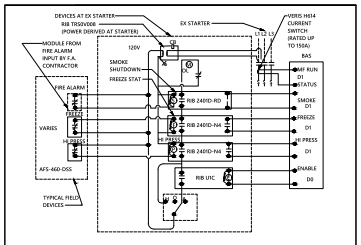
NOTES:
1. MECHANICAL CONTROLS CONTRACTOR SHALL PROVIDE A MINIMUM OF ONE INCH CONDUIT FOR ALL CONTROL WIRING.
2. MECHANICAL CONTROLS CONTRACTOR SHALL PROVIDE CONTROL WIRING, BAS, AND FIELD DEVICE CONNECTIONS.
3. RIB RELAYS BY MECHANICAL CONTROLS CONTRACTOR.

1 CMS TYPICAL MOTOR VFD BAS INTERFACE - AHU
NO SCALE



NOTES:
1. CONTROLS CONTRACTOR SHALL PROVIDE A MINIMUM OF ONE INCH CONDUIT FOR ALL CONTROL WIRING.
2. MECHANICAL CONTROLS CONTRACTOR SHALL PROVIDE CONTROL WIRING, AND FIELD DEVICE CONNECTIONS.
3. RIB RELAYS, CT'S, AND TRANSFORMER BY CONTROLS CONTRACTOR.

2 CMS TYPICAL MOTOR STARTER BAS INTERFACE - PUMP
NO SCALE



NOTES:
1. CONTRACTOR SHALL PROVIDE A MINIMUM OF ONE INCH CONDUIT FOR ALL CONTROL WIRING.
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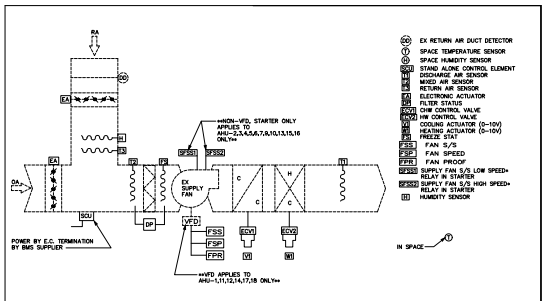
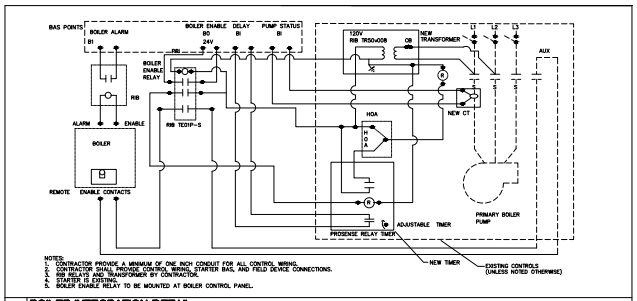
3. RIB RELAYS, CT'S, AND TRANSFORMER BY CONTROLS CONTRACTOR.

3 CMS TYPICAL MOTOR STARTER BAS INTERFACE - AHU
NO SCALE

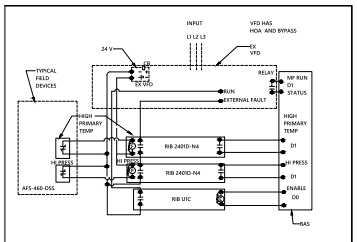


4 AHU FLOW/CONTROL DIAGRAM (AHU-1 THRU 7, 9 THRU 16)
NO SCALE



NOTES:
1. CONTRACTOR PROVIDE A MINIMUM OF ONE INCH CONDUIT FOR ALL CONTROL WIRING.
2. CONTRACTOR SHALL PROVIDE CONTROL WIRING, STARTER BAS, AND FIELD DEVICE CONNECTIONS.
3. RIB RELAYS AND TRANSFORMER BY CONTRACTOR.
4. STARTER IS EXISTING.
5. BOILER ENABLE RELAY TO BE MOUNTED AT BOILER CONTROL PANEL.

5 BOILER INTEGRATION DETAIL
NOT TO SCALE



NOTES:
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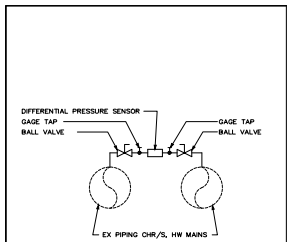
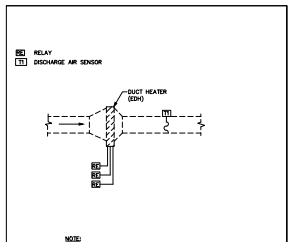
2. MECHANICAL CONTROLS CONTRACTOR SHALL PROVIDE CONTROL WIRING, BAS, AND FIELD DEVICE CONNECTIONS.
3. RIB RELAYS BY CONTROLS CONTRACTOR.

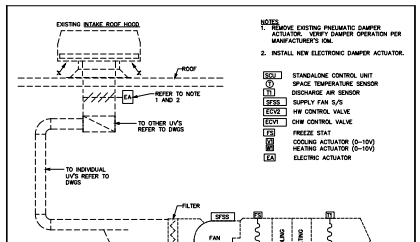
6 CMS TYPICAL MOTOR VFD BAS INTERFACE - PUMP
NO SCALE



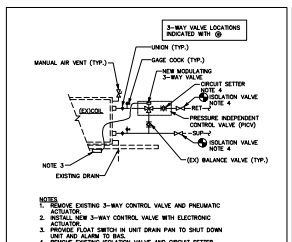
7 DIFFERENTIAL PRESSURE SENSOR PIPING DETAIL
NO SCALE



8 ELECTRIC DUCT HEATER DETAIL
NO SCALE

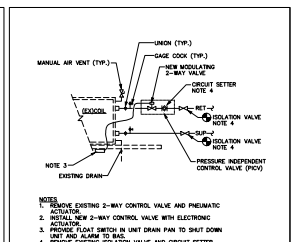


9 UV/FCU CONTROL DIAGRAM
NO SCALE



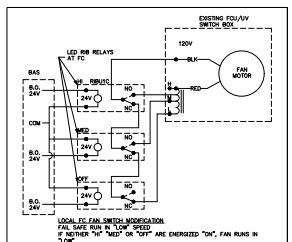
NOTES
1. REMOVE EXISTING 3-WAY CONTROL VALVE AND PNEUMATIC ACTUATOR.
2. INSTALL NEW 3-WAY CONTROL VALVE WITH ELECTRONIC ACTUATOR.
3. PROVIDE FLOAT SWITCH IN UNIT DRAIN PAN TO SHUT DOWN UNIT AND ALARM TO BAS.
4. REMOVE EXISTING ISOLATION VALVE AND CIRCUIT SETTER. PROVIDE NEW ISOLATION VALVE AND CIRCUIT SETTER.
5. PROVIDE SEPARATE VALVES, NOT COMBINATION VALVE (TYPICAL).
6. PICV PROVIDED WITH UNION BETWEEN CIRCUIT SETTER AND CONTROL VALVE.
7. DUE TO COIL PIPING ACCESSORY CHANGEOUT (CIRCUIT SETTER), ALL UV'S AND AHU'S ARE REQUIRED TO HAVE A CHW AND HW RE-BALANCE. REFER TO GPM QUANTITIES ON DRAWING M108 FOR CORRECT UV AND AHU GPM.

10 AHU + UV/FCU COIL UNIT PIPING (3-WAY)
NO SCALE

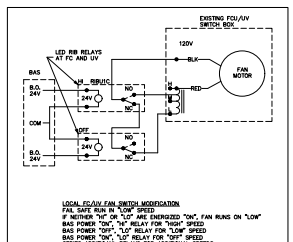


NOTES
1. REMOVE EXISTING 2-WAY CONTROL VALVE AND PNEUMATIC ACTUATOR.
2. INSTALL NEW 2-WAY CONTROL VALVE WITH ELECTRONIC ACTUATOR.
3. PROVIDE FLOAT SWITCH IN UNIT DRAIN PAN TO SHUT DOWN UNIT AND ALARM TO BAS.
4. REMOVE EXISTING ISOLATION VALVE AND CIRCUIT SETTER. PROVIDE NEW ISOLATION VALVE AND CIRCUIT SETTER.
5. PROVIDE SEPARATE VALVES, NOT COMBINATION VALVE (TYPICAL).
6. PICV PROVIDED WITH UNION BETWEEN CIRCUIT SETTER AND CONTROL VALVE.
7. DUE TO COIL PIPING ACCESSORY CHANGEOUT (CIRCUIT SETTER), ALL UV'S AND AHU'S ARE REQUIRED TO HAVE A CHW AND HW RE-BALANCE. REFER TO GPM QUANTITIES ON DRAWING M108 FOR CORRECT UV AND AHU GPM.

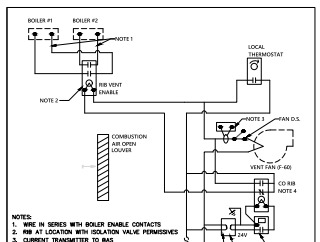
11 AHU + UV/FCU COIL UNIT PIPING (2-WAY)
NO SCALE



12 LOCAL SPEED SWITCH MODIFICATION
NO SCALE



13 LOCAL SPEED SWITCH MODIFICATION
NO SCALE



14 BOILER VENTILATION INTEGRATION DETAIL
NOT TO SCALE

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
1327 E. Trinity St., Suite 300, Greensboro NC 28403
333 Fayetteville St., Suite 31 | Raleigh NC 27601
PHONE: 336.378.0001 FAX: 336.378.0031
NORTH CAROLINA LICENSE NUMBER C-0914

SEAL:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036724 STEVEN R. DALEY
9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
361 DAVID BUTLER ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL CONTROLS SCHEMATICS BUILDING #1

DWG #:
M105

SHEET NO: 5 OF 23

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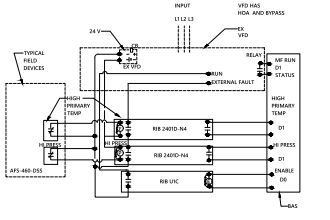
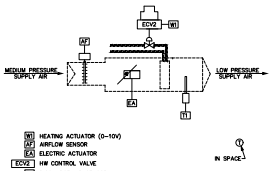
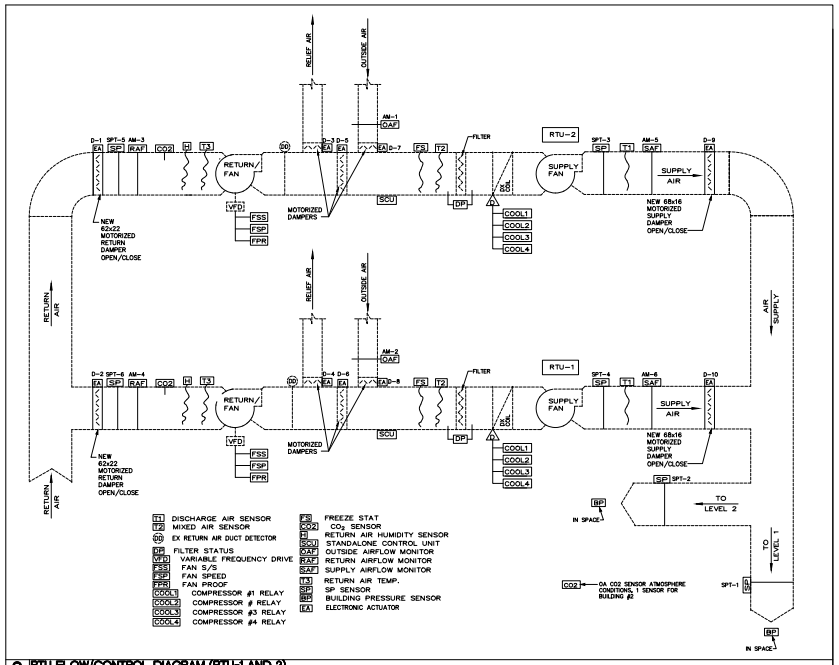


NOTES:
1. CONTROLS CONTRACTOR SHALL PROVIDE A MINIMUM OF ONE INCH CONDUIT FOR ALL CONTROL WIRING.
2. MECHANICAL CONTROLS CONTRACTOR SHALL PROVIDE CONTROL WIRING, BAS, AND FIELD DEVICE CONNECTIONS.
3. RIB RELAYS BY CONTROLS CONTRACTOR.

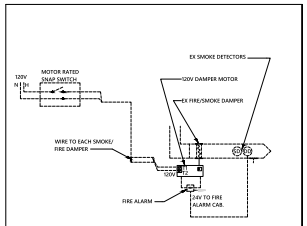
1 CMS TYPICAL MOTOR VFD BAS INTERFACE - PUMP
NO SCALE



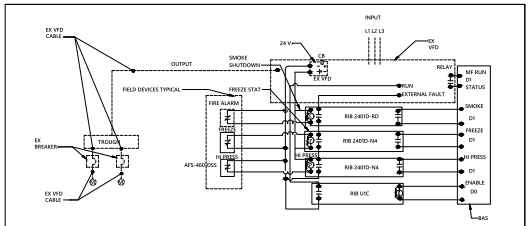
2 VAV BOX CONTROL DIAGRAM
NO SCALE



3 RTU FLOW/CONTROL DIAGRAM (RTU-1 AND 2)
NO SCALE

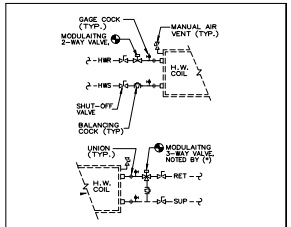


4 VAV BOX CONTROL DIAGRAM
NO SCALE



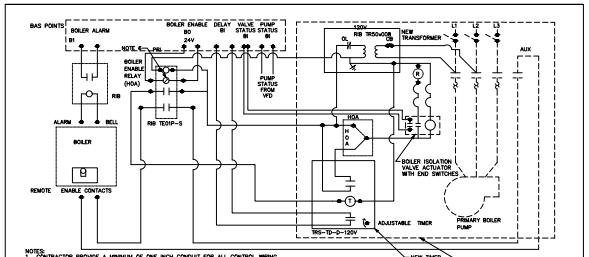
NOTES:
1. MECHANICAL CONTROLS CONTRACTOR SHALL PROVIDE A MINIMUM OF ONE INCH CONDUIT FOR ALL CONTROL WIRING.
2. MECHANICAL CONTROLS CONTRACTOR SHALL PROVIDE CONTROL WIRING, BAS, AND FIELD DEVICE CONNECTIONS.
3. RIB RELAYS BY MECHANICAL CONTROLS CONTRACTOR.

5 CMS TYPICAL MOTOR VFD BAS INTERFACE - AHU
NO SCALE



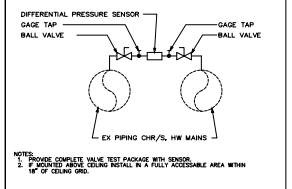
NOTES:
1. REMOVE EXISTING 2-WAY OR 3-WAY CONTROL VALVE.
2. INSTALL NEW CONTROL VALVE WITH ELECTRONIC ACTUATOR.

6 VAV BOX COIL PIPING DETAIL
NO SCALE



NOTES:
1. CONTRACTOR PROVIDE A MINIMUM OF ONE INCH CONDUIT FOR ALL CONTROL WIRING.
2. CONTRACTOR SHALL PROVIDE CONTROL WIRING, STARTER BAS, AND FIELD DEVICE CONNECTIONS.
3. RIB RELAYS AND TRANSFORMER BY CONTRACTOR.
4. BOILER ISOLATION VALVE.
5. BOILER ENABLE RELAY TO BE MOUNTED AT BOILER CONTROL PANEL.
6. 5-20MA/DC CONTROL INPUT.
7. PROVIDE VALVE WITH END SWITCHES.

7 BOILER INTEGRATION DETAIL - BUILDING #2
NOT TO SCALE



NOTES:
1. PROVIDE COMPLETE VALVE TEST PACKAGE WITH SENSOR.
2. 9' MOUNTED ABOVE CEILING INSTALL IN A FULLY ACCESSABLE AREA WITHIN 18" OF CEILING GRID.

8 DIFFERENTIAL PRESSURE SENSOR PIPING DETAIL
NO SCALE

MECHANICAL • ELECTRICAL • PLUMBING
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1927 B Tryon St. Suite 300, Charlotte NC 28203
333 Fayetteville St. Suite 31 | Raleigh NC 27601
Phone: 704.333.3431 www.optimaengineering.com
NORTH CAROLINA LICENSE NUMBER C-0914

SEAL:
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025361 STEVEN R. DALTON
9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
361 DAVID BUTLER ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL CONTROLS SCHEMATICS BUILDING #2

DWG #:
M106

SHEET NO: 6 OF 23

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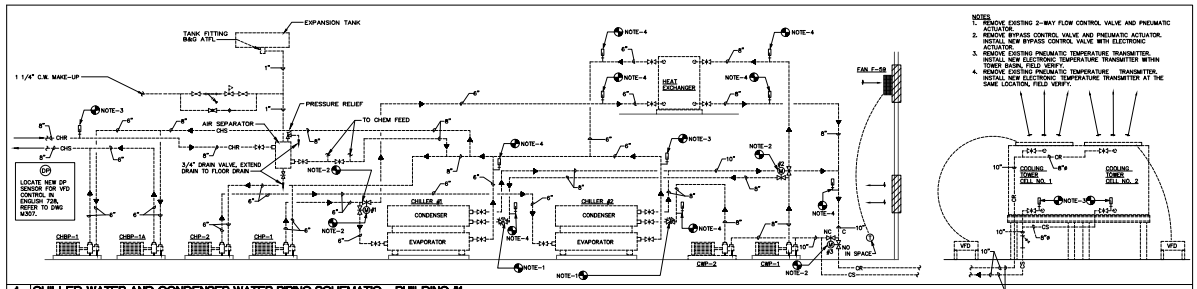
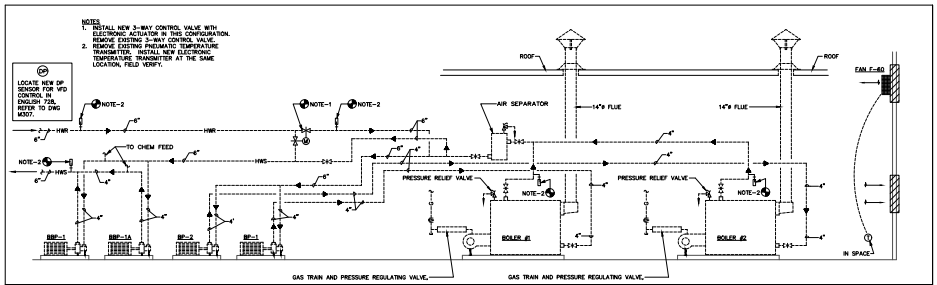
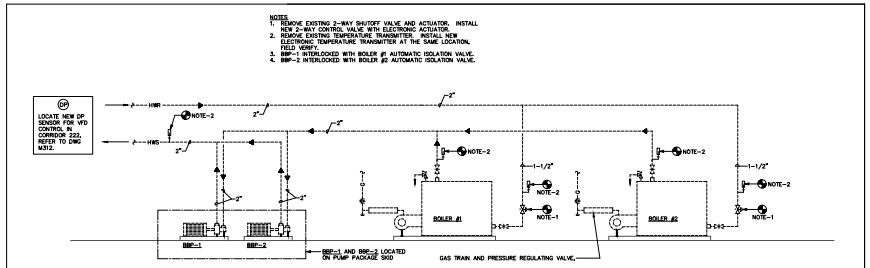


1 CHILLED WATER AND CONDENSER WATER PIPING SCHEMATIC - BUILDING #1
NO SCALE



2 HOT WATER PIPING SCHEMATIC - BUILDING #1
NO SCALE



3 HOT WATER PIPING SCHEMATIC (VARIABLE PRIMARY PUMPING) - BUILDING #2
NO SCALE

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FIRE PROTECTION • LIGHTING DESIGN
1927 B Tryon St., Suite 300, Charlotte NC 28203
333 Fayetteville St., Suite 31 | Raleigh NC 27601
PHONE: 704.333.4000 | FAX: 704.333.4001
NORTH CAROLINA LICENSE NUMBER C-0914

SEAL:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036 STEVEN R. DALLAS
9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
8811 WEST PINEVILLE-MATTHEWS ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL CHW/HW PIPING SCHEMATICS BUILDING #1 AND BUILDING #2

DWG #:
M107

SHEET NO: 7 OF 23

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BUILDING #2

EX ROOFTOP UNIT SCHEDULE - (DX COOLING - VAV)

•FOR INFORMATION ONLY•

SYMBOL	CFM	NOMINAL TONNAGE	O.A. CFM	E.S.P.	COOLING CAPACITY TC (BTUH)	SHC (BTUH)	EFFICIENCY EER	IEER	IPLV	HEATING CAPACITY INPUT (BTUH)	OUTPUT (BTUH)	EFFICIENCY AFUE	COMPRESSOR (EA) NO.	RLA	LRA	QTY.	FLA	OFM (EA) HP.	IFM (EA) HP.	COMB. FAN (EA) LRA	RETURN FAN ES. HP	HP.	POWER SUPPLY VOLTAGE	MCA	MOCP	OPERATING WEIGHT	MANUFACTURER WEIGHT	MANUFACTURER CARRIER MODEL
RTU-1	12,000	50	3,610	1.75"	597,000	412,000	9.7	--	--	--	--	--	4	--	--	4	--	15	--	--	0.75"	7.5	1.38	150	460V-3ø	525 LBS	CARRIER
RTU-2	12,000	50	3,610	1.75"	597,000	412,000	9.7	--	--	--	--	--	4	--	--	4	--	15	--	--	0.75"	7.5	1.38	150	460V-3ø	525 LBS	CARRIER

EX PUMP SCHEDULE

•FOR INFORMATION ONLY•

SYMBOL	SERVICE	GPM	HEAD	DESIGN EFFICIENCY	MOTOR B.F.M.	H.P.	VOLTAGE	MANUFACTURER B&G MODEL
BBP-1	HW LOOP	36	59'	--	1750	2	460V-3ø	E-1510 1.25BC
BBP-1A	HW LOOP	36	59'	--	1750	2	460V-3ø	E-1510 1.25BC

EX BOILER SCHEDULE

•FOR INFORMATION ONLY•

BOILER #1 (B-1) FULTON PHW 500 (CONDENSING)
500 MBH INPUT; 470 MBH OUTPUT; NATURAL GAS; 97% THERMAL EFFICIENCY; 36 GPM, 10' PD MAX.; 120V-1ø, 15 MOCP;

BOILER #2 (B-2) FULTON PHW 500 (CONDENSING)
500 MBH INPUT; 470 MBH OUTPUT; NATURAL GAS; 97% THERMAL EFFICIENCY; 36 GPM, 10' PD MAX.; 120V-1ø, 15 MOCP;

VAV BOX SCHEDULE

•FOR INFORMATION ONLY•

FPB/VAV SYMBOL	PRIMARY CFM MAXIMUM	MINIMUM	FAN CFM	TOTAL HEATING (MBH)	HOT WATER VOLTAGE	GPM	VAV TYPE
VAV 1-110	930	340	N/A	20.1	1.1		SINGLE DUCT
VAV 1-108	705	235	N/A	14.0	.8		SINGLE DUCT
VAV 1-106	705	235	N/A	14.0	.8		SINGLE DUCT
VAV 1-104	705	235	N/A	14.0	.8		SINGLE DUCT
VAV 1-102	1020	275	N/A	18.5	.9		SINGLE DUCT
VAV 1-105	1800	540	N/A	21.8	1.2		SINGLE DUCT
VAV 1-103	560	150	N/A		--		SINGLE DUCT
VAV 1-109	835	311	N/A	20.1	1.0		SINGLE DUCT
VAV 1-121	760	220	N/A	17.3	.9		SINGLE DUCT
VAV 1-123	1095	365	N/A	26.3	1.3		SINGLE DUCT
VAV 1-125	800	266	N/A	17.7	.9		SINGLE DUCT
VAV 1-127	865	280	N/A	10.9	.6		SINGLE DUCT
VAV 1-126	800	266	N/A	17.7	.9		SINGLE DUCT
VAV 1-128	800	266	N/A	17.7	.9		SINGLE DUCT
VAV 1-129	1120	305	N/A	17.7	.9		SINGLE DUCT
VAV 1-131	90	30	N/A	5.2	.2		SINGLE DUCT
VAV 1-134	880	265	N/A	18.5	.9		SINGLE DUCT
VAV 1-135	680	205	N/A	14.0	.7		SINGLE DUCT
VAV 2-210	1095	400	N/A	27.4	1.4		SINGLE DUCT
VAV 2-209	1050	808	N/A	21.7	1.1		SINGLE DUCT
VAV 2-203	1440	965	N/A	28.0	1.4		SINGLE DUCT
VAV 2-206	450	135	N/A	7.5	.4		SINGLE DUCT
VAV 2-211	1065	764	N/A	26.7	1.3		SINGLE DUCT
VAV 2-221	1185	962	N/A	26.7	1.3		SINGLE DUCT
VAV 2-213	1125	375	N/A	26.3	1.3		SINGLE DUCT
VAV 2-223	1345	955	N/A	28.0	1.4		SINGLE DUCT
VAV 2-224	800	275	N/A	10.9	.6		SINGLE DUCT
VAV 2-228	1475	800	N/A	26.7	1.3		SINGLE DUCT
VAV 2-229	90	30	N/A	5.2	.2		SINGLE DUCT
VAV 2-230	950	315	N/A	20.1	1.0		SINGLE DUCT
VAV 2-231	760	250	N/A	17.3	.9		SINGLE DUCT
VAV 2-201	150	50	N/A				SINGLE DUCT
VAV 2-212	450	135	N/A	7.58	.3		SINGLE DUCT

FAN SCHEDULE

•FOR INFORMATION ONLY•

SYMBOL	AREA SERVED/AHU ZONE	TYPE	CFM	APPROX. S.P.	DRIVE	MAX RPM	ELECTRICAL DATA WATTS	H.P.	VOLTAGE
EF-1	MAIN TOILETS/RTU-1/2	EXHAUST	3320	0.50"	BELT	624	--	1/2	120V-1ø
EF-2	ELEC RM 114/DAD-114	EXHAUST	700	0.50"	DIRECT	1100	--	1/6	120V-1ø
EF-3	ELEC RM 115/DAD-114	EXHAUST	700	0.50"	DIRECT	1100	--	1/6	120V-1ø
EF-4	WORKROOM 224/RTU-1	EXHAUST	450	0.50"	DIRECT	1625	--	1/8	120V-1ø
EF-5	ELEC RM 209/RTU-2	EXHAUST	148	.03750"	DIRECT	1075	--	1/25	120V-1ø
EF-1	PREP RM 204/RTU-2	EXHAUST	800	0.25"	BELT	1550	--	1/4	120V-1ø
EF-2	PREP RM 208/RTU-2	EXHAUST	800	0.25"	BELT	1550	--	1/4	120V-1ø
EF-3	PREP RM 225/RTU-2	EXHAUST	800	0.25"	BELT	1550	--	1/4	120V-1ø
EF-4	SCIENCE 202/RTU-2	EXHAUST	2700	0.375"	BELT	1300	--	1/2	120V-1ø
EF-5	SCIENCE 209/RTU-2	EXHAUST	2700	0.375"	BELT	1300	--	1/2	120V-1ø
EF-6	SCIENCE 211/RTU-2	EXHAUST	2700	0.375"	BELT	1300	--	1/2	120V-1ø
EF-7	SCIENCE 212/RTU-2	EXHAUST	2700	0.375"	BELT	1300	--	1/2	120V-1ø
EF-8	SCIENCE 223/RTU-2	EXHAUST	2700	0.375"	BELT	1300	--	1/2	120V-1ø
EF-9	SCIENCE 229/RTU-2	EXHAUST	2700	0.375"	BELT	1300	--	1/2	120V-1ø
HEF-1	FUME HOOD/RTU-2	EXHAUST	375	0.375"	DIRECT	1680	--	1/8	120V-1ø
HEF-2	FUME HOOD/RTU-2	EXHAUST	375	0.375"	DIRECT	1680	--	1/8	120V-1ø
HEF-3	FUME HOOD/RTU-2	EXHAUST	375	0.375"	DIRECT	1680	--	1/8	120V-1ø
HEF-4	FUME HOOD/RTU-2	EXHAUST	375	0.375"	DIRECT	1680	--	1/8	120V-1ø
HEF-5	FUME HOOD/RTU-2	EXHAUST	375	0.375"	DIRECT	1680	--	1/8	120V-1ø
HEF-6	FUME HOOD/RTU-2	EXHAUST	375	0.375"	DIRECT	1680	--	1/8	120V-1ø

BUILDING #1

EX AIR HANDLING UNIT SCHEDULE

•FOR INFORMATION ONLY•

UNIT NUMBER	LOCATION	TOTAL AIR FLOW (CFM)	OUTSIDE AIR FLOW (CFM)	EXT. STATIC PRESSURE (IN. H2O)	TOTAL CAPACITY	SENSIBLE CAPACITY	GPM	COOLING COIL E.W.T. (°F)	L.W.T. (°F)	MAX. P.D.	MAX. S.P.	HEATING COIL (REHEAT POSITION) RUNOUT SIZE	TOTAL CAP.	GPM	E.W.T. (°F)	L.W.T. (°F)	MAX. P.D.	MAX. S.P.	ELECTRICAL DATA RUNOUT SIZE	FAN (H.P.)	VOLTS	PHASE	Hz	MANUFACTURER & MODEL NO.
AHU-1	AUXILIARY GYM	5000	1250	0.50"	180,000	130,000	30.0	44	56	10'	.65"	2"	225,000	10.9	180	140	5'	.25"	1¼"	5	460	3	60	McQUAY LSL-108
AHU-2	ATHLETIC COMMONS	9500	600	0.75"	335,000	245,000	55.8	44	56	10'	.65"	2½"	415,000	20.8	180	140	5'	.25"	1½"	10	460	3	60	McQUAY LSL-122
AHU-3	MEDIA CENTER	11,550	2650	1.0"	405,000	295,000	79.0	44	56	10'	.65"	2½"	520,000	24.3	180	140	5'	.25"	2"	10	460	3	60	McQUAY LSL-122
AHU-4	LOCKER CORRIDOR	4000	400	0.50"	140,000	102,500	25.0	44	56	10'	.65"	1½"	180,000	8.8	180	140	5'	.25"	1¼"	3	460	3	60	McQUAY LSL-108
AHU-5	LOCKER CORRIDOR	4000	--	0.50"	140,000	102,500	25.0	44	56	10'	.65"	1½"	180,000	8.8	180	140	5'	.25"	1¼"	3	460	3	60	McQUAY LSL-108
AHU-6	LOCKER CORRIDOR	2500	--	0.50"	90,000	65,000	15.0	44	56	10'	.65"	1¼"	115,000	5.5	180	140	5'	.25"	1"	2	460	3	60	McQUAY LSL-106
AHU-7	LOCKER CORRIDOR	3500	--	0.50"	125,000	92,000	20.8	44	56	10'	.65"	1½"	160,000	8.0	180	140	5'	.25"	1¼"	3	460	3	60	McQUAY LSL-108
AHU-8	ADMINISTRATION	6000	500	0.75"	215,000	155,000	37.0	44	56	10'	.65"	2"	215,000	13.1	180	140	5'	.25"	1¼"	7½	460	3	60	McQUAY LSL-114
AHU-9	AUDITORIUM COMMONS	9500	600	0.75"	335,000	245,000	55.8	44	56	10'	.65"	2½"	415,000	20.8	180	140	5'	.25"	1½"	7½	460	3	60	McQUAY LSL-122
AHU-10	LOCKER CORRIDOR	4000	--	0.50"	140,000	102,500	25.0	44	56	10'	.65"	1½"	180,000	8.8	180	140	5'	.25"	1¼"	3	460	3	60	McQUAY LSL-108
AHU-11	AUDITORIUM	6000	1500	0.50"	225,000	160,000	54.0	44	56	10'	.65"	2"	275,000	13.1	180	140	5'	.25"	1¼"	5	460	3	60	McQUAY LSL-114
AHU-12	AUDITORIUM	6000	1500	0.50"	225,000	160,000	54.0	44	56	10'	.65"	2"	275,000	13.1	180	140	5'	.25"	1¼"	5	460	3	60	McQUAY LSL-114
AHU-13	STAGE	3700	500	0.50"	125,000	92,500	20.8	44	56	10'	.65"	1½"	165,000	8.1	180	140	5'	.25"	1¼"	3	460	3	60	McQUAY LSL-108
AHU-14	CAFETERIA	17,000	3500	0.75"	590,000	435,000	113.0	44	56	10'	.65"	3"	760,000	37.2	180	140	5'	.25"	2"	15	460	3	60	McQUAY LSL-170
AHU-15	VOCAL MUSIC	2700	500	0.50"	105,500	80,500	17.6	44	56	10'	.65"	1½"	130,000	6.5	180	140	5'	.25"	1"	3	460	3	60	McQUAY LSL-106
AHU-16	INSTRUMENTAL MUSIC	3200	500	0.50"	115,000	85,000	19.2	44	56	10'	.65"	1½"	140,000	8.0	180	140	5'	.25"	1"	3	460	3	60	McQUAY LSL-108
AHU-17	GYMNASIUM	DX COOLING SPLIT SYSTEM																						

AHU RE-BALANCE:
ALL AIR HANDLING UNITS SHALL HAVE THEIR EXISTING PIPING KITS REPLACED INCLUDING CIRCUIT SETTERS. REFER TO DETAIL 10/M105. HOT AND CHILLED WATER COILS ON ALL AIR HANDLERS LISTED ABOVE SHALL BE RE-BALANCED AS PER THE GPM LISTED ON THIS SCHEDULE.

EX UNIT VENTILATOR + FAN COIL UNIT SCHEDULE

•FOR INFORMATION ONLY•

UV/FCU TYPE	LOCATION	TOTAL AIR FLOW (CFM)	OUTSIDE AIR FLOW (CFM)	EXT. STATIC PRESSURE (IN. H2O)	COOLING COIL TOTAL CAPACITY	SENSIBLE CAPACITY	GPM	E.W.T. (°F)	L.W.T. (°F)	MAX. P.D.	RUNOUT SIZE	HEATING COIL TOTAL CAPACITY	GPM	E.W.T. (°F)	L.W.T. (°F)	MAX. P.D.	RUNOUT SIZE	ELECTRICAL DATA FAN (H.P.)	VOLTS	PHASE	Hz	MODEL NO.
UV TYPE-A	REFER TO DWGS	750	50	0.50"	27,500	17,600	5.5	45	57	10'	1"	35,000	2.0	180	140	5'	3/4"	1/2	277	1	60	AAF AH-3000
UV TYPE-B	REFER TO DWGS	1000	125	0.50"	34,400	23,900	7.0	45	57	10'	1"	45,000	2.5	180	140	5'	3/4"	1/2	277	1	60	AAF AH-4000
UV TYPE-C	REFER TO DWGS	1250	175	0.50"	47,100	33,700	10.0	45	57	10'	1 1/4"	55,000	3.0	180	140	5'	3/4"	1/2	277	1	60	AAF AH-5000
UV TYPE-D	REFER TO DWGS	1500	225	0.50"	59,000	38,600	10.0	45	57	10'	1 1/4"	65,000	3.5	180	140	5'	3/4"	1/2	277	1	60	AAF AH-6000
UV TYPE-E	REFER TO DWGS	2000	225	0.50"	67,900	46,800	11.5	45	57	10'	1 1/4"	87,000	4.5	180	140	5'	1"	1/2	277	1	60	AAF AH-8000
UV TYPE-F	REFER TO DWGS	2000	225	0.25"	67900	46,800	11.5	45	57	10'	1 1/4"	87,000	4.5	180	140	5'	1"	1/2	277	1	60	AAF AH-8000
UV TYPE-G	REFER TO DWGS	1250	125	0.50"	47,100	33,700	10.0	45	57	10'	1 1/4"	55,000	3.0	180	140	5'	3/4"	1/2	277	1	60	AAF AH-5000
FCU TYPE-A	REFER TO DWGS	200	25	0.25"	11,000	7,800	2.0	45	57	10'	3/4"	10,000	1.0	180	140	5'	1/2"	150 W.	277	1	60	McQUAY TSC-041F
FCU TYPE-B	REFER TO DWGS	350	35	0.25"	16,000	11,800	3.2	45	57	10'	3/4"	16,000	1.0	180	140	5'	1/2"	250 W.	277	1	60	McQUAY TSC-081F
FCU TYPE-C	REFER TO DWGS	500	40	0.25"	23,500	16,800	4.7	45	57	10'	1"	22,000	1.2	180	140	5'	1/2"	250 W.	277	1	60	McQUAY TSC-081F
FCU TYPE-D	REFER TO DWGS	750	40	0.25"	29,500	20,600	5.9	45	57	10'	1"	32,500	1.7	180	140	5'	1/2"	370 W.	277	1	60	McQUAY TSC-081F
FCU TYPE-E	REFER TO DWGS	600	--	0.25"	19,200	13,500	3.9	45	57	10'	1"	--	--	--	--	--	--	290 W.	277	1	60	McQUAY TSH-101F

UV AND FCU RE-BALANCE:
ALL UV/FCU'S SHALL HAVE THEIR EXISTING PIPING KITS REPLACED INCLUDING CIRCUIT SETTERS. REFER TO DETAIL 10/M105. HOT AND CHILLED WATER COILS ON ALL AIR HANDLERS LISTED ABOVE SHALL BE RE-BALANCED AS PER THE GPM LISTED ON THIS SCHEDULE.

PUMP SCHEDULE

•FOR INFORMATION ONLY•

SYMBOL	SERVICE	GPM	HEAD	MOTOR B.F.M.	H.P.	VOLTAGE	MANUFACTURER TACO
CHBP-1	CHILLED WATER	660	80	1750	25	460-3ø	FE4010
CHBP-1A	CHILLED WATER	660	80	1750	25	460-3ø	FE4010
CHP-1	CHILLED WATER	660	35	1750	10	460-3ø	N/A
CHP-2	CHILLED WATER	660	35	1750	10	460-3ø	N/A
CWP-1	CONDENSER WATER	850	55	1750	15	460-3ø	TA1224
CWP-2	CONDENSER WATER	850	55	1750	15	460-3ø	TA1224
BBP-1	HOT WATER	200	75	1750	7.5	460-3ø	FE2508
BBP-1A	HOT WATER	200	75	1750	7.5	460-3ø	FE2508
BP-1	HOT WATER	200	20	1750	2	460-3ø	FE2506
BP-2	HOT WATER	200	20	1750	2	460-3ø	FE2506

NEW PUMP VFD'S:
DEMOLISH EXISTING DISCONNECTS/STARTERS AND INSTALL NEW VFD'S AND GROUNDING RINGS FOR CHILLED AND HOT WATER SECONDARY PUMPS (BBP-1A, BBP-1, CHBP-1A AND CHBP-1) FIELD VERIFY PUMP VFD HP PRIOR TO ORDER. REFER TO SEQUENCE, POINTS LIST AND CHILLER/BOILER ROOM DRAWINGS M102, M104 AND M362. INSTALL NEW DP SENSORS IN CHW/HW MAINS LOCATED ABOVE ENGLISH 728 (REFER TO DWG M307), REFER TO SEQUENCES FOR DP SENSOR OPERATION.

PUMP RE-BALANCE:
PUMPS CHBP-1, CHPP-1A, BBP-1 AND BBP-1A SHALL ALL RECEIVE NEW VFDS AS DESCRIBED ON THE NOTE ABOVE. AFTER VFD INSTALLATION ALL PUMPS LISTED ON THIS NOTE SHALL BE RE-BALANCED TO GPM INDICATED ON SCHEDULE.

FINNED TUBE SCHEDULE

SYMBOL	ELEMENT LENGTH	ENCLOSURE LENGTH	BTUH	GPM	RUNOUT
FT	4'-0"	5'-0"	45,000	3.0	3/4"
FT	8'-0"	9'-0"	90,000	3.0	3/4"
FT-XX - REFER TO DRAWINGS FOR FT DESIGNATION					

FAN SCHEDULE

•FOR INFORMATION ONLY•

SYMBOL	LOCATION/AHU/UV ZONE	TYPE	CFM	APPROX. S.P.	DRIVE	MAX RPM	ELECTRICAL DATA WATTS	H.P.	VOLTAGE	MANUFACTURER GREENHECK
E-1	GYM/AHU-17	EXHAUST	15000	0.25"	BELT	480	--	1.5	460V-3ø	RBE-2148
E-2	GYM/AHU-17	EXHAUST	15000	0.25"	BELT	480	--	1.5	460V-3ø	RBE-2148
E-3	PE LOCKER/UV-108A/B, 103	EXHAUST	5830	0.50"	BELT	1200	--	2	460V-3ø	BSQ-200-20
E-4	TRAINING 123/UV-123	EXHAUST	300	0.375"	BELT	1300	--	1/15	120V-1ø	SQ-95-D
E-5	CUSTODIAL 126/N/A	EXHAUST	1105	0.50"	BELT	1200	--	1/4	120V-1ø	BSQ-130-4
E-6	PE LOCKER/UV-136A/B, 131	EXHAUST	5830	0.50"	BELT	1200	--	2	460V-3ø	BSQ-200-20
E-7	MECH RM 102A/N/A	SUPPLY	400	0.20"	DIRECT	1650	--	1/20	120V-1ø	SSI-10-42B-P
E-8	BOYS 215/AHU-4	EXHAUST	1200	0.50"	BELT	1200	--	1/4	120V-1ø	BSQ-130-4
E-9	ELEC 225/AHU-4	EXHAUST	800	0.375"	BELT	1200	290	--	120V-1ø	SP-155
E-10	GIRLS 234/AHU-4	EXHAUST	980	0.375"	BELT	1450	---	1/4	120V-1ø	BSQ-100-4
E-11	MEDIA TOILET/AHU-4	EXHAUST	125	0.25"	DIRECT	1030	76	--	120V-1ø	SP-125
E-12	GIRLS 402/AHU-5	EXHAUST	1875	0.50"	BELT	950	--	1/3	120V-1ø	BSQ-160-3
E-13	ELEC 406/N/A	EXHAUST	400	0.375"	BELT	1200	224	--	120V-1ø	SP-152
E-14	BOYS 420/AHU-5	EXHAUST	850	0.50"	BELT	1075	---	1/4	120V-1ø	BSQ-120-4
E-15	BOYS 517/AHU-7	EXHAUST	500	0.50"	BELT	1300	---	1/4	120V-1ø	BSQ-90-4
E-16	ELEC 533/AHU-7	EXHAUST	400	0.375"	BELT	1200	224	--	120V-1ø	SP-152
E-17	GIRLS 541/AHU-7	EXHAUST	1410	0.50"	BELT	1310	---	1/3	120V-1ø	BSQ-130-3
E-18	STORAGE 614/AHU-8	EXHAUST	500	0.50"	BELT	1300	---	1/4	120V-1ø	BSQ-90-4
E-19	GIRLS 704/AHU-10	EXHAUST	790	0.50"	BELT	1400	---	1/4	120V-1ø	BSQ-100-4
E-20	ELEC 712/AHU-10	EXHAUST	400	0.375"	BELT	1200	224	--	120V-1ø	SP-152
E-21	BOYS 727/AHU-10	EXHAUST	1500	0.50"	BELT	1075	---	1/4	120V-1ø	BSQ-140-4
E-22	GYM/AHU-17	SUPPLY	15000	0.25"	BELT	480	--	1.5	460V-3ø	RBF-2148
E-23	GYM/AHU-17	SUPPLY	15000		BELT	480	--	1.5	460V-3ø	RBF-2148
E-39	PREP RM 213/FCU-213	EXHAUST	1950	0.375"	BELT	860	--	1/4	120V-1ø	BSQ-160-4
E-40	PREP RM 210/FCU-210	EXHAUST	1950	0.375"	BELT	860	--	1/4	120V-1ø	BSQ-160-4
E-41	PREP RM 204/FCU-204	EXHAUST	1950	0.375"	BELT	860	--	1/4	120V-1ø	BSQ-160-4
E-42	PREP RM 205/FCU-205	EXHAUST	1950	0.375"	BELT	860	--	1/4	120V-1ø	BSQ-160-4
E-43	PREP RM 219/FCU-219	EXHAUST	1950	0.375"	BELT	860	--	1/4	120V-1ø	BSQ-160-4
E-44	PREP RM 230/FCU-230	EXHAUST	1950	0.375"	BELT	860	--	1/4	120V-1ø	BSQ-160-4
E-45	PREP RM 232/FCU-232	EXHAUST	1950	0.375"	BELT	860	--	1/4	120V-1ø	BSQ-160-4
E-46	STORAGE 220/N/A	EXHAUST	400	0.375"	BELT	1300	--	1/4	120V-1ø	BSQ-80-4
E-47	PROCESS RM 855/FCU-856	EXHAUST	175	0.25"	DIRECT	1030	76	--	120V-1ø	SP-125
E-48	DARK RM 846/FCU-856	EXHAUST	425	0.25"	DIRECT	1070	224	--	120V-1ø	SP-152
E-49	GENERATOR RM/DAD-542	EXHAUST	750	0.25"	BELT	1500	--	1/12	120V-1ø	SEI-12-632-G
E-50	STORAGE KITCHEN/FCU-810	EXHAUST	150	0.375"	BELT	1550	--	1/15	120V-1ø	SQ-80-D
E-51	MECH RM 809/N/A	SUPPLY	400	0.20"	DIRECT	1650	--	1/20	120V-1ø	SSI-10-42B-P
E-52	KITCHEN/UV-802A/B/C	EXHAUST	9750	1.25"	BELT	650	--	5	460V-3ø	CUBE-360HP-60
E-53	KITCHEN/N/A	MAKE-UP	6825	0.875"	BELT	1650	--	2	460V-3ø	RSF-180-20
E-54	DISHWASH RM 810/FCU-810	EXHAUST	600	0.75"	BELT	1405	--	1/4	120V-1ø	CUBE-100-4
E-55	TOILET 828/AHU-13	EXHAUST	200	0.25"	DIRECT	1300	--	1/20	120V-1ø	SQ-80-D
E-56	AUD ELEC RM/AHU-14	EXHAUST	500	0.375"	DIRECT	1080	285	---	120V-1ø	SP-255
E-57	WORKROOM 849/FCU-849	EXHAUST	500	0.375"	DIRECT	1080	285	---	120V-1ø	SP-255
E-58	CHILLER RM/N/A	EXHAUST	4500	0.25"	BELT	1150	---	3/4	460V-3ø	SBE-2420-7
E-60	BOILER ROOM/N/A	SUPPLY	2500	0.25"	BELT	975	---	1/4	120V-1ø	SBS-1920-4
E-61	ELEC RM/DAD-556	EXHAUST	1500	0.25"	BELT	900	---	1/4	120V-1ø	SBE-1920-4
E-62	STORAGE 717/UV-723	EXHAUST	150	0.375"	BELT	1550	---	1/15	120V-1ø	SQ-80-D
E-63	DRY STORAGE/N/A	EXHAUST	100	0.25"	DIRECT	950	80	--	120V-1ø	SP-7
E-65	CHILLER RM/N/A	EXHAUST	4500	0.375"	BELT	680	---	3/4	460V-3ø	CUBE-220-7

EX CHILLERS

•FOR INFORMATION ONLY•

CHILLER #1 & CHILLER #2 (TRANE)
275 TONS (MIN.); EVAPORATOR – 660 GPM, 54° F. E.W.T., 44° F. L.W.T., MAX. P.D. – 25', .00010 F.F.; CONDENSER – 850 GPM, 85° F. E.W.T., 95° F. L.W.T., MAX. P.D. – 20', .00025 F.F.; 10' MAX. LENGTH OF SHELLS; MAX. INPUT POWER – 173 KW (.63 KW/TON); IPLV (NPLV) – .491; ELECTRICAL DATA: 460V–3ø, 245 FLA, 1730 LRA, 780 INRUSH AMPS

EX COOLING TOWER

COOLING TOWER EVAPCO AT 29–224 (TWO CELL TOWER)
SUMMER CONDITIONS:
1650 GPM, 95° F. E.W.T., 85° F. L.W.T., 78° F. W.B. (6,600,000 BTUH MIN.)

WINTER CONDITIONS:
850 GPM, 52° F. E.W.T., 44° F. L.W.T., 38° F. W.B. (3,250,000 BTUH MIN.)

FANS: 2 @ 20 H.P. (EA.), 2–SPEED/2 WINDING, 460V–3ø
BASIN HEATERS – 4 @ 4 K.W. EACH, 460V–3ø WITH CONTACTORS AND LOW WATER CUTOFF.

EX PLATE HEAT EXCHANGER

PLATE HEAT EXCHANGER
CONDENSER WATER:
850 GPM, MAX. P.D. – 25', 44° F. E.W.T., 52° F. L.W.T.

CHILLED WATER:
660 GPM, MAX. P.D. – 20', 58° F. E.W.T., 48° F. L.W.T.

MINIMUM HEAT TRANSFER – 3,295,000 BTUH

EX BOILERS

•FOR INFORMATION ONLY•

BOILER #1 & #2 NEL–McLAIN BGL–1088–WF
CAST–IRON SECTIONAL BOILER; 2,450 MBH GROSS OUTPUT; 2132 MBH NET OUTPUT; 3,103 GAS INPUT (NATURAL GAS);
BURNER – POWER FLAME MODEL WCR2–G–20B GAS BURNER, 1½ H.P., 3450 RPM, 460V–3ø;

OUTSIDE AIR TRUNK DAMPER SCHEDULE

DAMPER	ASSOCIATED AHU, UV OR FCU
DAD-123	AHU-1, 17; UV-123, 103, 108A, 108B, 113; FCU-112, 121
DAD-117	UV-117, 131, 136A, 136B, 141; FCU-137
DAD-202	UV-201, 209, 211, 216, 217, 223, 203, 202, 229, 231, 214, 222, 223, 233, 226; FCU-213, 232, 219, 210, 230, 205, 204
DAD-320	UV-320, 313
DAD-310	AHU-4, 2; UV-305, 311
DAD-429	UV-404B, 417, 418, 427, 430, 432, 433, 435, 404A, 425, 424,412,410,430B, 403A, 410A, 422, 407, 421; FCU-423, 414A, 414B, 415, 431, 434
DAD-502	UV-510, 518, 501, 503, 504, 506, 520, 518, 535, 512, 513B, 528A, 528A, 537, 538, 540, 513A, 528B, 529B, 532; FCU-521, 524, 505, 502, 536, 512A, 539
DAD-637	UV-637
DAD-606	UV-615, 606
DAD-735	UV-736, 738, 739, 741, 733, 726, 723, 708, 706, 731, 714B, 715B, 714A, 715A, 730, 728, 711, 703, 705; FCU-729, 704, 716, 732, 707, 737, 740, 724, 725
DAD-846	AHU-15, 16; UV-843, 833, 857, 854, 851, 847; FCU-845, 856, 853, 849
DAD-807Z	AHU-14, 13; UV-807C, 807A, 807B, 815; FCU-831, 835, 836
DAD-814	AHU-12
DAD-818	AHU-11

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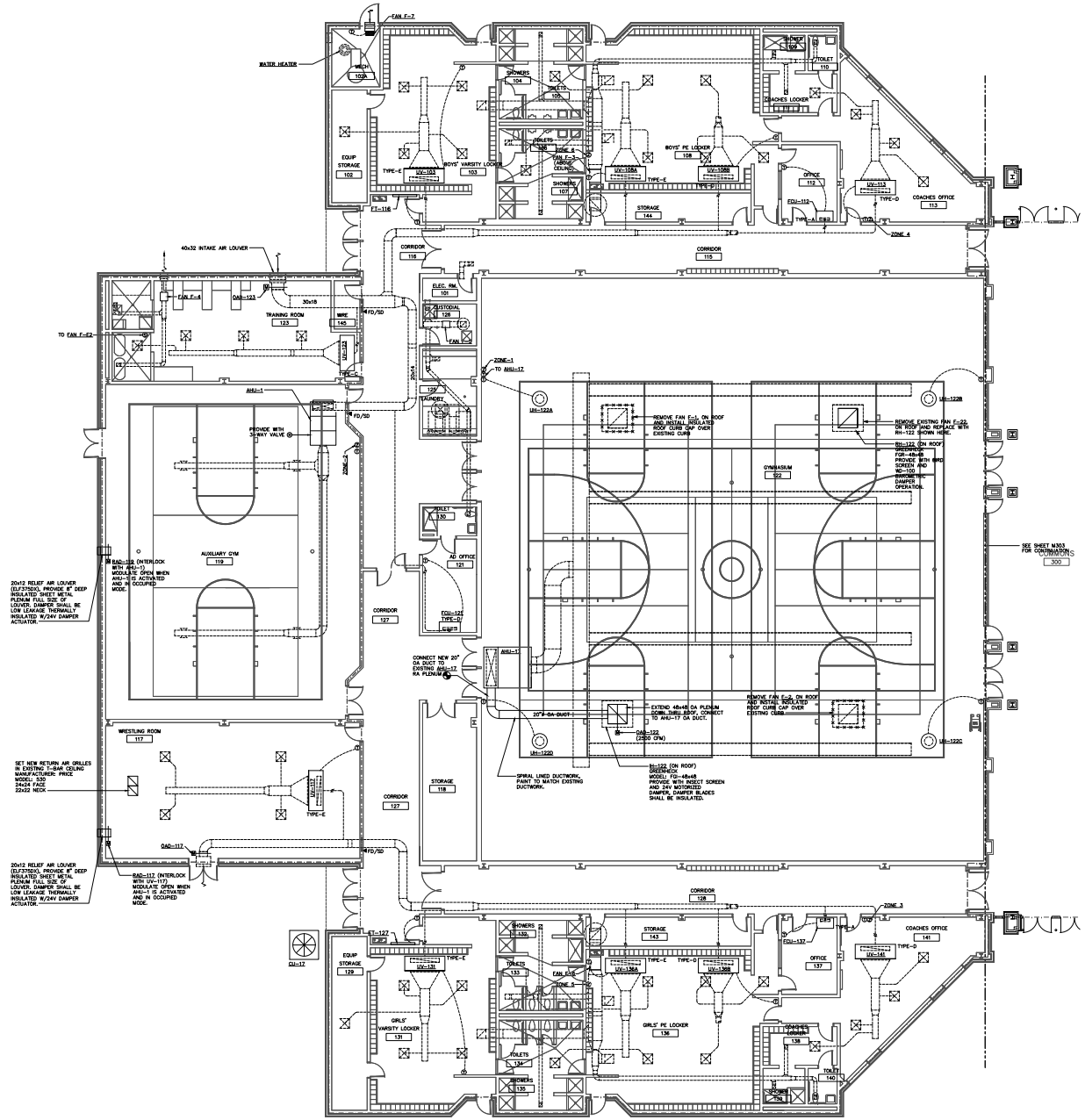


1 MECHANICAL FLOOR PLAN - AREA-1
1/8" = 1'-0"

DEMOLITION NOTES

ALL EXISTING UNIT VENTILATORS (UV), FANS (F) AND AIR HANDLERS (AHU) SHALL HAVE THEIR MANUFACTURER'S THERMOSTATS REMOVED AND REPLACED WITH A SWITCH OF APPLICABLE DEMOLISHED ALONG WITH ALL OTHER DDC AND/OR PNEUMATIC CONTROLS EQUIPMENT (HW/CHW ACTUATORS, DAMPER ACTUATORS, CONTROL BOARDS, ETC.). ALL UNIT VENTILATOR, FAN AND AIR HANDLER CONTROLS SHALL BE REPLACED WITH NEW CONTROLS SHOWN UNDER THESE DRAWINGS AS LISTED IN KEYED NOTES (THIS SHEET) ALONG WITH SCHEMATIC, SEQUENCE AND POINTS LIST DRAWINGS. UV WALL MOUNTED MANUAL SPEED SWITCHES SHALL NOT BE REPLACED. ALL EXISTING MANUAL STOP SWITCHES FOR THE AIR HANDLERS SHALL BE DEMOLISHED AND NOT REPLACED. UV SPEED SWITCHES AND STOP SHALL BE INTEGRATED WITH NEW BAS CONTROLS. IN ADDITION ALL AHU AND FCU/UV'S SHALL HAVE THEIR EXISTING PIPING RITE DEMOLISHED AND REPLACED INCLUDING, MANUAL ISOLATION VALVES, CIRCUIT SETTERS, GAUGE PORTS, REFER TO DETAIL 11/M105.

KEYED NOTES

TAG
EQUIP TYPE
XX-XX

UV-X UNIT VENTILATOR/FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- HOT WATER VALVE ACTUATOR
- CHILLER WATER VALVE ACTUATOR
- THERMOSTAT
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

F-X FAN
- CT SWITCH
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

OAD-X / RAD-X OUTSIDE/RELIEF AIR DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

AHU-X AIR HANDLING UNIT (REFER TO DWG 4/M105 FOR ADDITIONAL REQUIRED DEVICES)
- SUPPLY AIR TEMPERATURE SENSOR
- MIXED AIR TEMPERATURE SENSOR
- THERMOSTAT
- HOT WATER VALVE ACTUATOR
- CHILLER WATER VALVE ACTUATOR
- OUTSIDE AIR DAMPER ACTUATOR
- RETURN AIR DAMPER ACTUATOR
- FREEZE STAT
- FILTER DIFFERENTIAL PRESSURE SENSOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

FT-X FIN TUBE RADIATION
- THERMOSTAT
- HOT WATER VALVE ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

SD-X SMOKE DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

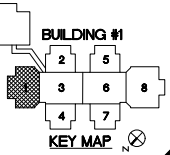
AHU-X / CU-X DX SPLIT SYSTEM UNIT
- SUPPLY AIR TEMPERATURE SENSOR
- MIXED AIR TEMPERATURE SENSOR
- RETURN AIR TEMPERATURE SENSOR
- OUTSIDE AIR DAMPER ACTUATOR
- RETURN AIR DAMPER ACTUATOR
- FREEZE STAT
- FILTER DIFFERENTIAL PRESSURE SENSOR
- RETURN AIR HUMIDISTAT
- STATIC PRESSURE SENSOR
- BUILDING PRESSURE SENSOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

UH-X UNIT VENTILATOR/FAN COIL
- HOT WATER VALVE ACTUATOR
- THERMOSTAT
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

COORDINATE ALL NEW TEMP/HUM SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC.
ANY EXISTING TEMP/HUM SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

BUILDING #2

BUILDING #1



KEY MAP

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
OPTIMA ENGINEERING
1327 E Trade St., Suite 300, Charlotte NC 28203
333 Fayetteville St., Suite 31 | Raleigh NC 27601
Phone: (704) 375-1300 | Fax: (704) 375-1301 | www.optimaeng.com
NORTH CAROLINA LICENSE NUMBER C-1914

SEAL:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036724 STEVEN R. DALEY
9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
361 DAVID BUTLER ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - FLOOR PLAN AREA - 1

DWG #:
M301

SHEET NO: 9 OF 23

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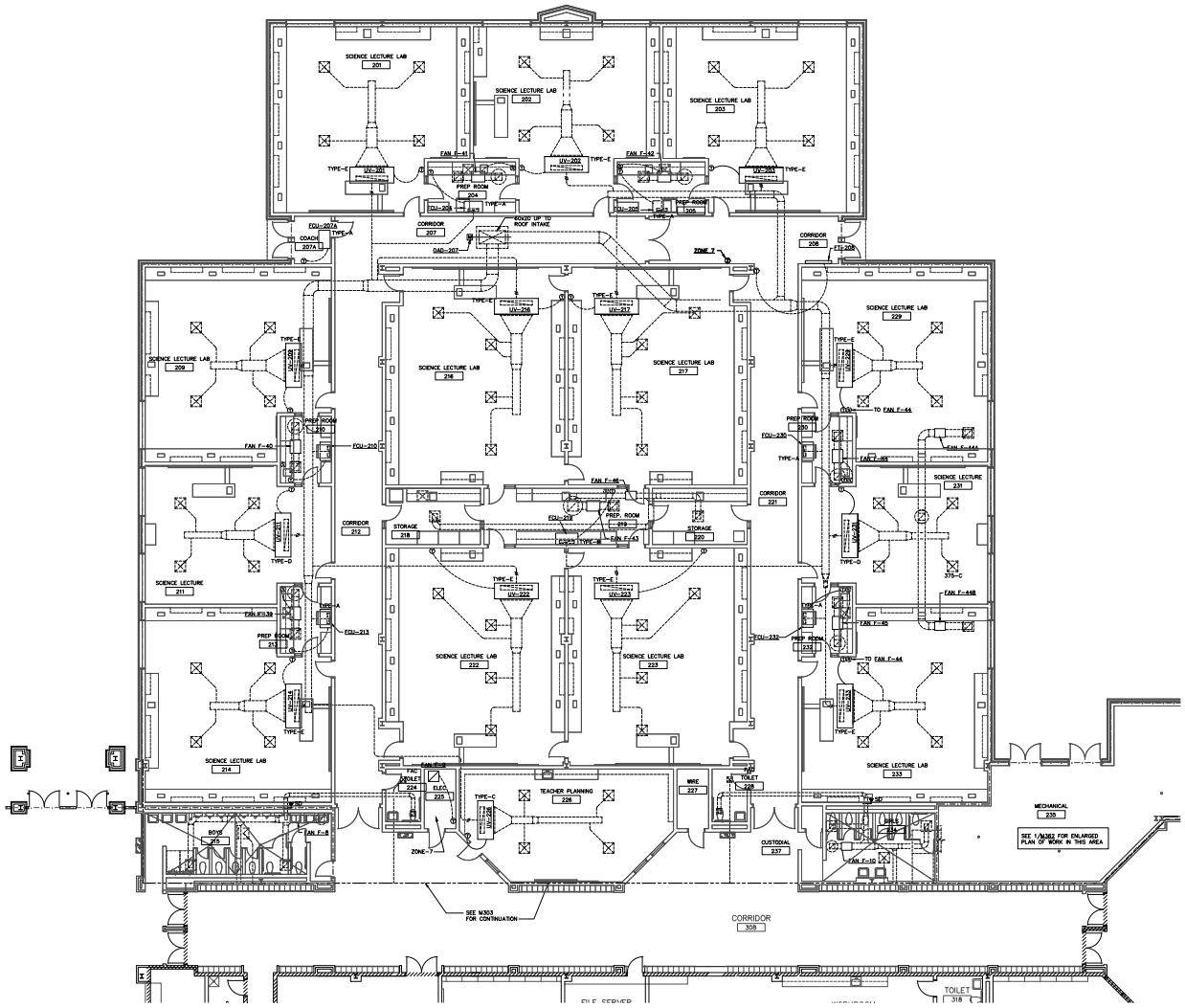


① MECHANICAL FLOOR PLAN - AREA-2
1/8" = 1'-0"

DEMOLITION NOTES

ALL EXISTING UNIT VENTILATORS (UV), FANS (F) AND AIR HANDLERS (AHU) SHALL HAVE THEIR EXISTING CONTROLS, THERMOSTATS OR SPACE SENSORS REMOVED. WALL SWITCH (V) APPLICABLE DEMOLISHED ALONG WITH ALL OTHER BOX AND WIRING ASSOCIATED WITH CONTROLS EQUIPMENT (THERMOSTATS, DAMPER ACTUATORS, CONTROL BOARDS, ETC.). ALL UNIT VENTILATOR, FAN AND AIR HANDLER CONTROLS SHALL BE REPLACED WITH NEW CONTROLS SHOWN UNDER THESE DRAWINGS AS LISTED IN KEYED NOTES (THIS SHEET) ALONG WITH SCHEMATIC, SEQUENCE AND POINTS LIST DRAWINGS. UV WALL MOUNTED MANUAL SPEED SWITCHES SHALL NOT BE REPLACED. ALL EXISTING MANUAL STOP SWITCHES FOR THE AIR HANDLERS SHALL BE DEMOLISHED AND NOT REUSED. ALL EXISTING DDC CONTROL SHALL BE INTEGRATED WITH NEW BAS CONTROLS. IN ADDITION ALL AHU AND UV'S SHALL HAVE THEIR EXISTING PIPING KITS DEMOLISHED AND REPLACED INCLUDING, MANUAL ISOLATION VALVES, CIRCUIT SETTERS, GAUGE PORTS. REFER TO DETAIL 11/M105.

KEYED NOTES

TAG
EQUIP TYPE
02-00

UV-X UNIT VENTILATOR/FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- HOT WATER VALVE ACTUATOR
- CHILLER WATER VALVE ACTUATOR
- THERMOSTAT
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

F-X FAN
- CT SWITCH
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

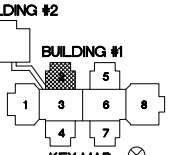
DAD-X OUTSIDE AIR DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

FT-X FIN TUBE RADIATION
- THERMOSTAT
- HOT WATER VALVE ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

SD-X SMOKE DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

COORDINATE ALL NEW TEMP/HUM SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC.
ANY EXISTING TEMP/HUM SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

BUILDING #2



KEY MAP

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
optima
1227 E. Trade St., Suite 300, Charlotte NC 28202
333 Fayetteville St., Suite 31, Raleigh NC 27601
Phone: (704) 332-2000 Fax: (704) 332-2001 www.optimaeng.com
NORTH CAROLINA LICENSE NUMBER C-1914

SEAL:
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 027296 STEVEN R. DALEY
9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

3611 DAVID BUTLER HIGH SCHOOL
ATTN: MR. JAMES WHITE
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - FLOOR PLAN AREA - 2

DWG #:
M302

SHEET NO: 10 OF 23

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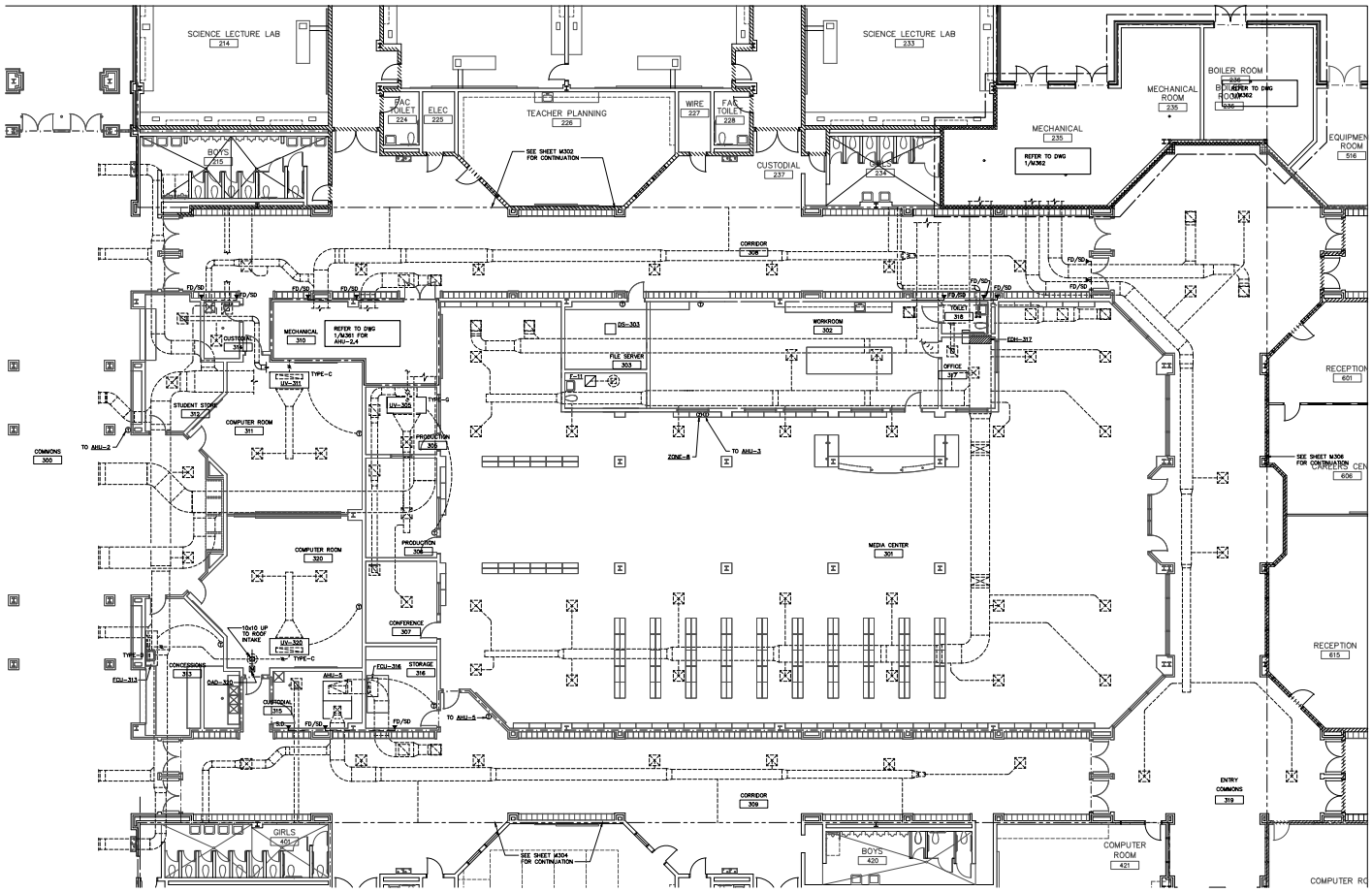


① MECHANICAL FLOOR PLAN - AREA-3
1/8" = 1'-0"

DEMOLITION NOTES

ALL EXISTING UNIT VENTILATORS (UV), FANS (F) AND AIR HANDLERS (AHU) SHALL HAVE THEIR EXISTING CONTROLS, THERMOSTATS AND MANUAL SPEED SELECTOR WALL SWITCH (IF APPLICABLE) DEMOLISHED ALONG WITH ALL OTHER DDC AND/OR PNEUMATIC CONTROLS EQUIPMENT (HW/CHW ACTUATORS, DAMPER ACTUATORS, CONTROL BOARDS, ETC.). ALL UNIT VENTILATOR, FAN AND AIR HANDLER CONTROLS SHALL BE REPLACED WITH NEW CONTROLS SHOWN UNDER THESE DRAWINGS AS LISTED IN KEYED NOTES (THIS SHEET) ALONG WITH SCHEMATIC, SEQUENCE AND POINTS LIST DRAWINGS. UV WALL MOUNTED MANUAL SPEED SWITCHES SHALL NOT BE REPLACED. ALL EXISTING SMALL STOP VALVES ON UNIT VENTILATORS AND HANDLERS SHALL BE DEMOLISHED AND NOT REPLACED. UV SPEED SELECTOR CONTROL SHALL BE INTEGRATED WITH NEW BAS CONTROLS. IN ADDITION ALL AHU AND UV'S SHALL HAVE THEIR EXISTING PIPING KITS DEMOLISHED AND REPLACED INCLUDING, MANUAL ISOLATION VALVES, CIRCUIT SETTERS, GAUGE PORTS, REFER TO DETAIL 11/M105.

KEYED NOTES

TAG
EQUIP TYPE-#
DD-XX

UV-X UNIT VENTILATOR/FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- HOT WATER VALVE ACTUATOR
- CHILLER WATER VALVE ACTUATOR
- THERMOSTAT
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

F-X FAN
- CT SWITCH
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

DAD-X OUTSIDE AIR DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

AHU-X AIR HANDLING UNIT (REFER TO DWG 4/M105 FOR ADDITIONAL REQUIRED DEVICES)
- SUPPLY AIR TEMPERATURE SENSOR
- MIXED AIR TEMPERATURE SENSOR
- THERMOSTAT
- HOT WATER VALVE ACTUATOR
- CHILLER WATER VALVE ACTUATOR
- OUTSIDE AIR DAMPER ACTUATOR
- RETURN AIR DAMPER ACTUATOR
- CO2 SENSOR
- FILTER DIFFERENTIAL PRESSURE SENSOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

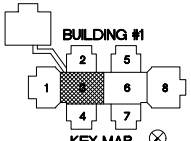
EDH-X ELECTRIC DUCT HEATER
- SUPPLY AIR TEMPERATURE SENSOR
- STAGE HEATING RELAYS
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

SD-X SMOKE DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

COORDINATE ALL NEW TEMP/HUM SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC. ANY EXISTING TEMP/HUM SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

BUILDING #2

BUILDING #1



KEY MAP

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
optima engineering
1327 E Trinity St., Suite 300, Greensboro NC 28403
333 Fayetteville St., Suite 31 | Raleigh NC 27601
PHONE: (336) 854-0309 | WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-0914

SEAL:
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036786 STEVEN R. DALTON
9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
361 DAVID BUTLER HIGH ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - FLOOR PLAN AREA - 3

DWG #:
M303

SHEET NO: 11 OF 23

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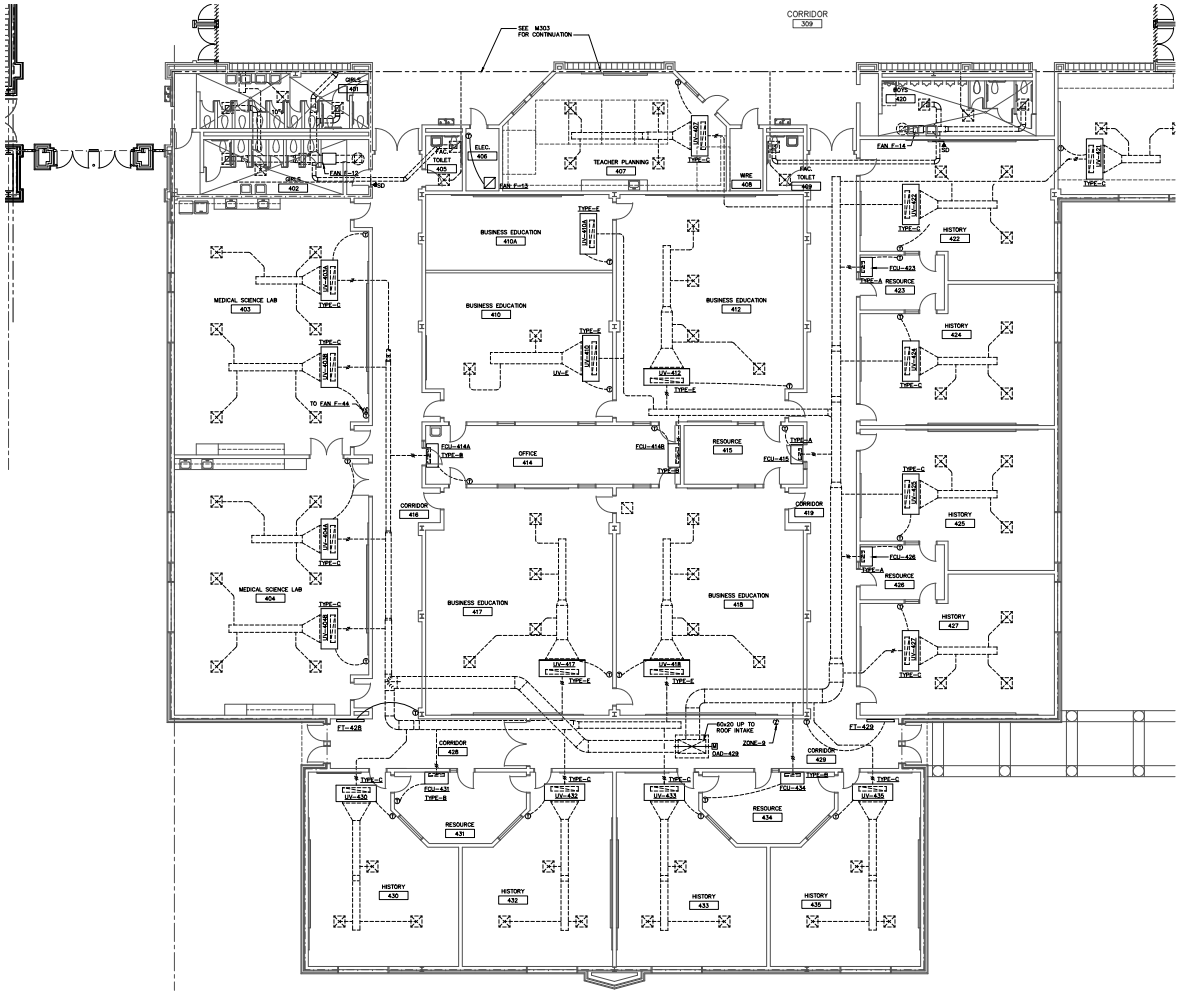


1 MECHANICAL FLOOR PLAN - AREA-4

1/8" = 1'-0"

DEMOLITION NOTES

ALL EXISTING UNIT VENTILATORS (UV), FANS (F) AND AIR HANDLERS (AHU) SHALL HAVE THEIR EXISTING CONTROLS, THERMOSTATS AND MANUAL SPEED SELECTOR WALL SWITCH (IF APPLICABLE) DEMOLISHED ALONG WITH ALL OTHER DDC AND/OR PNEUMATIC CONTROLS EQUIPMENT (HW/CHW ACTUATORS, DAMPER ACTUATORS, CONTROL BOARDS, ETC..). ALL UNIT VENTILATOR, FAN AND AIR HANDLER CONTROLS SHALL BE REPLACED WITH NEW CONTROLS SHOWN UNDER THESE DRAWINGS AS LISTED IN KEYED NOTES (THIS SHEET) ALONG WITH SCHEMATIC. WALL MOUNTED THERMOSTATS, UNIT MOUNTED SUMMER/WINTER SWITCHES SHALL NOT BE REPLACED. ALL EXISTING MANUAL STOP SWITCHES FOR THE AIR HANDLERS SHALL BE DEMOLISHED AND NOT REPLACED. UV SPEED SELECTOR CONTROL SHALL BE INTEGRATED WITH NEW BAS CONTROLS. IN ADDITION ALL AHU AND UV'S SHALL HAVE THEIR EXISTING PIPING KITS DEMOLISHED AND REPLACED INCLUDING, MANUAL ISOLATION VALVES, CIRCUIT SETTERS, GAUGE PORTS. REFER TO DETAIL 11/M105.

KEYED NOTES

TAG: EQUIP TYPE-1 / UV-XX

UV-X UNIT VENTILATOR/FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- HOT WATER VALVE ACTUATOR
- CHILLER WATER VALVE ACTUATOR
- THERMOSTAT
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

F-X FAN
- CT SWITCH
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

DAD-X OUTSIDE AIR DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

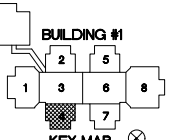
FT-X FIN TUBE RADIATION
- THERMOSTAT
- HOT WATER VALVE ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

SD-X SMOKE DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

COORDINATE ALL NEW TEMP/HUM SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC.
ANY EXISTING TEMP/HUM SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

BUILDING #2

BUILDING #1



KEY MAP

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
optima engineering
1327 E. TRON ST., SUITE 300, CHARLOTTE NC 28203
333 FAYETTEVILLE ST., SUITE 31, RALEIGH NC 27601
PHONE: (704) 332-2123 FAX: (704) 332-2124 WWW.OPTIMAENG.COM
NORTH CAROLINA LICENSE NUMBER C-1914

SEAL:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036786 STEVEN R. DALLY

9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

3611 DAVID BUTLER HIGH SCHOOL
ROAD / NORTH PINEVILLE ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - FLOOR PLAN AREA - 4

DWG #:
M304

SHEET NO: 12 OF 23

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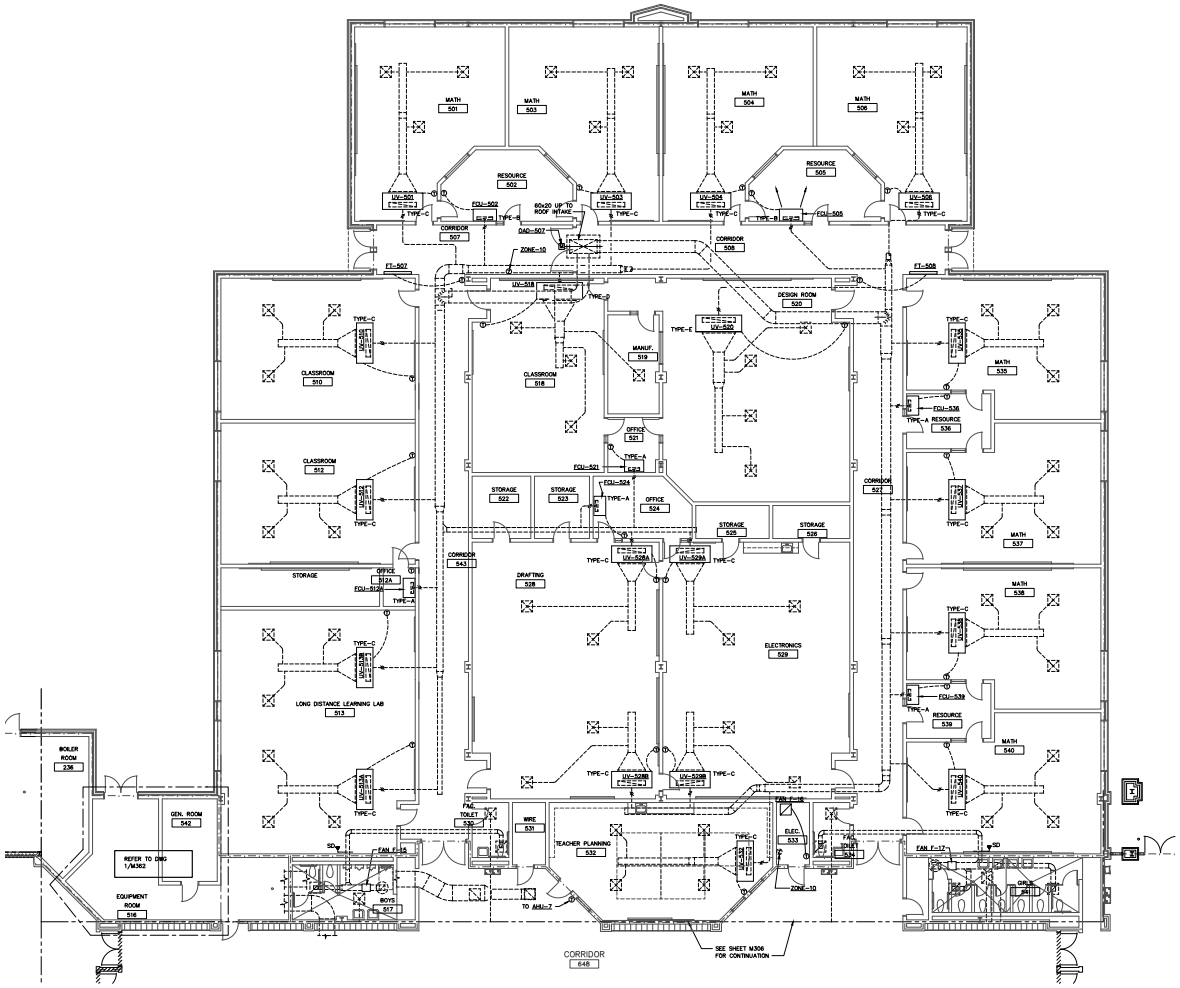


1 MECHANICAL FLOOR PLAN - AREA-5

1/8" = 1'-0"

DEMOLITION NOTES

ALL EXISTING UNIT VENTILATORS (UV), FANS (F) AND AIR HANDLERS (AHU) SHALL HAVE THEIR EXISTING CONTROLS, THERMOSTATS AND MANUAL SPEED SELECTOR WALL SWITCH (IF APPLICABLE) DEMOLISHED ALONG WITH ALL OTHER DDC AND/OR PNEUMATIC CONTROLS EQUIPMENT (VAV/CAV ACTUATORS, DAMPER ACTUATORS, CONTROL BOARDS, ETC.). ALL UNIT VENTILATOR, FAN AND AIR HANDLER CONTROLS SHALL BE REPLACED WITH NEW CONTROLS SHOWN UNDER THESE DRAWINGS AS LISTED IN KEYED NOTES (THIS SHEET) ALONG WITH SCHEMATIC, SEQUENCE AND POINTS LIST DRAWINGS. UV WALL MOUNTED MANUAL SPEED SWITCHES SHALL NOT BE REPLACED. ALL EXISTING PIPING ASSOCIATED WITH UV'S AND AHU'S HANDLERS SHALL BE DEMOLISHED AND NOT REPLACED. UV SPEED SELECTOR CONTROL SHALL BE INTEGRATED WITH NEW BAS CONTROLS. IN ADDITION ALL AHU AND UV'S SHALL HAVE THEIR EXISTING PIPING KITS DEMOLISHED AND REPLACED INCLUDING, MANUAL ISOLATION VALVES, CIRCUIT SETTERS, GAUGE PORTS, REFER TO DETAIL 11/M105.

KEYED NOTES

EQUIP TYPE — TAG (XX-XX)

UV-X UNIT VENTILATOR/FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- HOT WATER VALVE ACTUATOR
- CHILLED WATER VALVE ACTUATOR
- THERMOSTAT
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

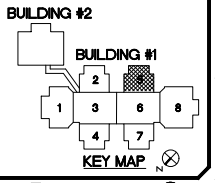
F-X FAN
- CT SWITCH
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

OAD-X OUTSIDE AIR DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

FT-X FIN TUBE RADIATION
- THERMOSTAT
- HOT WATER VALVE ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

SD-X SMOKE DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

COORDINATE ALL NEW TEMP/HUM SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC.
ANY EXISTING TEMP/HUM SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.



KEY MAP

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
optima engineering
1937-B TWIN ST., SUITE 300, CHARLOTTE NC 28203
333 FAYETTEVILLE ST., SUITE 31 | RALEIGH NC 27601
PHONE: (704) 332-2000 | WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-1914

SEAL:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025,246 STEVEN R. DALEY

9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

3611 DAVID BUTLER HIGH SCHOOL
ATTN: DAVID WHITAKER
1500 PLEASANT ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - FLOOR PLAN AREA - 5

DWG #:
M305

SHEET NO: 13 OF 23

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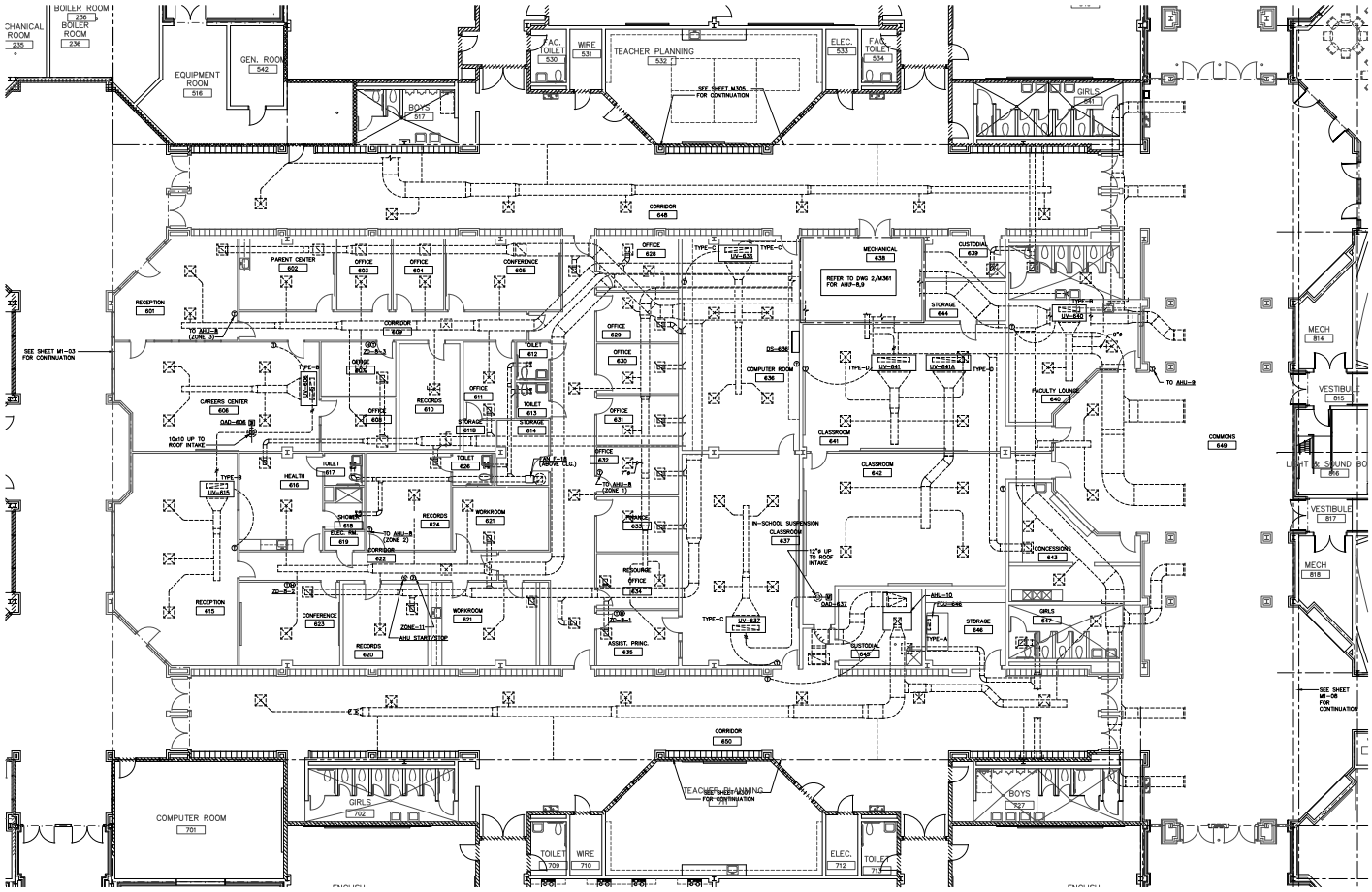


① MECHANICAL FLOOR PLAN - AREA-6
1/8" = 1'-0"

DEMOLITION NOTES

ALL EXISTING UNIT VENTILATORS (UV), FANS (F) AND AIR HANDLERS (AHU) SHALL HAVE THEIR EXISTING CONTROLS, THERMOSTATS AND MANUAL SPEED SELECTOR WALL SWITCH (IF APPLICABLE) DEMOLISHED ALONG WITH ALL OTHER DDC AND/OR PNEUMATIC CONTROLS EQUIPMENT (VAV/CAV ACTUATORS, DAMPER ACTUATORS, CONTROL BOARDS, ETC.). ALL UNIT VENTILATOR, FAN AND AIR HANDLER CONTROLS SHALL BE REPLACED WITH NEW DDC CONTROLS AS SHOWN ON THESE DRAWINGS AS LISTED IN KEYED NOTES (THIS SHEET) ALONG WITH SCHEMATIC, SEQUENCE AND POINTS LIST DRAWINGS. UV WALL MOUNTED MANUAL SPEED SWITCHES SHALL NOT BE REPLACED. ALL EXISTING MANUAL STOP SWITCHES FOR THE AIR HANDLERS SHALL BE DEMOLISHED AND NOT REPLACED. UV SPEED SELECTOR CONTROL SHALL BE INTEGRATED WITH NEW BAS CONTROLS. IN ADDITION ALL AHU AND UV'S SHALL HAVE THEIR EXISTING PIPING NOT DEMOLISHED BE REPLACED INCLUDING MANUAL ISOLATION VALVES, CIRCUIT SETTERS, GAUGE PORTS, REFER TO DETAIL 11/M105.

KEYED NOTES

TAG — EQUIP TYPE — (XX-XX)

UV-X UNIT VENTILATOR/FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- HOT WATER VALVE ACTUATOR
- CHILLER WATER VALVE ACTUATOR
- THERMOSTAT
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

F-X FAN
- CT SWITCH
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

OAD-X OUTSIDE AIR DAMPER
- OUTSIDE AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

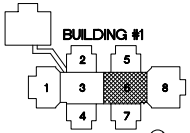
AHU-X AIR HANDLING UNIT (REFER TO DWG 4/M105 FOR ADDITIONAL REQUIRED DEVICES)
- SUPPLY AIR TEMPERATURE SENSOR
- MIXED AIR TEMPERATURE SENSOR
- THERMOSTAT
- HOT WATER VALVE ACTUATOR
- CHILLED WATER VALVE ACTUATOR
- OUTSIDE AIR DAMPER ACTUATOR
- RETURN AIR DAMPER ACTUATOR
- FREEZE STAT
- FILTER DIFFERENTIAL PRESSURE SENSOR
- SPACE HUMIDSTAT (AHU-8)
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

DS-X DUCTLESS SPLIT SYSTEM
- SPACE TEMPERATURE SENSOR

COORDINATE ALL NEW TEMP/H.M SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC.
ANY EXISTING TEMP/H.M SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

BUILDING #2

BUILDING #1



KEY MAP

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
optima engineering
1927-E Tryon St., Suite 300, Charlotte NC 28203
333 Fayetteville St., Suite 31, Raleigh NC 27601
Phone: (704) 333-3333 Fax: (704) 333-3334 www.optimaeng.com
NORTH CAROLINA LICENSE NUMBER C-1914

SEAL:
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030706 STEVEN R. DALLAS
9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

3611 DAVID BUTLER HIGH SCHOOL
DAVID BUTLER HIGH SCHOOL ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - FLOOR PLAN AREA - 6

DWG #:
M306

SHEET NO: 14 OF 23

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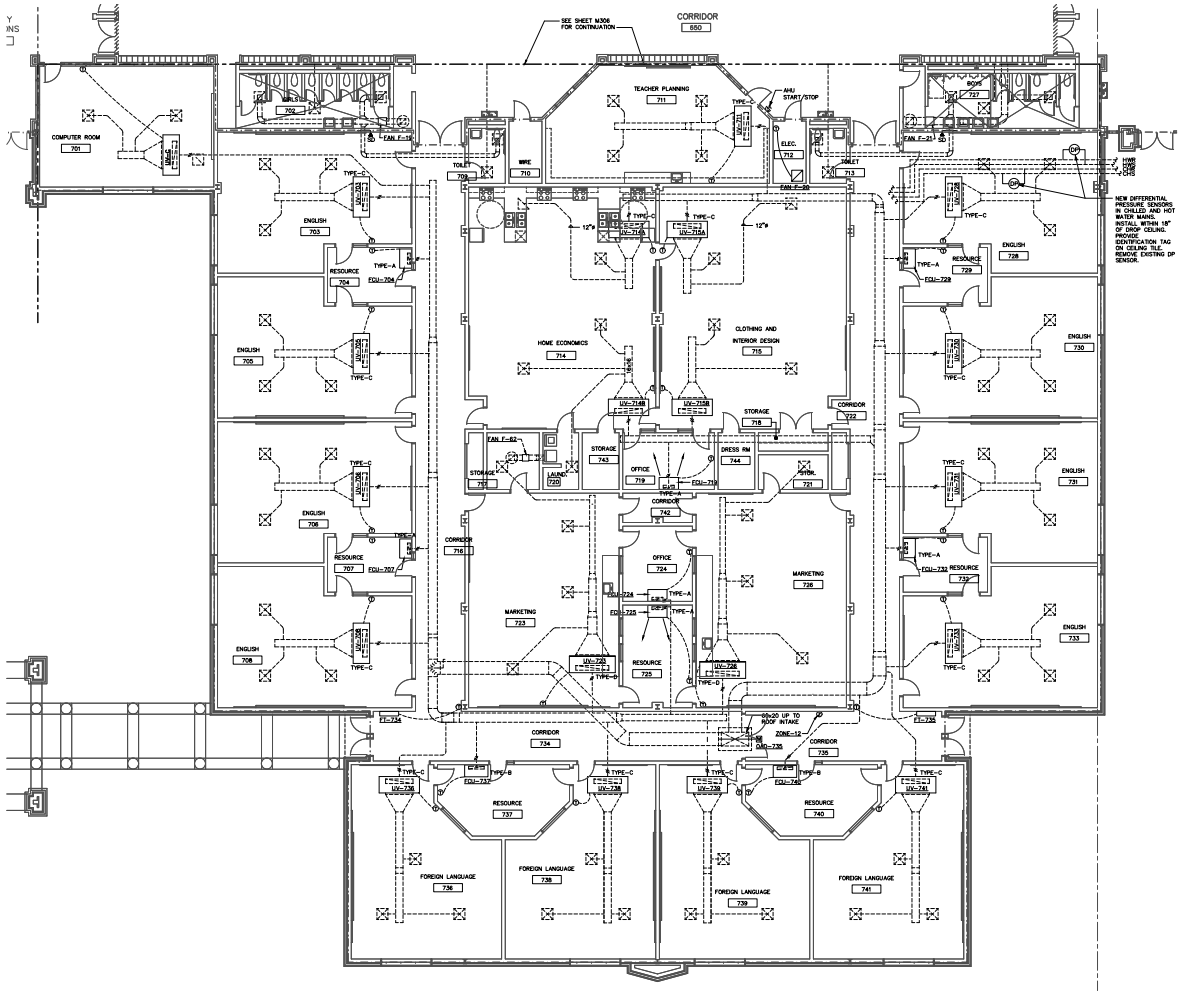

① MECHANICAL FLOOR PLAN - AREA-7
1/8" = 1'-0"

DEMOLITION NOTES

ALL EXISTING UNIT VENTILATORS (UV), FANS (F) AND AIR HANDLERS (AHU) SHALL HAVE THEIR EXISTING CONTROLS, THERMOSTATS AND MANUAL SPEED SELECTOR WALL SWITCH (IF APPLICABLE) DEMOLISHED ALONG WITH ALL OTHER DDC AND/OR PNEUMATIC CONTROLS EQUIPMENT (VHV/CHW ACTUATORS, DAMPER ACTUATORS, CONTROL BOARDS, ETC.). ALL UNIT VENTILATOR, FAN AND AIR HANDLER CONTROLS SHALL BE REPLACED WITH NEW CONTROLS SHOWN UNDER THESE DRAWINGS AS LISTED IN KEYED NOTES (THIS SHEET) ALONG WITH SCHEMATIC, SEQUENCE AND POINTS LIST DRAWINGS. UV WALL MOUNTED MANUAL SPEED SWITCHES SHALL BE REPLACED WITH NEW WALL MOUNTED MANUAL STOP SWITCHES FOR THE AIR HANDLERS SHALL BE DEMOLISHED AND NOT REPLACED. UV SPEED SELECTOR CONTROL SHALL BE INTEGRATED WITH NEW BAS CONTROLS. IN ADDITION ALL AHU AND UV'S SHALL HAVE THEIR EXISTING PIPING KITS DEMOLISHED AND REPLACED INCLUDING, MANUAL ISOLATION VALVES, CIRCUIT SETTERS, GAUGE PORTS, REFER TO DETAIL 11/M105.

KEYED NOTES

TAG
EQUIP TYPE—1
XX—XX

UV-X UNIT VENTILATOR/FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- HOT WATER VALVE ACTUATOR
- CHILLED WATER VALVE ACTUATOR
- THERMOSTAT
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

F-X FAN
- CT SWITCH
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

OAD-X OUTSIDE AIR DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

FT-X FIN TUBE RADIATION
- THERMOSTAT
- HOT WATER VALVE ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

SD-X SMOKE DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

COORDINATE ALL NEW TEMP/HUM/CO2 SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC. ANY EXISTING TEMP/HUM/CO2 SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

BUILDING #2
BUILDING #1
1 2 3 4 5 6 8
KEY MAP

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
1327-B TRYON ST., SUITE 300, CHARLOTTE NC 28203
333 FAYETTEVILLE ST., SUITE 3 | RALEIGH NC 27601
PHONE: (704) 333-3333 | WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-1914

SEAL:
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036796 STEVEN R. DALTON
9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
361 DAVID BUTLER HIGH ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - FLOOR PLAN AREA - 7

DWG #:
M307

SHEET NO: 15 OF 23

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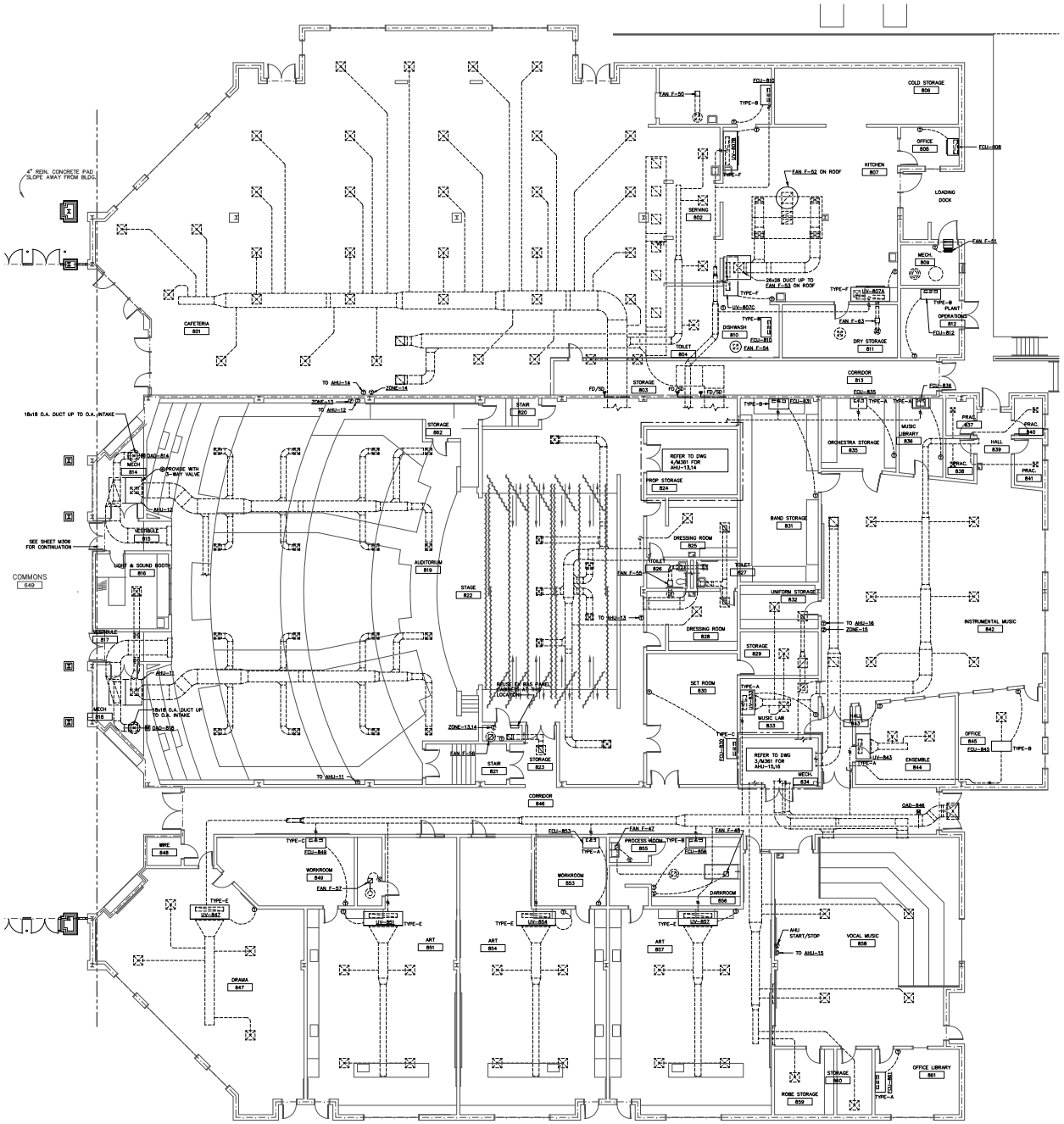

1 MECHANICAL FLOOR PLAN - AREA-B
1/8" = 1'-0"

DEMOLITION NOTES

ALL EXISTING UNIT VENTILATORS (UV), FANS (F) AND AIR HANDLERS (AHU) SHALL HAVE THEIR EXISTING CONTROLS, THERMOSTATS AND MANUAL SPEED SELECTOR WALL SWITCH (IF APPLICABLE) DEMOLISHED ALONG WITH ALL OTHER DDC AND/OR PNEUMATIC CONTROLS EQUIPMENT (VAV/CAV ACTUATORS, DAMPER ACTUATORS, CONTROL BOARDS, ETC.). ALL UNIT VENTILATOR, FAN AND AIR HANDLER CONTROLS SHALL BE REPLACED WITH NEW BAS CONTROLS AS DETAILED ON THESE DRAWINGS AS LISTED IN KEYED NOTES (THIS SHEET) ALONG WITH SCHEMATIC, SEQUENCE AND POINTS LIST DRAWINGS. UV WALL MOUNTED MANUAL SPEED SWITCHES SHALL NOT BE REPLACED. ALL EXISTING MANUAL STOP SWITCHES FOR THE AIR HANDLERS SHALL BE DEMOLISHED AND NOT REPLACED. UV SPEED SELECTOR CONTROL SHALL BE INTEGRATED WITH NEW BAS CONTROLS. IN ADDITION ALL AHU AND UV'S SHALL HAVE REPLACEMENT REPAIR KITS AND INSTALLED REPAIR PARTS, MANUAL ISOLATION VALVES, CIRCUIT SETTERS, GAUGE PORTS. REFER TO DETAIL 11/M105.

KEYED NOTES

TAG
EQUIP TYPE
UV-X

UV-X UNIT VENTILATOR/FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- HOT WATER VALVE ACTUATOR
- CHILLER WATER VALVE ACTUATOR
- THERMOSTAT
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

F-X FAN
- CT SWITCH
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

OAD-X OUTSIDE AIR DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

AHU-X AIR HANDLING UNIT (REFER TO DWG 4/M105 FOR ADDITIONAL REQUIRED DEVICES
- SUPPLY AIR TEMPERATURE SENSOR
- MIXED AIR TEMPERATURE SENSOR
- HUMIDISTAT
- HOT WATER VALVE ACTUATOR
- CHILLER WATER VALVE ACTUATOR
- OUTSIDE AIR DAMPER ACTUATOR
- RETURN AIR DAMPER ACTUATOR
- FREEZE STAT
- FILTER DIFFERENTIAL PRESSURE SENSOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

SD-X SMOKE DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

FT-X FIN TUBE RADIATION
- THERMOSTAT
- HOT WATER VALVE ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES

COORDINATE ALL NEW TEMP./HUM SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC. ANY EXISTING TEMP/HUM SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

BUILDING #2
BUILDING #1
1 2 3 4 5 6 7
KEY MAP

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
1937 E TRON ST., SUITE 300, CHARLOTTE NC 28203
333 FAYETTEVILLE ST., SUITE 31, RALEIGH NC 27601
PHONE: (704) 332-1181 WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-1914

SEAL:
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22196 STEVEN R. DALLAS
9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

3611 DAVID BUTLER HIGH SCHOOL
ATTN: MR. MATT STEWART
1001 MATTHEWS MINT HILL ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - FLOOR PLAN AREA - B

DWG #:
M308

SHEET NO: 16 OF 23

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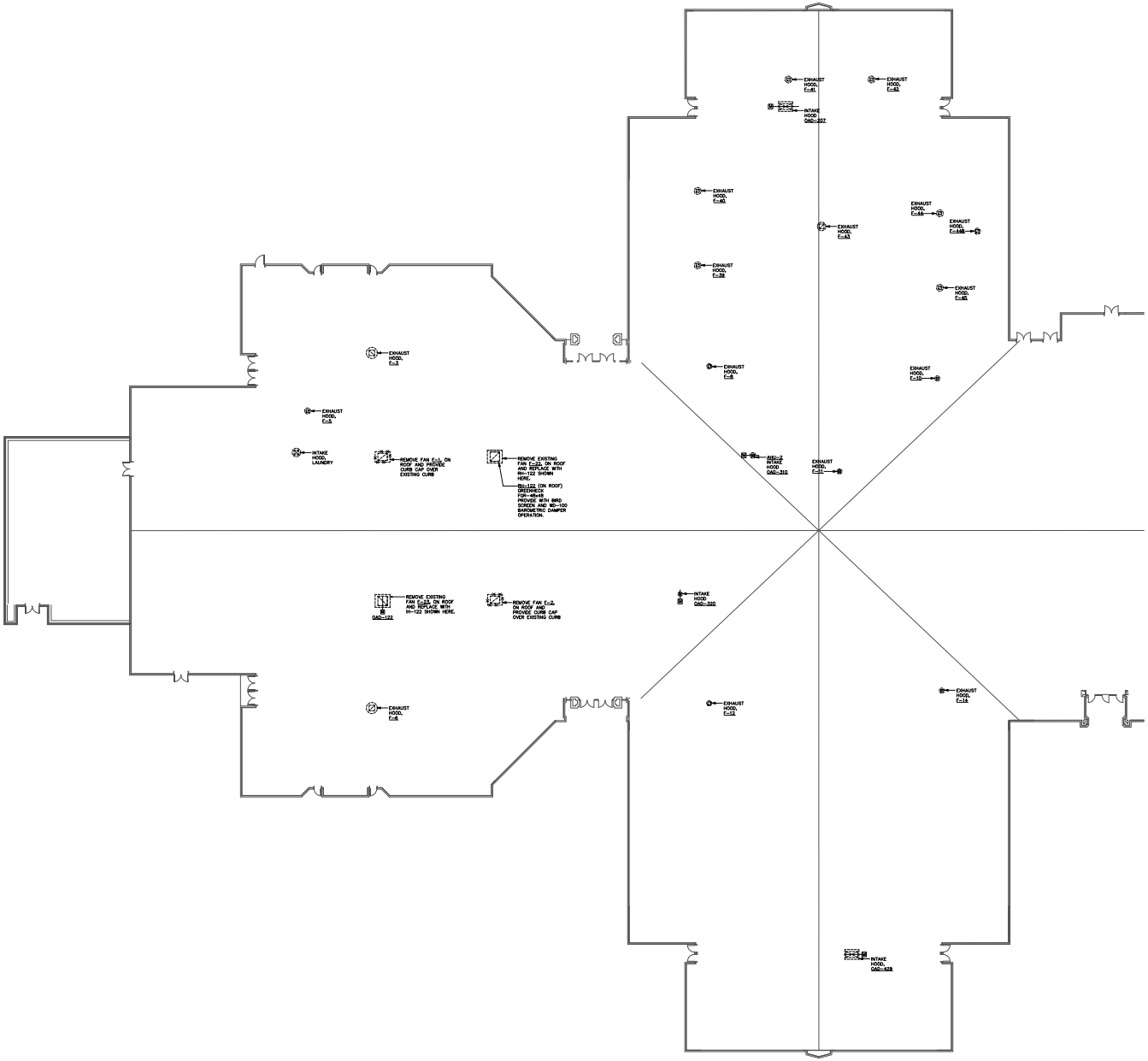
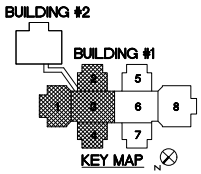


1 MECHANICAL PARTIAL ROOF PLAN
1/8" = 1'-0"



MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
optima engineering
1327 E Trade St., Suite 300, Charlotte NC 28202
333 Fayetteville St., Suite 31, Raleigh NC 27601
Phone: (704) 332-3125 Fax: (704) 332-3126 www.optimaeng.com
NORTH CAROLINA LICENSE NUMBER C-0914

SEAL:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22296 STEVEN R. DALLAS
9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
361 DAVID BUTLER HIGH ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - PARTIAL ROOF PLAN BUILDING #1

DWG #:
M309

SHEET NO: 17 OF 23

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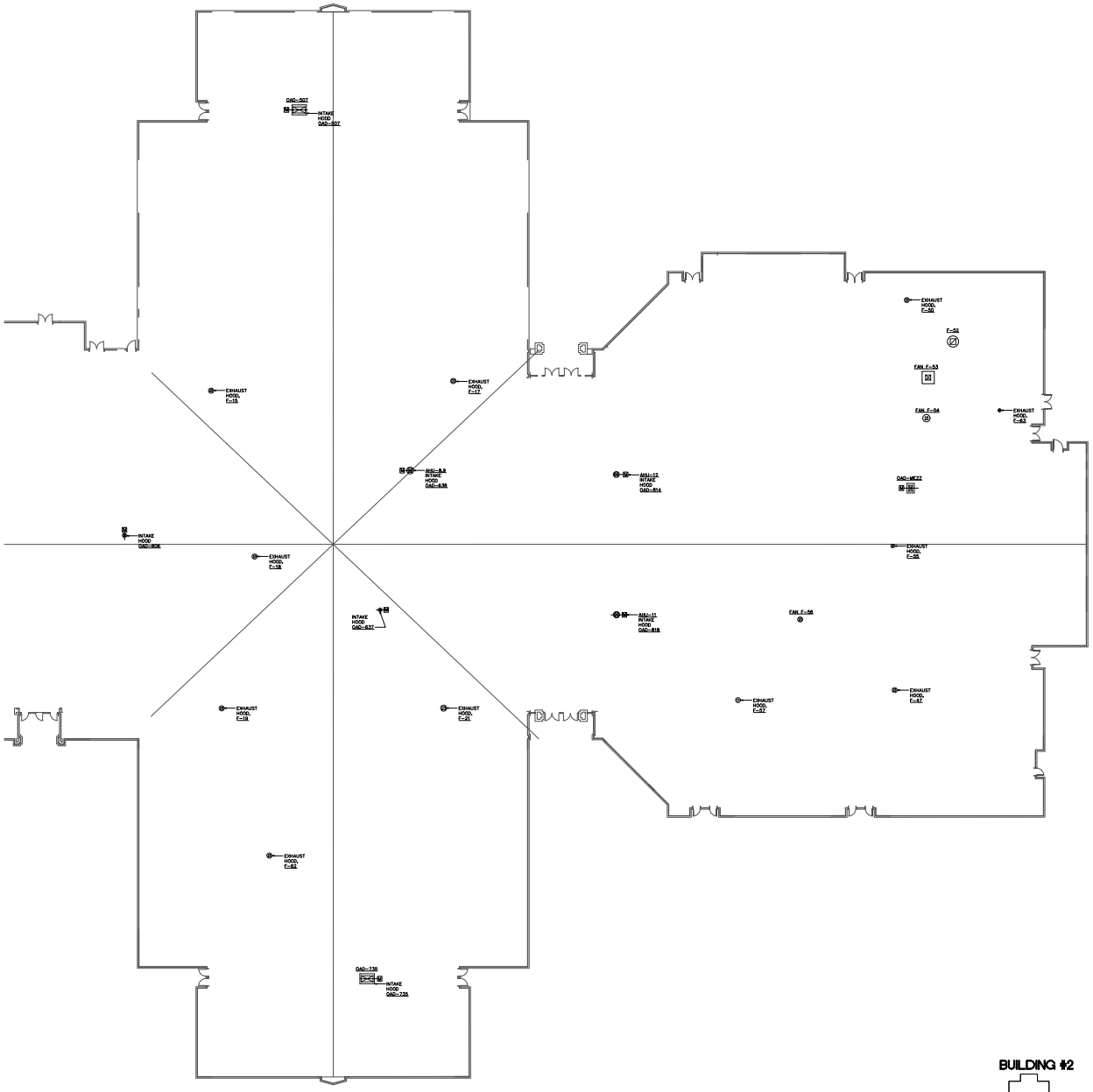
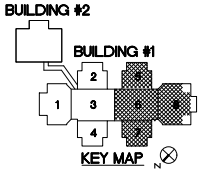


1 MECHANICAL PARTIAL ROOF PLAN
1/16" = 1'-0"



KEY MAP

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
1227 E Trade St., Suite 300, Charlotte NC 28205
333 Fayetteville St., Suite 31 | Raleigh NC 27601
Phone: (704) 332-3125 | Fax: (704) 332-3126 | www.optimaengineering.com
NORTH CAROLINA LICENSE NUMBER C-0914

SEAL:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045786 STEVEN R. DALLAS
9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
361 DAVID BUTLER HIGH ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - PARTIAL ROOF PLAN BUILDING #1

DWG #:
M310

SHEET NO: 18 OF 23

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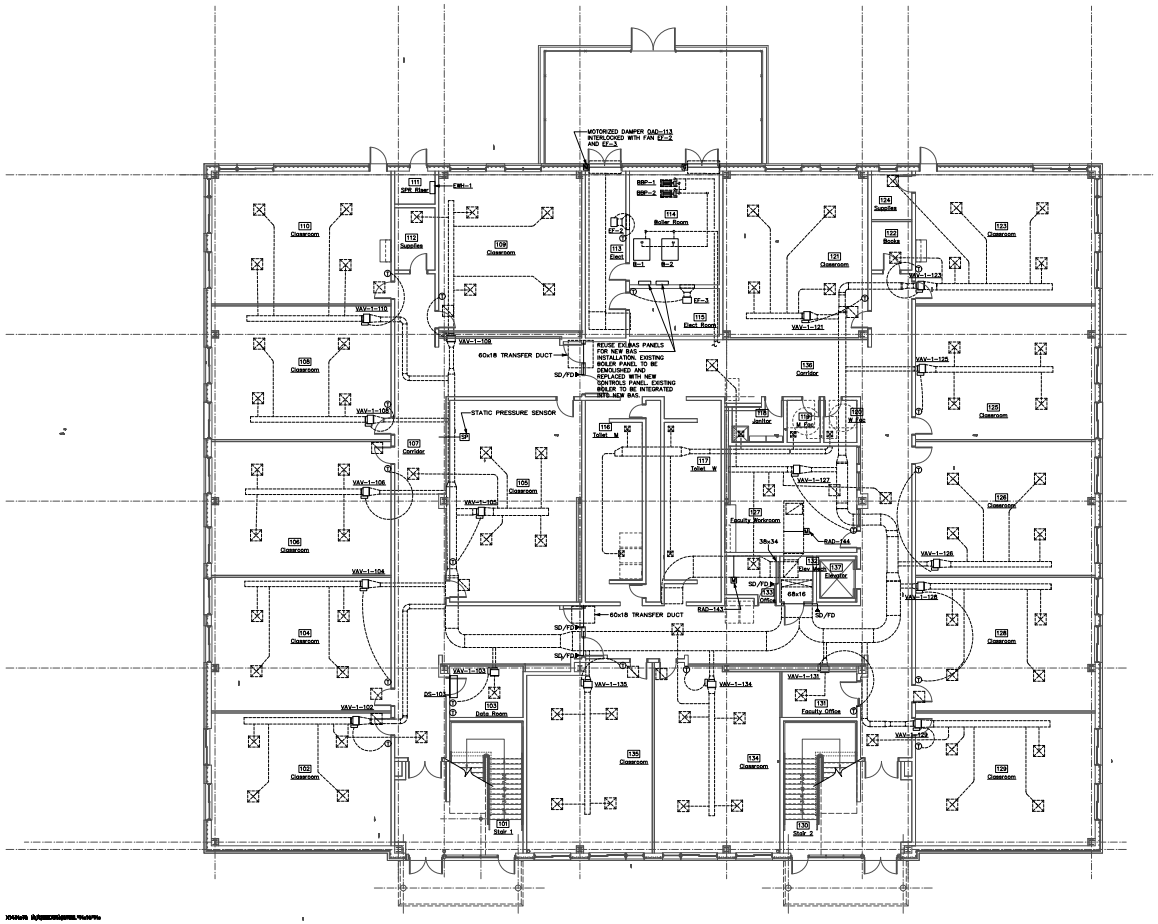


1 MECHANICAL FLOOR PLAN - LEVEL - 1
1/8" = 1'-0"

DEMOLITION NOTES

ALL EXISTING VARIABLE VOLUME BOXES (VAV), FANS (EF, EEF), PUMPS, BOILERS, DAMPERS, ELECTRIC HEATERS, ETC. SHALL HAVE THEIR EXISTING CONTROLS, THERMOSTATS DEMOLISHED ALONG WITH ALL OTHER DDC EQUIPMENT (VAV/AHU/FCU MOTORS, CONTROL VALVES, ETC.). ALL VAV, AHU AND ROOFTOP UNIT CONTROLS SHALL BE REPLACED WITH NEW CONTROLS SHOWN UNDER THESE DRAWINGS AS LISTED IN KEYED NOTES (THIS SHEET) ALONG WITH SCHEMATIC, SEQUENCE AND POINTS LIST DRAWINGS. ALL EXISTING MANUAL STOP SWITCHES FOR THE ROOFTOP UNITS SHALL BE DEMOLISHED AND NOT REPLACED.

KEYED NOTES

TAG
EQUIP TYPE
XX-XX

EF-X FAN
- CT SWITCH
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

EEF-X FAN
- CT SWITCH
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

RAD-X OUTSIDE AIR DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

OAD-X OUTSIDE AIR DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

EH-X ELECTRIC HEATER
- THERMOSTAT
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

P-X PUMPS
- CT SWITCH
- START/STOP RELAY
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

B-1 BOILERS
- START/STOP RELAY
- HOT WATER SUPPLY TEMPERATURE SENSOR
- HOT WATER RETURN TEMPERATURE SENSOR
- HOT WATER SYSTEM SUPPLY TEMPERATURE SENSOR
- HOT WATER BYPASS VALVE ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

SD-X SMOKE DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

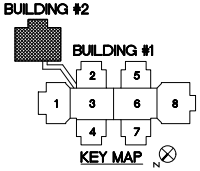
DS-X DUCTLESS SPLIT SYSTEM
- SPACE TEMPERATURE SENSOR

VAV-X VARIABLE VOLUME BOX
- SUPPLY AIR TEMPERATURE SENSOR
- THERMOSTAT
- HOT WATER VALVE ACTUATOR
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

COORDINATE ALL NEW TEMP/HUM/CO2 SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC. ANY EXISTING TEMP/HUM/CO2 SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

BUILDING #2

BUILDING #1



KEY MAP

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
1327 E. TRON ST., SUITE 300, CHARLOTTE NC 28203
333 FAYETTEVILLE ST., SUITE 31, RALEIGH NC 27601
PHONE: (704) 332-3200 FAX: (704) 332-3201 WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-1914

SEAL:

9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
361 DAVID BUTLER HIGH ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - FLOOR PLAN BUILDING #2 LEVEL 1

DWG #:
M311

SHEET NO: 19 OF 23

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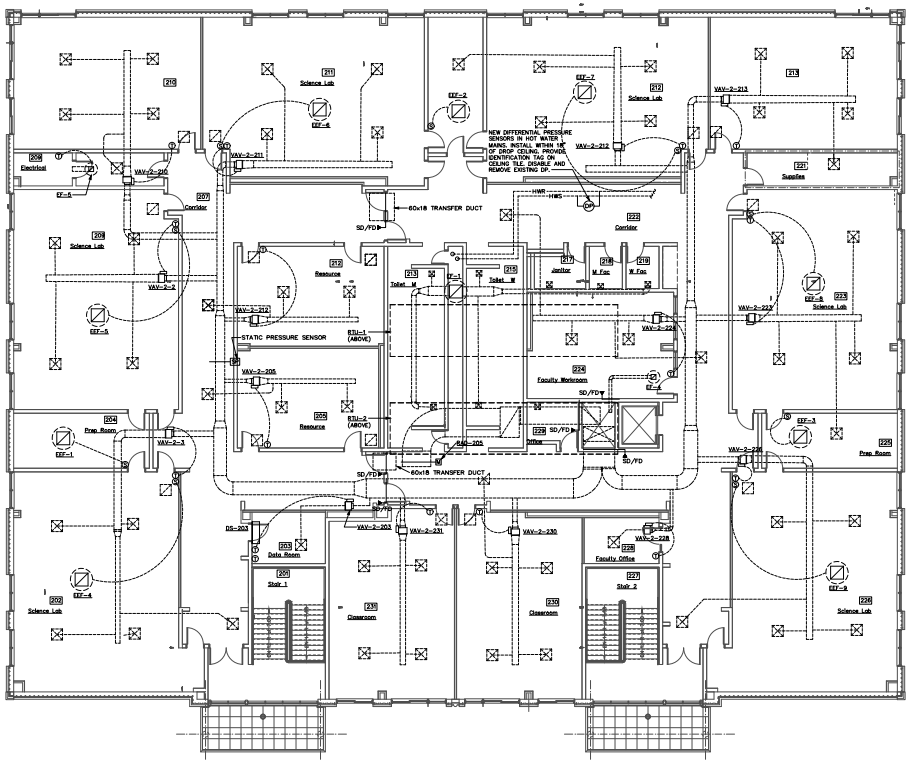


1 MECHANICAL FLOOR PLAN - LEVEL - 2

1/8" = 1'-0"

DEMOLITION NOTES

ALL EXISTING VARIABLE VOLUME BOXES (VAV), FANS (EF, EEF), DAMPERS, ETC. SHALL HAVE THEIR EXISTING CONTROLS, THERMOSTATS DEMOLISHED ALONG WITH ALL OTHER DDC EQUIPMENT (HW/CHW ACTUATORS, CONTROL BOARDS, ETC.). ALL NEW BOX CONTROLS SHALL BE PROVIDED WITH NEW DDC CONTROLS. PLEASE REFER THESE DRAWINGS AS LISTED IN KEYED NOTES ("M#S SHEET") ALONG WITH SCHEMATIC, SEQUENCE AND POINTS LIST DRAWINGS. ALL EXISTING MANUAL STOP SWITCHES FOR THE ROOFTOP UNITS SHALL BE DEMOLISHED AND NOT REPLACED.

KEYED NOTES

TAG: EQUIP TYPE - XX-XX

VAV-X VARIABLE VOLUME BOX
- SUPPLY AIR TEMPERATURE SENSOR
- THERMOSTAT
- HOT WATER VALVE ACTUATOR
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

DS-X DUCTLESS SPLIT SYSTEM
- SPACE TEMPERATURE SENSOR

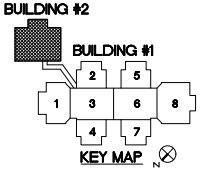
SD-X SMOKE DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

RAD-X OUTSIDE AIR DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

COORDINATE ALL NEW TEMP/H.W./CO2 SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC. ANY EXISTING TEMP/H.W./CO2 SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

BUILDING #2

BUILDING #1



KEY MAP

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN

optima engineering

1527 E. TWIGG ST., SUITE 300, CHARLOTTE NC 28203
333 FAYETTEVILLE ST., SUITE 31 | RALEIGH NC 27601
PHONE: (704) 332-3300 | WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-1914

SEAL:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 027196 STEVEN R. DALLAS

9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
361 DAVID BUTLER ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - FLOOR PLAN BUILDING #2 LEVEL 2

DWG #:
M312

SHEET NO: 20 OF 23

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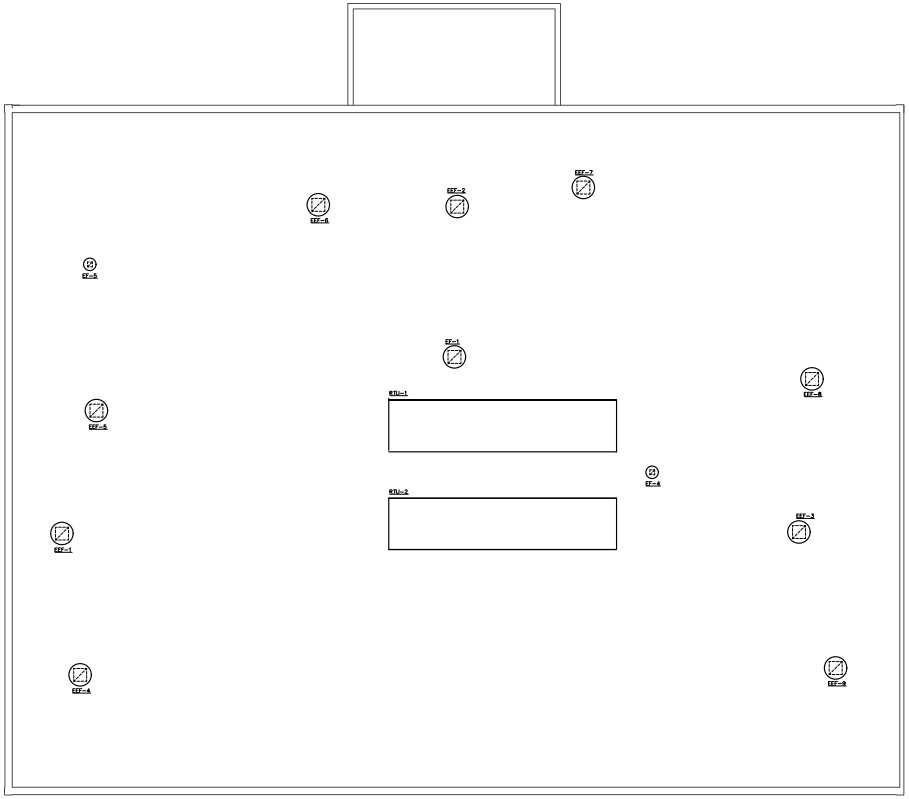


1 MECHANICAL ROOF PLAN
1/8" = 1'-0"

DEMOLITION NOTES

ALL EXISTING FANS (EF, EEF) AND ROOFTOP UNITS (RTU) SHALL HAVE THEIR EXISTING CONTROLS, THERMOSTATS DEMOLISHED ALONG WITH ALL OTHER DDC EQUIPMENT (HW/CHW ACTUATORS, CONTROL BOARDS, ETC.). ALL VAV BOX AND ROOFTOP UNIT CONTROLS SHALL BE REPLACED WITH NEW CONTROLS SHOWN UNDER THESE DRAWINGS AS LISTED IN KEYED NOTES.
(THIS SHEET) ALONG WITH SCHEMATIC, (SHEET M601) AND POINTS LIST DRAWINGS. ALL EXISTING MANUAL STOP SERVICES FOR THE ROOFTOP UNITS SHALL BE DEMOLISHED AND NOT REPLACED.

KEYED NOTES

EQUIP TYPE
XX-XX

EF-X FAN
- CT SWITCH
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

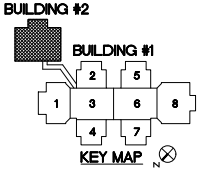
EEF-X FAN
- CT SWITCH
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

RTU-X ROOFTOP UNIT
- REFER TO RTU FLOW DIAGRAM SCHEMATIC 3/M106 FOR REQUIRED BAS SENSORS, ACTUATORS, DAMPERS, ETC.**
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

COORDINATE ALL NEW TEMP/HUM/CO2 SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC.
ANY EXISTING TEMP/HUM/CO2 SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

BUILDING #2

BUILDING #1



KEY MAP

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • LIGHTING DESIGN
1327 E. TRON ST., SUITE 300, CHARLOTTE NC 28203
333 FAYETTEVILLE ST., SUITE 31, RALEIGH NC 27601
PHONE: (704) 333-3120 FAX: (704) 333-3121 WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-1914

SEAL:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22196 STEVEN R. DALLAS

9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
361 DAVID BUTLER HIGH ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - ROOF PLAN - BUILDING #2

DWG #:
M313

SHEET NO: 21 OF 23

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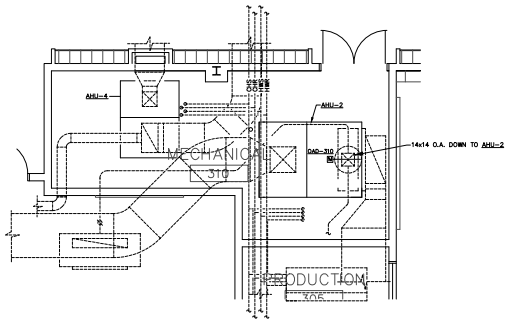
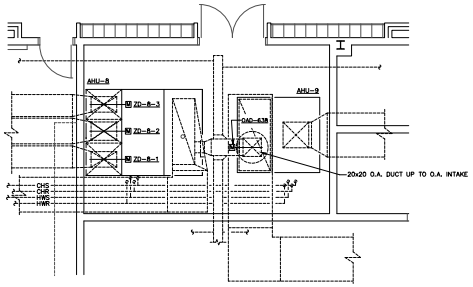
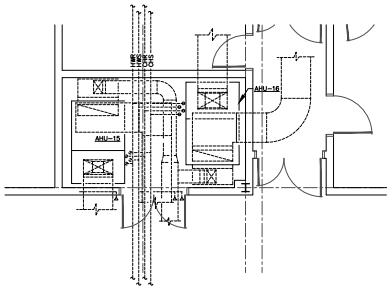


1 ENLARGED PLAN - MECHANICAL ROOM 310
1/4" = 1'-0"



2 ENLARGED PLAN - MECHANICAL ROOM 638
1/4" = 1'-0"



3 ENLARGED PLAN - MECHANICAL ROOM 834
1/4" = 1'-0"

KEYED NOTES

TAG
EQUIP TYPE
XX-XX

UV-X UNIT VENTILATOR/FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- HOT WATER VALVE ACTUATOR
- CHILLER WATER VALVE ACTUATOR
- THERMOSTAT
- FAN SPEED SWITCH
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

F-X FAN
- CT SWITCH
- THERMOSTAT
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

OAD-X OUTSIDE AIR DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

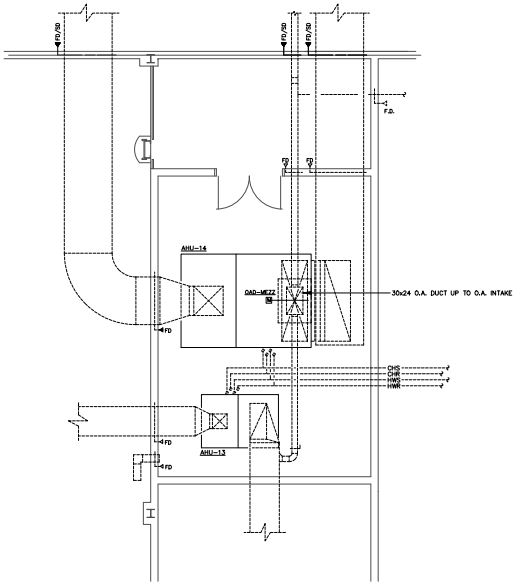
AHU-X AIR HANDLING UNIT (REFER TO DWG 4/M105 FOR ADDITIONAL REQUIRED DEVICES)
- SUPPLY AIR TEMPERATURE SENSOR
- MIXED AIR TEMPERATURE SENSOR
- THERMOSTAT
- HOT WATER VALVE ACTUATOR
- CHILLER WATER VALVE ACTUATOR
- OUTSIDE AIR DAMPER ACTUATOR
- RETURN AIR DAMPER ACTUATOR
- FREEZE STAT
- MULTI-DIFFERENTIAL PRESSURE SENSOR
- MULTI-STAGE DUCT DAMPER ACTUATORS IF APPLICABLE
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

SD-X SMOKE DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

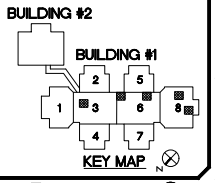
COORDINATE ALL NEW TEMP/H&M SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC.
ANY EXISTING TEMP/H&M/CO2 SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

DEMOLITION NOTES

ALL EXISTING UNIT VENTILATORS (UV), FANS (F) AND AIR HANDLERS (AHU) SHALL HAVE THEIR EXISTING CONTROLS, THERMOSTATS AND MANUAL SPEED SELECTOR WALL SWITCH (IF APPLICABLE) DEMOLISHED ALONG WITH ALL OTHER DDC AND/OR PNEUMATIC CONTROLS EQUIPMENT (VM/CHW ACTUATORS, DAMPER ACTUATORS, CONTROL BOARDS, ETC.). ALL UNIT VENTILATOR, FAN AND AIR HANDLER CONTROLS SHALL BE REPLACED WITH NEW CONTROLS SHOWN UNDER THESE DRAWINGS AS LISTED IN KEYED NOTES (THIS SHEET) ALONG WITH SCHEMATIC, SEQUENCE AND POINTS LIST DRAWINGS. UV WALL MOUNTED MANUAL SPEED SWITCHES SHALL NOT BE REPLACED. ALL EXISTING CHW/HW PIPING ASSOCIATED WITH AIR HANDLERS SHALL BE DEMOLISHED AND NOT REPLACED. UV SPEED SELECTOR CONTROL SHALL BE INTEGRATED WITH NEW BAS CONTROLS. IN ADDITION ALL AHU AND FCU/UV'S SHALL HAVE THEIR EXISTING PIPING KITS DEMOLISHED AND REPLACED INCLUDING, MANUAL ISOLATION VALVES, CIRCUIT SETTERS, GAUGE PORTS, REFER TO DETAIL 5/M107.



4 ENLARGED MEZZANINE PLAN - MECHANICAL
1/4" = 1'-0"



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SEAL:
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9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
361 DAVID BUTLER HIGH ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL ROOM FLOOR PLANS

DWG #:
M361

SHEET NO: 22 OF 23

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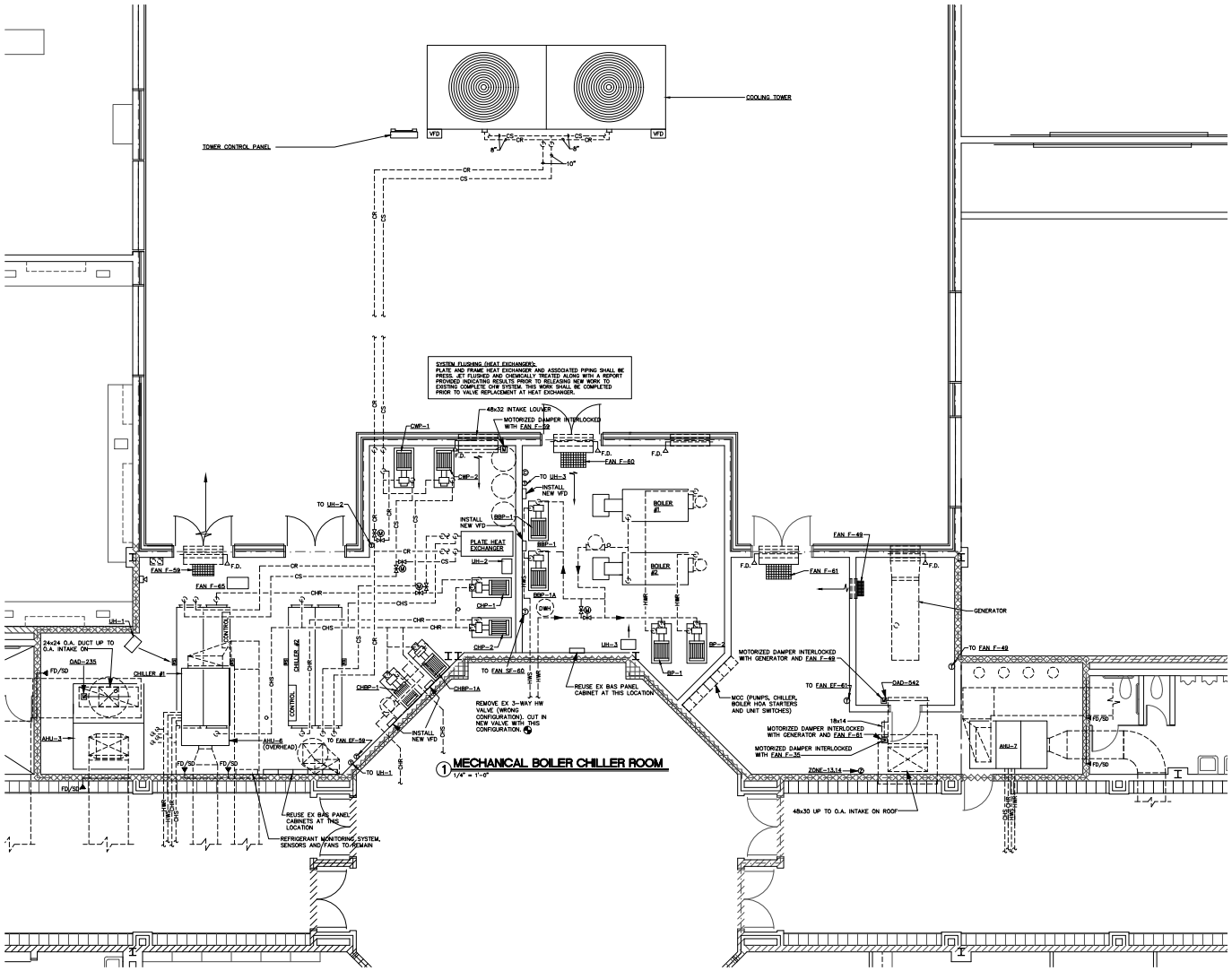


1 MECHANICAL BOILER CHILLER ROOM
1/4" = 1'-0"

DEMOLITION NOTES

ALL EXISTING FANS, PUMPS, BOILERS, CHILLERS, COOLING TOWERS, DAMPERS, ELECTRIC HEATERS, AHU'S, ETC. SHALL HAVE THEIR EXISTING CONTROLS, THERMOSTATS, ETC DEMOLISHED ALONG WITH ALL OTHER DDC/PNEUMATIC EQUIPMENT (VAV/SHV ACTUATORS, CONTROL BOARDS, ETC.). ALL UNIT VENTILATOR, FAN AND AIR HANDLER CONTROLS SHALL BE REPLACED WITH NEW CONTROLS SHOWN UNDER THESE DRAWINGS AS LISTED IN KEYED NOTES.
DEMOLISH ALL PER WITH SCHEMATIC, DEMOLITION AND DOWN LIST DRAWINGS. UV WALL MOUNTED MANUAL SPEED SWITCHES SHALL NOT BE REPLACED. ALL EXISTING MANUAL STOP SWITCHES FOR THE AIR HANDLERS SHALL BE DEMOLISHED AND NOT REPLACED. UV SPEED SELECTOR CONTROL SHALL BE INTEGRATED WITH NEW BAS CONTROLS. IN ADDITION ALL AHU AND FCU/S/F/S SHALL HAVE THEIR EXISTING PIPING KITS DEMOLISHED AND REPLACED INCLUDING, MANUAL ISOLATION VALVES, CIRCUIT SETTERS, GAUGE PORTS, REFER TO DETAIL 5/M07.

KEYED NOTES

TAG: EQUIP TYPE - 22-XX

P-X PUMPS
- CT SWITCH
- START/STOP RELAY
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

F-X FAN
- CT SWITCH
- THERMOSTAT
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

OAD-X OUTSIDE AIR DAMPER
- AIR DAMPER ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

AHU-X AIR HANDLING UNIT
- SUPPLY AIR TEMPERATURE SENSOR
- MIXED AIR TEMPERATURE SENSOR
- THERMOSTAT
- HOT WATER VALVE ACTUATOR
- CHILLER WATER VALVE ACTUATOR
- OUTSIDE AIR DAMPER ACTUATOR
- RETURN AIR DAMPER ACTUATOR
- FREEZE STAT
- FILTER DIFFERENTIAL PRESSURE SENSOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

CH-X CHILLER
- START/STOP RELAY
- CHILLED WATER SUPPLY TEMPERATURE SENSOR
- CHILLED WATER RETURN TEMPERATURE SENSOR
- CHILLED WATER SUPPLY PRESSURE SENSOR
- CHILLED WATER BYPASS VALVE ACTUATOR
- CONDENSER FLOW CONTROL VALVE ACTUATOR
- REFRIGERANT MONITORING PANEL STATUS
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

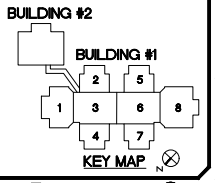
CT-X COOLING TOWER
- START/STOP RELAY
- CONDENSER WATER SUPPLY TEMPERATURE SENSOR
- CONDENSER WATER RETURN TEMPERATURE SENSOR
- COOLING TOWER BYPASS VALVE ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

HEX-X HEAT EXCHANGER
- CT LEAVING WATER TEMPERATURE SENSOR
- CHW LEAVING TEMPERATURE SENSOR
- CT ENTERING WATER TEMPERATURE SENSOR
- CHW ENTERING TEMPERATURE SENSOR

UH-X UNIT HEATER
- THERMOSTAT

B-1 BOILERS
- START/STOP RELAY
- HOT WATER SUPPLY TEMPERATURE SENSOR
- HOT WATER RETURN TEMPERATURE SENSOR
- HOT WATER SYSTEM SUPPLY TEMPERATURE SENSOR
- HOT WATER BYPASS VALVE ACTUATOR
- INTEGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES (230993)

COORDINATE ALL NEW TEMP/HUM/CO2 SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC. ANY EXISTING TEMP/HUM/CO2 SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.



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NORTH CAROLINA LICENSE NUMBER C-1914

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9-29-22

BUTLER HIGH SCHOOL
HVAC CONTROLS UPGRADE

361 DAVID BUTLER HIGH SCHOOL
361 DAVID BUTLER ROAD
MATTHEWS, NC 28105

REV #	DATE	DESCRIPTION

DATE:	09-29-2022
PROJECT #:	22-0151
DRAWN BY:	JMF
DESIGNED BY:	JMF
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL - CHILLER AN DBOILER ROOMS

DWG #:
M362

SHEET NO: 23 OF 23

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