

West Brunswick High School

550 Whiteville Road

NW Shallotte, NC 28470

Engineer: SE Energy & Sustainability Services

Project Number: RC17C1227_C2



<http://www.schneider-electric.com/buildings>

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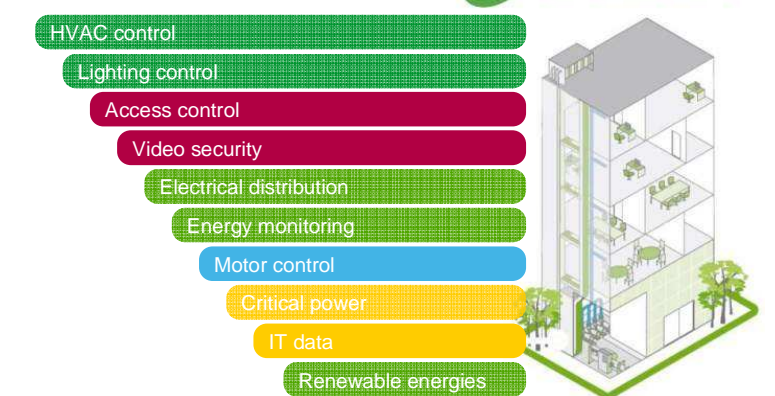
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Drawing Index:

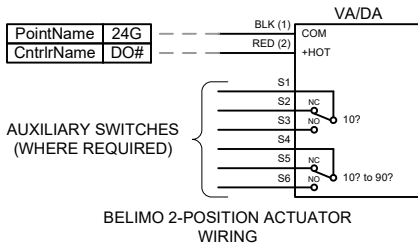
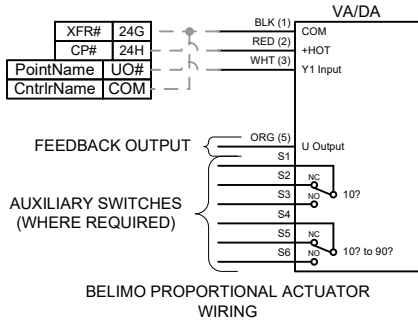
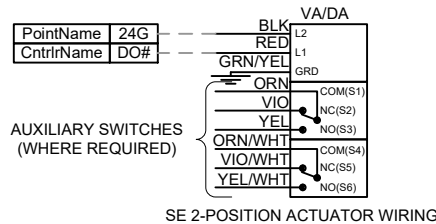
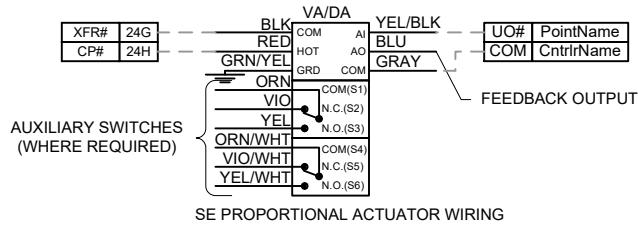
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Notes

- NOTE: Details on this page are representative of most commonly used devices and are not intended to represent all devices used in this project. Reference specific control schematics and details for additional information and coordination
- Reference Standard Device and Software Tags for additional information

Valve/Damper Actuators Wiring Detail

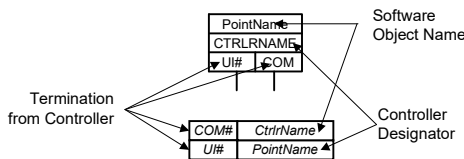


Legends

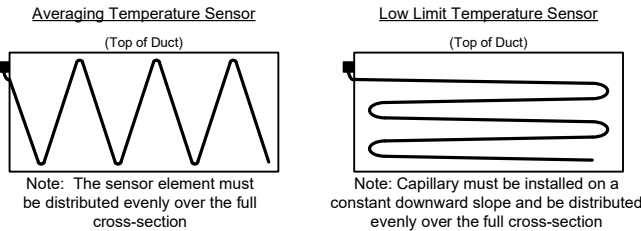
Drawing Reference Symbols

- 1 Drawing Revision Reference Note
- # Drawing Reference Note
- ## Detail Reference (Typically Wiring Details)
- 1 Tag Interlock Wiring Reference Note
- 2 A# SR# A# CP# Panel Interlock Wiring Reference Note

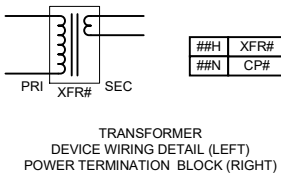
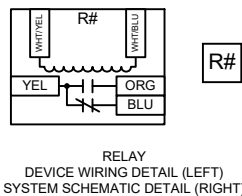
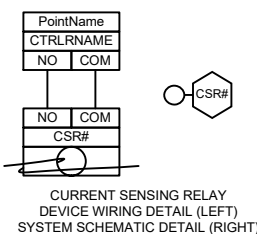
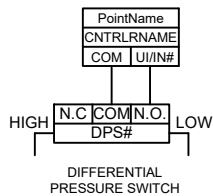
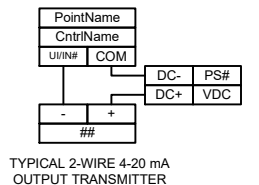
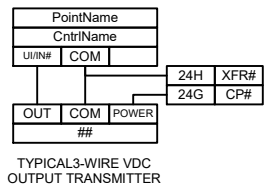
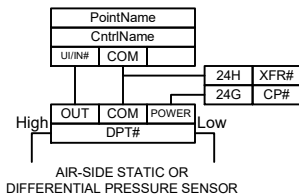
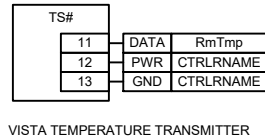
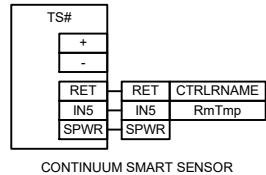
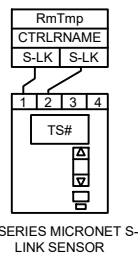
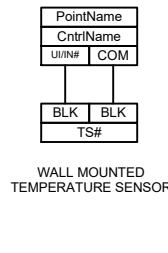
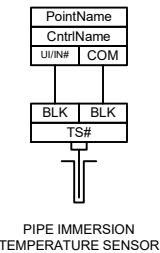
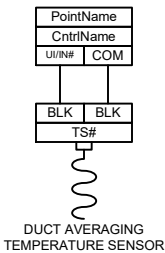
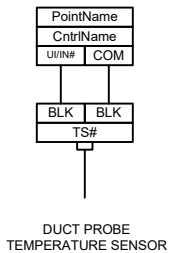
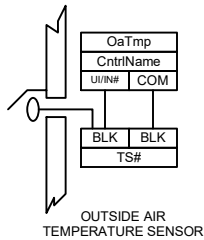
Input/Output Blocks Legend



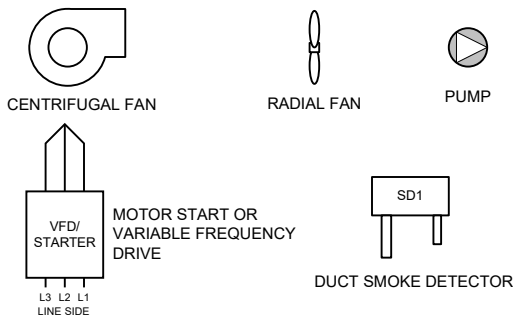
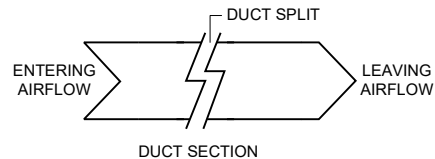
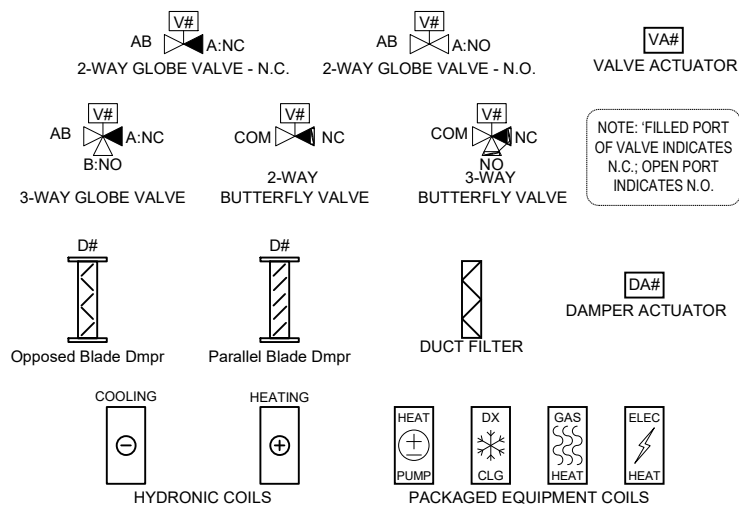
Sensor Installation



Field Sensing Devices



System Schematic Devices



General Notes

- All room thermostats/sensors/controllers shall be installed at XX" above finished floor for ADA compliance for new installations. For replacement of existing devices, leave sufficient rolled coil of wire above the ceiling should the device need to be moved down to meet this requirement in the future. Install one LON / BACnet / Infinet drop at t-stat per floor or wing.
- All panel keys will be collected daily and removed from the panels installed. These keys are to be given to the project manager or Schneider Electric Rep.
- All thermowells shall be filled with thermal conductive compound that is provided.
- Wiring Terminations designated as 'X' or 'XX' indicate information was unavailable at time of submittal. Installer shall document any final equipment terminations for use in record prints.
- Remote control devices, not in local panels, shall be accessible for adjustment and service - below 6' above fixed floor whenever possible or as shown on the provided Construction prints.
- Only prints marked Construction are to be used during installation. If the prints are not marked Construction, the installer will correct any discrepancies between prints used and Construction at no cost to Schneider Electric.
- All new BAS controller panels shall have a dedicated 120Vac power source. This source shall be located and marked in the electrical and control panel as well as on the control prints returned to Schneider Electric for Record prints.
- Installer responsible for maintaining existing safeties (if applicable) into new BAS control – electrically or pneumatically connected.
- See project plans, specifications and NEC for any additional information on installation standards.
- All field device cables and wires shall be labeled by the installing contractor using Brady PermaSleeve or equivalent; cables and wires shall be labeled with its corresponding point name as shown on the input/output block.

Revision:	Submitted		Date:	
	#	Change:		
	1			
	2			
	3			

Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	
Designed by:	RA
Software by:	TJC
Checked by:	
Date:	10/10/2018
Date:	10/10/2018
Date:	10/10/2018

Job Number	West Brunswick High School
File Name	550 Whiteville Road
Sheet Number	NW Shalotte, NC 28470
1 OF 31	

RC-17C1227_C2	Last Saved	10/10/2018
Legends.vsd	Last Printed	10/10/2018

Software/Device Tags

Standard Software Tags

Prefix	Description
AHU(xxx)	Air Handling Unit (number)
Blr	Boiler
Cba	Combustion Air
Cd	Cold Deck
Clg	Cooling
Chlr	Chiller
CwR	Condenser Water Return
CwS	Condenser Water Supply
ChwR	Chilled Water Return
ChwS	Chilled Water Supply
Ct	Cooling Tower
Da	Discharge Air
Ec	Energy Consumption
Ef	Exhaust Fan
Enth	Enthalpy
Fan	Fan
Fil	Filter
Frq	Frequency
Hd	Hot Deck
Ht	Heating
Hum	Humidifier
HwR	Hot Water Return
HwS	Hot Water Supply
Hx	Heat Exchanger
Iso	Isolation
Ma	Mixed Air
Oa	Outside Air
P(x)	Pump (Number)
Pht	Pre-Heat
Pri	Primary
Ra	Return Air
Rf	Return Fan
Rht	Reheat
Rm(xxx)	Room (Number)
Sa	Supply Air
Sec	Secondary
Sf	Supply Fan
Smk	Smoke
Stm	Steam
VAV(xxx)	VAV Box (Number)
Vfd	Variable Frequency Drive
Z(xxx)	Zone (Number)

Example: ChwSTmp

Chilled Water Supply Temperature

Suffix	Description
Alm	Alarm
Amp	Amps
Avg	Average
Cmd	Command/Control
CO	Carbon Monoxide
CO2	Carbon Dioxide
Dpr	Damper
DifPr	Differential Pressure
Drv	Drive
Dt	Differential Temperature
Dhw	Domestic Hot Water
Dx	Direct Expansion
Econ	Economizer
Ena	Enable
Esw	End Switch
Fire	Fire
Flo	Flow
Fz	Freeze
Hi	High Value
HL	High Limit
Hz	Hertz
LL	Low Limit
Lo	Low
Loc	Lockout
Max	Maximum
Min	Minimum
Pos	Position
Pr	Pressure
Rh	Relative Humidity
Rst	Reset
Sp	Static Pressure
Spd	Speed
Spt	Setpoint
Stg	Stage
Sts	Status
Sw	Switch
Tmp	Temperature
Tp	Total Pressure
Val	Value # (array)
Vlv	Valve
Vp	Velocity Pressure
Wb	Wet Bulb

Standard Device Tags

Device Tag	Description
AF#	Air Flow Sensor / Station
AFS#	Air Flow Switch
ALS#	Ambient Light Sensor
AQ#	Air Quality Sensor (CO2, VOC)
BAT#	Battery
BTM#	BTU Meter
BP#	Breaker Panel / Electrical Panel
CBK#	Circuit Breaker
CMS#	CO Sensor
CP#	Control Panel
CSR#	Current Sensing Relay
CT#	Current Transducer
D#	Damper
DA#	Damper Actuator
DPT#	Differential Pressure Transmitter
DPS#	Differential Pressure Switch
DWP#	Dewpoint Sensor
ENS#	Enthalpy Switch
EP#	Electric-Pneumatic Relay
ES#	End Switch
FM#	Flow Meter
FS#	Flow Switch (Water)
FUS#	Fuse
H#	Humidistat
HS#	Humidity Sensor
HSW#	Humidity Switch
IP#	Electric-Pneumatic Transducer
LD#	Leak Detector
LS#	Level Sensor
LSW#	Level Switch
LT#	Light / LED Indicator
NWR#	Network Router
NWS#	Network Switch

Device Tag	Description
ODS#	Oxygen Depletion Sensor
OS#	Occupancy Sensor
PB#	Push Button
PM#	Power Meter
PNL#	Panel / Enclosure
PS#	Power Supply
PT#	Pressure Transmitter
R#	Relay
R#-#	Relay Contacts
RM#	Refrigerant Monitor
SD#	Smoke Detector
SP#	Surge Protector
SPP#	Static Pressure Probe
SR#	Safety Relay Module
SR#:#	Safety Relay Module Relays
SW#	Switch
T#	Thermostat
TB#	Terminal Block
TC#	Temperature Controller
TDR#	Time Delay Relay
THL#	Temperature High Limit
THS#	Temp/Humid Sensor (combo)
TLL#	Temperature Low Limit
TS#	Temperature Sensor
TSW#	Temperature Switch
V#	Valve
VA#	Valve Actuator
VFD#	Variable Frequency Drive
VPP#	Velocity Pressure Probe
VT#	Voltage Transducer
WT#	Watt Transducer
XFR#	Transformer
XFR#:#	Transformer Multi Circuit Designation

Abbreviations

Abbreviation	Description
A.F.F.	Above Finished Floor
AHU	Air Handling Unit
AS	Automation Server
ASD	Address Specific Device
AWG	American Wire Gauge
B3	Continuum BACnet
BCX	Infinet II Controller/Router
BN	BACnet
CC	Cooling Coil
CHW	Chilled Water
CNT	Continuum
COM	Common
CP	Control Panel
DCW	Domestic Cold Water
DDC	Direct Digital Control
DHW	Domestic Hot Water
(E)	Existing
EA	Exhaust Air
EC	Electrical Contractor
EF	Exhaust Fan
EOL	End of Line
FACP	Fire Alarm Control Panel
FAS	Fare Alarm System
FBO	Furnished by Others
FWE	Furnished with Equipment
GND	Ground
HC	Heating Coil

Abbreviation	Description
HW	Hot Water
HX	Heat Exchanger
I2	Continuum Infinet Controller
I/A	Intelligent Automation
JACE	JAVA Application Control Engine
LAN	Local Area Network
LON	Local Operating Network
LPS	Low Pressure Steam
MC	Mechanical Contractor
MDB	Modbus
MNB	Micronet I/A BACnet
MNL	Micronet I/A LON
MS	Motor Starter
NC	Normally Closed
NO	Normally Open
NSR	Non-Spring Return
OA	Outside Air
PC	Plumbing Contractor
PHC	Preheat Coil
RA	Return Air
RHC	Reheat Coil
RLF	Relief Air
SA	Supply Air
SBO	SmartStruxure Building Operations
SXW	SmartStruxure
VAV	Variable Air Volume
VFD	Variable Frequency Drive

Wiring Standards

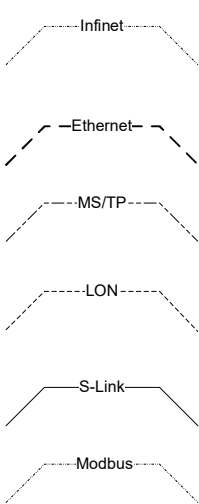
Wiring Requirements

Function	Device Type	Conductors	Preffered Plenum Jacket Color	PLENUM Equivalent Reference Info.	Preferred Non-Plenum Jacket Color	NON-PLENUM Equivalent Reference Info.	Notes
				iPortal [Connect Air] Part #		iPortal [Connect Air] Part #	
Comm	Infinet	24/2 Shielded Lo Cap	Orange	W241P-2000FRIB			(1-2) (5-7)
Comm	BACnet	24/2 Shielded Lo Cap	Orange	W241P-2000FRIB			(1-2) (5-7)
Comm	LON Bus	22/2 Non-Shielded Echelon	Blue	W221P-2001B	Purple	WLON-1-221P-GY-BX**	(3) (5-7)
Comm	Modbus	24/1.5P Shielded Lo Cap					(5-7)
T-Stat	S-Link	22/2 Non-Shielded	Blue	W3-222C-BL-RB	Blue	W1-222C-GY-BX**	(3) (5-7)
Power	24 VAC	16/2 Non-Shielded	White	W3-162C-WH-BX	White	W1-162C-GY-BX**	(5-7)
Power	24 VDC	18/2 Non-Shielded	Red Stripe	W3-182C-RDS-RB	Red Stripe	W1-182C-GY-BX**	(5-7)
BMS Control Cabling							
I/O	2-wire I/O Shielded	18/2 Shielded	White	W4-182C-WH-BX	White	W2-182C-GY-BX**	(5-8)
I/O	3-wire I/O Shielded	18/3 Shielded	White	W4-183C-WH-BX	White	W2-183C-GY-BX**	(5-8)
I/O	4-wire I/O Shielded	18/4 Shielded	White	W4-184C-WH-BX	White	W2-184C-GY-BX**	(5-8)
I/O	2-wire I/O Unshielded	18/2 Non Shielded	White	W3-182C-WH-BX	White	W1-182C-GY-BX**	(5-8)
I/O	3-wire I/O Unshielded	18/3 Non Shielded	White	W3-183C-WH-BX	White	W1-183C-GY-BX**	(5-8)
I/O	4-wire I/O Unshielded	18/4 Non Shielded	White	W3-184C-WH-BX	White	W1-184C-GY-BX**	(5-8)
Comm	Ethernet	24/4P Non-Shielded w/PVC	Blue	WCAT-6-3-244P-BL-BX	Blue	NA	(4) (5-7)

Keyed Notes

- (1) Capacitance between conductors is approximately 12pF per foot.
- (2) Shielded Twisted Pair.
- (3) Unshielded Twisted Pair.
- (4) Category-6 Ethernet cabling between Net Controllers and the Switch.
- (5) Plenum or Non-Plenum version shall be field determined.
- (6) Recommended colors shown; field confirm with Schneider Electric project manager
- (7) Equivalent cables from Belden, Windy City Wire, etc. are acceptable
- (8) Use shielded cable as required for specific installations

** Part number is for gray colored cable



CONTINUUM INFINET WIRING: 24AWG, 2 CONDUCTOR, LOW CAPACITANCE (12.5 pf OR LESS) STRANDED SHIELDED CABLE. CABLE LENGTHS OF UP TO 4,000-FT (1,220 m). A SIGNAL REPEATER, (i2200) IS REQUIRED TO ADD MORE NODES TO THE NETWORK OR FURTHER EXTEND THE CABLING. USING AN i2210 REPEATER ALLOWS YOU TO EXTEND THE LENGTH OF INFINET WITH FIBER OPTIC CABLE, RECOMMENDED FOR RUNNING CABLE BETWEEN BUILDINGS AND THROUGH NOISY ENVIRONMENTS.

ETHERNET WIRING: CATEGORY 6, 24 AWG 4-PAIR UTP. INSTALLERS OF ETHERNET BUS WIRING ARE REQUIRED TO REFER TO SCHNEIDER ELECTRIC TECHNICAL MANUAL F-25955 "ETHERNET NETWORKS" PRIOR TO INSTALLATION. MAXIMUM SEGMENT LENGTH 326'.

BACNET MS/TP WIRING: 24AWG, 2 CONDUCTOR, LOW CAPACITANCE (12.5 pf OR LESS) STRANDED SHIELDED CABLE. IMPEDANCE 120 OHM. 120 OHM 1/4WATT RESISTOR AT EACH EOL. NO TEES ALLOWED. DAISY-CHAINED ONLY. MAX LENGTH 4000'.

LON WIRING: LEVEL 4, 22AWG, 2 CONDUCTOR (15 pf), NON-SHIELDED, TWISTED PAIR. DAISY CHAIN CONFIGURATION, NO TEES ALLOWED. LON TERMINATOR MUST BE USED AT EACH EOL. INSTALL ALONE IN DEDICATED CONDUIT, NO OTHER CONDUCTORS ALLOWED. NO SPLICING OF LON WIRING PERMITTED. MAX LENGTH 4600' OR 63 DEVICES WITHOUT REPEATER.

S-LINK WIRING: 22AWG, 2 CONDUCTOR, STRANDED, NON-SHIELDED CABLE. CAPACITANCE BETWEEN CONDUCTORS CAN NOT EXCEED 32pF PER FOOT. S-LINK IS NON-POLARITY SENSITIVE. S-LINK & LON MAY BE HOUSED IN SAME CONDUIT BUT SHOULD BE IN SEPARATE CABLES (TWO PAIR CABLE IS NOT ALLOWED). MAX LENGTH 200'.

MODBUS WIRING:
NO T-TAPS, ALL WIRING MUST BE DAISY CHAINED.
24 AWG 1.5 PAIR WITH SHIELD IS REQUIRED (1 BALANCED PAIR WITH CHARACTERISTIC IMPEDANCE OF 100 OHMS OR MORE AND A THIRD WIRE FOR COMMON). THE COMMON AND SHIELD MUST BE GROUNDED AT ONE END. TERMINATING RESISTORS ARE REQUIRED AT BOTH ENDS (150 OHM ½ WATT OR 120 OHM ¼ WATT IN SERIES WITH A 1NF (10V MIN) CAPACITOR WHEN POLARIZATION IS REQUIRED).
COLOR CODE: D1 = YELLOW, D0= BROWN, COMMON =GREY
MAX LENGTH IS 1000 METERS.

I/A Series Guidelines

Wiring	S-Link	MS/TP	ADI or Remote I/O	UI, DI, UO	DO	Class 2 24 Vac
S-Link	Yes	Yes	Yes	Yes	No	No
MS/TP	Yes	Yes	Yes	No	Yes	Yes
ADI or Remote I/O	Yes	Yes	Yes	No	Yes	Yes
UI, DI, UO	Yes	No	No	Yes	No	No
DO	No	Yes	Yes	No	Yes	Yes
Class 2 24 Vac	No	Yes	Yes	No	Yes	Yes

Table above shows which wiring can be intermixed, including placement in the same conduit.

Ethernet Wiring

Pin	T568A Pair	T568B Pair	1000BASE-T Signal ID	Wire	T568B Color	Pins on plug face (socket is reversed)
1	3	2	DA+	tip	white/orange stripe	
2	3	2	DA-	ring	orange solid	
3	2	3	DB+	tip	white/green stripe	
4	1	1	DC+	ring	blue solid	
5	1	1	DC-	tip	white/blue stripe	
6	2	3	DB-	ring	green solid	
7	4	4	DD+	tip	white/brown stripe	
8	4	4	DD-	ring	brown solid	

Ethernet Wiring: Unless stated differently by the client or the Schneider Electric Site Supervisor, network cable shall meet or exceed all requirements of Category 6 cable as specified in ANSI/TIA/EAI 568-A. No other devices other than stated in these Construction drawings will be added to or removed from the client's Ethernet backbone or WAN. Maximum length 100 meters., switches needed if maximum length is exceeded.

Line & Text Styles

Style	Style Name	Usage
————	-SE Line 1 - Black	Awning or sidewalks on floorplans,
————	-SE Line 3 - Black	Default line for most controller wiring, detail wiring, duct layout, most shapes used in tool, unless otherwise specified
————	-SE Line 5 - Black	Floorplan – color or area served on floorplans (change color)
- - - - -	-SE Line 5 - Black	Pneumatic tubing
————	-SE Line 9 - Black	Hydronic piping
————	-SE Line 3 - gray	Floorplan – interior walls
————	-SE Line 5 - gray	Usage
————	-SE Line 9 - gray	Floorplan – exterior walls
— · — · —	-SE Matchline	Floorplan – matchline to area on other floorplan
— — — —	-SE Panel Call-Out	
·····	-SE Underground	Underground cabling or trenching
— — — —	-SE Field Wiring	
— · — · —	-SE Conduit	Conduit layout and location
Text 4	-SE Text 4	
Text 6	-SE Text 6	Default text
Text 8	-SE Text 8	Floorplan – room numbers and labels

Cable/Wire Color Code

Color	3-Letter	2-Letter	1-Letter
Black	BLK	BK	b
Brown	BRN	BR	n
Red	RED	RD	r
Orange	ORG	OR	o
Yellow	YEL	YL	y
Green	GRN	GN	g
Blue	BLU	BU	u
Violet	VIO	VL	v
Gray	GRY	GY	a
White	WHT	WH	w
Gold	GLD	GL	d
Silver	SLV	SV	s
Pink	PNK	PK	p

1-Letter abbreviations used for color of stripe on wire. (WH/o = White wire with orange stripe)



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Revision: Submitted

Change: 1 2 3 4 5

Date: 10/10/2018

Architect: SE Energy & Sustainability

Engineer: Services

Contractor: RA

Designed by: TJC

Software by:

Checked by:

Job Number: RC-17C1227_C2

File Name: Last Saved 10/10/2018

Sheet Number: 3 OF 31

West Brunswick High School

550 Whiteville Road

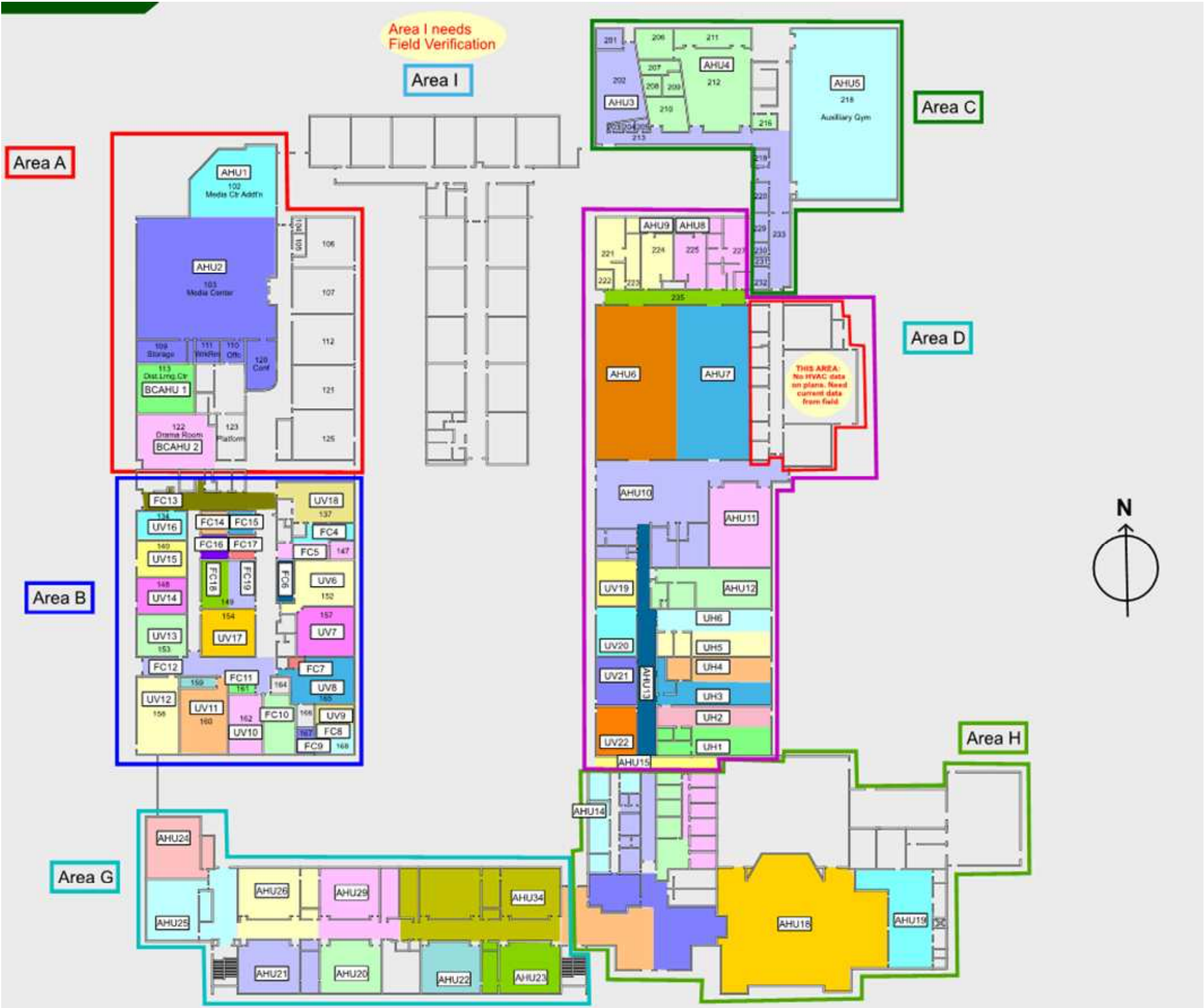
NW Shalotte, NC 28470

Wiring Standards

10/10/2018

10/10/2018

Floor Plan



Floorplan Key

- ACT ACT Panel
- CHW Schneider Electric Controllers
- UH Unit Heater
- A Alerton Integration
- T Temperature Sensor
- H Humidity Sensor



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Revision:		Construction	
#	Change:	#	Date:
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2		2	
3		3	
4		4	
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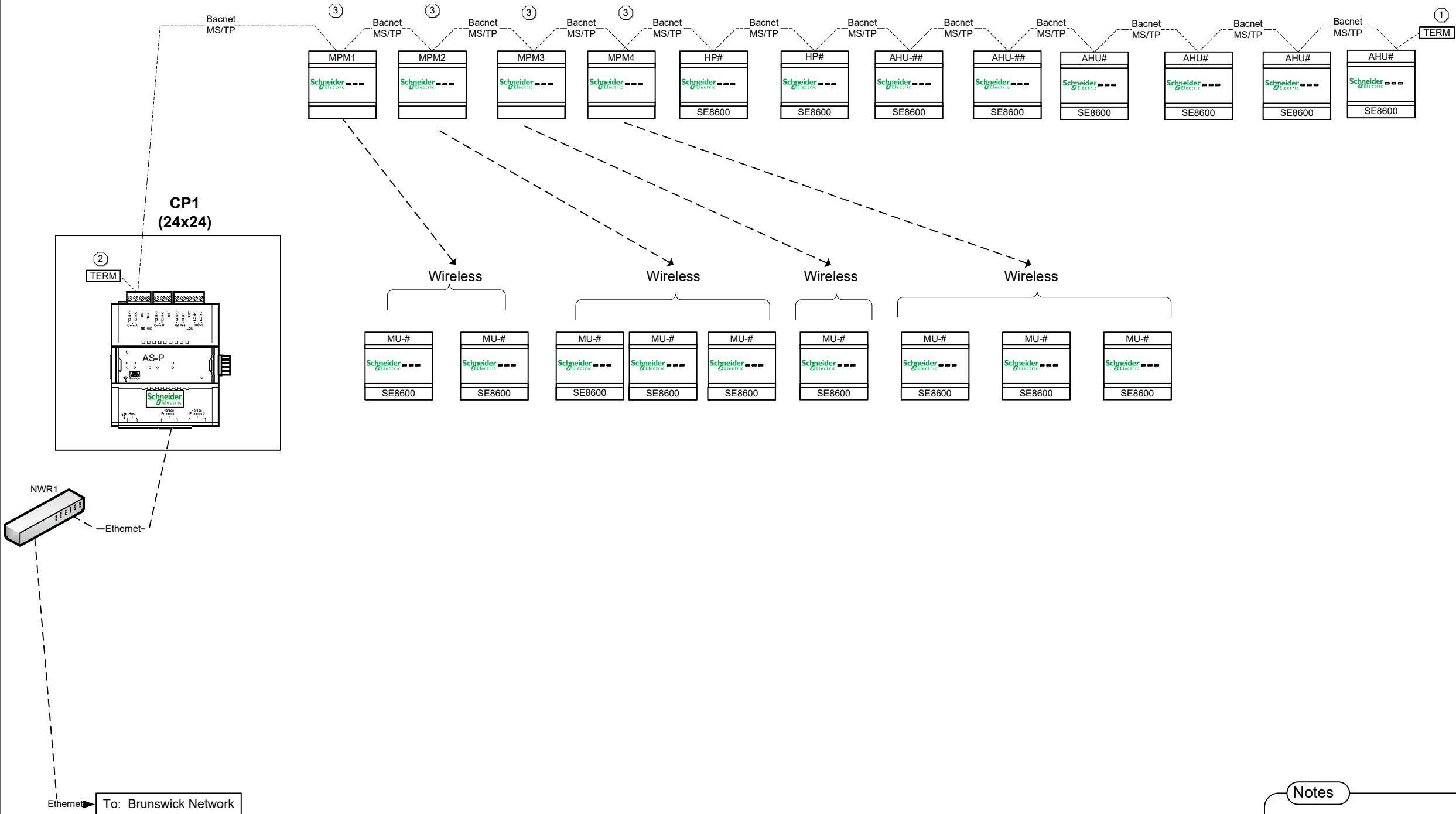
Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	RA
Designed by:	NP/PU
Software by:	TJC
Checked by:	TJC
Date:	10/10/2018
Date:	9/20/2017
Date:	10/10/2018

West Brunswick High School
550 Whiteville Road
NW Shalotte, NC 28470
Floor Plan

Job Number	RC-17C1227_C2	Last Saved	10/10/2018
File Name	Floor Plan.vsd	Last Printed	10/10/2018
Sheet Number	4 of 31		

Network Layout

Field confirm network layout order
As-built location of all controllers and the unit numbers



IP Schedule

BOM Tag	Controller Name	Panel Location	Area Served	IP Address	Subnet Mask	Default Gateway
West Brunswick AS1	West Brunswick AS1	TBD	All		255.255.255.0	
West Brunswick AS2	West Brunswick AS2	TBD	All		255.255.255.0	

Field verify location of mobile units and quantity of MPM's needed prior to ordering

Bill of Material

Default Device	Qty	Part Number	Description	Manufacturer
MPM#	4	MPM-GW-DIO-5045	GW2 ENOCAN 868 MHZ ZIGBEE HP	Schneider Electric

Notes

- Install 120 ohm terminator on last controller.
- Refer to AS-P wiring detail on panel page for AS-P biasing requirements.
- Mount MPM at unit closest to mobile units. See Floor Plan for MPM locations.

Revision:	Submitted
#	Change:
1	2
3	4
5	6

Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	RA
Designed by:	RA
Software by:	TJC
Checked by:	TJC
Date:	10/10/2018
Date:	12/7/2017
Date:	10/10/2018

West Brunswick High School	550 Whiteville Road
NW Shalotte, NC 28470	Network Layout

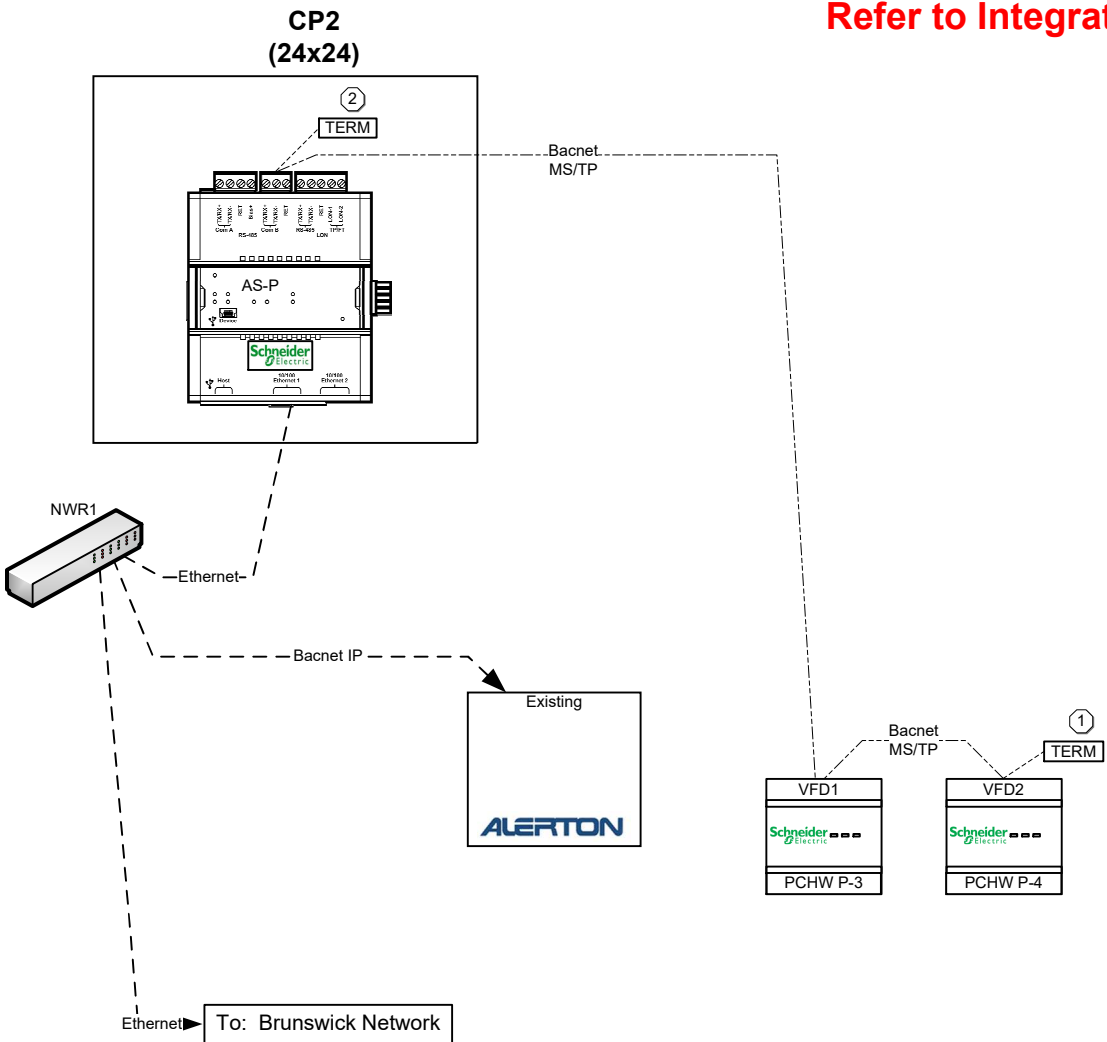
Job Number	RC-17C1227_C2
File Name	Network Layout.vsd
Last Saved	10/10/2018
Last Printed	10/10/2018
Sheet Number	5 OF 31

Network Layout (Integration)

Field confirm network layout order

As-built location of all controllers

Refer to Integration pages on what controllers are being integrated



Notes

- ① Install 120 ohm terminator on last controller.
- ② Refer to AS-P wiring detail on next page for AS-P biasing requirements.

Job Number

RC-17C1227_C2

File Name

Network
Layout.vsd

Sheet Number

6 OF 31

Last Saved

10/10/2018

Last Printed

10/10/2018

West Brunswick High School

550 Whiteville Road

NW Shalotte, NC 28470

Network Layout (Integration)

Architect:

Engineer:

Contractor:

Designed by:

Software by:

Checked by:

SE Energy & Sustainability

Services

Contractor:

Designed by:

Software by:

Checked by:

Revision:

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Date:

Submitted

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Date:

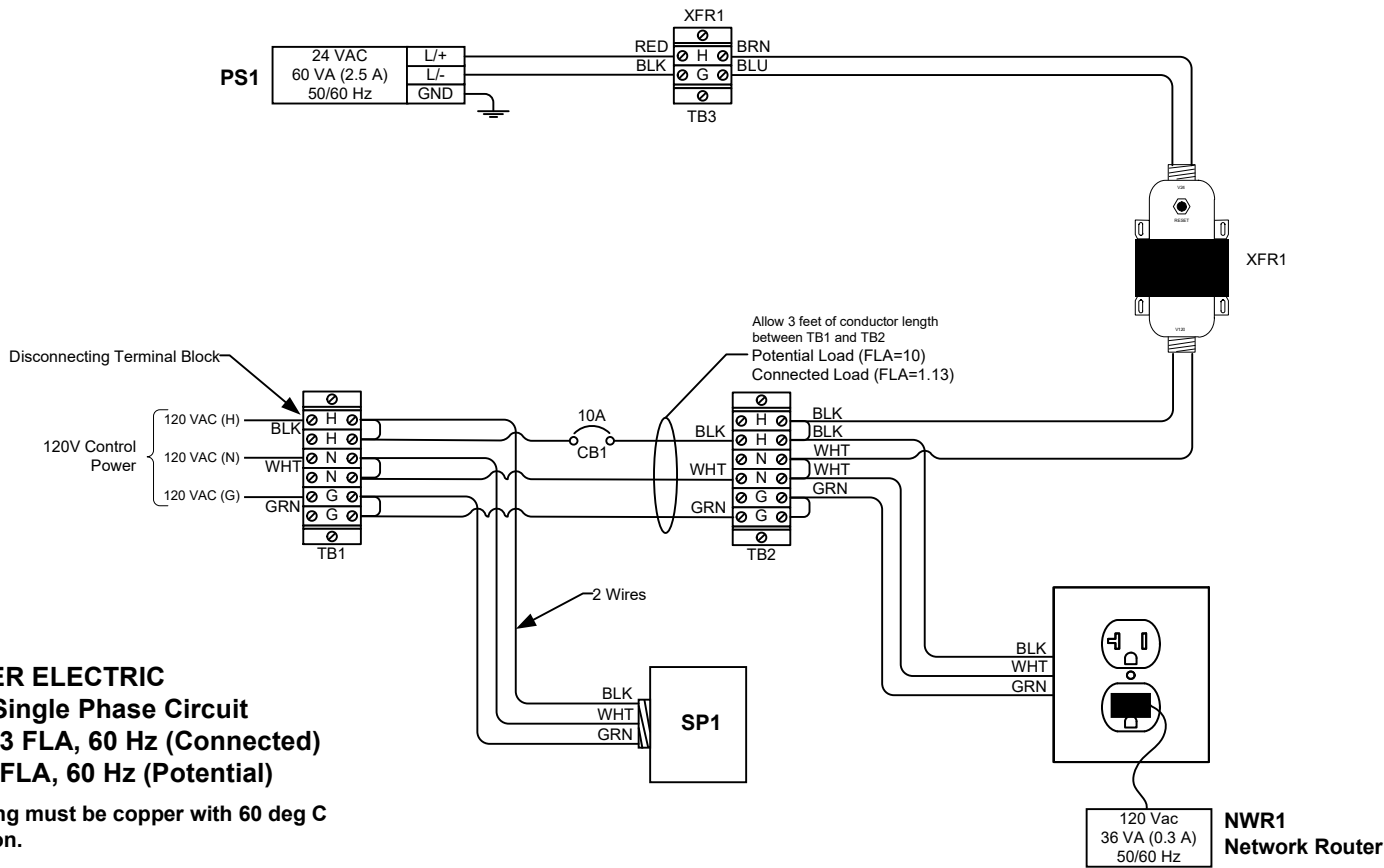
Schneider Electric

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ASP UL Panel Wiring and Layout

CP# Panel
(Typical Of 2)

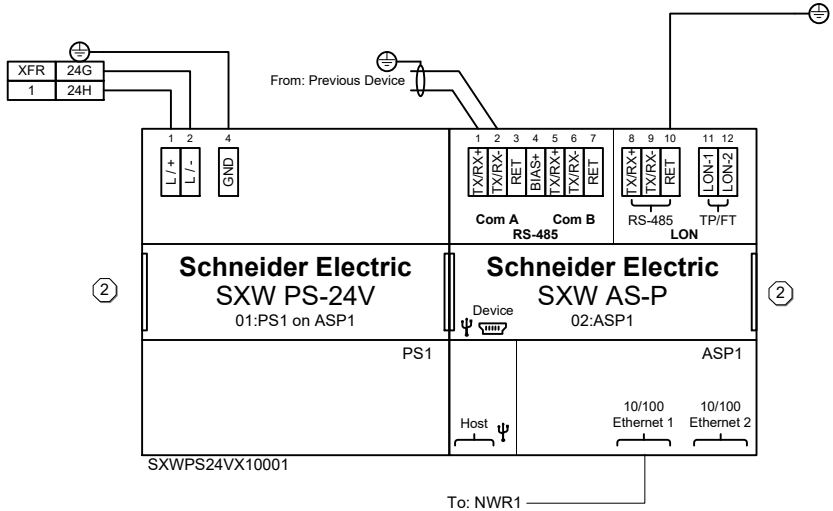
1 CP1 UL Panel Wiring



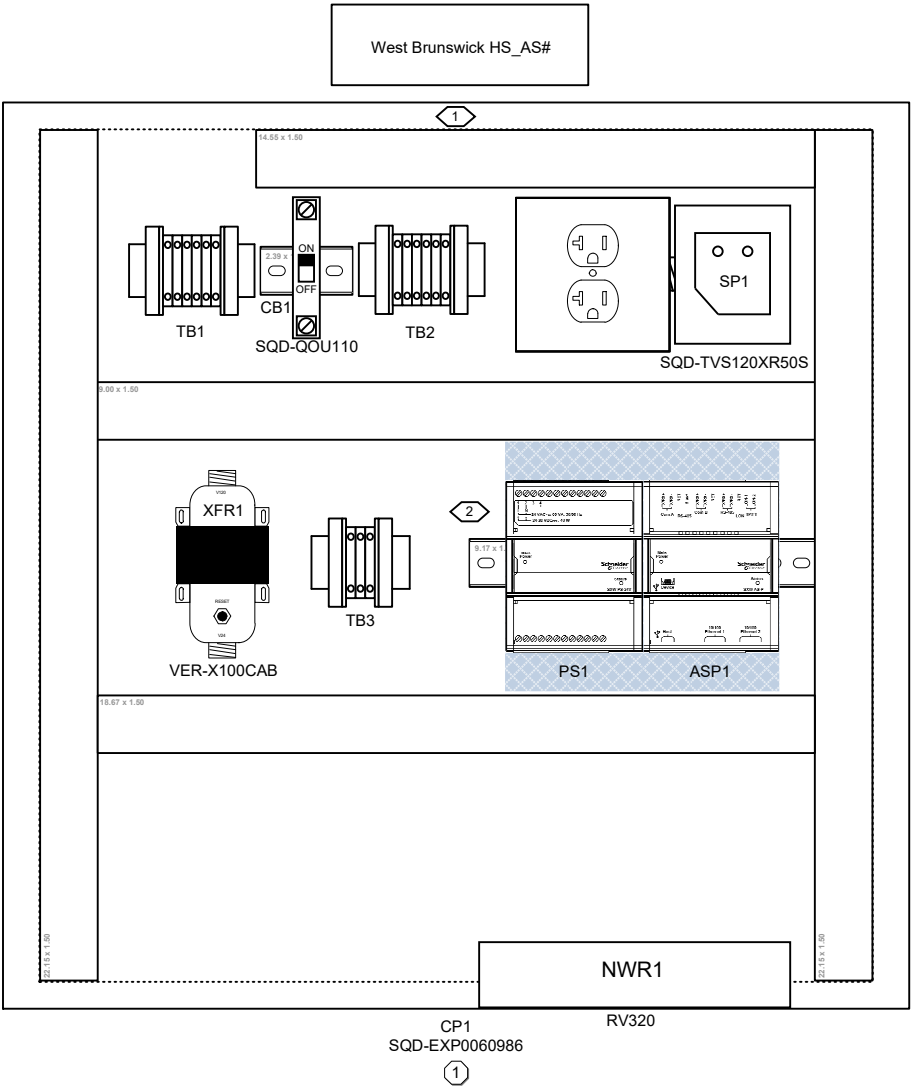
SCHNEIDER ELECTRIC
120V AC Single Phase Circuit
Panel : 1.13 FLA, 60 Hz (Connected)
Panel : 10 FLA, 60 Hz (Potential)

All Field wiring must be copper with 60 deg C wire insulation.
Power provided by appropriately sized and protected conductors as specified on building electrical plans.

2 AS Wiring Detail



Panel Tag Located on Panel Face



Notes

- ① Field verify mounting location.
- ② Mount controller in CP#.

Bill of Material

CP# Panel Device	Qty	Part Number	Description	Manufacturer
ASP1	2	SXWASPXXX10001	SMARTX CONTROLLER AS-P	Schneider Electric
ASP1_1	2	SXWTBASW110002	TB-ASP-W1 TERM BASE ASP W1	Schneider Electric
CB1	2	SQD-QOU110	MIN CIRCUIT BREAKER 120/240V	Square D
CP1	2	SQD-EXP0060986	ENC, 24X24X8, N4X, HC	Square D
NWR1	2	RV320	5 Port 10/100 Mbps Ethernet Sw	Cisco
PS1	2	SXWPS24VX10001	PS-24V POWER SUPPLY 24 VAC/VDC	Schneider Electric
PS1_1	2	SXWTBPSW110001	TB-PS-W1 TERM BASE PWR SUP W1	Schneider Electric
SP1	2	SQD-TVS120XR50S	SPD 102/240V 50KA	Square D
XFR1	2	VER-X100CAB	XFR 120V/24V 99 VA 1HB+FT	Veris Industries

Schneider Electric

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Revision:

#	Change	Date
1		
2		
3		
4		
5		

Architect: SE Energy & Sustainability Services

Engineer: RA

Contractor: TJC

West Brunswick High School

550 Whiteville Road

NW Shalotte, NC 28470

Job Number RC-17C1227_C2

Last Saved 10/10/2018

Last Printed 10/10/2018

7

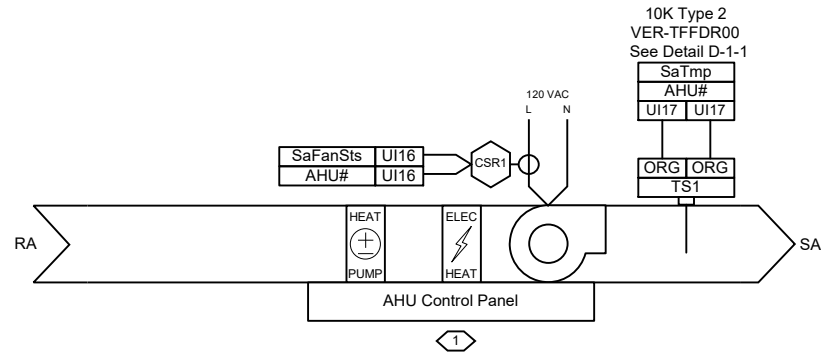
31

Layout

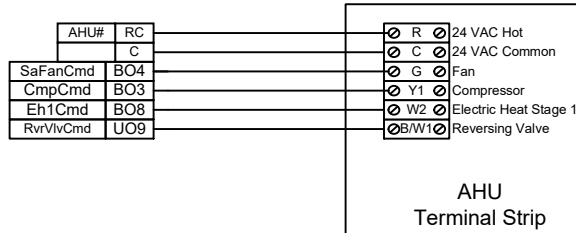
Field confirm system layout
Reuse relays and current switches unless defective

AHU 300 Bldg (Typical) System Diagram

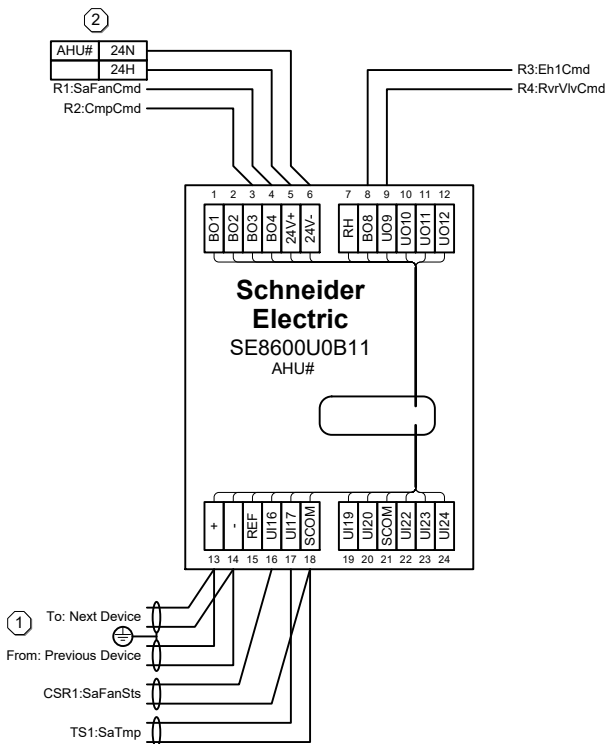
AHU#
(Typical Of 4)



1 AHU Control Panel Wiring



2 AHU Controller Layout



Sequence of Operation

Occupied Mode:

The AHU shall be started and stopped by the BAS under a time of day schedule. This schedule shall be modified by a start stop optimization program.

Space Temperature Control:

During occupied mode, two setpoints shall apply; cooling setpoint (74°F adj.), heating setpoint (72°F adj.) and cooling/heating setpoint deadband (1°F adj.). When the space temperature rises above the cooling setpoint, cooling will be activated until space temperature falls below deadband. When the space temperature falls below the heating setpoint, the hot water valve shall modulate to maintain heating setpoint.

Unoccupied Mode:

The AHU shall be shutdown unless the space temperature drops below the unoccupied low limit setpoint (60°F adj.) or rises above the unoccupied high limit (85°F adj.) with (5°F adj.) deadband. When the temperature drops below the unoccupied low limit setpoint or rises above the unoccupied high limit, the AHU shall operate in Occupied Mode until the space temperature has risen above/fallen below deadband.

Override Push Button Operation:

Programmed timed override control will be available from the space temperature sensor override pushbutton and shall put unit in occupied mode for 2 hours (adj.).

Notes

- See Network Layout for controller location in network.
- Field verify that there is an existing power source.
- Field verify unit terminations.

Bill of Material

AHU# Device	Qty	Part Number	Description	Manufacturer
AHU# TS1	4	SE8600U0B11	RTU IAQ BN WHT WHT	Schneider Electric
	4	VER-TFFDR00	TEMP SENSOR DUCT 10K T2	Veris Industries

Schneider
Electric

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Submitted	
Revision:	Date:
#	Change:
1	2
3	4
5	6

Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	RA
Designed by:	Date: 10/10/2018
Software by:	Date: 10/10/2018
Checked by:	TJC

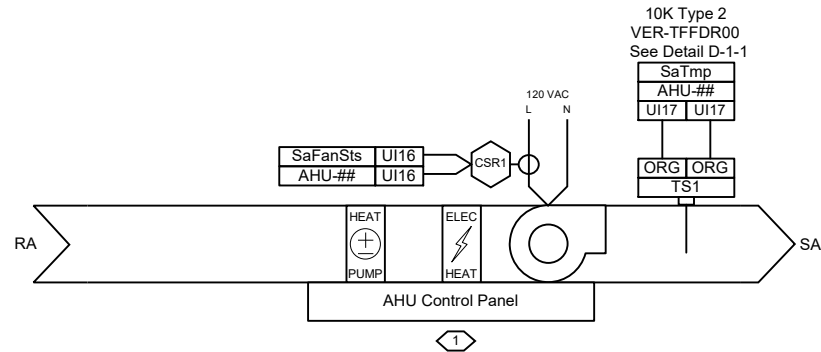
West Brunswick High School
550 Whiteville Road
NW Shalotte, NC 28470
AHU 300 Bldg (Typical)
System Diagram

Job Number	RC-17C1227_C2
File Name	Last Saved
AHU.vsd	10/10/2018
Sheet Number	Last Printed
8 OF 31	10/10/2018

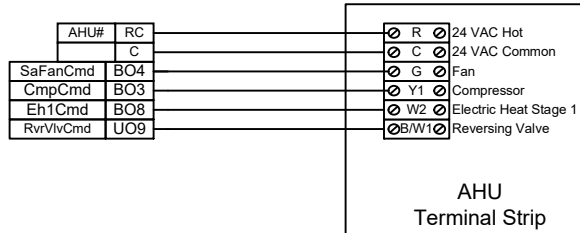
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Reuse relays and current switches unless defective

AHU ROTC Bldg (Typical) System Diagram

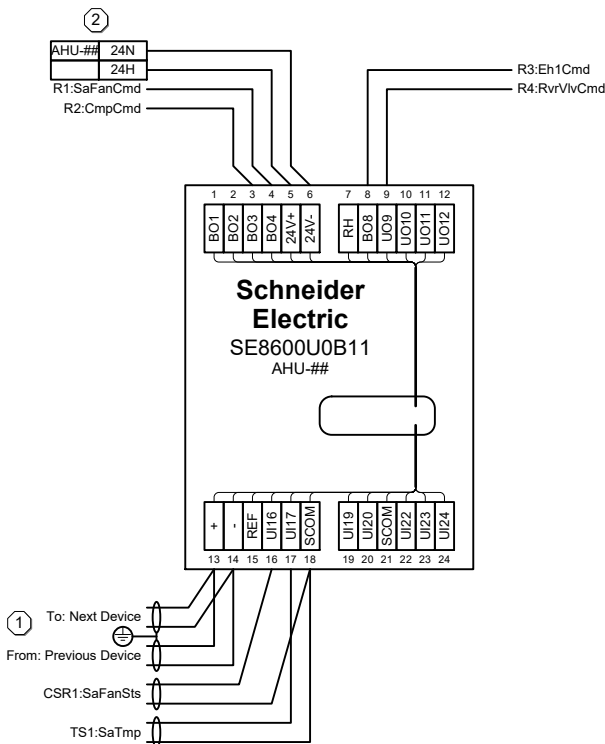
AHU-##
(Typical Of 2)



1 AHU Control Panel Wiring



2 AHU Controller Layout



Sequence of Operation

Occupied Mode:

The AHU shall be started and stopped by the BAS under a time of day schedule. This schedule shall be modified by a start stop optimization program.

Space Temperature Control:

During occupied mode, two setpoints shall apply; cooling setpoint (74°F adj.), heating setpoint (72°F adj.) and cooling/heating setpoint deadband (1°F adj.). When the space temperature rises above the cooling setpoint, cooling will be activated until space temperature falls below deadband. When the space temperature falls below the heating setpoint, the hot water valve shall modulate to maintain heating setpoint.

Unoccupied Mode:

The AHU shall be shutdown unless the space temperature drops below the unoccupied low limit setpoint (60°F adj.) or rises above the unoccupied high limit (85°F adj.) with (5°F adj.) deadband. When the temperature drops below the unoccupied low limit setpoint or rises above the unoccupied high limit, the AHU shall operate in Occupied Mode until the space temperature has risen above/fallen below deadband.

Override Push Button Operation:

Programmed timed override control will be available from the space temperature sensor override pushbutton and shall put unit in occupied mode for 2 hours (adj.).

Notes

- See Network Layout for controller location in network.
- Field confirm that there is an existing power source.
- Field verify unit terminations.

Bill of Material

AHU-## Device	Qty	Part Number	Description	Manufacturer
AHU-## TS1	2	SE8600U0B11	RTU IAQ BN WHT WHT	Schneider Electric
	2	VER-TFFDR00	TEMP SENSOR DUCT 10K T2	Veris Industries

Schneider
Electric

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Revision:	Submitted	Date:
#	Change:	
1	1	10/10/2018
2	2	10/10/2018
3	3	10/10/2018
4	4	10/10/2018
5	5	10/10/2018

Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	RA
Designed by:	RA
Software by:	TJC
Checked by:	TJC
Date:	10/10/2018
Date:	12/7/2017
Date:	10/10/2018

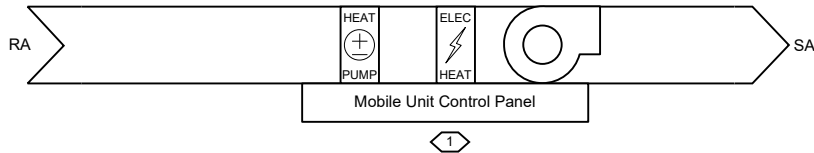
West Brunswick High School
550 Whiteville Road
NW Shalotte, NC 28470
AHU ROTC Bldg (Typical)
System Diagram

Job Number	RC-17C1227_C2
File Name	Last Saved AHU.vsd
Sheet Number	Last Printed 9 OF 31
Date	10/10/2018

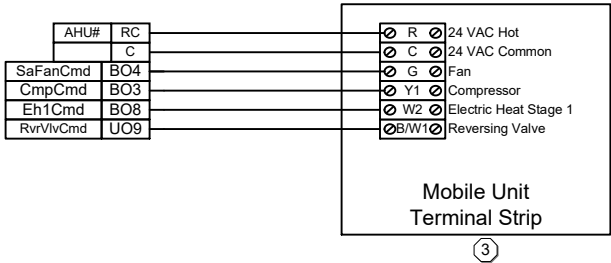
Field confirm system layout

Mobile Unit (Typical) System Diagram

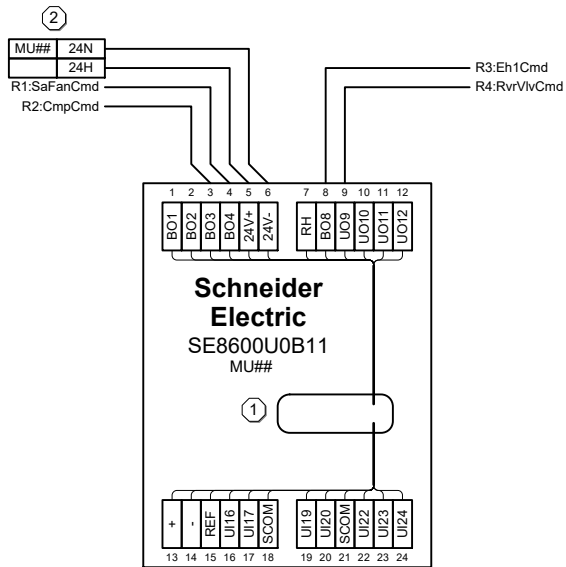
MU#
(Typical Of 9)



1 Mobile Unit Control Panel Wiring



2 Mobile Unit Controller Layout



Sequence of Operation

Occupied Mode:

The HP shall be started and stopped by the BAS under a time of day schedule. This schedule shall be modified by a start stop optimization program.

Space Temperature Control:

When the HP is in occupied mode, the supply fan shall start and the BAS shall monitor the space temperature. During occupied mode, two setpoints shall apply; cooling setpoint (74°F adj.) and heating setpoint (72°F adj.). When the space temperature rises above the cooling setpoint, the compressor shall be commanded ON and the reversing valve shall be commanded ON to maintain the cooling setpoint. When the space temperature falls below the heating setpoint, the compressor shall be commanded ON and the reversing valve shall be commanded OFF. If there is a continued drop in space temperature, the first stage of electric heat will be commanded ON. Between the cooling and heating setpoints, the compressor shall be commanded OFF.

Unoccupied Mode:

The HP shall be shutdown unless the space temperature drops below the unoccupied low limit setpoint (60°F adj.) or rises above the unoccupied high limit (85°F adj.) with (5°F adj.) deadband. When the temperature drops below the unoccupied low limit setpoint or rises above the unoccupied high limit, the HP shall operate in Occupied Mode until the space temperature has risen above/fallen below deadband.

Override Push Button Operation:

Programmed timed override control will be available from the space temperature sensor override pushbutton and shall put unit in occupied mode for 2 hours (adj.).

Notes

- ① See Network Layout for controller location in network.
- ② Field confirm that there is an existing power source.
- ③ Field verify unit terminations.

Bill of Material

MU# Device	Qty	Part Number	Description	Manufacturer
MU##	9	SE8600U0B11	RTU IAQ BN WHT WHT	Schneider Electric
MU##_1	9	VCN8000V5045P	COM MOD ZIG PRO SE8000	Schneider Electric



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Revision:	Submitted	#	Change:	Date:
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		2		
		3		
		4		
		5		

Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	
Designed by:	RA
Software by:	
Checked by:	TJC
Date:	10/10/2018
Date:	10/10/2018
Date:	10/10/2018

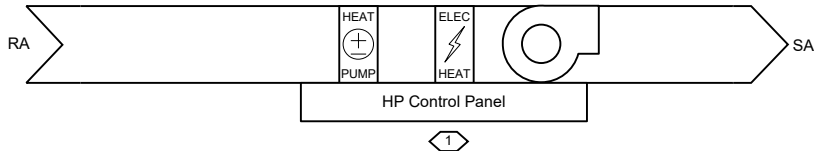
Job Number	West Brunswick High School
File Name	550 Whiteville Road
Sheet Number	NW Shalotte, NC 28470
10 of 31	Mobile Unit (Typical) System Diagram

RC-17C1227_C2	Last Saved
10/10/2018	10/10/2018
AHU.vsd	Last Printed
10 of 31	10/10/2018

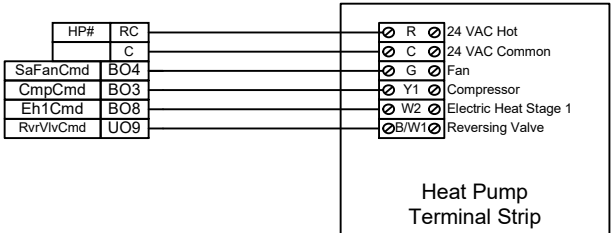
Field confirm system layout

HP ROTC Bldg (Typical) System Diagram

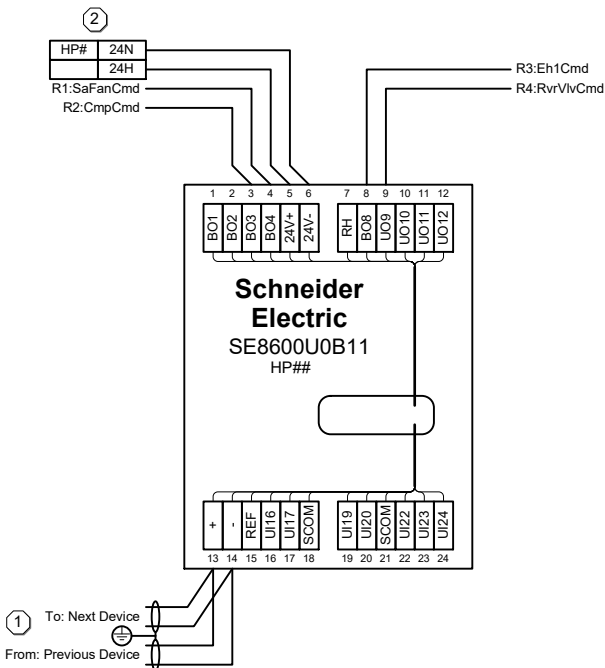
HP#
(Typical Of 2)



1 Heat Pump Control Panel Wiring



2 Heat Pump Controller Layout



Sequence of Operation

Occupied Mode:

The HP shall be started and stopped by the BAS under a time of day schedule. This schedule shall be modified by a start stop optimization program.

Space Temperature Control:

When the HP is in occupied mode, the supply fan shall start and the BAS shall monitor the space temperature. During occupied mode, two setpoints shall apply; cooling setpoint (74°F adj.) and heating setpoint (72°F adj.). When the space temperature rises above the cooling setpoint, the compressor shall be commanded ON and the reversing valve shall be commanded ON to maintain the cooling setpoint. When the space temperature falls below the heating setpoint, the compressor shall be commanded ON and the reversing valve shall be commanded OFF. If there is a continued drop in space temperature, the first stage of electric heat will be commanded ON. Between the cooling and heating setpoints, the compressor shall be commanded OFF.

Unoccupied Mode:

The HP shall be shutdown unless the space temperature drops below the unoccupied low limit setpoint (60°F adj.) or rises above the unoccupied high limit (85°F adj.) with (5°F adj.) deadband. When the temperature drops below the unoccupied low limit setpoint or rises above the unoccupied high limit, the HP shall operate in Occupied Mode until the space temperature has risen above/fallen below deadband.

Override Push Button Operation:

Programmed timed override control will be available from the space temperature sensor override pushbutton and shall put unit in occupied mode for 2 hours (adj.).

Notes

- ① See Network Layout for controller location in network.
- ② Field confirm that there is an existing power source.
- ③ Field verify unit terminations.

Bill of Material

HP# Device	Qty	Part Number	Description	Manufacturer
HP##	2	SE8600U0B11	RTU IAQ BN WHT WHT	Schneider Electric



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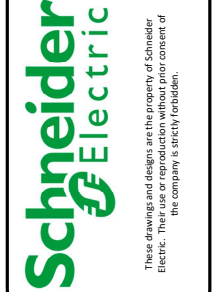
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2	2	10/10/2018
3	3	10/10/2018
4	4	10/10/2018
5	5	10/10/2018

Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	RA
Designed by:	RA
Software by:	TJC
Checked by:	TJC
Date:	10/10/2018
Date:	10/10/2018
Date:	10/10/2018

Job Number	West Brunswick High School
File Name	550 Whiteville Road
Last Saved	NW Shalotte, NC 28470
10/10/2018	HP ROTC Bldg (Typical)
Last Printed	System Diagram
10/10/2018	

Job Number	RC-17C1227_C2
File Name	AHU.vsd
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Integration Controllers



Revision: Submitted	
#	Date:
1	
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Architect:	SE Energy & Sustainability Services
Engineer:	
Contractor:	
Designed by:	RA
Software by:	Date: 10/10/2018
Checked by:	Date: 12/7/2017
	Date: 10/10/2018

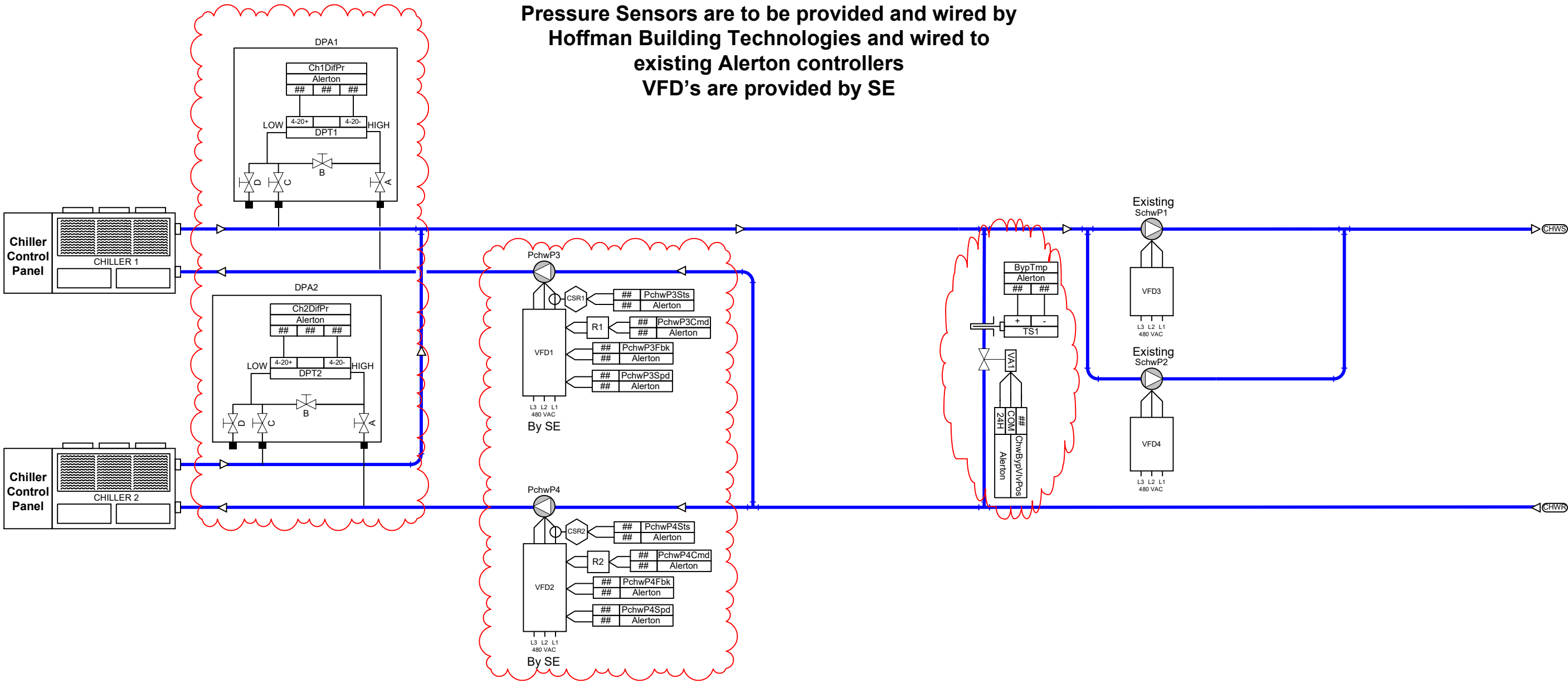
Job Number	RC17C1227_C2	West Brunswick High School
File Name	Integration.vsd	550 Whiteville Road
Sheet Number	12 OF 31	NW Shallotte, NC 28470
		Integration Controllers

Refer to Alerton control drawings for details

CHW Plant Integration 1/3

Per ECM-4.C, Bypass Valve, Bypass Supply Air Temperature Sensor and CHW Differential Pressure Sensors are to be provided and wired by Hoffman Building Technologies and wired to existing Alerton controllers
VFD's are provided by SE

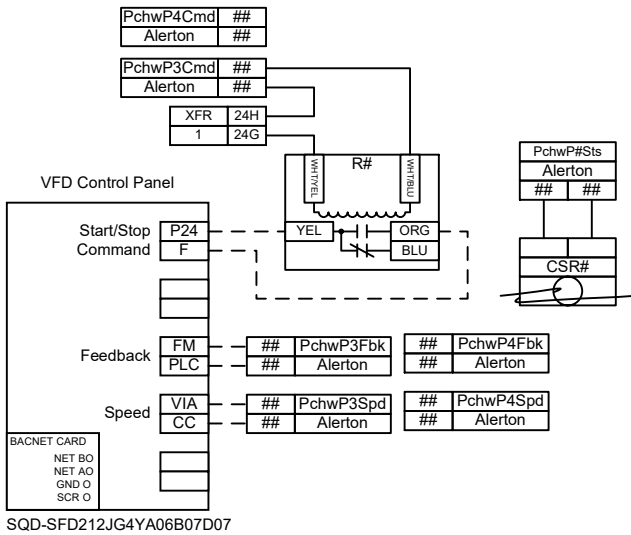
Bubbled devices are new and to be added to existing CHW Plant



VFD Schedule

BOM Tag	System	Quantity	Manufacturer	Part Number	Motor HP	Enclosure Type
VFD1	CHW	1	Schneider Electric	SQD-SFD212JG4YA06B07D07	15.0	NEMA1
VFD2	CHW	1	Schneider Electric	SQD-SFD212JG4YA06B07D07	15.0	NEMA1

1 VFD Detail (Typical for 2)



Schneider Electric

Revision:	Submitted
#	Change:
1	2
2	3
3	4
4	5

Architect:	SE Energy & Sustainability Services
Engineer:	RA
Contractor:	TJC
Designed by:	10/10/2018
Software by:	12/7/2017
Checked by:	10/10/2018

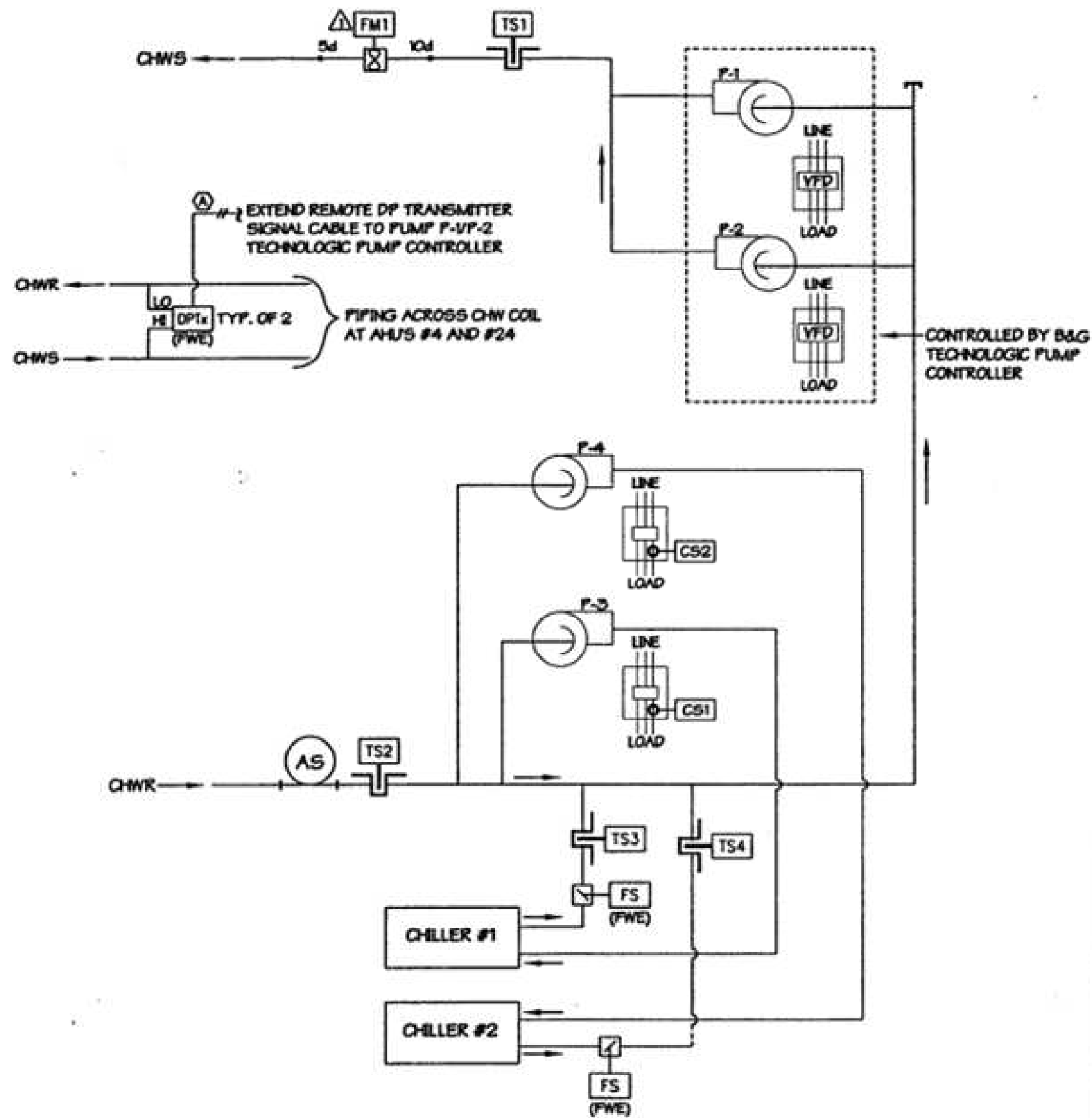
West Brunswick High School
550 Whiteville Road
NW Shalotte, NC 28470
CHW Plant Integration 1/3

Job Number	RC-17C1227_C2
File Name	Last Saved 10/10/2018
Integration.vsd	Last Printed 10/10/2018
Sheet Number	13 OF 31

Refer to Alerton control drawings for details

CHW Plant Integration 2/3

CHILLED WATER SYSTEM SCHEMATIC



Revision:		Submitted	
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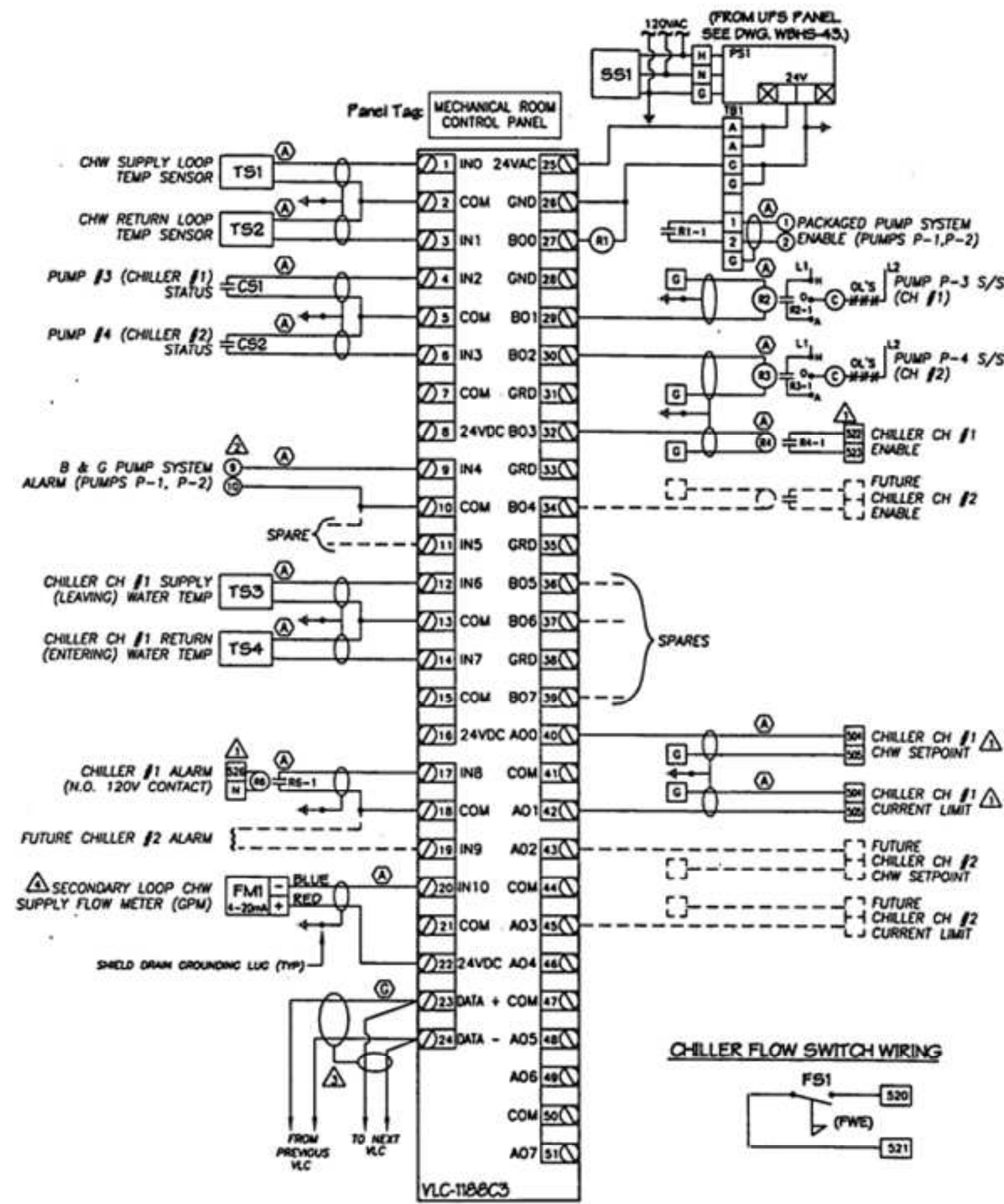
Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	
Designed by:	RA
Software by:	TJC
Checked by:	
Date:	10/10/2018
Date:	10/10/2018
Date:	10/10/2018

West Brunswick High School
550 Whiteville Road
NW Shalotte, NC 28470
CHW Plant Integration 2/3

Job Number	RC-17C1227_C2
File Name	Integration.vsd
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Last Saved	10/10/2018
Last Printed	10/10/2018

Refer to Alerton control drawings for details

CHW Plant Integration 3/3



Submitted	
Revision:	Date:
#	Change:
1	1
2	2
3	3
4	4
5	5

Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	RA
Designed by:	RA
Software by:	TJC
Checked by:	TJC
Date:	10/10/2018
Date:	12/7/2017
Date:	10/10/2018

West Brunswick High School
550 Whiteville Road
NW Shalotte, NC 28470
CHW Plant Integration 3/3

Job Number	RC-17C1227_C2
File Name	Last Saved Integration.vsd
Sheet Number	Last Printed 15 OF 31
Date	10/10/2018

Refer to Alerton control drawings for details
Pending sequence for bypass valve/bypass
temperature sensor

CHW Sequence

The chiller plant consists of two air cooled chillers (CH#1 and CH#2). The BAS will enable the chiller using a lead/lag control scheme and will stage the chillers based upon the load.

Unoccupied Mode

The chiller plant will be disabled when the building is in unoccupied mode. There will be no after-hours cooling scheduled for high limit temperature maintenance in the building.

Occupied Mode

The chiller plant (outdoor air-cooled chillers) will be enabled whenever the building is in occupied mode and the outside air temperature is greater than 55°F (adj.) or any time there is a call for dehumidification. When the outside air temperature falls below 50°F (adj.), the chiller plant will be disabled.

Chiller and Primary Pump Control

The chilled water primary pumps are variable flow pumps with variable frequency drives. The BAS shall generate an alarm if the pump fails to operate. The pumps are to modulate to maintain the chiller return temperature to be a degree or two below the system return temperature. The DP sensors shall calculate flow through the chillers. In the event that the temperature control loop would require the flow to be below the minimum flow for the chillers, then the pumps shall modulate to maintain minimum flow.

Secondary Pump Control

When the chilled water plant is called upon to run (for Occupied Mode, Dehumidification Mode), the chiller plant (BAS) controller will enable the secondary loop controller (B&G Technologic Controller). The B&G controller will enable the lad secondary loop pump (P-1 or P-2) to run and will control the pump speed in response to the remote differential pressure transmitters (two remote transmitters furnished by B&G, installed by H&H Controls). If the lead pump cannot maintain the loop pressure setpoint, the pump controller will energize the lag pump. The lag pump speed will be increased as the lead pump speed is decreased until both pumps are at the same speed. The pump controller will ramp the spump speed signals together as required to satisfy the loop pressure setpoint. When oen pump can once again maintain setpoint, the controller will de-energize the lag pump and maintain variable speed operation with one pump. Upon a general fault condition as monitored by the B&G controller, the B&G controller will send a “fault” signal to the chiller plant (BAS) controller. The B&G will alternate the lead/lag status of the secondary pumps as programmed into the factory installed controller. Secondary pumps are intended to operate as parallel pumps.

Chiller Demand Limit

The BAS controller will limit the total number of stages available for cooling based on a 4-20 mA signal to the chiller controller. When the BAS controller indicates a high electrical demand (kWh, monitored at the building power meter), the demand limit signal to the chiller may be ramped upward to limit the number of available cooling stages.

Chilled Water Flow

The controller will monitor the secondary loop flow as sensed by flow meter FM1 in the secondary return loop. The flor rate (GPM) will be displayed on the CHW system graphics.

Sensors

Immersion type temperature sensors, TS1 and TS2 will monitor the secondary CHW supply and return water temperatures, respectively. Primary CHW loop supply water temperature at each chiller will be monitored by well type temperature sensors. Current switch CS1 will monitor the status of pump P-3 and current switch CS2 will monitor the status of pump P-4. Flow meter FM1 will monitor secondary loop flow. Flow switch FS (furnished with the chiller) will monitor and verify flow through the chiller as an operating safety for the chiller controls. Differential pressure transmitters (two, DPT, furnished with B&G Technological Secondary pump controller) will monitor the secondary loop differential pressure.

Manual System Operation

In the event of DDC failure, the system can be operated in manual (“Hand”) mode. All constant speed pumps can be started manually through their respective H-O-A switches. All variable speed pumps can be started manually through their respective VFD’s, with speed modulation accomplished at the adjustable speed potentiometer on the drive controls interface. Boilers can be started manually in Hand mode and will operate under local controls for operating parameters and safeties. The chiller can be started manually in hand mode and will operate under local controls for operating parameters and safeties.



Revision: Submitted

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Architect: SE Energy & Sustainability

Engineer: Services

Contractor:

Designed by: RA

Software by: TJC

Checked by:

Date: 10/10/2018

Date: 10/10/2018

Date: 10/10/2018

Job Number RC-17C1227_C2

File Name Integration.vsd

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550 Whiteville Road

NW Shalotte, NC 28470

CHW Sequence

Last Saved 10/10/2018

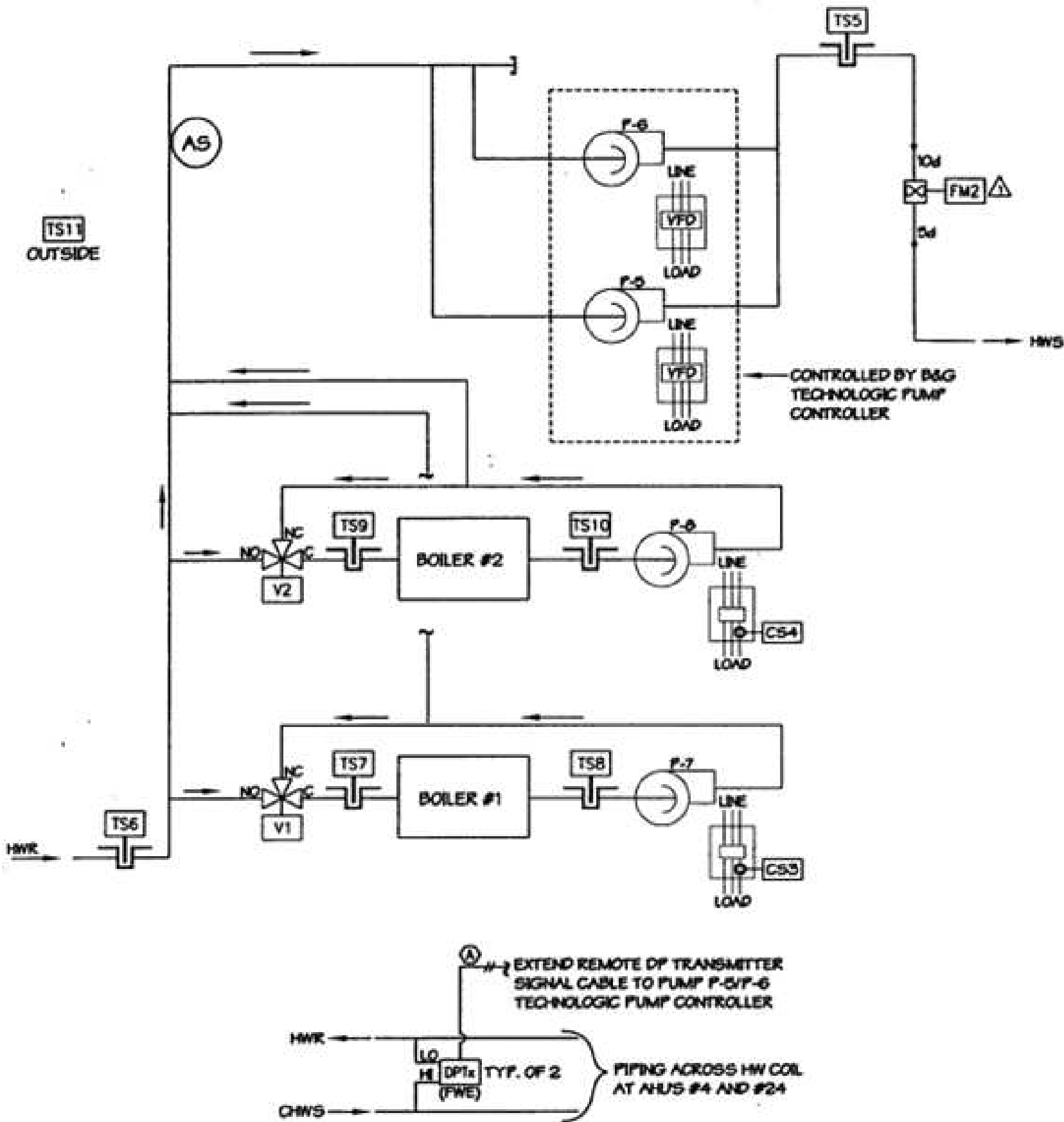
Last Printed 10/10/2018

Refer to Alerton control drawings for details

HW Plant Integration

Per ECM-3.A.1, Hoffman to replace existing burners on (2) boilers with new dual fuel burners.
Provided and wired by Hoffman Building Technologies and wired to existing Alerton controller.

HOT WATER SYSTEM SCHEMATIC



Revision:		Submitted	
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1		1	
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3		3	
4		4	
5		5	

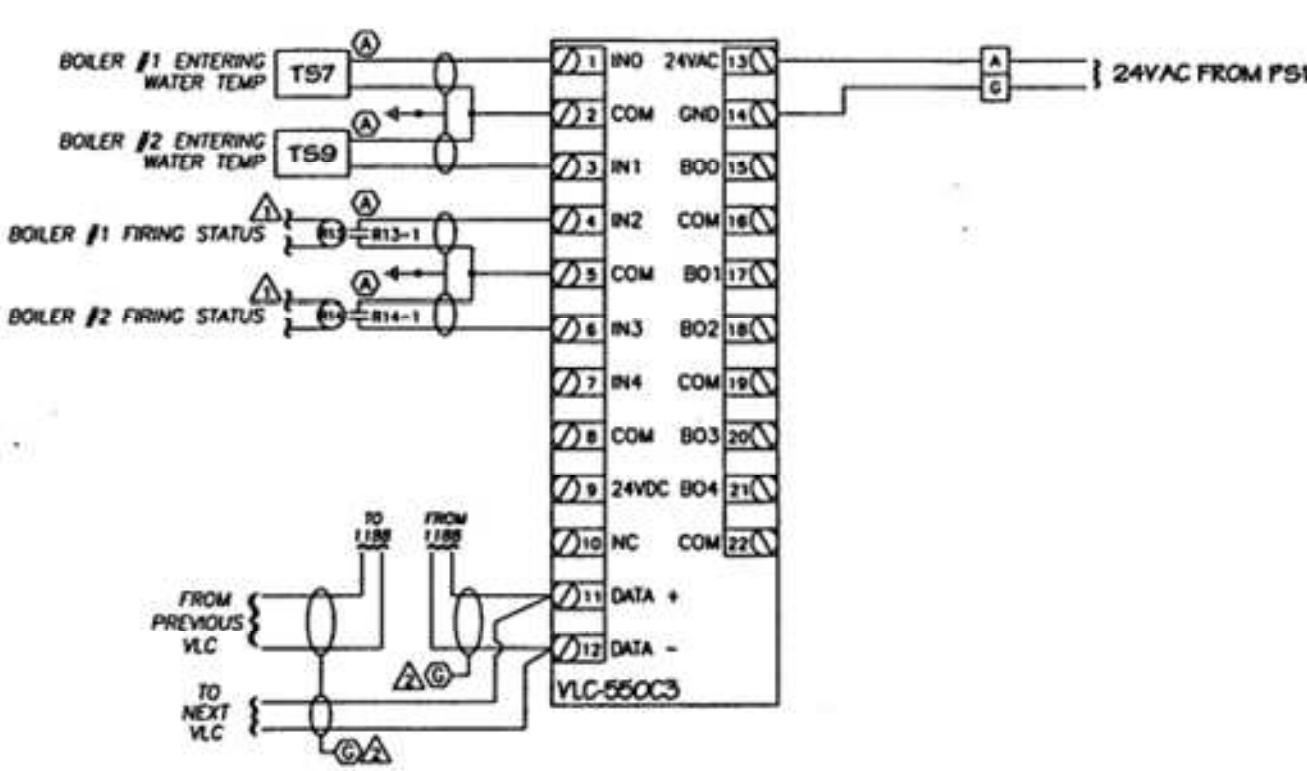
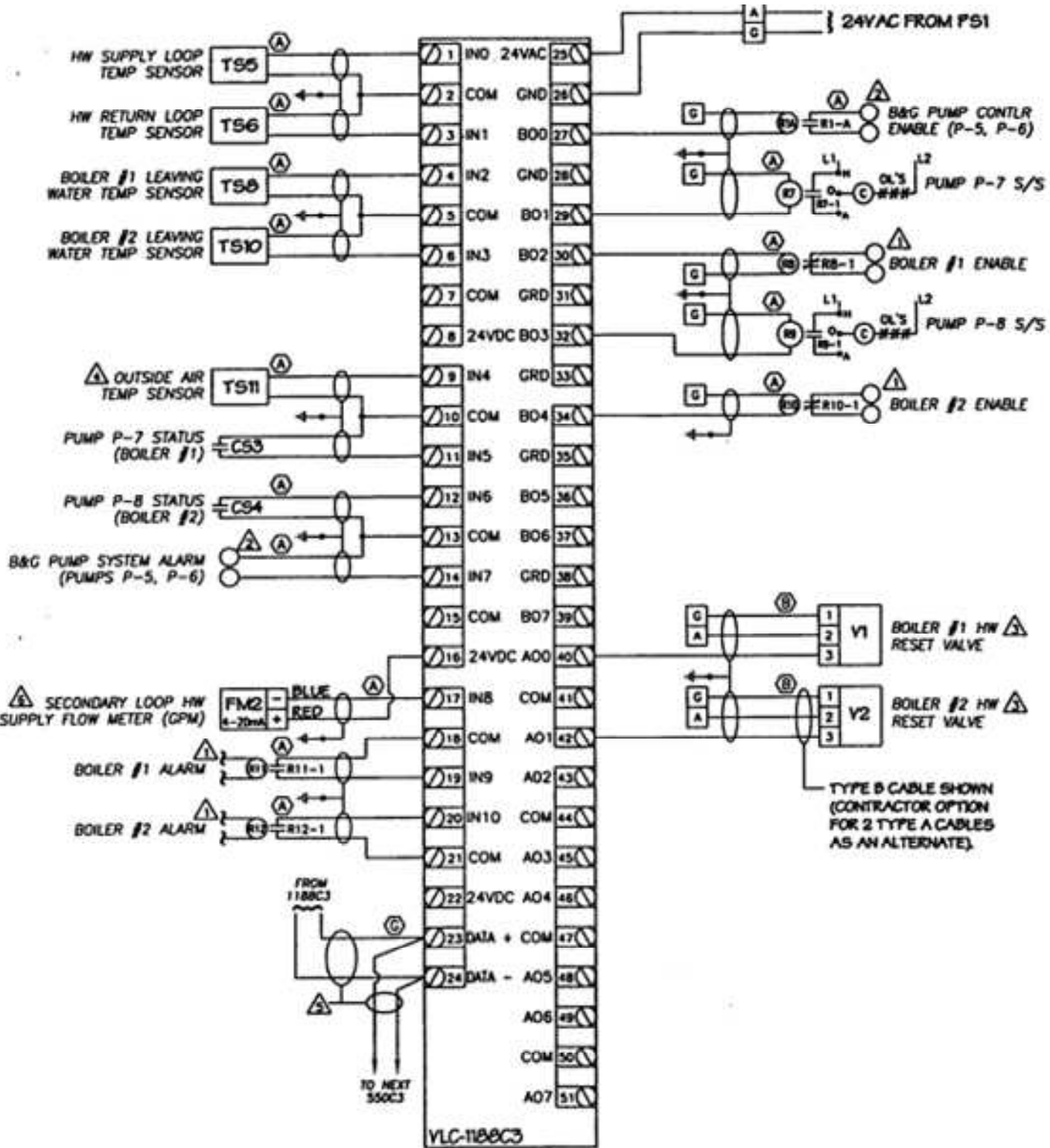
Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	RA
Designed by:	RA
Software by:	TJC
Checked by:	TJC
Date:	10/10/2018
Date:	12/7/2017
Date:	10/10/2018

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HW Plant Integration

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Refer to Alerton control drawings for details

HW Plant Integration Cont'd



New Boiler Burner (New Points, Typical for 2)	
Point Name	
Boiler Enable	
Boiler Alarm	

Job Number

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File Name

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10/10/2018

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10/10/2018

Architect

SE Energy & Sustainability Services

Engineer

Services

Contractor

RA

Designed by

TJC

Software by

TJC

Checked by

TJC

Date

10/10/2018

Date

10/10/2018

Date

10/10/2018

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HW Plant Integration Cont'd

Submitted

Revision: #

Change: 1

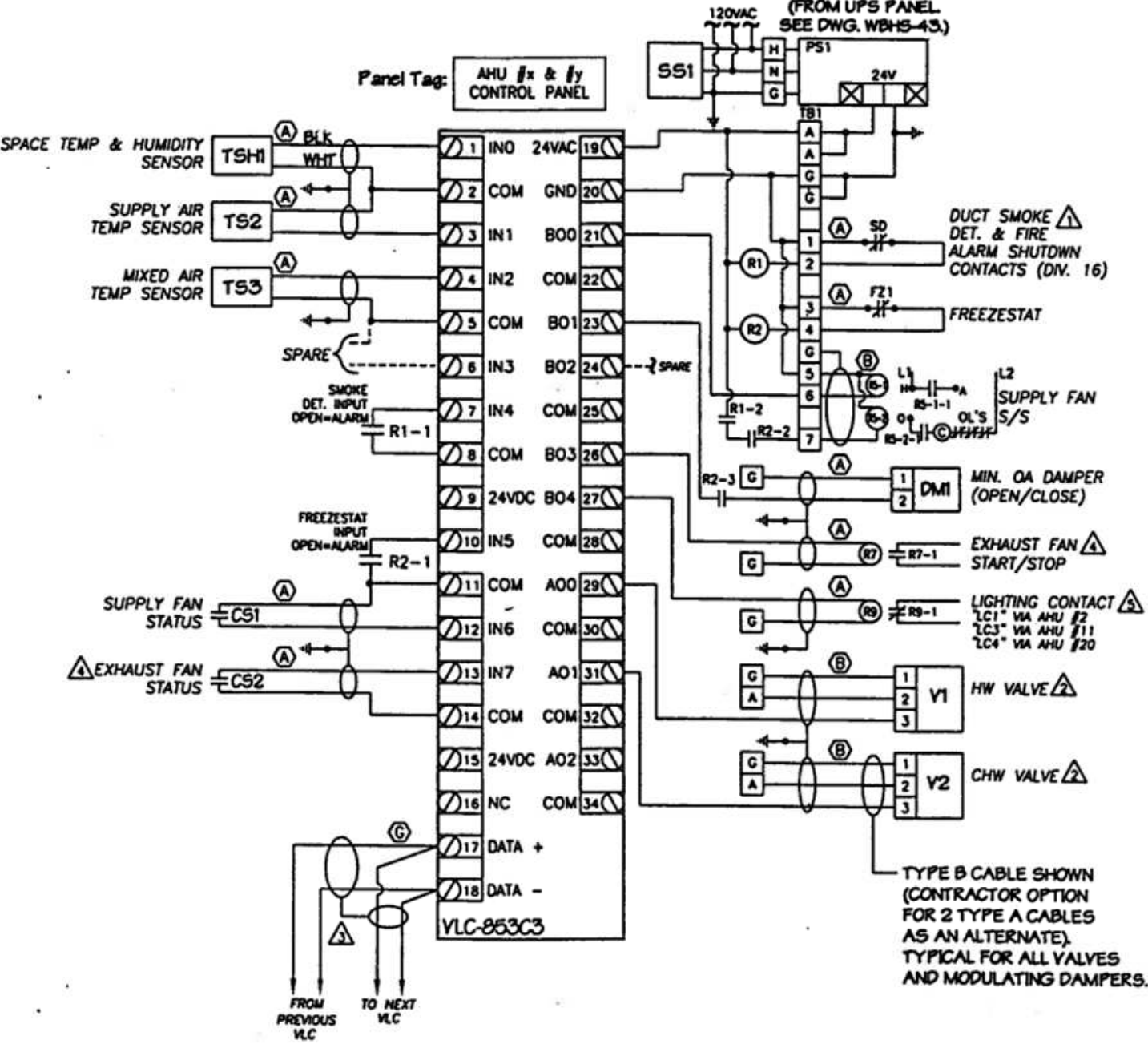
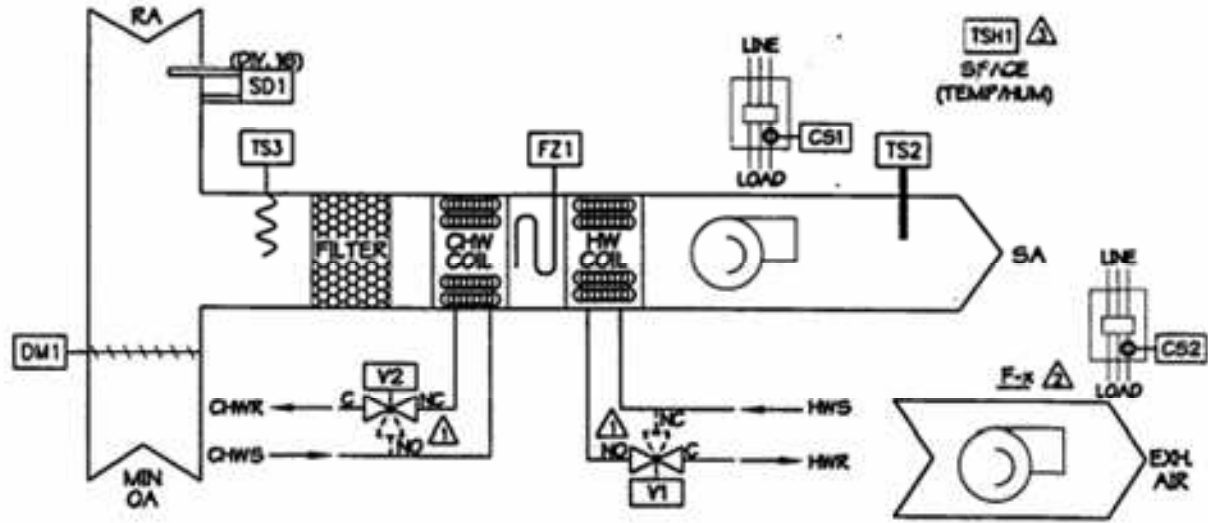
Date: 10/10/2018

SE Electric

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Per ECM-1.D, Hoffman to provide CO2 sensors for AHU-2. Two-position outside air damper to also be replaced with new proportional actuator for AHU-2. Provided and wired by Hoffman Building Technologies and wired to existing Alerton controller.

AHU WITH MINIMUM OUTSIDE AIR SYSTEM SCHEMATIC
(APPLIES TO THE FOLLOWING UNITS: AHU #1, 2, 11 THRU 16, 20 THRU 23, 24, 25, 27, 28, 30, 31, 33 & 34)



DCV (New Points)
Point Name
Room CO2
Outside Air Damper Position

Submitted

Revision:

#

Change:

Date:

1

2

3

4

5

6

Architect:

Engineer:

Contractor:

Designed by:

Software by:

Checked by:

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AHU Integration 1/6

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Last Printed

10/10/2018

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10/10/2018

Date:

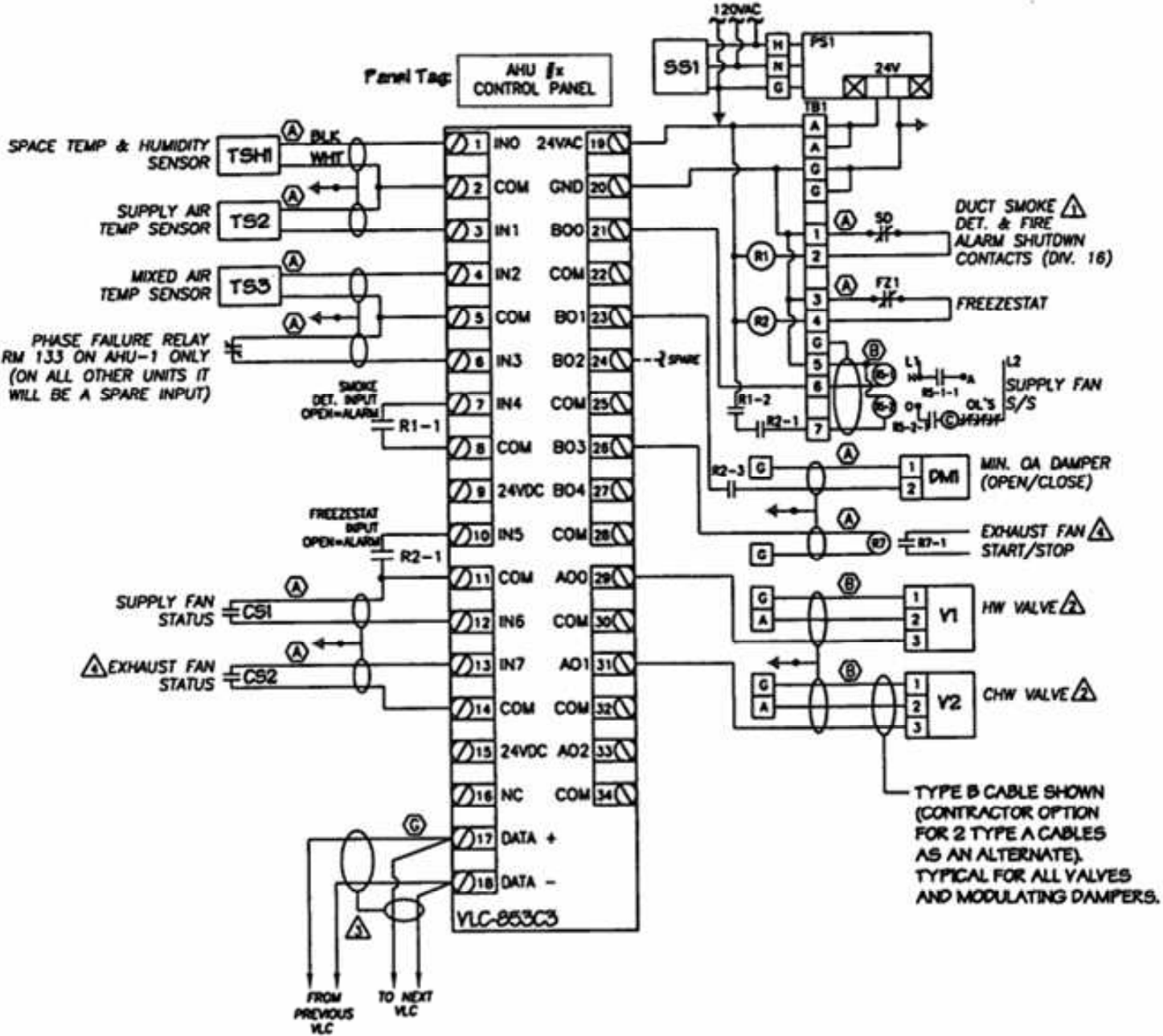
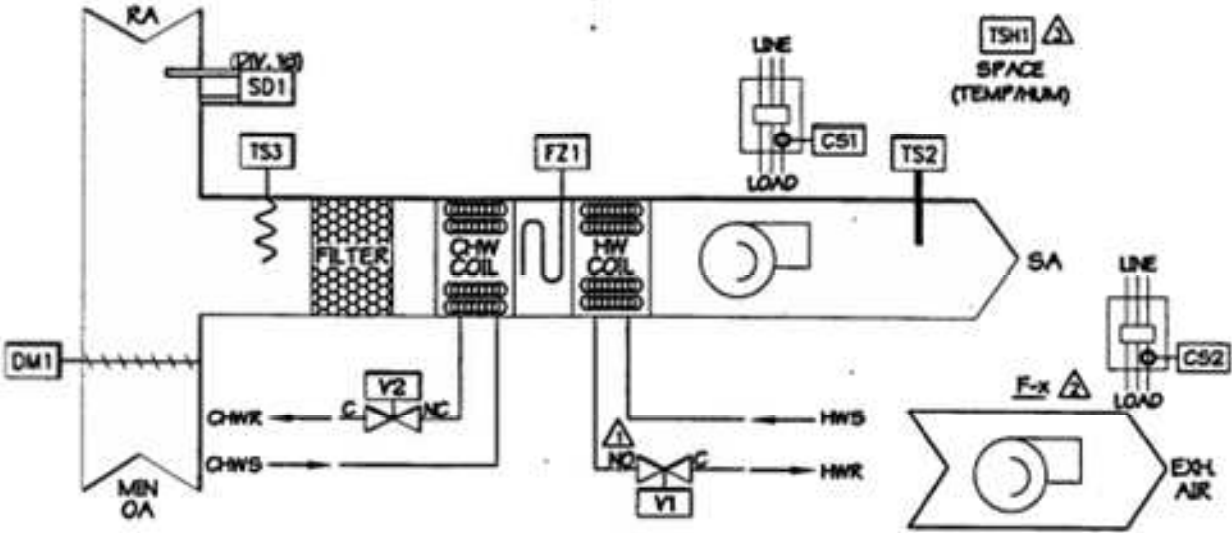
12/7/2017

Date:

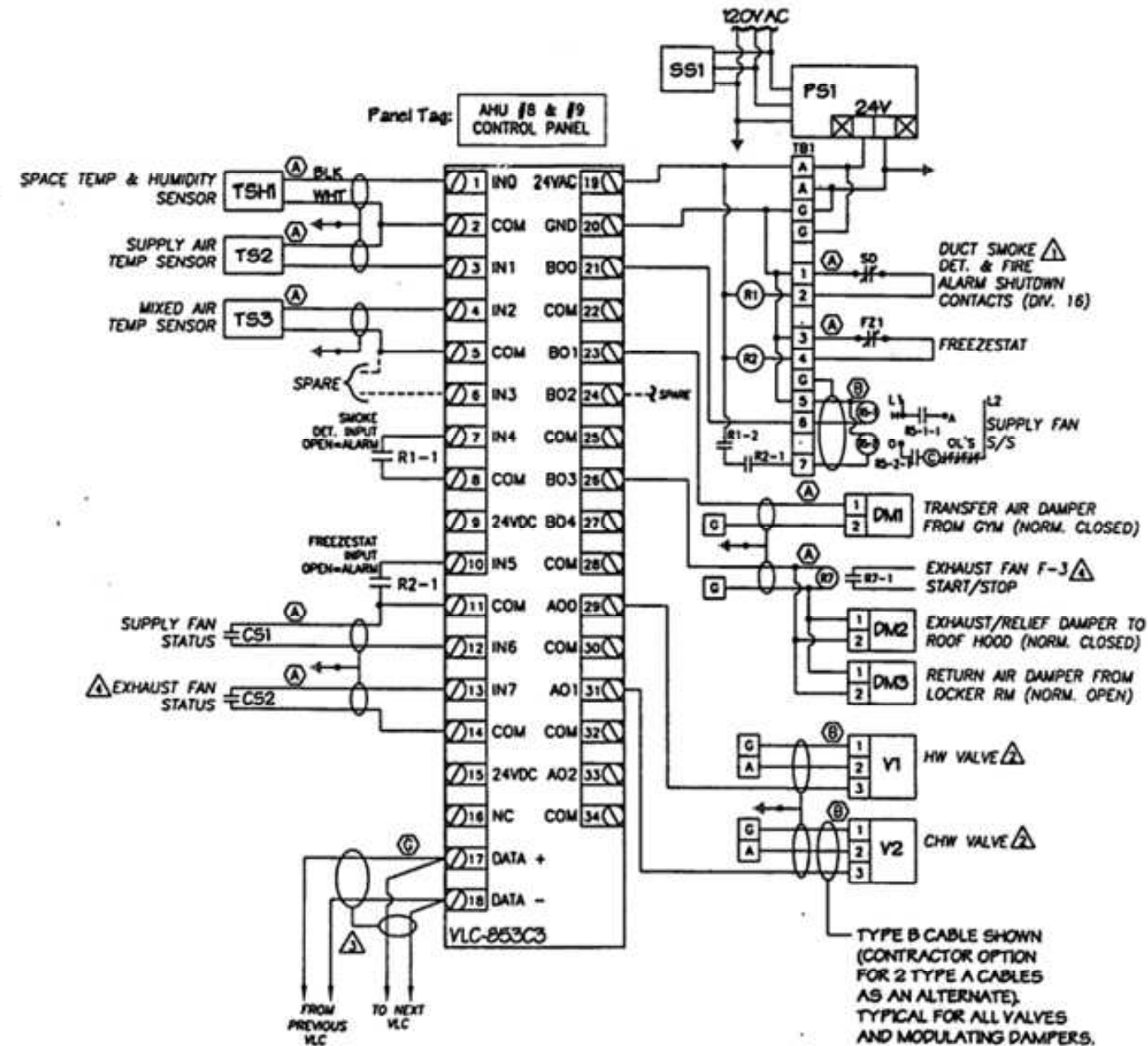
10/10/2018

AHU WITH MINIMUM OUTSIDE AIR SYSTEM SCHEMATIC (TYPE "B" UNITS)

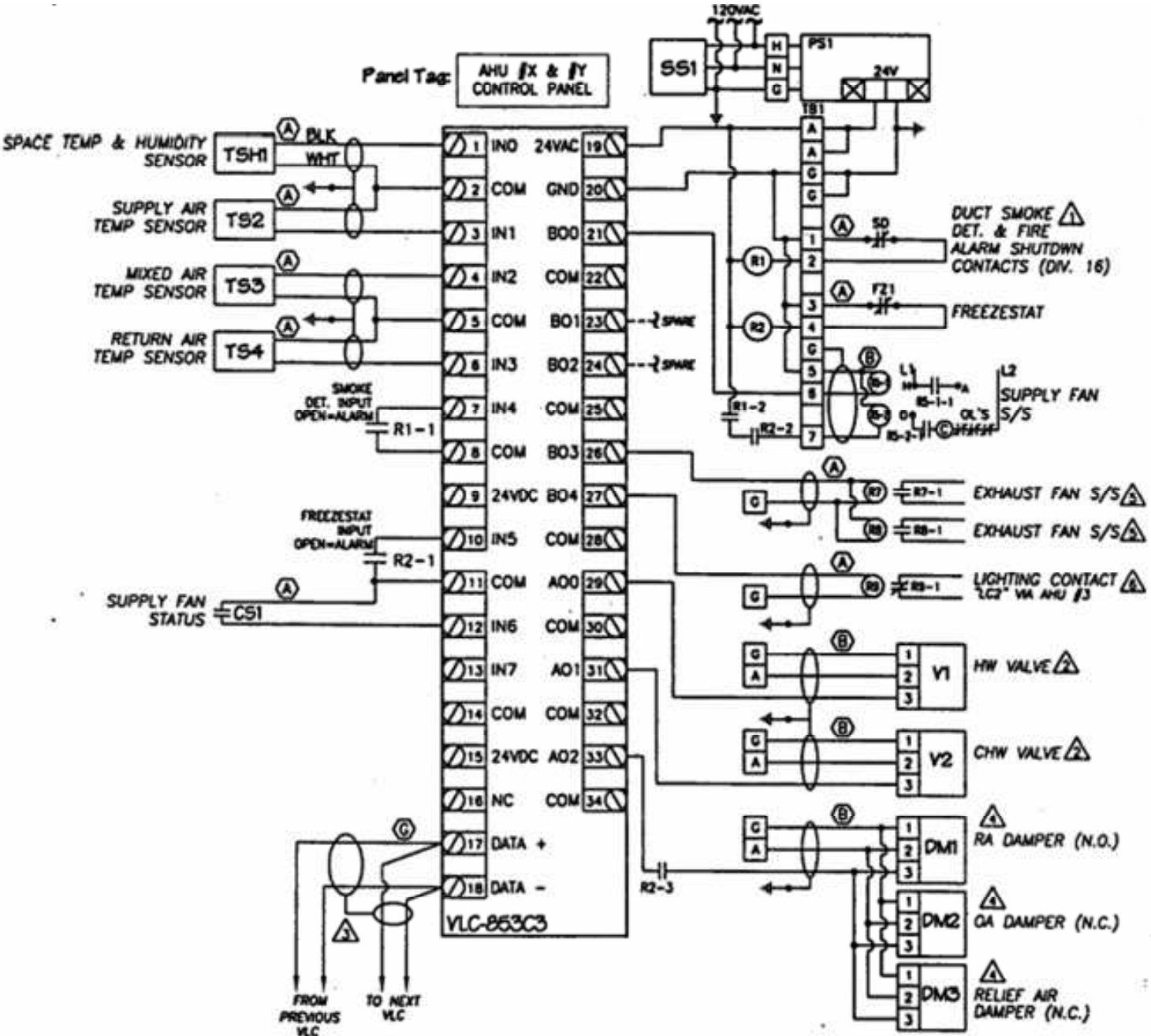
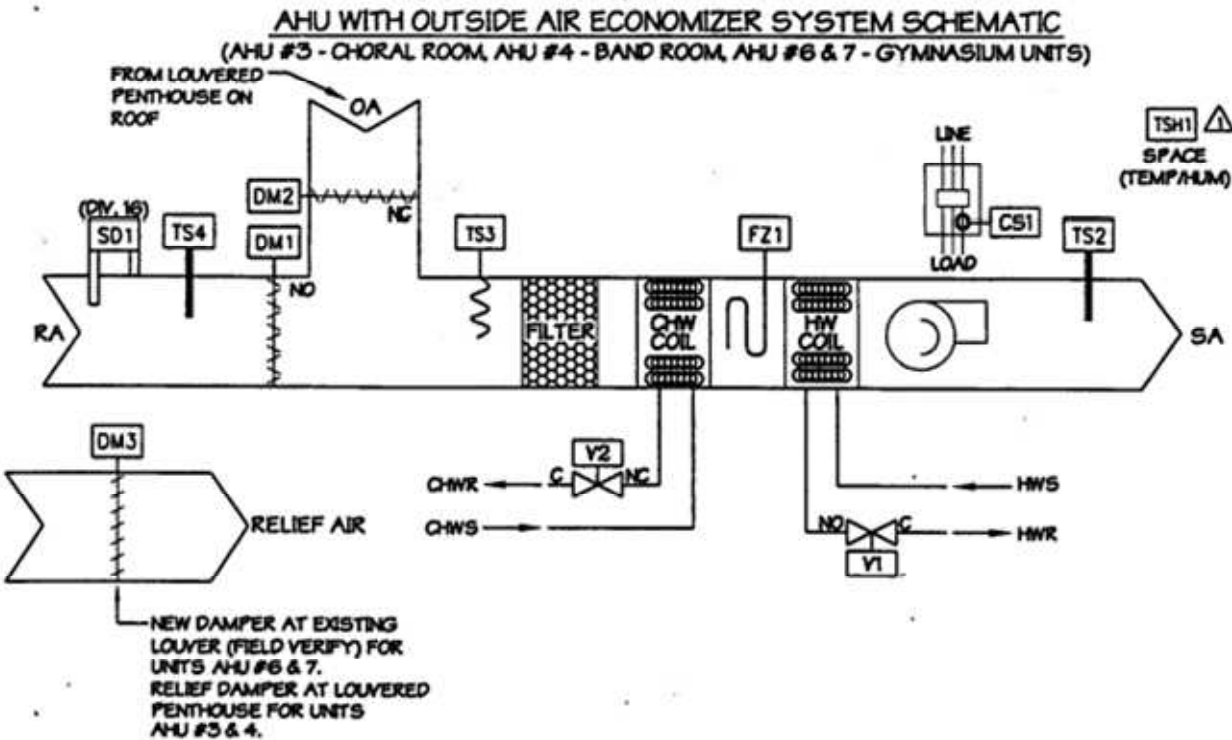
(APPLIES TO THE FOLLOWING UNITS: AHU #10, 17, 19, 26, 29 & 32).



AHU Integration 3/6

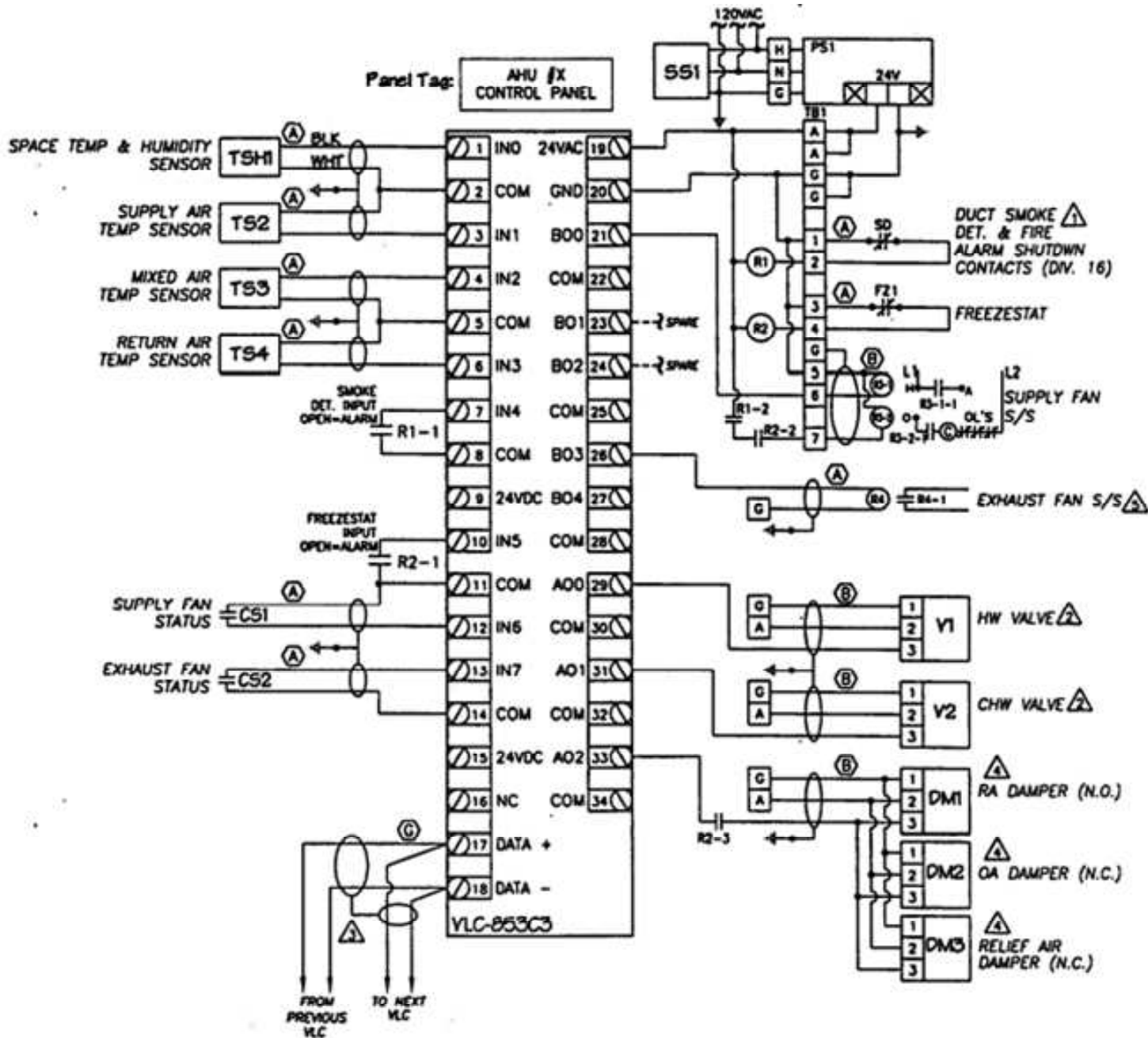
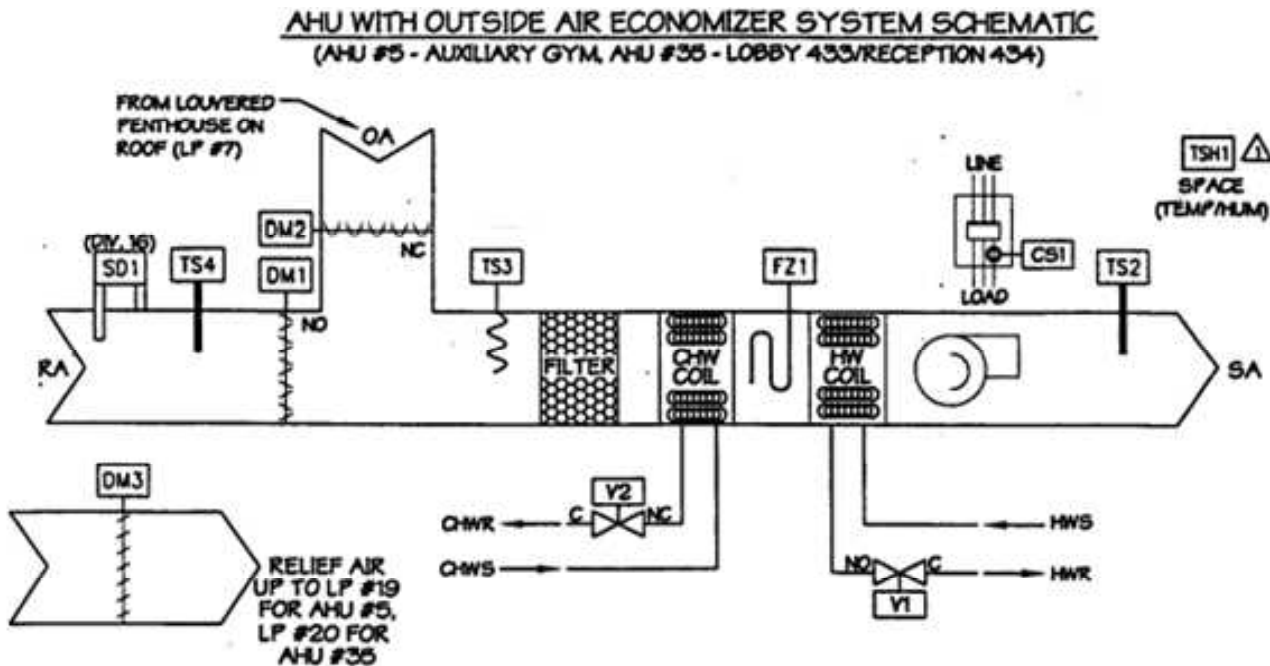


Per ECM-1.D, Hoffman to provide CO2 sensors for AHU-6 and 7. Provided and wired by Hoffman Building Technologies and wired to existing Alerton controller.



DCV (New Points)
Point Name
Room CO2

Per ECM-1.D, Hoffman to provide CO2 sensors for AHU-5. Provided and wired by Hoffman Building Technologies and wired to existing Alerton controller.



DCV (New Points)
Point Name
Room CO2

Revision:	Submitted
#	Change:
1	2
3	4
5	6

Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	RA
Designed by:	RA
Software by:	TJC
Checked by:	TJC

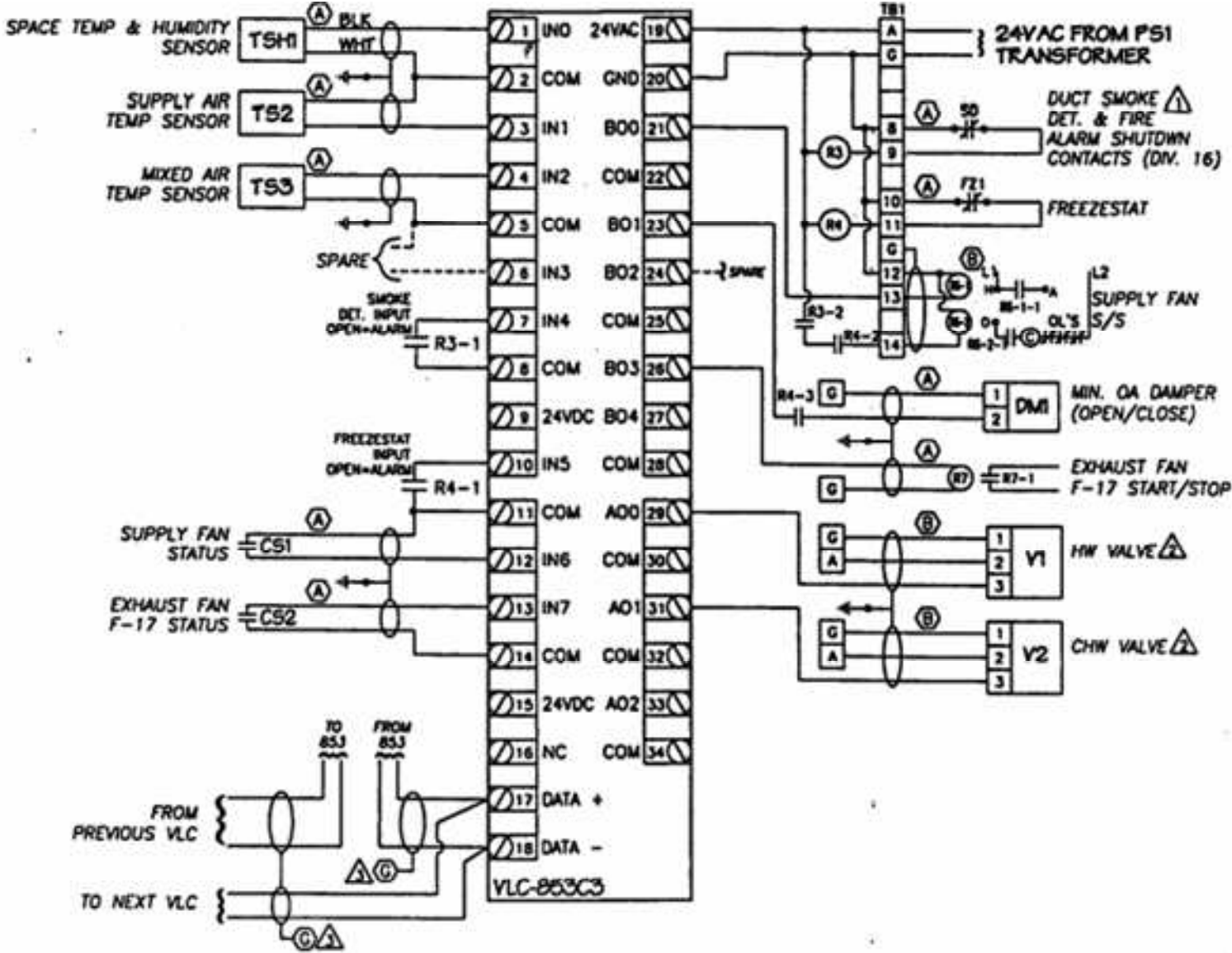
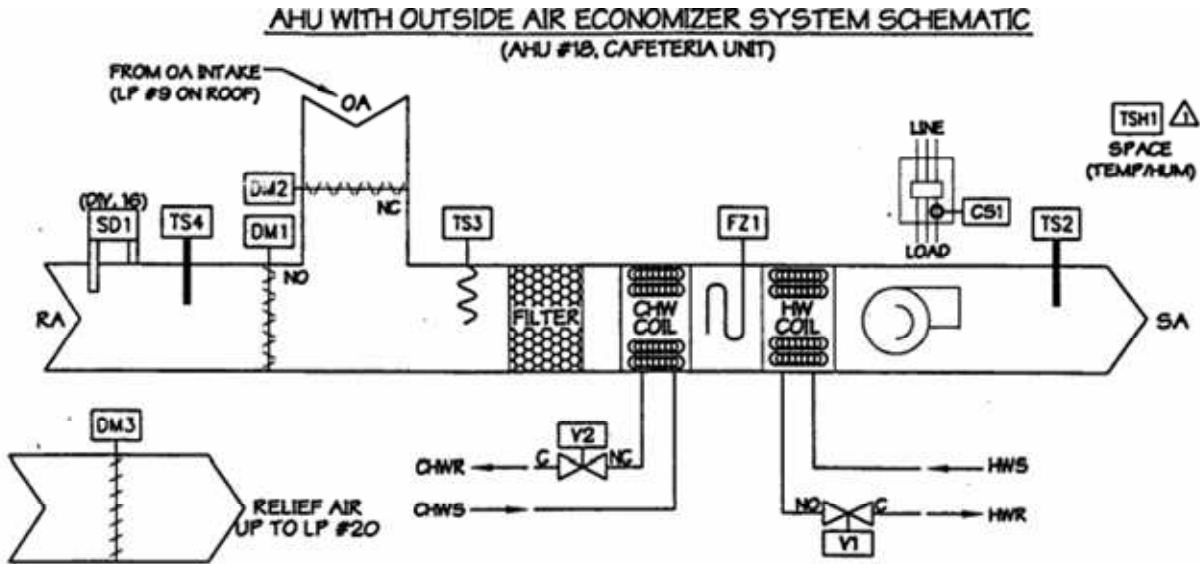
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AHU Integration 5/6

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Refer to Alerton control drawings for details

AHU Integration 6/6

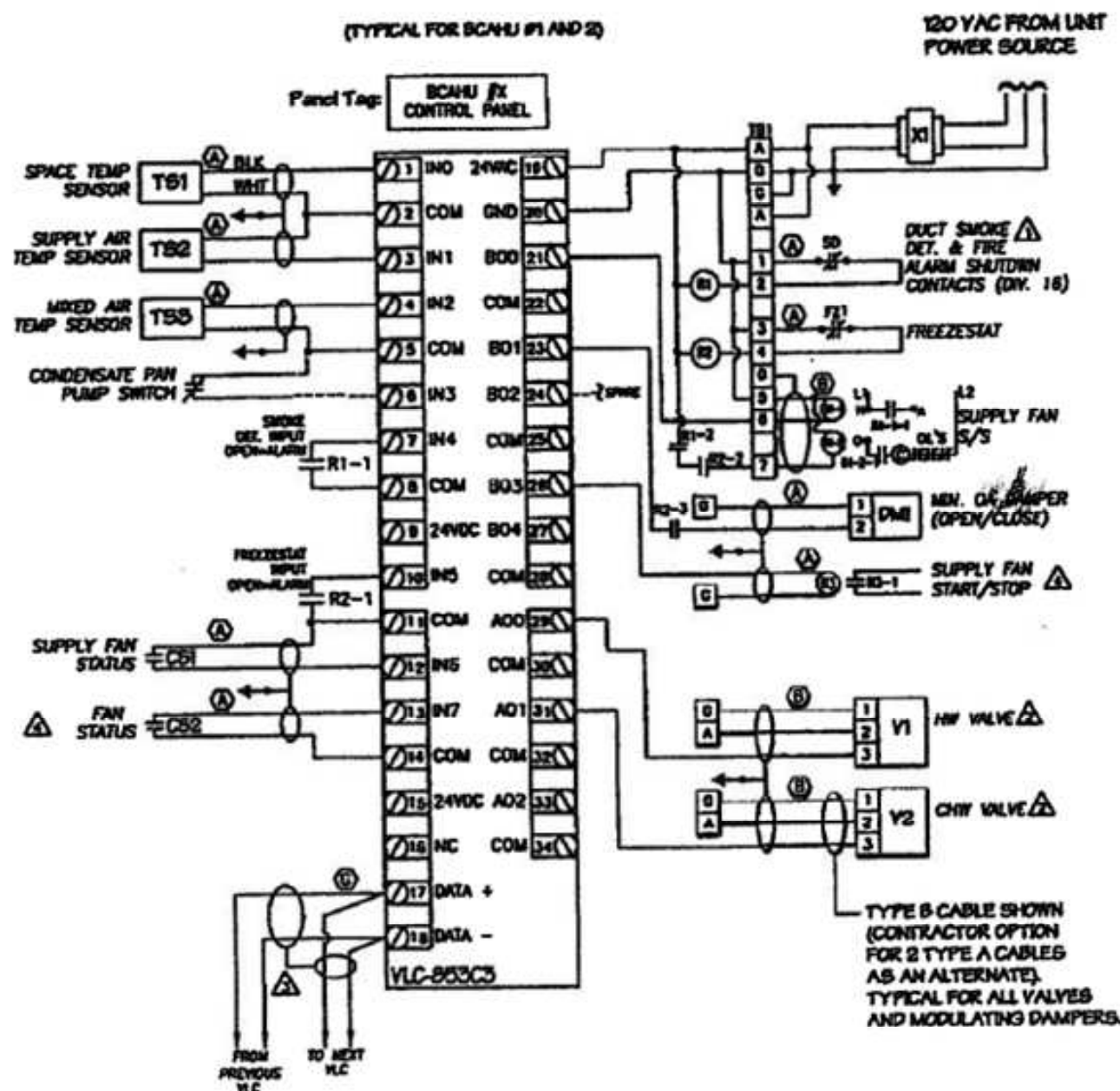
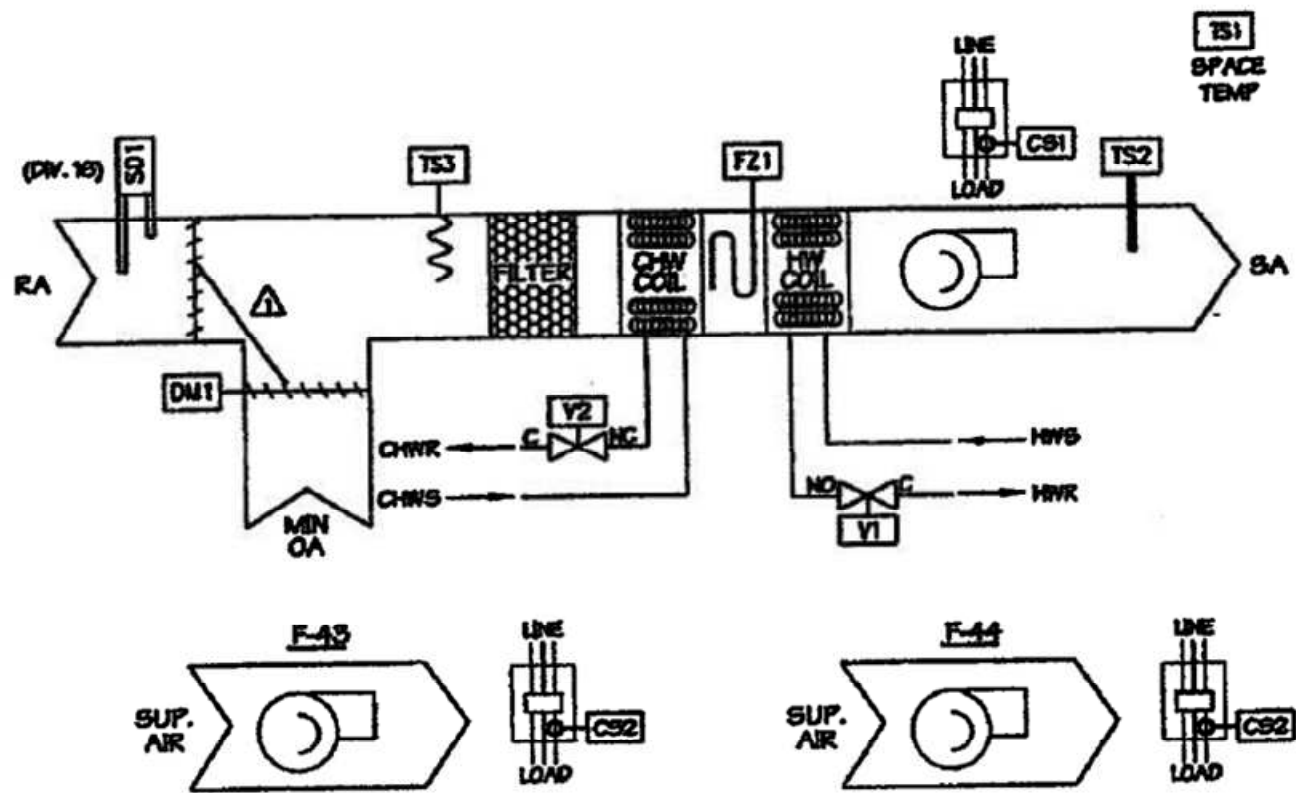
Per ECM-1.D, Hoffman to provide CO2 sensors for AHU-18. Provided and wired by Hoffman Building Technologies and wired to existing Alerton controller.



DCV (New Points)
Point Name
Room CO2

Refer to Alerton control drawings for details

BCAHU Integration



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10/10/2018

Architect

SE Energy & Sustainability Services

Engineer

Services

Contractor

RA

Designed by

TJC

Software by

TJC

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TJC

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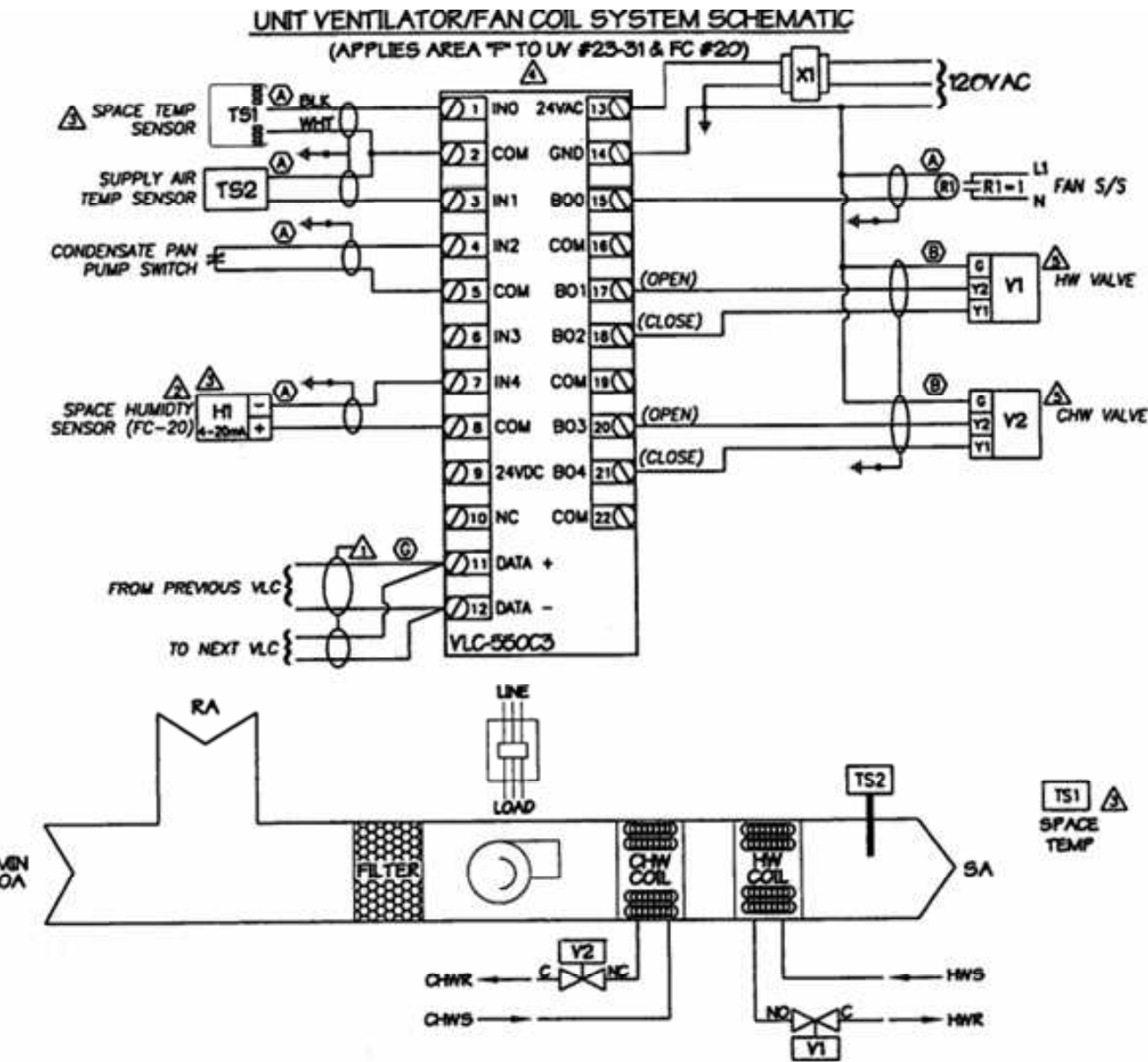
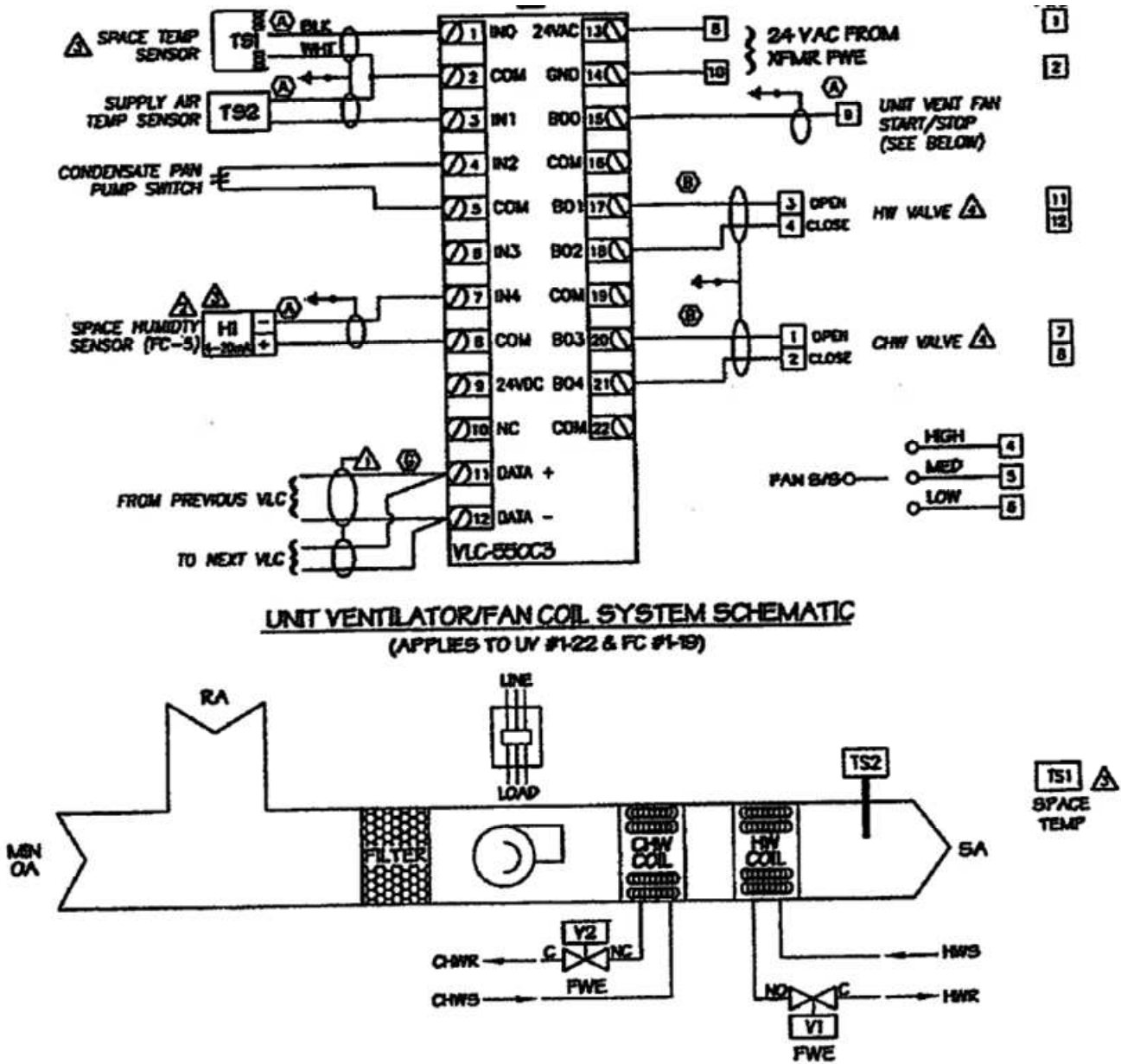
BCAHU Integration

SE Electric

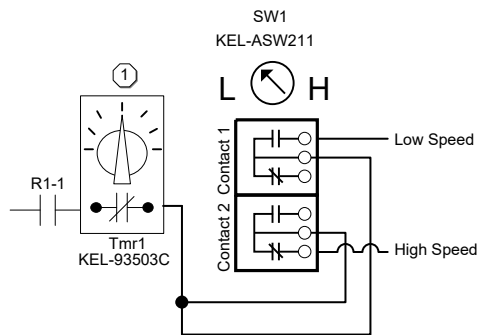
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Refer to Alerton control drawings for details

UV/FCU Integration



Unit Ventilator Hardwired Switch



Notes

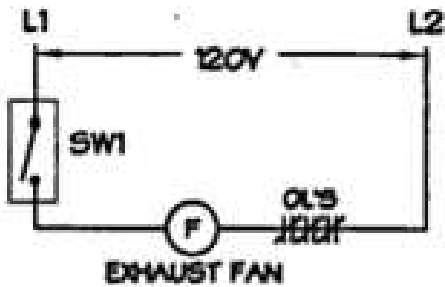
- 1 Nameplate is to be customized to have Low on the left side and High on the right side. Verify existing wiring to fan.

Bill of Material

UV Device	Qty	Part Number	Description	Manufacturer
SW1	39	KEL-ASW211	N.C. 7/8" 2-POSITION	IDEC
SW1_1	39	KEL-NWAL-CUSTOM	LEGEND PLATE WITH CUSTOM LETTE	Kele
SW1_2	39	KEL-SSG1-67	WALL PLATE: BOX MNT, 7/8" HOLE	IDEC
Tmr1	39	KEL-93503C	MAN TIME SWITCH 0-60 MIN	MH Rhodes Cramer Company

FAN WIRING DIAGRAM - SCHEMATIC "A"

(SCHEMATIC APPLIES TO TOILET FANS F-12,3 AND LAB EXHAUST FANS F-20, 21, 24, 26, 28, 30, 31, 34, 36 & 38, AND DISH RETURN ROOM FAN F-16)

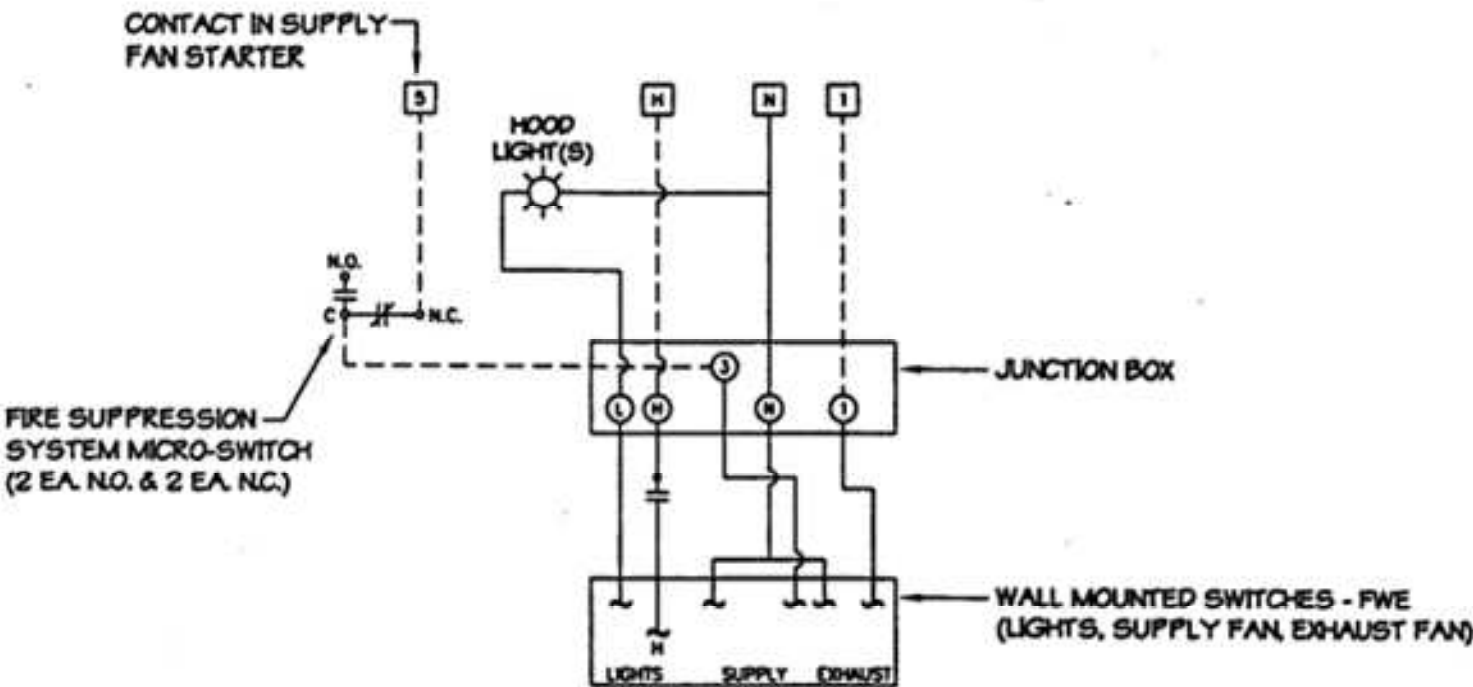
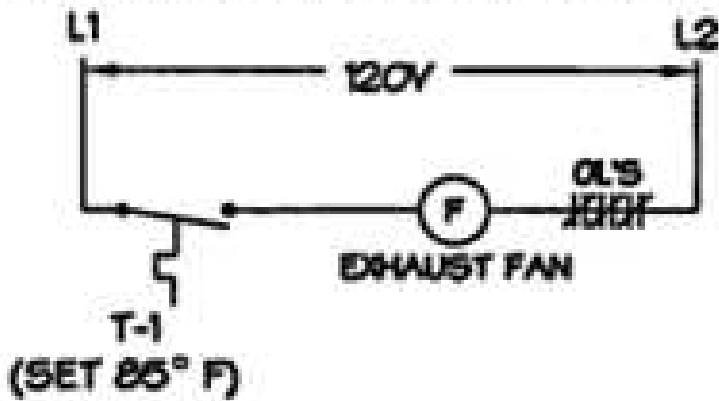


FAN WIRING DIAGRAM - SCHEMATIC "D"

(TYPICAL FOR FAN F-18 AND F-19)

FAN WIRING DIAGRAM - SCHEMATIC "C"

(SCHEMATIC APPLIES TO F-4, 5, 11, 15, 33, 36 & 39)



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Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	
Designed by:	RA
Software by:	TJC
Checked by:	
Date:	10/10/2018
Date:	10/10/2018
Date:	10/10/2018

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550 Whiteville Road
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EF Integration

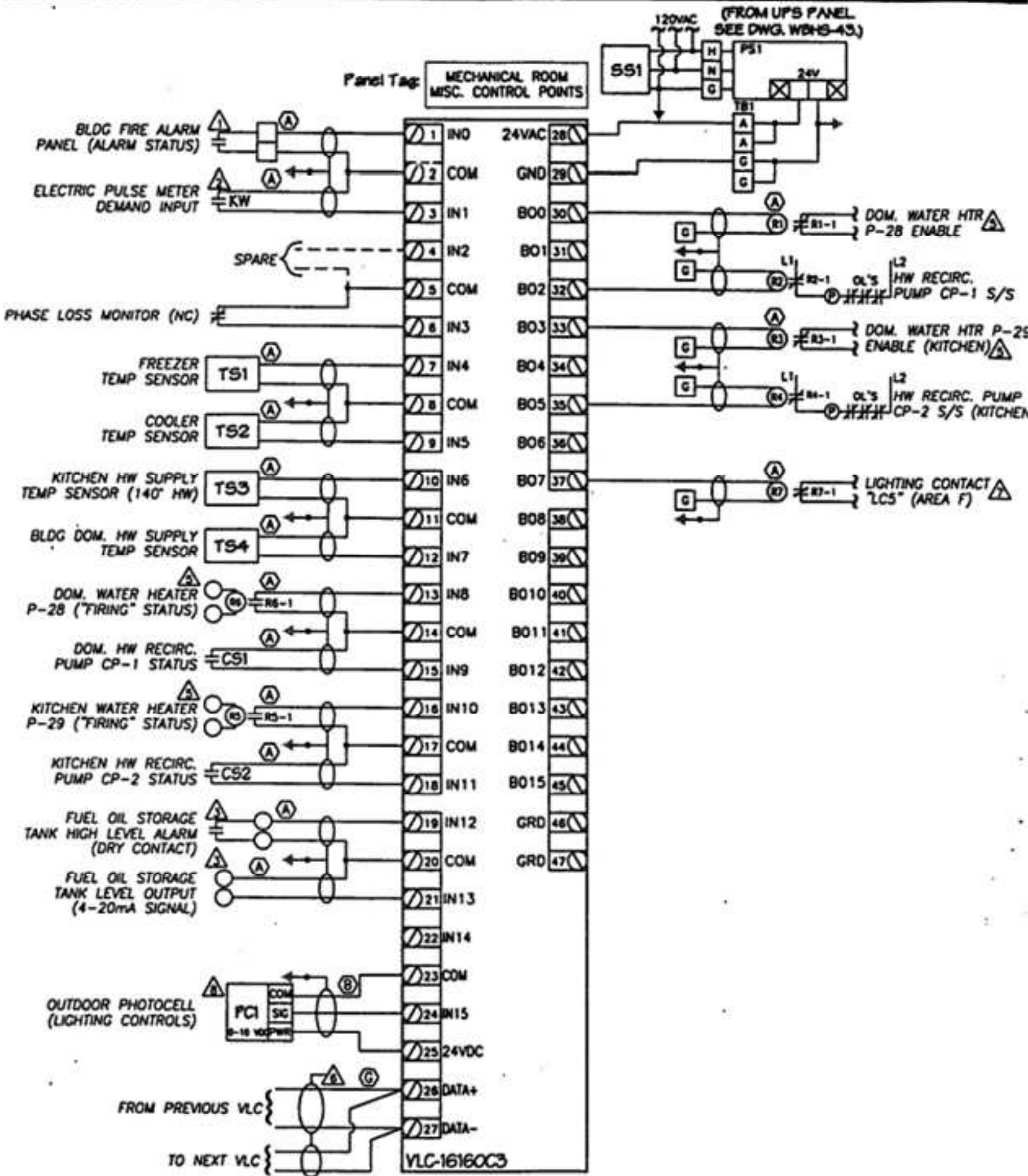
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Refer to Alerton control drawings for details

Dom HW/Misc Integration

Per ECM-11.A.2, Hoffman to replace existing kitchen domestic hot water heater with new propane heater. Provided and wired by Hoffman Building Technologies and wired to existing Alerton controller.

DHW Heater (New Point)
Point Name
DHW Heater Enable

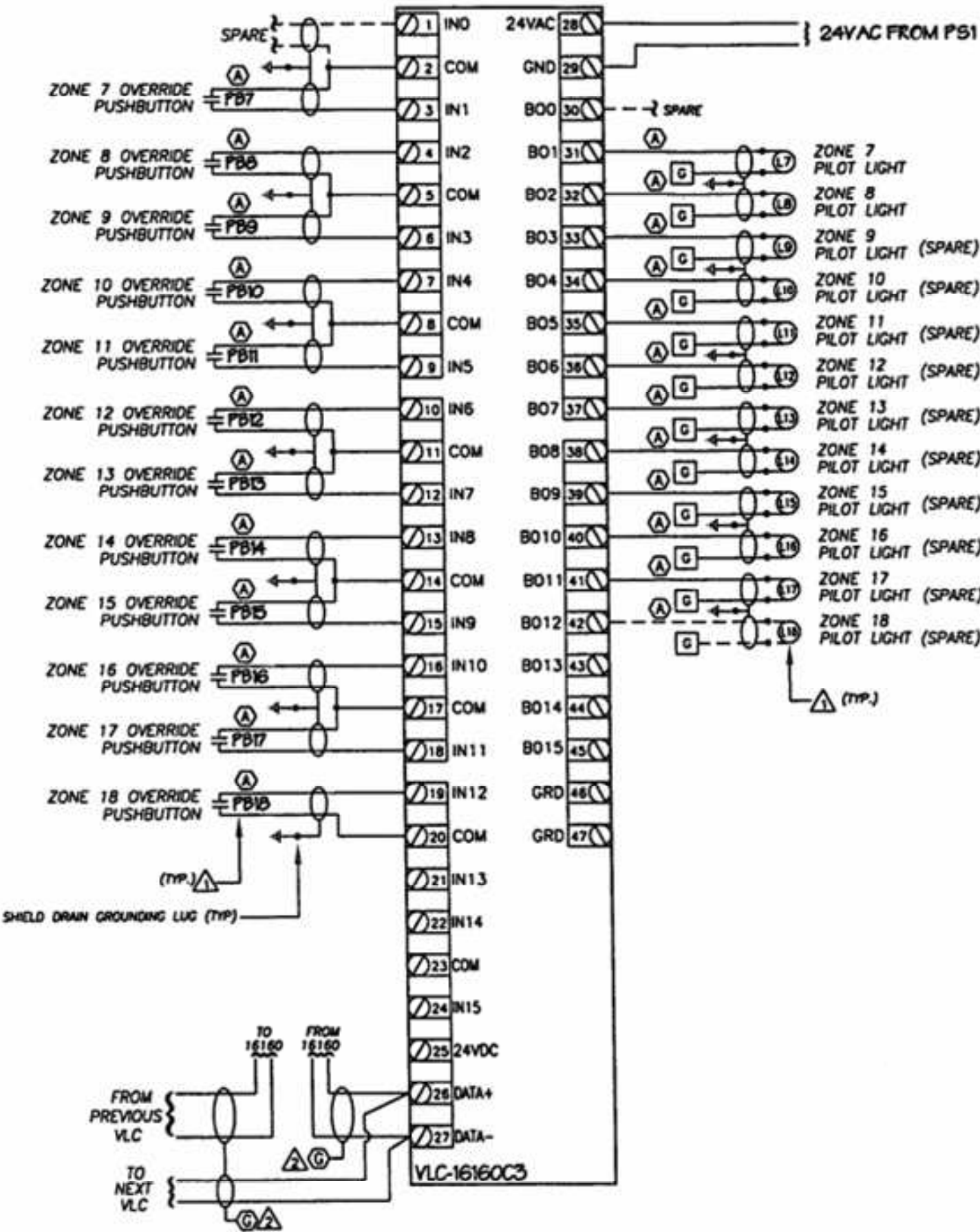


Revision:	Submitted	Date:
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Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	RA
Designed by:	RA
Software by:	TJC
Checked by:	TJC
Date:	10/10/2018
Date:	10/10/2018
Date:	10/10/2018

West Brunswick High School
550 Whiteville Road
NW Shalotte, NC 28470
Dom HW/Misc Integration

Job Number	RC-17C1227_C2
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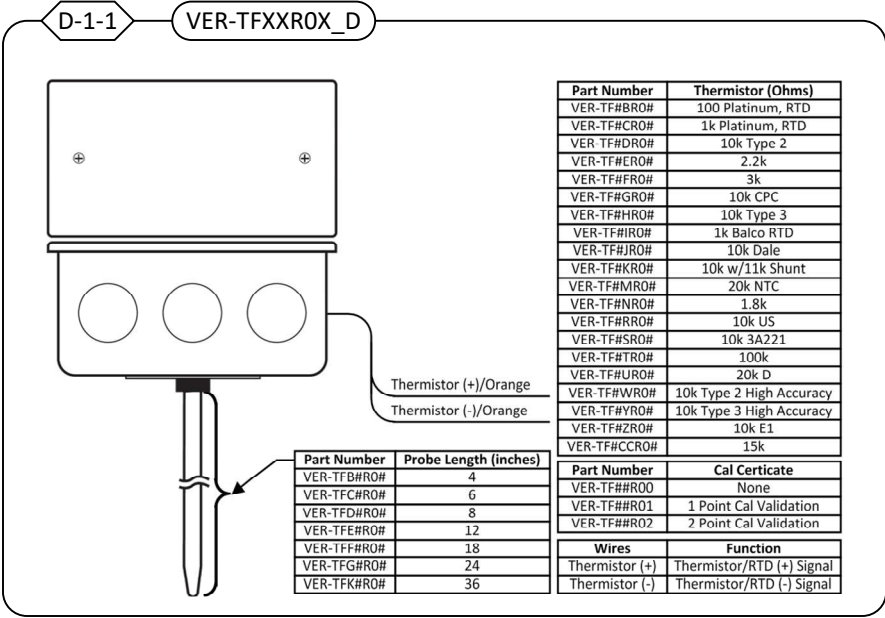


Revision:		Submitted	
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Architect:	SE Energy & Sustainability
Engineer:	Services
Contractor:	
Designed by:	RA
Software by:	
Checked by:	TJC
Date:	10/10/2018
Date:	10/10/2018
Date:	10/10/2018

West Brunswick High School
550 Whiteville Road
NW Shalotte, NC 28470
Override Panel Integration
Cont'd

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Device detail not available for all Schneider devices. Refer to System Detail pages for wiring.

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File Name

Detail

Drawing_vsd

Sheet Number

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West Brunswick High School

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Device Detail

Architect:

SE Energy & Sustainability

Engineer:

Services

Contractor:

RA

Designed by:

TJC

Software by:

TJC

Checked by:

TJC

Date:

10/10/2018

Date:

12/7/2017

Date:

10/10/2018

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Schneider Electric

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