Part 6 - Attachments
Base Bid - Building 1

1. Initial Building Survey Data
2. Building Plans

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/9/2015	**Building No.**	1
Building Name:	Applied Training Building	**Facility Type:**	Admin / Training
Facility Manager:	Lavern Rushin	**Jacobs CX Lead:**	Sam Ehreth
Building Monitor:	LS1 LOPEZ	**Jacobs CX Junior:**	Phil Dabrowski
		Jacobs Mech Engineer:	
		Jacobs Elec Engineer:	Dave Williams

1. Facility Investigation Narrative:	
Description:	The building is located South West corner of the base. The 2 story facility is used as training and administration The facility is about 50,618 square feet, built in 1964.
Facility Usage History:	The facility was designed with an auditorium, gymnasium, classrooms and offices.
Renovation History:	The original building was primarily the west half of the building. At some point, a building addition built the east half of the building. Airside systems were mostly kept separate between east in west. Some overlap in the HVAC water system occurs with the perimeter heating/cooling units in the offices.
As-Built Documents:	Control Drawings, Floor Plans & TABs documents where downloaded from the BAS when available. Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	Perimeter units constantly flood spaces with leaking pipes and leaking cooling coil condensate drain pans. Flushing of the piping systems is a temporary fix and is a reoccurring issue across all rooms. The gymnasium is hot and humid.
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	The original building (west) is served by (3) RTU's, water-to-water heat pumps, steam to hot water converter, and several 2-pipe perimeter fan coil units and above ceiling fan coil units. The newer portion of the building (east) that was not connected into the original HVAC hydronic system, is served by an air cooled chiller, (3) AHU's, and several above ceiling fan coil units. Exhaust and relief air is provided by exhaust fans and relief dampers. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
DDC Description:	Approximately 100% of the facility equipment has electric/electronic controls. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Lighting Description:	Lighting consists of 2x4, lay-in, parabolic and diffuser fixtures with T8 and u-tube fluorescent lamps. The building also uses 1x4, surface mount and lay-in 2 lamp T8 fluorescent fixtures and 2x2 indirect, lay-in, 2lamp fluorescent fixtures. Metal Halide, recessed and high-bay fixtures were also used. A significant amount of incandescent and halogen pendent fixtures were used. Motion sensor controls were not used. Exit and emergency lighting were well placed and responded to test conditions.
Equipment Deficiencies:	Generally, equipment was found to be in need of routine maintenance and cleaning (e.g. perimeter units flooding). Primary HVAC issue include not enough conditioned air in gymnasium and high humidity in all spaces due to poor performing equipment.
Other Information:	1) B-1 & B-2 have manual HW resets 2) RTU1/2 are all 100% Outside Air

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit: 11/9/2015
Building Name: Applied Training Building
Building No. 1
Facility Type: Admin / Training

Facility Manager: Lavern Rushin
Building Monitor: LS1 LOPEZ
Jacobs CX Lead: Sam Ehreth
Jacobs CX Junior: Phil Dabrowski
Jacobs Mech Engineer:
Jacobs Elec Engineer: Dave Williams

2. ECM Study Recommendations:	Priority
a. Replace 2-pipe perimeter units with 4-pipe system	M
b. Change all fixtures to LED equivalent using exiting circuits and switching.	M
c. Install ceiling mounted motion sensor control for rooms where motion sensors are not now used.	M
d. Replace the gym high ceiling diffusers with high velocity diffusers to push conditioned air to floor level.	L
e. Repair leaking cooling tower.	H
f. Replace Hot Water and Chilled water pumps for higher efficiency motors.	M

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning
a. RTU-1 and 2
b. WWHP-1 and 2
c. Chillers, Towers, and Pumps
d. MUA-1
e. HVU-1 and 2
f. AHU-1

4. Corrective Actions	Action Code
a. Replace perimeter units	3
b. Replace diffusers to better condition air near floor of gymnasium and adjust motor and sheaves to increase unit CFM's.	3
c. 213-315 (East Mechanical Room) has a leaking Chiller Pump & 100 FT of Insulation and Broken Temp Gauge (Inlet).	1
d. B-1 & B-2 are off but pumps are running.	1
e. RTU3 Fresh air hood has restricted air flow due to the return duct being to close (~ 7") to POE. Guarding is not secure (broken latch).	1
f. MAU-1 Filters need to be replaces.	1
g. HVU-2 has leaking filter seal door.	1

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a. Lighting monitoring at the switch level would require approximately 55 points.
b. Lighting monitoring at the circuit level would require approximately 245 points. This would avoid recircuiting non-lighting circuits from Lighting panels
c. Lighting monitoring at the panel level would require approximately 4 points. This may require recircuiting non-lighting circuits away from lighting panels.
d.
e.
f.

6. Recommended Mechanical Control Points:
a. Add AHU-1 that serves the women's locker room to the Automated Logic Control system (6 points).
b.
c.
d.
e.
f.

COOLING PLANT

Building Name: 1

DR C

CONTROL POINT NEEDED

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No ✓
Falls / Trips / Overhead	Yes___	No ✓
Extreme Room Temp	Yes___	No ✓
Hazardous Materials	Yes___	No ✓

Asbestos _____ Mold _____ Lead _____ Other _____

Chillers

WATER TO WATER HEAT PUMP

Tag	WW HP-2	WW HP-2	213 315		
Type	HP W A HR	W A HR	W A HR	W A HR	W A HR
Compressor	A C R S	A C R S	A C R (S)	A C R S	A C R S
Manufacturer	FHP	FHP	CARRIER AQUA SNAP		
Model Number	WP360-4CSN	WP240-4CSN	30 RAN 030 B		
Tons					
Age	>10 YEARS	> 10 Y			
Temp / Pressure gauges	Yes T No P	Yes T No P	Yes TP No___	Yes___ No___	Yes___ No___
°F CHW Temp	Supply 59 Return 50	Supply 68 Return 63	Supply NA Return NA	Supply___ Return___	Supply___ Return___
CHW Reset	OA L T	OA L T	OFF OA L T ?	OA L T	OA L T
Equipment Condition	1 2 3 (4) 5	1 2 3 (4) 5	1 2 3 (4) 5	1 2 3 4 5	1 2 3 4 5

100 FT of 4" insulation

Chiller Types
W - Water Cooled
A - Air Cooled
HR - Heat Recovery

Compressor Types
A - Absorption
C - Centrifugal
R - Reciprocating
S - Screw

CHW Reset TEMP BASED
OA - Outside Air OTP
L - Load
T - CHWR Temp

Condition
1. Non-functional / Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New
3.+ 4. Repair / RetroCx

Heat Rejection

Cooling Towers BAC Counter flow

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
CT 1	>10	# 1 @ ___Tons 1 Cells	✓Constant __VFD __Two Speed	✓Constant __VFD	__ Yes ✓No OA Temp___	1 2 (3) 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
CCBC-2	>10	# 1 @ ___Tons 1 Cells	✓Constant __VFD __Two Speed	✓Constant __VFD	__ Yes ✓No OA Temp___	1 2 (3) 4 5

EVAPCo

Condensing Units

Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ ___Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ ___Tons	__Constant __VFD __Two Speed	1 2 3 4 5

LSWA-58A2

~~CARRIER 30RAN030B-611EV~~

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ ___Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ ___Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ ___Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ ___Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
DR- Dry Cooler
C - Condensing Unit
EC - Evaporative Cooling
HP - Air to Air HP
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC

Notes / Potential ECM's: 213-315 (EAST MECHANICAL ROOM) LEAKING CHILLER PUMP & 100 FT of INSULATION
BROKEN TEMP GUAGE (INLET)

HEATING PLANT

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___ No___
Falls / Trips / Overhead	Yes___ No___
Extreme Boiler Room Temp	Yes___ No___
High Press Steam present	Yes___ No___
Hazardous Materials	Yes___ No___

Asbestos _____ Mold _____ Other _____

Boilers

Tag	B-1	B-2		
Type	HW	→		
Fuel	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P
Manufacturer	LAARS/SUMMIT	→		
Model Number	SMB-250N	→		
Capacity (mbh/lbsh)	257/231 mbh	→		
Age	DEC 2003	→		
Delivery Temp/Pressure	UNKNOWN	UNKNOWN		
Return Temp				
Steam Trap Type	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT
Steam Trap Condition	1 2 3 5	1 2 3 5	1 2 3 5	1 2 3 5
Breaching Type	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL
Breaching Condition	1 2 3 5	1 2 3 5	1 2 3 5	1 2 3 5
Boiler Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
HW Reset	MANUAL OA L T	MANUAL OA L T	OA L T	OA L T

Fuel Type
- **B** - Bio
- **C** - Coal
- **E** - Electric
- **FO2** - Fuel Oil#2
- **FO6** - Fuel Oil#6
- **NG** - Natural Gas
- **P** - Propane

Steam Trap Type
- **TS** - Thermostatic
- **F&T** - Float and Thermostatic
- **IB** - Inverted Bucket
- **OB** - Open bucket
- **DT** - Disk Trap
- **PT** - Piston Trap
- **OT** - Orifice Trap

Breaching Type
- **BRK** - Brick / Block
- **SS** - Stainless Steel
- **GAL** - Galvanized Steel
- **PLA** - Poly, PVC, CPVC
- **AL** - Aluminum AL29-4C

Note: ALL larger condensing boilers (>1000 MBH) **MUST** use AL29-4C

HW Reset
- **OA** - Outside Air
- **L** - Load
- **T** - HWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New

3 + 4. Repair / RetroCx

Notes / Potential ECM's: B-1 & B-2 PRESSURIZED - BOILER NOT HEATING WATER
PUMP IS RUNNING

AIRSIDE INFORMATION

Building Name: 1

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Mech Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

Tag	Manufacturer	Type	Supply Fan HP	5	VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
RTU 3	McQuay		Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	RDS708BY		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer	Y N	
For Local AHUs Only:	# of units: 1		Avg Capacity:	Tons	CFM				Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: ~~DISCONNECT OFF BUT RUNNING~~ FRESH AIR HOOD RESTRICTED
RTU 3 DOOR DOES NOT SEALED

Tag	Manufacturer	Type	Supply Fan HP	2	VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
RTU 2	McQuay	Chilled Cooling	Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	RDS708BY		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer	Y N	
For Local AHUs Only:	# of units: 1		Avg Capacity:	Tons	CFM				Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: 100% OUTSIDE AIR

Tag	Manufacturer	Type	Supply Fan HP	3	VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
RTU 1	McQuay		Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	RDS708BY		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer	Y N	
For Local AHUs Only:	# of units: 1		Avg Capacity:	Tons	CFM				Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: 100% OUTSIDE AIR

Central AHU Type
- **CAV** - Constant Volume
- **DD** - Dual Duct
- **HV** - Heating and Vent Unit
- **MZ** - Multizone
- **SZ** - Single Zone
- **VRH** - Var. Vol. w Reheat
- **VPFP** - Var. Vol. w Parallel FP Boxes
- **VSFP** - Var. Vol. w Series FP Boxes
- **VVVT** - Var. Vol. Var. Temp

Local AHU Type
- **2P FCU** - 2 pipe FCU
- **4P FCU** - 4 pipe FCU
- **ACB** - Active Chilled Beam
- **CRAC** - Computer Room AC
- **GSHP** - Ground Source HP
- **HP** - Air to Air HP
- **PCB** - Passive Chilled Beam
- **PTAC** - Packaged Terminal AC
- **SS** - Mini Split System
- **VRF** - Variable Refrig. Flow
- **WU** - Window AC
- **WSHP** - Water Source HP

Source
- **E** - Electric
- **HW** - Hot Water
- **NG** - Natural Gas
- **ST** - Steam
- **CHW** - Chilled Water
- **DX** - Direct Expansion

Controls
- **DDC** - Direct Digital Controls
- **E** - Electric/Local
- **H** - DDC/Pneumatic
- **P** - Pneumatic

Setbacks
- **P** - Static Pressure Reset
- **SA** - Supply Air Reset
- **T** - Unoccupied Space Temp

Energy Recovery
- **RA** - Runaround Loop
- **WA** - Wraparound Loop
- **EW** - Enthalpy Wheel
- **PL** - Plate Heat Exchanger

Flow Control
- **CV** - Constant Volume
- **Int** - Interminent
- **3SPD** - 3 Speed Control
- **VFD** - Variable Frequency Drive

Building Name:_____

Air Handling Units (Cont.)

Tag	Manufacturer	Type	Supply Fan HP	7.5	VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
MUA MAU-1	HEATEX	HEAT RECOVERY	Return Fan HP	3	VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	E-LASER-220/12-5200		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: FILTERS NEED REPLACED WOMENS LOCKER ROOM DEHUMIDIFIER

Tag	Manufacturer	Type	Supply Fan HP	VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
FAN COIL	ALL ROOMS	2 PIPE	Return Fan HP	VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	TRANE WOBMS6614		CFM		Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air		Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP	1.5	VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
HVU 2	DUNHAM/BUSH	HW	Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	VAH-40 B or BQ SN 5788		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units: 2		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: (6) 16X20 HVU2 (LEAKING FILTER DOOR SEALS)

Tag	Manufacturer	Type	Supply Fan HP	.5	VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU-1	DELTRON	PACKAGED HP	Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	DA3-007-43		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: AIR THERM DOOR HEATER 213327 (ASSET #) | 2nd floor 213943

Central AHU Type
- CAV - Constant Volume
- DD - Dual Duct
- HV - Heating and Vent Unit
- MZ - Multizone
- SZ - Single Zone
- VRH - Var. Vol. w/ Reheat
- VPFP - Var. Vol. w/ Parallel FP Boxes
- VSFP - Var. Vol. w/ Series FP Boxes
- VVVT - Var. Vol. Var. Temp

Local AHU Type
- 2P FCU - 2 pipe FCU
- 4P FCU - 4 pipe FCU
- ACB - Active Chilled Beam
- CRAC - Computer Room AC
- GSHP - Ground Source HP
- HP - Air to Air HP
- PCB - Passive Chilled Beam
- PTAC - Packaged Terminal AC
- SS - Mini Split System
- VRF - Variable Refrig. Flow
- WU - Window AC
- WSHP - Water Source HP

Source
- E - Electric
- HW - Hot Water
- NG - Natural Gas
- ST - Steam
- CHW - Chilled Water
- DX - Direct Expansion

Controls
- DDC - Direct Digital Controls
- E - Electric/Local
- H - DDC/Pneumatic
- P - Pneumatic

Setbacks
- P - Static Pressure Reset
- SA - Supply Air Reset
- T - Unoccupied Space Temp

Energy Recovery
- RA - Runaround Loop
- WA - Wraparound Loop
- EW - Enthalpy Wheel
- PL - Plate Heat Exchanger

Flow Control
- CV - Constant Volume
- Int - Interminent
- 3SPD - 3 Speed Control
- VFD - Variable Frequency Drive

ELECTRICAL SERVICE

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Elec Room Temp	Yes___	No___
Exposed / Bare Wiring	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Other _____

Main Utility Feeder(s)

Tag		
Type		
Manufacturer		
Model Number		
Capacity		
Age		
Voltage/phase/hertz		
Equipment Condition	1 2 3 4 5	1 2 3 4 5

Condition

1. Non-functional/Replace 2. Functional / Replace 3. Functional / Repair 4. Functional / RetroCx 5. Functional / New

Main Switchgear

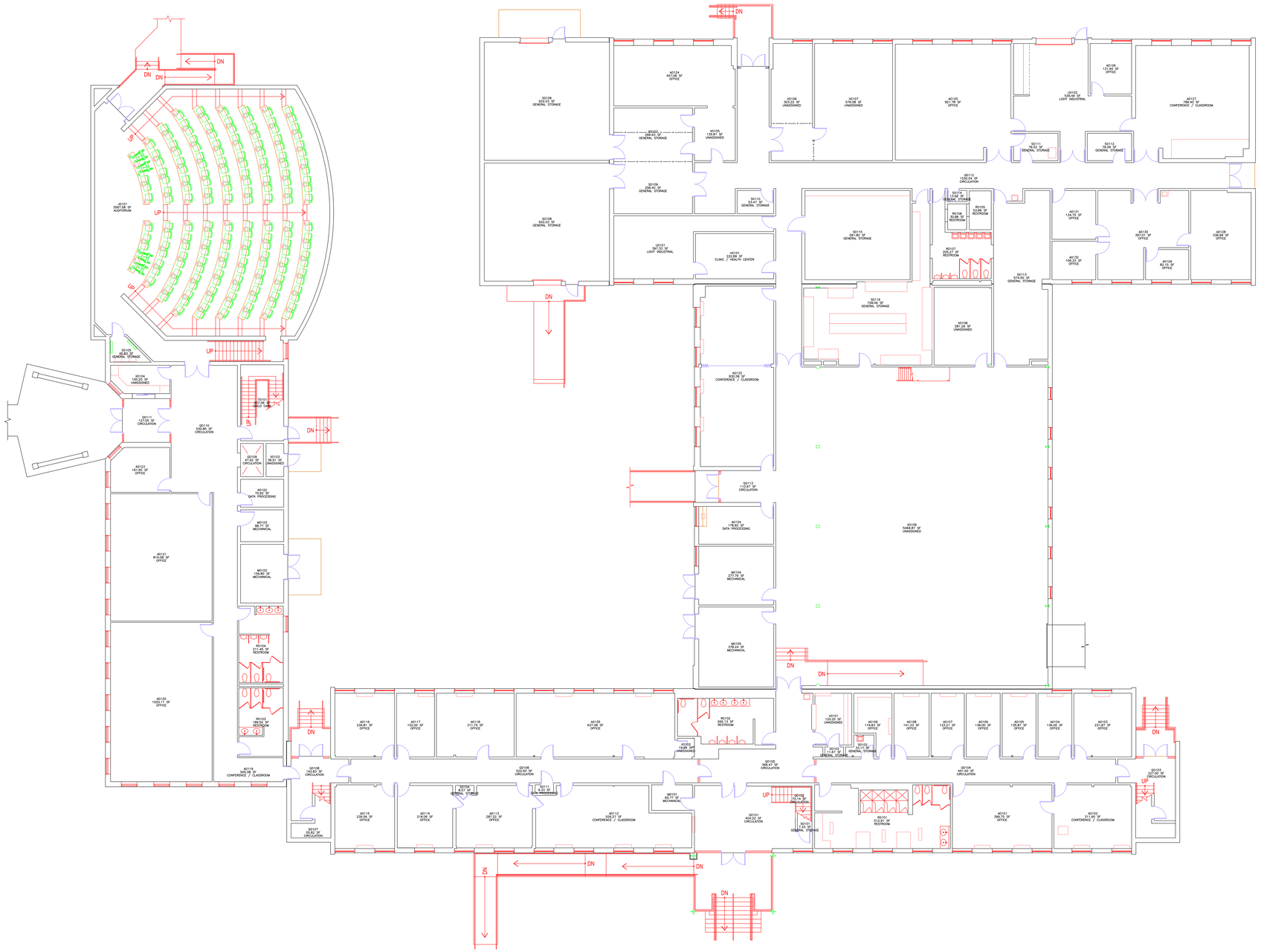
Tag				
Type				
Manufacturer				
Model Number				
Capacity				
Age				
Voltage/phase/hertz				
Equipment Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Distribution Panels / Motor Panels

Tag				
Type				
Location / Service				
Capacity				
Age				
Voltage/phase/hertz				
Equipment Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Notes/Potential ECMs:

111 - NEED MORE OUTLETS - SURGE PROTECTORS OVER USED



1 BUILDING 1 - FIRST FLOOR PLAN

Scale: GRAPHIC

0 20' 40'

NORTH

VERIFIED FLOOR PLAN - FOR OFFICIAL USE ONLY

NFA100001072634_1_01_FP.dwg 07 DEC 2011

NAVFAC MIDLANT GeoReadiness Center

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Building 1
First Floor

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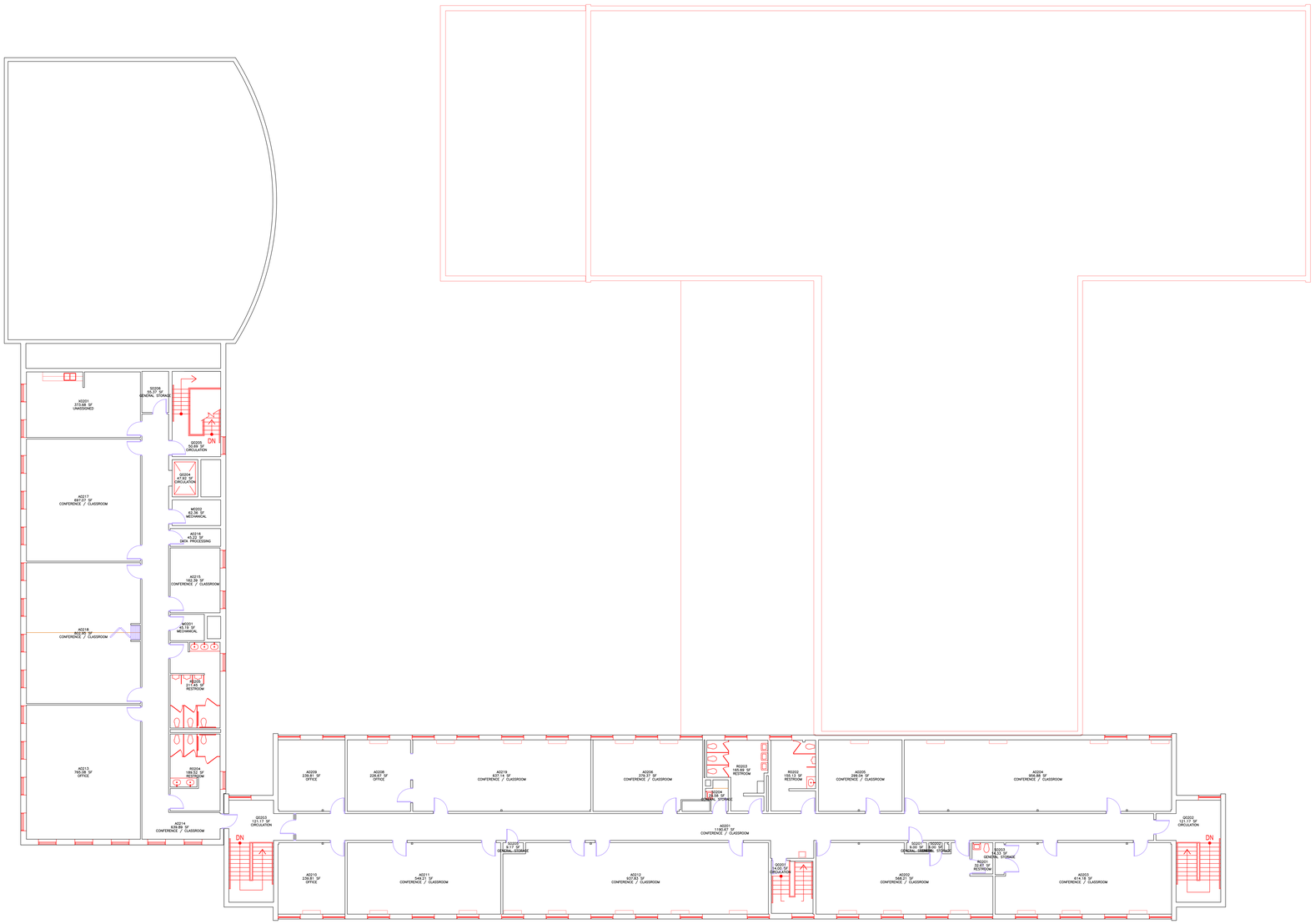
PWCNORVA_GIS_WEB@nmci-isf.com



1 BUILDING 1 - SECOND FLOOR PLAN

0 20' 40'

Scale: GRAPHIC

NORTH

VERIFIED FLOOR PLAN - FOR OFFICIAL USE ONLY

NFA100001072634_1_02_FP.dwg 07 DEC 2011

NAVFAC MIDLANT GeoReadiness Center

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Building 1
Second Floor

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Norfolk, VA 23511
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PWCNORVA_GIS_WEB@nmci-isf.com

Part 6 - Attachments
Base Bid - Building 112

1. Initial Building Survey Data
2. Building Plans

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/3/2015	**Building No.**	112
Building Name:	SWDG HQ	**Facility Type:**	Admin
Facility Manager:	Brian Savage	**Jacobs CX Lead:**	Sam Ehreth
Building Monitor:	Debbie Braun	**Jacobs CX Junior:**	Phil Dabrowski
		Jacobs Mech Engineer:	
		Jacobs Elec Engineer:	David Williams

1. Facility Investigation Narrative:	
Description:	The building is located at the southwest side of the base. The 1 story facility is used as an administrative and file storage area for ordinance management. The facility is about 16,858 square feet.
Facility Usage History:	The facility was originally designed/constructed as an ordinance storage area but has been converted to numerous office groups.
Renovation History:	Unknown.
As-Built Documents:	Control Drawings, Floor Plans & TABs documents where downloaded from the BAS when available. Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	The entry way FCU is broke and not working. Temperature control and reliability is an issue year round.
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	The building is installed with a 4-pipe system that is connected to air cooled chillers with constant flow and a steam to hot water heat exchanger with constant flow. Conditioned air is delivered to the spaces via an Air Handling Unit and fan coils. Exhaust and relief air is provided by exhaust fans and relief dampers. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
DDC Description:	Approximately 50% of the facility equipment has pneumatic/electric controls, the other 50% is electric/electronic controls. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Lighting Description:	Lighting consists primarily of 2x4, 4 lamp, diffuser, surface mount, and 2x4, 3 lamp, parabolic lay-in, T8 fluorescent fixtures. a few 2 x 4, 2 lamp, T8 fluorescent and recessed CFL fixtures were also used. Lighting levels seemed appropriate for most areas with a few slightly over lit. There is no motion detectors or daylighting control. Exit fixtures are well positioned but there were no emergency lighting fixtures installed. Spot checking of operation in the test battery mode confirmed proper operation.
Equipment Deficiencies:	Generally, equipment was found to be in need of routine maintenance and cleaning. The HVAC system issues included poor control of space temperature and humidity, insufficient chilled water/hot water flows, and low air flow. Refer to Section 2 & 4 for corrective issues and energy conversion measures. The envelope is failing in the area of FCU's 4 (broken), 5, and 6. The inability to control humidity in the spaces is contributing to the problem.
Other Information:	Mechanical and electrical rooms were typically found to be used for storage, limiting access to equipment. In some cases, old filters or other debris were found , which should be removed.

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/3/2015	**Building No.**	112
Building Name:	SWDG HQ	**Facility Type:**	Admin
Facility Manager:	Brian Savage	**Jacobs CX Lead:**	Sam Ehreth
Building Monitor:	Debbie Braun	**Jacobs CX Junior:**	Phil Dabrowski
		Jacobs Mech Engineer:	
		Jacobs Elec Engineer:	David Williams

2. ECM Study Recommendations:	Priority
a. Add motion sensors to control lighting in training areas and MWR Admin areas where applicable.	M
b. Replace all lighting with LED fixtures. Use existing circuits and switching.	M
c. Replace Hot Water and Chilled water pumps for higher efficiency motors.	M
d.	
e.	
f.	

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning
a. AHU
b. Pumps
c. Chillers
d. FCU's
e.
f.

4. Corrective Actions	Action Code
a. Install emergency lighting fixtures.	2
b. Repair entryway FCU (#4).	2
c. Cleaning coils for chiller and air handling units	2
d.	
e.	
f.	

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a. Lighting monitoring at the switch level would require 40 points.
b. Lighting monitoring at the circuit level would require 13 points. This would avoid recircuiting non-lighting circuits from Lighting panels
c. Lighting monitoring at the panel level would require 1 point. This may require recircuiting non lighting circuits away from lighting panels.
d.
e.
f.

6. Recommended Mechanical Control Points:
a.
b.
c.
d.
e.
f.

COOLING PLANT

Building Name: 112

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Chillers

Tag	CH-1 R22				
Type	W (A) HR	W A HR	W A HR	W A HR	W A HR
Compressor	A (C) R S	A C R S	A C R S	A C R S	A C R S
Manufacturer	TRANE				
Model Number	RTAAD004XN				
Tons	+10 YRS				
Age					
Temp / Pressure gauges	Yes___ No ✓	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___
CHW Temp	Supply ?___ Return ?___	Supply___ Return___	Supply___ Return___	Supply___ Return___	Supply___ Return___
CHW Reset	OA L T ?	→ TEMP RESET OA L T	OA L T	OA L T	OA L T
Equipment Condition	1 2 3 (4) 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Chiller Types
W - Water Cooled
A - Air Cooled
HR - Heat Recovery

Compressor Types
A - Absorption
C - Centrifugal
R - Reciprocating
S - Screw

CHW Reset
OA - Outside Air
L - Load
T - CHWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New
3.+ 4. Repair / RetroCx

Heat Rejection

Cooling Towers

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5

Condensing Units

Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
DR- Dry Cooler
C - Condensing Unit
EC - Evaporative Cooling
HP - Air to Air HP
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC

Notes / Potential ECM's: _____

HEATING PLANT

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Boiler Room Temp	Yes___	No___
High Press Steam present	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Other _____

Boilers

Tag				
Type				
Fuel	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P
Manufacturer				
Model Number				
Capacity (mbh/lbsh)				
Age				
Delivery Temp/Pressure				
Return Temp				
Steam Trap Type	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT
Steam Trap Condition	1 2 3 5	1 2 3 5	1 2 3 5	1 2 3 5
Breaching Type	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL
Breaching Condition	1 2 3 5	1 2 3 5	1 2 3 5	1 2 3 5
Boiler Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
HW Reset	OA L T	OA L T	OA L T	OA L T

Fuel Type
- **B** - Bio
- **C** - Coal
- **E** - Electric
- **FO2** - Fuel Oil#2
- **FO6** - Fuel Oil#6
- **NG** - Natural Gas
- **P** - Propane

Steam Trap Type
- **TS** - Thermostatic
- **F&T** - Float and Thermostatic
- **IB** - Inverted Bucket
- **OB** - Open bucket
- **DT** - Disk Trap
- **PT** - Piston Trap
- **OT** - Orifice Trap

Breaching Type
- **BRK** - Brick / Block
- **SS** - Stainless Steel
- **GAL** - Galvanized Steel
- **PLA** - Poly, PVC, CPVC
- **AL** - Aluminum AL29-4C

Note: ALL larger condensing boilers (>1000 MBH) **MUST** use AL29-4C

HW Reset
- **OA** - Outside Air
- **L** - Load
- **T** - HWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New

3 + 4. Repair / RetroCx

Notes / Potential ECM's: _____

* Steam → HW HTX

AIRSIDE INFORMATION

Building Name: 12

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Mech Room Temp	Yes___	No___
Hazardous Materials	Yes X	No___

Asbestos _____ Mold X Lead _____ Other _____

Air Handling Units

Tag	Manufacturer	Type	Supply Fan HP		VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
ENTRY	McQUAY	F/C	Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	?		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	(1) 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: NOT WORKING FOR 1 YEAR 30" WIDE UNIT

FCU-5

Tag	Manufacturer	Type	Supply Fan HP		VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
CONFRM A	McQUAY	F/C	Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 (3 4) 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

FCU-6

Tag	Manufacturer	Type	Supply Fan HP		VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
CONFRM B	McQUAY	F/C	Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 (3 4) 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Central AHU Type
CAV - Constant Volume
DD - Dual Duct
HV - Heating and Vent Unit
MZ - Multizone
SZ - Single Zone
VRH - Var. Vol. w Reheat
VPFP - Var. Vol. w Parallel FP Boxes
VSFP - Var. Vol. w Series FP Boxes
VVVT - Var. Vol. Var. Temp

Local AHU Type
2P FCU - 2 pipe FCU
4P FCU - 4 pipe FCU
ACB - Active Chilled Beam
CRAC - Computer Room AC
GSHP - Ground Source HP
HP - Air to Air HP
PCB - Passive Chilled Beam
PTAC - Packaged Terminal AC
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC
WSHP - Water Source HP

Source
E - Electric
HW - Hot Water
NG - Natural Gas
ST - Steam
CHW - Chilled Water
DX - Direct Expansion

Controls
DDC - Direct Digital Controls
E - Electric/Local
H - DDC/Pneumatic
P - Pneumatic

Setbacks
P - Static Pressure Reset
SA - Supply Air Reset
T - Unoccupied Space Temp

Energy Recovery
RA - Runaround Loop
WA - Wraparound Loop
EW - Enthalpy Wheel
PL - Plate Heat Exchanger

Flow Control
CV - Constant Volume
Int - Intermittent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive

FCU-1/2/3 LARGE OPEN OFFICE AREA
McQUAY F/C (3-4) RATING

Building Name:_____

Air Handling Units (Cont.)

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
ENTRY FCU-7	McQUAY		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons			CFM	Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: ENTRY OFFICES

CONF/CO

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
FCU 8	McQUAY		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons			CFM	Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: NO CONTROL / UNDER PERFORMING

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU-1	McQUAY	AHU	Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	LSL1280V		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units: 1		Avg Capacity:		Tons			CFM	Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP	?	VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
IT Room	DATA AIR	CRAC	Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons			CFM	Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: 6' TALL X 5' WIDE X 4' DEEP 26' x 46' LIGHT! DATA CENTER

Central AHU Type
CAV - Constant Volume
DD - Dual Duct
HV - Heating and Vent Unit
MZ - Multizone
SZ - Single Zone
VRH - Var. Vol. w Reheat
VPFP - Var. Vol. w Parallel FP Boxes
VSFP - Var. Vol. w Series FP Boxes
VVVT - Var. Vol. Var. Temp

Local AHU Type
2P FCU - 2 pipe FCU
4P FCU - 4 pipe FCU
ACB - Active Chilled Beam
CRAC - Computer Room AC
GSHP - Ground Source HP
HP - Air to Air HP
PCB - Passive Chilled Beam
PTAC - Packaged Terminal AC
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC
WSHP - Water Source HP

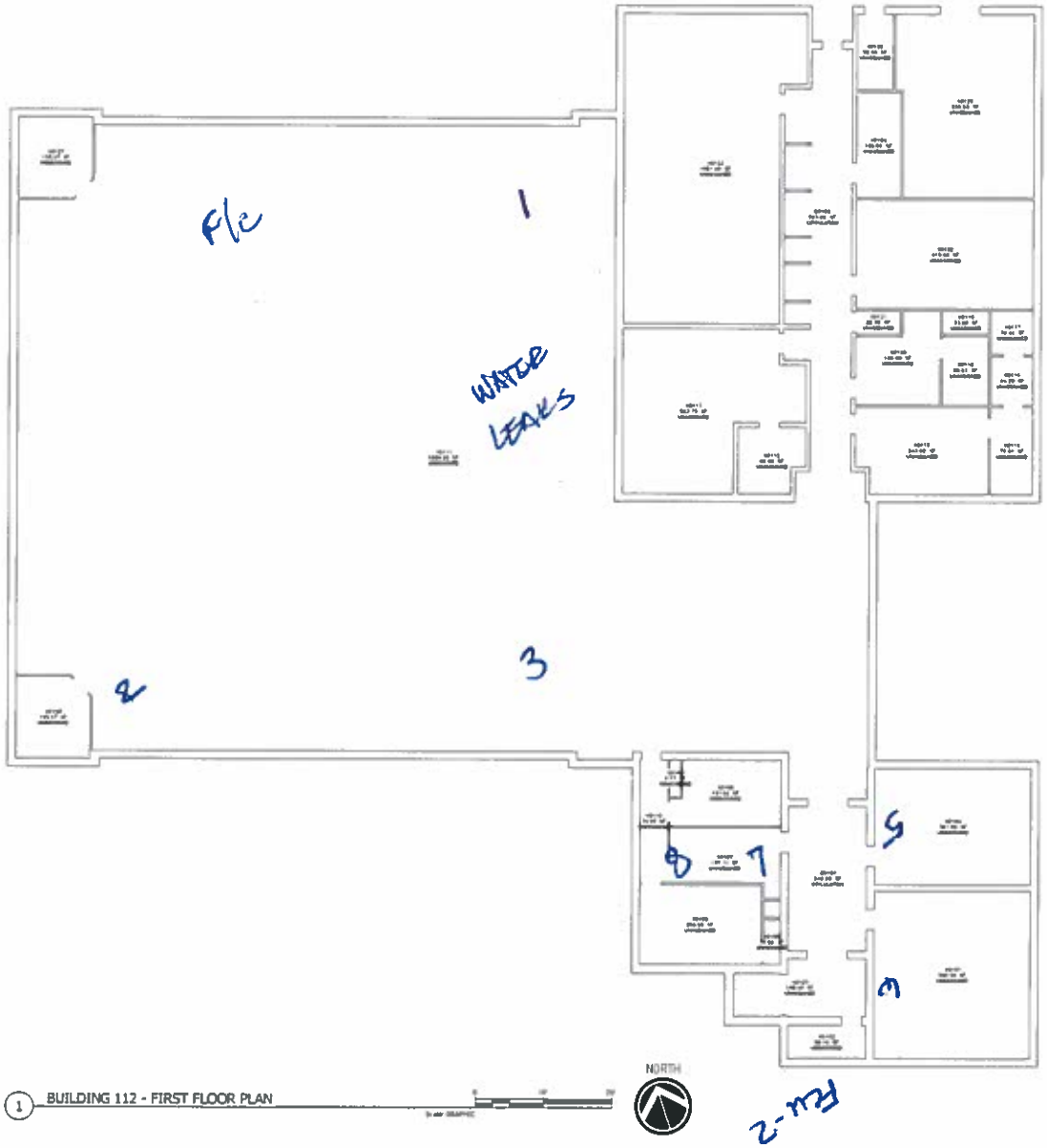
Source
E - Electric
HW - Hot Water
NG - Natural Gas
ST - Steam
CHW - Chilled Water
DX - Direct Expansion

Controls
DDC - Direct Digital Controls
E - Electric Local
H - DDC/Pneumatic
P - Pneumatic

Setbacks
P - Static Pressure Reset
SA - Supply Air Reset
T - Unoccupied Space Temp

Energy Recovery
RA - Runaround Loop
WA - Wraparound Loop
EW - Enthalpy Wheel
PL - Plate Heat Exchanger

Flow Control
CV - Constant Volume
Int - Interminent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive



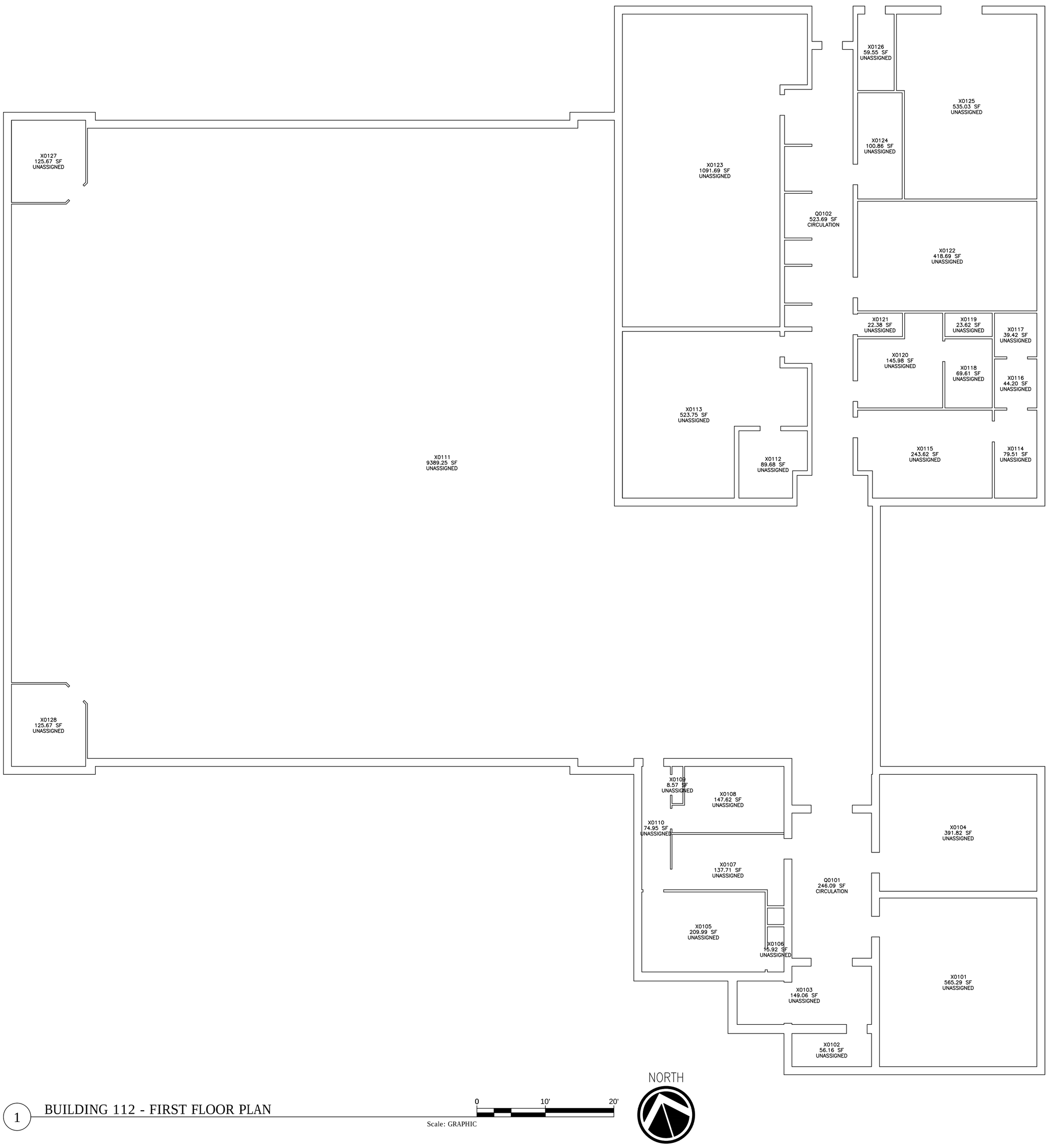
1 BUILDING 112 - FIRST FLOOR PLAN

NAVFAC MIDLANT GeoReadiness Center

Building 112
First Floor

BD-GIS MID-Atlantic
Norfolk, VA 23511
(757) 444-4718
PWCNORVA_GIS_WEB@navfac-bd.com

VERIFIED FLOOR PLAN - FOR OFFICIAL USE ONLY



1 BUILDING 112 - FIRST FLOOR PLAN

VERIFIED FLOOR PLAN - FOR OFFICIAL USE ONLY

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NAVFAC MIDLANT GeoReadiness Center

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Building 112
First Floor

BD-GIS Mid-Atlantic
Norfolk, VA 23511
(757) 444-4716
PWCNORVA_GIS_WEB@nmci-isf.com

Part 6 - Attachments
Base Bid - Building 3144

1. Initial Building Survey Data
2. Building Plans

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/9/2015	**Building No.**	3144
Building Name:	Operations Administration	**Facility Type:**	Admin / Maint / Training
Facility Manager:	Lavern Rushin	**Jacobs CX Lead:**	Ross Watson
Building Monitor:	BMC Rio Brown	**Jacobs CX Junior:**	Andy Huynh
		Jacobs Mech Engineer:	Trevor Behar
		Jacobs Elec Engineer:	David Williams

1. Facility Investigation Narrative:	
Description:	The building is located in the north side of the base. The single story building is used as an area to facilitate operations, administration, and training for the Beachmaster Unit 2. The facility is about 32,000 square feet.
Facility Usage History:	The facility appears to have been developed as an equipment repair facility with administration support.
Renovation History:	Several of the building interior spaces have been redesigned to provide more offices and living quarters within the facility. The space has been heavily retrofit above the ceiling with loose wires and mechanical systems in disarray.
As-Built Documents:	Control Drawings, Floor Plans & TAB documents were downloaded from the BAS when available. Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	Lighting occupancy sensors do not operate within the corridors and are manually turned on. Portable AC units are installed within certain spaces to make-up for the lack of cooling (26 installed, see picture). The space is occupied for 24 hours a day with about 20 occupants during the night to 160 during the day. Offices in between the bays lack cooling and air circulation. The corridors are warm due to the lack of diffusers. The facility lacks emergency back-up power sources, and there has been reports of numerous power outages. There is a lack of heat removal and ventilation, which
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	The facility consist of a chiller and steam to hot water heat exchanger to provide cooling and heating from three air handlers that are multi-zoned. The multi-zone splits the supply duct into multiple ducts with actuators to control the amount of supplied air to each zone. The air-handling units are served by a single dual temperature coil which provides heating or cooling depending on the season. The chiller has a single pump to circulate water. The steam hot water system also has a pump to circulate hot water. The air handlers require compressed air for electro-pneumatic controls.
DDC Description:	The chiller, steam heat exchanger, air handling units, and heating ventilation units are on the DDC. The units run based on temperature satisfactions from the thermostats.
Lighting Description:	Lighting consists of a large amount of 2x4, diffuser lay-in and 1x4, T8 fluorescent fixtures . High bay metal halide fixtures have just been installed. There are a few incandescent pendant mount, 2x4 and 2x2 diffuser lay-in fixtures also used. Exit and emergency lighting is well placed. Fifty percent of these have been replaced with new LED units. Motion sensors are installed in some office and aisle way areas. it is reported that lamps are burning out frequently.
Equipment Deficiencies:	Some of the air handling unit dampers for outside air do not modulate. Insulation above ceiling tiles have been tampered and not sufficient. Heating ventilation unit HVU 3A is inoperable with an open fan panel. The HVAC systems have not been maintained properly, in part due to poor accessibility.
Other Information:	The single story building was constructed with a metal pitched roof with shingles. The shingles seem to be a new addition due to potential past roof leaks. The facility also has three bays where training takes place for mechanics. There seems to be a minimal amounts of penetrations for exhausting air. The building pressure is questionable.

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/9/2015	**Building No.**	3144
Building Name:	Operations Administration	**Facility Type:**	Admin / Maint / Training
Facility Manager:	Lavern Rushin	**Jacobs CX Lead:**	Ross Watson
Building Monitor:	BMC Rio Brown	**Jacobs CX Junior:**	Andy Huynh
		Jacobs Mech Engineer:	Trevor Behar
		Jacobs Elec Engineer:	David Williams

2. ECM Study Recommendations:	Priority
a. Insulate above ceiling to minimize heat transfer between ceiling plenum and occupied spaces.	M
b. Replace Hot Water and Chilled water pumps for higher efficiency motors.	M
c. Replace pneumatic controls with electronic controls	H
d. Insulate Pump Heads	M
e. Remove 25+ portable coolers, see picture, by replacing air handling units with VAV system.	H
f. Add motion sensors to control lighting where not now done.	H
g. Replace all lighting with LED fixtures. Use existing circuits and switching.	M

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning
a. Chiller
b. Air handling units
c. Steam heat exchanger
d.
e.
f.

4. Corrective Actions	Action Code
a. Cleaning coils for chiller and air handling unit	2
b. Correct the actuation of outside air dampers in air handling units	2
c. Relamp building with new lamps and ballast to avoid constant replacement.	2
d.	
e.	
f.	

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a. Lighting monitoring at the switch level would require approximately 65 points.
b. Lighting monitoring at the circuit level would require approximately 45 points. This would avoid recircuiting non-lighting circuits from Lighting panels
c. Lighting monitoring at the panel level would require approximately 4 points. This may require recircuiting non-lighting circuits away from lighting panels.
d.
e.
f.

6. Recommended Mechanical Control Points:
a. Add HVU-3A into the DDC
b. Return air temperature for all units
c. Replacing all Pneumatic Controls points
d.
e.
f.

3144

- AHU 3A
  Multi-Zone Unit
  No OA, recirculating air

- HUV-3A
  Does not operate
  Open panel to fan for unit

- AHU 3C
  "Burps" once a month
  Multizone w/ multiple actuators
  as well

- AHU ??? beyond the wall

- HVU-3E
  Possibly missing belt
  actuator does not work

General

- Insulation has been tampered with from lighting & wiring
- No roof/ceiling insulation
- Portable AC units
- No ventilation for showers
- Catwalk does not go straight across the roof
- Units are Electro/Pneumatic
- Units are mix temp cold & hot valves w/ actuator
- Suggestion; maybe stop RCx due to needing a "gutting"
- Lack of roof penetrations for exhausting moisture from showers
- Shingle roofing on top of metal pitch roof

NAB Little Creek DO-2 ECM-004A

Project: 540044

Building 3144

SECTION 15910N - DIRECT DIGITAL CONTROL SYSTEMS

SUBMITTALS:

PostTABs

Controls Contractor:

Thermo-Trol Systems, Inc.
504 Viking Dr.
Virginia Beach, VA 23452
757.428.4646
757.428.4030 fax

East Coast Test & Balance, Inc.

824 Chris Court, Chesapeake, Virginia 23322
(757) 410-3337/ fax (757) 410-3338

Post-Construction Test Report

Project: Building 3144 - Amphibious Ops
Contract # NABLC DO-2 ECM-004A
Naval Amphibious Base, Little Creek
Virginia Beach, Virginia

Date: May 6, 2009

Prime Contractor: NORESCO
Westborough, Massachusetts

Controls Contactor: Thermo-Trol Systems, I nc.
Virginia Beach, Virginia

East Coast Test & Balance, Inc.

General Notes

Building 3144 - Amphibious Ops

System Date: 5/6/2009

AHU-3A

1.) Inside of unit is very dirty.
2.) Unit is operating @ 100% outside air.
3.) Drive belt is about to break.
4.) Outside air damper blades are not operating properly. One of the three blades is stuck in the open position. Outside air can not be properly set on unit.
5.) Filters are dirty.

AHU-3C

1.) Inside of unit is very dirty.
2.) Return damper is stuck at 20% open. May be a problem with the linkage.
3.) Unit is operating @ 100% outside air.
4.) Filters are dirty.

AHU-3D

1.) Inside of unit is very dirty.
2.) Drive belt is about to break.
3.) Unit is operating @ 100% return. (no outside air)

None of the items found during preTABs have been addressed as of 5/6/09.

East Coast Test & Balance, Inc.

Air Handler Test Data

Project: Bldg. - 3144 Amphibious Ops
System: AHU - 3A

Date: 5/06/09
Location: Ceiling

Fan Information

Fan Manufacturer: McQuay
Fan Model: LML108CH
Serial No.: 3TG00472-06

	Design	Actual
Total CFM	Not Given	3,503
Min. O.A. CFM	Not Given	3,503
Return CFM	Not Given	0
Discharge Pressure (ESP/TSP)	N/A	N/A / N/A
Suction Pressure (ESP/TSP)	N/A	-.24" / .40"
Fan Static Pressure (ESP/TSP)	Not Given	.24" / .40"
Fan RPM	Not Given	1,015
Fan Sheave & Shaft Size	6" OD. x 1 1/8"	
Shaft Center to Center	28 7/8"	
Belt Quantity / Size	1 - 5L730	

Motor Information

Motor Manufacturer: Magnetek
Motor Model No.: 6 - 357720 - 01

	Design	Actual
Motor H.P.	3.00	3.00
Frame	N/A	S182T
Amperage	4.5	3.6 / 3.8 / 3.9
Voltage & Phase	460/3/60	469 / 468 / 470
Motor RPM	1,745	1,759
Motor Sheave & Shaft Size	1VP50 x 1 1/8"	
Service Factor	1.15	
Filter Quantity / Size	6 / 16" x 25" x 2"	

Remarks: See general notes page.

East Coast Test & Balance, Inc.

Air Handler Test Data

Project: Bldg. - 3144 Amphibious Ops
System: AHU - 3C

Date: 5/06/2009
Location: Ceiling

Fan Information

Fan Manufacturer: McQuay
Fan Model: LML106CH
Serial No.: 3TG00665 - 06

	Design	Actual
Total CFM	Not Given	1,612
Min. O.A. CFM	Not Given	449
Return CFM	Not Given	1,163
Discharge Pressure (ESP/TSP)	N/A	.53" / .53"
Suction Pressure (ESP/TSP)	N/A	-.09" / -.56"
Fan Static Pressure (ESP/TSP)	Not Given	.62" / 1.09"
Fan RPM	Not Given	1,081
Fan Sheave & Shaft Size	5 3/4" OD. x 1 1/8"	
Shaft Center to Center	24 1/4"	
Belt Quantity / Size	1 - 5L620	

Motor Information

Motor Manufacturer: Magnetek
Motor Model No.: 8 - 349937 - 02

	Design	Actual
Motor H.P.	1.50	1.50
Frame	N/A	M145T
Amperage	2.6	2.2 / 2.4 / 2.2
Voltage & Phase	460/3/60	471 / 470 / 470
Motor RPM	1,745	1,781
Motor Sheave & Shaft Size	1VL40 x 7/8"	
Service Factor	1.15	
Filter Quantity / Size	6 / 16" x 20" x2"	

Remarks: See general notes page.

East Coast Test & Balance, Inc.

Air Handler Test Data

Project: Bldg. - 3144 Amphibious Ops
System: AHU - 3D

Date: 5/6/09
Location: Ceiling

Fan Information

Fan Manufacturer: McQuay
Fan Model: LML108CH
Serial No.: 3TG00473 - 06

	Design	Actual
Total CFM	Not Given	2,106
Min. O.A. CFM	Not Given	280
Return CFM	Not Given	1,826
Discharge Pressure (ESP/TSP)	N/A	N/A / N/A
Suction Pressure (ESP/TSP)	N/A	-.23" / -.37"
Fan Static Pressure (ESP/TSP)	Not Given	.23" / .37"
Fan RPM	Not Given	808
Fan Sheave & Shaft Size	5 5/8"OD. X 1"	
Shaft Center to Center	25 1/2"	
Belt Quantity / Size	1 - A68	

Motor Information

Motor Manufacturer: Magnetek
Motor Model No.: 8 - 349287 - 02

	Design	Actual
Motor H.P.	2.00	2.00
Frame	N/A	145T
Amperage	3.2	2.6 / 2.6 / 2.5
Voltage & Phase	460/3/60	471 / 470 / 472
Motor RPM	1,745	1,784
Motor Sheave & Shaft Size	5 1/4" OD. X 7/8"	
Service Factor	1.15	
Filter Quantity / Size	6 / 16" x 25" x 2"	

Remarks: See general notes page.

NAB Little Creek DO-2 ECM-004A

Project: 540044

Building 3144

SECTION 15910N - DIRECT DIGITAL CONTROL SYSTEMS

SUBMITTALS:
SD-06 PVT Reports

Controls Contractor:

Thermo-Trol Systems, Inc.
504 Viking Dr.
Virginia Beach, VA 23452
757.428.4646
757.428.4030 fax

SD-06 PVT Reports

PVT Reports

Building

Date: 4/15/09

MZAHU-3A | MZAHU-3D
PERFORMANCE VERIFICATION TEST
System: Run Conditions

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Zone Scheduled Occupancy	The DDC system shall enable the AHU based upon zone scheduled time of day and day of week including holidays. There shall be provisions for manual and timed overrides that may enable equipment outside of the normal schedule.	Configure time of day and day of week enable schedules incuding holidays for zones. Initiate schedules and observe system response.	Gm - 5 pm.	4/15/09 EL
AHU enable based upon Cooling Requests from Unoccupied Zones	The DDC system shall enable the AHU based upon a 2 cooling request form ~~2 (adj.) or more~~ unoccupied zones (as indicated in the zone section of this document).	Initiate a cooling request (during unoccupancy) from two or more zones and observe system response.	2 COOLING REQ SYSTEM STARTS	4/15/09 EL
Zone Unoccupied Override	The DDC system shall also enable the AHU, anytime an occupant depresses the unoccupied override button (located on the local space temperature sensor) during unoccupied periods of time. When the override button is depressed, the AHU and associated zones will run in the occupied mode of operation for 60 min. (adj.).	Set system to "Unoccupied". Depress space temperature occupied override button and observe system response.	~~N/A~~ VERIFIED	~~N/A~~ 4/15/09 EL
Zone Scheduled Optimization	The DDC system shall enable the AHU based upon zone calculated optimal start up period before the scheduled occupancy. During optimal start up the outside air damper is to remain closed.	Set system to "Optimal Start Up" mode and observe system response.	VERIFIED	EL 4/15/09
Unoccupied Period free of run requests	During the unoccupied period which is free of run requests, the associated AHU and zones shall remain off and no requests for Chilled Water system operation shall be broadcasted.	Set system to "Unoccupied" mode and free of run requests listed above and observe system response.	VERIFIED SYSTEM RESPONSE	EL 4/15/09

MZAHU-3A | MZAHU-3D
PERFORMANCE VERIFICATION TEST
System: Safety Circuit Shutdown

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Safety Circuit Shuldown	The DDC system shall monitor the freezestat/~~smoke~~ detector safety circuit and shut down the unit in and alarm condition and generate an alarm at the operator workstation.	Set the Safety Circuit to alarm and observe system response	VERIFIED 3A+3D ~~3D NOT SHOWING ON 3A~~	EL 4/15/09
Safety Circuit Shutdown	The Safety Circuit shall be hard wire interlocked to shutdown the Supply fan and will require a manual reset from the freezestat and/or smoke detector.	Manually trip the Freezestat or smoke detector and observe system response. Verify manual reset is in place	VERIFIED 3A+3D	EL 4/15/09
Safety Circuit Shutdown	If the Supply Fan has tripped OFF on the Safety Circuit, the DDC system will command the heating valve 100% (adj.) open, disable the supply fan, and all outside air dampers shall close	Set supply fan to tripped on the safety circuit and observe system response	VERIFIED 3A+3D	EL 4/15/09

MZAHU3A WAS TESTED, 3D HAS SAME PROGRAM, W/O RA FAN

MZAHU-nd-dtd-econ-co2 (UNIQUE)
(3A, 3C, 3D)

MZAHU-3A | MZAHU-3D
PERFORMANCE VERIFICATION TEST
System: Supply Fan Control & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
AHU Supply Fan Start/Stop	The DDC system shall start/stop the AHU Supply Fan once Run Conditions are met and sufficient delay is allowed for VAV damper(s) to open, or position feedback of AHU damper(s).	Enable the system and observe system response.	N/A	N/A
AHU Supply Fan VFD Command	When the DDC system commands the Supply Fan on, the VFD will modulate to maintain the Static Pressure control algorithms. The Supply Fan VFD speed shall not drop below 30% (adj.).	See above test	N/A	N/A
Supply Fan Operation	The Supply Fan shall operate continuously as long as run conditions are met.	See above test.	N/A	N/A
Supply Fan Operation	To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.	See above test.	N/A	N/A
AHU Supply Fan Failure	The DDC system shall continuously monitor the on/off status of the supply fan. If a loss of fan status occurs for 30 sec. (adj.) while the fan is commanded to run an alarm shall be generated at the operator	Manually set the supply fan status to "off" for 30 sec. (adj.) while it is commanded on and observe system response.	VERIFIED	[illegible] 4/15/09
AHU Supply Fan In Hand	The DDC system shall continuously monitor the on/off status of supply fan. If a status of "on" occurs for 10 sec. (adj.) while the fan is commanded off an alarm shall be generated at the operator workstation.	Manually set the supply fan status to "on " for 10 sec. (adj.) while it is commanded off and observe system response	ALARM VERIFIED	[illegible] 4/15/09

MZAHU-3A | MZAHU-3D
PERFORMANCE VERIFICATION TEST
System: Dual Temp Supply Air Temperature Setpoint Optimization & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Cooling Supply Air Temperature Optimization	The DDC system shall monitor the supply air temperature and shall maintain a supply air temperature reset based on zone cooling requirements. The setpoint will be calculated every 5 min. (adj.). The supply air temperature setpoint shall be 58°F (adj.) initially.	Observe that the system maintains 58°F (adj.) supply air temperature setpoint initially	58°F	4/15/09
Cooling Supply Air Temperature Optimization	As cooling demand increases, the setpoint shall incrementally reset down to a minimum of 55°F (adj.).	Set 1 (adj.) or more zones in max cooling to request a greater cooling demand to the VAVAHU and observe system response.	VERIFIED 55°F	4/15/09
Cooling Supply Air Temperature Optimization	As cooling demand decreases, the setpoint shall incrementally reset up to a maximum of 60°F (adj.).	Set all zones to be satisfied to reqest no cooling command and observe system response.	VERIFIED 60°F	4/15/09
Heating Supply Air Temperature Optimization	The DDC system shall monitor the supply air temperature and shall maintain a supply air temperature reset based on zone Heating requirements. The setpoint will be calculated every 5 min. (adj.). The supply air temperature setpoint shall be 90°F (adj.) initially.	Observe that the system maintains 90°F (adj.) supply air temperature setpoint initially	VERIFIED 90°F	4/15/09
Heating Supply Air Temperature Optimization	As heating demand increases, the setpoint shall incrementally reset up to a maximum of 110°F (adj.).	Set 1 (adj.) or more zones in max cooling to request a greater cooling demand to the VAVAHU and observe system response.	VERIFIED 110°F	4/15/09
Heating Supply Air Temperature Optimization	As heating demand decreases, the setpoint shall incrementally reset down to a minimum of 80°F (adj.).	Set all zones to be satisfied to reqest no cooling command and observe system response.	VERIFIED 80°F	4/15/09
High Supply Air Temperature Alarming	30 min. (adj.) after fan operation and the supply air temperature is 5°F (adj.) or greater above the setpiont an alarm shall be generated at the operator workstation.	Manually set the supply air temperature 5°F (adj.) above the current setpoint. Observe system response. Temporarily change 30 min. time delay to generate alarm if needed.	ALARM VERIFIED	4/15/09
Low Supply Air Temperature Alarming	30 min. (adj.) after fan operation and the supply air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the supply air temperature below 45°F (adj.). Observe system response. Temporarily change 30 min. time delay to generate alarm if needed.	ALARM VERIFIED	4/15/09

MZAHU-3A | MZAHU-3D
PERFORMANCE VERIFICATION TEST
System: Dual Temperature Cooling

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temperature Cooling Mode	The DDC system shall measure the supply air temperature and modulate the valve to maintain its cooling setpoint. When the supply air temperature is above the cooling setpoint, and the dual temperature water supply is less than 60°F (adj.), and the outside air temperature is greater than ~~60~~ 65°F (adj.) and the fan is on the valve shall modulate open.	Manually set the supply air temperature above the cooling setpoint, and the dual temperature water supply less than 60°F (adj.), and the outside air temperature greater than ~~60~~ 65°F (adj.), and the fan on and observe system response.	DTV OPENED	4/16/09
Dual Temperature Cooling Mode	When the supply air temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the supply air temperature below the cooling setpoint, and the dual temperature water supply less than 60°F (adj.), and the outside air temperature greater than 60°F (adj.), and the fan on and observe system response.	DTV STARTED CLOSED	4/16/09
Dual Temperature Cooling Mode	When the supply air temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the dual temperature water supply greater than 60°F (adj.), and the supply air temperature above the cooling setpoint, and the outside air temperature greater than 60°F (adj.), and the fan on and observe system response.	DTV CLOSED	4/16/09
Dual Temperature Cooling Mode	When the supply air temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the outside air temperature less than 60°F (adj.), and the supply air temperature above the cooling setpoint, and the dual temperature less than 60°F (adj.), and the fan on and observe system response.	DTV CLOSED	4/16/09
Dual Temperature Cooling Mode	When the supply air temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed.	Disable the fan and observe system response.	DTV CLOSED	4/16/09

MZAHU-3A | MZAHU-3D
PERFORMANCE VERIFICATION TEST
System: Dual Temperature Heating

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temperature Heating Mode	The DDC system shall measure the supply air temperature and modulate the valve to maintain its heating setpoint. When the supply air temperature is below the heating setpoint, and the dual temperature water supply is greater than 70°F (adj.), and the outside air temperature is less than 70°F (adj.) and the fan is on the valve shall modulate open	Manually set the supply air temperature below the heating setpoint, and the dual temperature water supply greater than 70°F (adj.), and the outside air temperature less than 70°F (adj.), and the fan on and observe system response	~~LES~~ VERIFIED SYSTEM RESPONSE DTV MODULATED OPEN	EC 4/16/09
Dual Temperature Heating Mode	When the supply air temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed	Manually set the supply air temperature above the heating setpoint, and the dual temperature water supply greater than 70°F (adj.), and the outside air temperature less than 70°F (adj.), and the fan on and observe system response.	VERIFIED SYSTEM RESPONSE DTV MODULATED CLOSED	EC 4/16/09
Dual Temperature Heating Mode	When the supply air temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the dual temperature water supply less than 70°F (adj.), and the supply air temperature below the heating setpoint, and the outside air temperature less than 70°F (adj.), and the fan on and observe system response.	DTV CLOSED	EC 4/16/09
Dual Temperature Heating Mode	When the supply air temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed	Manually set the outside air temperature greater than 70°F (adj.), and the supply air temperature below the heating setpoint, and the dual temperature greater than 70°F (adj.), and the fan on and observe system response.	DTV CLOSED	EC 4/16/09
Dual Temperature Heating Mode	When the supply air temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed.	Disable the fan and observe system response.	DTV CLOSED	EC 4/16/09

MZAHU-3A | MZAHU-3D
PREFORMANCE VERIFICATION TEST
System: Economizer

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Economizer Control	The economizer shall be enabled whenever the outside air enthalpy is less than 28 (adj.) ~~and the outside air temperature is less than the zone temperature and the supply fan status is on~~ OAT LES + SUPPLY FAN ON	Manually set the outside air enthalpy less than 28 (adj.) ~~and the outside air temperature less than the zone temperature~~ and the supply fan OATLES status on.	ECON IS ALLOWED	EL 4/16/09
Economizer Control	The DDC system shall measure the ~~zone~~ MA temperature and modulate the economizer dampers open if the ~~zone temperature~~ is greater than 2°F (adj.) less than the ~~cooling~~ CD setpoint.	Manually set the ~~zone~~ MA temperature greater than 2°F (adj.) less than the ~~cooling~~ CD setpoint and observe system response.	ECON OPENED DAMPER ABOVE MIN POSITION	EL 4/16/09
Economizer Control	The DDC system shall measure the zone temperature and modulate the economizer dampers closed if the zone temperature is less than 2°F (adj.) less than the cooling setpoint.	Manually set the zone temperature less than 2°F (adj.) less than the cooling setpoint and observe system response.	ECON DAMPER CLOSED TO MIN POSITION	EL 4/16/09
Economizer Control	The economizer shall be disabled whenever the outside air enthalpy is greater than 28 (adj.) or the outside air temperature is greater than the zone temperature or the supply fan status is off.	Manually set the outside air enthalpy greater than 28 (adj.) and observe sytem response.	ECON DISABLED	EL 4/16/09
Economizer Control	The economizer shall be disabled whenever the outside air enthalpy is greater than 28 (adj.) or the outside air temperature is greater than the zone temperature or the supply fan status is off.	Manually set the outside air temperature greater than the zone temperature and observe sytem response.	ECON DISABLED	EL 4/16/09
Economizer Control	The economizer shall be disabled whenever the outside air enthalpy is greater than 28 (adj.) or the outside air temperature is greater than the zone temperature or the supply fan status is off.	Manually set the fan status to off and observe system response.	ECON DISABLED	EL 4/16/09
Economizer Control	The outside air damper shall maintain a minimum adjustable position of 20% (adj.) open whenever occupied.	Verify that the outside air damper maintains a minimum of 20% open during operation. 10	10% VERIFIED	EL 4/16/09

MZAHU-3A | MZAHU-3D
PREFORMANCE VERIFICATION TEST
System: Minimum Outside Air Ventilation Control

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Minimum Outside Air Ventilation Control	During occupied mode and conditions for economizer mode are unavailable the DDC system shall open ~~the~~ 10 % outside air damper.	Manually command the unit on and observe system response.	VERIFIED	EL 4/16/09
Minimum Outside Air Ventilation Control	The outside air damper shall closed and the return air damper shall modulate open when the unit is off ~~or in optimal start up mode~~.	Manually command the unit off and observe system response.	VERIFIED	EL 4/16/09

MZAHU-3A | MZAHU-3D
PREFORMANCE VERIFICATION TEST
System: Return Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Return Air Temperature Alarming	2 min. (adj.) after fan operation and the return air temperature is greater than 90°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the return air temperature above 90°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED ALARM	EW 4/16/09
Low Return Air Temperature Alarming	2 min. (adj.) after fan operation and the return air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the return air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED ALARM	EW 4/16/09

MZAHU-3A | MZAHU-3D
PERFORMANCE VERIFICATION TEST
System: Mixed Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Mixed Air Temperature Alarming	2 min. (adj.) after fan operation and the mixed air temperature is greater than 90°F (adj.) an alarm shall be generated at the operator workstation	Manually set the mixed air temperature above 90°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED ALARM	EW 4/16/09
Low Mixed Air Temperature Alarming	2 min. (adj.) after fan operation and the mixed air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the mixed air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED ALARM	EW 4/16/09

Thermo-Trol's Signature / Date	Noresco's Signature / Date
	4/16/09
Owner's Representative's Signature / Date	**Owner Representative's Signature / Date**

RETURN FAN

MZAHU-3A ONLY
PERFORMANCE VERIFICATION TEST
System: Return Fan Control & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
MZAHU Return Fan Start/Stop	The Return Fan shall be interlocked with the Supply Fan.	Enable the system and observe system response.	OUTPUT VERIFIED*	4/16/09
Return Fan Operation	To prevent short cycling, the return fan shall have a 3 min. (adj.) minimum runtime.	Disable the system prior to 3 min. (adj.) runtime and observe system response.	3 MIN ON/OFF	4/16/09
MZAHU Return Fan Failure	The DDC system shall continuously monitor the on/off status of the return fan. If a loss of fan status occurs for 30 sec. (adj.) while the fan is commanded to run an alarm shall be generated at the operator workstation.	Manually set the return fan status to "off" for 30 sec. (adj.) while it is commanded on and observe system response.	ALARM VERIFIED	4/16/09
MZAHU Return Fan in Hand	The DDC system shall continuously monitor the on/off status of return fan. If a status of "on" occurs for 10 sec. (adj.) while the fan is commanded off an alarm shall be generated at the operator workstation	Manually set the return fan status to "on" for 10 sec. (adj.) while it is commanded off and observe system response.	ALARM VERIFIED	4/16/09

RA FAN OOC DURING TESTING.

MZAHU-3A
PERFORMANCE VERIFICATION TEST
System: Dual Temp Supply Air Temperature Setpoint Optimization & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Cooling Supply Air Temperature Optimization	The DDC system shall monitor the supply air temperature and shall maintain a supply air temperature reset based on zone cooling requirements. The setpoint will be calculated every 5 min. (adj.). The supply air temperature setpoint shall be 55°F (adj.) initially.	Observe that the system maintains 55°F (adj.) supply air temperature setpoint initially.		
Cooling Supply Air Temperature Optimization	As cooling demand increases, the setpoint shall incrementally reset down to a minimum of 55°F (adj.).	Set 1 (adj.) or more zones in max cooling to request a greater cooling demand to the VAVAHU and observe system response.		
Cooling Supply Air Temperature Optimization	As cooling demand decreases, the setpoint shall incrementally reset up to a maximum of 60°F (adj.).	Set all zones to be satisfied to reqest no cooling command and observe system response.		
Heating Supply Air Temperature Optimization	The DDC system shall monitor the supply air temperature and shall maintain a supply air temperature reset based on zone Heating requirements. The setpoint will be calculated every 5 min. (adj.). The supply air temperature setpoint shall be 90°F (adj.) initially.	Observe that the system maintains 90°F (adj.) supply air temperature setpoint initially		
Heating Supply Air Temperature Optimization	As heating demand increases, the setpoint shall incrementally reset up to a maximum of 120°F (adj.).	Set 1 (adj.) or more zones in max cooling to request a greater cooling demand to the VAVAHU and observe system response.		
Heating Supply Air Temperature Optimization	As heating demand decreases, the setpoint shall incrementally reset down to a minimum of 80°F (adj.).	Set all zones to be satisfied to reqest no cooling command and observe system response		
High Supply Air Temperature Alarming	30 min. (adj.) after fan operation and the supply air temperature is 5°F (adj.) or greater above the setpoint an alarm shall be generated at the operator workstation	Manually set the supply air temperature 5°F (adj.) above the current setpoint. Observe system response. Temporarily change 30 min. time delay to generate alarm if needed.		
Low Supply Air Temperature Alarming	30 min. (adj.) after fan operation and the supply air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the supply air temperature below 45°F (adj.). Observe system response. Temporarily change 30 min. time delay to generate alarm if needed.		

Bldg 3144

Date: 28 Apr 09

MZAHU-3C
PERFORMANCE VERIFICATION TEST
System: Run Conditions

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Zone Scheduled Occupancy	The DDC system shall enable the MZAHU based upon zone scheduled time of day and day of week including holidays. There shall be provisions for manual and timed overrides that may enable equipment outside of the normal schedule.	Configure time of day and day of week enable schedules including holidays for MZTU's. Initiate schedules and observe system response.	VERIFIED	WP 28 Apr 09
AHU enable based upon Cooling Requests from Unoccupied Zones	The DDC system shall enable the AHU based upon a cooling request form 2 (adj.) or more unoccupied zones (as indicated in the Multi Zone Terminal unit section of this document)	Initiate a cooling request (during unoccupancy) from two or more MZTU's and observe system response	VERIFIED	WP 28 Apr 09
Zone Unoccupied Override	The DDC system shall also enable the AHU, anytime an occupant depresses the unoccupied override button (located on the local space temperature sensor) during unoccupied periods of time. When the override button is depressed, the AHU and associated MZTU's will run in the occupied mode of operation for 60 min. (adj.).	Set system to "Unoccupied". Depress space temperature occupied override button and observe system response.	VERIFIED	WP 28 Apr 09
Zone Scheduled Optimization	The DDC system shall enable the MZAHU based upon zone calculated optimal start up period before the scheduled occupancy. During optimal start up the outside air damper is to remain closed.	Set system to "Optimal Start Up" mode and observe system response.	VERIFIED	WP 28 Apr 09
Unoccupied Period free of run requests	During the unoccupied period which is free of run requests, the associated MZAHU and MZTU's shall remain off and no requests for Chilled Water system operation shall be broadcasted	Set system to "Unoccupied" mode and free of run requests listed above and observe system response	VERIFIED	WP 28 Apr 09

MZAHU-3C
PERFORMANCE VERIFICATION TEST
System: Safety Circuit Shutdown

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Safety Circuit Shutdown	The DDC system shall monitor the freezestat/smoke detector safety circuit and shut down the unit in and alarm condition and generate an alarm at the operator workstation.	Set the Safety Circuit to alarm and observe system response.	VERIFIED	WP 28 Apr 09
Safety Circuit Shutdown	The Safety Circuit shall be hard wire interlocked to shutdown the Supply fan and will require a manual reset from the freezestat and/or smoke detector	Manually trip the Freezestat or smoke detector and observe system response. Verify manual reset is in place.	VERIFIED	WP 28 Apr 09
Safety Circuit Shutdown	If the Supply Fan has tripped OFF on the Safety Circuit, the DDC system will command the dual temp valve 100% (adj.) open, disable the supply fan, and all outside air dampers shall close.	Set supply fan to tripped on the safety circuit and observe system response.	VERIFIED	WP 28 Apr 09

MZAHU-3C
PREFORMANCE VERIFICATION TEST
System: Supply Fan Control & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
MZAHU Supply Fan Start/Stop	The DDC system shall start/stop the MZAHU Supply Fan once Run Conditions are met	Enable the system and observe system response	VERIFIED	WP 28 Apr 09
Supply Fan Operation	To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.	Disable the system prior to 3 min. (adj.) runtime and observe system response.	VERIFIED	WP 28 Apr 09
MZAHU Supply Fan Failure	The DDC system shall continuously monitor the on/off status of the supply fan. If a loss of fan status occurs for 30 sec. (adj.) while the fan is commanded to run an alarm shall be generated at the operator workstation.	Manually set the supply fan status to "off" for 30 sec. (adj.) while it is commanded on and observe system response.	VERIFIED	WP 28 Apr 09
MZAHU Supply Fan In Hand	The DDC system shall continuously monitor the on/off status of supply fan. If a status of "on" occurs for 10 sec. (adj.) while the fan is commanded off an alarm shall be generated at the operator workstation	Manually set the supply fan status to "on" for 10 sec. (adj.) while it is commanded off and observe system response.	VERIFIED	WP 28 Apr 09

MZAHU-3C
PERFORMANCE VERIFICATION TEST
System: Dual Temp Supply Air Temperature Setpoint Optimization & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Cooling Supply Air Temperature Optimization	The DDC system shall monitor the supply air temperature and shall maintain a supply air temperature reset based on zone cooling requirements. The setpoint will be calculated every 5 min. (adj.). The supply air temperature setpoint shall be 55°F (adj.) initially.	Observe that the system maintains 55°F (adj.) supply air temperature setpoint initially.	VERIFIED	WP 28 Apr
Cooling Supply Air Temperature Optimization	As cooling demand increases, the setpoint shall incrementally reset down to a minimum of 55°F (adj.).	Set 1 (adj.) or more zones in max cooling to request a greater cooling demand to the VAVAHU and observe system response.	VERIFIED	WP 28 Apr
Cooling Supply Air Temperature Optimization	As cooling demand decreases, the setpoint shall incrementally reset up to a maximum of 60°F (adj.).	Set all zones to be satisfied to request no cooling command and observe system response.	VERIFIED	WP 28 Apr
Heating Supply Air Temperature Optimization	The DDC system shall monitor the supply air temperature and shall maintain a supply air temperature reset based on zone Heating requirements. The setpoint will be calculated every 5 min. (adj.). The supply air temperature setpoint shall be 90°F (adj.) initially.	Observe that the system maintains 90°F (adj.) supply air temperature setpoint initially.	VERIFIED	WP 28 Apr
Heating Supply Air Temperature Optimization	As heating demand increases, the setpoint shall incrementally reset up to a maximum of 120°F (adj.).	Set 1 (adj.) or more zones in max cooling to request a greater cooling demand to the VAVAHU and observe system response.	VERIFIED	28 Apr WP
Heating Supply Air Temperature Optimization	As heating demand decreases, the setpoint shall incrementally reset down to a minimum of 80°F (adj.).	Set all zones to be satisfied to request no cooling command and observe system response.	VERIFIED	WP 28 Apr
High Supply Air Temperature Alarming	30 min. (adj.) after fan operation and the supply air temperature is 5°F (adj.) or greater above the setpoint an alarm shall be generated at the operator workstation.	Manually set the supply air temperature 5°F (adj.) above the current setpoint. Observe system response. Temporarily change 30 min. time delay to generate alarm if needed.	VERIFIED	WP 28 Apr
Low Supply Air Temperature Alarming	30 min. (adj.) after fan operation and the supply air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the supply air temperature below 45°F (adj.). Observe system response. Temporarily change 30 min. time delay to generate alarm if needed.	VERIFIED	WP 28 Apr

MZAHU-3C
PERFORMANCE VERIFICATION TEST
System: Dual Temperature Cooling

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temperature Cooling Mode	The DDC system shall measure the supply air temperature and modulate the valve to maintain its cooling setpoint. When the supply air temperature is above the cooling setpoint, and the dual temperature water supply is less than 60°F (adj.), and the outside air temperature is greater than 60°F (adj.) and the fan is on the valve shall modulate open.	Manually set the supply air temperature above the cooling setpoint, and the dual temperature water supply less than 60°F (adj.), and the outside air temperature greater than 60°F (adj.), and the fan on and observe system response.	VERIFIED	WP 28 Apr
Dual Temperature Cooling Mode	When the supply air temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the supply air temperature below the cooling setpoint, and the dual temperature water supply less than 60°F (adj.), and the outside air temperature greater than 60°F (adj.), and the fan on and observe system response.	VERIFIED	WP 28 Apr

Dual Temperature Cooling Mode	When the supply air temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed	Manually set the dual temperature water supply greater than 60°F (adj.), and the supply air temperature above the cooling setpoint, and the outside air temperature greater than 60°F (adj.), and the fan on and observe system response.	VERIFIED	WP 28 Apr
Dual Temperature Cooling Mode	When the supply air temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed	Manually set the outside air temperature less than 60°F (adj.), and the supply air temperature above the cooling setpoint, and the dual temperature less than 60°F (adj.), and the fan on and observe system response.	VERIFIED	WP 28 Apr
Dual Temperature Cooling Mode	When the supply air temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed.	Disable the fan and observe system response.	VERIFIED	WP 28 Apr

MZAHU-3C
PERFORMANCE VERIFICATION TEST
System: Dual Temperature Heating

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temperature Heating Mode	The DDC system shall measure the supply air temperature and modulate the valve to maintain its heating setpoint. When the supply air temperature is below the heating setpoint, and the dual temperature water supply is greater than 70°F (adj.), and the outside air temperature is less than 70°F (adj.) and the fan is on the valve shall modulate open.	Manually set the supply air temperature below the heating setpoint, and the dual temperature water supply greater than 70°F (adj.), and the outside air temperature less than 70°F (adj.), and the fan on and observe system response	VERIFIED	28 Apr WP
Dual Temperature Heating Mode	When the supply air temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the supply air temperature above the heating setpoint, and the dual temperature water supply greater than 70°F (adj.), and the outside air temperature less than 70°F (adj.), and the fan on and observe system response.	VERIFIED	28 Apr WP
Dual Temperature Heating Mode	When the supply air temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the dual temperature water supply less than 70°F (adj.), and the supply air temperature below the heating setpoint, and the outside air temperature less than 70°F (adj.), and the fan on and observe system response.	VERIFIED	28 Apr WP
Dual Temperature Heating Mode	When the supply air temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the outside air temperature greater than 70°F (adj.), and the supply air temperature below the heating setpoint, and the dual temperature greater than 72°F (adj.), and the fan on and observe system response	VERIFIED	28 Apr WP
Dual Temperature Heating Mode	When the supply air temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed.	Disable the fan and observe system response.	VERIFIED	28 Apr WP

MZAHU-3C
PREFORMANCE VERIFICATION TEST
System: Cooling Compressor Control

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Cooling Compressor Control	The DDC system shall monitor the dual temp deck supply air temperature and cycle the compressor to maintain its setpoint.	No Test		
DX Cooling Control	The DX cooling shall be enabled whenever the dual temperature system is in heating mode, and the Multi Zones are requesting cooling, and the fan is on.	Manually set the zone temperature above the cooling setpoint with the dual temp system in the heating mode and the fan on. Observe system response.	VERIFIED	28 Apr WP
Cooling Control	The DX cooling shall be disabled whenever the dual temperature system is in cooling mode, or the Multi Zones are not requesting cooling, or the fan is off.	Manually set the zone temperature below the cooling setpoint, or the dual temp system in the cooling mode, or the fan off. Observe system response.	VERIFIED	28 Apr WP
Staging Control	To prevent short cycling , the compressor shall have a 2 min. (adj.) minimum runtime and a 2 min. (adj.) minimum off time.	Disable cooling within 2 min. (adj.) of enabling and observe system response	VERIFIED	WP
Staging Control	To prevent short cycling , the compressor shall have a 2 min. (adj.) minimum runtime and a 2 min. (adj.) minimum off time.	Enable cooling within 2 min. (adj.) of disabling and observe system response.	VERIFIED	WP

MZAHU-3C
PREFORMANCE VERIFICATION TEST
System: Economizer

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Economizer Control	The economizer shall be enabled whenever the outside air enthalpy is less than 24 (adj.) and the outside air temperature is less than 65°F (adj.) and the outside air temperature is less than the return air temperature and the supply fan status is on.	Manually set the outside air enthalpy less than 24 (adj.) and the outside air temperature is less than 65°F (adj.) and the outside air temperature less than the cold deck supply air temperature and the supply fan status on.	LOGIC FOR ECONOMIZER IN PROGRAM AND IS OPERATIONAL.	28 Apr 09 WP.
Economizer Control	The DDC system shall measure the cold deck supply air temperature and modulate the economizer dampers open if the cold deck supply air temperature is more than 2°F (adj.) less than the cooling setpoint.	Manually set the cold deck supply air temperature more than 2°F (adj.) less than the cooling setpoint and observe system response.		
Economizer Control	The DDC system shall measure the cold deck supply air temperature and modulate the economizer dampers closed if the cold deck supply air temperature is less than 2°F (adj.) less than the cooling setpoint.	Manually set the cold deck supply air temperature less than 2°F (adj.) less than the cooling setpoint and observe system response.		
Economizer Control	The economizer shall be disabled whenever the outside air enthalpy is greater than 24(adj.) or the outside air temperature is greater than 65°F (adj.) or the outside air temperature is greater than the return air temperature or the supply fan status is off.	Manually set the outside air enthalpy greater than 24 (adj.) or the outside air temperature greater than 65°F (adj.) or the outside air temperature greater than the return air temperature or the supply fan status off. Observe system response.	OUTSIDE AIR TOO SMALL, TO PROVIDE PROPER AIR FLOW, SET UP AS MIN. OUT DOOR AIR AT 20% WP.	
Economizer Control	The outside air damper shall fully close and the return air damper shall fully open whenever the unit is off or during optimal startup or the safety interlock relay is in alarm status or on a loss of supply fan status.	Disable the unit or the supply fan status and observe system response. Refer to Safety Circuit testing for outside air damper operation during safety circuit alarming.		
Economizer Control	The outside air damper shall maintain a minimum adjustable position of 0% (adj.) open whenever occupied.	Verify that the outside air damper maintains a minimum of 0% open during operation.		

DELETED DUE TO OA DUCT DIAMETER 1 1/2 RA DUCT SIZE

MZAHU-3C
PREFORMANCE VERIFICATION TEST
System: Minimum Outside Air Ventilation Control

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Minimum Outside Air Ventilation Control	During occupied mode and conditions for economizer mode are unavailable the DDC system shall open the outside air damper.	Manually command the unit on and observe system response	VERIFIED	WP
Minimum Outside Air Ventilation Control	The outside air damper shall closed and the return air damper shall modulate open when the unit is off or in optimal start up mode.	Manually command the unit off and observe system response.	VERIFIED	W 28 Apr

MZAHU-3C
PREFORMANCE VERIFICATION TEST
System: Return Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Return Air Temperature Alarming	2 min. (adj.) after fan operation and the return air temperature is greater than 90°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the return air temperature above 90°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED	28 Apr WP
Low Return Air Temperature Alarming	2 min. (adj.) after fan operation and the return air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the return air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed	VERIFIED	28 Apr WP

MZAHU-3C
PERFORMANCE VERIFICATION TEST
System: Mixed Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Mixed Air Temperature Alarming	2 min. (adj.) after fan operation and the mixed air temperature is greater than 90°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the mixed air temperature above 90°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED	28 Apr WP
Low Mixed Air Temperature Alarming	2 min. (adj.) after fan operation and the mixed air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the mixed air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED	28 Apr WP

Thermal Tech's Signature / Date	Northern's Signature / Date 28 Apr 09
Owner's Representative's Signature / Date	Owner Representative's Signature / Date

Building

Date: 4/14/09

AHU-1
PREFORMANCE VERIFICATION TEST
System: Run Conditions

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Zone Scheduled Occupancy	The DDC system shall enable the AHU based upon zone scheduled time of day and day of week including holidays. There shall be provisions for manual and timed overrides that may enable equipment outside of the normal schedule.	Configure time of day and day of week enable schedules including holidays for the AHU. Initiate schedules and observe system response.	6am - 5pm M-F [illegible]	4/14/09
AHU enable based upon Cooling from the Unoccupied Zone	The DDC system shall enable the AHU if the zone temperature rises above the unoccupied cooling setpoint.	During the unoccupied mode manually set the zone temperature above the unoccupied cooling setpoint and observe system response.	SYSTEM ENABLED	4/14/09
AHU enable based upon Heating from the Unoccupied Zone	The DDC system shall enable theAHU if the zone temperature falls below the unoccupied heating setpoint.	During the unoccupied mode manually set the zone temperature below the unoccupied heating setpoint and observe system response.	SYSTEM ENABLED	4/14/09
Zone Unoccupied Override	The DDC system shall also enable the AHU, anytime an occupant depresses the unoccupied override button (located on the local space temperature sensor) during unoccupied periods of time. When the override button is depressed, the AHU will run in the occup	Set system to "Unoccupied". Depress space temperature occupied override button and observe system response.	UNOCC OVERRIDE VERIFIED	4/14/09
Zone Scheduled Optimization	The DDC system shall enable the AHU based upon zone calculated optimal start up period before the scheduled occupancy.	Set system to "Optimal Start Up" mode and observe system response.	VERIFIED SET POINTS FOR [illegible]	4/14/09
Unoccupied Period free of run requests	During the unoccupied period which is free of run request, the AHU shall remain off.	Set system to "Unoccupied" mode and free of run request listed above and observe system response.	VERIFIED	4/14/09

AHU-1
PERFORMANCE VERIFICATION TEST
System: Zone Temperature Setpoint Control & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Occupied Zone Temperature Control	The occupied cooling setpoint shall be 74°F (adj.) and the occupied heating setpoint shall be 70°F (adj.).	Verify that the occupied cooling and heating setpoints are 74°F (adj.) and 70°F (adj.) respectively.	VERIFIED	4/14/09
Unoccupied Zone Temperature Control	The unoccupied cooling setpoint shall be 82°F (adj.) and the unoccupied heating setpoint shall be 62°F (adj.).	Verify that the unoccupied cooling and heating setpoints are 82°F (adj.) and 62°F (adj.) respectively.	VERIFIED	4/14/09
High Zone Temperature Alarm	The DDC system shall continuously monitor the zone temperature. If the zone temperature rises above the cooling setpoint by 5°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the zone temperature 5°F (adj.) above the cooling setpoint and observe system response.	ALARM VERIFIED	4/14/09
Low Zone Temperature Alarm	The DDC system shall continuously monitor the zone temperature. If the zone temperature falls below the heating setpoint by 5°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the zone temperature 5°F (adj.) below the heating setpoint and observe system response.	ALARM VERIFIED	4/14/09

Fcu - dtv - dx - econ - mat - rat (unique)

NO FREEZE STAT OR SMOKE DETECTOR

AHU-1
PERFORMANCE VERIFICATION TEST
System: Safety Circuit Shutdown

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Safety Circuit Shutdown	The DDC system shall monitor the freezestat/smoke detector safety circuit and shut down the unit in and alarm condition and generate an alarm at the operator workstation.	Set the Safety Circuit to alarm and observe system response.		
Safety Circuit Shutdown	The Safety Circuit shall be hard wire interlocked to shutdown the Supply fan and will require a manual reset from the freezestat and/or smoke detector.	Manually trip the Freezestat or smoke detector and observe system response. Verify manual reset is in place.	CHECKED ON 28 Apr 09	
Safety Circuit Shutdown	If the Supply Fan has tripped OFF on the Safety Circuit, the DDC system will command the heating valve 100% (adj.) open, disable the supply fan, and all outside air dampers shall close.	Set supply fan to tripped on the safety circuit and observe system response.		

AHU-1
PREFORMANCE VERIFICATION TEST
System: Supply Fan Control & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
AHU Supply Fan Control	The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties.	Enable the unit and observe system response.	VERIFIED	EC 4/14/09
AHU Supply Fan Control	To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.	Disable the unit within 3 min. (adj.) of enabling the unit and observe system response.	VERIFIED 3 MIN	EC 4/14/09
AHU Supply Fan Control	To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.	Disable the unit after 3 min. (adj.) of enabling the unit and observe system response.	VERIFIED 3 MIN	EC 4/14/09
AHU Supply Fan Failure	The DDC system shall continuously monitor the on/off status of the supply fan. If a loss of fan status occurs for 30 sec. (adj.) while the fan is commanded to run an alarm shall be generated at the operator workstation.	Manually set the supply fan status to "off" for 30 sec. (adj.) while it is commanded on and observe system response.	ALARM VERIFIED	EC 4/14/09
AHU Supply Fan In Hand	The DDC system shall continuously monitor the on/off status of supply fan. If a status of "on" occurs for 10 sec. (adj.) while the fan is commanded off an alarm shall be generated at the operator workstation.	Manually set the supply fan status to "on" for 10 sec. (adj.) while it is commanded off and observe system response.	ALARM VERIFIED	EC 4/14/09

AHU-1
PREFORMANCE VERIFICATION TEST
System: Cooling Compressor Control

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Cooling Compressor Control	The DDC system shall monitor the zone temperature and cycle the compressor to maintain its setpoint.	No Test		
Cooling Control	The cooling shall be enabled whenever the zone temperature is above the cooling setpoint, and the fan status is on.	Manually set the zone temperature above the cooling setpoint with the fan on and observe system response.	COMP ON VERIFIED	WP 28 Apr 09
Cooling Control	The cooling shall be disabled whenever the zone temperature is below the cooling setpoint or the fan status is off.	Manually set the zone temperature below the cooling setpoint with the fan on and observe system response.	COMP OFF VERIFIED	WP 28 Apr 09
Cooling Control	The cooling shall be disabled whenever the zone temperature is below the cooling setpoint or the fan status is off.	Disable the fan and observe system response.	VERIFIED	WP 28 Apr 09
Staging Control	To prevent short cycling , the compressor shall have a 2 min. (adj.) minimum runtime and a 2 min. (adj.) minimum off time.	Disable cooling within 2 min. (adj.) of enabling and observe system response.	VERIFIED	WP 28 Apr 09
Staging Control	To prevent short cycling , the compressor shall have a 2 min. (adj.) minimum runtime and a 2 min. (adj.) minimum off time.	Enable cooling within 2 min. (adj.) of disabling and observe system response.	VERIFIED	WP 28 Apr 09

AHU-1
PERFORMANCE VERIFICATION TEST
System: Heating Coil Valve Control

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Heating Coil Valve Control	The DDC system shall measure the zone temperature and modulate the heating coil valve to maintain its heating setpoint.	No Test		
Heating Coil Valve Control	The DDC system shall modulate the heating coil valve open when the zone temperature is below the heating setpoint and the outside air temperature is less than 65°F (adj.) and the supply fan status is on.	Manually set the zone temperature below the heating setpoint and the outside air temperature less than 65°F (adj.) and the supply fan status on and observe sytem response.	HW VLV OPEN FAN STARTS	WP 28 Apr 09
Heating Coil Valve Control	The DDC system shall modulate the heating coil valve closed when the zone temperature is above the heating setpoint or the outside air temperature is greater than 66°F (adj.) or the fan status is off.	Manually set the zone temperature above the heating setpoint and the outside air temperature less than 65°F (adj.) and the supply fan status on and observe system response.	HW VLV CLOSE FAN STOP AFTER DELAY	WP 28 Apr 09
Heating Coil Valve Control	The DDC system shall modulate the heating coil valve closed when the zone temperature is above the heating setpoint or the outside air temperature is greater than 66°F (adj.) or the fan status is off.	Manually set the outside air temperature above 66°F (adj.) and zone temperature below the heating setpoint and the supply fan status on and observe system response.	HW VLV CLOSES	WP 28 Apr 09
Heating Coil Valve Control	The DDC system shall modulate the heating coil valve closed when the zone temperature is above the heating setpoint or the outside air temperature is greater than 66°F (adj.) or the fan status is off.	Manually set the supply fan status to off and observe system response.	HW VLV CLOSES	WP 28 Apr 09
Heating Coil Valve Control	The heating coil valve shall open to 100% (adj.) whenever the freezestat is in alarm condition.	Refer to Freeze Protection testing for heating coil valve operation during freezestat alarming.	NO FREEZE STAT CK ON 28 Apr 09	

AHU-1
PREFORMANCE VERIFICATION TEST
System: Economizer

NO ECONOMIZER AHU ODA ONLY

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Economizer Control	The economizer shall be enabled whenever the outside air enthalpy is less than 28 (adj.) and the outside air temperature is less than the zone temperature and the supply fan status is on.	Manually set the outside air enthalpy less than 28 (adj.) and the outside air temperature less than the zone temperature and the supply fan status on.		
Economizer Control	The DDC system shall measure the zone temperature and modulate the economizer dampers open if the zone temperature is greater than 2°F (adj.) less than the cooling setpoint.	Manually set the zone temperature greater than 2°F (adj.) less than the cooling setpoint and observe system response.		
Economizer Control	The DDC system shall measure the zone temperature and modulate the economizer dampers closed if the zone temperature is less than 2°F (adj.) less than the cooling setpoint.	Manually set the zone temperature less than 2°F (adj.) less than the cooling setpoint and observe system response.		
Economizer Control	The economizer shall be disabled whenever the outside air enthalpy is greater than 28 (adj.) or the outside air temperature is greater than the zone temperature or the supply fan status is off.	Manually set the outside air enthalpy greater than 28 (adj.) and observe sytem response.		
Economizer Control	The economizer shall be disabled whenever the outside air enthalpy is greater than 28 (adj.) or the outside air temperature is greater than the zone temperature or the supply fan status is off.	Manually set the outside air temperature greater than the zone temperature and observe sytem response.		
Economizer Control	The economizer shall be disabled whenever the outside air enthalpy is greater than 28 (adj.) or the outside air temperature is greater than the zone temperature or the supply fan status is off.	Manually set the fan status to off and observe system response.		
Economizer Control	The outside air damper shall maintain a minimum adjustable position of 20% (adj.) open whenever occupied.	Verify that the outside air damper maintains a minimum of 20% open during operation.		

AHU-1
PREFORMANCE VERIFICATION TEST
System: Minimum Outside Air Ventilation Control

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Minimum Outside Air Ventilation Control	During occupied mode and conditions for economizer mode are unavailable the DDC system shall open the outside air damper.	Manually command the unit on and observe system response.	VERIFIED	WP 28 Apr 09
Minimum Outside Air Ventilation Control	The outside air damper shall closed and the return air damper shall modulate open when the unit is off or in optimal start up mode.	Manually command the unit off and observe system response	VERIFIED	WP 28 Apr 09

AHU-1
PREFORMANCE VERIFICATION TEST
System: Return Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Return Air Temperature Alarming	2 min. (adj.) after fan operation and the return air temperature is greater than 90°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the return air temperature above 90°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	AIC ALARM VERIFIED	EL 4/14/09
Low Return Air Temperature Alarming	2 min. (adj.) after fan operation and the return air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the return air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	ALARM VERIFIED	EL 4/14/09

AHU-1
PERFORMANCE VERIFICATION TEST
System: Mixed Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Mixed Air Temperature Alarming	2 min. (adj.) after fan operation and the mixed air temperature is greater than 90°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the mixed air temperature above 90°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	ALARM VERIFIED	4/14/09
Low Mixed Air Temperature Alarming	2 min. (adj.) after fan operation and the mixed air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the mixed air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	ALARM VERIFIED	4/14/09

AHU-1
PERFORMANCE VERIFICATION TEST
System: Supply Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Supply Air Temperature Alarming	2 min. (adj.) after fan operation and the supply air temperature is greater than 120°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the supply air temperature above 120°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	ALARM VERIFIED	4/14/09
Low Supply Air Temperature Alarming	2 min. (adj.) after fan operation and the supply air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the supply air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	ALARM VERIFIED	4/14/09

Thermo Trol's Signature / Date	Noresco's Signature / Date

Owner's Representative's Signature / Date	Owner Representative's Signature / Date

Bldg 3144

Date: 4/14/09

ZONE1 THRU ZONE 18
PERFORMANCE VERIFICATION TEST
System: Run Conditions

PVT PERFORMED ON RA 21. PROGRAM MATCHES ON ALL ZONES ON ALL MZAHU'S

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Zone Scheduled Occupancy	The DDC system shall enable the zone based upon zone scheduled time of day and day of week including holidays. There shall be provisions for manual and timed overrides that may enable equipment outside of the normal schedule.	Configure time of day and day of week enable schedules incuding holidays for zones. Initiate schedules and observe system response	6am - 5pm M-F	Ec 4/14/09
zone enable/disable based upon Heating or Cooling from the Unoccupied Zone	The DDC system shall enable the zone if the zone temperature rises above the unoccupied cooling setpoint or falls below the unoccupied heating setpoint.	During the unoccupied mode manually set the zone temperature above the unoccupied cooling setpoint and observe system response.	Neutral Deck 100% HTG MODE & DT DECK 100% COOLING	Ec 4/14/09
zone enable/disable based upon Heating or Cooling from the Unoccupied Zone	The DDC system shall disable the zone if the zone temperature falls below the unoccupied cooling setpoint or rises above the unoccupied heating setpoint.	During the unoccupied mode manually set the zone temperature below the unoccupied cooling setpoint and observe system response.	Neutral DECK + DT DECK 50% / 50% IN HTG MODE	Ec 4/14/09
zone enable/disable based upon Heating or Cooling from the Unoccupied Zone	The DDC system shall enable the zone if the zone temperature rises above the unoccupied cooling setpoint or falls below the unoccupied heating setpoint.	During the unoccupied mode manually set the zone temperature below the unoccupied heating setpoint and observe system response.	Neutral Deck 100% HTG DT. DECK 0% COOLING	Ec 4/14/09
zone enable/disable based upon Heating or Cooling from the Unoccupied Zone	The DDC system shall disable the zone if the zone temperature falls below the unoccupied cooling setpoint or rises above the unoccupied heating setpoint.	During the unoccupied mode manually set the zone temperature above the unoccupied heating setpoint and observe system response	N + DT DECK WENT TO 50%	Ec 4/14/09
Zone Unoccupied Override	The DDC system shall also enable the zone, anytime an occupant depresses the unoccupied override button (located on the local space temperature sensor) during unoccupied periods of time. When the override button is depressed, the zone will run in the occupied mode of operation for 60 min. (adj.)	Set system to "Unoccupied". Depress space temperature occupied override button and observe system response.	OVERRIDE VERIFIED	Ec 4/14/09
Zone Scheduled Optimization	The DDC system shall enable the zone based upon zone calculated optimal start up period before the scheduled occupancy	Set system to "Optimal Start Up" mode and observe system response.	OPTIMIZED START UP VERIFIED	Ec 4/14/09
Unoccupied Period free of run requests	During the unoccupied period which is free of run request, the zone shall remain off and no requests for HWS operation shall be broadcasted.	Set system to "Unoccupied" mode and free of run request listed above and observe system response.	N + DT DECK 50% NO HW REQ	Ec 4/14/09

ZONE1
PERFORMANCE VERIFICATION TEST
System: Variable Volume Terminal Unit - Flow Control

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Damper Control	The unit shall maintain zone setpoints by modulating the damper between the hot deck and cold deck	No Test.		N/A
Cooling	When zone temperature is greater than its cooling setpoint, the damper shall modulate increasing cooling airflow and decreasing heating airflow until the zone is satisfied. When the zone temperature is between the cooling setpoint and the heating setpoint, the damper return to middle position.	Manually set the zone temperature above the cooling setpoint and observe system response	VERIFIED DURING PREVIOUS STEPS	Ec 4/14/09

mztu - rh - dtd - nd - extdmpr - zn (uvlogic)

Heating	When zone temperature is less than its heating setpoint, the damper shall modulate increasing heating airflow and decreasing cooling airflow until the zone is satisfied. When the zone temperature is between the cooling setpoint and the heating setpoint, the damper return to middle position.	Manually set the zone temperature below the heating setpoint and observe system response.	TESTED DURING PREVIOUS STEP	EL 4/14/09

ZONE1

PERFORMANCE VERIFICATION TEST

System: VAV Zone Temperature Setpoint Control & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Occupied Zone Temperature Control	The occupied cooling setpoint shall be 74°F (adj.) and the occupied heating setpoint shall be 70°F (adj.).	Verify that the occupied cooling and heating setponts are 74°F (adj.) and 70°F (adj.) respectively.	VERIFIED	EL 4/14/09
Unoccupied Zone Temperature Control	The unoccupied cooling setpoint shall be 82°F (adj.) and the unoccupied heating setpoint shall be 62°F (adj.).	Verify that the unoccupied cooling and heating setponts are 82°F (adj.) and 62°F (adj.) respectively.	VERIFIED	EL 4/14/09
High Zone Temperature Alarm	The DDC system shall continuously monitor the zone temperature. If the zone temperature rises above the cooling setpoint by 5°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the zone temperature 5°F (adj.) above the cooling setpoint and observe system response.	ALARM VERIFIED	EL 4/14/09
Low Zone Temperature Alarm	The DDC system shall continuously monitor the zone temperature. If the zone temperature falls below the heating setpoint by 5°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the zone temperature 5°F (adj.) below the heating setpoint and observe system response.	ALARM VERIFIED	EL 4/14/09

ZONE1
PERFORMANCE VERIFICATION TEST
System: Supply Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Supply Air Temperature Alarm	If the supply air temperature is greater than 120°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the supply air temperature greater than 120°F (adj.) and observe system response.	VERIFIED	EL 4/14/09
Low Supply Air Temperature Alarm	If the supply air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the supply air temperature less than 45°F (adj.) and observe system response.	VERIFIED	EL 4/14/09

Thermo-Tech's Signature / Date	Notesco's Signature / Date
Kevin A Stolzer	4/15/09

Owner's Representative's Signature / Date	Owner Representative's Signature / Date

QUESTIONABLE DAMPER OPERATION OF 8 TITE FOLLOWING ZONES.
3A Z5, 3C Z1, 3C Z3, 3D Z1 thru 3D Z7

Building

Date: 29 Apr 09

AHU-3B | 3E
PERFORMANCE VERIFICATION TEST
System: Run Conditions

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Zone Scheduled Occupancy	The DDC system shall enable the AHU based upon zone scheduled time of day and day of week including holidays. There shall be provisions for manual and timed overrides that may enable equipment outside of the normal schedule.	Configure time of day and day of week enable schedules including holidays for the AHU. Initiate schedules and observe system response	VERIFIED	WP 29 Apr
AHU enable based upon Heating from the Unoccupied Zone	The DDC system shall enable the AHU if the zone temperature falls below the unoccupied heating setpoint.	During the unoccupied mode manually set the zone temperature below the unoccupied heating setpoint and observe system response.	VERIFIED	WP 29 Apr
Zone Unoccupied Override	The DDC system shall also enable the AHU, anytime an occupant depresses the unoccupied override button (located on the local space temperature sensor) during unoccupied periods of time. When the override button is depressed the AHU will run in the occupied mode of operation for 60 min (adj.).	Set system to "Unoccupied". Depress space temperature occupied override button and observe system response	VERIFIED	WP 29 Apr
Unoccupied Period free of run requests	During the unoccupied period which is free of run request, the AHU shall remain off	Set system to "Unoccupied" mode and free of run request listed above and observe system response	VERIFIED	WP 29 Apr

AHU-3B | 3E
PERFORMANCE VERIFICATION TEST
System: Zone Temperature Setpoint Control & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Occupied Zone Temperature Control	The occupied heating setpoint shall be 70°F (adj.).	Verify that the occupied heating setpoint is 70°F (adj.)	VERIFIED	WP 29 Apr
Unoccupied Zone Temperature Control	The unoccupied heating setpoint shall be 62°F (adj.).	Verify that the unoccupied heating setpoint is 62°F (adj.)	VERIFIED	WP 29 Apr
Low Zone Temperature Alarm	The DDC system shall continuously monitor the zone temperature. If the zone temperature falls below the heating setpoint by 5°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the zone temperature 5°F (adj.) below the heating setpoint and observe system response.	VERIFIED	WP 29 Apr

AHU-3B | 3E
PERFORMANCE VERIFICATION TEST
System: Safety Circuit Shutdown

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Safety Circuit Shutdown	The DDC system shall monitor the freezestat/smoke detector safety circuit and shut down the unit in and alarm condition and generate an alarm at the operator workstation	Set the Safety Circuit to alarm and observe system response	VERIFIED	WP 29 Apr
Safety Circuit Shutdown	The Safety Circuit shall be hard wire interlocked to shutdown the Supply fan and will require a manual reset from the freezestat and/or smoke detector.	Manually trip the Freezestat or smoke detector and observe system response. Verify manual reset is in place.	VERIFIED	WP 29 Apr
Safety Circuit Shutdown	If the Supply Fan has tripped OFF on the Safety Circuit, the DDC system will command the heating valve 100% (adj.) open, disable the supply fan, and all outside air dampers shall close	Set supply fan to tripped on the safety circuit and observe system response	VERIFIED	WP 29 Apr

* AHU-3B HAS BAD FAN MOTOR WILL NOT RUN – MOTOR HAS LOUD HUMMING.
AHU-3E HAS BAD DUAL TEMPERATURE CONTROL VALVE

FCU- dtv - 2SPDFAN - ECON - MAT

(AHU 3B, 3E, HVU-3C, HVU-3E)

→ VERIFIED FOR 3E, FAN MTR BAD IN 3B.

AHU-3B | 3E
PREFORMANCE VERIFICATION TEST
System: Supply Fan Control & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
AHU Supply Fan Control	The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties.	Enable the unit and observe system response.		
AHU Supply Fan Control	To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.	Disable the unit within 3 min (adj.) of enabling the unit and observe system response.	VERIFIED	WP 29 Apr
AHU Supply Fan Control	To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.	Disable the unit after 3 min. (adj.) of enabling the unit and observe system response.	VERIFIED	WP 29 Apr
AHU Supply Fan Failure	The DDC system shall continuously monitor the on/off status of the supply fan. If a loss of fan status occurs for 30 sec. (adj.) while the fan is commanded to run an alarm shall be generated at the operator workstation.	Manually set the supply fan status to "off" for 30 sec. (adj.) while it is commanded on and observe system response.	VERIFIED	WP 29 Apr
AHU Supply Fan in Hand	The DDC system shall continuously monitor the on/off status of supply fan. If a status of "on" occurs for 10 sec. (adj.) while the fan is commanded off an alarm shall be generated at the operator workstation.	Manually set the supply fan status to "on" for 10 sec. (adj.) while it is commanded off and observe system response.	VERIFIED	WP 29 Apr

AHU-3B | 3E
PERFORMANCE VERIFICATION TEST
System: Dual Temperature Cooling

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temperature Cooling Mode	The DDC system shall measure the zone temperature and modulate the valve to maintain its cooling setpoint. When the zone temperature is above the cooling setpoint, and the dual temperature water supply is less than 60°F (adj.), and the outside air temperature is greater than 60°F (adj.) and the fan is on the valve shall modulate open.	Manually set the zone temperature above the cooling setpoint, and the dual temperature water supply less than 60°F (adj.), and the outside air temperature greater than 60°F (adj.), and the fan on and observe system response.		
Dual Temperature Cooling Mode	When the zone temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the zone temperature below the cooling setpoint, and the dual temperature water supply less than 60°F (adj.), and the outside air temperature greater than 60°F (adj.), and the fan on and observe system response.		
Dual Temperature Cooling Mode	When the zone temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the dual temperature water supply greater than 60°F (adj.), and the zone temperature above the cooling setpoint, and the outside air temperature greater than 60°F (adj.), and the fan on and observe system response.		
Dual Temperature Cooling Mode	When the zone temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the outside air temperature less than 60°F (adj.), and the zone temperature above the cooling setpoint, and the dual temperature less than 60°F (adj.), and the fan on and observe system response.		
Dual Temperature Cooling Mode	When the zone temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed.	Disable the fan and observe system response.		

AHU-3B | 3E
PERFORMANCE VERIFICATION TEST
System: Dual Temperature Heating

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temperature Heating Mode	The DDC system shall measure the zone temperature and modulate the valve to maintain its heating setpoint. When the zone temperature is below the heating setpoint, and the dual temperature water supply is greater than 70°F (adj.), and the outside air temperature is less than 70°F (adj.) and the fan is on the valve shall modulate open.	Manually set the zone temperature below the heating setpoint, and the dual temperature water supply greater than 70°F (adj.), and the outside air temperature less than 70°F (adj.), and the fan on and observe system response		
Dual Temperature Heating Mode	When the zone temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed	Manually set the zone temperature above the heating setpoint, and the dual temperature water supply greater than 70°F (adj.), and the outside air temperature less than 70°F (adj.), and the fan on and observe system response.		
Dual Temperature Heating Mode	When the zone temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the dual temperature water supply less than 70°F (adj.), and the zone temperature below the heating setpoint, and the outside air temperature less than 70°F (adj.), and the fan on and observe system response.		
Dual Temperature Heating Mode	When the zone temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed	Manually set the outside air temperature greater than 70°F (adj.), and the zone temperature below the heating setpoint, and the dual temperature greater than 70°F (adj.), and the fan on and observe system response.		
Dual Temperature Heating Mode	When the zone temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed	Disable the fan and observe system response.		

AHU-3B | 3E
PREFORMANCE VERIFICATION TEST
System: Outside Air Damper Control

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Outside Air Damper Control	When in the occupied mode, the DDC system shall command the outside air damper open.	Set the system to occupied and observe system response.	VERIFIED	WP 29 Apr
Outside Air Damper Control	The DDC system shall close the outside air damper when the system is unoccupied or the safety circuit is in alarm status or a loss of supply fan status	Manually set the system to unoccupied or the safety circuit to alarm status or the supply fan status to off and observe system response	VERIFIED	WP 29 Apr

N/A TO AHU 3B (NO R/A SENSOR)

AHU-3B | 3E
PREFORMANCE VERIFICATION TEST
System: Return Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Return Air Temperature Alarming	2 min. (adj.) after fan operation and the return air temperature is greater than 90°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the return air temperature above 90°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED	WP 29 Apr
Low Return Air Temperature Alarming	2 min. (adj.) after fan operation and the return air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the return air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED	WP 29 Apr

AHU-3B | 3E
PERFORMANCE VERIFICATION TEST
System: Mixed Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Mixed Air Temperature Alarming	2 min. (adj.) after fan operation and the mixed air temperature is greater than 90°F (adj.) an alarm shall be generated at the operator workstation	Manually set the mixed air temperature above 90°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED FOR UNIT 3-B	WP 29 Apr
Low Mixed Air Temperature Alarming	2 min. (adj.) after fan operation and the mixed air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the mixed air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED FOR UNIT 3-B	WP 29 Apr

N/A TO AHU-3E NO ECONOMIZER OR ~~AHU-3B~~

AHU-3B | 3E
PERFORMANCE VERIFICATION TEST
System: Supply Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Supply Air Temperature Alarming	2 min. (adj.) after fan operation and the supply air temperature is greater than 120°F (adj.) an alarm shall be generated at the operator workstation	Manually set the supply air temperature above 120°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED	WP 29 Apr
Low Supply Air Temperature Alarming	2 min. (adj.) after fan operation and the supply air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the supply air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED	WP 29 Apr

Thermo-Tech's Signature / Date	Noresco's Signature / Date

Owner's Representative's Signature / Date	Owner Representative's Signature / Date

Bldg 3144

Date: 4/28/09

DUAL TEMP SYSTEM (CW LOOP)
PERFORMANCE VERIFICATION TEST
System: Dual Temp System (Chilled Water Loop) Run Conditions

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temp System (Chilled Water Loop) Run Conditions	The DDC system shall enable the DTS Chilled Water Loop whenever the outside air temperature rises above the setpoint of 55°F (adj.) and the software mode switch for the dual temperature system is in cool mode.	Manually set the outside air temperature above the setpoint of 55°F (adj.) with the software mode switch in cool mode and observe system response.	OK VERIFIED	WD 28 Apr 09
Dual Temp System (Chilled Water Loop) Run Conditions	The DDC system shall disable the DTS Chilled Water Loop whenever the outside air temperature falls below the setpoint of 54°F (adj.) or the software mode switch for the dual temperature system is in heat mode.	Manually set the outside air temperature below the setpoint of 54°F (adj.) or the software mode switch in heat mode and observe system response.	OK VERIFIED	WD 28 Apr 09

Dual Temperature System (Chilled Water Loop)
PERFORMANCE VERIFICATION TEST
System: Dual Temp Pump Operation

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temp Pump Operation	When the software mode switch is in cool mode, the ~~Dual Temp~~ Pump shall run anytime the DTS Chilled Water Loop is called to run. — CHILLED WATER PUMP —	Manually set the outside air temperature above the setpoint of 55°F (adj.) with software mode switch in cool mode and observe system response.	CWL Pump Starts VERIFIED	WD 28 Apr 09
Dual Temp Pump Operation	The Dual Temp Pump shall run for freeze protection whenever the outside air temperature is less than 38°F (adj.).	Manually set the outside air temperature below the freeze protection setpoint of 38°F (adj.) with software mode switch in any position and observe system response.	N/A	N/A
Dual Temp Pump Operation	The ~~Dual Temp~~ Pump shall have a minimum 5 min. (adj.) delay on shutdown after the chiller is disabled. → CHILLED WATER PUMP	Manually set the outside air temperature below the setpoint of 54°F (adj.) with software mode switch in cool mode and verify that the ~~Dual Temp~~ Pump continues to run for 5 min. (adj.) after the chiller has been disabled.	OK	WD 28 Apr 09

Dual Temperature System (Chilled Water Loop)
PERFORMANCE VERIFICATION TEST
System: Dual Temperature Changeover Valve Control

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temp Changeover Valve Control	When the software mode switch is in the Cool mode, the dual temperature changeover valve shall be commanded to allow flow through the chiller.	Manually set the software modeswitch in the cool mode and observe system response.	OK VERIFIED	WD 28 Apr 09
Dual Temp Changeover Valve Control	The chiller shall not operate unless the dual temperature changeover valve is commanded to allow flow through the chiller.	Verify that the chiller remains disabled until the dual temperature changeover valve is commanded to allow flow through the chiller.	OK VERIFIED	WD 28 Apr 09

dt - CSAC - 1p - SW - 2N

Dual Temperature System (Chilled Water Loop)
PERFORMANCE VERIFICATION TEST
System: Chiller Operation & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Chiller Operation	The chiller shall have a minimum 5 min. (adj.) delay on startup after the pump status is proven on.	Manually set the outside air temperature above the setpoint of 55°F (adj.) with software mode switch in cool mode and verify that the chiller remains disabled for 5 min. (adj.) after the Dual Temp Pump is commanded on.	CHILLER WAS BUILT IN ON DELAY - FROM 5 TO 20 MIN	WP 28 Apr 09
Chiller Operation	The chiller shall be disabled on a loss of pump status	Manually set the Dual Temp Pump status to "off" and observe system response.	HARDWARE INTERLOCK	4/17/09
~~Chiller~~ CWP Running in Hand	The DDC system shall continuously monitor the on/off status of the ~~chiller~~ CWP. If a status of "on" occurs for 10 sec. (adj.) while the ~~chiller~~ CWP is commanded off an alarm shall be generated at the operator workstation.	Manually set the ~~chiller~~ CWP status to "on" for 10 sec. (adj.) while it is commanded off and observe system response.	ALARM VERIFIED	4/17/09

Dual Temperature System (Chilled Water Loop)
PERFORMANCE VERIFICATION TEST
System: Dual Temp Chilled Water Loop Supply Temperature Setpoint & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temp Chilled Water Loop Supply Temperature Setpoint	The chiller shall maintain a Dual Temp Chilled Water Loop Supply temperature setpoint as determined by its own internal controls (provided by others). Initial setpoint is assumed to be 45°F (adj.).	Verify that the chiller maintains an internal setpoint of 45°F (adj.).	VERIFIED OK	WP 28 Apr 09
High Dual Temp Chilled Water Loop Supply Temperature	The DDC system shall continuously monitor the Dual Temp Chilled Water Loop Supply temperature and generate an alarm at the operator workstation if the temperature rises above 55°F (adj.) and the DTS Chilled Water Loop has been enabled for 15 min. (adj.).	Manually set the Dual Temp Chilled Water Loop Supply temperature above 55°F (adj.) prior to the DTS Chilled Water Loop being enabled for 15 min. (adj.) and observe system response.	ALARM ~~VERIFIED~~ DISABLED	4/17/09
High Dual Temp Chilled Water Loop Supply Temperature	The DDC system shall continuously monitor the Dual Temp Chilled Water Loop Supply temperature and generate an alarm at the operator workstation if the temperature rises above 55°F (adj.) and the DTS Chilled Water Loop has been enabled for 15 min. (adj.).	Manually set the Dual Temp Chilled Water Loop Supply temperature above 55°F (adj.) after the DTS Chilled Water Loop has been enabled for 15 min. (adj.) and observe system response.	ALARM VERIFIED	4/17/09
Low Dual Temp Chilled Water Loop Supply Temperature	The DDC system shall continuously monitor the Dual Temp Chilled Water Loop Supply temperature and generate an alarm at the operator workstation if the temperature falls below 38°F (adj.).	Manually set the Dual Temp Chilled Water Loop Supply temperature below 38°F (adj.) and observe system response.	ALARM VERIFIED	4/17/09

Thermo-Tabl's Signature / Date	Noresco's Signature / Date
	28 Apr 09

Owner's Representative's Signature / Date	Owner Representative's Signature / Date

Bldg 3144

Date: 4/16/09

DUAL TEMP SYSTEM (HW LOOOP)
PERFORMANCE VERIFICATION TEST
System: Dual Temp System (Hot Water Loop) Run Comditions

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temp System (Hot Water Loop) Run Conditions	The DDC system shall enable the DTS Hot Water Loop whenever the outside air temperature falls below the setpoint of 65°F (adj.) and the software mode switch for the dual temperature system is in heat mode.	Manually set the outside air temperature below the setpoint of 65°F (adj.) with the software mode switch in heat mode and observe system response.	~~VERIFIED~~ VERIFIED	~~[illegible]~~ [illegible] 4/16/09
Dual Temp System (Hot Water Loop) Run Conditions	The DDC system shall disable the DTS Hot Water Loop whenever the outside air temperature rises above the setpoint of 66°F (adj.) or the software mode switch for the dual temperature system is in cool mode.	Manually set the outside air temperature above the setpoint of 66°F (adj.) or the software mode switch in cool mode and observe system response.	OK Pump Shutdown	WP 28 Apr 09
Dual Temp System (Hot Water Loop) Run Conditions	The DTS Hot Water Loop shall run for freeze protection whenever the outside air temperature is less than 38°F (adj.).	Manually set the outside air temperature below the freeze protection setpoint of 38°F (adj.) with software mode switch in any position and observe system response.	VERIFIED <38°F	[illegible] 4/16/09

Dual Temperature System (Hot Water Loop)
PERFORMANCE VERIFICATION TEST
System: ~~Dual Temp~~ HW Pump Operation & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
~~Dual Temp~~ HW Pump Operation	When the software mode switch is in heat mode, the ~~Dual Temp~~ HW Pump shall run anytime the DTS Hot Water Loop is called to run.	Manually set the outside air temperature below the setpoint of 65°F (adj.) with software mode switch in heat mode and observe system response.	VERIFIED	[illegible] 4/16/09
~~Dual Temp~~ HW Pump Failure	The DDC system shall continuously monitor the on/off status of ~~Dual Temp~~ HW Pump. If a loss of pump status occurs for 30 sec. (adj.) while the pump is commanded to run an alarm shall be generated at the operator workstation.	Manually set ~~Dual Temp~~ HW Pump status to "off" for 30 sec. (adj.) while it is commanded on and observe system response.	ALARM VERIFIED	[illegible] 4/16/09
~~Dual Temp~~ HW Pump in Hand	The DDC system shall continuously monitor the on/off status of ~~Dual Temp~~ HW Pump. If a status of "on" occurs for 10 sec. (adj.) while the pump is commanded off an alarm shall be generated at the operator workstation.	Manually set ~~Dual Temp~~ HW Pump status to "on" for 10 sec. (adj.) while it is commanded off and observe system response	ALARM VERIFIED	[illegible] 4/16/09

Dual Temperature System (Hot Water Loop)
PERFORMANCE VERIFICATION TEST
System: Dual Temperature Changeover Valve Control

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temp Changeover Valve Control	When the software mode switch is in the Heat mode, the dual temperature changeover valve shall be commanded to allow flow through the heat exchanger.	Manually set the software modeswitch in the heat mode and observe system response.	FLOW VERIFIED THRU HX	[illegible] 4/16/09
Dual Temp Changeover Valve Control	The heat exchanger steam valve shall not operate unless the dual temperature changeover valve is commanded to allow flow through the heat exchanger	Verify that the heat exchanger steam valve remains closed until the dual temperature changeover valve is commanded to allow flow through the heat exchanger.	STM VALVE CLOSED IN SUMMER MODE	[illegible] 4/16/09

dt-hex-stm-1-2v_1-2p-NET-2N (#3165, #3006)

Dual Temperature System (Hot Water Loop)
PERFORMANCE VERIFICATION TEST
System: Dual Temp Hot Water Loop Supply Temperature Setpoint Reset & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temp Hot Water Loop Supply Temperature Setpoint Reset	The Dual Temp Hot Water Loop Supply temperature setpoint shall reset based on outside air temperature. As outside air temperature rises from 0°F (adj.) to 70°F (adj.) the Dual Temp Hot Water Loop Supply temperature setpoint shall reset downwards from 180°F (adj.) to 120°F (adj.).	Manually set the outside air temperature at various temperatures and verify that the dual temp hot water loop supply temperature setpoint resets accoirdingly.	OAT 53F DTSupply 134F	EL 4/16/09
High Dual Temp Hot Water Loop Supply Temperature	The DDC system shall continuously monitor the Dual Temp Hot Water Loop Supply temperature and generate an alarm at the operator workstation if the temperature rises above 200°F (adj.).	Manually set the Dual Temp Hot Water Loop Supply temperature above 200°F (adj.) and observe system response.	ALARM VERIFIED	EL 4/16/09
Low Dual Temp Hot Water Loop Supply Temperature	The DDC system shall continuously monitor the Dual Temp Hot Water Loop Supply temperature and generate an alarm at the operator workstation if the temperature falls below 100°F (adj.) after the DTS Hot Water Loop has been enabled for 15 min. (adj.).	Manually set the Dual Temp Hot Water Loop Supply temperature below 100°F (adj.) prior to the DTS Hot Water Loop being enabled for 15 min. (adj.) and observe system response.	ALARM ~~VERIFIED~~ DISABLED	EL 4/16/09
Low Dual Temp Hot Water Loop Supply Temperature	The DDC system shall continuously monitor the Dual Temp Hot Water Loop Supply temperature and generate an alarm at the operator workstation if the temperature falls below 100°F (adj.) after the DTS Hot Water Loop has been enabled for 15 min. (adj.).	Manually set the Dual Temp Hot Water Loop Supply temperature below 100°F (adj.) after to the DTS Hot Water Loop has been enabled for 15 min. (adj.) and observe system response.	ALARM VERIFIED	EL 4/16/09

Dual Temperature System (Hot Water Loop)
PERFORMANCE VERIFICATION TEST
System: Heat Exchanger Steam Valve - Hot Water Control

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Heat Exchanger Steam Valve - Hot Water Control	The steam valve shall modulate open whenever the pump status is proven on and the Dual Temp Hot Water Loop Supply temperature is below the hot water temperature setpoint.	With the pump status on, manually set the Dual Temp Hot Water Loop Supply temperature below the setpoint and observe system response.	VALVE OPENING	EL 4/16/09
Heat Exchanger Steam Valve - Hot Water Control	The steam valve shall modulate closed whenever the Dual Temp Hot Water Loop Supply temperature is above the hot water temperature setpoint or on a loss of pump status.	Manually set the Dual Temp Hot Water Loop Supply temperature above the setpoint or manually set the dual temp pump status to "off" and observe system response.	VALVE CLOSING	EL 4/16/09
Heat Exchanger Steam Valve - Hot Water Control	The steam valve shall modulate closed whenever the Dual Temp Hot Water Loop Supply temperature rises from 190°F (adj.) to 200°F (adj.).	Manually set the Dual Temp Hot Water Loop Supply temperature above 190°F (adj.) and observe system response.	VALVE CLOSING	EL 4/16/09

Thermotrol's Signature / Date	Noresco's Signature / Date
	28 Apr 09
Owner's Representative's Signature / Date	**Owner Representative's Signature / Date**

Building
3144

Date: 30 Apr 09

FCU-1 | AHU-3F
PREFORMANCE VERIFICATION TEST
System: Run Conditions

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Zone Scheduled Occupancy	The DDC system shall enable the AHU based upon zone scheduled time of day and day of week including holidays. There shall be provisions for manual and timed overrides that may enable equipment outside of the normal schedule.	Configure time of day and day of week enable schedules incuding holidays for the AHU. Initiate schedules and observe system response.	VERIFIED	WP 30Apr
AHU enable based upon Cooling from the Unoccupied Zone	The DDC system shall enable the AHU if the zone temperature rises above the unoccupied cooling setpoint.	During the unoccupied mode manually set the zone temperature above the unoccupied cooling setpoint and observe system response.	FAN STARTS, DT VALVE OPENS VERIFIED	WP 30Apr
AHU enable based upon Heating from the Unoccupied Zone	The DDC system shall enable theAHU if the zone temperature falls below the unoccupied heating setpoint.	During the unoccupied mode manually set the zone temperature below the unoccupied heating setpoint and observe system response.	FAN STARTS, DT VALVE OPEN VERIFIED	WP 30Apr
Zone Unoccupied Override	The DDC system shall also enable the AHU, anytime an occupant depresses the unoccupied override button (located on the local space temperature sensor) during unoccupied periods of time. When the override button is depressed, the AHU will run in the occup	Set system to "Unoccupied"; Depress space temperature occupied override button and observe system response.	VERIFIED	WP 30Apr
Zone Scheduled Optimization	The DDC system shall enable the AHU based upon zone calculated optimal start up period before the scheduled occupancy.	Set system to "Optimal Start Up" mode and observe system response.	VERIFIED	WP 30Apr
Unoccupied Period free of run requests	During the unoccupied period which is free of run request, the AHU shall remain off.	Set system to "Unoccupied" mode and free of run request listed above and observe system response.	VERIFIED	WP 30Apr

FCU-1 | AHU-3F
PERFORMANCE VERIFICATION TEST
System: Zone Temperature Setpoint Control & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Occupied Zone Temperature Control	The occupied cooling setpoint shall be 74°F (adj.) and the occupied heating setpoint shall be 70°F (adj.).	Verify that the occupied cooling and heating setpoints are 74°F (adj.) and 70°F (adj.) respectively.	VERIFIED	WP 30Apr
Unoccupied Zone Temperature Control	The unoccupied cooling setpoint shall be 82°F (adj.) and the unoccupied heating setpoint shall be 62°F (adj.).	Verify that the unoccupied cooling and heating setpoints are 82°F (adj.) and 62°F (adj.) respectively	VERIFIED	WP 30Apr
High Zone Temperature Alarm	The DDC system shall continuously monitor the zone temperature. If the zone temperature rises above the cooling setpoint by 5°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the zone temperature 5°F (adj.) above the cooling setpoint and observe system response.	ALARMS VERIFIED	WP 30Apr
Low Zone Temperature Alarm	The DDC system shall continuously monitor the zone temperature. If the zone temperature falls below the heating setpoint by 5°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the zone temperature 5°F (adj.) below the heating setpoint and observe system response.	ALARMS VERIFIED	WP 30Apr

FCU-dtv - lockout - pnu (unique)
(AHU-3F, FCU-1, 2, 3)

N/A RETURN AIR ONLY NO OUTDOOR AIR

FCU-1 | AHU-3F
PERFORMANCE VERIFICATION TEST
System: Safety Circuit Shutdown

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Safety Circuit Shutdown	The DDC system shall monitor the freezestat/smoke detector safety circuit and shut down the unit in and alarm condition and generate an alarm at the operator workstation.	Set the Safety Circuit to alarm and observe system response.		
Safety Circuit Shutdown	The Safety Circuit shall be hard wire interlocked to shutdown the Supply fan and will require a manual reset from the freezestat and/or smoke detector	Manually trip the Freezestat or smoke detector and observe system response. Verify manual reset is in place.		
Safety Circuit Shutdown	If the Supply Fan has tripped OFF on the Safety Circuit, the DDC system will command the heating valve 100% (adj.) open, disable the supply fan, and all outside air dampers shall close.	Set supply fan to tripped on the safety circuit and observe system response.		

FCU-1 | AHU-3F
PREFORMANCE VERIFICATION TEST
System: Supply Fan Control & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
AHU Supply Fan Control	The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties.	Enable the unit and observe system response.	VERIFIED	WP 30Apr
AHU Supply Fan Control	To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.	Disable the unit within 3 min. (adj.) of enabling the unit and observe system response.	VERIFIED	WP 30 Apr
AHU Supply Fan Control	To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.	Disable the unit after 3 min. (adj.) of enabling the unit and observe system response.	VERIFIED	WP 30Apr
AHU Supply Fan Failure	The DDC system shall continuously monitor the on/off status of the supply fan. If a loss of fan status occurs for 30 sec. (adj.) while the fan is commanded to run an alarm shall be generated at the operator workstation.	Manually set the supply fan status to "off" for 30 sec. (adj.) while it is commanded on and observe system response.	ALARM VERIFIED	WP 30 Apr
AHU Supply Fan In Hand	The DDC system shall continuously monitor the on/off status of supply fan. If a status of "on" occurs for 10 sec. (adj.) while the fan is commanded off an alarm shall be generated at the operator workstation.	Manually set the supply fan status to "on" for 10 sec. (adj.) while it is commanded off and observe system response.	ALARM VERIFIED	WP 30Apr

FCU-1 | AHU-3F
PERFORMANCE VERIFICATION TEST
System: Dual Temperature Cooling

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temperature Cooling Mode	The DDC system shall measure the zone temperature and modulate the valve to maintain its cooling setpoint. When the zone temperature is above the cooling setpoint, and the dual temperature water supply is less than 60°F (adj.), and the outside air temperature is greater than 60°F (adj.) and the fan is on the valve shall modulate open.	Manually set the zone temperature above the cooling setpoint, and the dual temperature water supply less than 60°F (adj.), and the outside air temperature greater than 60°F (adj.), and the fan on and observe system response.	VALVE OPENS TO COOL VERIFIED	WP 30Apr
Dual Temperature Cooling Mode	When the zone temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the zone temperature below the cooling setpoint, and the dual temperature water supply less than 60°F (adj.), and the outside air temperature greater than 60°F (adj.), and the fan on and observe system response.	VALVE CLOSES VERIFIED	WP 30Apr
Dual Temperature Cooling Mode	When the zone temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), ~~or the fan is off the~~ valve shall modulate closed.	Manually set the dual temperature water supply greater than 60°F (adj.), and the zone temperature above the cooling setpoint, and the outside air temperature greater than 60°F (adj.), and the fan on and observe system response.	WITH FAN ON VALVE CLOSES VERIFIED	WP 30Apr WITH FAN OFF
Dual Temperature Cooling Mode	When the zone temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), ~~or the fan is off~~ the valve shall modulate closed	Manually set the outside air temperature less than 60°F (adj.), and the zone temperature above the cooling setpoint, and the dual temperature less than 60°F (adj.), and the fan on and observe system response.	VERIFIED	WP 30Apr
Dual Temperature Cooling Mode	When the zone temperature is below the cooling setpoint, or the dual temperature is greater than 60°F (adj.), or the outside air is less than 60°F (adj.), or the fan is off the valve shall modulate closed.	Disable the fan and observe system response	VERIFIED	WP 30Apr

FCU 1 – IS TWO POSITION VALVE - (HEAT + COOL)
AHU 3F – IS MODULATING VALVE

* OUTDOOR TEMPERATURE WILL NOT LOCK OUT RETURN AIR ONLY ALLOW VALVE TO OPERATE IF COOLING SIGNAL IS ACTIVE

FCU-1 | AHU-3F
PERFORMANCE VERIFICATION TEST
System: Dual Temperature Heating

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Dual Temperature Heating Mode	The DDC system shall measure the zone temperature and modulate the valve to maintain its heating setpoint. When the zone temperature is below the heating setpoint, and the dual temperature water supply is greater than 70°F (adj.), and the outside air temperature is less than 70°F (adj.) and the fan is on the valve shall modulate open.	Manually set the zone temperature below the heating setpoint, and the dual temperature water supply greater than 70°F (adj.), and the outside air temperature less than 70°F (adj.), and the fan on and observe system response.	VALVE OPENS TO HEAT VERIFIED	WP 30Apr
Dual Temperature Heating Mode	When the zone temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the zone temperature above the heating setpoint, and the dual temperature water supply greater than 70°F (adj.), and the outside air temperature less than 70°F (adj.), and the fan on and observe system response.	VALVE CLOSES VERIFIED	WP 30Apr
Dual Temperature Heating Mode	When the zone temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the dual temperature water supply less than 70°F (adj.), and the zone temperature below the heating setpoint, and the outside air temperature less than 70°F (adj.), and the fan on and observe system response.	VALVE CLOSES VERIFIED	WP 30Apr
Dual Temperature Heating Mode	When the zone temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed.	Manually set the outside air temperature greater than 70°F (adj.), and the zone temperature below the heating setpoint, and the dual temperature greater than 70°F (adj.), and the fan on and observe system response.	VALVES CLOSES VERIFIED	WP 30Apr
Dual Temperature Heating Mode	When the zone temperature is above the heating setpoint, or the dual temperature is less than 70°F (adj.), or the outside air is greater than 70°F (adj.), or the fan is off the valve shall modulate closed.	Disable the fan and observe system response.		

FCU-1 | AHU-3F
PERFORMANCE VERIFICATION TEST
System: Supply Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Supply Air Temperature Alarming	2 min. (adj.) after fan operation and the supply air temperature is greater than 120°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the supply air temperature above 120°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed	ALARM VERIFIED	WP 30Apr
Low Supply Air Temperature Alarming	2 min. (adj.) after fan operation and the supply air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the supply air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed	ALARM VERIFIED	WP 30Apr

Thermo-Trol's Signature / Date	Noresco's Signature / Date
	30 Apr 09
Owner's Representative's Signature / Date	**Owner Representative's Signature / Date**

Building

Date: 29 Apr 09

HVU3A | B | X | D | X
PERFORMANCE VERIFICATION TEST
System: Run Conditions

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Zone Scheduled Occupancy	The DDC system shall enable the AHU based upon zone scheduled time of day and day of week including holidays. There shall be provisions for manual and timed overrides that may enable equipment outside of the normal schedule.	Configure time of day and day of week enable schedules including holidays for the AHU Initiate schedules and observe system response.	VERIFIED	WP 29 Apr
AHU enable based upon Heating from the Unoccupied Zone	The DDC system shall enable the AHU if the zone temperature falls below the unoccupied heating setpoint	During the unoccupied mode manually set the zone temperature below the unoccupied heating setpoint and observe system response.	VERIFIED	WP 29 Apr
Zone Unoccupied Override	The DDC system shall also enable the AHU, anytime an occupant depresses the unoccupied override button (located on the local space temperature sensor) during unoccupied periods of time. When the override button is depressed, the AHU will run in the occupied mode of operation for 60 min. (adj.)	Set system to "Unoccupied". Depress space temperature occupied override button and observe system response	VERIFIED	WP 29 Apr
Unoccupied Period free of run requests	During the unoccupied period which is free of run request, the AHU shall remain off.	Set system to "Unoccupied" mode and free of run request listed above and observe system response.	VERIFIED	WP 29 Apr

HVU3A | B | X | D | X
PERFORMANCE VERIFICATION TEST
System: Zone Temperature Setpoint Control & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Occupied Zone Temperature Control	The occupied heating setpoint shall be 70°F (adj.)	Verify that the occupied heating setpoint is 70°F (adj.).	VERIFIED	WP 29 Apr
Unoccupied Zone Temperature Control	The unoccupied heating setpoint shall be 62°F (adj.)	Verify that the unoccupied heating setpoint is 62°F (adj.)	VERIFIED	WP 29 Apr
Low Zone Temperature Alarm	The DDC system shall continuously monitor the zone temperature. If the zone temperature falls below the heating setpoint by 5°F (adj.) an alarm shall be generated at the operator workstation	Manually set the zone temperature 5°F (adj.) below the heating setpoint and observe system response.	VERIFIED	WP 29 Apr

HVU3A | B | X | D | X
PERFORMANCE VERIFICATION TEST
System: Safety Circuit Shutdown

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Safety Circuit Shutdown	The DDC system shall monitor the freezestat/smoke detector safety circuit and shut down the unit in and alarm condition and generate an alarm at the operator workstation	Set the Safety Circuit to alarm and observe system response	FAN STOP VLV 100%	WP 29 Apr
Safety Circuit Shutdown	The Safety Circuit shall be hard wire interlocked to shutdown the Supply fan and will require a manual reset from the freezestat and/or smoke detector	Manually trip the Freezestat or smoke detector and observe system response. Verify manual reset is in place	VERIFIED	WP 29 Apr
Safety Circuit Shutdown	If the Supply Fan has tripped OFF on the Safety Circuit, the DDC system will command the heating valve 100% (adj.) open, disable the supply fan, and all outside air dampers shall close.	Set supply fan to tripped on the safety circuit and observe system response.	VERIFIED ALARMED	WP 29 Apr

HVU 3-A HAD BAD FAN MOTOR
3-B BAD DP SWITCH
3-D BAD HW VALVE
MUAHU - 100CA - 2t - 2SFAN - dtv - dx
(HVU - 3A, 3B, 3D)

HVU3A | B | C | D | E

PREFORMANCE VERIFICATION TEST

System: Supply Fan Control & Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
AHU Supply Fan Control	The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties.	Enable the unit and observe system response.	VERIFIED	WP 29 Apr
AHU Supply Fan Control	To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.	Disable the unit within 3 min. (adj.) of enabling the unit and observe system response	VERIFIED	WP 29 Apr
AHU Supply Fan Control	To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum ~~runtime~~ OFF	Disable the unit after 3 min. (adj.) of enabling the unit and observe system response.	VERIFIED	WP 29 Apr
AHU Supply Fan Failure	The DDC system shall continuously monitor the on/off status of the supply fan. If a loss of fan status occurs for 30 sec. (adj.) while the fan is commanded to run an alarm shall be generated at the operator workstation.	Manually set the supply fan status to "off" for 30 sec. (adj.) while it is commanded on and observe system response.	VERIFIED	WP 29 Apr
AHU Supply Fan In Hand	The DDC system shall continuously monitor the on/off status of supply fan. If a status of "on" occurs for 10 sec. (adj.) while the fan is commanded off an alarm shall be generated at the operator workstation.	Manually set the supply fan status to "on" for 10 sec. (adj.) while it is commanded off and observe system response.	VERIFIED	WP 29 Apr

HVU3A | B | C | D | E

PERFORMANCE VERIFICATION TEST

System: Heating Coil Valve Control

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Heating Coil Valve Control	The DDC system shall measure the zone temperature and modulate the heating coil valve to maintain its heating setpoint.	No Test		
Heating Coil Valve Control	The DDC system shall modulate the heating coil valve open when the zone temperature is below the heating setpoint and the outside air temperature is less than 65°F (adj.) and the supply fan status is on.	Manually set the zone temperature below the heating setpoint and the outside air temperature less than 65°F (adj.) and the supply fan status on and observe sytem response.	VALVE OPENS VERIFIED	WP 29 APR 09
Heating Coil Valve Control	The DDC system shall modulate the heating coil valve closed when the zone temperature is above the heating setpoint or the outside air temperature is greater than 66°F (adj.) or the fan status is off	Manually set the zone temperature above the heating setpoint and the outside air temperature less than 65°F (adj.) and the supply fan status on and observe system response.	VALVE CLOSED VERIFIED	WP 29 Apr
Heating Coil Valve Control	The DDC system shall modulate the heating coil valve closed when the zone temperature is above the heating setpoint or the outside air temperature is greater than 66°F (adj.) or the fan status is off.	Manually set the outside air temperature above 66°F (adj.) and zone temperature below the heating setpoint and the supply fan status on and observe system response.	VALVE CLOSES VERIFIED	WP 29 Apr
Heating Coil Valve Control	The DDC system shall modulate the heating coil valve closed when the zone temperature is above the heating setpoint or the outside air temperature is greater than 66°F (adj.) or the fan status is off	Manually set the supply fan status to off and observe system response.	VALVE CLOSE	WP 29 Apr
Heating Coil Valve Control	The heating coil valve shall open to 100% (adj.) whenever the freezestat is in alarm condition.	Refer to Freeze Protection testing for heating coil valve operation during freezestat alarming	VERIFIED	WP 29 Apr

HVU3A | B | C | D | E

PREFORMANCE VERIFICATION TEST

System: Outside Air Damper Control

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
Outside Air Damper Control	When in the occupied mode, the DDC system shall command the outside air damper open.	Set the system to occupied and observe system response.	VERIFIED	WP 29 Apr
Outside Air Damper Control	The DDC system shall close the outside air damper when the system is unoccupied or the safety circuit is in alarm status or a loss of supply fan status.	Manually set the system to unoccupied or the safety circuit to alarm status or the supply fan status to off and observe system response.	VERIFIED	WP 29 Apr

HVU3A | B | ~~C~~ | D | ~~E~~ → N/A

PREFORMANCE VERIFICATION TEST

System: Return Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Return Air Temperature Alarming	2 min. (adj.) after fan operation and the return air temperature is greater than 90°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the return air temperature above 90°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.		
Low Return Air Temperature Alarming	2 min. (adj.) after fan operation and the return air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the return air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.		

NO RETURN AIR SENSOR 100% ODA

HVU3A | B | ~~C~~ | D | ~~E~~ → N/A

PERFORMANCE VERIFICATION TEST

System: Mixed Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Mixed Air Temperature Alarming	2 min. (adj.) after fan operation and the mixed air temperature is greater than 90°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the mixed air temperature above 90°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.		
Low Mixed Air Temperature Alarming	2 min. (adj.) after fan operation and the mixed air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the mixed air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.		

NO MIXED AIR SENSORS 100% ODA

HVU3A | B | ~~C~~ | D | ~~E~~

PERFORMANCE VERIFICATION TEST

System: Supply Air Temperature Alarming

System loop	Expected System Response	Test Method	Observed Response	Initial/Date
High Supply Air Temperature Alarming	2 min. (adj.) after fan operation and the supply air temperature is greater than 120°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the supply air temperature above 120°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED	WP 29Apr
Low Supply Air Temperature Alarming	2 min. (adj.) after fan operation and the supply air temperature is less than 45°F (adj.) an alarm shall be generated at the operator workstation.	Manually set the supply air temperature below 45°F (adj.). Observe system response. Temporarily change 2 min. time delay to generate alarm if needed.	VERIFIED	WP 29Apr

Thermo-Lo's Signature / Date	Witnesses Signature / Date
	29 Apr 09
Owner's Representative's Signature / Date	**Owner Representative's Signature / Date**

NAB Little Creek DO-2 ECM-004A

Project: 540044

Building 3144

SECTION 15910N - DIRECT DIGITAL CONTROL SYSTEMS

SUBMITTALS:
SD-10 100% SD-10

Controls Contractor:

Thermo-Trol Systems, Inc.
504 Viking Dr.
Virginia Beach, VA 23452
757.428.4646
757.428.4030 fax

SD-10 100% AsBuilts

AsBuilt Visio Drawings
Sequences
Points List

Bldg 3144

MZAHU-3A
Multi-Zone Air Handling Unit

General:
All alarms shall be generated at the operator workstation.

Run Conditions - Requested:
The unit shall be enabled whenever:
• Any zone is occupied (run request from zone controllers).
• OR 2 (adj.) unoccupied zones need cooling or heating (see zone night setback cooling/heating sequences).

The unit shall be disabled whenever:
• No zones are occupied (0 run requests from zone controllers).
• AND 0 (adj.) unoccupied zones need cooling or heating(see zone night setback cooling/heating sequences).

Safety Interlock Relay Status:
The unit shall shut down and generate an alarm upon receiving a Safety interlock relay status.

Supply Fan:
The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.

Alarms shall be provided as follows:
• Supply Fan Failure: Fan is commanded on, but the status is off for 30 sec. (adj.).
• Supply Fan in Hand: Fan is commanded off, but the status is on for 10 sec. (adj.).

Return Fan:
The return fan shall be commanded to run anytime the supply fan is commanded to run, unless shutdown on safeties. To prevent short cycling, the return fan shall have a 3 min. (adj.) minimum runtime.

Alarms shall be provided as follows:
• Return Fan Failure: Fan is commanded on, but the status is off for 30 sec. (adj.).
• Return Fan in Hand: Fan is commanded off, but the status is on for 10 sec. (adj.).

Dual Temp Heating/Cooling Deck:
Cooling/Heating Mode is determined by the dual temp systems heating cooling mode. The controller shall monitor the active deck supply air temperature and shall maintain an active deck supply air temperature setpoint reset based on zone cooling/heating requirements.

Active Deck Cooling Supply Air Temperature Setpoint - Optimized:
Setpoint will be calculated every 5 min. (adj.) Setpoint = LastSetpoint + 1 (adj) - (zone cooling request (max of 3 (adj.)) x 1).

- The initial cooling supply air temperature setpoint shall be 58°F (adj.).
- As cooling demand increases, the setpoint shall incrementally reset down to a minimum of 55°F (adj.).
- As cooling demand decreases, the setpoint shall incrementally reset up to a maximum of 75°F (adj.).

30 min.(adj.) after unit has proven airflow, alarms shall be provided as follows:
High Cooling Supply Air Temp: If the active deck supply air temperature is 5°F (adj.) greater than setpoint.

Active Deck Heating Supply Air Temperature Setpoint - Optimized:
Setpoint will be calculated every 5 min. (adj.) Setpoint = LastSetpoint - 1 (adj) + (zone cooling request (max of 3 (adj.)) x 1).

- The initial heating supply air temperature setpoint shall be 90°F (adj.).
- As heating demand increases, the setpoint shall incrementally reset up to a maximum of 110°F (adj.).
- As heating demand decreases, the setpoint shall incrementally reset down to a minimum of 80°F (adj.).

30 min.(adj.) after unit has proven airflow, alarms shall be provided as follows:
High Heating Supply Air Temp: If the active deck supply air temperature is greater than 120°F (adj.).
Low Heating Supply Air Temp: If the active deck supply air temperature is 5°F (adj.) less than setpoint.

Dual Temp Valve Cooling Mode:
The controller shall measure the active deck supply air temperature and modulate the dual temp valve to maintain its cooling setpoint.

The cooling shall be enabled whenever:
- The Dual Temperature Water Supply is less than the return air temperature.
- AND Outside air temperature is greater than 55°F (adj.).
- AND the active deck supply air temperature is above cooling setpoint.
- AND the fan is on.

The cooling shall be disabled whenever:
- The Dual Temperature Water Supply is greater than return air temperature.
- OR Outside air temperature is less than 54°F (adj.).
- OR the active deck supply air temperature is below cooling setpoint.
- OR the fan is off.

Dual Temp Valve Heating Mode:
The controller shall measure the active deck supply air temperature and modulate the dual temp valve to maintain its heating setpoint.

The heating shall be enabled whenever:
- The Dual Temperature Water Supply is greater than the return air temperature.
- AND Outside air temperature is less than 65°F (adj.).
- AND the active deck supply air temperature is below heating setpoint.
- AND the fan is on.

The heating shall be disabled whenever:
- The Dual Temperature Water Supply is less than the return air temperature.
- OR Outside air temperature is greater than 66°F (adj.).
- OR the active deck supply air temperature is above heating setpoint.
- OR the fan is off.

Economizer:
The controller shall measure the mixed air temperature and modulate the economizer dampers in sequence to maintain the optimized active deck cooling setpoint.

The economizer shall be enabled whenever:
- Outside air enthalpy is less than 24 btu/lb (adj.).
- AND the outside air temperature is less than the return air temperature.
- AND the outside air temperature is less than 65°F (adj.).
- AND the supply fan status is on.

The economizer shall be disabled whenever:
- Outside air enthalpy is greater than 24 btu/lb (adj.).
- OR the outside air temperature is greater than the return air temperature.
- OR the outside air temperature is greater than 66°F (adj.).
- OR the supply fan status is off.

Minimum Outside Air Ventilation:
When in the occupied mode and not in economizer mode, the controller shall modulate the outside air damper to a minimum adjustable position of 20% (adj.) open.

The outside and exhaust air dampers shall fully close and the return air damper shall fully open when the unit is off or during optimal start up.

The outside air damper shall modulate closed whenever:
- The Freezestat is in alarm status.
- OR on a loss of supply fan status.

Return Air Temperature:
The controller shall monitor the return air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Return Air Temp: If the return air temperature is greater than 90°F (adj.).
- Low Return Air Temp: If the return air temperature is less than 45°F (adj.).

Mixed Air Temperature:
The controller shall monitor the mixed air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Mixed Air Temp: If the mixed air temperature is greater than 90°F (adj.).
- Low Mixed Air Temp: If the mixed air temperature is less than 45°F (adj.).

Supply Air Temperature:
The controller shall monitor the supply air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

Building 3144

MZAHU-3A

	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
Actual Deck Supply Air Temp	*							*		*
Neutral Deck Supply Air Temp	*							*		*
Mixed Air Temp	*							*		*
Return Air Temp	*							*		*
DT Coil Valve		*						*		*
Economizer Dampers		*						*		*
Supply Fan Status			*					*		*
Return Fan Status			*					*		*
Safety Interlock			*					*		*
Supply Fan Start/Stop				*				*		*
Return Fan Start/Stop				*				*		*
DT Cooling Supply Air Temp Setpoint					*			*		*
DT Heating Supply Air Temp Setpoint					*			*		*
Economizer Mixed Air Temp Setpoint					*			*		*
Supply Fan Failure									*	
Supply Fan in Hand									*	
Return Fan Failure									*	
Return Fan in Hand									*	
High DT Cooling Supply Air Temp									*	
High DT Heating Supply Air Temp									*	
Low DT Heating Supply Air Temp									*	
High Mixed Air Temp									*	
Low Mixed Air Temp									*	
High Return Air Temp									*	
Low Return Air Temp									*	
Totals	4	2	3	2	3	0	0	14	11	14
Total Hardware (11)					Total Software (28)					

Bldg 3144

MZAHU-3C
Multi-Zone Air Handling Unit

General:
All alarms shall be generated at the operator workstation.

Run Conditions - Requested:
The unit shall be enabled whenever:
• Any zone is occupied (run request from zone controllers).
• OR 2 (adj.) unoccupied zones need cooling or heating (see zone night setback cooling/heating sequences).

The unit shall be disabled whenever:
• No zones are occupied (0 run requests from zone controllers).
• AND 0 (adj.) unoccupied zones need cooling or heating(see zone night setback cooling/heating sequences).

Safety Interlock Relay Status:
The unit shall shut down and generate an alarm upon receiving a Safety interlock relay status.

Supply Fan:
The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.

Alarms shall be provided as follows:
• Supply Fan Failure: Fan is commanded on, but the status is off for 30 sec. (adj.).
• Supply Fan in Hand: Fan is commanded off, but the status is on for 10 sec. (adj.).

Dual Temp Heating/Cooling Deck:
Cooling/Heating Mode is determined by the dual temp systems heating cooling mode. The controller shall monitor the active deck supply air temperature and shall maintain an active deck supply air temperature setpoint reset based on zone cooling/heating requirements.

Active Deck Cooling Supply Air Temperature Setpoint - Optimized:
Setpoint will be calculated every 5 min. (adj.) Setpoint = LastSetpoint + 1 (adj) - (zone cooling request (max of 3 (adj.)) x 1).

• The initial cooling supply air temperature setpoint shall be 58°F (adj.).
• As cooling demand increases, the setpoint shall incrementally reset down to a minimum of 55°F (adj.).
• As cooling demand decreases, the setpoint shall incrementally reset up to a maximum of 75°F (adj.).

30 min (adj.) after unit has proven airflow, alarms shall be provided as follows:
High Cooling Supply Air Temp: If the active deck supply air temperature is 5°F (adj.) greater than setpoint.

Active Deck Heating Supply Air Temperature Setpoint - Optimized:
Setpoint will be calculated every 5 min. (adj.) Setpoint = LastSetpoint - 1 (adj) + (zone cooling request (max of 3 (adj.)) x 1).

- The initial heating supply air temperature setpoint shall be 90°F (adj.).
- As heatling demand increases, the setpoint shall incrementally reset up to a maximum of 110°F (adj.).
- As heating demand decreases, the setpoint shall incrementally reset down to a minimum of 80°F (adj.).

30 min.(adj.) after unit has proven airflow, alarms shall be provided as follows:
High Heating Supply Air Temp: If the active deck supply air temperature is greater than 120°F (adj.).
Low Heating Supply Air Temp: If the active deck supply air temperature is 5°F (adj.) less than setpoint.

Dual Temp Valve Cooling Mode:
The controller shall measure the active deck supply air temperature and modulate the dual temp valve to maintain its cooling setpoint.

The cooling shall be enabled whenever:
- The Dual Temperature Water Supply is less than the return air temperature.
- AND Outside air temperature is greater than 55°F (adj.).
- AND the active deck supply air temperature is above cooling setpoint.
- AND the fan is on.

The cooling shall be disabled whenever:
- The Dual Temperature Water Supply is greater than return air temperature.
- OR Outside air temperature is less than 54°F (adj.).
- OR the active deck supply air temperature is below cooling setpoint.
- OR the fan is off.

Dual Temp Valve Heating Mode:
The controller shall measure the active deck supply air temperature and modulate the dual temp valve to maintain its heating setpoint.

The heating shall be enabled whenever:
- The Dual Temperature Water Supply is greater than the return air temperature.
- AND Outside air temperature is less than 65°F (adj.).
- AND the active deck supply air temperature is below heating setpoint.
- AND the fan is on.

The heating shall be disabled whenever:
- The Dual Temperature Water Supply is less than the return air temperature.
- OR Outside air temperature is greater than 66°F (adj.).
- OR the active deck supply air temperature is above heating setpoint.
- OR the fan is off.

Dual Temp Deck - Cooling Compressor:
The controller shall measure the active deck supply air temperature and stage the cooling to maintain its cooling setpoint. To prevent short cycling, the compressor shall have a 2 min. (adj.) minimum runtime and a 2 min. (adj.) minimum off time.

The cooling shall be enabled whenever:
- Outside air temperature is greater than 55°F (adj.).
- AND the supply fan status is on
- AND there is a call for cooling.
- AND the dual temp water system is in heating mode
- AND there are no calls for heating.

The cooling shall be disabled whenever:
- Outside air temperature is less than 54°F (adj.).
- OR the supply fan status is off
- OR there is no call for cooling.
- OR the dual temp water system is in cooling mode
- OR there is a call for heating.

Economizer:
The controller shall measure the mixed air temperature and modulate the economizer dampers in sequence to maintain the optimized active deck cooling setpoint.

The economizer shall be enabled whenever:
- Outside air enthalpy is less than 24 btu/lb (adj.).
- AND the outside air temperature is less than the return air temperature.
- AND the outside air temperature is less than 65°F (adj.).
- AND the supply fan status is on.

The economizer shall be disabled whenever:
- Outside air enthalpy is greater than 24 btu/lb (adj.).
- OR the outside air temperature is greater than the return air temperature.
- OR the outside air temperature is greater than 66°F (adj.).
- OR the supply fan status is off.

Minimum Outside Air Ventilation:
When in the occupied mode and not in economizer mode, the controller shall modulate the outside air damper to a minimum adjustable position of 20% (adj.) open.

The outside air damper shall fully close and the return air damper shall fully open when the unit is off or during optimal start up.

The outside air damper shall modulate closed whenever:
- The Freezestat is in alarm status.
- OR on a loss of supply fan status.

Return Air Temperature:
The controller shall monitor the return air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Return Air Temp: If the return air temperature is greater than 90°F (adj.).
- Low Return Air Temp: If the return air temperature is less than 45°F (adj.).

Mixed Air Temperature:
The controller shall monitor the mixed air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Mixed Air Temp: If the mixed air temperature is greater than 90°F (adj.).
- Low Mixed Air Temp: If the mixed air temperature is less than 45°F (adj.).

Supply Air Temperature:
The controller shall monitor the supply air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

Building 3144

MZAHU-3C

	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
Active Deck Supply Air Temp	*							*		*
Neutral Deck Supply Air Temp	*							*		*
Mixed Air Temp	*							*		*
Return Air Temp	*							*		*
DT Coil Valve		*						*		*
Economizer Dampers		*						*		*
Supply Fan Status			*					*		*
Safety Interlock			*					*		*
Cooling Stage 1				*				*		*
Cooling Stage 2				*				*		*
Supply Fan Start/Stop				*				*		*
DT Cooling Supply Air Temp Setpoint					*			*		*
DT Heating Supply Air Temp Setpoint					*			*		*
Economizer Mixed Air Temp Setpoint					*			*		*
High Zone Temp									*	
Low Zone Temp									*	
Supply Fan Failure									*	
Supply Fan in Hand									*	
High Cooling Supply Air Temp									*	
High Heating Supply Air Temp									*	
Low Heating Supply Air Temp									*	
High Mixed Air Temp									*	
Low Mixed Air Temp									*	
High Return Air Temp									*	
Low Return Air Temp									*	
Totals	4	2	2	3	3	0	0	14	11	14
Total Hardware (11)					Total Software (28)					

Bldg 3144

MZAHU-3D
Multi-Zone Air Handling Unit

General:
All alarms shall be generated at the operator workstation.

Run Conditions - Requested:
The unit shall be enabled whenever:
• Any zone is occupied (run request from zone controllers).
• OR 2 (adj.) unoccupied zones need cooling or heating (see zone night setback cooling/heating sequences).

The unit shall be disabled whenever:
• No zones are occupied (0 run requests from zone controllers).
• AND 0 (adj.) unoccupied zones need cooling or heating(see zone night setback cooling/heating sequences).

Safety Interlock Relay Status:
The unit shall shut down and generate an alarm upon receiving a Safety interlock relay status.

Supply Fan:
The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.

Alarms shall be provided as follows:
• Supply Fan Failure: Fan is commanded on, but the status is off for 30 sec. (adj.).
• Supply Fan in Hand: Fan is commanded off, but the status is on for 10 sec. (adj.).

Dual Temp Heating/Cooling Deck:
Cooling/Heating Mode is determined by the dual temp systems heating cooling mode. The controller shall monitor the active deck supply air temperature and shall maintain an active deck supply air temperature setpoint reset based on zone cooling/heating requirements.

Active Deck Cooling Supply Air Temperature Setpoint - Optimized:
Setpoint will be calculated every 5 min. (adj.) Setpoint = LastSetpoint + 1 (adj) - (zone cooling request (max of 3 (adj.)) x 1).

• The initial cooling supply air temperature setpoint shall be 58°F (adj.).
• As cooling demand increases, the setpoint shall incrementally reset down to a minimum of 55°F (adj.).
• As cooling demand decreases, the setpoint shall incrementally reset up to a maximum of 75°F (adj.).

30 min (adj.) after unit has proven airflow, alarms shall be provided as follows:
High Cooling Supply Air Temp: If the active deck supply air temperature is 5°F (adj.) greater than setpoint.

Active Deck Heating Supply Air Temperature Setpoint - Optimized:
Setpoint will be calculated every 5 min. (adj.) Setpoint = LastSetpoint - 1 (adj) + (zone cooling request (max of 3 (adj.)) x 1)

- The initial heating supply air temperature setpoint shall be 90°F (adj.)
- As heatling demand increases, the setpoint shall incrementally reset up to a maximum of 110°F (adj.).
- As heating demand decreases, the setpoint shall incrementally reset down to a minimum of 80°F (adj.)

30 min.(adj.) after unit has proven airflow, alarms shall be provided as follows:
High Heating Supply Air Temp: If the active deck supply air temperature is greater than 120°F (adj.).
Low Heating Supply Air Temp: If the active deck supply air temperature is 5°F (adj.) less than setpoint.

Dual Temp Valve Cooling Mode:
The controller shall measure the active deck supply air temperature and modulate the dual temp valve to maintain its cooling setpoint.

The cooling shall be enabled whenever:
- The Dual Temperature Water Supply is less than the return air temperature.
- AND Outside air temperature is greater than 55°F (a dj.).
- AND the active deck supply air temperature is above cooling setpoint.
- AND the fan is on.

The cooling shall be disabled whenever:
- The Dual Temperature Water Supply is greater than return air temperature.
- OR Outside air temperature is less than 54°F (adj.).
- OR the active deck supply air temperature is below cooling setpoint.
- OR the fan is off.

Dual Temp Valve Heating Mode:
The controller shall measure the active deck supply air temperature and modulate the dual temp valve to maintain its heating setpoint.

The heating shall be enabled whenever:
- The Dual Temperature Water Supply is greater than the return air temperature.
- AND Outside air temperature is less than 65°F (adj.).
- AND the active deck supply air temperature is below heating setpoint.
- AND the fan is on.

The heating shall be disabled whenever:
- The Dual Temperature Water Supply is less than the return air temperature.
- OR Outside air temperature is greater than 66°F (ad j.).
- OR the active deck supply air temperature is above heating setpoint.
- OR the fan is off.

Economizer:
The controller shall measure the mixed air temperature and modulate the economizer dampers in sequence to maintain the optimized active deck cooling setpoint.

The economizer shall be enabled whenever:
- Outside air enthalpy is less than 24 btu/lb (adj.).
- AND the outside air temperature is less than the return air temperature.
- AND the outside air temperature is less than 65°F (adj.).
- AND the supply fan status is on.

The economizer shall be disabled whenever:
- Outside air enthalpy is greater than 24 btu/lb (adj.).
- OR the outside air temperature is greater than the return air temperature.
- OR the outside air temperature is greater than 66°F (adj.).
- OR the supply fan status is off.

Minimum Outside Air Ventilation:
When in the occupied mode and not in economizer mode, the controller shall modulate the outside air damper to a minimum adjustable position of 20% (adj.) open.

The outside air damper shall fully close and the return air damper shall fully open when the unit is off or during optimal start up.

The outside air damper shall modulate closed whenever:
- The Freezestat is in alarm status.
- OR on a loss of supply fan status.

Return Air Temperature:
The controller shall monitor the return air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Return Air Temp: If the return air temperature is greater than 90°F (adj.).
- Low Return Air Temp: If the return air temperature is less than 45°F (adj.).

Mixed Air Temperature:
The controller shall monitor the mixed air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Mixed Air Temp: If the mixed air temperature is greater than 90°F (adj.).
- Low Mixed Air Temp: If the mixed air temperature is less than 45°F (adj.).

Supply Air Temperature:
The controller shall monitor the supply air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

Building 3144

MZAHU-3D

	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
Active Deck Supply Air Temp	*							*		*
Neutral Deck Supply Air Temp	*							*		*
Mixed Air Temp	*							*		*
Return Air Temp	*							*		*
DT Coil Valve		*						*		*
Economizer Dampers		*						*		*
Supply Fan Status			*					*		*
Safety Interlock			*					*		*
Supply Fan Start/Stop				*				*		*
DT Cooling Supply Air Temp Setpoint					*			*		*
DT Heating Supply Air Temp Setpoint					*			*		*
Economizer Mixed Air Temp Setpoint					*			*		*
Supply Fan Failure									*	
Supply Fan in Hand									*	
High DT Cooling Supply Air Temp									*	
High DT Heating Supply Air Temp									*	
Low DT Heating Supply Air Temp									*	
High Mixed Air Temp									*	
Low Mixed Air Temp									*	
High Return Air Temp									*	
Low Return Air Temp									*	
Totals	4	2	2	1	3	0	0	12	9	12
Total Hardware (9)					Total Software (24)					

Bldg 3144

Zone1 (typical of 18)

General:
All alarms shall be generated at the operator workstation.

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:
- Occupied Mode: The unit shall maintain
  - o A 74°F (adj.) cooling setpoint
  - o A 70°F (adj.) heating setpoint.
- Unoccupied Mode (night setback): The unit shall maintain
  - o A 82°F (adj.) cooling setpoint.
  - o A 62°F (adj.) heating setpoint.

Alarms shall be provided as follows:
- High Zone Temp: If the zone temperature is greater than the cooling setpoint by 5°F (adj.) and the un it has been in its current mode for 30 min (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by 5°F (adj.) and the unit ha s been in its current mode for 30 min (adj.).

ZoneSetpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints ±2°F (adj.) at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of the scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for 60 min. (adj.). At the expiration of this time, control of the unit shall automatically return to the schedule.

Zone Damper Control:
The unit shall maintain zone setpoints by controlling the airflow through each of the following:

- When zone temperature is greater than its cooling setpoint, the damper shall modulate increasing cooling airflow and decreasing neutral airflow until the zone is satisfied.
- When the zone temperature is between the cooling setpoint and the heating setpoint, the damper return to middle position.
- When zone temperature is less than its heating setpoint, the damper shall modulate increasing heating airflow and decreasing neutral airflow until the zone is satisfied.

Supply Air Temperature:
The controller shall monitor the supply air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

Building 3144										
Zone1 (typ of 18)										
	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
Zone Temp	*							*		*
Zone Setpoint Adjust	*									*
Discharge Air Temp	*							*		*
Duct Damper		*						*		*
Zone Override			*					*		*
Schedule							*			
Heating Setpoint								*		*
Cooling Setpoint								*		*
High Zone Temp									*	
Low Zone Temp									*	
High Discharge Air Temp									*	
Low Discharge Air Temp									*	
Totals	5	2	1	0	4	0	1	13	4	14
Total Hardware (8)					Total Software (22)					

Bldg 3144

AHU-1
Single Zone Air Handling Unit

General:
All alarms shall be generated at the operator workstation.

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:
- Occupied Mode: The unit shall maintain
  - o A 74°F (adj.) cooling setpoint
  - o A 70°F (adj.) heating setpoint.
- Unoccupied Mode (night setback): The unit shall maintain
  - o A 82°F (adj.) cooling setpoint.
  - o A 62°F (adj.) heating setpoint.

Alarms shall be provided as follows:
- High Zone Temp: If the zone temperature is greater than the cooling setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).

ZoneSetpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints ±2°F (adj.) at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of the scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for 60 min. (adj.). At the expiration of this time, control of the unit shall automatically return to the schedule.

Safety Interlock Relay Status:
The unit shall shut down and generate an alarm upon receiving a Safety interlock relay status.

Supply Fan:
The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.

Alarms shall be provided as follows:
- Supply Fan Failure: The fan is commanded on, but the status is off for 30 sec. (adj.).
- Supply Fan in Hand: The fan is commanded off, but the status is on for 10 sec. (adj.).

Dual Temp Valve Cooling Mode:
The controller shall measure the zone temperature and modulate the dual temp valve to maintain its cooling setpoint.

The cooling shall be enabled whenever:
• The Dual Temperature Water Supply is less than the zone temperature.
• AND Outside air temperature is greater than 55°F (adj.).
• AND the zone temperature is above the cooling setpoint.
• AND the fan is on.

The cooling shall be disabled whenever:
• The Dual Temperature Water Supply is greater than the zone temperature.
• OR Outside air temperature is less than 54°F (adj.).
• OR the zone temperature is below the cooling setpoint.
• OR the fan is off.

Dual Temp Valve Heating Mode:
The controller shall measure the zone temperature and modulate the dual temp valve to maintain its heating setpoint.

The heating shall be enabled whenever:
• The Dual Temperature Water Supply is greater than the zone temperature.
• AND Outside air temperature is less than 65°F (adj.).
• AND the zone temperature is below heating setpoint.
• AND the fan is on.

The heating shall be disabled whenever:
• The Dual Temperature Water Supply is less than the zone temperature.
• OR Outside air temperature is greater than 66°F (adj.).
• OR the zone temperature is above heating setpoint.
• OR the fan is off.

DX Cooling Stage:
The controller shall measure the supply air temperature and stage the cooling to maintain its cooling setpoint. To prevent short cycling, the compressor shall have a 2 min. (adj.) minimum runtime and a 2 min. (adj.) minimum off time.

The DX cooling shall be enabled whenever:
• Outside air temperature is greater than 55°F (adj.).
• AND the supply fan status is on
• AND the zone temperature is above the cooling setpoint.

The DX cooling shall be disabled whenever:
• Outside air temperature is less than 54°F (adj.).
• OR the supply fan status is off
• OR the zone temperature is below the cooling setpoint.

Outside Air Damper:
The outside air damper shall be commanded open when the unit is commanded on unless shut down on safeties.

The outside air damper shall close whenever:
- The safety circuit is in alarm status.
- OR on a loss of supply fan status.

Return Air Temperature:
The controller shall monitor the return air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Return Air Temp: If the return air temperature is greater than 90°F (adj.).
- Low Return Air Temp: If the return air temperature is less than 45°F (adj.).

Mixed Air Temperature:
The controller shall monitor the mixed air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Mixed Air Temp: If the mixed air temperature is greater than 90°F (adj.).
- Low Mixed Air Temp: If the mixed air temperature is less than 45°F (adj.).

Supply Air Temperature:
The controller shall monitor the supply air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

Building 3144

AHU-1

	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
Zone Temp	*							*		*
Zone Setpoint Adjust	*									*
Return Air Temp	*							*		*
Supply Air Temp	*							*		*
Mixed Air Temp	*							*		*
Dual Temp Coil Valve		*						*		*
Economizer Dampers		*						*		*
Zone Override			*					*		*
Supply Fan Status			*					*		*
Safety Interlock			*					*		*
Cooling Stage 1				*				*		*
Supply Fan Start/Stop				*				*		*
Outside Air Damper				*				*		*
Schedule							*			
Heating Setpoint								*		*
Cooling Setpoint								*		*
High Zone Temp									*	
Low Zone Temp									*	
Supply Fan Failure									*	
Supply Fan in Hand									*	
High Return Air Temp									*	
Low Return Air Temp									*	
High Supply Air Temp									*	
Low Supply Air Temp									*	
High Mixed Air Temp									*	
Low Mixed Air Temp									*	
Totals	5	2	3	3	0	0	1	14	10	15
Total Hardware (13)					Total Software (25)					

Bldg 3144

AHU-3B
Single Zone Air Handling Unit

General:
All alarms shall be generated at the operator workstation.

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:
- Occupied Mode: The unit shall maintain
  - o A 74°F (adj.) cooling setpoint
  - o A 70°F (adj.) heating setpoint.
- Unoccupied Mode (night setback): The unit shall maintain
  - o A 82°F (adj.) cooling setpoint.
  - o A 62°F (adj.) heating setpoint.

Alarms shall be provided as follows:
- High Zone Temp: If the zone temperature is greater than the cooling setpoint by 5°F (adj.) and the un it has been in its current mode for 30 min (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by 5°F (adj.) and the unit ha s been in its current mode for 30 min (adj.).

ZoneSetpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints ±2°F (adj.) at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of the scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for 60 min. (adj.). At the expiration of this time, control of the unit shall automatically return to the schedule.

Safety Interlock Relay Status:
The unit shall shut down and generate an alarm upon receiving a Safety interlock relay status.

2 Speed Supply Fan.
The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties. The supply fan shall run in low speed whenever the zone temperature is less than 2°F (adj.) above the cooling setpoint and less than 2°F (adj.) below the heating setpoint. The supply fan shall run in high speed whenever the zone temperature is more than 2°F (adj.) above the cooling setpoint or more than 2°F (adj.) below the heating setpoint. To prevent short cycling, each supply fan speed shall have a 3 min. (adj.) minimum runtime.

Alarms shall be provided as follows:
- Supply Fan High Speed Failure: The high speed fan is commanded on, but the status is off for 30 sec. (adj.).
- Supply Fan Low Speed Failure: The low speed fan is commanded on, but the status is off for 30 sec. (adj.).
- Supply Fan in Hand: The fan is commanded off, but the status is on for 10 sec. (adj.).

Dual Temp Valve Cooling Mode:
The controller shall measure the zone temperature and modulate the dual temp valve to maintain its cooling setpoint.

The cooling shall be enabled whenever:
- The Dual Temperature Water Supply is less than the zone temperature.
- AND Outside air temperature is greater than 55°F (adj.).
- AND the zone temperature is above the cooling setpoint.
- AND the fan is on.

The cooling shall be disabled whenever:
- The Dual Temperature Water Supply is greater than the zone temperature.
- OR Outside air temperature is less than 54°F (adj.).
- OR the zone temperature is below the cooling setpoint.
- OR the fan is off.

Dual Temp Valve Heating Mode:
The controller shall measure the zone temperature and modulate the dual temp valve to maintain its heating setpoint.

The heating shall be enabled whenever:
- The Dual Temperature Water Supply is greater than the zone temperature.
- AND Outside air temperature is less than 65°F (adj.).
- AND the zone temperature is below heating setpoint.
- AND the fan is on.

The heating shall be disabled whenever:
- The Dual Temperature Water Supply is less than the zone temperature.
- OR Outside air temperature is greater than 66°F (adj.).
- OR the zone temperature is above heating setpoint.
- OR the fan is off.

Minimum Outside Air Ventilation:
When in the occupied mode, the controller shall modulate the outside air damper to a minimum adjustable position of 20% (adj.) open.

The outside air damper shall fully close and the return air damper shall fully open when the unit is off or during optimal start up.

The outside air damper shall modulate closed whenever:
- The Freezestat is in alarm status.
- OR on a loss of supply fan status.

Mixed Air Temperature:
The controller shall monitor the mixed air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Mixed Air Temp: If the mixed air temperature is greater than 90°F (adj.).
- Low Mixed Air Temp: If the mixed air temperature is less than 45°F (adj.).

Supply Air Temperature:
The controller shall monitor the supply air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

Building 3144

AHU-3B

	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
Zone Temp	*							*		*
Zone Setpoint Adjust	*									*
Supply Air Temp	*							*		*
Mixed Air Temp	*							*		*
DT Coil Valve		*						*		*
Mixed Air Dampers		*						*		*
Zone Override			*					*		*
Supply Fan Status			*					*		*
Safety Interlock			*					*		*
Supply Fan Low Speed				*				*		*
Supply Fan High Speed				*				*		*
Schedule							*			
Cooling Setpoint								*		*
Heating Setpoint								*		*
High Zone Temp									*	
Low Zone Temp									*	
Low Speed Supply Fan Failure									*	
High Speed Supply Fan Failure									*	
Supply Fan in Hand									*	
High Supply Air Temp									*	
Low Supply Air Temp									*	
High Mixed Air Temp									*	
Low Mixed Air Temp									*	
Totals	4	2	3	2	0	0	1	12	9	13
Total Hardware (11)							Total Software (23)			

Bldg 3144

AHU-3E
Single Zone Air Handling Unit

General:
All alarms shall be generated at the operator workstation.

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:
- Occupied Mode: The unit shall maintain
  - o A 74°F (adj.) cooling setpoint
  - o A 70°F (adj.) heating setpoint.
- Unoccupied Mode (night setback): The unit shall maintain
  - o A 82°F (adj.) cooling setpoint.
  - o A 62°F (adj.) heating setpoint.

Alarms shall be provided as follows:
- High Zone Temp: If the zone temperature is greater than the cooling setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).

ZoneSetpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints ±2°F (adj.) at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of the scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for 60 min. (adj.). At the expiration of this time, control of the unit shall automatically return to the schedule.

Safety Interlock Relay Status:
The unit shall shut down and generate an alarm upon receiving a Safety interlock relay status.

Supply Fan:
The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.

Alarms shall be provided as follows:
- Supply Fan Failure: The fan is commanded on, but the status is off for 30 sec. (adj.).
- Supply Fan in Hand: The fan is commanded off, but the status is on for 10 sec. (adj.).

Dual Temp Valve Cooling Mode:
The controller shall measure the zone temperature and modulate the dual temp valve to maintain its cooling setpoint.

The cooling shall be enabled whenever:
- The Dual Temperature Water Supply is less than the zone temperature.
- AND Outside air temperature is greater than 55°F (adj.).
- AND the zone temperature is above the cooling setpoint.
- AND the fan is on.

The cooling shall be disabled whenever:
- The Dual Temperature Water Supply is greater than the zone temperature.
- OR Outside air temperature is less than 54°F (adj.).
- OR the zone temperature is below the cooling setpoint.
- OR the fan is off.

Dual Temp Valve Heating Mode:
The controller shall measure the zone temperature and modulate the dual temp valve to maintain its heating setpoint.

The heating shall be enabled whenever:
- The Dual Temperature Water Supply is greater than the zone temperature.
- AND Outside air temperature is less than 65°F (adj.).
- AND the zone temperature is below heating setpoint.
- AND the fan is on.

The heating shall be disabled whenever:
- The Dual Temperature Water Supply is less than the zone temperature.
- OR Outside air temperature is greater than 66°F (adj.).
- OR the zone temperature is above heating setpoint.
- OR the fan is off.

Minimum Outside Air Ventilation:
When in the occupied mode, the controller shall modulate the outside air damper to a minimum adjustable position of 20% (adj.) open.

The outside air damper shall fully close and the return air damper shall fully open when the unit is off or during optimal start up.

The outside air damper shall modulate closed whenever:
- The Freezestat is in alarm status.
- OR on a loss of supply fan status.

Return Air Temperature:
The controller shall monitor the return air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Return Air Temp: If the return air temperature is greater than 90°F (adj.).
- Low Return Air Temp: If the return air temperature is less than 45°F (adj.).

Supply Air Temperature:
The controller shall monitor the supply air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

Building 3144

AHU-3E

	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
Zone Temp	*							*		*
Zone Setpoint Adjust	*									*
Return Air Temp	*							*		*
Supply Air Temp	*							*		*
DT Coil Valve		*						*		*
Mixed Air Dampers		*						*		*
Zone Override			*					*		*
Supply Fan Status			*					*		*
Safety Interlock			*					*		*
Supply Fan Start/Stop				*				*		*
Schedule							*			
Cooling Setpoint								*		*
Heating Setpoint								*		*
High Zone Temp									*	
Low Zone Temp									*	
Supply Fan Failure									*	
Supply Fan in Hand									*	
High Return Air Temp									*	
Low Return Air Temp									*	
High Supply Air Temp									*	
Low Supply Air Temp									*	
Totals	**4**	**2**	**3**	**1**	**0**	**0**	**1**	**11**	**8**	**12**
Total Hardware (10)					**Total Software (20)**					

Bldg 3144

HVU-3A (Typical of 3B & 3D)
Single Zone Air Handling Unit

General:
All alarms shall be generated at the operator workstation.

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:
- Occupied Mode: The unit shall maintain
  - o A 74°F (adj.) cooling setpoint
  - o A 70°F (adj.) heating setpoint.
- Unoccupied Mode (night setback): The unit shall maintain
  - o A 82°F (adj.) cooling setpoint.
  - o A 62°F (adj.) heating setpoint.

Alarms shall be provided as follows:
- High Zone Temp: If the zone temperature is greater than the cooling setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).

ZoneSetpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints ±2°F (adj.) at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of the scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for 60 min. (adj.). At the expiration of this time, control of the unit shall automatically return to the schedule.

Safety Interlock Relay Status:
The unit shall shut down and generate an alarm upon receiving a Safety interlock relay status.

Supply Fan:
The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.

Alarms shall be provided as follows:
- Supply Fan Failure: The fan is commanded on, but the status is off for 30 sec. (adj.).
- Supply Fan in Hand: The fan is commanded off, but the status is on for 10 sec. (adj.).

Dual Temp Valve Cooling Mode:
The controller shall measure the zone temperature and modulate the dual temp valve to maintain its cooling setpoint.

The cooling shall be enabled whenever:
- The Dual Temperature Water Supply is less than the zone temperature.
- AND Outside air temperature is greater than 55°F (a dj.)
- AND the zone temperature is above the cooling setpoint.
- AND the fan is on.

The cooling shall be disabled whenever:
- The Dual Temperature Water Supply is greater than the zone temperature.
- OR Outside air temperature is less than 54°F (adj.).
- OR the zone temperature is below the cooling setpoint.
- OR the fan is off.

Dual Temp Valve Heating Mode:
The controller shall measure the zone temperature and modulate the dual temp valve to maintain its heating setpoint.

The heating shall be enabled whenever:
- The Dual Temperature Water Supply is greater than the zone temperature.
- AND Outside air temperature is less than 65°F (adj.).
- AND the zone temperature is below heating setpoint.
- AND the fan is on.

The heating shall be disabled whenever:
- The Dual Temperature Water Supply is less than the zone temperature.
- OR Outside air temperature is greater than 66°F (ad j.).
- OR the zone temperature is above heating setpoint.
- OR the fan is off.

Outside Air Damper:
The outside air damper shall be commanded open when the unit is commanded on unless shut down on safeties.

The outside air damper shall close whenever:
- The safety circuit is in alarm status.
- OR on a loss of supply fan status.

Supply Air Temperature:
The controller shall monitor the supply air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows.
- High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

Building 3144										
HVU-3A (Typical of 3B & 3D)										
	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
Zone Temp	x							x		x
Zone Setpoint Adjust	x									x
Supply Air Temp	x							x		x
Dual Temp Coil Valve		x						x		x
Zone Override			x					x		x
Supply Fan Status			x					x		x
Safety Interlock			x					x		x
Outside Air Damper				x				x		x
Supply Fan Start/Stop				x				x		x
Schedule							x			
Heating Setpoint								x		x
Cooling Setpoint								x		x
High Zone Temp									x	
Low Zone Temp									x	
Supply Fan Failure									x	
Supply Fan in Hand									x	
High Supply Air Temp									x	
Low Supply Air Temp									x	
Totals	3	1	3	2	0	0	1	10	6	11
Total Hardware (9)					Total Software (17)					

Bldg 3144

HVU-3C (Typical of 3E)
Single Zone Air Handling Unit

General:
All alarms shall be generated at the operator workstation.

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:
- Occupied Mode: The unit shall maintain
  - o A 74°F (adj.) cooling setpoint
  - o A 70°F (adj.) heating setpoint.
- Unoccupied Mode (night setback): The unit shall maintain
  - o A 82°F (adj.) cooling setpoint.
  - o A 62°F (adj.) heating setpoint.

Alarms shall be provided as follows:
- High Zone Temp: If the zone temperature is greater than the cooling setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).

ZoneSetpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints ±2°F (adj.) at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of the scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for 60 min. (adj.). At the expiration of this time, control of the unit shall automatically return to the schedule.

Safety Interlock Relay Status:
The unit shall shut down and generate an alarm upon receiving a Safety interlock relay status.

Supply Fan:
The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.

Alarms shall be provided as follows:
- Supply Fan Failure: The fan is commanded on, but the status is off for 30 sec. (adj.).
- Supply Fan in Hand: The fan is commanded off, but the status is on for 10 sec. (adj.).

Dual Temp Valve Cooling Mode:
The controller shall measure the zone temperature and modulate the dual temp valve to maintain its cooling setpoint.

The cooling shall be enabled whenever:
• The Dual Temperature Water Supply is less than the zone temperature.
• AND Outside air temperature is greater than 55°F (adj.).
• AND the zone temperature is above the cooling setpoint.
• AND the fan is on.

The cooling shall be disabled whenever:
• The Dual Temperature Water Supply is greater than the zone temperature.
• OR Outside air temperature is less than 54°F (adj.).
• OR the zone temperature is below the cooling setpoint.
• OR the fan is off.

Dual Temp Valve Heating Mode:
The controller shall measure the zone temperature and modulate the dual temp valve to maintain its heating setpoint.

The heating shall be enabled whenever:
• The Dual Temperature Water Supply is greater than the zone temperature.
• AND Outside air temperature is less than 65°F (adj.).
• AND the zone temperature is below heating setpoint.
• AND the fan is on.

The heating shall be disabled whenever:
• The Dual Temperature Water Supply is less than the zone temperature.
• OR Outside air temperature is greater than 66°F (adj.).
• OR the zone temperature is above heating setpoint.
• OR the fan is off.

Minimum Outside Air Ventilation:
When in the occupied mode, the controller shall modulate the outside air damper to a minimum adjustable position of 20% (adj.) open.

The outside air damper shall fully close when the unit is off or during optimal start up.

The outside air damper shall modulate closed whenever:
• The Freezestat is in alarm status.
• OR on a loss of supply fan status.

Return Air Temperature:
The controller shall monitor the return air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
• High Return Air Temp: If the return air temperature is greater than 90°F (adj.).
• Low Return Air Temp: If the return air temperature is less than 45°F (adj.).

Mixed Air Temperature:
The controller shall monitor the mixed air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Mixed Air Temp: If the mixed air temperature is greater than 90°F (adj.).
- Low Mixed Air Temp: If the mixed air temperature is less than 45°F (adj.).

Supply Air Temperature:
The controller shall monitor the supply air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

Building 3144

HVU-3C (Typical of 3E)

	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
Zone Temp	*							*		*
Zone Setpoint Adjust	*									*
Return Air Temp	*							*		*
Supply Air Temp	*							*		*
Mixed Air Temp	*							*		*
Dual Temp Coil Valve		*						*		*
Outside Air Damper		*						*		*
Zone Override			*					*		*
Supply Fan Status			*					*		*
Safety Interlock			*					*		*
Supply Fan Start/Stop				*				*		*
Schedule							*			
Heating Setpoint								*		*
High Zone Temp									*	
Low Zone Temp									*	
Supply Fan Failure									*	
Supply Fan in Hand									*	
High Return Air Temp									*	
Low Return Air Temp									*	
High Supply Air Temp									*	
Low Supply Air Temp									*	
High Mixed Air Temp									*	
Low Mixed Air Temp									*	
Totals	5	2	3	1	0	0	1	11	10	12
Total Hardware (11)					Total Software (22)					

Bldg 3144

FCU-1
Single Zone Air Handling Unit

General:
All alarms shall be generated at the operator workstation.

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:
- Occupied Mode: The unit shall maintain
  - o A 74°F (adj.) cooling setpoint
  - o A 70°F (adj.) heating setpoint.
- Unoccupied Mode (night setback): The unit shall maintain
  - o A 82°F (adj.) cooling setpoint.
  - o A 62°F (adj.) heating setpoint.

Alarms shall be provided as follows:
- High Zone Temp: If the zone temperature is greater than the cooling setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).

ZoneSetpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints ±2°F (adj.) at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of the scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for 60 min. (adj.). At the expiration of this time, control of the unit shall automatically return to the schedule.

Supply Fan:
The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.

Alarms shall be provided as follows:
- Supply Fan Failure: The fan is commanded on, but the status is off for 30 sec. (adj.).
- Supply Fan in Hand: The fan is commanded off, but the status is on for 10 sec. (adj.).

Dual Temp Valve Cooling Mode:
The controller shall measure the zone temperature and command the dual temp valve to maintain its cooling setpoint.

The cooling shall be enabled whenever:
- The Dual Temperature Water Supply is less than the zone temperature.
- AND Outside air temperature is greater than 55°F (adj.).
- AND the zone temperature is above the cooling setpoint.
- AND the fan is on.

The cooling shall be disabled whenever:
- The Dual Temperature Water Supply is greater than the zone temperature.
- OR Outside air temperature is less than 54°F (adj.).
- OR the zone temperature is below the cooling setpoint.
- OR the fan is off.

Dual Temp Valve Heating Mode:
The controller shall measure the zone temperature and command the dual temp valve to maintain its heating setpoint.

The heating shall be enabled whenever:
- The Dual Temperature Water Supply is greater than the zone temperature.
- AND Outside air temperature is less than 65°F (adj.).
- AND the zone temperature is below heating setpoint.
- AND the fan is on.

The heating shall be disabled whenever:
- The Dual Temperature Water Supply is less than the zone temperature.
- OR Outside air temperature is greater than 66°F (adj.).
- OR the zone temperature is above heating setpoint.
- OR the fan is off.

Supply Air Temperature:
The controller shall monitor the supply air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

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FCU-1

	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
Zone Temp	*							*		*
Zone Setpoint Adjust	*									*
Supply Air Temp	*							*		*
Zone Override			*					*		*
Supply Fan Status			*					*		*
Safety Interlock			*					*		*
Supply Fan Start/Stop				*				*		*
Dual Temp Coil Valve				*				*		*
Schedule							*			
Heating Setpoint								*		*
Cooling Setpoint								*		*
High Zone Temp									*	
Low Zone Temp									*	
Supply Fan Failure									*	
Supply Fan in Hand									*	
High Supply Air Temp									*	
Low Supply Air Temp									*	
Totals	3	0	3	2	0	0	1	9	6	10
Total Hardware (8)					Total Software (16)					

Bldg 3144

FCU-2 & 3
Single Zone Air Handling Unit

General:
All alarms shall be generated at the operator workstation.

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:
- Occupied Mode: The unit shall maintain
  - o A 74°F (adj.) cooling setpoint
  - o A 70°F (adj.) heating setpoint.
- Unoccupied Mode (night setback): The unit shall maintain
  - o A 82°F (adj.) cooling setpoint.
  - o A 62°F (adj.) heating setpoint.

Alarms shall be provided as follows:
- High Zone Temp: If the zone temperature is greater than the cooling setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).

ZoneSetpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints ±2°F (adj.) at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of the scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for 60 min. (adj.). At the expiration of this time, control of the unit shall automatically return to the schedule.

Supply Fan:
The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime. The fan speeds shall automatically be indexed as follows:

- Low Speed shall run anytime the zone temperature is within setpoints.
- Medium Speed shall run anytime the zone temperature is outside of setpoints.
- High Speed shall run anytime the zone temperature is outside of setpoints by 3°F (adj.).

Alarms shall be provided as follows:
- Supply Fan Failure: The fan is commanded on, but the status is off for 30 sec. (adj.).
- Supply Fan Failure: The fan is commanded on, but the status is off for 30 sec. (adj.).
- Supply Fan Failure: The fan is commanded on, but the status is off for 30 sec. (adj.).
- Supply Fan in Hand: The fan is commanded off, but the status is on for 10 sec. (adj.).

Dual Temp Valve Cooling Mode:
The controller shall measure the zone temperature and command the dual temp valve to maintain its cooling setpoint.

The cooling shall be enabled whenever:
- The Dual Temperature Water Supply is less than the zone temperature.
- AND Outside air temperature is greater than 55°F (adj.).
- AND the zone temperature is above the cooling setpoint.
- AND the fan is on.

The cooling shall be disabled whenever:
- The Dual Temperature Water Supply is greater than the zone temperature.
- OR Outside air temperature is less than 54°F (adj.).
- OR the zone temperature is below the cooling setpoint.
- OR the fan is off.

Dual Temp Valve Heating Mode:
The controller shall measure the zone temperature and command the dual temp valve to maintain its heating setpoint.

The heating shall be enabled whenever:
- The Dual Temperature Water Supply is greater than the zone temperature.
- AND Outside air temperature is less than 65°F (adj.).
- AND the zone temperature is below heating setpoint.
- AND the fan is on.

The heating shall be disabled whenever:
- The Dual Temperature Water Supply is less than the zone temperature.
- OR Outside air temperature is greater than 66°F (adj.).
- OR the zone temperature is above heating setpoint.
- OR the fan is off.

Supply Air Temperature:
The controller shall monitor the supply air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

Building 3144

FCU-2 (Typical of FCU-3)

	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
Zone Temp	*							*		*
Zone Setpoint Adjust	*									*
Supply Air Temp	*							*		*
Zone Override			*					*		*
Supply Fan Status			*					*		*
Safety Interlock			*					*		*
Supply Fan Low Speed				*				*		*
Supply Fan Med Speed				*				*		*
Supply Fan High Speed				*				*		*
Dual Temp Coil Valve				*				*		*
Schedule							*			
Heating Setpoint								*		*
Cooling Setpoint								*		*
High Zone Temp									*	
Low Zone Temp									*	
Low Speed Supply Fan Failure									*	
Med Speed Supply Fan Failure									*	
High Speed Supply Fan Failure									*	
Supply Fan in Hand									*	
High Supply Air Temp									*	
Low Supply Air Temp									*	
Totals	3	0	3	4	0	0	1	11	0	12
Total Hardware (10)							Total Software (18)			

Bldg 3144

AHU-3F
Single Zone Air Handling Unit

General:
All alarms shall be generated at the operator workstation.

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:
- Occupied Mode: The unit shall maintain
  - o A 74°F (adj.) cooling setpoint
  - o A 70°F (adj.) heating setpoint.
- Unoccupied Mode (night setback): The unit shall maintain
  - o A 82°F (adj.) cooling setpoint.
  - o A 62°F (adj.) heating setpoint.

Alarms shall be provided as follows:
- High Zone Temp: If the zone temperature is greater than the cooling setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).
- Low Zone Temp: If the zone temperature is less than the heating setpoint by 5°F (adj.) and the unit has been in its current mode for 30 min (adj.).

ZoneSetpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints ±2°F (adj.) at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of the scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for 60 min. (adj.). At the expiration of this time, control of the unit shall automatically return to the schedule.

Supply Fan:
The supply fan shall be commanded to run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a 3 min. (adj.) minimum runtime.

Alarms shall be provided as follows:
- Supply Fan Failure: The fan is commanded on, but the status is off for 30 sec. (adj.).
- Supply Fan in Hand: The fan is commanded off, but the status is on for 10 sec. (adj.).

Dual Temp Valve Cooling Mode.
The controller shall measure the zone temperature and modulate the dual temp valve to maintain its cooling setpoint.

The cooling shall be enabled whenever:
- The Dual Temperature Water Supply is less than the zone temperature.
- AND Outside air temperature is greater than 55°F (adj.).
- AND the zone temperature is above the cooling setpoint.
- AND the fan is on.

The cooling shall be disabled whenever:
- The Dual Temperature Water Supply is greater than the zone temperature.
- OR Outside air temperature is less than 54°F (adj.).
- OR the zone temperature is below the cooling setpoint.
- OR the fan is off.

Dual Temp Valve Heating Mode:
The controller shall measure the zone temperature and modulate the dual temp valve to maintain its heating setpoint.

The heating shall be enabled whenever:
- The Dual Temperature Water Supply is greater than the zone temperature.
- AND Outside air temperature is less than 65°F (adj.).
- AND the zone temperature is below heating setpoint.
- AND the fan is on.

The heating shall be disabled whenever:
- The Dual Temperature Water Supply is less than the zone temperature.
- OR Outside air temperature is greater than 66°F (adj.).
- OR the zone temperature is above heating setpoint.
- OR the fan is off.

Supply Air Temperature.
The controller shall monitor the supply air temperature.

2 min. (adj.) after unit has proven airflow, alarms shall be provided as follows:
- High Supply Air Temp: If the supply air temperature is greater than 120°F (adj.).
- Low Supply Air Temp: If the supply air temperature is less than 45°F (adj.).

Building 3144

AHU-3F

	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
Zone Temp	x							x		x
Zone Setpoint Adjust	x									x
Supply Air Temp	x							x		x
Dual Temp Coil Valve		x						x		x
Zone Override			x					x		x
Supply Fan Status			x					x		x
Safety Interlock			x					x		x
Supply Fan Start/Stop				x				x		x
Schedule							x			
Heating Setpoint								x		x
Cooling Setpoint								x		x
High Zone Temp									x	
Low Zone Temp									x	
Supply Fan Failure									x	
Supply Fan in Hand									x	
High Supply Air Temp									x	
Low Supply Air Temp									x	
Totals	3	1	3	1	0	0	1	9	6	10
Total Hardware (8)					Total Software (16)					

Bldg 3144

Chiller

Dual Temperature System Chilled Water Loop Sequence of Operation

DTS Chilled Water Loop- Run Conditions:
The DTS Chilled Water Loop shall be enabled whenever:

The Software Mode Switch for the Dual Temperature System is in Cool Mode
AND the outside air temperature is greater than 55°F (adj.).

The DTS Chilled Water Loop shall be disabled whenever:

The Software Mode Switch for the Dual Temperature System is in Heat Mode
OR the outside air temperature is less than 54°F (adj.).

DT Chilled Water Loop Pump:
When the software mode switch is in Cool mode, the DT chilled water loop pump shall run anytime the

The delay times will be set appropriately to allow for orderly chilled water loop start-up, shutdown and

DT Chilled Water Loop Pump Failure: The pump is commanded on, but the status is off for 30 sec. (adj.).
DT Chilled Water Loop Pump Running in Hand: The pump is commanded off, but the status is on for 10

Dual Temperature Changeover Valve:
When the software mode switch is in Cool mode, the dual temperature changeover valve shall be

Chiller:
The chiller shall be hard wired interlocked with the flow switch and shall be enabled when the flow switch

The chiller shall run subject to its own internal safeties and controls.

Chilled Water Loop Supply Setpoint:
The chiller shall maintain a chilled water loop supply temperature setpoint as determined by its own

Chilled Water Loop Temperature Monitoring:
The following temperatures shall be monitored:

Chilled water loop supply.

Alarms shall be provided as follows:

High Chilled Water Loop Supply Temp: If the chilled water loop supply temperature is greater than 55°F
Low Chilled Water Loop Supply Temp: If the chilled water loop supply temperature is less than 38°F

Dual Temp System Temperature Monitoring:
The following temperatures shall be monitored:

Dual Temp Supply Temperature
Dual Temp Return Temperature

Alarms shall be provided as follows:

High Dual Temp System Supply Temp: If the dual temp system supply temperature is greater than 190°F
Low Dual Temp System Supply Temp: If the dual temp system supply temperature is less than 38°F

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DT CHW

	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
DT Chilled Water Loop Return Temp	•							•		•
DT Chilled Water Loop Supply Temp	•							•		•
Dual Temp System Return Temp	•							•		•
Dual Temp System Supply Temp	•							•		•
DT Chilled Water Loop Pump Status			•					•		•
DT Chilled Water Loop Pump S/S				•						•
DT Chilled Water Loop Pump Failure									•	
DT Chilled Water Loop Pump in Hand									•	
High DT Chilled Water Loop Supply Temp									•	
Low DT Chilled Water Loop Supply Temp									•	
High Dual Temp System Supply Temp									•	
Low Dual Temp System Supply Temp									•	
Totals	4	0	1	1	0	0	0	5	6	6
Total Hardware (6)					Total Software (11)					

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HEX
Dual Temperature System (Hot Water Loop) Sequence of Operation

DTS Hot Water Loop Run Conditions:
The DTS Hot Water Loop shall be enabled whenever:

The Software Mode Switch for the Dual Temperature System is in Heat Mode
AND the outside air temperature is less than 65°F (adj.).

The DTS Hot Water Loop shall be disabled whenever:

The Software Mode Switch for the Dual Temperature System is in Cool Mode
OR the outside air temperature is greater than 66°F (adj).

The DTS Hot Water Loop shall also run for freeze protection whenever the outside air temperature is less than 38°F (adj.).

Hot Water Loop Pump:
When the software mode switch is in Heat mode, the hot water loop pump shall run anytime the Hot Water Loop is called to run.

Alarms will be provided as follows:

Hot Water Loop Pump Failure: The pump is commanded on, but the status is off for 30 sec. (adj.).
Hot Water Loop Pump Running in Hand: The pump is commanded off, but the status is on for 10 sec. (adj.).

Dual Temperature Changeover Valve:
When the software mode switch is in Heat mode, the dual temperature changeover valve shall be commanded to allow flow through the heat exchanger.

DTS Hot Water Loop Supply Temperature Setpoint Reset:
The hot water loop supply temperature setpoint shall reset based on outside air temperature.

As outside air temperature rises from 0°F (adj.) to 70° F (adj.) the hot water loop supply temperature setpoint shall reset downwards from 180°F (adj.) to 120 °F (adj.).

Alarms shall be provided as follows:

High Hot Water Loop Supply Temp: If the temperature is greater than the setpoint by more than 30°F (adj.).
Low Hot Water Loop Supply Temp: If the temperature is less than the setpoint by more than 30°F (adj.) and the Hot Water Loop has been enabled for 15 min. (adj.).

Heat Exchanger Steam Valve - Hot Water Control:
The controller shall measure the hot water loop supply temperature and modulate the steam valve to maintain its setpoint.

The steam valve shall modulate open whenever:

The pump status is proven on.
AND hot water loop supply temperature is below setpoint.

The steam valve shall modulate closed whenever:

A loss of pump status
OR hot water loop supply temperature is below setpoint.

The steam valve shall close whenever the hot water loop supply temperature rises from 190°F (adj.) to 200°F (adj.).

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DT HW

	Hardware Points				Software Points					
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic
DT Hot Water Loop Supply Temp	*							*		*
DT Hot Water Loop Return Temp	*							*		*
Outside Air Temp	*									*
Heat Exchanger Steam Valve		*						*		*
DT Hot Water Loop Pump Status			*					*		*
DT Hot Water Loop Pump S/S				*						*
Dual Temp Changeover Valve				*						*
Hot Water Loop Supply Temp Setpoint					*			*		*
DT Hot Water Loop Pump Failure									*	
DT Hot Water Loop Pump in Hand									*	
High Hot Water Loop Supply Temp									*	
Low Hot Water Loop Supply Temp									*	
Totals	3	1	1	2	1	0	0	5	4	8
Total Hardware (7)					Total Software (10)					

Product Schedule for NABLC DO-2 Listed by Specification Section

DID	Part Number	Description	Manufacturer	Cutsheet	Operation Manual	Date Submitted
Specification Section 15910N Paragraph 2.1.1						
RC642	RC642	Room Controller	Automated Logic	CSRC642rev2.pdf	RoomControllerTI.pdf	initial
RC642D	RC642D	Room Controller w/ Display	Automated Logic	CSRC642rev2.pdf	RoomControllerTI.pdf	initial
SE6104	SE6104	SE6104 Single Equipment Application	Automated Logic	CSSErev7.pdf	SE6104.pdf	initial
SE6166	SE6166	SE6166 Single Equipment Application	Automated Logic	CSSErev7.pdf	SE6166.pdf	initial
ZAF	FILT	Replacement air filter for integral velocity sensors	Automated Logic	FILT.pdf	n/a	initial
ZASF	ZASF	ZN-line Daughter Board with Actuator	Automated Logic	CSZASFrev2.pdf	ZASF.pdf	initial
M4106	M4106	M4106 Multi-Equipment Controller	Automated Logic	M4106.pdf	CSMLINErev8.pdf	
MX16160	MX16160	MX16160 Multi-Equipment Point Expander	Automated Logic	MX16160.pdf	CSMLINErev8.pdf	
ZN141	ZN141V+	ZN141V+ Zone Controller	Automated Logic	CSZN341v+rev10.pdf	ZN341v+.pdf	initial
ZN220	ZN220	ZN220 Zone Controller	Automated Logic	CSZN220rev6.pdf	ZN220.pdf	initial
ZN253	ZN253	ZN253 Zone Controller	Automated Logic	CSZN253rev6.pdf	ZN253.pdf	initial
ZN341	ZN341V+	ZN341V+ Zone Controller	Automated Logic	CSZN341v+rev10.pdf	ZN341v+.pdf	initial
ZN551	ZN551	ZN551 Zone Controller	Automated Logic	CSZN551rev6.pdf	ZN551.pdf	initial
ZUDF	UDF	Accessory Dual Air Flow Board. ZN253, ZN552	Automated Logic	CSUASFrev6.pdf	UDF.pdf	initial
ZUSF	USF	Accessory Single Air Flow Board. ZN253, ZN551	Automated Logic	CSUASFrev6.pdf	USF.pdf	initial
Specification Section 15910N Paragraph 2.1.1.11						
AAR	AAR	ARCnet to ARCnet Router	Automated Logic	CSAARrev2.pdf	AAR.pdf	initial
BDSL12	2611-A1-430	IP DSLAM. GigE Uplink. 24Port	Zhone	2600IP.pdf	2600-A2-GN20-60.pdf	initial
BNBT	BT485	ARCnet 485 Biasing Terminator	Automated Logic	BT485_17722.pdf	BT485.pdf	initial
BNDD	DIAG485	485 Network Diagnostic Board	Automated Logic	CSARCrev5.pdf	DIAG485.pdf	initial
BNFR	FIBER485	485 Network Fiberoptic Repeater Board	Automated Logic	CS485rev3.pdf	n/a	initial
BNFT	FIBER485T	485 Network Fiberoptic TeeTap Board	Automated Logic	CS485rev3.pdf	n/a	initial
BNPD	PROT485	485 Network Protection Board	Automated Logic	CSARCrev5.pdf	PROT485.pdf	initial
BNRP	REP485	485 Network Repeater Board	Automated Logic	CSARCrev5.pdf	REP485.pdf	initial
BNT	TERM485	ARCnet 485 Terminator	Automated Logic	term485.pdf	n/a	initial
Specification Section 15910N Paragraph 2.1.1.12						
Specification Section 15910N Paragraph 2.1.1.13						
CTM	6382-A1-200	ADSL2+/ReachDSL CPE Router (TI). 4 Port Ethernet Switch	Zhone	6382.pdf	6382-A2-GB20-00.pdf	initial
Specification Section 15910N Paragraph 2.1.1.14						
LGE	LGE	Legacy BACnet Router	Automated Logic	CSLGErev7.pdf	LGE.pdf	initial
LGR	LGR25	BACnet Router. 25 Integration Points	Automated Logic	CSLGRrev5.pdf	LGR25.pdf	initial
LGR1000	LGR1000	BACnet Router. 1000 Integration Points	Automated Logic	CSLGRrev5.pdf	LGR250.pdf	initial
LGR250	LGR250	BACnet Router. 250 Integration Points	Automated Logic	CSLGRrev5.pdf	LGR1000.pdf	initial
MELGR	MELGR	BACnet Router. Various Integration Points	Automated Logic	CSMELGRrev5.pdf	ME-LGR25.pdf	initial
Specification Section 15910N Paragraph 2.1.2						
WCTRL	WebCTRL	WebCTRL DDC Software	Automated Logic	A4_CSWCrev9.pdf	WebCTRLv4	initial
Specification Section 15910N Paragraph 2.1.2.1						
WCTRLP	LogicBuilder	WebCTRL Programming Software	Automated Logic	A4_CSWCrev9.pdf	EIKON_LogicBuilder_v4.pdf	initial
Specification Section 15910N Paragraph 2.1.3.3						
WCTRLV	ViewBuilder	WebCTRL Graphics Software	Automated Logic	A4_CSWCrev9.pdf	ViewBuilderv4.pdf	initial
Specification Section 15910N Paragraph 2.1.3.1						
WNDA	PowerEdge 2900a	WebCTRL Database Archive	DELL	dell_poweredge_2900_da.pdf	n/a	2-Apr-08

WNDS	PowerEdge 2900	WebCTRL Server. Web Server	DELL	dell_poweredge_2900_ws.pdf	n/a	2-Apr-08
WNOS	OptiPlex 755	Bacnet Operator Workstation	DELL	dell_optiplex_755_mini.pdf	n/a	initial
WNOM	Vizio 46" 1080p LCD	46" 1080P LCD TV/Monitor	Vizio	1080P LCDTV.pdf	n/a	26-Nov-08
WNU15	RS 1500VA	RS 1500 VA 120 V UPS System	APC	apc_ups_1500va.pdf	n/a	2-Apr-08
WNU9	XS 900VA	XS 900 VA 120 V UPS System	APC	apc_ups_900va.pdf	n/a	initial
WNXP	Model 1110	Laser Printer 1110	DELL	dell_laser_1110_brochure.pdf	n/a	initial
WNXPC	Laser Printer 1110 Toner	Laser Printer 1110 Toner Cartridge	DELL	dell_toner_laser_1110.pdf	n/a	initial
WNWS	Precision T3400	Workstatoin Computer	DELL	Dell_T3400.pdf	n/a	5-Nov-08
WNU75	750VA	Belkin UPS 750VA	DELL	Dell_UPS_750va.pdf	n/a	5-Nov-08
WNSP	12 Outlet	Belkin 12 Outlet Surge Protector	DELL	Dell_surge_protector.pdf	n/a	5-Nov-08
WNXLP	Laser Printer	HP5200N Network Laser Printer w/ Toner	DELL	Dell_HP5200.pdf	n/a	5-Nov-08
WNOMB	DC50T	Level Mount Fixed/Tilt	Level Mount	Level Mount Fixed_Tilt.pdf	n/a	21-Nov-08
Specification Section 15910N Paragraph 2.1.4						
WNPOT	Vostro 1520	Notebook Computer	DELL	Vostro_1520.pdf	n/a	17-Aug-08
WNPTC	Laptop Travel Case	Notebook Computer Travel Case	DELL	Backpacks.pdf	n/a	17-Aug-08
WNPXA	APT	Access Port Transceiver	Automated Logic	n/a	APT.pdf	initial
Specification Section 15910N Paragraph 2.2.1.1						
+1 T_RS	RS	Room Sensor. Comm	Automated Logic	CSRSrev10.pdf	RSRoomSensors.pdf	initial
+1 T_RSL	RSPL	Room Sensor. Comm. Setpoint. Override	Automated Logic	CSRSrev10.pdf	RSRoomSensors.pdf	initial
+1 T_RSF	RSPF	Room Sensor. Digital. Fan. Comm. Setpoint. Override	Automated Logic	CSRSrev10.pdf	RSRoomSensors.pdf	initial
+1 T_RSP	RSP	Room Sensor. Digital. Comm. Setpoint. Override	Automated Logic	CSRSrev10.pdf	RSRoomSensors.pdf	initial
+1 TAD4	A/CP-D-4"	Temp Sensors. 10K-2. Duct. 4in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAD8	A/CP-D-8"	Temp Sensors. 10K-2. Duct. 8in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAD12	A/CP-D-12"	Temp Sensors. 10K-2. Duct. 12in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAD18	A/CP-D-18"	Temp Sensors. 10K-2. Duct. 18in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAN4	A/CP-DO-4"	Temp Sensors. 10K-2. Duct. No Box. 4in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAN8	A/CP-DO-8"	Temp Sensors. 10K-2. Duct. No Box. 8in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAN12	A/CP-DO-12"	Temp Sensors. 10K-2. Duct. No Box. 12in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAN18	A/CP-DO-18"	Temp Sensors. 10K-2. Duct. No Box. 18in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAI2	A/CP-I-2.5"	Temp Sensors. 10K-2. Immersion. 2.5in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAI4	A/CP-I-4"	Temp Sensors. 10K-2. Immersion. 4in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAI8	A/CP-I-8"	Temp Sensors. 10K-2. Immersion. 8in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAA8	A/CP-A-8'	Temp Sensors. 10K-2. Averaging. 8ft	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAA12	A/CP-A-12'	Temp Sensors. 10K-2. Averaging. 12ft	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAA24	A/CP-A-24'	Temp Sensors. 10K-2. Averaging. 24ft	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAR18	A/CP-RA-18"	Temp Sensors. 10K-2. Rigid Averaging. 18in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAR24	A/CP-RA-24"	Temp Sensors. 10K-2. Rigid Averaging. 24in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAR36	A/CP-RA-36"	Temp Sensors. 10K-2. Rigid Averaging. 36in	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAS	A/CP-S	Temp Sensors. 10K-2. Strap-on	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAOA	A/CP-O	Temp Sensors. 10K-2. Outside Air	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAWS	A/CP-SP	Temp Sensors. 10K-2. Stainless Plate	ACI	ACI 10K-CP (type II).pdf	ACI 10K-CP rts_io.pdf	initial
+1 TAI2W	ACI/2.5	Stainless Steel Thermowells	ACI	wells.pdf	wells.pdf	initial
+1 TAI4W	ACI/4	Stainless Steel Thermowells	ACI	wells.pdf	wells.pdf	initial
+1 TAI8W	ACI/8	Stainless Steel Thermowells	ACI	wells.pdf	wells.pdf	initial
Specification Section 15910N Paragraph 2.2.2.1						
+3 H_LS	LSBASE2H	LS Combo Room Sensor. 2%RH	Automated Logic	CSLSXH.pdf	n/a	initial
+3 H_LSP	LSPLUS2H	LS Combo Room Sensor. 2%RH	Automated Logic	CSLSXH.pdf	n/a	initial
+3 AC3D	A/RH3-10K-CP-D	Humidity. Temperature. Duct. 3%.	ACI	RH-T_low.pdf	RH_duct_inst.pdf	initial
+3 AC3P	A/RH3-10K-CP-SP	Humidity. Temperature. Plate. 3%.	ACI	RH-T_low.pdf	RH_room_inst.pdf	initial
+3 AC3O	ACI/RH3-CP-O	Humidity. Temperature. Outside. 3%	ACI	RH-T_low.pdf	RH_duct_inst.pdf	5-Nov-08
+3 HMD70	HMD70U/Y	Humidity. Temperature. Transmitter	Vaisala	HMD70U-V.pdf	HMD70 Guide.pdf	5-Nov-08
+3 A3D	A/RH3-D	Humidity. Duct. 3%.	ACI	rh.pdf	RH_duct_inst.pdf	initial
+3 HP3A	A/RH3-SP	Humidity. Plate. 3%.	ACI	rh.pdf	RH_room_inst.pdf	initial

Specification Section 15910N Paragraph 2.2.2.2						
+4 AB5A	ZPS-20-SP05-BB-ST-D	Transmitter. Low Pressure. Differential. LCD. Air	BAPI	ZPS_Display_pressure.pdf	17185_ins_ZPS_BB.pdf	initial
+4 WV3A	PW2XX03S	Transmitter. Pressure. Differential. Water. mA	Veris Industries	pw2_d.pdf	pw2_Z204201-0d2.pdf	initial
+4 WV4A	PW2XX04S	Transmitter. Pressure. Differential. Water. mA	Veris Industries	pw2_d.pdf	pw2_Z204201-0d2.pdf	initial
+4 WV3V	PWXX03S	Transmitter. Pressure. Differential. Water. VDC	Veris Industries	pw_d.pdf	pw_jkl2.pdf	initial
+4 WV4A	PWXX04S	Transmitter. Pressure. Differential. Water. VDC	Veris Industries	pw_d.pdf	pw_jkl2.pdf	initial
Specification Section 15910N Paragraph 2.2.4.1						
+6 CWVT	Ventostat 8003	Sensor. CO2. Wall. 0-10V	Telaire	80038009.pdf	80038009manual.pdf	initial
+6 CDVT	Ventostat 8009	Sensor. CO2. Duct. 0-10V. Pitot Tube	Telaire	80038009.pdf	80038009manual.pdf	initial
Specification Section 15910N Paragraph 2.2.5						
+7 CVAC	H10F	Switch. Current. Auto Calibrating.	Veris Industries	h10_d.pdf	h10_j0e2.pdf	initial
+7 CVAV	H600	Switch. Current. .2-200 Amp	Veris Industries	h600_j0h.pdf	h600_j0h.pdf	2-Sep-09
+7 CVACV	H904	Switch. Current. VFD. Auto Calibrating.	Veris Industries	h904_d.pdf	h904_j0e.pdf	initial
+7 DPAAA	ACI/AFS-222	Switch. Pressure. Differential. Air. Auto-reset	ACI	AFS-222.pdf	afs222.pdf	initial
+7 DPAAM	ACI/AFS-460	Switch. Pressure. Differential. Air. Manual-reset	ACI	AFS-460.pdf	afs460.pdf	initial
+7 DPATS	ACI/SPT	Sensing Tube. Air. Static Pressure	ACI	AFS-222.pdf	n/a	initial
+7 DPATV	ACI/VPT	Sensing Tube. Air. Velocity Pressure	ACI	AFS-222.pdf	n/a	initial
+7 FLJS	F61KB-11	Switch. Liquid Flow. SPDT	Johnson Controls	F61 Series.pdf	FlowSwitch(Standard SPDT).pdf	initial
Specification Section 15910N Paragraph 2.2.6						
+8 SLL20	A/FS-1	Thermostat. Low Limit. Manual Reset. 20 ft. SPDT	ACI	freeze.pdf	n/a	21-Nov-08
+8 SLL10	A/FS-10	Thermostat. Low Limit. Manual Reset. 10 ft. SPDT	ACI	freeze.pdf	n/a	21-Nov-08
+8 SLL6	A/FS-6	Thermostat. Low Limit. Manual Reset. 6 ft. SPDT	ACI	freeze.pdf	n/a	21-Nov-08
+8 SLLA	DBZ-05	Low limit control. Capillary Mounting brackets	ACI	freeze.pdf	n/a	21-Nov-08
Specification Section 15910N Paragraph 2.3.2						
-2CV2B	-B2XX-X	Control Valve, Belimo 2-way ball valve	Belimo	Ball_Valves_Tech_Doc.pdf	Ball_Valves_Tech_Doc.pdf	12-May-08
-2CV2H	-VBN2XXX	Control Valve, Honeywell 2-way ball valve	Honeywell	63-2648.pdf	63-2648.pdf	12-May-08
-2CV3B	-B3XX-X	Control Valve, Belimo 3-way ball valve	Belimo	Ball_Valves_Tech_Doc.pdf	Ball_Valves_Tech_Doc.pdf	12-May-08
-2CV3H	-VBN3XXX	Control Valve, Honeywell 3-way ball valve	Honeywell	63-2648.pdf	63-2648.pdf	12-May-08
-2VG2B	G215, 224, 225	Control Valve, Belimo 2-way ball valve	Belimo	G2S_NVFD24_E.pdf	n/a	21-Nov-08
-2VG3B	G350	Control Valve, Belimo 3-way ball valve	Belimo	G3_NVF24_MFT_E.pdf	n/a	21-Nov-08
-3 +VB04	UGLK 1406	Valve Linkage.	Belimo	UGLK.pdf	UGLK.pdf	2-Sep-09
-3 +VB05	UNV-008	Valve Linkage.	Belimo	UNV_Retrofit.pdf	UNV_Retrofit.pdf	2-Sep-09
-3 +VB06	UGLK 1150	Valve Linkage.	Belimo	UGLK.pdf	UGLK.pdf	2-Sep-09
-3 +VB07	UGLK 1402	Valve Linkage.	Belimo	UGLK.pdf	UGLK.pdf	2-Sep-09
-3 +VB08	UGLK 1000	Linkage, Siebe Valve	Belimo	UGLK.pdf	UGLK.pdf	2-Sep-09
-3 +VJ01	M9000-500	Valve Linkage.	JCI	TL_Series.pdf	TL_Series.pdf	2-Sep-09
-3 +VJ02	V9999	Valve Linkage.	JCI	1924115[1].pdf	1924115[1].pdf	2-Sep-09
-3 DNB14	NMBX-MFT	Actuator. Direct Couple. Non-Spring Return. 90inlb 24V	Belimo	NMBX24_MFT.pdf	NMBX24_MFT.pdf	2-Sep-09
-3 DNH02	MN6105	Actuator. Direct Couple. 44inlb. Floating. 24V	Honeywell	63-1313.pdf	63-2633.pdf, 63-2632.pdf	initial
-3 DNH03	MN6110A1003	Actuator. Direct Non-Spring Return.88INLB. 2-POS. 24V	Honeywell	63-2632mn6110.pdf	63-2632mn6110.pdf	12-May-08
-3 DNH04	MN7505	Actuator. Direct Couple. 44inlb. Modulating. 24V	Honeywell	63-1313.pdf	63-2633.pdf, 63-2632.pdf	initial
-3 DNH12	MN6110	Actuator. Direct Couple. 327inlb. Floating. 24V	Honeywell	63-1314.pdf	63-2633.pdf, 63-2632.pdf	initial
-3 DNH14	MN7510	Actuator. Direct Couple. 354inlb. Modulating. 24V	Honeywell	63-1314.pdf	63-2633.pdf, 63-2632.pdf	initial
-3 DNH22	MN6120	Actuator. Direct Couple. 221inlb. Floating. 24V	Honeywell	63-1303.pdf	63-2587.pdf, 62-0206.pdf	initial
-3 DNH24	MN7220	Actuator. Direct Couple. 256inlb. Modulating. 24V	Honeywell	63-1303.pdf	63-2587.pdf, 62-0206.pdf	initial
-3 DNH32	MN6134	Actuator. Direct Couple. 327inlb. Floating. 24V	Honeywell	63-1304.pdf	63-2587.pdf, 62-0206.pdf	initial
-3 DNH34	MN7234	Actuator. Direct Couple. 354inlb. Modulating. 24V	Honeywell	63-1304.pdf	63-2587.pdf, 62-0206.pdf	initial
-3 DNJ72	VA-7202-1001	Actuator. Direct Couple. Proportional. 210lb 0-10VDC	Johnson Controls	JC-720x_Actuator.pdf	n/a	2-Sep-09
-3 DSB10	AF24-MFT-US	Actuator. MF. Direct Couple. Spring Return. 133inlb 24V	Belimo	AF24-MFT-US.pdf	AF24-MFT-US.pdf	2-Sep-09
-3 DSB12	LF120	Actuator. Direct Couple. Spring Return. 35inlb 120V	Belimo	LF120.pdf	LF120.pdf	2-Sep-09
-3 DSB13	FSLF24	Actuator. Direct Couple. Spring Return. 5 Nm 24AC	Belimo	FSLF24.pdf	FSLF24.pdf	2-Sep-09

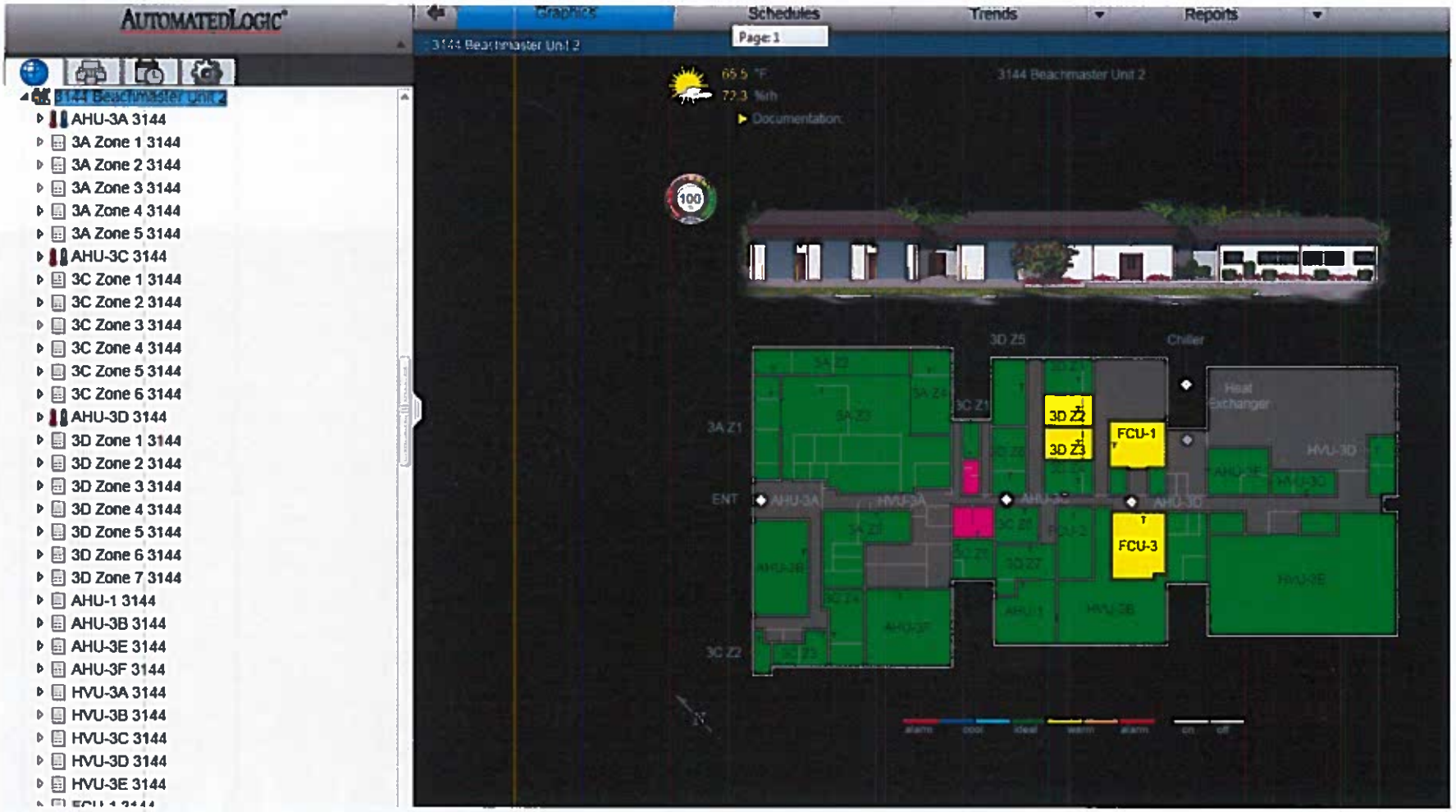
-3 DSE352	CE-352 P1U	Actuator. Direct Couple. 352inlb. Proportional. 24V	ELO Drive	CE_352in-lb.pdf	n/a	21-Nov-08
-3 DSH01	MS4105	Actuator. Direct Couple. Spring Return. 44inlb. 2-Pos. 120V	Honeywell	63-1302.pdf	63-2607.pdf, 62-0188.pdf	initial
-3 DSH03	MS7510A2008	Actuator Direct Direct RETURN.88INLB. 2-POS. 24V	Honeywell	63-2607ms7510.pdf	63-2607ms7510.pdf	12-May-08
-3 DSH03	MS8105	Actuator. Direct Couple. Spring Return. 44inlb. 2-Pos. 24V	Honeywell	63-1302.pdf	63-2607.pdf, 62-0188.pdf	initial
-3 DSH05	MS7505	Actuator. Direct Couple. Spring Return. 44inlb. Mod. 24V	Honeywell	63-1302.pdf	63-2607.pdf, 62-0188.pdf	initial
-3 DSH11	MS4110	Actuator. Direct Couple. Spring Return. 88inlb. 2-Pos. 120V	Honeywell	63-1296.pdf	63-2607.pdf, 62-0188.pdf	initial
-3 DSH13	MS8110	Actuator. Direct Couple. Spring Return. 88inlb. 2-Pos. 24V	Honeywell	63-1296.pdf	63-2607.pdf, 62-0188.pdf	initial
-3 DSH15	M7415	Actuator. Direct Couple. Spring Return. 25inlb 24V	Honeywell	63-2100.pdf	63-2607.pdf, 62-0188.pdf	2-Sep-09
-3 DSH15	MS7510	Actuator. Direct Couple. Spring Return. 88inlb. Mod. 24V	Honeywell	63-1295.pdf	63-2607.pdf, 62-0188.pdf	initial
-3 DSH21	MS4120	Actuator. Direct Couple. Spring Return. 175inlb. 2-Pos. 120V	Honeywell	63-1295.pdf	63-2607.pdf, 62-0188.pdf	initial
-3 DSH23	MS8120	Actuator. Direct Couple. Spring Return. 175inlb. 2-Pos. 24V	Honeywell	63-1295.pdf	63-2607.pdf, 62-0188.pdf	initial
-3 DSH25	MS7520	Actuator. Direct Couple. Spring Return. 175inlb. Mod. 24V	Honeywell	63-1295.pdf	63-2607.pdf, 62-0188.pdf	initial
-3 DSH26	V8043F1036	Actuator. Direct Couple. Spring Return. 2-Pos. 24V	Honeywell	60-2133.pdf	60-2133.pdf	5-May-09
-3 DSH27	M7285A1045	Actuator. Direct Couple. Spring Return. 60inlb. Mod. 24V	Honeywell	63-2640.pdf	63-2640.pdf	7-May-09
-3 DSS22	GCA 151-1P	Actuator. Direct Couple. Spring Return. 142inlb 24V	Siemens	gma_gca.pdf	gma_gca.pdf	2-Sep-09
-3 VNB03	NMB24-MFT	Actuator. Direct Couple. Non-Spring Return. 90inlb 2-10VDC	Belimo	NMBX24_MFT.pdf	n/a	21-Nov-08
-3 VNB04	G232S	Actuator. Direct Couple. Non-Spring Return. 25inlb 24V	Belimo	g2s_nvd24_3[1].pdf	g2s_nvd24_3[1].pdf	2-Sep-09
-3 VNB05	LMB24-3	Actuator. Direct Couple. Non-Spring Return. 45inlb 24V	Belimo	LM_Actuators.pdf	LM_Actuators.pdf	2-Sep-09
-3 VNH16	ML6420A	Actuator. Direct Couple. Non-Spring Return. 25lbf 24V	Honeywell	ML6420.pdf	ML6420.pdf	2-Sep-09
-3 VNJ20	VA7202	Actuator. Direct Couple. Non-Spring Return. 180lbf 24V	JCI	JC-720x_Actuator.pdf	JC-720x_Actuator.pdf	2-Sep-09
-3 VSB01	NVF24-MFT, NVF24-MFT-E	Actuator. Direct Couple. Spring Return. 180inlb 2-10VDC	Belimo	G3_NVF24_MFT_E.pdf	n/a	21-Nov-08
-3 VSB02	AMB24-3	Actuator. Direct Couple. Spring Return. 180inlb 24V	Belimo	AMB24_3_S.pdf	n/a	21-Nov-08
-3 VSB04	AF24-SR US	Actuator. Direct Couple. Spring Rtrn. 133inlb 2-10VDC	Belimo	AF24_SR.pdf	n/a	21-Nov-08
-3 VSB06	NF24-SR US	Actuator. Direct Couple. Spring Return. 60inlb 2-10VDC	Belimo	NF24_SR_S.pdf	NF24_SR_S.pdf	16-Feb-09
-3 VSB07	NF24-MFT US	Actuator. MF. Direct Couple. Spring Return. 60inlb 2-10VDC	Belimo	NF24_MFT_S.pdf	NF24_MFT_S.pdf	22-Apr-09
-3 VSB08	NF24 US	Actuator. Direct Couple. Spring Return. 60inlb 24V	Belimo	NF24_S.pdf	NF24_S.pdf	22-Apr-09
-3 VSB09	AF24-S US	Actuator. Direct Couple. Spring Return. 133inlb 24V	Belimo	AF24_S.pdf	AF24_S.pdf	4-May-09
-3 VSB11	LF24-MFT	Actuator. MF. Direct Couple. Spring Return. 35inlb 24V	Belimo	LF24-MFT.pdf	LF24-MFT.pdf	2-Sep-09
-3 VSH17	MS7505A2008	Actuator. Direct Couple. Spring Return. 44inlb 24V	Honeywell	MS_Series.pdf	MS_Series.pdf	2-Sep-09
-3 VSH18	V8044A-1010	Actuator. Direct Couple. Spring Return. 24V	Honeywell	60-2133.pdf	60-2133.pdf	2-Sep-09
-3 VSJ21	M9216-HGA-3, M9216-HGA-2	Actuator. Direct Couple. Spring Return. 140inlb 24V	JCI	2681068[1].pdf	2681068[1].pdf	2-Sep-09
-3 VSK19	MEP 5372	Actuator. Direct Couple. Spring Return. 50inlb 24V	KMC	MEP-5372-73-74.pdf	MEP-5372-73-74.pdf	2-Sep-09
-3 VSR23	AT33A000	Actuator. Direct Couple. Non-Spring Return. 14in2lb 24V	Erie	Erie actuators.pdf	Erie actuators.pdf	2-Sep-09
-3 VSR24	AG13A020	Actuator. Direct Couple. Spring Return. 142inlb 24V	Eire	Erie actuators.pdf	Erie actuators.pdf	2-Sep-09
Specification Section 15910N Paragraph 2.3.3.1						
Specification Section 15910N Paragraph 2.3.4						
-4 TEPGO	EPC2G	Electro-Pnuematic Transducer. Dual. Adj. Gauge	ACT	EPC.pdf	EPC2.pdf	initial
-4 XTIBT	TIB-515	Trane Thermostat Interface Board. BRD-0968	Trane	TIB-515.pdf	n/a	12-May-08
Specification Section 15910N Paragraph 2.3.5.1						
-5 RF1M	RIBU1C	Relay. SPDT. LED. 10-30VAC/VDC. 120VAC	Functional Devices	RIBU1C.pdf	RIBU1C.pdf	initial
-5 ROF1M	RIBMU1S	Relay. SPST. Override. LED. 10-30VAC/VDC. 120VAC	Functional Devices	RIBMU1S.pdf	n/a	16-Dec-08
-5 RI2A	RH2B-UL-AC24V	Relay. DPDT. UL. LED. 24VAC	Idec	RH-RR_RJ.pdf	n/a	initial
-5 RI2D	RH2B-UL-DC24V	Relay. DPDT. UL. LED. 24VDC	Idec	RH-RR_RJ.pdf	n/a	initial
-5 RI2T	SH2B	Relay. Base. RH2B	Idec	SH_SR_SJ.pdf	n/a	initial
-5 RI4A	RH4B-UL-AC24V	Relay. 4PDT. UL. LED. 24VAC	Idec	RH-RR_RJ.pdf	n/a	2-Jan-08
-5 RI4T	SH4B	Relay. Base. RH4B	Idec	SH_SR_SJ.pdf	n/a	2-Jan-08
Specification Section 15910N Paragraph 2.1.1.15						
PE S16	SCE-18N 1606NK-T	Enclosure.NEMA 1. 16Wx18H. Tan	SCE	SCE-18N1606.pdf	n/a	initial
PE S20	SCE-24N 2006NK-T	Enclosure.NEMA 1. 20Wx24H. Tan	SCE	SCE-24N2006.pdf	n/a	initial
PE S24	SCE-36N 2406NK-T	Enclosure.NEMA 1. 24Wx36H. Tan	SCE	SCE-36N2406.pdf	n/a	initial
PE SKL	SCE-MIN-QK	Enclosure Door Keylock	SCE	SCE-MIN-QK.pdf	n/a	2-Jan-08

Specification Section 15910N Paragraph 2.1.1.16						
PA R	various	120VAC Receptacle	various	n/a	n/a	initial
PA S	various	Main Power Switch	various	n/a	n/a	initial
PA SR	various	Main Power Switch. 120VAC Receptacle	various	n/a	n/a	initial
PS S3IOO	ASW320	Switch. 3-Position. 2NO Contacts	Idec	idec-8140033 switch.pdf	n/a	2-Jan-08
PS SCO	HW-C10	Contact Block. 1NO	Idec	Idec-8140200.pdf	n/a	2-Jan-08
PS SCC	HW-C01	Contact Block. 1NC	Idec	Idec-8140200.pdf	n/a	2-Jan-08
PS SCD	HW-D	Contact Block. Dummy	Idec	Idec-8140200.pdf	n/a	2-Jan-08
PS SILHC	Custom	Switch. Legend Plate. Heat-Off-Cool	Custom	n/a	n/a	2-Jan-08
Specification Section 15910N Paragraph 2.4.1						
PX C50	LE16550	LE16550 24V 50VA Transformer	Core Components	LE16550.pdf	LE16550.pdf	initial
PX C96	LE17550	LE17550 24V 96VA Transformer	Core Components	LE17550.pdf	LE17550.pdf	initial
Specification Section 15910N Paragraph 2.4.2.1						
PX SPPN1	TCS-HWR	TCS-HWR	Northern Tech.	TCS-HW.pdf	n/a	7-Dec-07
Specification Section 15910N Paragraph 2.4.3						
PX WAN	4340PL-LC-GRNBK	22 AWG Plenum 2 Conductor Shielded ArcNet Comm Wire	Cable Plus, Inc.	4340PL-LC-GRNBX	n/a	2-Jan-08
PX WIS2	4360PL-LC	18 AWG Plenum 2 Conductor Shielded Wire	Cable Plus, Inc.	4360PL.pdf	n/a	12-May-08
PX WIS3	4440PL-LC	18 AWG Plenum 3 Conductor Shielded Wire	Cable Plus, Inc.	4440PL.pdf	n/a	12-May-08
PX WRN	4220PL-LC	22 AWG Plenum 4 Conductor Shielded Rnet Comm Wire	Cable Plus, Inc.	4220PL.pdf	n/a	12-May-08
Specification Section 15910N Paragraph 2.8						
VFDCIP	CI-007-P4	TITAN >7.5HP VFD	CERUS IND PROD	PSeries_CS120503.pdf	n/a	12-May-08
VFDCI3G	CI-003-GS4	TITAN 3HP VFD	CERUS IND PROD	Cerus VFD GS Series.pdf	n/a	2-Sep-09
VFDCI2G	CI-002-GS4	TITAN 2HP VFD	CERUS IND PROD	Cerus VFD GS Series.pdf	n/a	2-Sep-09
STCIP	BAS-1-18/J-22	MOTOR STARTER	CERUS IND PROD	Starters Brochure.pdf	BAS_EOL_MCP_1 3 1_STARTER.pdf	12-May-08

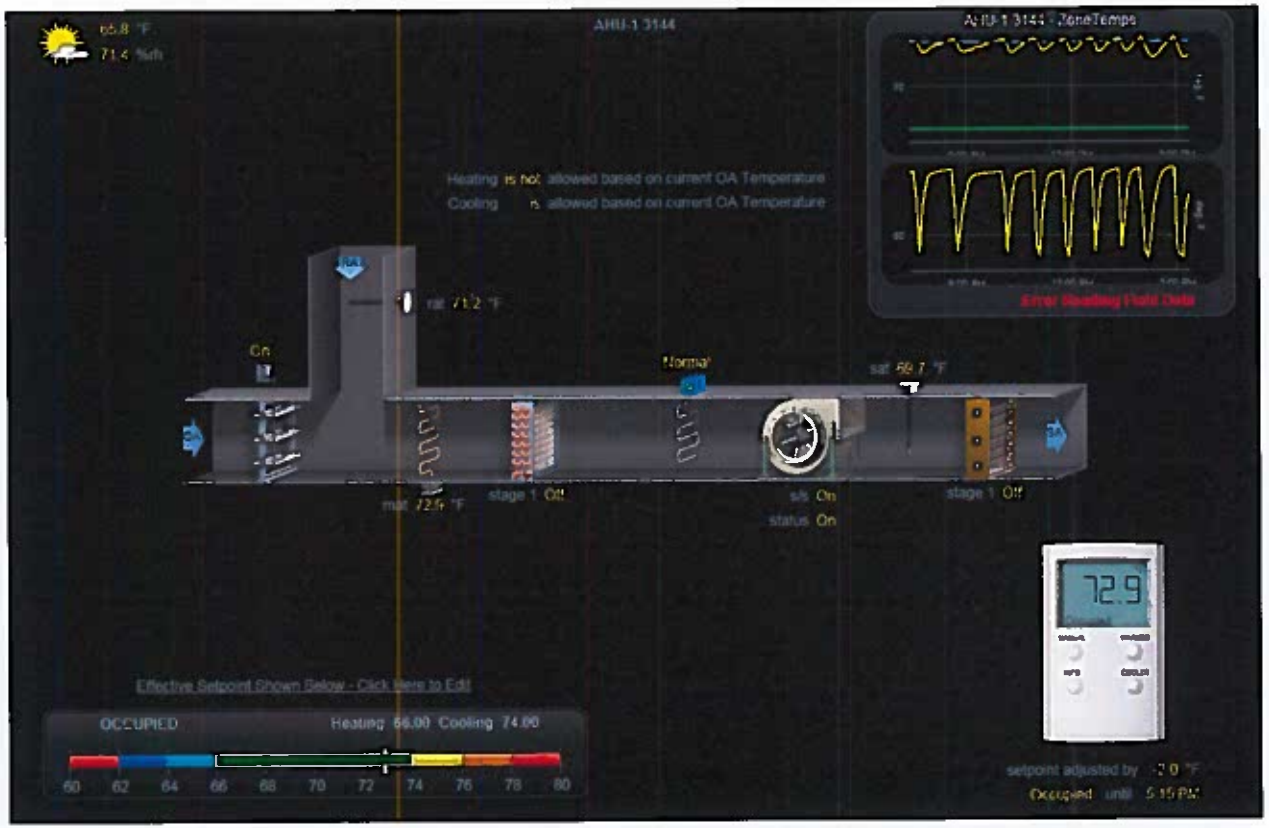
DID	Spec Sect		DESCRIPTION
	2.1.1	__SE6104	Direct Digital Controls
		__SE6166	
		__ZN141	
		__ZN341	
		__ZN253	
		__ZN551	
	2.1.1.7	P_T	Transformers
	2.1.1.11	_BN	Digital controller BACnet Internetwork
	2.1.1.13	_BM	Modems
	2.1.1.14	_LGR	Gateways
	2.1.1.15	P_E	Digital Control Cabinet
	2.1.1.16	P_S	Main Power Switch and Receptacle
		P_R	Main Power Switch and Receptacle
	2.1.2	_WCTRL	DDC Software
	2.1.2.1	_WCTRLP	Programming
	2.1.3		Bacnet Operator Workstation
	2.1.3.1	_WNOWS	Bacnet Operator Workstation Hardware
	2.1.3.2		Bacnet Operator Workstation DDC software
	2.1.3.3	_WCTRLV	Graphics Software
	2.1.4	_WNPOT	Notebook Computer
	2.1.5	_WNTPA	Bacnet Protocol Analyzer
	2.2	+1	Input Hardware
	2.2.1.1	+1 T	Thermistors
	2.2.1.2	+1 TR	Resistance Temperature Detectors
	2.2.1.3		Temperature Sensor Details
		_RS	
		_RSF	
		_RSP	
	2.2.2	+2	Transmitters
	2.2.2.1	+3 H	Relative Humidity Transmitters
	2.2.2.2	+4 P	Pressure Transmitters
	2.2.3	+5 C	Current Transducers
	2.2.4	+6	Air Quality Sensor
	2.2.4.1	+6 C	CO2 Sensors
	2.2.4.2	+6 Q	Air Quality Sensor
	2.2.5	+7	Input Switches
		+7 CS	Current Switches
	2.2.5.1		Timed Local Overrides
	2.2.6	+8 L	Freeze Protection Thermostats
	2.2.7	+9	Air Flow Measurement stations
	2.3.	-	OUTPUT HARDWARE
	2.3.1	-1 CD	Control Dampers
	2.3.2	-2 CV	Control Valves
	2.3.2.1	-2 CV	Valve Assembly
	2.3.2.2	-2 CVB	Butterfly Valves
	2.3.2.3	-2 CV	Two-Way Valves
	2.3.2.4	-2 CV	Three Way Valves

2.3.2.5	-2 CV	Valves for Chilled Water
2.3.2.6	-2 CV	Valves for Hot Water
2.3.2.7	-2 CV	Valves for High Temperature
2.3.2.8	-2 CVS	Valves for Steam Services
2.3.3	-3	Actuators
2.3.3.1	-3	Electric Actuators
2.3.3.2	-3P	Pneumatic Actuators
2.3.4	-4	Output Signal Conversion
2.3.4.1	-	Electronic-to-Pneumatic Transducers
2.3.5	-5	Output Switches
2.3.5.1	-5R	ControlsRelays
2.4.1	P	Transformers
2.4.2.1	PX-SP	Power Line Surge Protection
2.4.2.3		Controller Input/Output Protection
2.4.3	P_W	Wiring
2.7.4	PN	In-Line Filters
2.7.5.2	T	polyethylene tubing
2.8.		Variable Frequency Drives

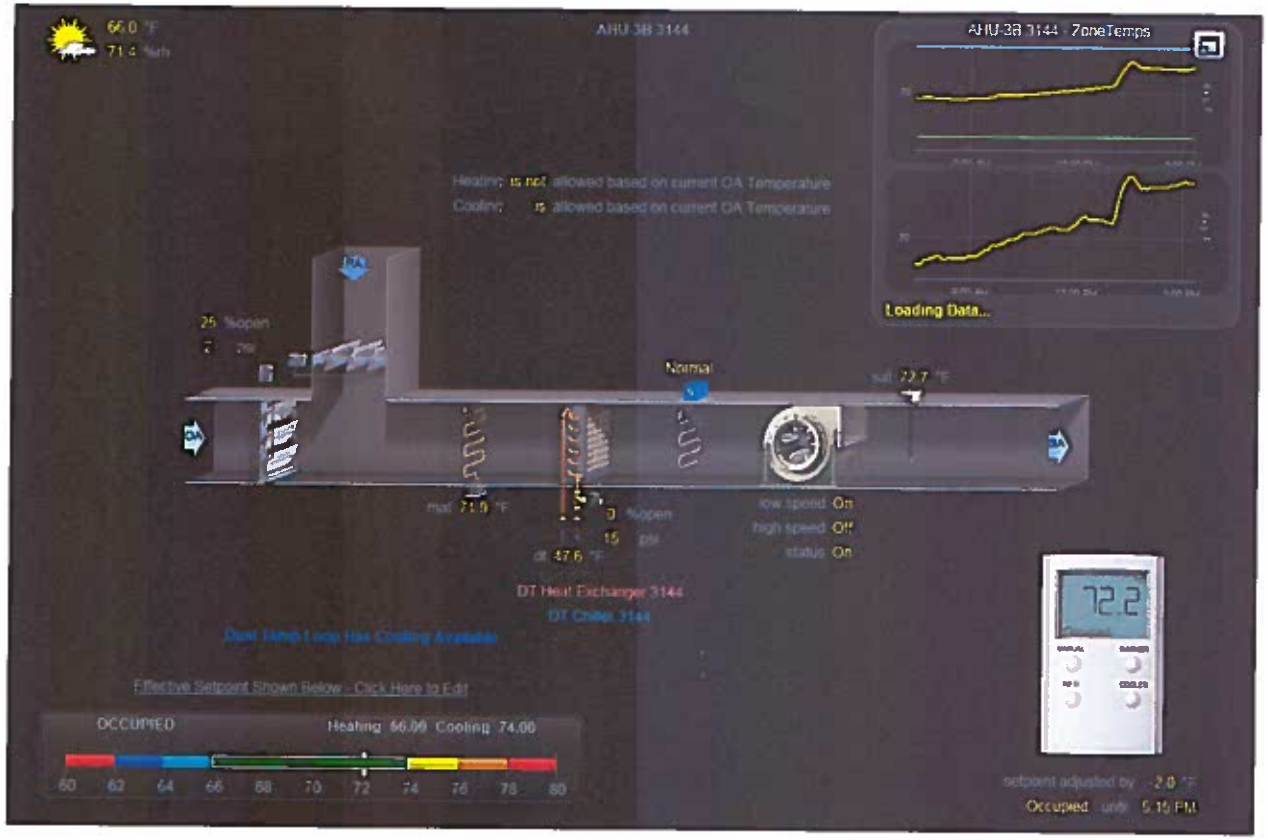
3144 Beachmaster Unit 2



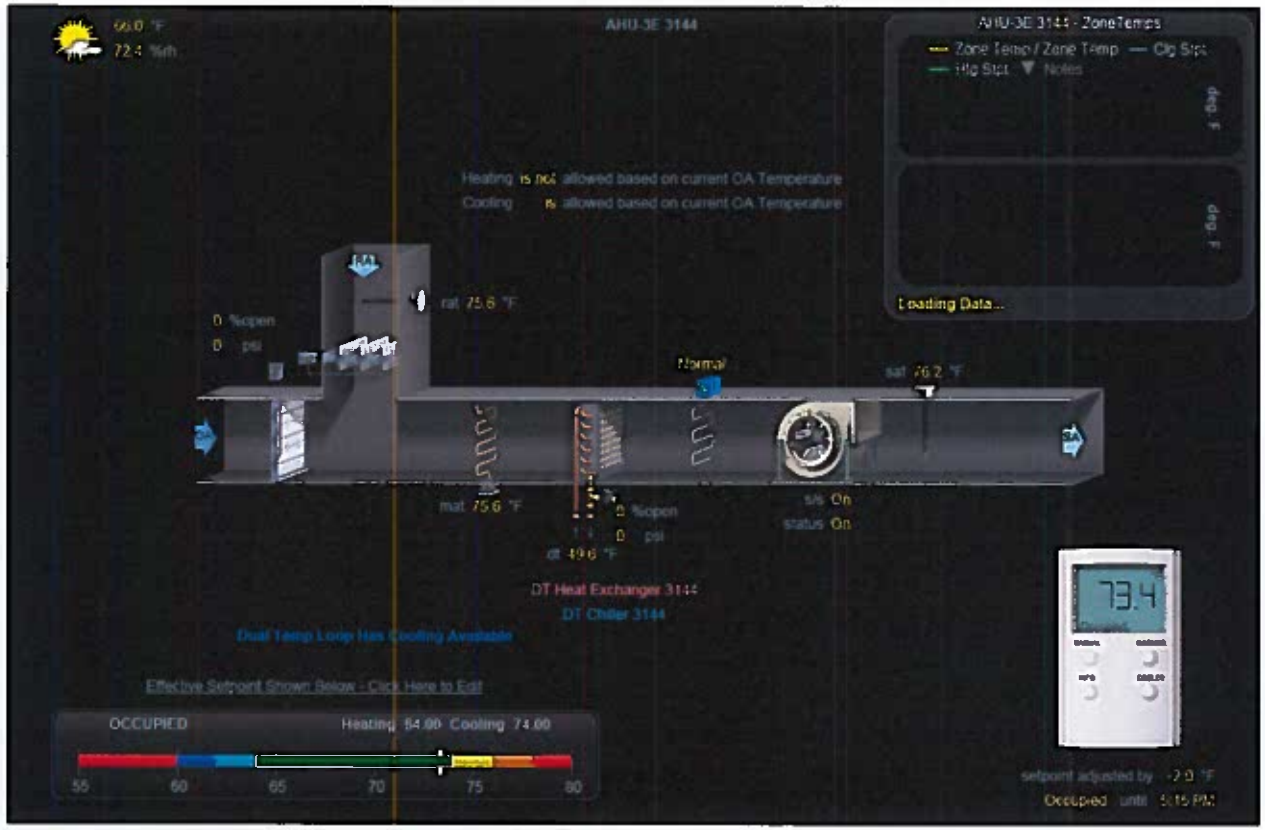
3144 first floor


AHU-1 3144
Heating is not allowed based on current OA Temperature
Cooling is allowed based on current OA Temperature
On
Normal
stage 1 Off
s/s On
status On
stage 1 Off
72.9
Effective Setpoint Shown Below - Click here to Edit
OCCUPIED
Heating 66.00 Cooling 74.00
60 62 64 66 68 70 72 74 76 78 80

3144 AHU-1


66.0 °F
AHU 3B 3144
AHU-3B 3144 - ZoneTemps
Heating: is not allowed based on current OA Temperature
Cooling: is allowed based on current OA Temperature
Loading Data...
25 %open
Normal
sat 72.7 °F
mat 71.9 °F
0 %open
15 psi
dt 47.6 °F
low speed On
high speed Off
status On
DT Heat Exchanger 3144
DT Chiller 3144
Dual Temp Loop Has Cooling Available
Effective Setpoint Shown Below - Click Here to Edit
OCCUPIED
Heating 66.00 Cooling 74.00
60 62 64 66 68 70 72 74 76 78 80
72.2
setpoint adjusted by -2.0 °F
Occupied until 5:15 PM

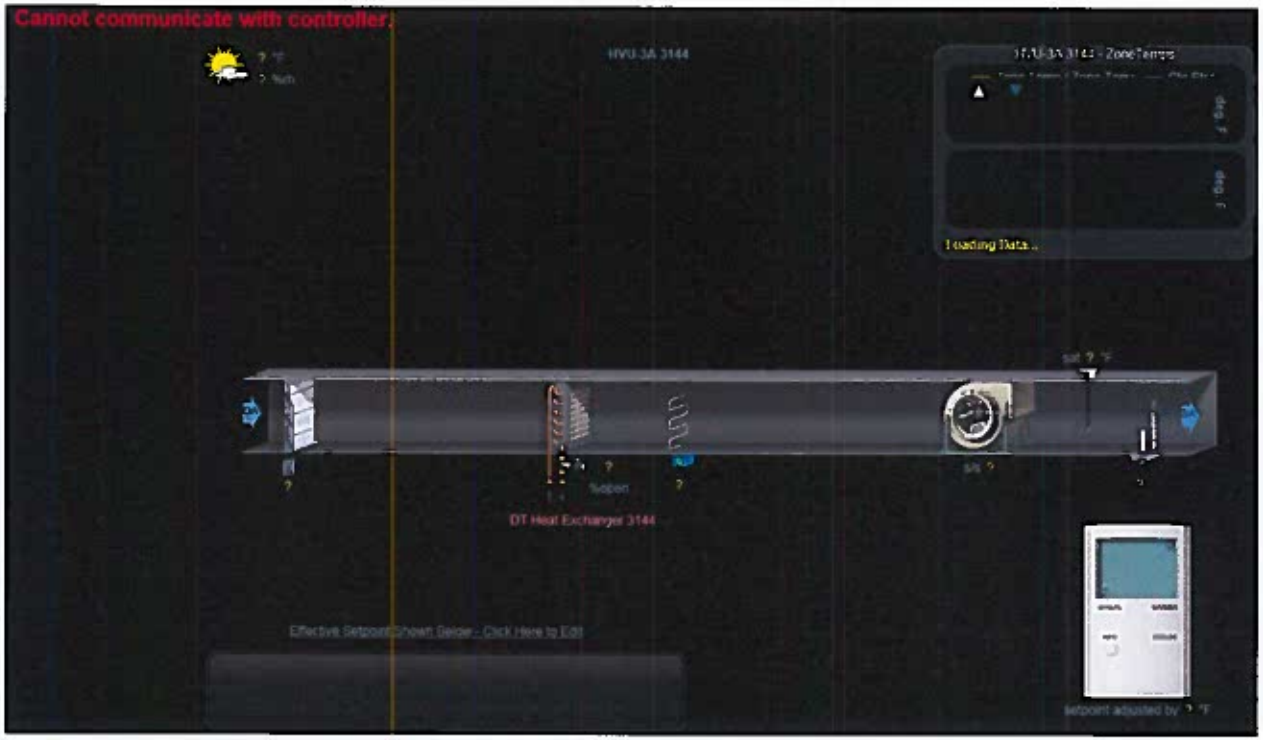
3144 AHU-3B


AHU-3E 3144
Heating is not allowed based on current OA Temperature
Cooling is allowed based on current OA Temperature
Loading Data...
Normal
DT Heat Exchanger 3144
DT Chiller 3144
Dual Temp Loop Has Cooling Available
Effective Setpoint Shown Below - Click Here to Edit
OCCUPIED
Heating 64.00 Cooling 74.00
55
60
65
70
75
80
73.4

3144 AHU-3E

66.0 °F
72.4 %rh
AHU-3F 3144
AHU-3F 3144 - ZoneTemps
Heating is not allowed based on current conditions
Cooling is allowed based on current conditions
Environmental Index
Instantaneous 100.0
Daily Average
sat 57.1 °F
RA
SA
0 %open
0 psi
fan On
status Off
Failed
DT Heat Exchanger 3144
DT Chiller 3144
Fan Runs When Occupied
67.8
Effective Setpoint Shown Below - Click Here to Edit
OCCUPIED
Heating 66.00 Cooling 76.00
60
65
70
75
80
85
Occupied until 5:15 PM

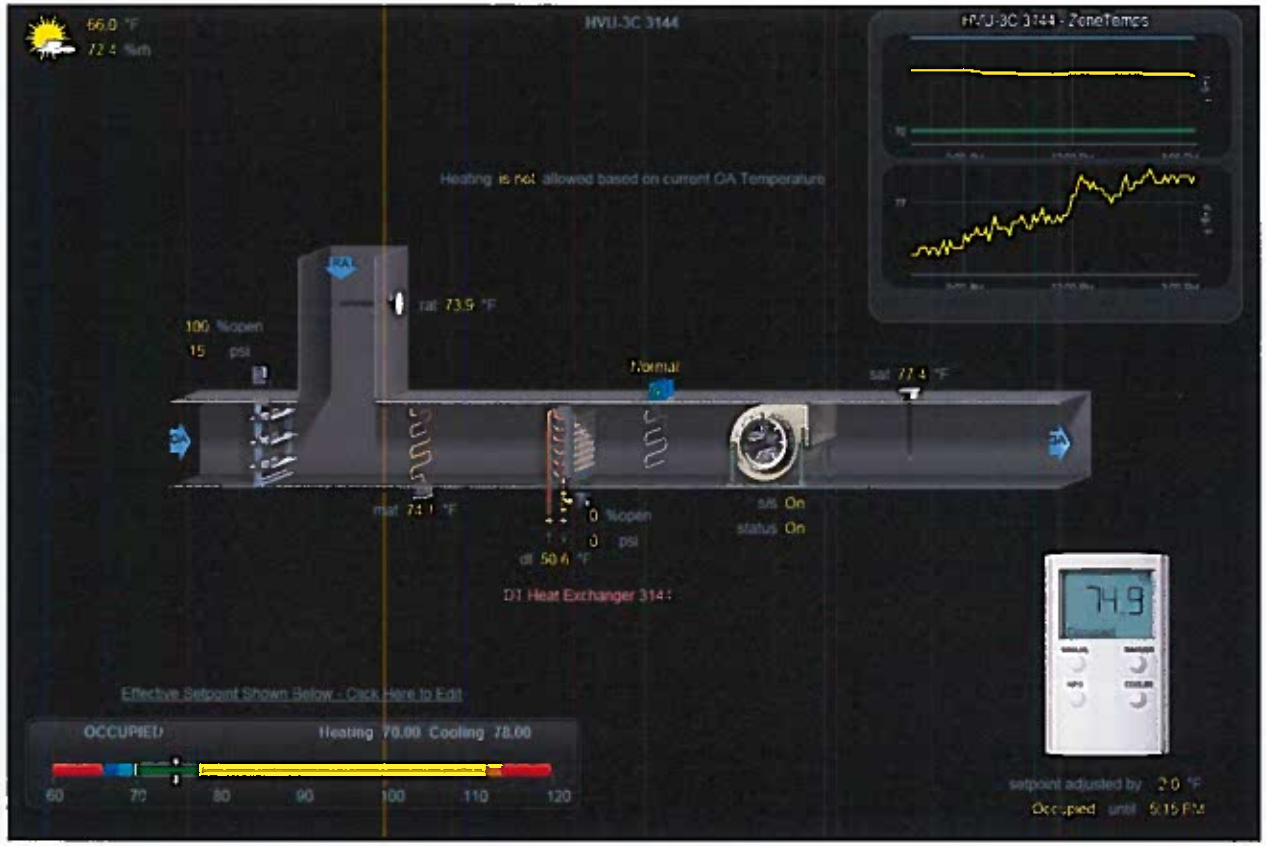
3144 AHU-3F


Cannot communicate with controller.
HVU-3A 3144
Loading Data...
DT Heat Exchanger 3144
Effective Setpoint Shown Below - Click Here to Edit

3144 HVU-3A

66.0 °F
HVU-3B 3144
HVU-3B 3144 - ZoneTemps
Loading Data...
Closed
0
%open
Normal
DT Heat Exchanger 3144
Off
status Off
Normal
76.6
Effective Setpoint Shown Below - Click Here to Edit
OCCUPIED
Heating 58.00 Cooling 86.00
30 40 50 60 70 80 90 100 110 120
Occupied

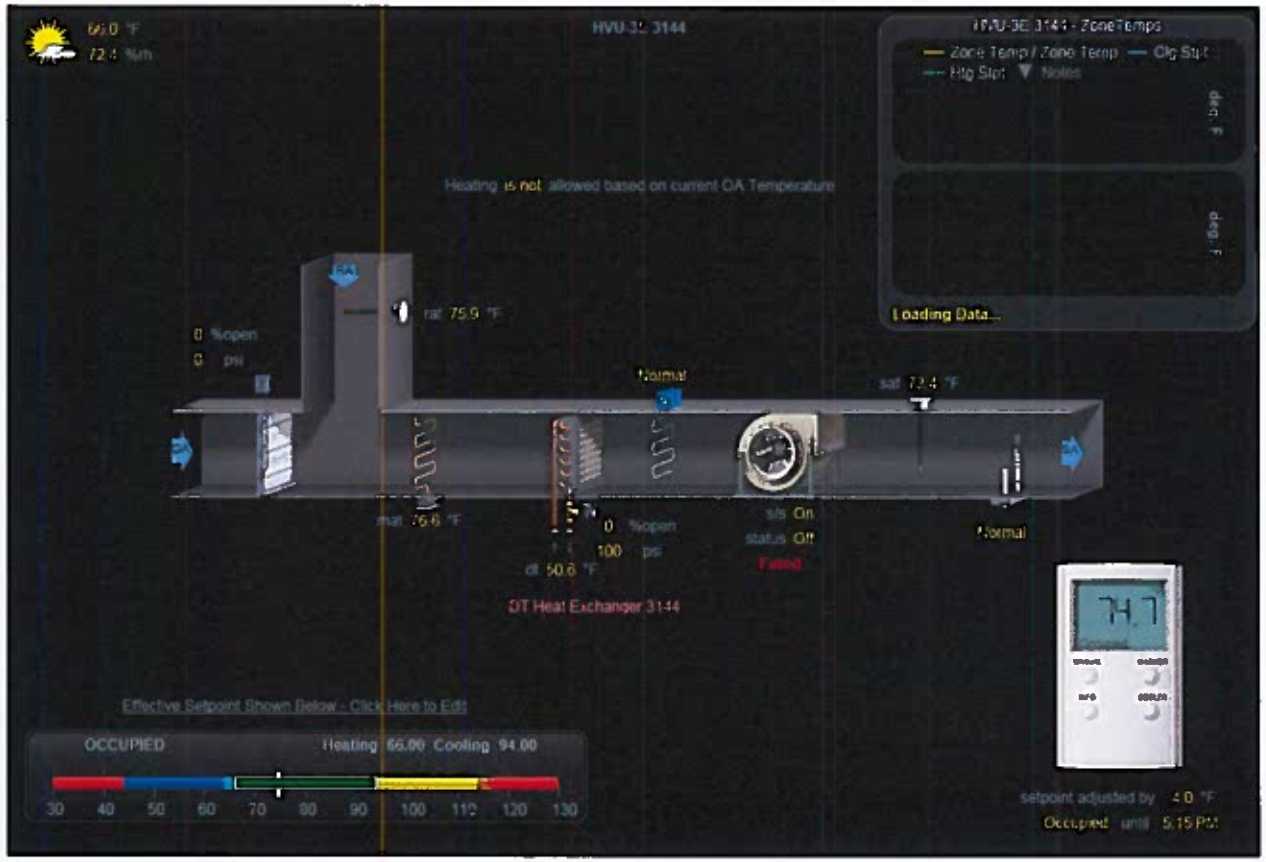
3144 HVU-3B


66.0 °F
HVU-3C 3144
Heating is not allowed based on current OA Temperature
RA
rat 73.9 °F
100 %open
15 psi
Normal
sat 77.4 °F
mat 74.1 °F
0 %open
0 psi
dt 50.6 °F
DT Heat Exchanger 3144
s/s On
status On
74.9
Effective Setpoint Shown Below - Click Here to Edit
OCCUPIED
Heating 70.00 Cooling 78.00
60
70
80
90
100
110
120
setpoint adjusted by 2.0 °F
Occupied until 5:15 PM

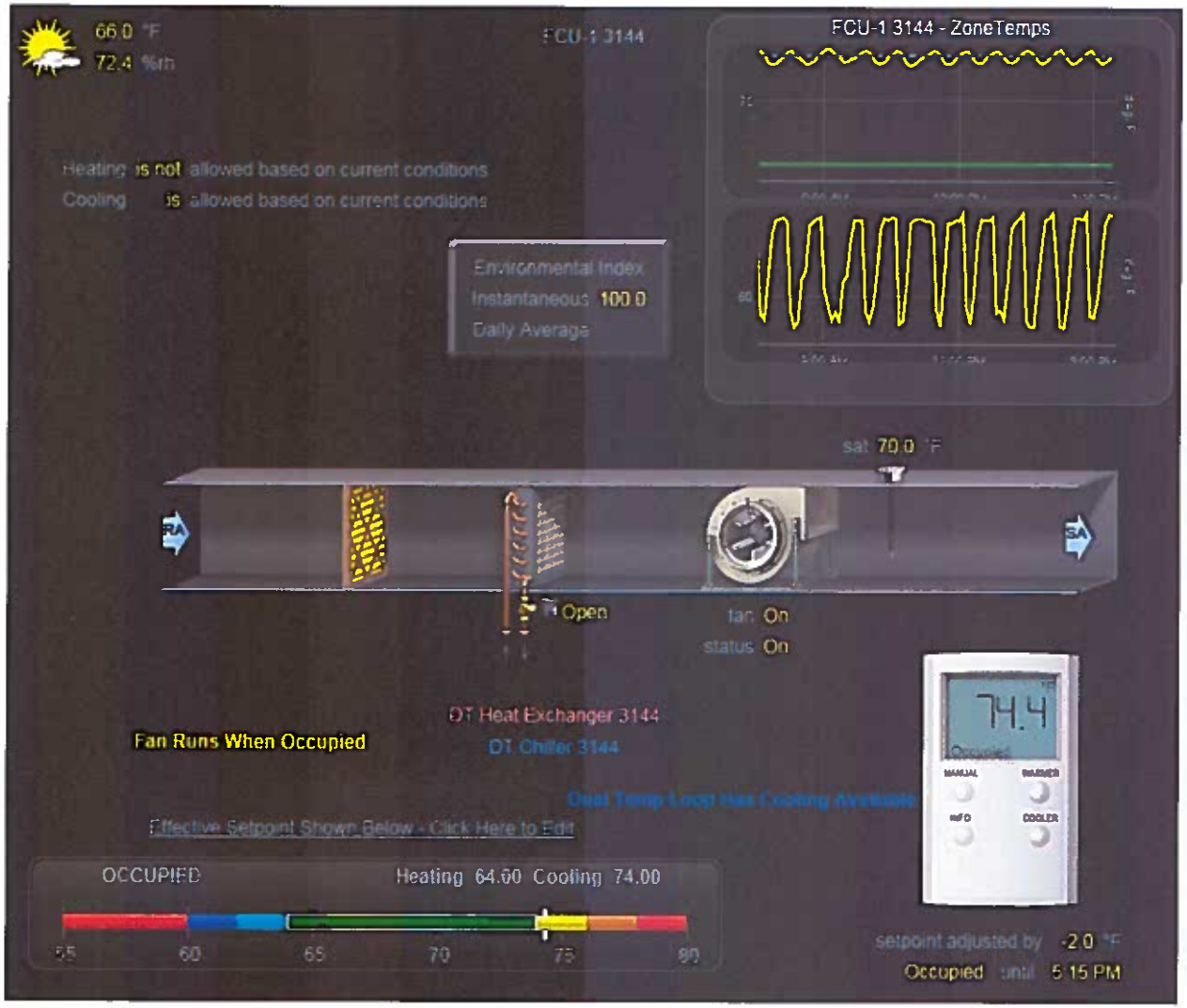
3144 HVU-3C

66.0 °F
72.4 %rh
HVU-3D 3144
HVU-3D 3144 : ZoneTemps
Loading Data...
sat 68.4 °F
Closed
0
%open
Normal
Off
status Off
Normal
DT Heat Exchanger 3144
71.2
Effective Setpoint Shown Below - Click Here to Edit
OCCUPIED
Heating 64.00 Cooling 97.00
50
60
70
80
90
100
110
120
setpoint adjusted by 2.0 °F
Occupied until 5:15 PM

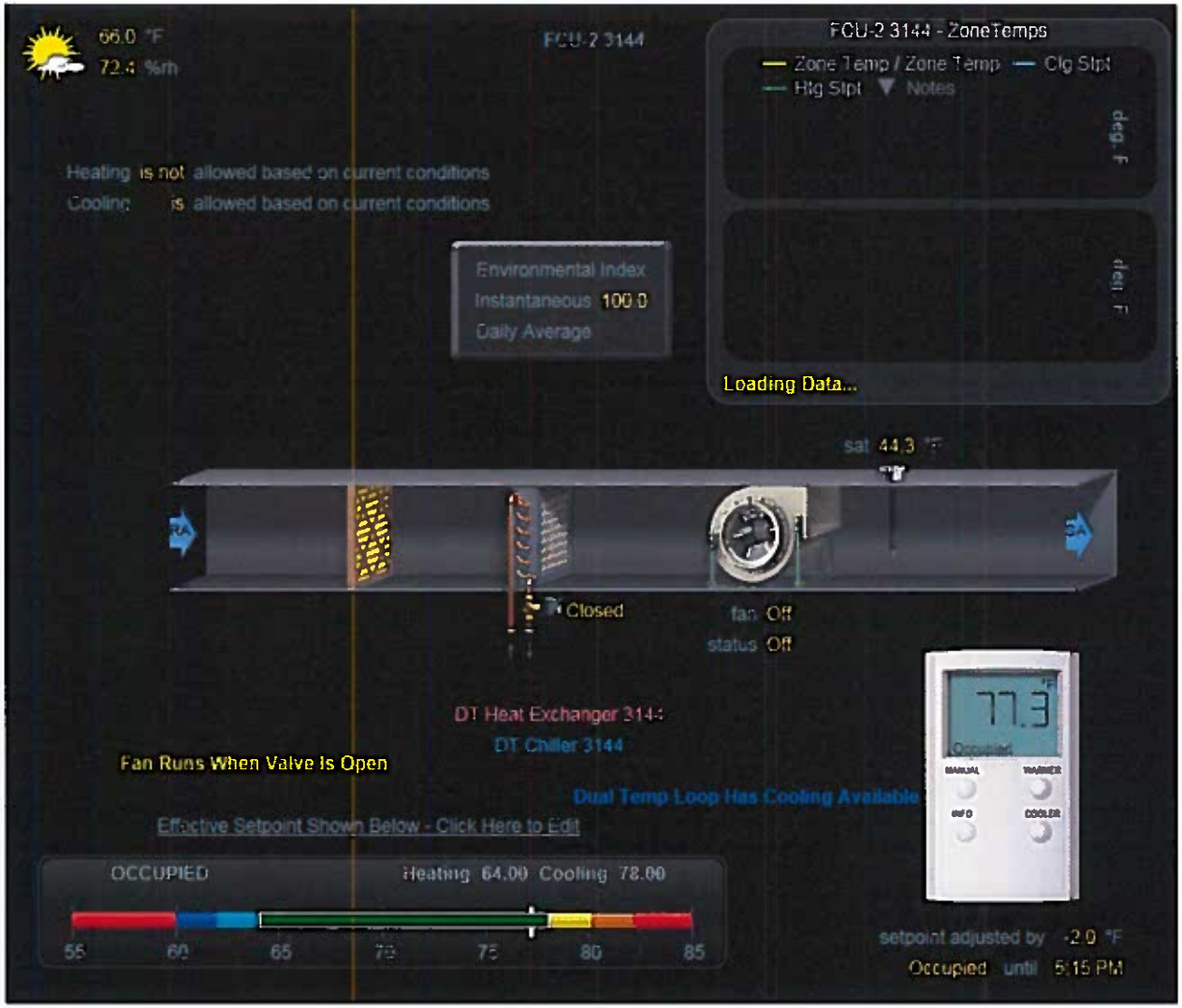
3144 HVU-3D


HVU-3E 3144
Heating is not allowed based on current OA Temperature
Loading Data...
Normal
DT Heat Exchanger 3144
Effective Setpoint Shown Below - Click Here to Edit
OCCUPIED
Heating 66.00 Cooling 94.00
30 40 50 60 70 80 90 100 110 120 130
74.7

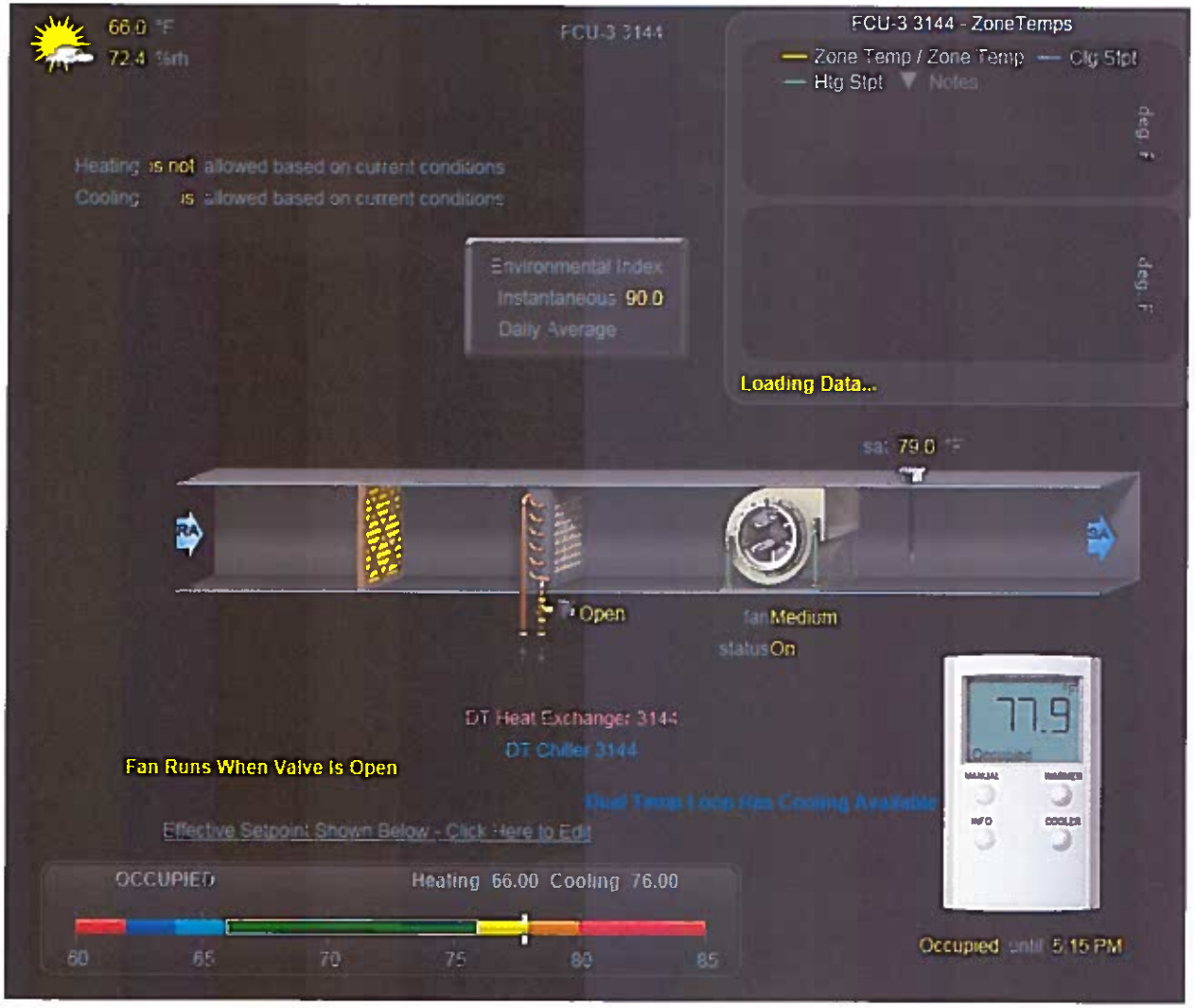
3144 HVU-3E


66.0 °F
72.4 %rh
FCU-1 3144
FCU-1 3144 - ZoneTemps
Heating is not allowed based on current conditions
Cooling is allowed based on current conditions
Environmental Index
Instantaneous 100.0
Daily Average
sat 70.0 °F
RA
SA
Open
fan On
status On
74.4
Fan Runs When Occupied
DT Heat Exchanger 3144
DT Chiller 3144
Dual Temp Loop Has Cooling Available
Effective Setpoint Shown Below - Click Here to Edit
OCCUPIED
Heating 64.00 Cooling 74.00
55
60
65
70
75
80
setpoint adjusted by -2.0 °F
Occupied until 5:15 PM

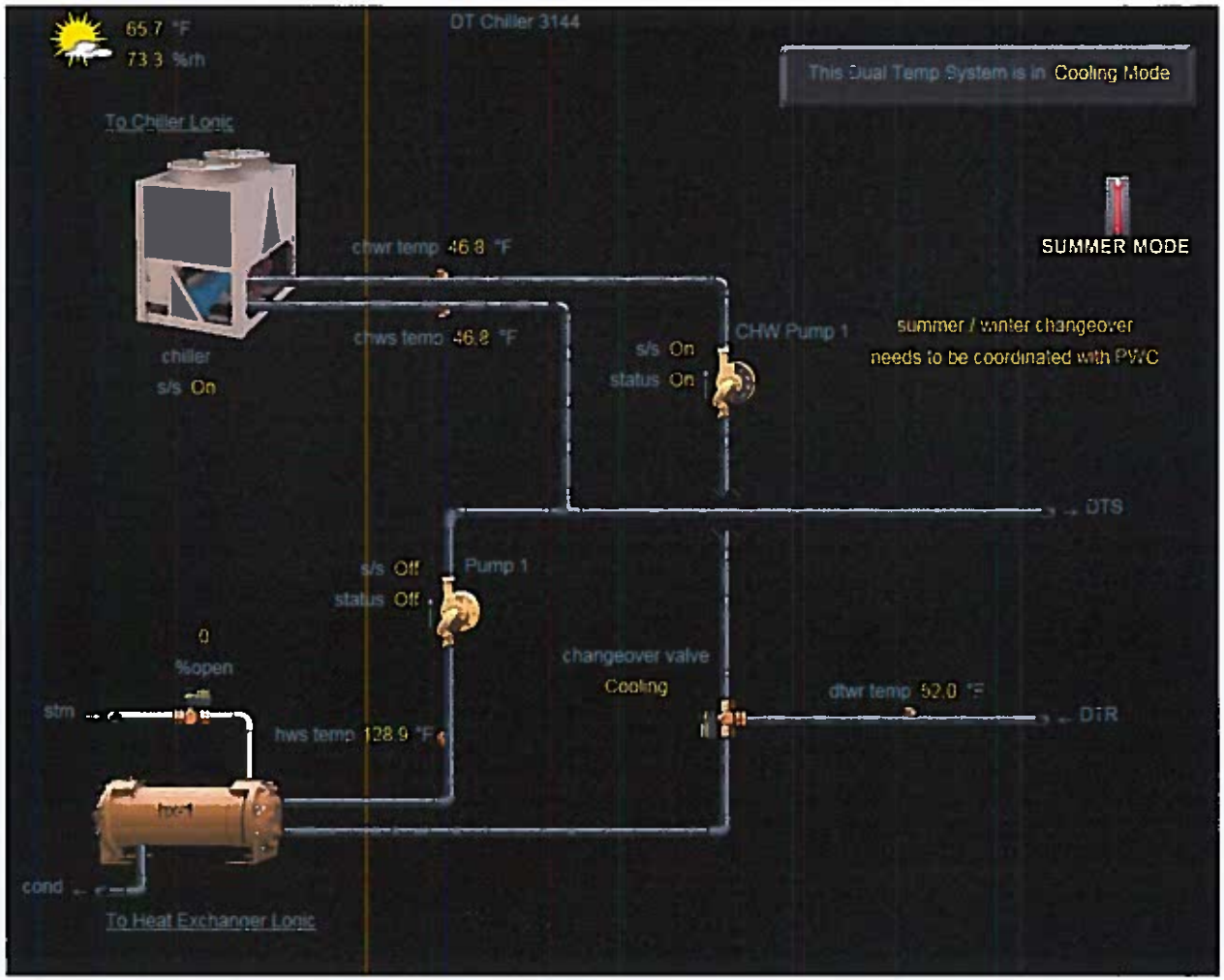
FCU-1


66.0 °F
72.4 %rh
FCU-2 3144
FCU-2 3144 - ZoneTemps
Zone Temp / Zone Temp
Clg Stpt
Htg Stpt
Notes
deg. F
deg. F
Heating is not allowed based on current conditions
Cooling is allowed based on current conditions
Environmental Index
Instantaneous 100.0
Daily Average
Loading Data...
sat 44.3 °F
RA
SA
Closed
fan Off
status Off
77.3
DT Heat Exchanger 3144
DT Chiller 3144
Fan Runs When Valve Is Open
Dual Temp Loop Has Cooling Available
Effective Setpoint Shown Below - Click Here to Edit
OCCUPIED
Heating 64.00 Cooling 78.00
55
60
65
70
75
80
85
setpoint adjusted by -2.0 °F
Occupied until 5:15 PM

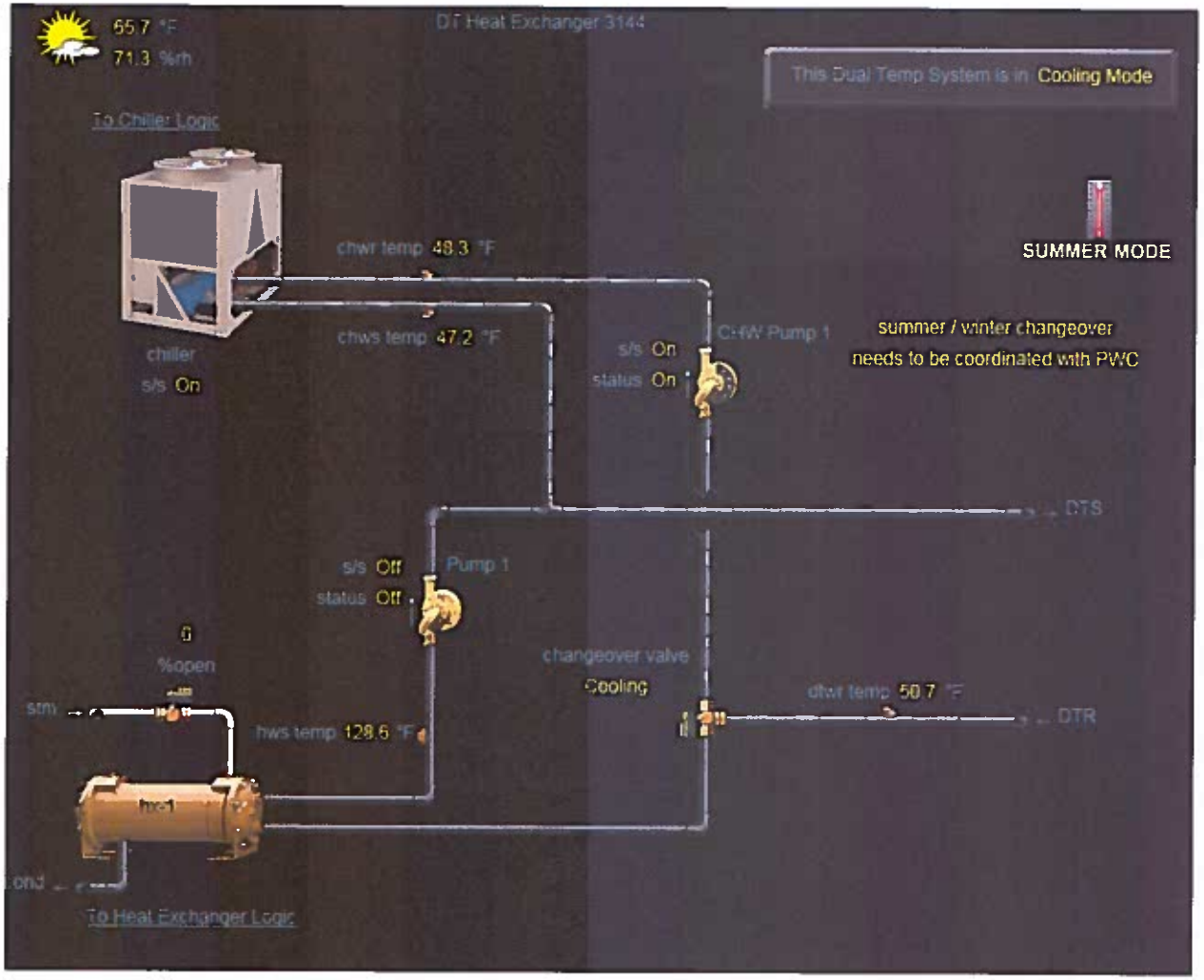
FCU-2


66.0 °F
72.4 %rh
FCU-3 3144
FCU-3 3144 - ZoneTemps
Zone Temp / Zone Temp
Clg Stpt
Htg Stpt
Notes
Heating is not allowed based on current conditions
Cooling is allowed based on current conditions
Environmental Index
Instantaneous 90.0
Daily Average
Loading Data...
sa: 79.0 °F
RA
SA
Open
fan Medium
status On
DT Heat Exchanger 3144
DT Chiller 3144
Fan Runs When Valve Is Open
Dual Temp Loop Has Cooling Available
Effective Setpoint Shown Below - Click Here to Edit
OCCUPIED
Heating 66.00 Cooling 76.00
60
65
70
75
80
85
77.9
Occupied
MANUAL
INFO
COOLER
Occupied until 5:15 PM

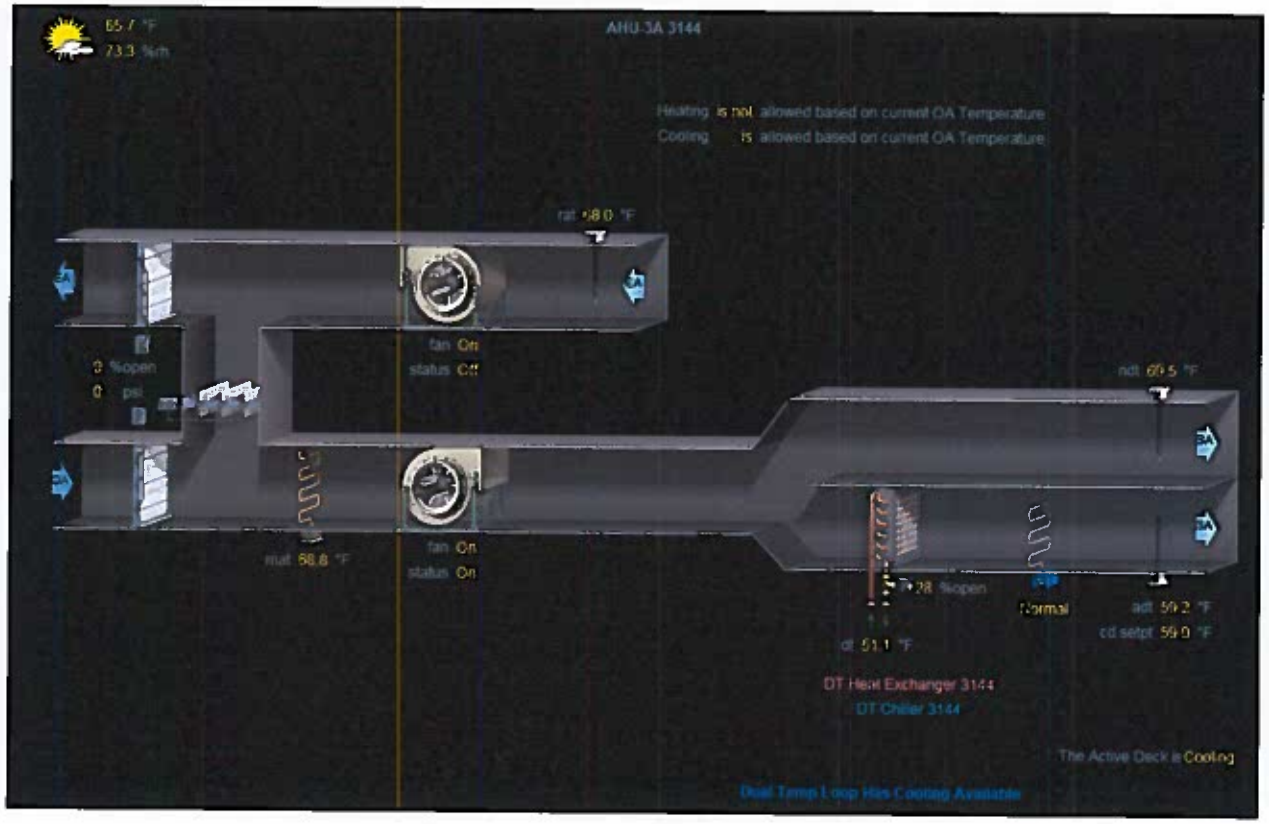
FCU-3



3144 CHILLER


65.7 °F
71.3 %rh
DT Heat Exchanger 3144
This Dual Temp System is in: Cooling Mode
To Chiller Logic
SUMMER MODE
chwr temp 48.3 °F
chws temp 47.2 °F
chiller
s/s On
s/s On
status On
CHW Pump 1
summer / winter changeover
needs to be coordinated with PWC
DTS
s/s Off
status Off
Pump 1
6
%open
changeover valve
Cooling
dtwr temp 50.7 °F
DTR
stm
hws temp 128.6 °F
hx1
cnd
To Heat Exchanger Logic

3144 HX



3144 AHU-3A

3144 AHU-3B

3144 AU-3C

BUILDING 3144

NABLC D0-2 ECM-004A DDC UPGRADES

FOR NORESCO

AS PREPARED BY

THERMO-TROL SYSTEMS, INC.

504 VIKING DRIVE, VIRGINIA BEACH, VIRGINIA 23452

PHONE NUMBER: (757) 428-4646
FAX NUMBER: (757) 428-4030

AUTOMATEDLOGIC®
CORPORATION

1: Titlepage
2: Table of Contents
3: Abbreviations
4: Symbol Legend
5: Summary Bill of Materials
6: Network Riser
7: DCP-BRC (Router)
8: MZAHU-3A
9: MZAHU-3C
10: MZAHU-3D
11: MZAHU-3A (Cont.) Zone1 (Typical of 18)
12: AHU-1
13: AHU-3B
14: AHU-3E
15: HVU-3A (Typical of HVU-3B & 3D)
16: HVU-3C (Typical of HVU-3E)
17: FCU-1
18: AHU-3F
19: FCU-2 (Typical of FCU-3)
20: DTWS (Chiller & HEX)

Rev 3 Drawings dated 8/25/2010 only affect MZAHU-3A (new electric valve) and AHU-1 (new indoor AHU) as shown.

Rev 4 Drawings dated 4/26/2011 affect the Chiller (sensors) and HEX (sensors) as shown.

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AUTOMATED LOGIC CORPORATION

NAVFAC

TABLE OF CONTENTS

BUILDING 3144

NABLC D0-2 ECM-004A DDC UPGRADES

N6 2473-07-F-4082	FOR COMMANDER NAVFAC DATE DD/MM/YY	JOB NO. 171585-AW
		TYPE: AS-BUILT
DE-AM35-09-EE-73680 (IDIQ)		REVISION: 4
		DATE: 4/26/2011
	ACTIVITY - SATISFACTORY ID DATE DD/MM/YY	DRAWN BY: RDW
		ENGINEER BY: RDW
SCALE: NONE		CHECKED BY: RF/SA
	80091 SIZE: ANSI B	SHEET: 2 OF 20

COMMON ABBREVIATIONS

#	-Variable for ANY Number
°C	-Degrees Celsius
°F	-Degrees Fahrenheit
A	-Ampere
ABS	-Absolute
ACCU	-Air Conditioning Condensing Unit
ACU	-Air Conditioning Unit
ADA	-Americans with Disabilities Act
AFF	-Above Finished Floor
AHU	-Air Handling Unit
AI	-Analog Input
ALM	-Alarm
AMB	-Ambient
AO	-Analog Output
ARCNET	-Network Comm 156K
ATS	-Automatic Transfer Switch
AUTO	-Automatic
AUX	-Auxiliary
AVG	-Average
AWG	-American Wire Gauge
BAI	-BACnet Analog Input
BAO	-BACnet Analog Output
BAS	-Building Automation System
BBI	-BACnet Binary Input
BBO	-BACnet Binary Output
BD	-Backdraft Damper
BFF	-Below Finished Floor
BH	-Basin Heater
BIV	-Boiler Isolation Valve
BIJ	-Building Router Intergration
BKUP	-Backup
BLR	-Boiler
BOM	-Bill Of Materials
BRC	-Building Router Control Panel
BRI	-Building Router Intergration
BTU	-British Thermal Units
BV	-Bypass Valve
BWP	-Boiler Water Pump
BWR	-Boiler Water Return (Inlet)
BWS	-Boiler Water Supply (Outlet)
CAV	-Constant Air Volume
CCV	-Cooling Coil Control Valve
CCW	-Counter Clockwise
CD	-Cooling / Cold Deck
CDBV	-Condenser Water Bypass Valve
CDIV	-Condenser Water Isolation Valve
CDP	-Condenser Water Pump
CDR	-Condenser Water Return
CDS	-Condenser Water Supply
CDW	-Condenser Water
CFM	-Cubic Feet Per Minute
CHIV	-Chilled Water Isolation Valve
CHLR	-Chiller
CHP	-Chilled Water Pump
CHR	-Chilled Water Return
CHS	-Chilled Water Supply
CHV	-Chilled Water Valve
CHW	-Chilled Water
CM	-Control Module
CO	-Carbon Monoxide
CO2	-Carbon Dioxide
COND	-Condenser
CRAC	-Computer Room Air Condationer
CRAH	-Computer Room Air Handler
CRU	-Computer Room Unit
CS	-Current Switch
CT	-Cooling Tower
CTRL	-Control
CTX	-Current Transducer / Transformer
CU	-Condensing Unit
CUH	-Cabinet Unit Heater
CV	*-Coefficient, Valve Flow*
CW	-Clockwise
DA	-Discharge Air
DAF	-Design Air Flow
DAT	-Discharge Air Temperature
DCW	-Domestic Cold Water
DCWR	-Domestic Cold Water Return
DCWS	-Domestic Cold Water Supply
DCP	-Direct Digital Control Panel
DD	-Double Duct
DDC	-Direct Digital Controls
DES	-Damper End Switch
DEV	-Device
DH	-Duct Heater
DHW	-Domestic Hot Water
DHWR	-Domestic Hot Water Return
DHWS	-Domestic Hot Water Supply
DI	-Digital Input
DM	-Damper Motor / Actuator
DMU	-Domestic Make-Up
DO	-Digital Output
DP	-Differential Pressure
DPDT	-Double Pole Double Throw
DPS	-Differential Pressure Switch
DPST	-Double Pole Single Throw
DPT	-Differential Pressure Transducer
DSP	-Duct Static Pressure
DSPT	-Duct Static Pressure Setpoint
DWG	-Drawing
DX	-Direct Expansion
E	-Existing
EA	-Exhaust Air
EAD	-Exhaust Air Damper
EAT	-Entering Air Temperature
ECON	-Economizer
EDH	-Electric Duct Heater
EF	-Exhaust Fan
EPO	-Emergency Power Off
ESD	-Emergency Shutdown
EVAP	-Evaporator
EWT	-Entering Water Temperature
FBD	-Face and Bypass Dampers
FBO	-Furnished by Others
FC	-Fail Closed
FCU	-Fan Coil Unit
FM-200	-Chemical Fire Suppression
FMP	-Field Module Panel
FO	-Fail Open
FOP	-Fuel Oil Pump
FOS	-Fuel Oil System
FOV	-Fuel Oil Valve
FS	-Flow Switch
FZ	-Low Limit Temperature Switch
G or GND	-Ground
GEN	-Generator
GPM	-Gallons Per Minute
H	-Hot (AC Voltage)
H2	-Hydrogen
HCV	-Heating Coil Control Valve
HD	-Heating / Hot Deck
HG	-Mercury
HGB	-Hot Gas Bypass
HMV	-Hot Water Mixing Valve
HOA	-Hand/Off/AUTO
HP	-Heat Pump
HRC	-Heat Recovery Coil
HRU	-Heat Recovery Unit
HSP	-High Static Pressure
HU	-Humidifier
HW	-Hot Water
HWP	-Hot Water Pump
HWR	-Hot Water Return
HWS	-Hot Water Supply
HWV	-Hot Water Valve
HX	-Heat Exchanger
HZ	-Frequency
I/O	-Input/Output
IAQ	-Indoor Air Quality
ID	-Isolation Damper
inWC	-Inches of Water Column
IP	-Internet Protocol
ISO	-Isolation
IV	-Isolation Valve
KW	-Kilowatt
KWH	-Kilowatt Hour
L	-Line Voltage
L/S	-Liters per Second
LAT	-Leaving Air Temperature
LL	-Liquid Level
LPC	-Low Pressure Condensate
LPS	-Low Pressure Steam
LVL	-Level
LWT	-Leaving Water Temperature
M	-Motor
mA	-Milliamp
MAD	-Mixed Air Damper (Outside & Return)
MAT	-Mixed Air Temperature
MAX	-Maximum (or XXXmx)
MGR	-Manager
MIN	-Minimum (or XXXmn)
MISC	-Miscellaneous
MRC	-Mechanical Room Controller
MRH	-Mechanical RM Hot System
MUA	-Makeup Air Unit
N	-Neutral
NA	-Not Applicable
NC	-Normally Closed
NEC	-National Electric Code
NIC	-Not In Contract
NO	-Normally Open
NTS	-Not To Scale
OA	-Outdoor Air
OAD	-Outdoor Air Damper
OAH	-Outdoor Air Humidity
OAQ	-Outdoor Air Quality (CO2)
OAT	-Outdoor Air Temperature
OATH	-Outdoor Air Temperature / Humidity
OBD	-Opposed Blade Damper
OCC	-Occupied
OPS	-Oil Pressure Switch
PA	-Pascals
PAC	-Packaged Air Conditioning Unit
PAV	-Primary Air Valve
PBD	-Parallel Blade Damper
PCDP	-Primary Condenser Water Pump
PCDR	-Primary Condenser Water Return
PCDS	-Primary Condenser Water Supply
PCHP	-Primary Chilled Water Pump
PCHR	-Primary Chilled Water Return
PCHS	-Primary Chilled Water Supply
PCT	-Percent
PCV	-Preheat Coil Control Valve
PH	-Phase
PHWP	-Primary Hot Water Pump
PHWR	-Primary Hot Water Return
PHWS	-Primary Hot Water Supply
PM	-Power Monitoring
PMP	-Pump
PNL	-Panel
POS	-Position
PPM	-Parts Per Million
PS	-Power Switch
PSI	-Pounds Per Square Inch
PWR	-Power
R	-Relay
RA	-Return Air
RAD	-Return Air Damper
RAH	-Return Air Humidity
RAQ	-Return Air Quality (CO2)
RAT	-Return Air Temperature
RCV	-Reheat Coil Control Valve
RD	-Refrigerant Discharge
RED	-Relief Air Damper
REL	-Relief
RET	-Return
REV	-Revision
RF	-Return Fan
RFS	-Return Fan Status
RH	-Relative Humidity
RL	-Refrigerant Liquid
RM	-Room
RMD	-Refrigerant Monitoring Device
RP	-Radiant Panel
RS	-Refrigerant Suction
RTD	-Resistance Temperature Device
RTU	-Rooftop Unit
RV	-Refrigerant Vapor
RX	-Reciever
S	-Starter
S/S	-Start / Stop
SA	-Supply Air
SAT	-Supply Air Temperature
SCDP	-Secondary Condenser Water Pump
SCDR	-Secondary Condenser Water Return
SCDS	-Secondary Condenser Water Supply
SCHP	-Secondary Chilled Water Pump
SCHR	-Secondary Chilled Water Return
SCHS	-Secondary Chilled Water Supply
SD	-Smoke Detector
SDR	-Smoke Detector Relay
SF	-Supply Fan
SFS	-Supply Fan Status
SHWP	-Secondary Hot Water Pump
SHWR	-Secondary Hot Water Return
SHWS	-Secondary Hot Water Supply
SP	-Static Pressure
SPDT	-Single Pole Double Throw
SPST	-Single Pole Single Throw
SSP	-Systems & Service Provider
STP	-Setpoint
STS	-Static Transfer Switch
SUP	-Supply
SW	-Switch
T	-Thermostat
TB	-Terminal Block
TD	-Time Delay
TEMP	-Temperature
TP	-Total Pressure
TPI	-Third Party Interface
TS	-Temperature Switch
TSP	-Twisted Shielded Pair
TU	-Terminal Unit
TX	-Transmit / Transmitter
UH	-Unit Heater
UL	-Underwriters Laboratories
UNC	-Unoccupied
UPS	-Uninterrupted Power Supply
UST	-Underground Storage Tank
UV	-Unit Ventilator
VA	-Apparent Power (Voltage*Amperage)
VAC	-AC Voltage
VAV	-Variable Air Volume
VD	-Volume Damper
VDC	-DC Voltage
VESDA	-Very Early Smoke Detecting Apparatus
VFD	-Variable Frequency Drive
VLV	-Valve
VP	-Velocity Pressure
VVTU	-Variable Volume Terminal Unit
W	-Watt
W/	-With
W/O	-Without
WB	-Wet Bulb
WSHP	-Water Source Heat Pump
X	-Variable for ANY Letter
XF	-Transformer
ZAQ	-Zone or Space Air Quality (CO2)
ZD	-Zone Damper
ZH	-Zone or Space Humidity
ZSPT	-Zone or Space Temperature Setpoint
ZT	-Zone or Space Temperature

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AUTOMATED LOGIC CORPORATION

NAVFAC

ABBREVIATIONS

BUILDING 3144

NABLC 00-2 ECM-004A DDC UPGRADES

N6 2473-07-F-4082	FOR COMMANDER NAVFAC DATE DD/MM/YY	JOB NO. 171595-AW
		TYPE: AS-BUILT
DE-AM38-09-EE-73680 (IDIQ)		REVISION 4
	ACTIVITY - SATISFACTORY ID DATE DD/MM/YY	DATE: 4/26/2011
		DRAWN BY: RDW
		DESIGNED BY: RDW
SCALE: NONE		CHECKED BY: RF/SA
	CODE IDENT NO. 80091 NOTE: ANSI B	SHEET 3 OF 20

HVAC EQUIPMENT

BOILERS

ELECTRIC — GAS — HOT WATER — STEAM

CHILLERS

AIR COOLED — WATER COOLED

COOLING TOWERS

SINGLE CELL — MULTI CELL

FANS

CENTRIFUGAL — EXHAUST — PROPELLER — VANE AXIAL

VALVES

3-WAY ELECTRIC — 2 WAY ELECTRIC (N.O. / N.C.) — 3-WAY PNEUMATIC — 2 WAY PNEUMATIC (N.O. / N.C.)

COILS

DX — DIRECT EXPANSION
HP — HEAT PUMP
CHC — CHILL WATER
HWC — HOT WATER
STM — STEAM
GAS — GAS
ELECTRIC — ELECTRIC
DTS — DUAL TEMP

DAMPERS

GRAVITY/BACKDRAFT — PARALLEL BLADE (N.C. / N.O.) — OPPOSED BLADE (N.C. / N.O.)

FILTERS

PLEATED — HEPA

HEAT EXCHANGERS

Heat Exchanger — Plate Heat Exchanger

METERS

GAS — GAS
KW — KILOWATT
PHASE MONITOR
H2O — WATER

TANKS

Horizontal Storage Tank — SUMP — Vertical Storage Tank

MISCELLANEOUS

VSD — VARIABLE SPEED DRIVE
MOTOR STARTER
CENTRIFUGAL PUMP
CIRCULATING PUMP
LOUVER
HUMIDIFIER

HVAC INSTRUMENTATION

RS PRO
RS PROF
RS PLUS
RS
SENSOR, COMBINATION, ZONE
SENSOR, HUMIDITY, ZONE
SENSOR, TEMPERATURE, ZONE
SENSOR, AIR QUALITY, ZONE
VAV BOX AIR FLOW PICKUP TUBES
SWITCH, PRESSURE, DIFFERENTIAL
TRANSMITTER, PRESSURE
TRANSMITTER, PRESSURE DIFFERENTIAL
MOTOR ACTUATOR/ OPERATOR
PNEUMATIC ACTUATOR/ OPERATOR
TUBING, PNUEMATIC
SWITCH, THERMOSTATIC, CLOSE ON TEMP DROP
SWITCH, THERMOSTATIC, CLOSE ON TEMP RISE
SWITCH, FLOAT FLUID
SWITCH, FLOW FLUID
ELECTRO-PNUEMATIC TRANSDUCER

RELAY, ENCLOSED
RELAY, ENCLOSED, INTEGRAL CURRENT SWITCH
RELAY, ENCLOSED, EXTERNAL CURRENT SWITCH
SENSOR, TEMPERATURE, DUCT
SWITCH, TEMPERATURE
SENSOR, TEMPERATURE, AVERAGING, DUCT
SWITCH, SAFETY, LOW-LIMIT, TEMPERATURE
SENSOR, TEMPERATURE, STRAP-ON
SENSOR, HUMIDITY, DUCT
SENSOR, COMBO, TEMPERATURE, HUMIDITY, DUCT
SENSOR, AIR QUALITY, DUCT
SWITCH, SAFETY, SMOKE DETECTOR
AIR FLOW STATION PROBE
AIR FLOW STATION, THERMAL DISPERSION
TRANSMITTER, FLOW AIR
TRANSMITTER, VELOCITY AIR
SWITCH, FLOW AIR
OUTSIDE AIR SENSOR, TEMPERATURE OR HUMIDITY
COMBINATION OUTSIDE AIR SENSOR, TEMPERATURE AND HUMIDITY
OUTSIDE AIR SENSOR, OTHER
SENSOR, TEMPERATURE, IMMERSION IN WELL
TRANSMITTER, FLUID PRESSURE DIFFERENTIAL
SWITCH, FLUID, PRESSURE DIFFERENTIAL

NETWORK

SERVER, RACK MOUNTED
UPS, RACK MOUNTED
SERVER, TOWER
OWS — OPERATOR WORKSTATION
PDT — PORTABLE OPERATOR TERMINAL
PRINTER
UPS
NETWORK SWITCH/HUB
MODEM
BNBT — BT485 / NETWORK BIASING AND TERMINATER DEVICE
BNT — TERM485 / NETWORK TERMINATER DEVICE
BNDD — DIAG485 / NETWORK DIAGNOSTIC DEVICE
BNRP — REP485 / NETWORK REPEATER DEVICE
BNPD — PROT485 / NETWORK PROTECTION DEVICE
BNFR — FIBER485 / NETWORK FIBER OPTIC CONVERTER
VARIOUS — MODEM, NETWORK COMMUNICATIONS

DRAWING CODE FORMATS

NETWORK HARDWARE SSS-HHH-BBB AAA.AAA.AAA.AAA
NETWORK VVSSS-TT-BBB
HHH SSS-DA-EN — CONTROL MODULE
OPC — EID - Point Name DA-EN-PL — MODULE POINT TAG

AAA = IP ADDRESS
BBB = BUILDING ID
HHH = HARDWARE MODEL
SSS = SEQUENCE ID NO
TT = NETWORK TYPE
VV = VENDOR ID NO

DA = DEVICE ADDRESS
EN = EXPANDER NUMBER
PL = I/O POINT TYPE & ID
OPC = LINK TO SEPARATE PAGE

PANEL COMPONENTS

ALARM HORN
CONTACTS, N.C.
CONTACTS, N.O.
PANEL GROUND BUS
AMBER BLUE GREEN RED WHITE — INDICATING LAMP
PUSHBUTTON N.C.
PUSHBUTTON, N.O.
RESISTOR
RELAY
SWITCH, 3-WAY, (H-O-A SHOWN)
TERMINAL, EQUIPMENT
TERMINAL, PANEL CONNECTION
TERMINAL, PANEL, EXISTING PNEUMATIC
TERMINAL, PANEL, EXISTING ELECTRIC
TERMINAL, STRIP
TERMINAL, STRIP, FUSED
TIMER
CONTROL TRANSFORMER

ANNOTATIONS

CONNECTION NOTES
PROVIDED BY OTHERS OR EXISTING
COMPONENT NOTES
NETWORK INPUT / OUTPUT POINTS

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AUTOMATED LOGIC CORPORATION
NAVFAC

SYMBOL LEGEND

BUILDING 3144

NABLC D0-2 ECM-004A DDC UPGRADES

NS 2473-07-F-4082	FOR COMMANDER NAVFAC DATE DD/MM/YY	JOB NO. 171595-AW
		TYPE AS-BUILT
OE-AM36-99-EE-73860 (IDIQ)	ACTIVITY - SATISFACTORY ID DATE DD/MM/YY	REVISION 4
		DATE 4/26/2011
		DRAWN BY RDW
		ENGINEERED BY RDW
SCALE NONE		CHECKED BY RF/SA
	80091 ANSI B	SHEET 4 OF 20

Summary Bill of Materials

DID	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
BMBT	ARCNET 485 BIASING TERMINATOR	AUTOMATED LOGIC	BT485	4 ea
BMRP	ARC156 REPEATER DEVICE	AUTOMATED LOGIC	REPT485	1 ea
SE6104	SE6104 DDC CONTROLLER	AUTOMATED LOGIC	SE6104	3 ea
ZN253	ZN253 DDC CONTROLLER	AUTOMATED LOGIC	ZN253	7 ea
ZN551	ZN551 DDC CONTROLLER	AUTOMATED LOGIC	ZN551	7 ea
+1 T RSP	ROOM SENSOR DIGITAL COMM SETPOINT OVERRIDE	AUTOMATED LOGIC	RSP	30 ea
+1 TAA24	TEMP SENSOR 10K-2 AVERAGING 24FT	ACI	A/CP-A-24	6 ea
+1 TAD8	TEMP SENSOR 10K-2 DUCT 8IN	ACI	A/CP-D-8	43 ea
+1 TAI4	TEMP SENSOR 10K-2 IMMERSION 4IN	ACI	A/CP-I-4	4 ea
+1 TAOA	TEMP SENSORS 10K-2 OUTSIDE AIR	ACI	A/CP-O	1 ea
-3 VNB05	ACTUATOR, NON-SPRING, DIRECT COUPLE, 24V	BELIMO	LMB24-3	18 ea
-5 RHA	RELAY DPDT UL LED 24VAC	IDEC	RH4B-UL-AC24V	11 ea
-5 RHT	RELAY BASE RH4B	IDEC	SH4B	11 ea
ZN220	ZN220 DDC CONTROLLER	AUTOMATED LOGIC	ZN220	18 ea

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AUTOMATED LOGIC CORPORATION — WEB CTRL — NAVFAC

SUMMARY BILL OF MATERIALS

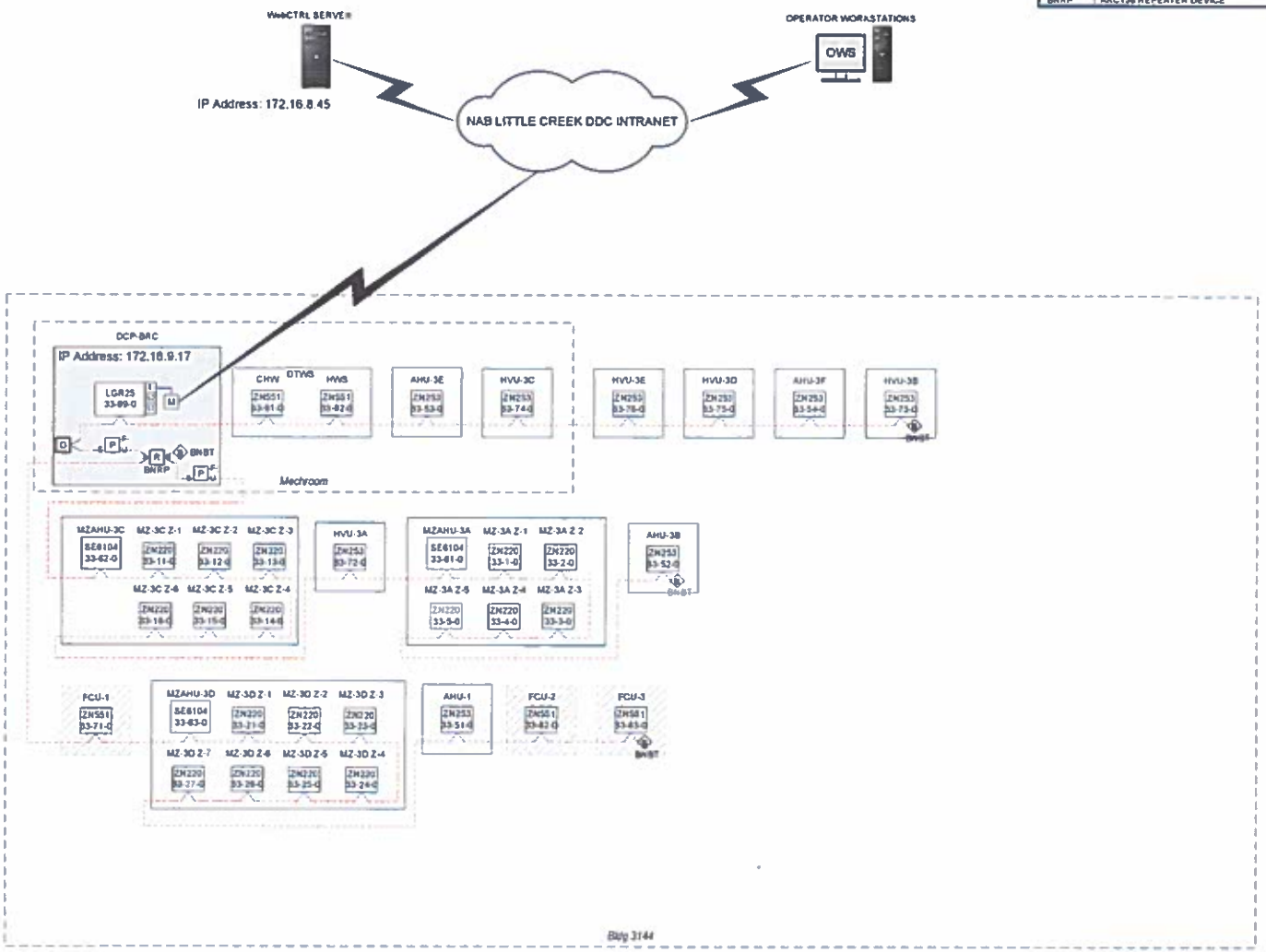
BUILDING 3144

NABLC D0-2 ECM-004A DDC UPGRADES

NB 2473-07-F-4882	FOR COMMANDER NAVFAC DATE DD/MM/YY	JOB NO. 171505-AW
DE-AM36-99-EE-73680 (IDIQ)		TYPE: AS-BUILT
		REVISION 4
	ACTIVITY - SATISFACTORY IO DATE DD/MM/YY	DATE: 4/26/2011
		DRAWN BY RDW
		ENGINEERED BY RDW
SCALE: NONE		CHECKED BY RF/SA
	CODE ID NO. 80091 REV. ANSI B	SHEET 5 OF 20

Bill of Materials

DID	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
BNBT	ARCNET 485 BIASING TERMINATOR	AUTOMATED LOGIC	BT485	4 ea
BNRP	ARC156 REPEATER DEVICE	AUTOMATED LOGIC	REPT485	1 ea



LOCATION

PANEL ID SYSTEM — Control Panel

PANEL ID SYSTEM — Existing Panel

SYSTEM — Equipment Housing

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AUTOMATED LOGIC CORPORATION — WebCTRL — NAVFAC

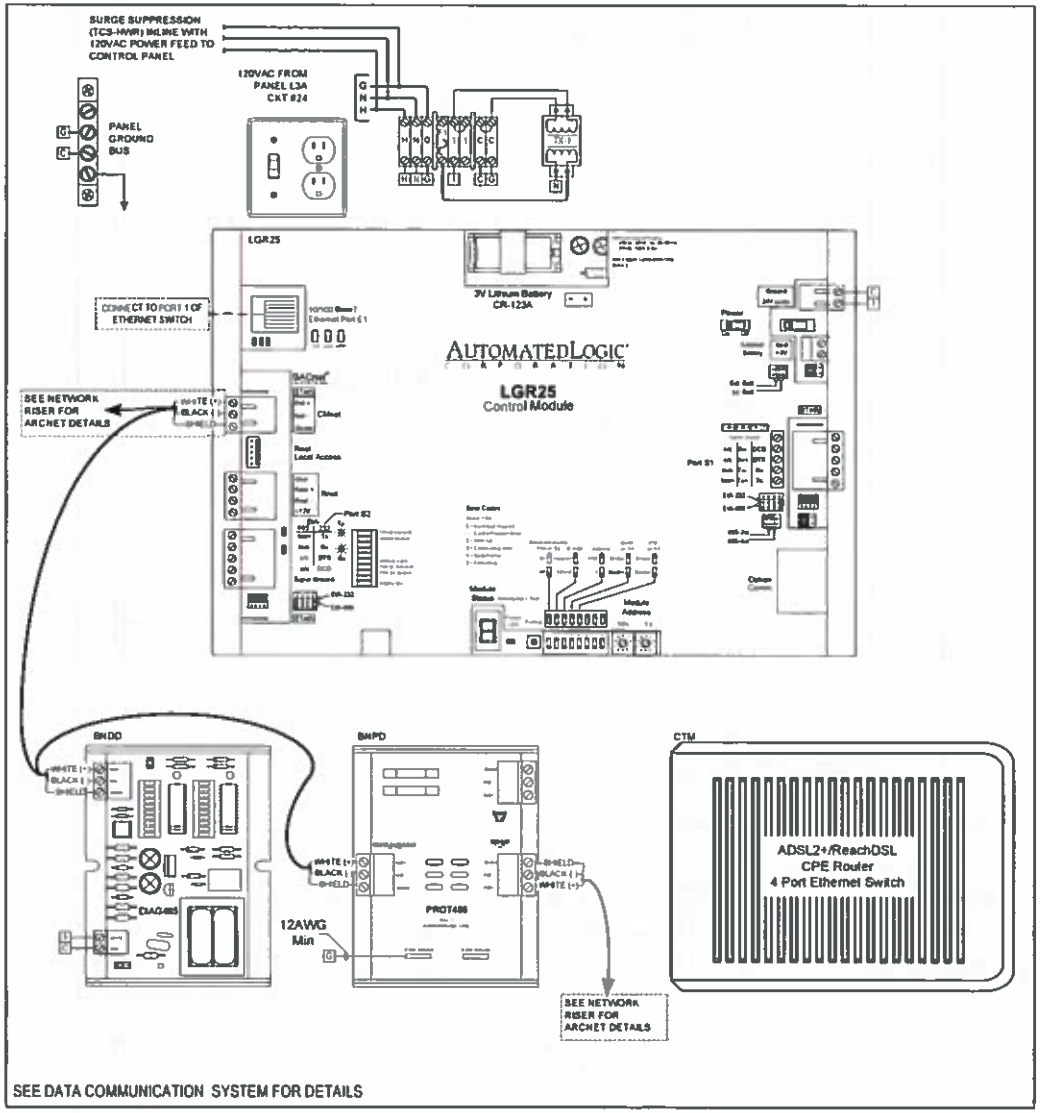
NETWORK RISER

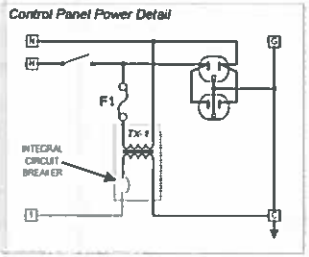
BUILDING 3144

NABLC D0-2 ECM-004A DDC UPGRADES

NG 2473-07-F-4082	FOR COMMANDER NAVFAC DATE DD/MM/YY	JOB NO. 171595-AW
CONSTR. CONTR. NO. DE-AM36-99-EE-73680 (IDIQ)		TYPE: AS-BUILT
NAVFAC DRAWING NO.	ACTIVITY – SATISFACTORY TO DATE DD/MM/YY	REVISION 4
		DATE 4/26/2011
		DRAWN BY RDW
		DESIGNED BY RDW
SCALE NONE	JOB ORDER NO.	CHECKED BY RFISA
DRAWING NO.	CODE IDENT NO. 80091 SIZE ANSI B	SHEET 6 OF 20

SEE DATA COMMUNICATION SYSTEM FOR MATERIALS





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AUTOMATEDLOGIC CORPORATION

NAVFAC

DCP-BRC (ROUTER)

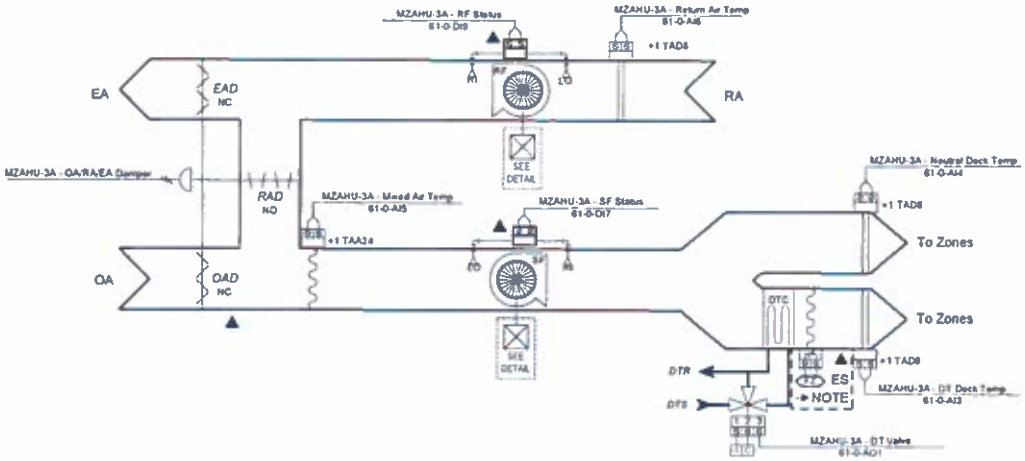
BUILDING 3144

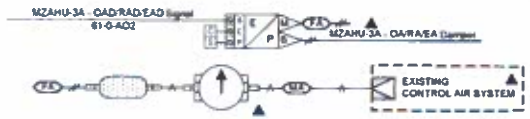
NABLC D0-2 ECM-004A DDC UPGRADES

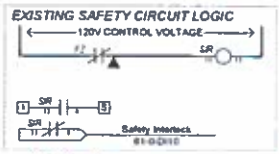
NS 2473-07-F-4082	FOR COMMANDER NAVFAC DATE: DD/MM/YY	JOB NO. 171505-AW
		TYPE: AS-BUILT
DELIVERY ORDER NO. DE-AM36-09-EE-73680 (IDIQ)		REVISION 4
	ACTIVITY - SATISFACTORY ID DATE DD/MM/YY	DATE 4/26/2011
		DRAWN BY RDW
		ENGINEERED BY RDW
SCALE: NONE		CHECKED BY RF/SA
	CODE IDENT NO. 80091 SIZE ANSI B	SHEET 7 OF 20

Bill of Materials

ID	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
SE6104	SE6104 DDC CONTROLLER	AUTOMATED LOGIC	SE6104	1 ea
+1 TAA24	TEMP SENSOR 10K-2 AVERAGING 24FT	ACI	ACP-A-24	1 ea
+1 TAD8	TEMP SENSOR 10K-2 DUCT SIN	ACI	ACP-D-8	3 ea
-1 RH4A	RELAY DPDT UL LED 24VAC	IDEC	RH4B-UL-AC24V	1 ea
-5 RH4T	RELAY BASE RH4B	IDEC	SH4B	1 ea







FZ LOW LIMIT CUTOUT SWITCH ▲
SD SUPPLY AIR SMOKE DETECTOR ▲
SFE SUPPLY FAN ENABLE RELAY
SIR SAFETY INTERLOCK RELAY

NOTE ES - *Actual safety device installation and safety circuit wiring will be determined after field verification of existing system equipment and components. Actual device quantities may vary per unit, but all will be wired in series. Safety circuits are based on rewiring of existing control devices using the following guidelines:*

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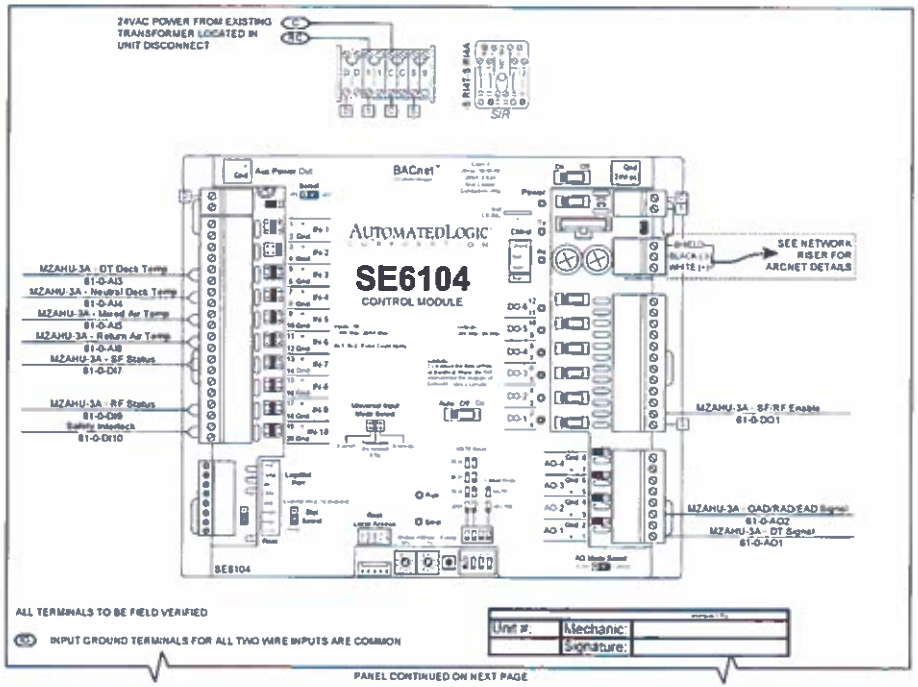
2. *Low Limit Thermostats installed on all units with water coils that are exposed to outside air.*

▲ PROVIDED BY OTHERS OR EXISTING

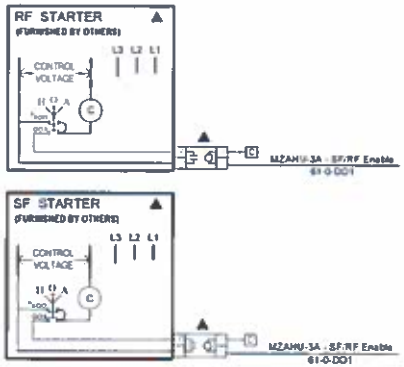


ALL TERMINALS TO BE FIELD VERIFIED

INPUT GROUND TERMINALS FOR ALL TWO WIRE INPUTS ARE COMMON

Unit #:	Mechanic:
	Signature:

PANEL CONTINUED ON NEXT PAGE



DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVY PUBLIC WORKS CENTER

NAB LITTLE CREEK — NORFOLK, VIRGINIA

NORESCO — 8 PROGRESS DRIVE, SHELTON, CT 06484, PHONE (203) 929-0266, FAX (203) 926-1111

THERMO-TROL SYSTEMS — 504 VIKING DRIVE, VIRGINIA BEACH, VA 23452, 757 428 4646 FAX 757 428 4838

AUTOMATED LOGIC CORPORATION

NAVFAC

MZAHU-3A

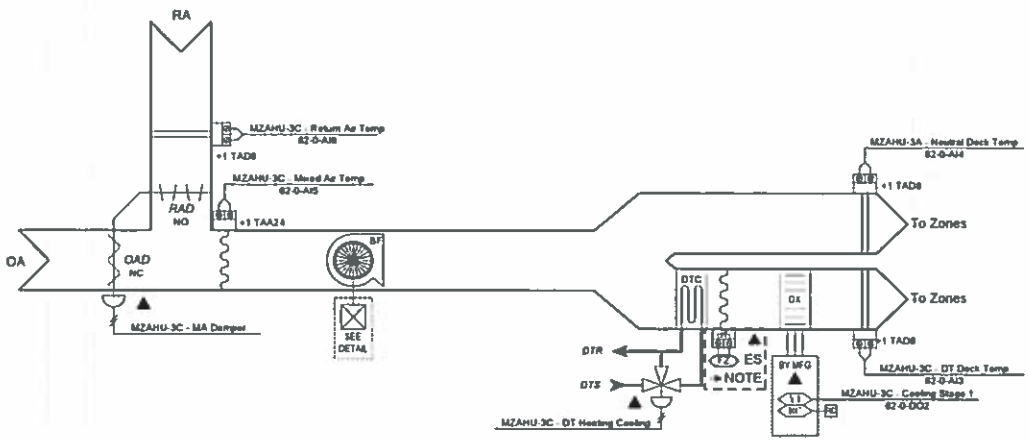
BUILDING 3144

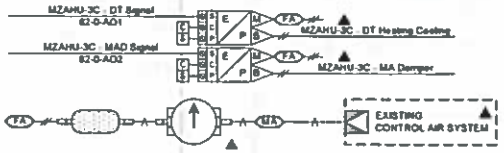
NABLC D0-2 ECM-004A DDC UPGRADES

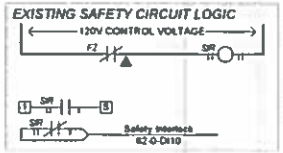
WORK ORDER NO. NB 2473-07-F-4082	APPROVED FOR COMMANDER NAVFAC DATE: DD/MM/YY	JOB NO. 171595-AW	
CONTR. CONTR NO. DE-AM38-99-EE-73680 (IDIQ)	APPROVED ACTIVITY - SATISFACTORY ID DATE: DD/MM/YY	TYPE: AS-BUILT	REVISION: 4
NAVFAC DRAWING NO.		DATE: 4/28/2011	DRAWN BY: RDW
SCALE: NONE	PW ORDER NO.	ENGINEERED BY: RDW	CHECKED BY: RF/SA
DRAWING NO.	TYPE IS NO. 80091 REV. ANSI B	SHEET 8 OF 20	

Bill of Materials

DID	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
SE6104	SE6104 DDC CONTROLLER	AUTOMATED LOGIC	SE6104	1 ea
+1 TAA24	TEMP SENSOR 10K-2 AVERAGING 24FT	ACI	A/CP-A-24	1 ea
+1 TAD8	TEMP SENSOR 10K-2 DUCT SIN	ACI	A/CP-D-8	3 ea
-5 RH4A	RELAY DPDT UL LED 24VAC	IDEC	RH4B-UL-AC24V	1 ea
-5 RH4T	RELAY BASE RH4B	IDEC	SH4B	1 ea





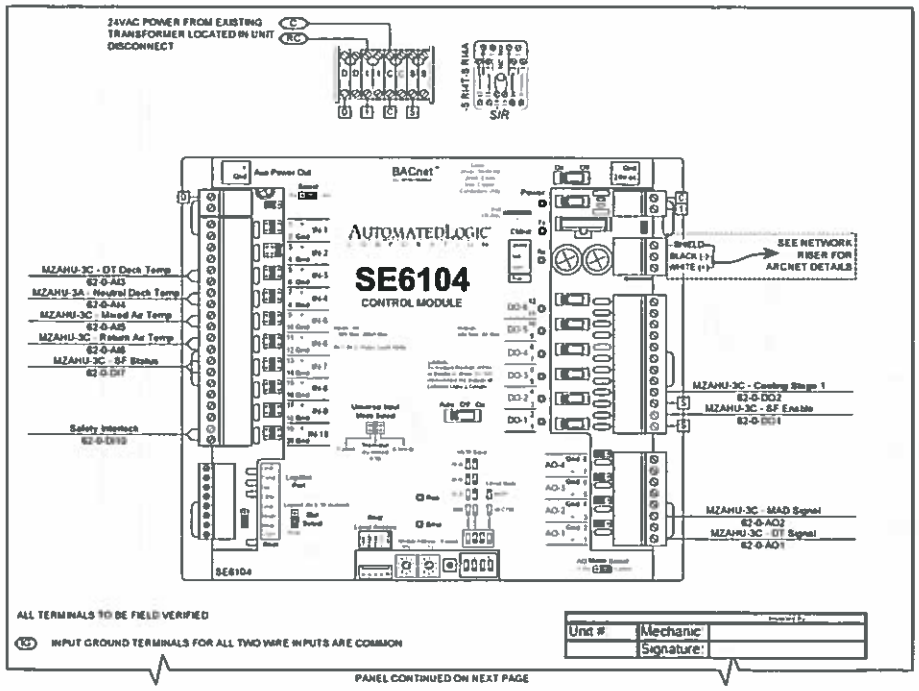


FZ LOW LIMIT CUTOUT SWITCH ▲
SD SUPPLY AIR SMOKE DETECTOR ▲
SFE SUPPLY FAN ENABLE RELAY
SIR SAFETY INTERLOCK RELAY

NOTE ES - *Actual safety device installation and safety circuit wiring will be determined after field verification of existing system equipment and components. Actual device quantities may vary per unit, but all will be wired in series. Safety circuits are based on rewiring of existing control devices using the following guidelines:*

1. Smoke Detectors installed per applicable Codes.
2. Low Limit Thermostats installed on all units with water coils that are exposed to outside air.

▲ PROVIDED BY OTHERS OR EXISTING

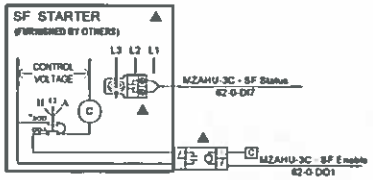


ALL TERMINALS TO BE FIELD VERIFIED

(12) INPUT GROUND TERMINALS FOR ALL TWO WIRE INPUTS ARE COMMON

Unit #	Mechanic Signature:

PANEL CONTINUED ON NEXT PAGE



DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVY PUBLIC WORKS CENTER

NAS LITTLE CREEK — NORFOLK, VIRGINIA

NORESCO — 8 PROGRESS DRIVE, SHELTON, CT 06484, PHONE (203) 929-0266, FAX (203) 929-2311

THERMO-TROL SYSTEMS — 584 VIRGINIA DRIVE, VIRGINIA BEACH, VA 23452, 757 428 4646 FAX 757 428 4638

AUTOMATED LOGIC CORPORATION

NAVFAC

MZAHU-3C

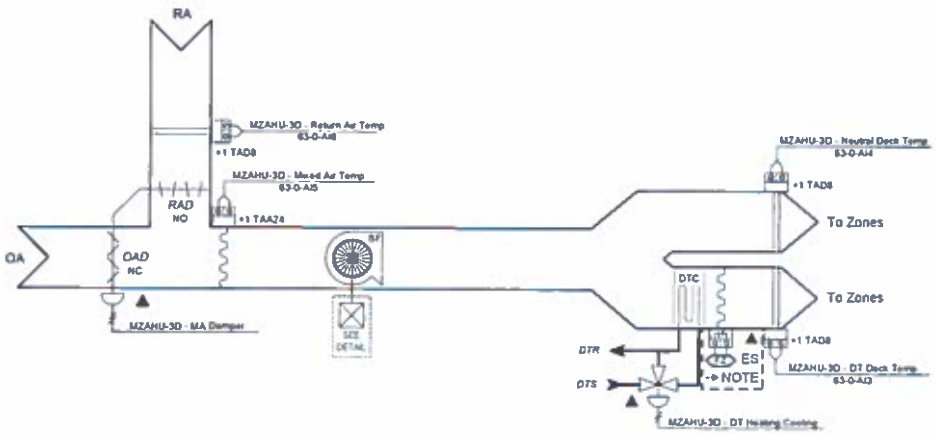
BUILDING 3144

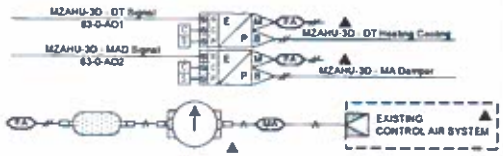
NABLC DD-2 ECM-004A DDC UPGRADES

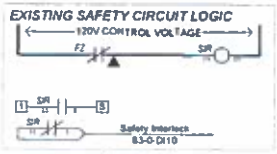
GRAND ORDER NO. NS 2473-07-F-4082	APPROVED FOR COMMANDER NAVFAC DATE: DD/MM/YY	JOB NO 171595-AW
CONTR. CONTR. NO. DE-AM36-99-EE-73680 (IDIQ)	APPROVED ACTIVITY – SATISFACTORY 40 DATE: DD/MM/YY	TYPE AS-BUILT
		REVISION 4
		DATE 4/26/2011
		DRAWN BY RDW
		DESIGNED BY RDW
SCALE NONE		CHECKED BY RF/SA
	CODE IDENT NO. 80091 SIZE ANSI B	SHEET 9 OF 20

Bill of Materials

DID	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
SE6104	SE6104 DDC CONTROLLER	AUTOMATED LOGIC	SE6104	1 ea
+1 TAA24	TEMP SENSOR 10K-2 AVERAGING 24FT	ACI	A/CP-A-24	1 ea
+1 TAD8	TEMP SENSOR 10K-2 DUCT SIN	ACI	A/CP-D-8	3 ea
-5 RHA	RELAY DPDT UL LED 24VAC	IDEC	RH4B-UL-AC24V	1 ea
-5 RHT	RELAY BASE RH4B	IDEC	SH4B	1 ea







FZ LOW LIMIT CUTOUT SWITCH ▲
SD SUPPLY AIR SMOKE DETECTOR ▲
SFE SUPPLY FAN ENABLE RELAY
SIR SAFETY INTERLOCK RELAY

NOTE ES - *Actual safety device installation and safety circuit wiring will be determined after field verification of existing system equipment and components. Actual device quantities may vary per unit, but all will be wired in series. Safety circuits are based on rewiring of existing control devices using the following guidelines:*

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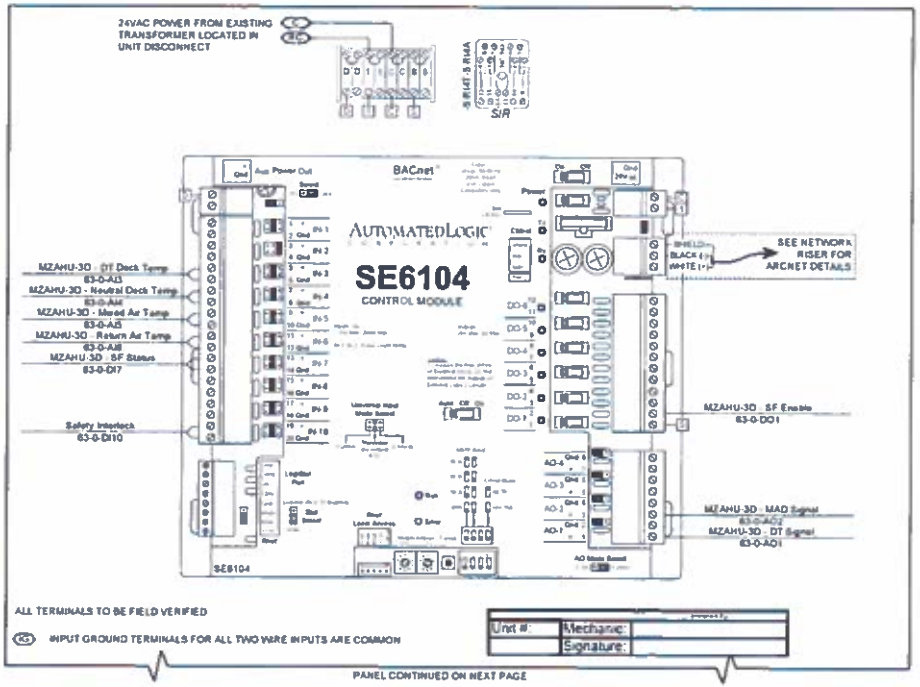
▲ PROVIDED BY OTHERS OR EXISTING

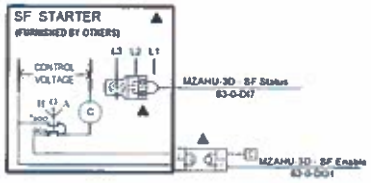


ALL TERMINALS TO BE FIELD VERIFIED

(GS) INPUT GROUND TERMINALS FOR ALL TWO WIRE INPUTS ARE COMMON

Unit #:	Mechanic:
	Signature:

PANEL CONTINUED ON NEXT PAGE



DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVY PUBLIC WORKS CENTER

NAB LITTLE CREEK — NORFOLK, VIRGINIA

NORESCO — 8 PROGRESS DRIVE, SHELTON, CT 06484, PHONE (203) 929-0766, FAX (203) 929-3331

THERMO-TROL SYSTEMS — 504 VIKING DRIVE, VIRGINIA BEACH, VA 23452, 757 428 4646 Fax 757 428 4636

AUTOMATEDLOGIC CORPORATION — WALCTRL — NAVFAC

MZAHU-3D

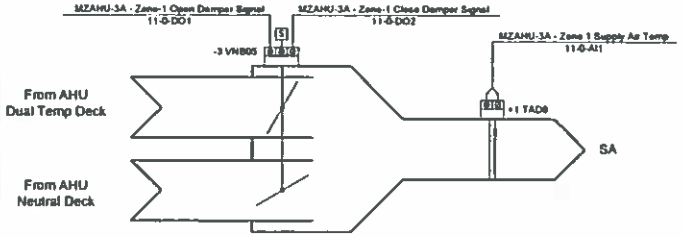
BUILDING 3144

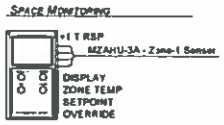
NABLC D0-2 ECM-004A DDC UPGRADES

N6 2473-07-F-4082	FOR COMMANDER NAVFAC DATE DD/MM/YY	JOB NO. 171595-AW
		TYPE: AS-BUILT
		REVISION: 4
DE-AM36-99-EE-73680 (IDIQ)	ACTIVITY - SATISFACTORY TO DATE DD/MM/YY	DATE: 4/26/2011
		DRAWN BY: RDW
		ENGINEERED BY: RDW
NONE		CHECKED BY: RF/SA
	50091 SIZE: ANSI B	SHEET 10 OF 20

Bill of Materials

OID	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
+1 T RSP	ROOM SENSOR, DIGITAL, COMM SETPOINT, OVERRIDE	AUTOMATED LOGIC	RSP	18 ea
+1 TAD8	TEMP SENSOR, 10K-2, DUCT, BIN	ACI	ACP-D-8	18 ea
-3 VNB05	ACTUATOR, NON-SPRING, DIRECT COUPLE, 24V	BELIMO	LM824-3	18 ea
ZN220	ZN220 DDC CONTROLLER	AUTOMATED LOGIC	ZN220	18 ea

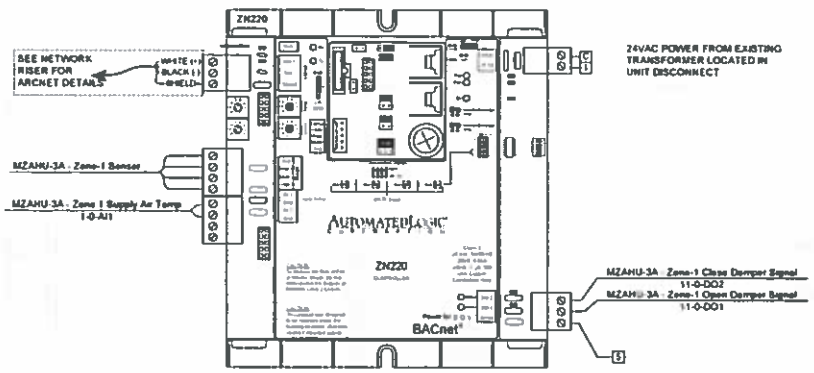




MZAHU Zone Schedule
Building 3144

ZONE	UNIT	Network Address
ZONE-1	MZAHU-3A	1
ZONE-2	MZAHU-3A	2
ZONE-3	MZAHU-3A	3
ZONE-4	MZAHU-3A	4
ZONE-5	MZAHU-3A	5
ZONE-1	MZAHU-3C	11
ZONE-2	MZAHU-3C	12
ZONE-3	MZAHU-3C	13
ZONE-4	MZAHU-3C	14
ZONE-5	MZAHU-3C	15
ZONE-6	MZAHU-3C	16
ZONE-1	MZAHU-3D	21
ZONE-2	MZAHU-3D	22
ZONE-3	MZAHU-3D	23
ZONE-4	MZAHU-3D	24
ZONE-5	MZAHU-3D	25
ZONE-6	MZAHU-3D	26
ZONE-7	MZAHU-3D	27

PANEL CONTINUED FROM PREVIOUS PAGE



ALL TERMINALS TO BE FIELD VERIFIED

(G) INPUT GROUND TERMINALS FOR ALL TWO WIRE INPUTS ARE COMMON

▲ PROVIDED BY OTHERS OR EXISTING

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
NAVY PUBLIC WORKS CENTER
NAB LITTLE CREEK — NORFOLK, VIRGINIA

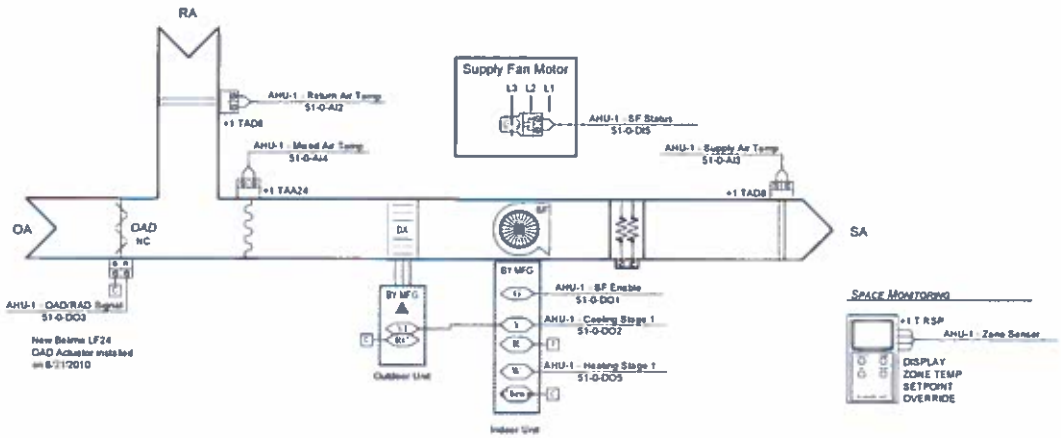
NORESCO — 8 PROGRESS DRIVE, SHELTON, CT 06484, PHONE (203) 929-0266, FAX (203) 929-2311
THERMO-TROL SYSTEMS — 504 VIKING DRIVE, VIRGINIA BEACH, VA 23452, 757 428 4646 FAX 757 428 4036
AUTOMATED LOGIC CORPORATION
NAVFAC

MZAHU-3A (CONT.) ZONE1 (TYPICAL OF 18)

BUILDING 3144
NABLC D0-2 ECM-004A DDC UPGRADES

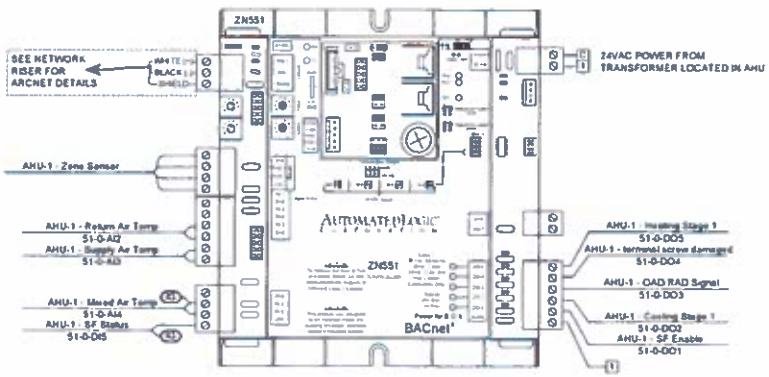
NS 2473-07-F-4082	FOR COMMANDER NAVFAC DATE DD/MM/YY	JOB NO. 171995-AW
DE-AM36-99-EE-73680 (IDIQ)	ACTIVITY - SATISFACTORY IO DATE DD/MM/YY	TYPE: AS-BUILT
		REVISION 4
		DATE 4/26/2011
		DRAWN BY RDW
		DESIGNED BY RDW
SCALE: NONE		CHECKED BY RF/SA
	CODE ID NO. 80091 SIZE: ANSI B	SHEET 11 OF 20

Unit #	Mechanic:
	Signature:



Bill of Materials

ORD	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
ZN551	ZN551 DDC CONTROLLER	AUTOMATED LOGIC	ZN551	1 ea
+1 T RSP	ROOM SENSOR DIGITAL COMM SETPOINT OVERRIDE	AUTOMATED LOGIC	RSP	1 ea
+1 TAA24	TEMP SENSOR 10K-2 AVERAGING 24FT	ACI	A/CP-A-24	1 ea
+1 TAD8	TEMP SENSOR 10K-2 DUCT BIN	ACI	A/CP-D-8	2 ea
-5 RI4A	RELAY DPDT UL LED 24VAC	IDEC	RH4B-UL-AC24V	1 ea
-5 RI4T	RELAY BASE RH4B	IDEC	SH4B	1 ea



ALL TERMINALS TO BE FIELD VERIFIED

(1) INPUT GROUND TERMINALS FOR ALL TWO WIRE INPUTS ARE COMMON

Unit #:	Mechanic:
	Signature:

NOTE #5 - *Actual safety device installation and safety circuit wiring will be determined after field verification of existing system equipment and components. Actual device quantities may vary per unit, but all will be wired in series. Safety circuits are based on rewiring of existing control devices using the following guidelines:*

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2. *Low Limit Thermostats installed on all units with water coils that are exposed to outside air.*

▲ PROVIDED BY OTHERS OR EXISTING

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVY PUBLIC WORKS CENTER

NAB LITTLE CREEK — NORFOLK, VIRGINIA

NORESCO — 6 PROGRESS DRIVE, SHELTON, CT 06484, PHONE (203) 929-0266, FAX (203) 929-1311

THERMO-TROL SYSTEMS — 504 Viking Drive, Virginia Beach, VA 23452, 757 428 4648 Fax 757 428 4636

AUTOMATED LOGIC CORPORATION

NAVFAC

AHU-1

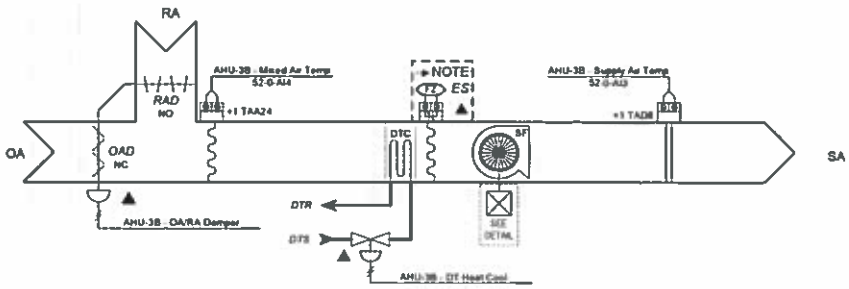
BUILDING 3144

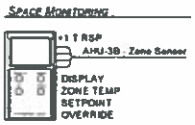
NABLC DD-2 ECM-004A DDC UPGRADES

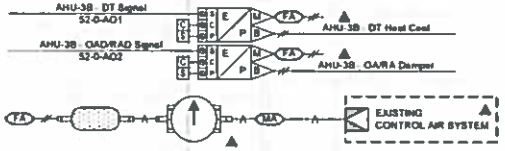
CONTR. ORDER NO. N5 2473-07-F-4082	APPROVED: FOR COMMANDER NAVFAC DATE DD/MM/YY	JOB NO. 171595-AW
CONTR. CONTR. NO. DE-AM36-99-EE-73680 (IDIQ)	APPROVED: ACTIVITY - SATISFACTORY TO DATE DD/MM/YY	TYPE. AS-BUILT
NAVFAC DRAWING NO.		REVISION 4
SCALE: NONE		DATE. 4/26/2011
		DRAWN BY RDW
		DESIGNED BY RDW
		CHECKED BY RF/SA
	CODE IDENT NO. 80091 SIZE. ANSI B	SHEET 12 OF 20

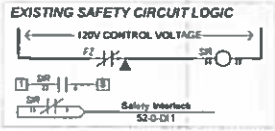
Bill of Materials

DID	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
ZN253	ZN253 DDC CONTROLLER	AUTOMATED LOGIC	ZN253	1 ea
+1 T RSP	ROOM SENSOR DIGITAL, COMM SETPOINT OVERRIDE	AUTOMATED LOGIC	RSP	1 ea
+1 TAA24	TEMP SENSOR 10K-2 AVERAGING 24FT	ACI	A/CP-A-24	1 ea
+1 TAD8	TEMP SENSOR 10K-2 DUCT 8IN	ACI	A/CP-D-8	1 ea
-5 RH4A	RELAY DPDT UL LED 24VAC	IDEC	RH4B-UL-AC24V	1 ea
-5 RH4T	RELAY BASE RH4B	IDEC	SH4B	1 ea







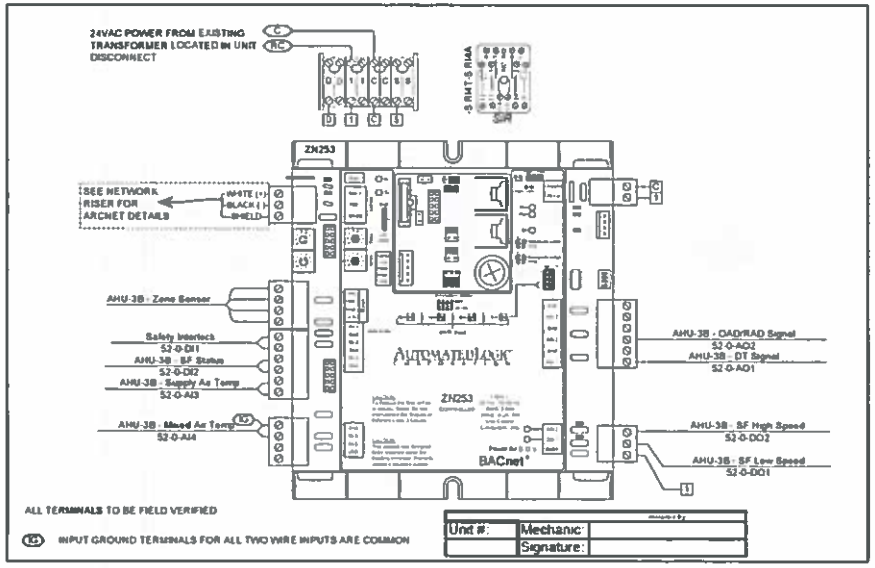


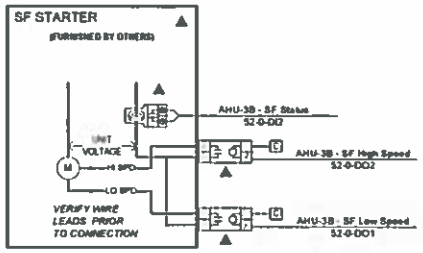
FZ LOW LIMIT CUTOUT SWITCH
SD SUPPLY AIR SMOKE DETECTOR
SFE SUPPLY FAN ENABLE RELAY
SIR SAFETY INTERLOCK RELAY

NOTE ES - *Actual safety device installation and safety circuit wiring will be determined after field verification of existing system equipment and components. Actual device quantities may vary per unit, but all will be wired in series. Safety circuits are based on rewiring of existing control devices using the following guidelines:*

1. *Smoke Detectors installed per applicable Codes*
2. *Low Limit Thermostats installed on all units with water coils that are exposed to outside air*

▲ PROVIDED BY OTHERS OR EXISTING





DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVY PUBLIC WORKS CENTER

NAB LITTLE CREEK — NORFOLK, VIRGINIA

NORESCO — 8 PROGRESS DRIVE, SHELTON, CT 06340, PHONE (203) 929-0244, FAX (203) 929-2331

THERMO-TROL SYSTEMS — 584 VOLVO DRIVE, VIRGINIA BEACH, VA 23452, 757 428 4848 FAX 757 428 4030

AUTOMATED LOGIC CORPORATION — NAVFAC

AHU-3B

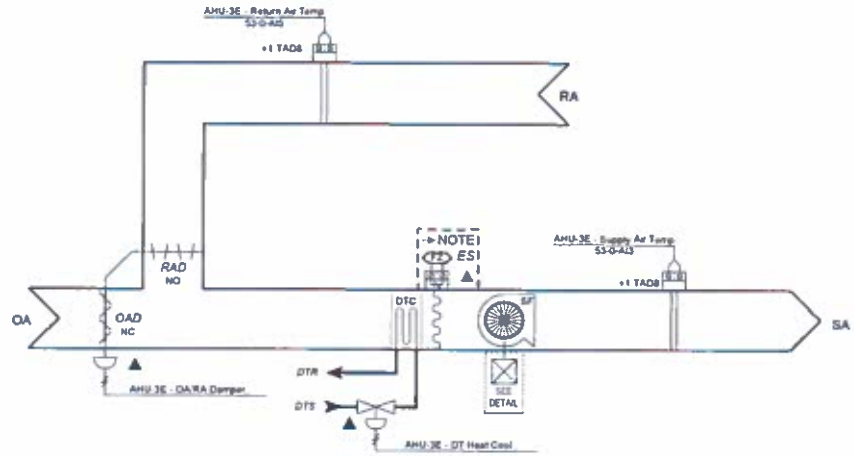
BUILDING 3144

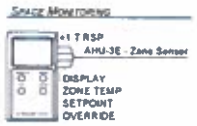
NABLC D0-2 ECM-004A DDC UPGRADES

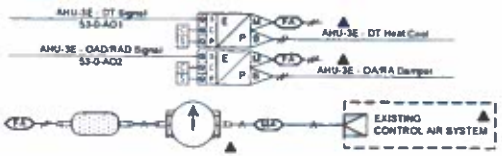
WORK ORDER NO. N6 2473-07-F-4082	APPROVED FOR COMMANDER NAVFAC DATE DD/MM/YY	JOB NO. 171595-AW
		TYPE: AS-BUILT
		REVISION 4
CONTRACT ESTIMATE NO. DE-AM38-09-EE-73680 (IDIQ)	APPROVED ACTIVITY – SATISFACTORY ID DATE DD/MM/YY	DATE: 4/26/2011
		DRAWN BY RDW
		ENGINEERED BY RDW
SCALE: NONE	JOB ORDER NO.	CHECKED BY RF/SA
	CODE ID NO. 80091 SIZE: ANSI B	SHEET 13 OF 20

Bill of Materials

DID	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
ZN253	ZN253 DDC CONTROLLER	AUTOMATED LOGIC	ZN253	1 ea
+1 T RSP	ROOM SENSOR DIGITAL COMM SETPOINT OVERRIDE	AUTOMATED LOGIC	RSP	1 ea
+1 TAA24	TEMP SENSOR 10K-2 AVERAGING 24FT	ACI	A/CP-A-24	1 ea
+1 TAD8	TEMP SENSOR 10K-2 DUCT BIN	ACI	A/CP-D-8	2 ea
-5 RH4A	RELAY DPDT UL LED 24VAC	IDEC	RH4B-UL-AC24V	1 ea
-5 RH4T	RELAY BASE RH4B	IDEC	SH4B	1 ea







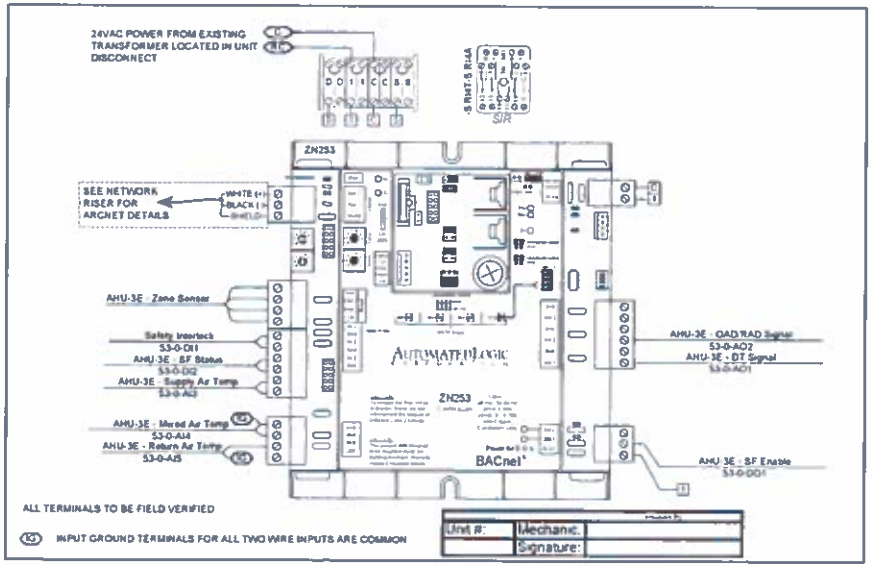
EXISTING SAFETY CIRCUIT LOGIC

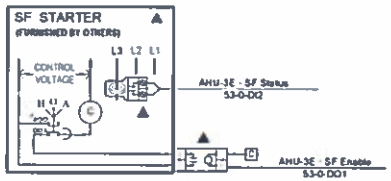
FZ LOW LIMIT CUTOUT SWITCH ▲
SD SUPPLY AIR SMOKE DETECTOR ▲
SFE SUPPLY FAN ENABLE RELAY
SIR SAFETY INTERLOCK RELAY

NOTE ES - *Actual safety device installation and safety circuit wiring will be determined after field verification of existing system equipment and components. Actual device quantities may vary per unit, but all will be wired in series. Safety circuits are based on rewiring of existing control devices using the following guidelines:*

1. *Smoke Detectors installed per applicable Codes.*
2. *Low Limit Thermostats installed on all units with water coils that are exposed to outside air*

▲ PROVIDED BY OTHERS OR EXISTING





DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVY PUBLIC WORKS CENTER

NAB LITTLE CREEK — NORFOLK, VIRGINIA

NORESCO — 8 PROGRESS DRIVE, SHELTON, CT 06484, PHONE (203) 929-0264

THERMO-TROL SYSTEMS — 504 VIKING DRIVE, VIRGINIA BEACH, VA 23452, 757 428 4848 FAX 757 428 4838

AUTOMATEDLOGIC CORPORATION

NAVFAC

AHU-3E

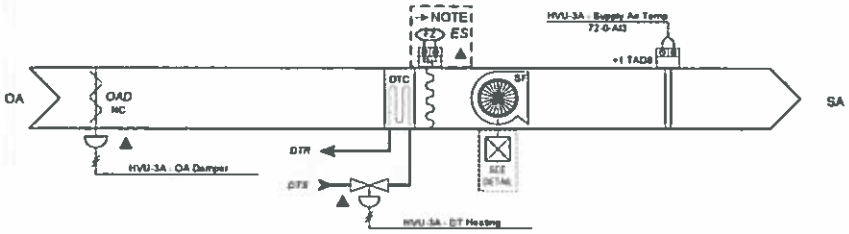
BUILDING 3144

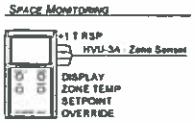
NABLC D0-2 ECM-004A DDC UPGRADES

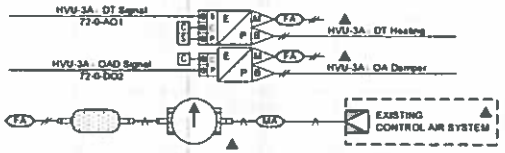
CONTRACT NO. N62473-07-F-4082	APPROVED FOR COMMANDER NAVFAC DATE DD/MM/YY	JOB NO. 171595-AW
CONTR. CONTR. NO. DE-AM35-99-EE-73680 (IDIQ)	APPROVED ACTIVITY – SATISFACTORY ID DATE DD/MM/YY	TYPE: AS-BUILT
		REVISION 4
		DATE 4/26/2011
		DRAWN BY RDW
		ENGINEERED BY RDW
SCALE: NONE		CHECKED BY RF/SA
	CODE IDENT NO. 80091 SIZE ANSI B	SHEET 14 OF 20

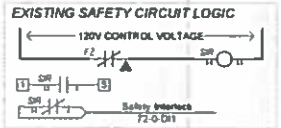
Bill of Materials

DID	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
ZN253	ZN253 DDC CONTROLLER	AUTOMATED LOGIC	ZN253	3 ea
+1 T RSP	ROOM SENSOR DIGITAL COMM SETPOINT OVERRIDE	AUTOMATED LOGIC	RSP	3 ea
+1 TAD8	TEMP SENSOR 10K-2 DUCT 8IN	ACI	ACP-D-8	3 ea
-5 RM4A	RELAY DPDT UL LED 24VAC	IDEC	RH4B-UL-AC24V	3 ea
-5 RM4T	RELAY BASE RH4B	IDEC	SH4B	3 ea









FZ LOW LIMIT CUTOUT SWITCH ▲
SD SUPPLY AIR SMOKE DETECTOR ▲
SFE SUPPLY FAN ENABLE RELAY
SIR SAFETY INTERLOCK RELAY

NOTE ES - *Actual safety device installation and safety circuit wiring will be determined after field verification of existing system equipment and components. Actual device quantities may vary per unit, but all will be wired in series. Safety circuits are based on rewiring of existing control devices using the following guidelines:*

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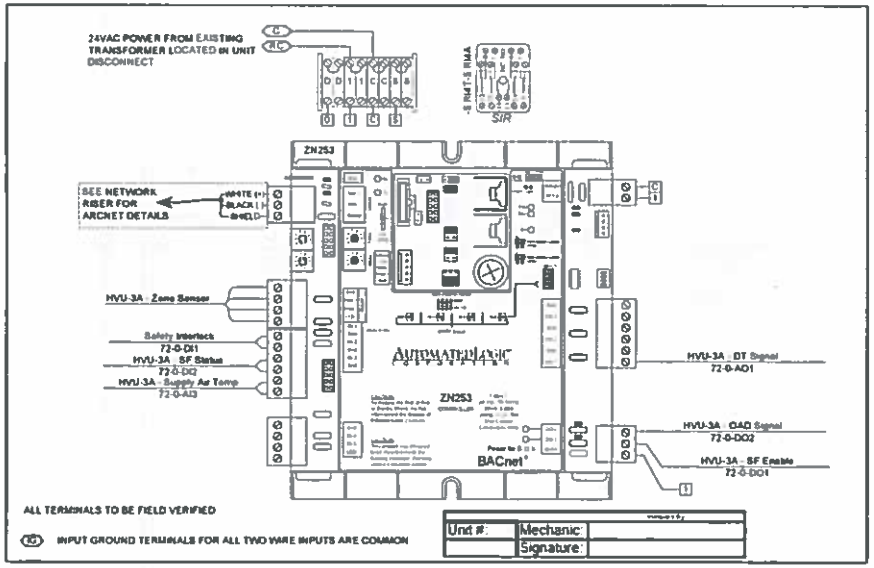
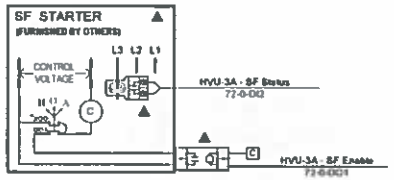
▲ PROVIDED BY OTHERS OR EXISTING





DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVY PUBLIC WORKS CENTER

NAB LITTLE CREEK — NORFOLK, VIRGINIA

NORESCO — 8 PROGRESS DRIVE, SHELTON, CT 06484, PHONE (203) 929-0366, FAX (203) 929-2311

THERMO-TROL SYSTEMS — 504 VIRGINIA DRIVE, VIRGINIA BEACH, VA 23452, 757 428 4648 FAX 757 428 4636

AUTOMATED LOGIC CORPORATION

NAVFAC

HVU-3A (TYPICAL OF HVU-3B & 3D)

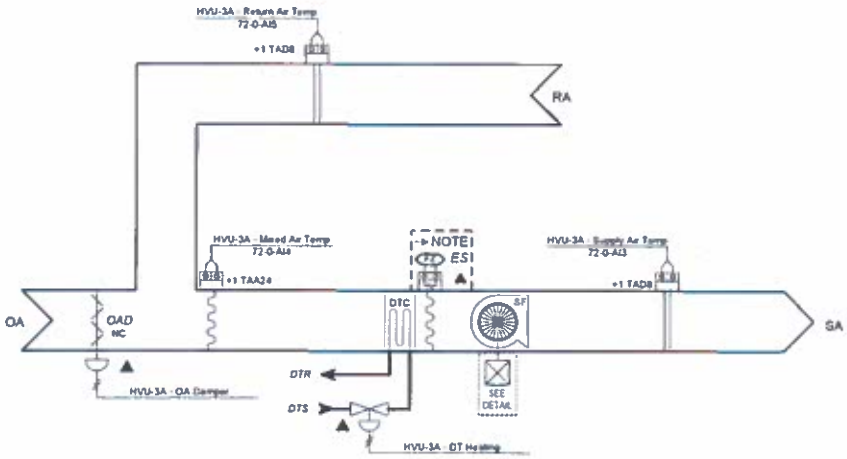
BUILDING 3144

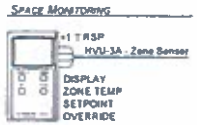
NABLC D0-2 ECM-004A DDC UPGRADES

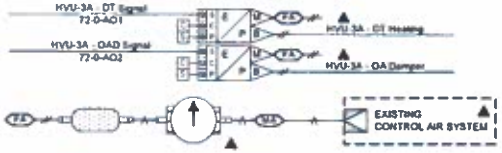
N6 2473-07-F-4082	FOR COMMANDER NAVFAC DATE: DD/MM/YY	JOB NO. 171595-AW
		TYPE: AS-BUILT
DE-AM36-99-EE-73680 (IDIQ)		REVISION: 4
	ACTIVITY - SATISFACTORY ID DATE: DD/MM/YY	DATE: 4/26/2011
		DRAWN BY: RDW
		ENGINEERED BY: RDW
SCALE: NONE		CHECKED BY: RF/SA
	CODE IDENT NO. 80091 SIZE: ANSI B	SHEET 15 OF 20

Bill of Materials

EID	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
ZN253	ZN253 DDC CONTROLLER	AUTOMATED LOGIC	ZN253	2 ea
+1 TRSP	ROOM SENSOR DIGITAL COMM SETPOINT OVERRIDE	AUTOMATED LOGIC	RSP	2 ea
+1 TAA24	TEMP SENSOR 10K-2 AVERAGING 24FT	ACI	ACP-A-24	2 ea
+1 TAD8	TEMP SENSOR 10K-2 DUCT 8IN	ACI	ACP-D-8	4 ea
-S RIMA	RELAY DPDT UL LED 24VAC	IDEC	RH4B-UL-AC24V	2 ea
-S RIMT	RELAY BASE RH4B	IDEC	SH4B	2 ea







FZ LOW LIMIT CUTOUT SWITCH ▲
SD SUPPLY AIR SMOKE DETECTOR ▲
SFE SUPPLY FAN ENABLE RELAY
SIR SAFETY INTERLOCK RELAY

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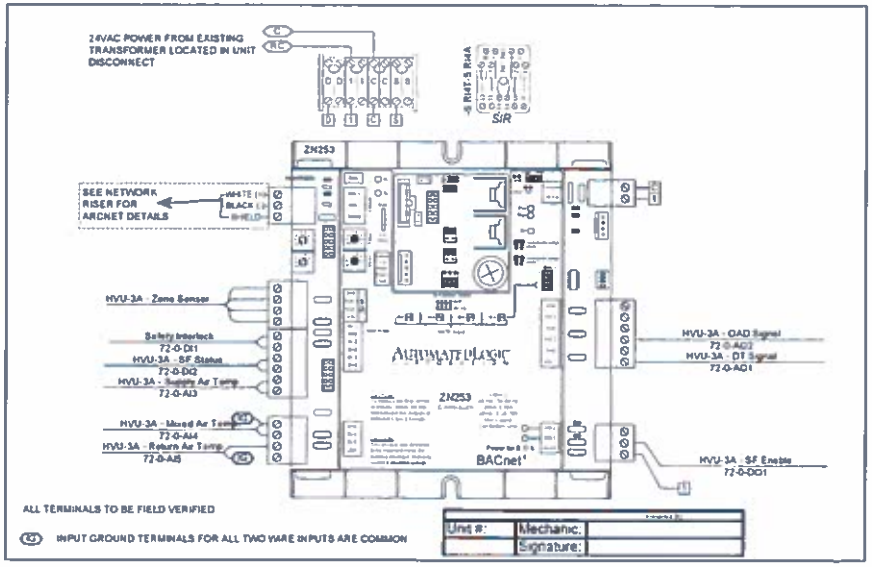
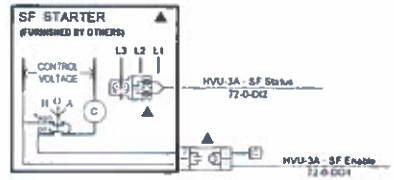




DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVY PUBLIC WORKS CENTER

NAS LITTLE CREEK — NORFOLK, VIRGINIA

NORESCO — 8 PROGRESS DRIVE, SHELTON, CT 06484, PHONE (203) 929-0266, FAX (203) 929-2551

THERMO-TROL SYSTEMS — 504 Viking Drive, Virginia Beach, VA 23452, 757 426 4646 Fax 757 428 4638

AUTOMATED LOGIC CORPORATION

NAVFAC

HVU-3C (TYPICAL OF HVU-3E)

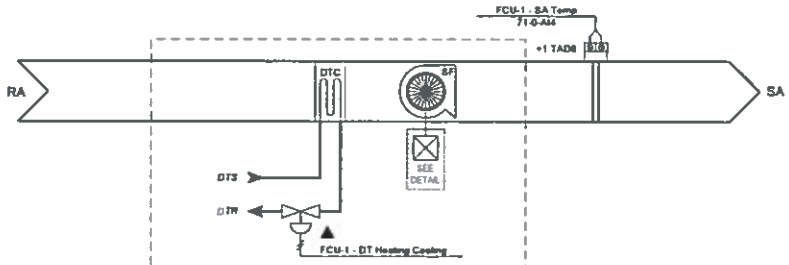
BUILDING 3144

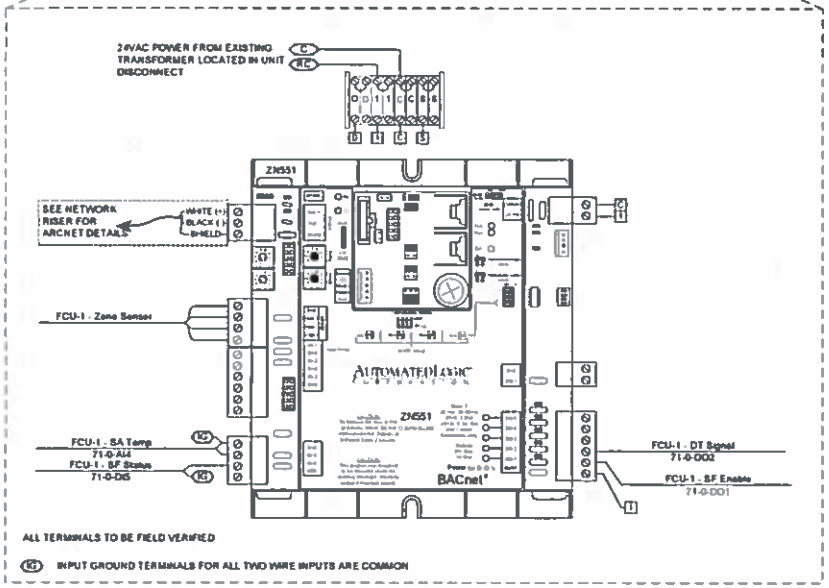
NABLC D0-2 ECM-004A DDC UPGRADES

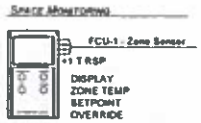
N6 2473-07-F-4082	FOR COMMANDER NAVFAC DATE DD/MM/YY	JOB NO. 171595-AW
		TYPE AS-BUILT
OE-AM36-09-EE-73680 (IDIQ)		REVISION 4
	ACTIVITY - SATISFACTORY ID DATE DD/MM/YY	DATE 4/26/2011
		DRAWN BY RDW
		DESIGNED BY RDW
NONE		CHECKED BY RF/SA
	80091 ANSI B	SHEET 16 OF 20

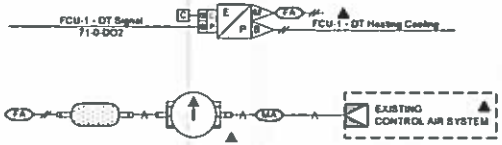
Bill of Materials

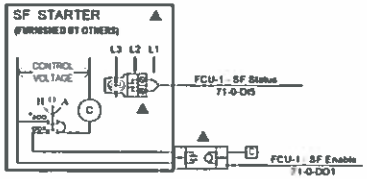
DID	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
ZN551	ZN551 DDC CONTROLLER	AUTOMATED LOGIC	ZN551	1 ea
+1 T RSP	ROOM SENSOR DIGITAL, COMM SETPOINT OVERRIDE	AUTOMATED LOGIC	RSP	1 ea
+1 TAD8	TEMP SENSOR 10K-2 DUCT 8IN	ACI	A/CP-D-8	1 ea











▲ PROVIDED BY OTHERS OR EXISTING

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVY PUBLIC WORKS CENTER

NAB LITTLE CREEK — NORFOLK, VIRGINIA

NORESCO — 8 PROGRESS DRIVE, SHELTON, CT 06484, PHONE (203) 929-0266, FAX (203) 929-2311

THERMO-TROL SYSTEMS — 504 VIKING DRIVE, VIRGINIA BEACH, VA 23452, 757 428 4648 FAX 757 428 4639

AUTOMATED LOGIC CORPORATION

NAVFAC

FCU-1

BUILDING 3144

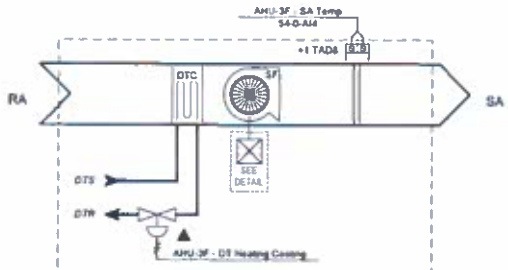
NABLC D0-2 ECM-004A DDC UPGRADES

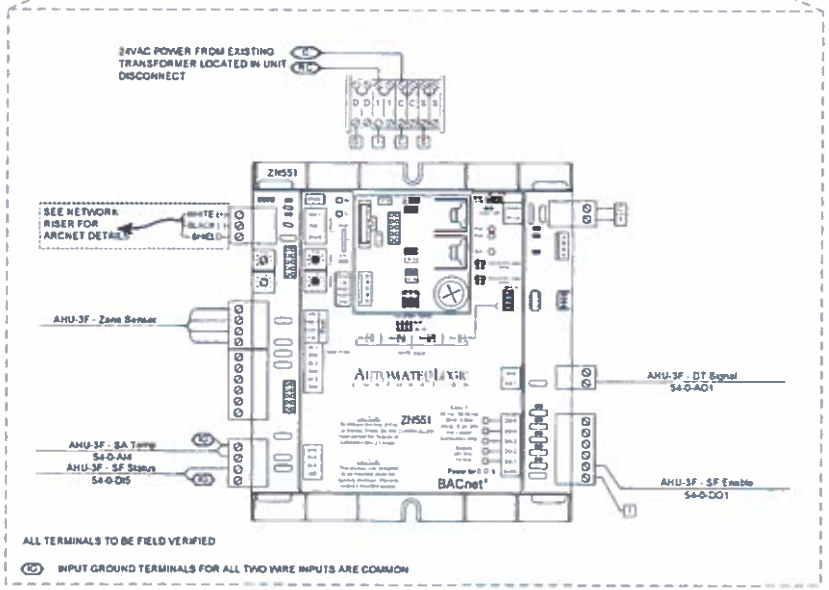
NBS 2473-07-F-4082	APPROVED FOR COMMANDER NAVFAC DATE: DD/MM/YY	JOB NO. 171595-AW
		TYPE: AS-BUILT
DE-AM38-99-EE-73680 (IDIQ)		REVISION 4
	APPROVED ACTIVITY - SATISFACTORY ID DATE: DD/MM/YY	DATE: 4/26/2011
		DRAWN BY RDW
		SUPERVISED BY RDW
SCALE: NONE		CHECKED BY RF/SA
	CODE IDENT NO. 80091 SIZE: ANSI B	SHEET 17 OF 20

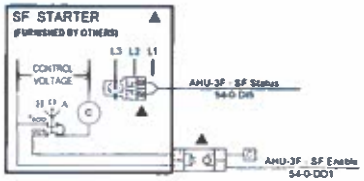
Unit #:	Mechanic:
	Signature:

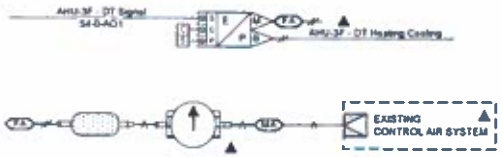
Bill of Materials

CKT	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
ZN551	ZN551 DDC CONTROLLER	AUTOMATED LOGIC	ZN551	1 ea
+1 T RSP	ROOM SENSOR DIGITAL COMM SETPOINT OVERRIDE	AUTOMATED LOGIC	RSP	1 ea
+1 TAD8	TEMP SENSOR 10K-2 DUCT BIN	ACI	ACP-D-8	1 ea









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DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVY PUBLIC WORKS CENTER

NAB LITTLE CREEK — NORFOLK, VIRGINIA

NORESCO — 5 PROGRESS DRIVE, SHELTON, CT 06484, PHONE (203) 929-0266, FAX (203) 929-2551

THERMO-TROL SYSTEMS — 504 VIKING DRIVE, VIRGINIA BEACH, VA 23452, 757 428 4648 FAX 757 428 4636

AUTOMATED LOGIC CORPORATION

NAVFAC

AHU-3F

BUILDING 3144

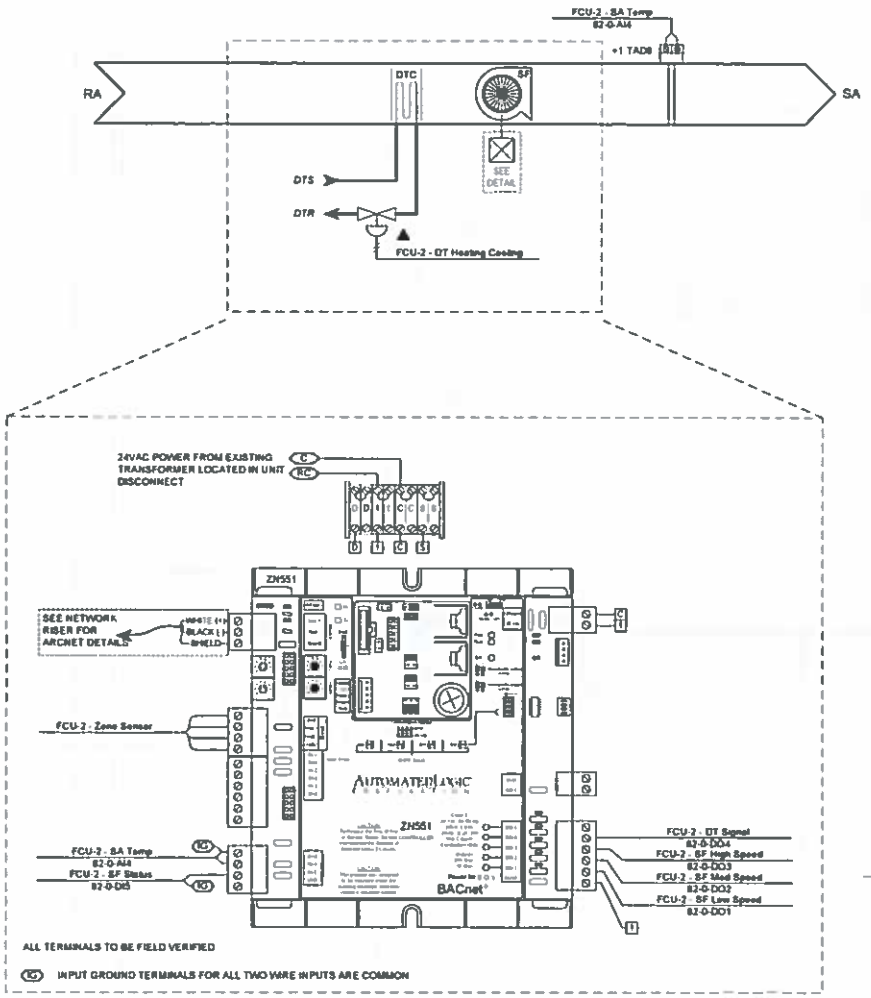
NABLC D0-2 ECM-004A DDC UPGRADES

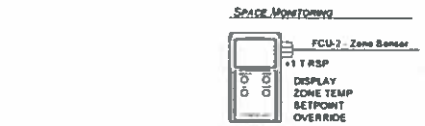
WORK ORDER NO: N8 2473-07-F-4082	APPROVED: FOR COMMANDER NAVFAC DATE: DD/MM/YY	JOB NO: 171595-AW
		TYPE: AS-BUILT
CONTR CONTR NO: DE-AM36-99-EE-73680 (IDIQ)		REVISION: 4
	APPROVED: ACTIVITY - SATISFACTORY TO DATE: DD/MM/YY	DATE: 4/26/2011
		DRAWN BY: RDW
		ENGINEERED BY: RDW
SCALE: NONE	JOB ORDER NO:	CHECKED BY: RF/SA
	CODE ID NO: 80091 SIZE: ANSI B	SHEET: 18 OF 20

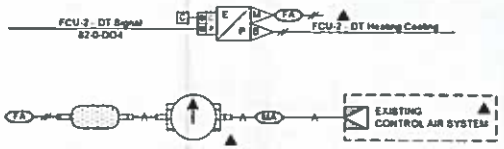
Unit #:	Mechanic:
	Signature:

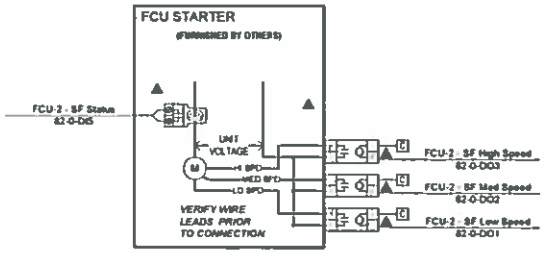
Bill of Materials

DID	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
ZN551	ZN551 DDC CONTROLLER	AUTOMATED LOGIC	ZN551	2 ea
+1 T RSP	ROOM SENSOR DIGITAL COMM SETPOINT OVERRIDE	AUTOMATED LOGIC	RSP	2 ea
+1 TAD8	TEMP SENSOR 10K-2 DUCT 6IN	ACI	ACP-D-8	2 ea









▲ PROVIDED BY OTHERS OR EXISTING

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVY PUBLIC WORKS CENTER

NAB LITTLE CREEK — NORFOLK, VIRGINIA

NORESCO — 8 PROGRESS DRIVE, SHELTON, CT 06484, PHONE (203) 929-0266, FAX (203) 929-2311

THERMO-TROL SYSTEMS — 584 VIKING DRIVE, VIRGINIA BEACH, VA 23452, 757 428 4646 FAX 757 428 4636

AUTOMATED LOGIC CORPORATION — MACTRL

NAVFAC

FCU-2 (TYPICAL OF FCU-3)

BUILDING 3144

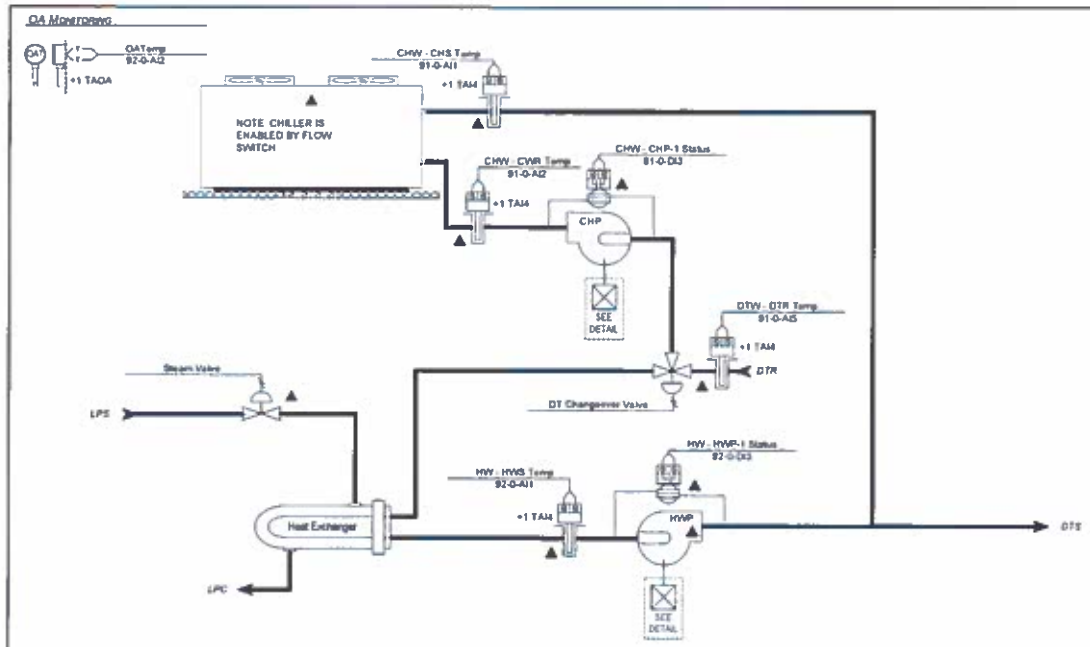
NABLC D0-2 ECM-004A DDC UPGRADES

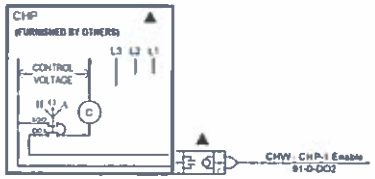
NS 2473-07-F-4082	FOR COMMANDER NAVFAC DATE DD/MM/YY	JOB NO. 171595-AW
DE-AM36-99-EE-73680 (IDIQ)	ACTIVITY - SATISFACTORY ID DATE. DD/MM/YY	TYPE: AS-BUILT
		REVISION 4
		DATE: 4/26/2011
		DRAWN BY RDW
		TECHNICAL REVIEW BY RDW
SCALE: NONE		CHECKED BY RF/SA
	CODE IDENT. 80091 SIZE: ANSI B	SHEET 19 OF 20

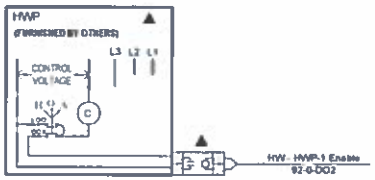
Unit #:	Mechanic:
	Signature:

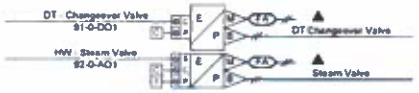
Bill of Materials

DID	DESCRIPTION	MANUFACTURER	PART NUMBER	QTY
ZN551	ZN551 DDC CONTROLLER	AUTOMATED LOGIC	ZN551	2 ea
+1 TAI4	TEMP SENSOR 10K-2 IMMERSION 4IN	ACI	ACP-I-4	4 ea
+1 TAOA	TEMP SENSORS 10K-2 OUTSIDE AIR	ACI	ACP-O	1 ea









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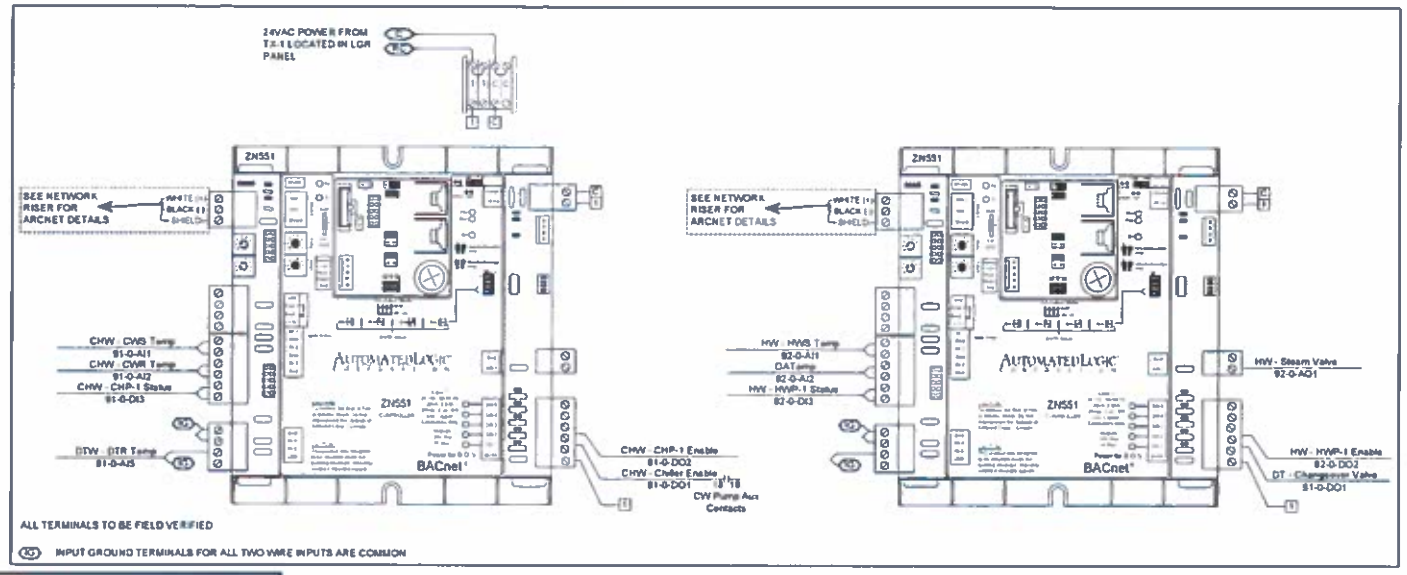

Unit #:	Mechanic:
	Signature:

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

NAVY PUBLIC WORKS CENTER

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AUTOMATED LOGIC CORPORATION

NAVFAC

DTWS (CHILLER & HEX)

BUILDING 3144

NABLC D0-2 ECM-004A DDC UPGRADES

WORK ORDER NO. NB 2473-07-F-4082	APPROVED FOR COMMANDER NAVFAC DATE DD/MM/YY	JOB NO. 171995-AW
CONTR. CONTR NO. DE-AM36-99-EE-73680 (IDIQ)		TYPE AS-BUILT
NAVFAC DRAWING NO.	APPROVED ACTIVITY - SATISFACTORY TO DATE DD/MM/YY	REVISION 4
		DATE 4/28/2011
		DRAWN BY RDW
		DESIGNED BY RDW
SCALE NONE	JOB CODE NO.	CHECKED BY RF/SA
DRAWING NO.	CODE IDENT NO. 80091 SIZE ANSI B	SHEET 20 OF 20

COOLING PLANT

Building Name: 3144

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___ No___
Falls / Trips / Overhead	Yes___ No___
Extreme Room Temp	Yes___ No___
Hazardous Materials	Yes___ No___

Asbestos _____ Mold _____ Lead _____ Other _____

Chillers

Tag					
Type	W (A) HR	W A HR	W A HR	W A HR	W A HR
Compressor	A C R (S)	A C R S	A C R S	A C R S	A C R S
Manufacturer	Trane				
Model Number	CGAF254R				
Tons	25				
Age	2005				
Temp / Pressure gauges	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___
CHW Temp	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___
CHW Reset	OA L T	OA L T	OA L T	OA L T	OA L T
Equipment Condition	1 2 3 (4) 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Chiller Types
W - Water Cooled
A - Air Cooled
HR - Heat Recovery

Compressor Types
A - Absorption
C - Centrifugal
R - Reciprocating
S - Screw

CHW Reset
OA - Outside Air
L - Load
T - CHWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New
3 + 4. Repair / RetroCx

Heat Rejection

Cooling Towers

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5

Condensing Units

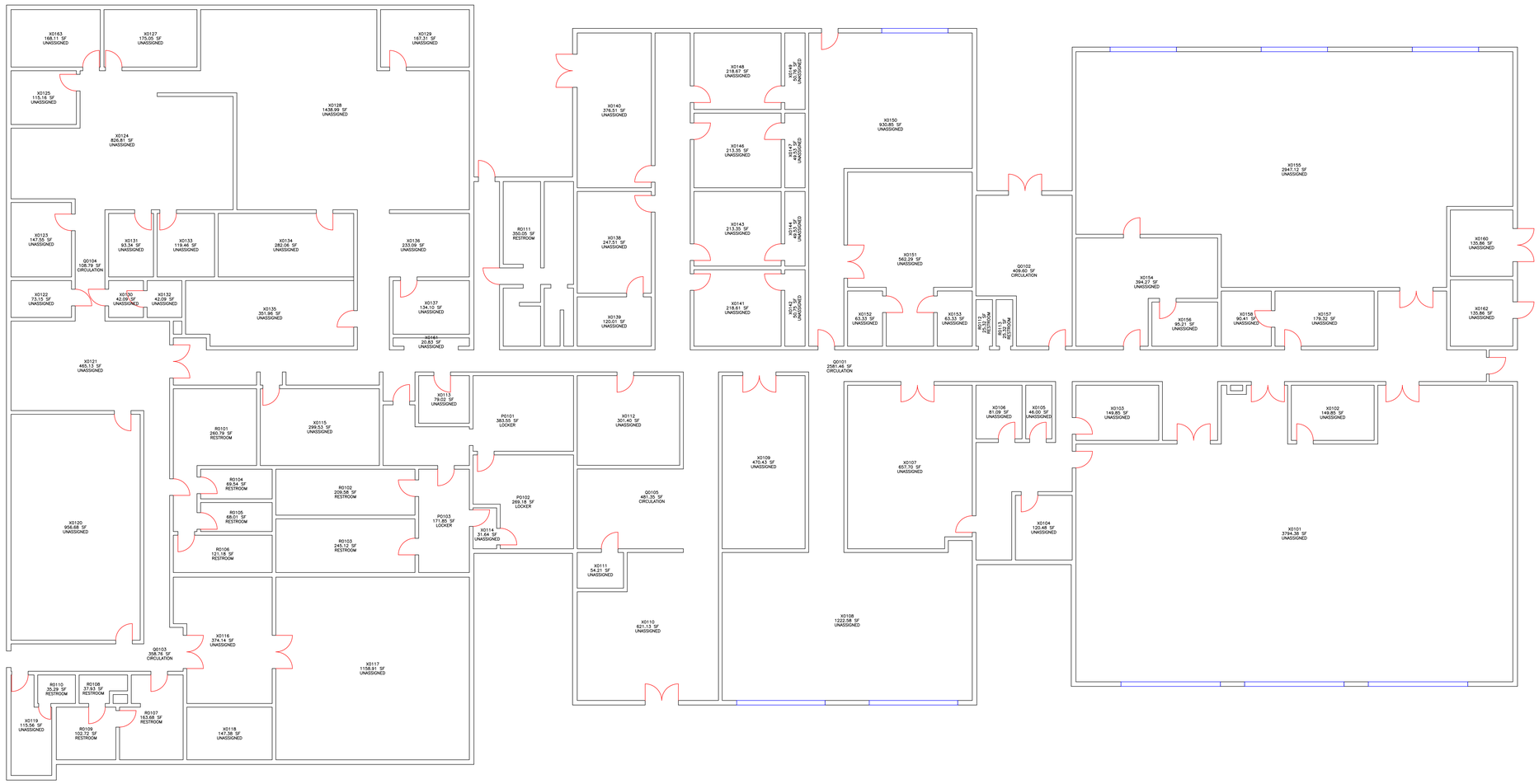
Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
DR- Dry Cooler
C - Condensing Unit
EC - Evaporative Cooling
HP - Air to Air HP
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC

Notes / Potential ECM's: _____



1 BUILDING 3144 - FIRST FLOOR PLAN

0 10' 20'
Scale: GRAPHIC

NORTH

VERIFIED FLOOR PLAN 2006 - Contractor Collected
Note: UOM is INCH for Adobe measuring tool

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NAVFAC MIDLANT GeoReadiness Center

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Building 3144
First Floor

BD-GIS Mid-Atlantic
Norfolk, VA 23511
(757) 444-4716
PWCNORVA_GIS_WEB@nmci-isf.com

Part 6 - Attachments
Base Bid - Building 3147

1. Initial Building Survey Data
2. Building Plan

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/10/2015	**Building No.**	3147
Building Name:	Gym Special Services	**Facility Type:**	Gym / Training
Facility Manager:	Robert Jackson	**Jacobs CX Lead:**	Ross Watson
Building Monitor:	Mike Hillian	**Jacobs CX Junior:**	Andy Huynh
		Jacobs Mech Engineer:	Trevor Behar
		Jacobs Elec Engineer:	David Williams

1. Facility Investigation Narrative:	
Description:	The building is located in the center of the base. The two story facility is used as a gymnasium and fitness center. The facility is about 71,000 square feet.
Facility Usage History:	The building was constructed in the 1940s and has primarily functioned as a recreation and training gym for the base.
Renovation History:	The building features several major additions and renovations over the years.
As-Built Documents:	Control Drawings, Floor Plans & TAB documents were downloaded from the BAS when available. Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	The BM was knowledgeable of the facility. The building has high humidity issues with minimal cooling in the first floor. The facility purchased multiple portable AC units to maintain the temperature and humidity.
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	The facility uses DX condensing units for cooling with multiple air handling units. There are two large heating ventilation units for the main floor of the gym. The facility uses three boilers with one pump to circulate heating hot water.
DDC Description:	The AHU's, HVU's, and EF's are on the DDC using electronic controls.
Lighting Description:	Lighting consists of 2x4, and 2x2 diffuser, T8 flourescent fixtures. High bay 2x4, 4 and 6 lamp, T5 flourescent fixtures are used in jym areas. Other areas also use an assortment of 1x4 and 1x2 flourescent, recessed CFL and recessed incandescent fixtures. Excersise areas on the first floor were somewhat over lit. Exit and emergency lighting is well placed but many batteries did not function during testing.
Equipment Deficiencies:	Majority of the AHU's have dirty filters and difficulty in accessing coils for cleaning. Actuators for the air handling units seem to not function. AHU-2 had bad bearings for supply fan. The space humidity is excessive and the current HVAC systems are not capable of removing the moisture.
Other Information:	

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/10/2015	**Building No.**	3147
Building Name:	Gym Special Services	**Facility Type:**	Gym / Training
Facility Manager:	Robert Jackson	**Jacobs CX Lead:**	Ross Watson
Building Monitor:	Mike Hillian	**Jacobs CX Junior:**	Andy Huynh
		Jacobs Mech Engineer:	Trevor Behar
		Jacobs Elec Engineer:	David Williams

2. ECM Study Recommendations:	Priority
a. Remove 3-4 Portable A/C Units from spaces	H
b. Fix H&V unit 90 degree supply elbow	L
c. Insulate and vapor barrier the ceiling	M
d. Add motion sensors to control lighting where not now done.	M
e. Repace all lighting with LED equivalent fixtures. Use existing circuits and switching.	M
f.	

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning
a. All AHU
b.
c.
d.
e.
f.

4. Corrective Actions	Action Code
a. Calibration of CO_2 sensors	1
b. Remove lamps or fixtures in over lit exersise rooms.	2
c. Replace failed exit and emergency light batteries.	2
d. Repair dampers and control on HVU-1 & 2.	2
e. Clean and sanitize all AHU coils, condensate pans and traps.	2
f. Replace air filters on more regular schedule due to high occupant density.	2

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a. Lighting monitoring at the switch level would require approximately 90 points.
b. Lighting monitoring at the circuit level would require approximately 45 points. This would avoid recircuiting non-lighting circuits from Lighting panels
c. Lighting monitoring at the panel level would require approximately 4 points. This may require recircuiting non-lighting circuits away from lighting panels.
d.
e.
f.

6. Recommended Mechanical Control Points:
a. Humidity sensing points in the AHU return and supply air duct from spaces with new humidity control sequences of operation.
b.
c.
d.
e.
f.

8147

- Main Court is based on OA
  - ↳ Floor is slippery during summer
  - ↳ Open louvers to the court
  - ↳ HVU's serve the Court only w/ return & OA
- ~~Peak~~ hours has an intense amount of occupants
- 4 portable A/C units bought personally
- Doors are left open
- LED lighting is used for heat gain reduction
- AHU 8 reading 74/occupied } ~~Side by side thermostats~~
- AHU 5 ~~no display~~ 73/occup }
- AHU 2 has clogging & draining issues
  - ↳ Bad bearings
  - ↳ OA duct is damaged
  - ↳ Dirty Coils
  - ↳ Appears to have low CFM

- AHU 5 (No damper actuation from "Auto" to "Off")
- AHU 8
- No insulation above ~~testing~~ ceiling
- AHU 9 reading 74.5 (occupied)
- Bad / Inefficient EF in Shaw
- AHU 1
  - ↳ OA not working
  - ↳ No filter dryer
  - ↳ Leaking insulation for DX
- AHU 3 - filter is not big enough and air is bypassing
- AHU 4
- AHU 3 reading 74 (occupied) AHU 12 73/OCC

2015-2016

- AHU ll 74 / occupied
- ET (6 of them) are OFF on discomfort and 3 are called for on BAS

- AO Smith / Burkay x 3 w/ 3/4 HP pumps
  ↳ Al fume
  ↳ NG

- HWR Pump (5 HP) 87.5 % EF

1 BUILDING 3147 - FIRST FLOOR PLAN

0 20' 40'
Scale: GRAPHIC

UNVERIFIED FLOOR PLAN Year Unknown - Source Unknown
Note: UOM is INCH for Adobe measuring tool

NFA100001073296_3147_01_fp.dwg 06 SEP 2012

NAVFAC MIDLANT GeoReadiness Center

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Building 3147
First Floor

BD-GIS Mid-Atlantic
Norfolk, VA 23511
(757) 444-4716
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Part 6 - Attachments
Base Bid - Building 3607

1. Initial Building Survey Data
2. Building Plan

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/3/2015	**Building No.**	3607
Building Name:	TORGOSEN HALL - GALLEY	**Facility Type:**	Kitchen/Dining
Facility Manager:		**Jacobs CX Lead:**	Paul Nelson
Building Monitor:		**Jacobs CX Junior:**	Artheley "Lee" Weeks
		Jacobs Mech Engineer:	Carlos Teran
		Jacobs Elec Engineer:	David Williams

FACILITY PHOTO

1. Facility Investigation Narrative:	
Description:	The building is approximately 28,480 SQFT. It was built in 1973. The building consists of primarly dining and kitchen areas with walk in coolers/freezers, storage, locker rooms, toilet rooms, and support office spaces.
Facility Usage History:	Appears to be the same as when constructed.
Renovation History:	Unknown
As-Built Documents:	Control Drawings, TAB, and Sequence of Operation documents where downloaded from the BAS . Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	The mechanical cooling for the facility is handled by air cooled chillers. Heating is provided by direct steam from the central plant. AHUs and Heating and Ventilating units distribute air through out the building to maintain comfort level and provide make up air for the kitchen hoods. Chilled water pumps circulate cooled water required by the AHUs and the H&V units.
DDC Description:	The facility HVAC is controlled by an Automated Logic DDC. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Lighting Description:	Lighting consists of an assortmant of 2x2, 2x4, 1x6 and CFL flourescent fixtures throughout the building. Incandesecent ceiling mounted fixtures with fans were used in the serving areas. Motion sensor controls are not used . Exit and emergency lighting were well placed but some did not work during test condition.
Equipment Deficiencies:	Many of the Heating and Ventilating units were in very poor condition. One was locked out and inoperable. One of the unit appeared to have a broken chilled water control valve stuck in the closed position.
Other Information:	

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/3/2015	**Building No.**	3607
Building Name:	TORGOSEN HALL - GALLEY	**Facility Type:**	Kitchen/Dining
Facility Manager:		**Jacobs CX Lead:**	Paul Nelson
Building Monitor:		**Jacobs CX Junior:**	Artheley "Lee" Weeks
		Jacobs Mech Engineer:	Carlos Teran
		Jacobs Elec Engineer:	David Williams

FACILITY PHOTO

2. ECM Study Recommendations:	Priority
a. Install VFD on supply fan (>=5 HP) of VAV AHUs	H
b. Change all fixtures to LED equivilent using exiting circuits and switching.	M
c. Install ceiling mounted motion sensor control for rooms where appropriate.	M
d. Install LED exit and emergency lighting with wireless monitoring and testing to replace aging units. Use exising circuits.	M
e.	
f.	

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning
a. HVAC Retro-commissioning and TAB
b. Full DDC Retro-commissioning
c.
d.
e.
f.

4. Corrective Actions	Action Code
a. Repair chilled water pipe condensation leaks above building drop ceiling.	2
b. Install missing temperature and pressure gauges of AHUs and chiller.	2
c. Repair condensate return system.	2
d. Repair chilled water control valve serving HV unit.	1
e. Replace batteries in emergency and exit lights that do not operate.	1
f.	

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a. Lighting monitoring at the switch level would require approximately 50 points.
b. Lighting monitoring at the circuit level would require approximately 30 points. This would avoid recircuiting non-lighting circuits from Lighting panels
c. Lighting monitoring at the panel level would require approximately 2 points. This may require recircuiting non-lighting circuits away from lighting panels.
d.
e.
f.

6. Recommended Mechanical Control Points:
a. Add necessary control points to provide VFD on supply fan of VAV AHUs. See ECM (a).
b.
c.
d.
e.
f.

AIRSIDE INFORMATION

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Mech Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
HV-5	York		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	CP455C7		CFM			~~Cooling~~	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: OA/RA MIX. OAD 100% CLOSED. HAS TWO STM COILS. VERY DIRTY INSIDE UNIT WAS OFF. COIL NOT ACTIVE. *

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
HV-6	York		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	YCP43MP "B" Series.		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air	100% OA.		Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: FC FAN IN BAD SHAPE, COIL DIRTY, OA DAMPER ACT. LINKAGE DISCONNECTED. FAN FLEX. CONNECT BAD. UNIT OFF, COIL ~~ACTIV~~ NOT ACTIVE.

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
HV-3	York		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	YCP43MP "B" Series		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air	100%		Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: COIL DIRTY, STM LEAK @ COIL CONNECTION, FAN FLEX CONNECT 1994 BAD. UNIT OFF COIL ACTIVE.

Central AHU Type
- CAV - Constant Volume
- DD - Dual Duct
- HV - Heating and Vent Unit
- MZ - Multizone
- SZ - Single Zone
- VRH - Var. Vol. w/Reheat
- VPFP - Var. Vol. w/Parallel FP Boxes
- VSFP - Var. Vol. w/Series FP Boxes
- VVVT - Var. Vol. Var. Temp.

Local AHU Type
- 2P FCU - 2 pipe FCU
- 4P FCU - 4 pipe FCU
- ACB - Active Chilled Beam
- CRAC - Computer Room AC
- GSHP - Ground Source HP
- HP - Air to Air HP
- PCB - Passive Chilled Beam
- PTAC - Packaged Terminal AC
- SS - Mini Split System
- VRF - Variable Refrig. Flow
- WU - Window AC
- WSHP - Water Source HP

Source
- E - Electric
- HW - Hot Water
- NG - Natural Gas
- ST - Steam
- CHW - Chilled Water
- DX - Direct Expansion

Controls
- DDC - Direct Digital Controls
- E - Electric/Local
- H - DDC/Pneumatic
- P - Pneumatic

Setbacks
- P - Static Pressure Reset
- SA - Supply Air Reset
- T - Unoccupied Space Temp

Energy Recovery
- RA - Runaround Loop
- WA - Wraparound Loop
- EW - Enthalpy Wheel
- PL - Plate Heat Exchanger

Flow Control
- CV - Constant Volume
- Int - Interminent
- 3SPD - 3 Speed Control
- VFD - Variable Frequency Drive

* LOOKS LIKE SOME UNITS HAVE STM HEAT + WATER COIL. SOME NOT SOME COLD MAYBE 2-PIPE SYST.

EXHAUST FANS.

1.	GREENNECK	GB-140	Running okay.	3
2.	GreenNeck	GB-180	OFF	3
3.	"	G-060	Running	4

COOLING PLANT

Building Name: 560 1

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No ✓
Falls / Trips / Overhead	Yes___	No ✓
Extreme Room Temp	Yes___	No ✓
Hazardous Materials	Yes___	No ✓

Asbestos _____ Mold _____ Lead _____ Other _____

Chillers

Tag					
Type	W A HR	W A HR	W A HR	W A HR	W A HR
Compressor	A C R S	A C R S	A C R S	A C R S	A C R S
Manufacturer					
Model Number					
Tons					
Age					
Temp / Pressure gauges	Yes___ No ✓	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___
CHW Temp	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___
CHW Reset	OA L T	OA L T	OA L T	OA L T	OA L T
Equipment Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Chiller Types
W - Water Cooled
A - Air Cooled
HR - Heat Recovery

Compressor Types
A - Absorption
C - Centrifugal
R - Reciprocating
S - Screw

CHW Reset
OA - Outside Air
L - Load
T - CHWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New
3.+ 4. Repair / RetroCx

Heat Rejection

Cooling Towers

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5

Condensing Units

Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
DR- Dry Cooler
C - Condensing Unit
EC - Evaporative Cooling
HP - Air to Air HP
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC

Notes / Potential ECM's: _____

CHW PUMP
M# AD80
HP 10
NOM EFF 89.5%
GUARATEED EF. 87.5%

*

STEAM
SINGLE STAGE PRV
- LEAKING ISOLATION VALVE.
- NO STEAM METER
- NO CONDENSATE PUMP.

AHU-5 IN THE CIELING STORAGE ROOM. [CHECK TOMORROW]

Building Name: 360' 1

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No X
Falls / Trips / Overhead	Yes___	No X
Extreme Mech Room Temp	Yes___	No X
Hazardous Materials	Yes___	No X

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
4	York	CAV	Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	CP44FC5046D		CFM			Cooling	DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:
- OA DAMPERS RUSTED
- OA DAMPER ACTUATOR RUSTED.

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
2	York	CAV	Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	CP45FC7504GD		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:
- OA DAMPER RUSTED
- OA DAMPER ACTUATOR RUSTED.

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
1	York	CAV	Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	CP45FC7504GD		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:
- OA DAMPERS RUSTED - OA DAMPER ACTUATOR RUSTED.

Central AHU Type
CAV - Constant Volume
DD - Dual Duct
HV - Heating and Vent Unit
MZ - Multizone
SZ - Single Zone
VRH - Var. Vol. w Reheat
VPFP - Var. Vol. w Parallel FP Boxes
VSFP - Var. Vol. w Series FP Boxes
VVVT - Var. Vol. Var. Temp

Local AHU Type
2P FCU - 2 pipe FCU
4P FCU - 4 pipe FCU
ACB - Active Chilled Beam
CRAC - Computer Room AC
GSHP - Ground Source HP
HP - Air to Air HP
PCB - Passive Chilled Beam
PTAC - Packaged Terminal AC
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC
WSHP - Water Source HP

Source
E - Electric
HW - Hot Water
NG - Natural Gas
ST - Steam
CHW - Chilled Water
DX - Direct Expansion

Controls
DDC - Direct Digital Controls
E - Electric Local
H - DDC/Pneumatic
P - Pneumatic

Setbacks
P - Static Pressure Reset
SA - Supply Air Reset
T - Unoccupied Space Temp

Energy Recovery
RA - Runaround Loop
WA - Wraparound Loop
EW - Enthalpy Wheel
PL - Plate Heat Exchanger

Flow Control
CV - Constant Volume
Int - Intermittent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive

EXHAUST FANS.

MANUFACT.	CONDITION	M#
DAYTON	3	4YC49G
DAYTON	3	4YC86G
DAYTON	3	4YC86G

COMPRESSOR ROOM

GREENHECK	3	CBE-48-20
PENN	3	DX11B
GREENHECK	3	G-163-BX-QD
PENNBARRY	3	DX1602
GREENHECK	3	G-101-AX-QD
GREENHECK	1	4YC89 ← MOTOR SIEZED.
GREENHECK	1	CBE-18-4
GREENHECK	3	G-101-AX-QD

COOLING PLANT

Tangerson Galley.

Building Name: 5607

Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Chillers

Tag	Chiller				
Type	W (A) HR	W A HR	W A HR	W A HR	W A HR
Compressor	A C R (S)	A C R S	A C R S	A C R S	A C R S
Manufacturer	Trane				
Model Number	RTAC 1704 UQ0N				
Tons	170				
Age					
Temp / Pressure gauges	Yes Trigger No___	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___
CHW Temp	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___
CHW Reset	OA L T	OA L T	OA L T	OA L T	OA L T
Equipment Condition	1 2 (3) 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Chiller Types
W - Water Cooled
A - Air Cooled
HR - Heat Recovery

Compressor Types
A - Absorption
C - Centrifugal
R - Reciprocating
S - Screw

S/N 1107B02262

CHW Reset
OA - Outside Air
L - Load
T - CHWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New
3.+ 4. Repair / RetroCx

Heat Rejection

Cooling Towers

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5

Condensing Units

Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5

~~3384~~

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
DR- Dry Cooler
C - Condensing Unit
EC - Evaporative Cooling
HP - Air to Air HP
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC

Notes / Potential ECM's: _____

2 CHW Pumps M# AD80 Condition (3)
10 Hp — (3) One pump running w/o guard.
Nom Eff: 89.5% Guar. Eff. 87.5%

AIRSIDE INFORMATION

Building Name:_____

Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Mech Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

Tag	Manufacturer	Type	Supply Fan HP	1.5	VFD X	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
KCP2	Captive	HV	Return Fan HP	X	VFD X	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	NRTP BA2 G/J		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 (3) 4 5		% Outside Air			Reheat	E HW NG (ST)	(2) 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	(CV) Int 3SPD VFD	

Kitch

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP	3	VFD X	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
KCP-1	Captive	HV	Return Fan HP	X	VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	NRTP DA4920		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 (3) 4 5		% Outside Air			Reheat	E HW NG (ST)	(2) 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	(CV) Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP	7.5	VFD X	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
Bx-83	York	RTU	Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	BQ240E36B4		CFM			Cooling	CHW (DX)	2 3	DCV	Y N	RA WA EW PL
Condition	1 (2) 3 4 5		% Outside Air			Reheat	(E) HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	(CV) Int 3SPD VFD	

Notes/Potential ECMs: 3 circuits ++242045E03646

Central AHU Type
CAV - Constant Volume
DD - Dual Duct
HV - Heating and Vent Unit
MZ - Multizone
SZ - Single Zone
VRH - Var. Vol. w/Reheat
VPFP - Var. Vol. w/Parallel FP Boxes
VSFP - Var. Vol. w/Series FP Boxes
VVVT - Var. Vol. Var. Temp.

Local AHU Type
2P FCU - 2 pipe FCU
4P FCU - 4 pipe FCU
ACB - Active Chilled Beam
CRAC - Computer Room AC
GSHP - Ground Source HP
HP - Air to Air HP
PCB - Passive Chilled Beam
PTAC - Packaged Terminal AC
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC
WSHP - Water Source HP

Source
E - Electric
HW - Hot Water
NG - Natural Gas
ST - Steam
CHW - Chilled Water
DX - Direct Expansion

Controls
DDC - Direct Digital Controls
E - Electric/Local
H - DDC/Pneumatic
P - Pneumatic

Setbacks
P - Static Pressure Reset
SA - Supply Air Reset
T - Unoccupied Space Temp

Energy Recovery
RA - Runaround Loop
WA - Wraparound Loop
EW - Enthalpy Wheel
PL - Plate Heat Exchanger

Flow Control
CV - Constant Volume
Int - Interminent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive

Exhaust Fan Axial — Captive NCA24FA 2Hp (with ~~HV-2~~ KCP-2)
condition 3 DDC (?)

Exhaust Fan Axial — Captive NCA30FA 5Hp (with KCP-1)
condition 3 DDC (?)

Building Name:_____

Air Handling Units (Cont.)

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:		# of units:	Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:		# of units:	Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:		# of units:	Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:		# of units:	Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Central AHU Type
- **CAV** - Constant Volume
- **DD** - Dual Duct
- **HV** - Heating and Vent Unit
- **MZ** - Multizone
- **SZ** - Single Zone
- **VRH** - Var. Vol. w/Reheat
- **VPFP** - Var. Vol. w/Parallel FP Boxes
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Local AHU Type
- **2P FCU** - 2 pipe FCU
- **4P FCU** - 4 pipe FCU
- **ACB** - Active Chilled Beam
- **CRAC** - Computer Room AC
- **GSHP** - Ground Source HP
- **HP** - Air to Air HP
- **PCB** - Passive Chilled Beam
- **PTAC** - Packaged Terminal AC
- **SS** - Mini Split System
- **VRF** - Variable Refrig. Flow
- **WU** - Window AC
- **WSHP** - Water Source HP

Source
- **E** - Electric
- **HW** - Hot Water
- **NG** - Natural Gas
- **ST** - Steam
- **CHW** - Chilled Water
- **DX** - Direct Expansion

Controls
- **DDC** - Direct Digital Controls
- **E** - Electric/Local
- **H** - DDC/Pneumatic
- **P** - Pneumatic

Setbacks
- **P** - Static Pressure Reset
- **SA** - Supply Air Reset
- **T** - Unoccupied Space Temp

Energy Recovery
- **RA** - Runaround Loop
- **WA** - Wraparound Loop
- **EW** - Enthalpy Wheel
- **PL** - Plate Heat Exchanger

Flow Control
- **CV** - Constant Volume
- **Int** - Interminent
- **3SPD** - 3 Speed Control
- **VFD** - Variable Frequency Drive

Exhaust Fan
~~Heat Exchanger~~
Axial

Greenheck
CUVB-300-3-X
Condition 3

(stand alone unit)

1 BUILDING 3607 - FIRST FLOOR PLAN

0 10' 20'
Scale: GRAPHIC

NORTH

VERIFIED FLOOR PLAN - FOR OFFICIAL USE ONLY

NFA100001075604_3607_01_FP.dwg 28 DEC 2011

NAVFAC MIDLANT GeoReadiness Center

This plan belongs to the CRNMA GeoReadiness Center (GRC). Plans and maps from the GRC are believed to be accurate but this is not guaranteed and the burden for determining accuracy, completeness and appropriateness for use rests solely on the user accessing this information. Data owners should be consulted if field verification or additional information is needed. This material is For Official Use Only. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the CNRMA GRC.

Building 3607
First Floor

BD-GIS Mid-Atlantic
Norfolk, VA 23511
(757) 444-4716
PWCNORVA_GIS_WEB@nmci-isf.com

Part 6 - Attachments
Base Bid - Building 3808

1. Initial Building Survey Data
2. Building Plan

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/17/2015	**Building No.**	3808
Building Name:	SEAL TEAM TEN BLDG	**Facility Type:**	Admin / Training
Facility Manager:	Robert Jackson	**Jacobs CX Lead:**	Sam Ehreth
Building Monitor:	Tom Landreth	**Jacobs CX Junior:**	Phil Dabrowski
		Jacobs Mech Engineer:	
		Jacobs Elec Engineer:	David Williams

1. Facility Investigation Narrative:	
Description:	The building is located in the north / central portion of the base. The 2 story facility is used as Admin/Training for SEAL Team 10. The facility is about 68,647 square feet.
Facility Usage History:	The facility is designed/constructed as a central location for Seal Team 10.
Renovation History:	N/A
As-Built Documents:	Control Drawings, Floor Plans & TABs documents where downloaded from the BAS when available. Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	Dry room (C101B) does not dry SEAL equipment, and may contribute to mold/dry rot. Room (C202) leaking diffuser. Constant Issues with AHU-1. Humming noises in D203E.
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	The building is installed with a 4-pipe AHU system that is connected to air cooled chillers with variable flow and steam to hot water heat exchangers with constant flow. Conditioned air is delivered to the spaces via Air Handling Units and VAV boxes. Exhaust and relief air is provided by exhaust fans and relief dampers. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
DDC Description:	Approximately 100% of the facility equipment has electric/electronic controls. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Lighting Description:	Lighting consists of an array of 2x4, 3 lamp and 4 lamp T8 fluorescent fixtures and 1x4 2 lamp T8 fluorescent fixtures. High bay, 6 lamp, T5 fluorescent fixtures and recessed CFL units are also used.
Equipment Deficiencies:	Generally, equipment was found to be in need of routine maintenance and cleaning. Primary HVAC system issues included, leaking pipes to AHU, collapsed filters, and leaking diffusers. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Other Information:	1) Leaking roofs & broken outdoor showers 2) Work Requests from the past 12 months given.

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/17/2015	**Building No.**	3808
Building Name:	SEAL TEAM TEN BLDG	**Facility Type:**	Admin / Training
Facility Manager:	Robert Jackson	**Jacobs CX Lead:**	Sam Ehreth
Building Monitor:	Tom Landreth	**Jacobs CX Junior:**	Phil Dabrowski
		Jacobs Mech Engineer:	
		Jacobs Elec Engineer:	David Williams

2. ECM Study Recommendations:	Priority
a. ACC-1 and ACC-2 need triple Duty Valves	M
b. AHU-1 Add Airside Economizer	H
c. Dehumidifying unit for Dry Room	M
d. Remove floor units when HVAC correctly balanced	H
e. Install ceiling mounted motion sensor controls.	M
f. Change all fixtures to LED equivalent using existing circuits and switching.	H

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning
a. AHU-1 through 3
b. HVU-1 and 2
c. Chiller
d. Pumps
e.
f.

4. Corrective Actions	Action Code
a. AHU-1 Replace dirty and collapsed filters	1
b. AHU-2 Leaking CW pipe	1
c. Repair several lighting switches that were not properly connected creating a hazard.	1
d. Repair lighting in rooms C218 and C209. The entire lighting in these areas are out.	1
e. Install (8) upright, wall powered circulation fans in SEAL storage area.	1
f. Cleaning coils for chiller and air handling units	2

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a. Lighting monitoring at the switch level would require approximately 150 points.
b. Lighting monitoring at the circuit level would require approximately 75 points. This would avoid recircuiting non-lighting circuits from Lighting panels
c. Lighting monitoring at the panel level would require approximately 4 points. This may require recircuiting non-lighting circuits away from lighting panels.
d.
e.
f.

6. Recommended Mechanical Control Points:
a. Install humidity sensors in SEAL storage locker area (10 points)
b.
c.
d.
e.
f.

3808

JACOBS

FACILITY MANAGEMENT SPECIALIST (FMS) QUESTIONNAIRE

BUILDING NUMBER: [3808] **FACILITY MANAGEMENT SPECIALIST:** Robert Jackson

BUILDING MONITOR (BM): _____

Please complete the following. Space is provided at end of form for Additional/detailed comments.

General Building Condition: 5 = Good Condition 1 = Poor (Circle Answer)

1.	What is the general condition of the building?	5 (4) 3 2 1 N/A		
2.	What is the general condition of the HVAC equipment?	5 (4) 3 2 1 N/A		
3.	What is the general condition of the HVAC controls?	5 (4) 3 2 1 N/A		
4.	What is the general condition of the Plumbing/Domestic water?	5 (4) 3 2 1 N/A		
5.	What is the general condition of the Electrical gear and distribution?	5 (4) 3 2 1 N/A		
6.	Have there been any recent renovations? (Indicate yes/no, year)	YES	(NO)	Year:
7.	Have there been any recent major equipment replacements?	YES	(NO)	Year:
8.	What is the approximate occupancy of the building?	No. of People: 600		
9.	What type of HVAC controls are installed (Pneumatic, Electric, DDC, None)?			
10.	Does the building have Lighting Controls?	YES	(NO)	
11.	Who Maintains the building (Contact Info):			
12.	Is the building or any space of the building a SCIF?	(YES)	NO	

Building Thermal Comfort: 5=Good 1=Poor

1.	Winter – Spaces maintain temperature. (No or Low number of cold calls. No or low number of complaints of static and stuffiness.)	5 4 3 2 1 N/A
2.	Spring - Spaces maintain temperature. (No or Low number of hot/cold calls. No or low number of complaints of humidity and stuffiness.)	5 4 3 2 1 N/A
3.	Summer - Spaces maintain temperature. (No or Low number of hot/cold calls. No or low number of complaints of humidity and stuffiness.)	5 4 3 2 1 N/A
4.	Fall - Spaces maintain temperature. (No or Low number of hot/cold calls. No or low number of complaints of humidity and stuffiness.)	5 4 3 2 1 N/A

COOLING PLANT

Building Name: 3808

Jeff BEAL ~~Dave~~ MEAR
757 763 2972

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Chillers

					Pumps	
Tag	ACC-1	ACC 2			P1/4	P5-P6
Type	W (A) HR	W A HR	W A HR	W A HR	BASE MOUNT	ARMSTRONG
Compressor	A C R (S)	A C R S	A C R S	A C R S	END SUCTION	
Manufacturer	YORK	TRANE			BALDOR	BASEMOUNT
Model Number	YLAA120E46	CGAM060F	ZA02 AX02		15HP	5
Tons			C1A - G431 C1B - 2229		VFD	NO
Age		ΔP	C2A 1507 C2B 6912		NO BALANCING VALVE	VFD
Temp / Pressure gauges	Yes T P No P	Yes P No T	Yes___ No___	Yes___ No___		
CHW Temp	Supply 40 Return 46	Supply___ Return___	Supply___ Return___	Supply___ Return___		
CHW Reset	OA L T	DISABLED OA L (T) OK	OA L T	OA L T	(4)	
Equipment Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	

PRESSURE Δ
NO GAUGE

NO RESET

ECM TRIPLE [illegible]

Chiller Types
W - Water Cooled
A - Air Cooled
HR - Heat Recovery

Compressor Types
A - Absorption
C - Centrifugal
R - Reciprocating
S - Screw

CHW Reset
OA - Outside Air
L - Load
T - CHWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New
3.+ 4. Repair / RetroCx

Heat Rejection

Cooling Towers

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5

Condensing Units

Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
DR- Dry Cooler
C - Condensing Unit
EC - Evaporative Cooling
HP - Air to Air HP
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC

Notes / Potential ECM's: _____

AIRSIDE INFORMATION

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___ No___
Falls / Trips / Overhead	Yes___ No___
Extreme Mech Room Temp	Yes___ No___
Hazardous Materials	Yes___ No___

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
	STERLING	INDIRECT GAS FIRE	Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:			Tons		CFM	Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: 100% OUTSIDE AIR – 3 WAY DISCHARGE PLENUM

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU3			Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:			Tons		CFM	Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: D108B AHU3/VAV 4 (XZ)? MAYBE DX
HW DUCT HEATER

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
VAV 4			Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:			Tons		CFM	Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Central AHU Type
CAV - Constant Volume
DD - Dual Duct
HV - Heating and Vent Unit
MZ - Multizone
SZ - Single Zone
VRH - Var. Vol. w/Reheat
VPFP - Var. Vol. w/Parallel FP Boxes
VSFP - Var. Vol. w/Series FP Boxes
VVVT - Var. Vol. Var. Temp.

Local AHU Type
2P FCU - 2 pipe FCU
4P FCU - 4 pipe FCU
ACB - Active Chilled Beam
CRAC - Computer Room AC
GSHP - Ground Source HP
HP - Air to Air HP
PCB - Passive Chilled Beam
PTAC - Packaged Terminal AC
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC
WSHP - Water Source HP

Source
E - Electric
HW - Hot Water
NG - Natural Gas
ST - Steam
CHW - Chilled Water
DX - Direct Expansion

Controls
DDC - Direct Digital Controls
E - Electric/Local
H - DDC/Pneumatic
P - Pneumatic

Setbacks
P - Static Pressure Reset
SA - Supply Air Reset
T - Unoccupied Space Temp

Energy Recovery
RA - Runaround Loop
WA - Wraparound Loop
EW - Enthalpy Wheel
PL - Plate Heat Exchanger

Flow Control
CV - Constant Volume
Int - Interminent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive

Building Name:_____

Air Handling Units (Cont.)

Tag	Manufacturer	Type	Supply Fan HP	40	VFD ✓ YES	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU2	YORK	4 PIPE	Return Fan HP		VFD ✓	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	DESIGN D AP 580		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer	Y N	
For Local AHUs Only:	# of units: 1		Avg Capacity:	Tons	CFM				Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: (20) 24x24x2 LEAKING CHW PIPES

COIL # CA 0061275

Tag	Manufacturer	Type	Supply Fan HP	7.5	VFD ✓ YES	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU-1	YORK		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	AP215		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer	Y N	
For Local AHUs Only:	# of units:		Avg Capacity:	Tons	CFM				Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: 2nd ~~floor~~ MECH ROOM - ISSUES

ECM

Tag	Manufacturer	Type	Supply Fan HP	30	VFD ✓	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU4	TRANE		Return Fan HP	15	VFD ✓	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	MCCB030UA		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer	Y N	
For Local AHUs Only:	# of units:		Avg Capacity:	Tons	CFM				Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: COLAPPSED FILTER / DIRTY FILTER

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU3		F/C	Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer	Y N	
For Local AHUs Only:	# of units:		Avg Capacity:	Tons	CFM				Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Central AHU Type
CAV - Constant Volume
DD - Dual Duct
HV - Heating and Vent Unit
MZ - Multizone
SZ - Single Zone
VRH - Var. Vol. w/Reheat
VPFP - Var. Vol. w/Parallel FP Boxes
VSFP - Var. Vol. w/Series FP Boxes
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Flow Control
CV - Constant Volume
Int - Interminent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive

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ML - Little Creek Customer

Location: LITCRE-3808 Work Type: EMERGENCY

Originating Record	Work Order	Status	Description	Approved Date		Entered Date		Actual Finish		Affectedusername
10135863	CFCB4G	COMP	REPAIR CHILLER	7/21/15	1:09:23 PM	7/21/15	1:08:00 PM	7/22/15	10:15:41 AM	Robert B Savage
10333487	CGL746	COMP	(P) NO A/C BOTH ROOF TOP CHILLERS DOWN,MAKE REPAIRS AS NEEDED	9/21/15	8:31:17 AM	9/21/15	8:27:00 AM	9/22/15	8:04:00 AM	TOM LNDRIFTH
10339103	CGMRCR	COMP	(P) NO A.C ENTIRE BLDG	9/22/15	2:07:11 PM	9/22/15	8:50:00 AM	9/23/15	12:51:56 PM	TOM LANDRETH

Location: LITCRE-3808 Work Type: ROUTINE

Originating Record	Work Order	Status	Description	Approved Date		Entered Date		Actual Finish		Affectedusername
9747210	CB9WZS	ASSIGNED	E) WEST SIDE ENTRANCE DOOR TO MAIN LOCKER ROOM DOES NOT SHUT ALL THE WAY, PREVENTING THE DOOR FROM LOCKING. REQUEST REPLACE OF DOOR CLOSING MECHANIS	4/2/15	6:36:41 PM	4/1/15	9:20:00 AM			MM1 BARAJAS
10279765	CFWZZH	ASSIGNED	(E) REPAIR HOLE IN WALL IN SPACE 103A, COMMAND SUITE, CMC'S OFFICE...REPAIR WAS DONE ON LEAK AND SQUARE WALL WAS REMOVED, BUT JUST PUSHED BACK IN PLAC	9/3/15	8:12:02 AM	9/2/15	4:50:00 PM			MM1 BARAJAS
10310949	CG9YY7	ASSIGNED	(E) FIRE CODE VIOLATION SELF CLOSING DEVICE(S) ON TOP OF DOOR MISSING - Replace self-closing device on door. Offices/ Classroom REAR WEST STAIRWELL	9/15/15	8:38:46 AM	9/14/15	9:42:00 AM			Mr. Simoni, Ronald
10594870	CJBPWM	ASSIGNED	REPAIR/ PUMP, ELECTRIC, FIRE PER PM INSPECTION, FOR THE SHOP	10/28/15	3:13:10 PM	10/28/15	8:31:00 AM			Nelson I Beaubien
9046128	C39JVD	COMP	E) Request a dedicated power receptacle for our laminating machine located in our intel office (N2). POWER REUIREMENTS: 15 AMPS 100-130 VAC AHD 60 HZ.	7/24/14	1:54:17 PM	7/24/14	11:52:00 AM	9/23/15	7:58:27 AM	MM1 BARAJAS / MM1 TALDE
9071191	C3F9VX	COMP	(E) Command Suite-The flushing valve for the VIP toilet is stuck open. The water supply is currently secured via isolation valve.	8/4/14	7:09:00 AM	8/1/14	1:44:00 PM	9/2/15	9:32:58 AM	MM1 BARAJAS

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ML - Little Creek Customer

Location: LITCRE-3808 Work Type: ROUTINE

Originating Record	Work Order	Status	Description	Approved Date		Entered Date		Actual Finish		Affectedusername
9521507	C6X3XY	COMP	(E) REQUEST REPAIR OR REPLACEMENT OF EXIT LIGHT ABOVE THE EXIT FROM THE MENS LOCKER ROOM TO ROOM B106A. EXIT SIGN IS NOT ILLUMINATING.	1/13/15	1:00:43 PM	1/12/15	8:02:00 AM	9/23/15	7:58:27 AM	BU2 VANGINKEL / MM1 BARAJAS
10002694	CDMFTN	COMP	REPLACE MOTORS ON CHILLER	6/17/15	7:05:02 AM	6/17/15	7:03:00 AM	7/29/15	8:25:45 AM	Robert B Savage
10186067	CFH7JL	COMP	E) REQUEST REPAIR/ REPLACEMENT OF DRAIN PIPING OF THE ICE MACHINE IN THE ARMORY SPACE	8/4/15	7:53:18 AM	8/3/15	10:07:00 AM	8/26/15	11:16:08 AM	MM1 BARAJAS
10339572	CGM9JZ	COMP	STEAM - REPLACE PRESSURE REDUCTION VALVE IN MECH RM	9/22/15	6:30:00 AM	9/22/15	10:46:00 AM	9/23/15	7:40:45 AM	Barry J Taylor
10339071	CGM7P3	COMP	REPAIR STEAM LEAK, FOR THE SHOPS	9/22/15	8:44:15 AM	9/22/15	8:42:00 AM	9/29/15	6:42:07 AM	MIKE SIMPKINS
10563898	CHPPRP	PEND	E) Request the repair of a door handle which has fallen off. The door is located by medical on the first floor leading to the stairwell			10/19/15	1:12:00 PM			MM1 Barajas
10591971	CJB6KR	PEND	(E) Request repair of 3 Troop Low Bay (C103A) doors and pin pad. Doors are bent in and pin pad is malfunctioning			10/27/15	1:51:00 PM			MM1 Barajas
10595108	CJBZBV	PEND	(E) Request repair of 1 Troop Low Bay door (most nothern one). Door without handle will not lock.			10/28/15	9:28:00 AM			MM1 Barajas
10587365	CJ79MK	PEND	(E) Lights are out and will not turn on in spaces C207 and C209. Request troubleshoot and repair.			10/26/15	1:06:00 PM			john.barajas
10585810	CJ6HFT	PEND	(E) Repair electrical outlet.-Armory/ Work shop Quarterdeck bunk area			10/26/15	7:17:00 AM			Chief Quiliic, Jason
10186198	CFH7JM	PEND	(E) REQUEST REPAIR/ REPLACEMENT OF RAIN GUTTER DIRECTLY ABOVE THE ENTRANCE TO THE QUARTER DECK. GUTTER IS BENT AND ALMOST DETACHED FROM THE BUILDING			8/3/15	10:31:00 AM			MM1 BARAJAS

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ML - Little Creek Customer

Location: LITCRE-3808 Work Type: URGENT

Originating Record	Work Order	Status	Description	Approved Date		Entered Date		Actual Finish		Affectedusername
9937247	CDGDGC	COMP	E, Southwest corner of compound, Correct cause of ACC-2 not producing chill water. Spaces served are excessively hot.	6/1/15	7:03:54 AM	5/30/15	7:12:00 AM	6/4/15	3:02:00 PM	Landreth
9978055	CDKDFL	COMP	REPAIR YORK CHILLER NO AC 1 ST FLOOR	6/10/15	11:15:48 AM	6/10/15	11:13:00 AM	6/13/15	7:13:00 AM	Robert B Savage
10026201	CDTVXP	COMP	(p) chiller is down in fault mode no a.c entire bldg	6/24/15	8:32:27 AM	6/23/15	3:11:00 PM	6/29/15	8:32:00 AM	TOM LANDRETH
10107026	CF36SC	COMP	INSTALL STARTERS	7/14/15	10:46:41 AM	7/14/15	10:43:00 AM	7/20/15	7:16:02 AM	CHARLES B RHODES
10118240	CF49LM	COMP	REPLACE TXV VALVE	7/16/15	3:28:11 PM	7/16/15	3:25:00 PM	7/24/15	7:51:26 AM	CHARLES B RHODES
10334646	CGLLR6	COMP	(E) Request troubleshoot/repair of wall mounted AC unit in space C228. It is not cooling down the LAN room.	9/21/15	12:30:47 PM	9/21/15	10:55:00 AM	9/23/15	10:32:15 AM	MM1 Barajas
10335053	CGM6RX	COMP	(E) Request repair of A/C in space C218. Temp has already reached 85 degrees.	9/22/15	7:23:42 AM	9/21/15	12:22:00 PM	9/24/15	6:11:13 AM	MM1 BARAJAS
10510534	CGTBPY	COMP	(E) CORRECT CAUSE OF CHILLER #1 AND AHU-4 NOT FUNCTIONING	10/5/15	7:06:51 AM	10/2/15	9:11:00 AM	10/6/15	8:20:47 AM	Landreth
10524422	CGTVZL	COMP	FOR THE SHOPS REPAIR CHILLER	10/6/15	1:37:26 PM	10/6/15	1:25:00 PM	10/13/15	1:37:00 PM	Robert B Savage
10543623	CH4J9J	COMP	FOR THE SHOPS REPAIR INOP CHILLER	10/13/15	8:27:50 AM	10/13/15	8:25:00 AM	10/20/15	7:27:00 AM	Robert B Savage

Number of Records: 30

Dynamic Where Clause: ((((workorder.woclass = 'WORKORDER' or workorder.woclass = 'ACTIVITY') and workorder.historyflag = 0 and workorder.istask = 0 and workorder.siteid = '10201' and (workorder.worktype = 'EMERGENCY' or workorder.worktype = 'ROUTINE' or workorder.worktype = 'URGENT') and workorder.location like '%LITCRE-3808%')) and (exists ((select siteid from siteauth a1,groupuser b1,maxgroup m1,applicationauth t1 where b1.userid = 'JACKSONRE' and b1.groupname=a1.groupname and b1.groupname=m1.groupname and m1.independent = 1 and a1.groupname = t1.groupname and t1.app = 'WOTRACK' and a1.siteid = workorder.siteid) union all (select siteid from siteauth a,groupuser b,maxgroup m where b.userid = 'JACKSONRE' and b.groupname=a.groupname and b.groupname=m.groupname and m.independent = 0 and a.siteid = workorder.siteid and (exists (select 1 from maxgroup m2,applicationauth c,groupuser d where d.userid = 'JACKSONRE' and d.groupname = m2.groupname and d.groupname = c.groupname and m2.independent = 0 and c.app = 'WOTRACK'))))))

1 BUILDING 3808 - FIRST FLOOR PLAN

0 10' 20'
Scale: GRAPHIC

NORTH

VERIFIED FLOOR PLAN - FOR OFFICIAL USE ONLY

NFA20000501075_3808_01_FP.dwg 28 DEC 2011

NAVFAC MIDLANT GeoReadiness Center

This plan belongs to the CRNMA GeoReadiness Center (GRC). Plans and maps from the GRC are believed to be accurate but this is not guaranteed and the burden for determining accuracy, completeness and appropriateness for use rests solely on the user accessing this information. Data owners should be consulted if field verification or additional information is needed. This material is For Official Use Only. Reproduction, distribution, publication, or exhibition of this data is strictly prohibited without the written consent of the CNRMA GRC.

Building 3808
First Floor

BD-GIS Mid-Atlantic
Norfolk, VA 23511
(757) 444-4716
PWCNORVA_GIS_WEB@nmci-isf.com

1 BUILDING 3808 - SECOND FLOOR PLAN

0 10' 20'

Scale: GRAPHIC

NORTH

VERIFIED FLOOR PLAN - FOR OFFICIAL USE ONLY

NFA20000501075_3808_02_FP.dwg 28 DEC 2011

NAVFAC MIDLANT GeoReadiness Center

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Building 3808
Second Floor

BD-GIS Mid-Atlantic
Norfolk, VA 23511
(757) 444-4716
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Part 6 - Attachments
Base Bid - Building 3889

1. Initial Building Survey Data
2. Building Plan

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/12/2015	**Building No.**	3889
Building Name:	NIOC Norfolk COMM	**Facility Type:**	Adimn / WH / Maint / Training
Facility Manager:	Robert Jackson	**Jacobs CX Lead:**	Paul Nelson
Building Monitor:	Rick Buechel	**Jacobs CX Junior:**	Artheley 'Lee' Weeks
		Jacobs Mech Engineer:	Carlos Teran
		Jacobs Elec Engineer:	David Williams

FACILITY PHOTO

1. Facility Investigation Narrative:	
Description:	The facility has 98,375 gross SQFT. It was built in 2009 to house the Spec War Amphibious Operations facility and associted administrative offices.
Facility Usage History:	None
Renovation History:	None.
As-Built Documents:	Control Drawings and Sequence of Operation documents where downloaded from the BAS. Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	The FMS indicated that they experience consistent issues with the control and sequencing of the mechanical heating and cooling equipment. Specifically, the VRF system.
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	The mechanical cooling for the facility is primarily handled by an air cooled chiller. Heating is provided by a natural gas boiler. RTUs, H&V units, and split units provide most of the conditioned air to the building. The SW wing of the building uses a fairly new but failing VRF system.
DDC Description:	The facility HVAC is controlled by an Automated Logic DDC. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Lighting Description:	Lighting consists of 2x4, 3 lamp, diffuser and parabolic, 1x4 2 lamp T8 flourscent fixtures along with 2x2 2 u-tube lamp, flourescent fixtures. There were spme 8" round recessed CFL flourescent fixtures as well. Motion sensor controls were used in some rooms.
Equipment Deficiencies:	The front end of the BAS does not fully reflect what is actually on site. The VRF system does not operate properly and its associated equipment fails consistently.
Other Information:	

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		Jacobs Mech Engineer:	Carlos Teran
		Jacobs Elec Engineer:	David Williams

FACILITY PHOTO

2. ECM Study Recommendations:	Priority
a. Install VFD on supply fan (>=5 HP) of VAV AHUs	H
b. Change all fixtures to LED equivilent using exiting circuits and switching.	M
c. Install ceiling mounted motion sensor control for rooms where 24 hour operation is not used.	M
d.	
e.	
f.	

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning
a. Chiller
b. DDC
c. VRF System
d.
e.
f.

4. Corrective Actions	Action Code
a. Review control sequence of mechanical systems	2
b.	
c.	
d.	
e.	
f.	

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a. Lighting monitoring at the switch level would require approximately 130 points.
b. Lighting monitoring at the circuit level would require approximately 60 points. This would avoid recircuiting non-lighting circuits from Lighting panels
c. Lighting monitoring at the panel level would require approximately 3 points. This may require recircuiting non-lighting circuits away from lighting panels.
d.
e.
f.

6. Recommended Mechanical Control Points:
a. Provide control points for feedback status of mechanical equipment
b. Provide control points for variable air flow in AHUs. See ECM (a)
c.
d.
e.
f.

3889

JACOBS

FACILITY MANAGEMENT SPECIALIST (FMS) QUESTIONNAIRE

BUILDING NUMBER: [3889] **FACILITY MANAGEMENT SPECIALIST:** Robert Jackson

BUILDING MONITOR (BM): Rick Buechel

Please complete the following. Space is provided at end of form for Additional/detailed comments.

General Building Condition: 5 = Good Condition 1 = Poor (Circle Answer)

1.	What is the general condition of the building?	5	4	3	2	1	N/A
2.	What is the general condition of the HVAC equipment?	5	4	3	2	1	N/A
3.	What is the general condition of the HVAC controls?	5	4	3	2	1	N/A
4.	What is the general condition of the Plumbing/Domestic water?	5	4	3	2	1	N/A
5.	What is the general condition of the Electrical gear and distribution?	5	4	3	2	1	N/A
6.	Have there been any recent renovations? (Indicate yes/no, year)	YES	NO	Year:			
7.	Have there been any recent major equipment replacements?	YES	NO	Year:			
8.	What is the approximate occupancy of the building?	No. of People:					
9.	What type of HVAC controls are installed (Pneumatic, Electric, DDC, None)?						
10.	Does the building have Lighting Controls?	YES		NO			
11.	Who Maintains the building (Contact Info):						
12.	Is the building or any space of the building a SCIF?	YES		NO			

Building Thermal Comfort: 5=Good 1=Poor

1.	Winter – Spaces maintain temperature. (No or Low number of cold calls. No or low number of complaints of static and stuffiness.)	5	4	3	2	1	N/A
2.	Spring - Spaces maintain temperature. (No or Low number of hot/cold calls. No or low number of complaints of humidity and stuffiness.)	5	4	3	2	1	N/A
3.	Summer - Spaces maintain temperature. (No or Low number of hot/cold calls. No or low number of complaints of humidity and stuffiness.)	5	4	3	2	1	N/A
4.	Fall - Spaces maintain temperature. (No or Low number of hot/cold calls. No or low number of complaints of humidity and stuffiness.)	5	4	3	2	1	N/A

COOLING PLANT

Building Name: 3889

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___ No___
Falls / Trips / Overhead	Yes___ No___
Extreme Room Temp	Yes___ No___
Hazardous Materials	Yes___ No___

Asbestos _____ Mold _____ Lead _____ Other _____

Chillers

Tag					
Type	W A HR	W A HR	W A HR	W A HR	W A HR
Compressor	A C R S	A C R S	A C R S	A C R S	A C R S
Manufacturer					
Model Number					
Tons					
Age					
Temp / Pressure gauges	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___
CHW Temp	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___
CHW Reset	OA L T	OA L T	OA L T	OA L T	OA L T
Equipment Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Chiller Types
W - Water Cooled
A - Air Cooled
HR - Heat Recovery

Compressor Types
A - Absorption
C - Centrifugal
R - Reciprocating
S - Screw

CHW Reset
OA - Outside Air
L - Load
T - CHWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New
3.+ 4. Repair / RetroCx

Heat Rejection

Cooling Towers

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5

Condensing Units

Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
DR- Dry Cooler
C - Condensing Unit
EC - Evaporative Cooling
HP - Air to Air HP
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC

Notes / Potential ECM's: _____

VRF not working
Automatic Logic Control.

Serv Rm
Elec Rm
Elev. Rm
Sw Rm.

} split Units

HEATING PLANT

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___ No___
Falls / Trips / Overhead	Yes___ No___
Extreme Boiler Room Temp	Yes___ No___
High Press Steam present	Yes___ No___
Hazardous Materials	Yes___ No___

Asbestos _____ Mold _____ Other _____

Boilers

(4)

Tag	B-1			
Type	HWB			
Fuel	B C E FO2 FO6 (NG) P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P
Manufacturer	Fulton			
Model Number	PHW 1400			
Capacity (mbh/lbsh)	1260 Mbh			
Age	8			
Delivery Temp/Pressure				
Return Temp				
Steam Trap Type	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT
Steam Trap Condition	1 2 3 5	1 2 3 5	1 2 3 5	1 2 3 5
Breaching Type	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL
Breaching Condition	1 2 3 5	1 2 3 5	1 2 3 5	1 2 3 5
Boiler Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
HW Reset	OA L T	OA L T	OA L T	OA L T

Fuel Type
- **B** - Bio
- **C** - Coal
- **E** - Electric
- **FO2** - Fuel Oil#2
- **FO6** - Fuel Oil#6
- **NG** - Natural Gas
- **P** - Propane

Steam Trap Type
- **TS** - Thermostatic
- **F&T** - Float and Thermostatic
- **IB** - Inverted Bucket
- **OB** - Open bucket
- **DT** - Disk Trap
- **PT** - Piston Trap
- **OT** - Orifice Trap

Breaching Type
- **BRK** - Brick / Block
- **SS** - Stainless Steel
- **GAL** - Galvanized Steel
- **PLA** - Poly, PVC, CPVC
- **AL** - Aluminum AL29-4C

Note: ALL larger condensing boilers (>1000 MBH) **MUST** use AL29-4C

HW Reset
- **OA** - Outside Air
- **L** - Load
- **T** - HWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New

3 + 4. Repair / RetroCx

Notes / Potential ECM's: _____

Exhaust Fan EF-4 mus 24x7.

AIRSIDE INFORMATION

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___ No___
Falls / Trips / Overhead	Yes___ No___
Extreme Mech Room Temp	Yes___ No___
Hazardous Materials	Yes___ No___

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

Tag	Manufacturer	Type	Supply Fan HP		VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
CU-6 & CU-7	LG		Return Fan HP		VFD___	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #	MultiV		CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 (4) 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units: 2		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: ARUB121DT3(x 4) VRF Air Conditioner Not running (Defecti 3 yr old

Tag	Manufacturer	Type	Supply Fan HP		VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD___	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD___	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Central AHU Type
CAV - Constant Volume
DD - Dual Duct
HV - Heating and Vent Unit
MZ - Multizone
SZ - Single Zone
VRH - Var. Vol. w Reheat
VPFP - Var. Vol. w Parallel FP Boxes
VSFP - Var. Vol. w Series FP Boxes
VVVT - Var. Vol. Var. Temp.

Local AHU Type
2P FCU - 2 pipe FCU
4P FCU - 4 pipe FCU
ACB - Active Chilled Beam
CRAC - Computer Room AC
GSHP - Ground Source HP
HP - Air to Air HP
PCB - Passive Chilled Beam
PTAC - Packaged Terminal AC
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC
WSHP - Water Source HP

Source
E - Electric
HW - Hot Water
NG - Natural Gas
ST - Steam
CHW - Chilled Water
DX - Direct Expansion

Controls
DDC - Direct Digital Controls
E - Electric/Local
H - DDC/Pneumatic
P - Pneumatic

Setbacks
P - Static Pressure Reset
SA - Supply Air Reset
T - Unoccupied Space Temp

Energy Recovery
RA - Runaround Loop
WA - Wraparound Loop
EW - Enthalpy Wheel
PL - Plate Heat Exchanger

Flow Control
CV - Constant Volume
Int - Interminent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive

EF-3

Twin City Fans & Blowers (4)
DCRD060B
1/8 Hp

Com - Rm
Samsung (4)
Condensing Unit
AQV12NSDX (31W)

Com + Office
Samsung x2 (4)
Condensing units

CU-4
EM1 (4)
SIG 90000ATOU
.125 Hp

Condensing units - Switch Rm F205
Mitsubishi
Model: PUY-A18NHA4
: PUY-A12NHA4 (CU-1)

Support issues - T-stats.
T/B needed in Bldg
Filter dirty

1/3 + 1/3 HP

Building Name:_____

Air Handling Units (Cont.)

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
	Bard		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	Wall AC Units		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 (4) 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units: 6		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: W36A1-B00. Big Square Box.

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
OAU-1	Addison	OAU	Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	TRSA360CM5E4A		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 (4) 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: Cat 1 - Unit has been failing (compressor issues) Replaced twice.

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Central AHU Type
- **CAV** - Constant Volume
- **DD** - Dual Duct
- **HV** - Heating and Vent Unit
- **MZ** - Multizone
- **SZ** - Single Zone
- **VRH** - Var. Vol. w Reheat
- **VPFP** - Var. Vol. w Parallel FP Boxes
- **VSFP** - Var. Vol. w Series FP Boxes
- **VVVT** - Var. Vol. Var. Temp.

Local AHU Type
- **2P FCU** - 2 pipe FCU
- **4P FCU** - 4 pipe FCU
- **ACB** - Active Chilled Beam
- **CRAC** - Computer Room AC
- **GSHP** - Ground Source HP
- **HP** - Air to Air HP
- **PCB** - Passive Chilled Beam
- **PTAC** - Packaged Terminal AC
- **SS** - Mini Split System
- **VRF** - Variable Refrig. Flow
- **WU** - Window AC
- **WSHP** - Water Source HP

Source
- **E** - Electric
- **HW** - Hot Water
- **NG** - Natural Gas
- **ST** - Steam
- **CHW** - Chilled Water
- **DX** - Direct Expansion

Controls
- **DDC** - Direct Digital Controls
- **E** - Electric Local
- **H** - DDC Pneumatic
- **P** - Pneumatic

Setbacks
- **P** - Static Pressure Reset
- **SA** - Supply Air Reset
- **T** - Unoccupied Space Temp

Energy Recovery
- **RA** - Runaround Loop
- **WA** - Wraparound Loop
- **EW** - Enthalpy Wheel
- **PL** - Plate Heat Exchanger

Flow Control
- **CV** - Constant Volume
- **Int** - Interminent
- **3SPD** - 3 Speed Control
- **VFD** - Variable Frequency Drive

1 BUILDING 3889 - FIRST FLOOR PLAN

Scale: GRAPHIC 0 20' 40'

NORTH

UNVERIFIED FLOOR PLAN Year Unknown - Source Unknown

Note: UOM is INCH for Adobe measuring tool

NFA20000067461 9_3889_01_fp.dwg 06 SEP 2012

NAVFAC MIDLANT GeoReadiness Center

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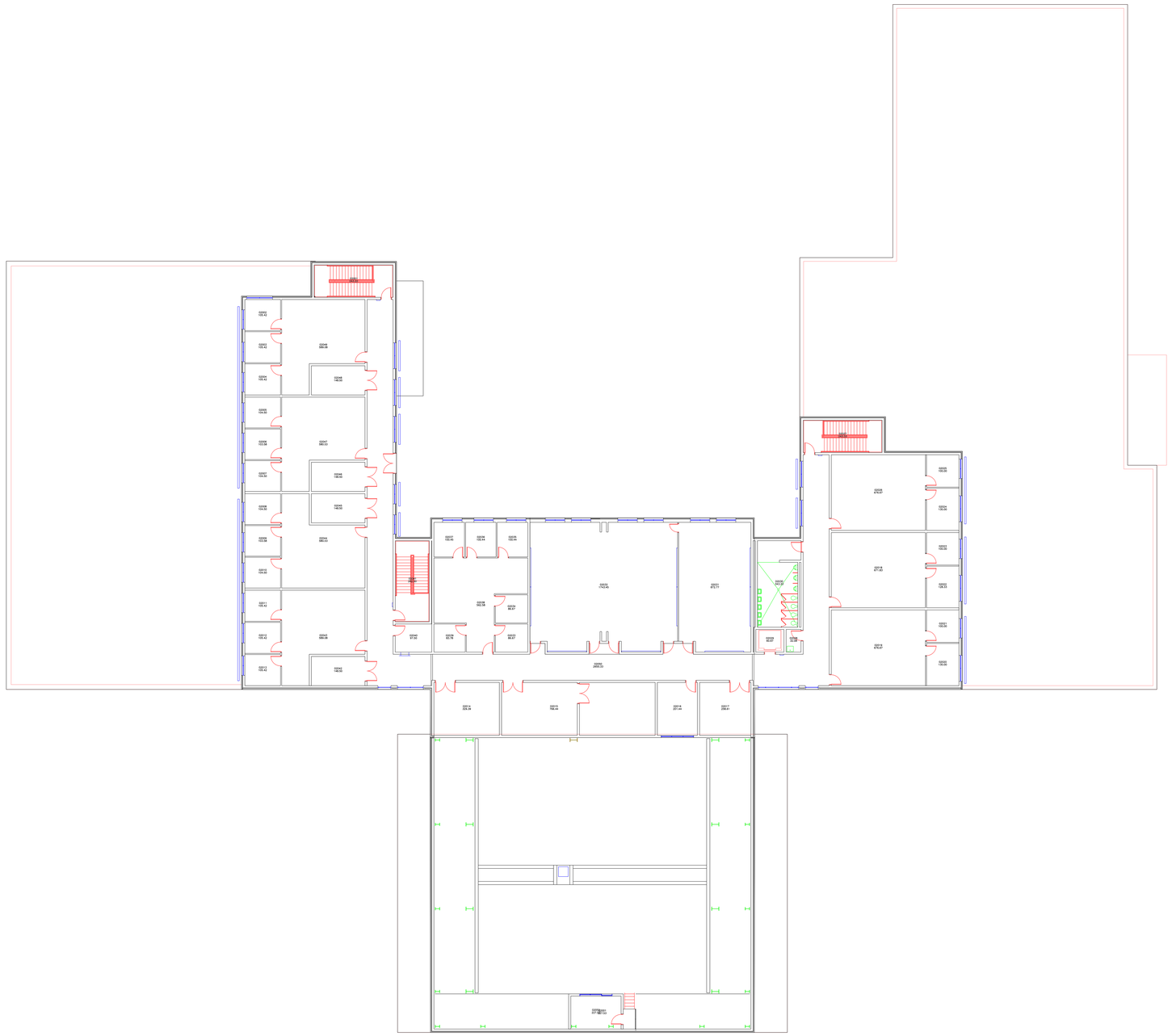
Building 3889
First Floor

BD-GIS Mid-Atlantic
Norfolk, VA 23511
(757) 444-4716
PWCNORVA_GIS_WEB@nmci-isf.com



1 BUILDING 3889 - SECOND FLOOR PLAN

Scale: GRAPHIC 0 20' 40'

NORTH

UNVERIFIED FLOOR PLAN Year Unknown - Source Unknown

Note: UOM is INCH for Adobe measuring tool

Building 3889
Second Floor

NFA20000674619_3889_02_fp.dwg 06 SEP 2012

BD-GIS Mid-Atlantic
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Part 6 - Attachments
Base Bid - Building T111

1. Initial Building Survey Data
2. Building Plan

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit: 11/4/2015
Building Name: Admin Building/TACRON 21/22

Building No. T111
Admin / Training

Facility Manager: Lavern Rushin
Building Monitor: Carmelo Richardson

Jacobs CX Lead: Sam Ehreth
Jacobs CX Junior: Phil Dabrowski
Jacobs Mech Engineer:
Jacobs Elec Engineer: David Williams

1. Facility Investigation Narrative:	
Description:	The building is located on the west side of the base. The 3-story facility is used as training facility. The facility is about 20,992 square feet.
Facility Usage History:	The facility was originally designed/constructed as a dormitory but has been converted to numerous training and office groups.
Renovation History:	The building has been renovated to have the facility used for office spaces and training.
As-Built Documents:	Control Drawings, Floor Plans & TABs documents where downloaded from the BAS when available. Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	Lack of sufficient cooling, heating, and control.
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	The building is installed with a 2-pipe system that is connected to air cooled chillers with variable flow and steam to hot water heat exchangers with constant flow. Conditioned air is delivered to the spaces via Air Handling Units, fan coils, and VAV boxes. Exhaust and relief air is provided by exhaust fans and relief dampers. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
DDC Description:	Approximately 50% of the facility equipment has pneumatic controls, the other 50% is electric/electronic controls. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Lighting Description:	Lighting consists primarily of 2x4, 4 lamp, diffuser T8 fluorescent fixtures. 2x2 2 u-tube lamp, fluorescent fixtures are used as well. there were a few 6" round recessed fluorescent fixtures. 1 x 4, 2 lamp T8 fluorescent wall mount fixtures were used in bathrooms and stairwells. Lighting levels seemed appropriate for most areas with a few slightly over lit. There is no motion detector or daylighting control. Exit fixtures are well positioned. Spot checking of operation in the test battery mode confirmed proper operation.
Equipment Deficiencies:	Generally, equipment was found to be in need of routine maintenance and cleaning. Primary HVAC system issues included poor water treatment, chilled water/hot water flows, and temperature and humidity control on all floors. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Other Information:	Lead paint was present throughout the building.

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit: 11/4/2015 **Building No.** T111
Building Name: Admin Building/TACRON 21/22 Admin / Training

Facility Manager: Lavern Rushin **Jacobs CX Lead:** Sam Ehreth
Building Monitor: Carmelo Richardson **Jacobs CX Junior:** Phil Dabrowski
Jacobs Mech Engineer:
Jacobs Elec Engineer: David Williams

2. ECM Study Recommendations:	Priority
a. Change all fixtures to LED equivalent using exiting circuits and switching.	M
b. Install ceiling mounted motion sensor control for rooms where 24 hour operation is not used.	M
c.	
d.	
e.	
f.	

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning
a. AHU-3, 107, 212, 312
b. Chiller
c. Pumps
d.
e.
f.

4. Corrective Actions	Action Code
a. Replace emergency and exit light batteries.	2
b. Repair simulation room AHU	2
c. Install independent cooling for (2) IT rooms.	2
d. Repair 20 feet of insulation for 2" pipe in mechanical room.	2
e. Cleaning coils for chiller and air handling units	2
f.	2
g.	1
h.	1
i.	1

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a. Lighting monitoring at the switch level would require 40 points.
b. Lighting monitoring at the circuit level would require 20 points. This would avoid recircuiting non-lighting circuits from Lighting panels
c. Lighting monitoring at the panel level would require 1 point. This may require recircuiting non-lighting circuits away from lighting panels.
d.
e.
f.

6. Recommended Mechanical Control Points:
a.
b.
c.
d.
e.
f.

COOLING PLANT

Building Name: 1111

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

DDC POINTS NEEDED TIII – ADMIN RECON 21/22

Asbestos _____ Mold _____ Lead _____ Other _____

Chillers

Tag	— 40A				
Type	W (A) HR	W A HR	W A HR	W A HR	W A HR
Compressor	A ~~C~~ R (S)	A C R S	A C R S	A C R S	A C R S
Manufacturer	TRANE				
Model Number	CGAM 052A 2CD2				
Tons					
Age	<5YR				
Temp / Pressure gauges	Yes ✓✓ No___	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___
CHW Temp	Supply 52 Return 55	Supply___ Return___	Supply___ Return___	Supply___ Return___	Supply___ Return___
CHW Reset	OA L T NONE	OA L T	OA L T	OA L T	OA L T
Equipment Condition	1 2 3 (4) 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Chiller Types
W - Water Cooled
A - Air Cooled
HR - Heat Recovery

Compressor Types
A - Absorption
C - Centrifugal
R - Reciprocating
S - Screw

CHW Reset
OA - Outside Air
L - Load
T - CHWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New
3.+ 4. Repair / RetroCx

Heat Rejection

Cooling Towers

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5

Condensing Units

Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
DR- Dry Cooler
C - Condensing Unit
EC - Evaporative Cooling
HP - Air to Air HP
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC

Notes / Potential ECM's: _____

AIRSIDE INFORMATION

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Mech Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

AHU 3

Tag	Manufacturer	Type	Supply Fan HP		VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
Smoke Rm	Trane	100% Reuse	~~Return Fan HP~~		~~VFD___~~	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	42BVE10ND		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air	Ø		Reheat	E HW NG ST	2 3	Airside Economizer	Y N	
For Local AHUs Only:	# of units: 1		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: TOWER SIM 1-PAPTS Rm 113 no control. FORCES ROOM TRAINING FAILURE

Tag	Manufacturer	Type	Supply Fan HP	5	VFD✓	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
DOAU-1	INNOVENT	AHU MAY 2011	~~Return Fan HP~~		~~VFD___~~	~~Preheat~~	~~E HW NG ST~~	2 3	Setbacks	P SA T	
Model #	LASER-PL-3800		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer	Y N	
For Local AHUs Only:	# of units: 1		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: PERIMETER FAN/COIL 4-PIPE

IT ROOM 205 NEEDS A/C

Tag	Manufacturer	Type	Supply Fan HP		VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer	Y N	
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

IT ROOM 317 NEEDS WINDOW UNIT REPLACED

Notes/Potential ECMs:

Central AHU Type
- **CAV** - Constant Volume
- **DD** - Dual Duct
- **HV** - Heating and Vent Unit
- **MZ** - Multizone
- **SZ** - Single Zone
- **VRH** - Var. Vol. w/Reheat
- **VPFP** - Var. Vol. w/Parallel FP Boxes
- **VSFP** - Var. Vol. w/Series FP Boxes
- **VVVT** - Var. Vol. Var. Temp.

Local AHU Type
- **2P FCU** - 2 pipe FCU
- **4P FCU** - 4 pipe FCU
- **ACB** - Active Chilled Beam
- **CRAC** - Computer Room AC
- **GSHP** - Ground Source HP
- **HP** - Air to Air HP
- **PCB** - Passive Chilled Beam
- **PTAC** - Packaged Terminal AC
- **SS** - Mini Split System
- **VRF** - Variable Refrig. Flow
- **WU** - Window AC
- **WSHP** - Water Source HP

Source
- **E** - Electric
- **HW** - Hot Water
- **NG** - Natural Gas
- **ST** - Steam
- **CHW** - Chilled Water
- **DX** - Direct Expansion

Controls
- **DDC** - Direct Digital Controls
- **E** - Electric/Local
- **H** - DDC/Pneumatic
- **P** - Pneumatic

Setbacks
- **P** - Static Pressure Reset
- **SA** - Supply Air Reset
- **T** - Unoccupied Space Temp

Energy Recovery
- **RA** - Runaround Loop
- **WA** - Wraparound Loop
- **EW** - Enthalpy Wheel
- **PL** - Plate Heat Exchanger

Flow Control
- **CV** - Constant Volume
- **Int** - Interminent
- **3SPD** - 3 Speed Control
- **VFD** - Variable Frequency Drive

Building Name:_____

Air Handling Units (Cont.)

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
T11A	BARD	WALL MOUNT	Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	WH243DA04		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units: 1		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
EF	—	UP BLAST	Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	EFU 1/2/3/5		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: EXHAUST FAN FOR BATHROOMS

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
13 FCU	AHU 107		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	AHU 212 AHU 312		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Central AHU Type
CAV - Constant Volume
DD - Dual Duct
HV - Heating and Vent Unit
MZ - Multizone
SZ - Single Zone
VRH - Var. Vol. w Reheat
VPFP - Var. Vol. w Parallel FP Boxes
VSFP - Var. Vol. w Series FP Boxes
VVVT - Var. Vol. Var. Temp.

Local AHU Type
2P FCU - 2 pipe FCU
4P FCU - 4 pipe FCU
ACB - Active Chilled Beam
CRAC - Computer Room AC
GSHP - Ground Source HP
HP - Air to Air HP
PCB - Passive Chilled Beam
PTAC - Packaged Terminal AC
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC
WSHP - Water Source HP

Source
E - Electric
HW - Hot Water
NG - Natural Gas
ST - Steam
CHW - Chilled Water
DX - Direct Expansion

Controls
DDC - Direct Digital Controls
E - Electric Local
H - DDC/Pneumatic
P - Pneumatic

Setbacks
P - Static Pressure Reset
SA - Supply Air Reset
T - Unoccupied Space Temp
Energy Recovery
RA - Runaround Loop
WA - Wraparound Loop
EW - Enthalpy Wheel
PL - Plate Heat Exchanger
Flow Control
CV - Constant Volume
Int - Interminent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive

JACOBS

BUILDING MONITOR QUESTIONNAIRE

BUILDING NUMBER: [BLDG T-111/T-111A] **BUILDING MONITOR: GM1 RICHARDSON**

Please complete the following. Space is provided at end of form for Additional/detailed comments

General Building Condition: 5 = Good Condition 1 = Poor (Circle Answer)

1.	What is the general condition of the building?	5	4	3	2	1	N/A
2.	What is the general condition of the HVAC equipment?	5	4	3	2	1	N/A
3.	What is the general condition of the HVAC controls?	5	4	3	2	1	N/A
4.	What is the general condition of the Plumbing/Domestic water?	5	4	3	2	1	N/A
5.	What is the general condition of the Electrical gear and distribution? LIGHTING SENSORS	5	4	3	2	1	N/A
6.	Are any of the MEP/FP systems not capable of meeting your mission needs? LEAKS, COOLING, ELECTRICITY WIRING	YES			~~NO~~		
7.	Have there been any recent renovations? (Indicate yes/no, year) If yes, provide short description at end of survey.	YES	NO		Year: 2014/15		
8.	Have there been any recent major equipment replacements? If Yes, please list at end of survey. I-PARTS ROOM A/C POWER SINKS	YES	NO		Year: 2015		
9.	What is the total occupancy of the building?	No. of People: 85/70 >160					
10.	Have there been issues with Indoor Air Quality? If yes, please provide short description of issue/location(s) at end of survey. NOT MUCH VENT	YES			NO		
11.	Who Maintains the building? (Contact Info): W/O TO NAVFAC						

Building Occupancy – Please indicate times of occupancy

1.	Weekday	~~164~~	150
2.	Saturday	0	2
3.	Sunday	0	2
4.	Holiday	4	2
5.	Special Event/Other	80	

Overall Building Thermal Comfort: 5=Good 1=Poor

1.	Winter – Spaces maintain temperature. (No or Low number of cold calls. No or low number of complaints of static and stuffiness.)	5 4 3 2 1 N/A
2.	Spring - Spaces maintain temperature. (No or Low number of hot/cold calls. No or low number of complaints of humidity and stuffiness.)	5 4 3 2 1 N/A WINDOWS
3.	Summer - Spaces maintain temperature. (No or Low number of hot/cold calls. No or low number of complaints of humidity and stuffiness.)	5 4 3 2 1 N/A
4.	Fall - Spaces maintain temperature. (No or Low number of hot/cold calls. No or low number of complaints of humidity and stuffiness.)	5 4 3 2 1 N/A WINDOWS
5.	Are there more complaints from occupants for cold or hot calls and what time of year?	SUMMER
6.	Are there complaints of draftiness, stuffiness or high humidity?	STUFFINESS, DRAFTS

Building Utilities:

UNIT BROUGHT BACKUP POWER

1.	Have power reliability issues occurred in the last year?	YES	NO
2.	Is the building served by Natural Gas?	YES	NO
3.	Is the building served by base distributed Steam?	YES	NO
4.	Is the building served by base distributed Chilled Water?	YES	NO
5.	Is the building connected to base wide BAS/BMS?	YES	NO
6.	Are any of the utilities serving the building metered? (List applicable utilities).	YES	NO

Building Cooling Systems: 5=Good 1=Poor

1.	What type of air conditioning system(s) are installed	TRANE SYSTEM		
2.	What is the general condition of the air conditioning equipment?	5 4 3 2 1 N/A		
3.	Is preventative maintenance being performed on equipment?	YES		NO
4.	Has any of the air conditioning equipment been recently replaced (Indicate yes/no, year). If yes Please list at end of survey	YES	NO	Year: 2015
5.	What is the typical cooling set point of the spaces? (Occupied/Unoccupied)	Occupied: 70		Unoccupied: OFF

Building Heating Systems:

1.	What type of heating system(s) are installed? (Steam, Hot Water, Gas Fired, etc….)	STEAM		
2.	What is the general condition of the heating equipment?	5 4 3 2 1 N/A		
3.	Has any of the heating equipment been recently replaced? (Indicate yes/no, year) If yes Please list at end of survey.	YES	NO	Year:
4.	What is the typical heating set point of the spaces? (Occupied/Unoccupied)	Occupied 70		unoccupied OFF

Building Ventilation/Exhaust Systems:

1.	What type of Ventilation system(s) are installed? (Air Handling Units, Natural Ventilation, Supply/Exhaust Fans)	NATURAL VENTS		
2.	Does the building have kitchen exhaust or special exhaust systems? If yes please list at end of survey.	YES	NO	N/A
3.	What is the general condition of the ventilation equipment?	5 4 3 2 1 N/A		
4.	Has any of the ventilation or exhaust equipment been recently replaced? (Indicate yes/no, year) If yes, please list at end of survey.	YES	NO	Year:
5.	What is the typical set point of the spaces? (Occupied/Unoccupied)	Occupied: 70		Unoccupied: OFF

Building Controls:

1.	What type of HVAC Control system(s) are installed? (Pneumatic, Electric/Electronic, DDC, etc...).	ELECTRIC		
2.	Is the building controlled or monitored by the base wide BAS?	YES	NO	N/A
3.	Does the building have any standalone controls (e.g. unit heaters on adjustable line voltage thermostats? If yes, please list types of equipment with standalone controls at end of survey.	YES	NO	N/A
4.	What is the general condition of the control equipment?	5 4 3 2 1 N/A		
5.	Has any of the control equipment been recently replaced? (Indicate yes/no, year) If yes, please list at end of survey	YES	NO	Year:
6.	Is the control system integrated with lighting controls?	YES		NO

Building Lighting Systems:

1.	What types of Lighting system(s) are installed? (Fluorescent, Incandescent, LED, etc…)	LED/ FLUORESCENT/ INCANDESCENT		
2.	Does the building have exterior lighting Controls? (Daylight sensor, time clock)	YES	NO	Type BOTH
3.	Does the building have interior lighting Controls? (Daylight sensor, time clock, occupancy sensors)	YES	NO	Type OCC. SENSORS
4.	What is the general condition of the lighting equipment?	5 4 3 2 1 N/A		
5.	Has any of the lighting equipment been recently replaced? (Indicate yes/no, year) If yes, please list at end of survey	YES	NO	Year:

List major issues/concerns of the building:

THIS IS AN OLD BIULDING AND STILL HAS LEAD BASE PAINT / ABESTOSE THOUGHT OUT THE FACILITY AND ALL THE BUILDING EQUIPMENT IS OLD AS WELL AND NEED TO BE UPATED THESE ARE THE EXTRA DESCREPECY AS FOLLOWS:

1. LEAD BASE PAINT SHEDDING ON ALL THE STAIRWELL HALLWAYS.

2. AC UNITS CUT OFF FREQUENTLY DURING THE SUMMER TIME CREATEING EQUIPMENT OVER HEAT AND MOLDING.

3. WATER LEAKS AT WINDOW SEALS CREATE MOLD AND RUST AND CAUSES DRAFTS.

4. IN ROOM 103(IPARTS) HAS A NEW COOLING UNIT FOR THE TOWER SIMULATOR SYSTEM.

5. THE HEATING UNITS ARE THE SAME AS THE COOLONG UNITS/ OLD EQUIPMENT.

6. BATHROOM REPAIRS/ PIPE LEAKS, IN-OPERATABLE SINKS, CORROSION /RUST.

7. SENSOR LIGHT EQUIP IN T-111 MALFUCNTION FREQUENTLY/OLD EQUIPMENT.

8. FOUNDATION CRACKS CAUSES LEAKS AND RUST IN (T-111A)

1 BUILDING T111 - FIRST FLOOR PLAN

0 10' 20'

Scale: GRAPHIC

NORTH

VERIFIED FLOOR PLAN - FOR OFFICIAL USE ONLY

NFA100001075427_T111_01_FP.dwg 05 JAN 2012

NAVFAC MIDLANT GeoReadiness Center

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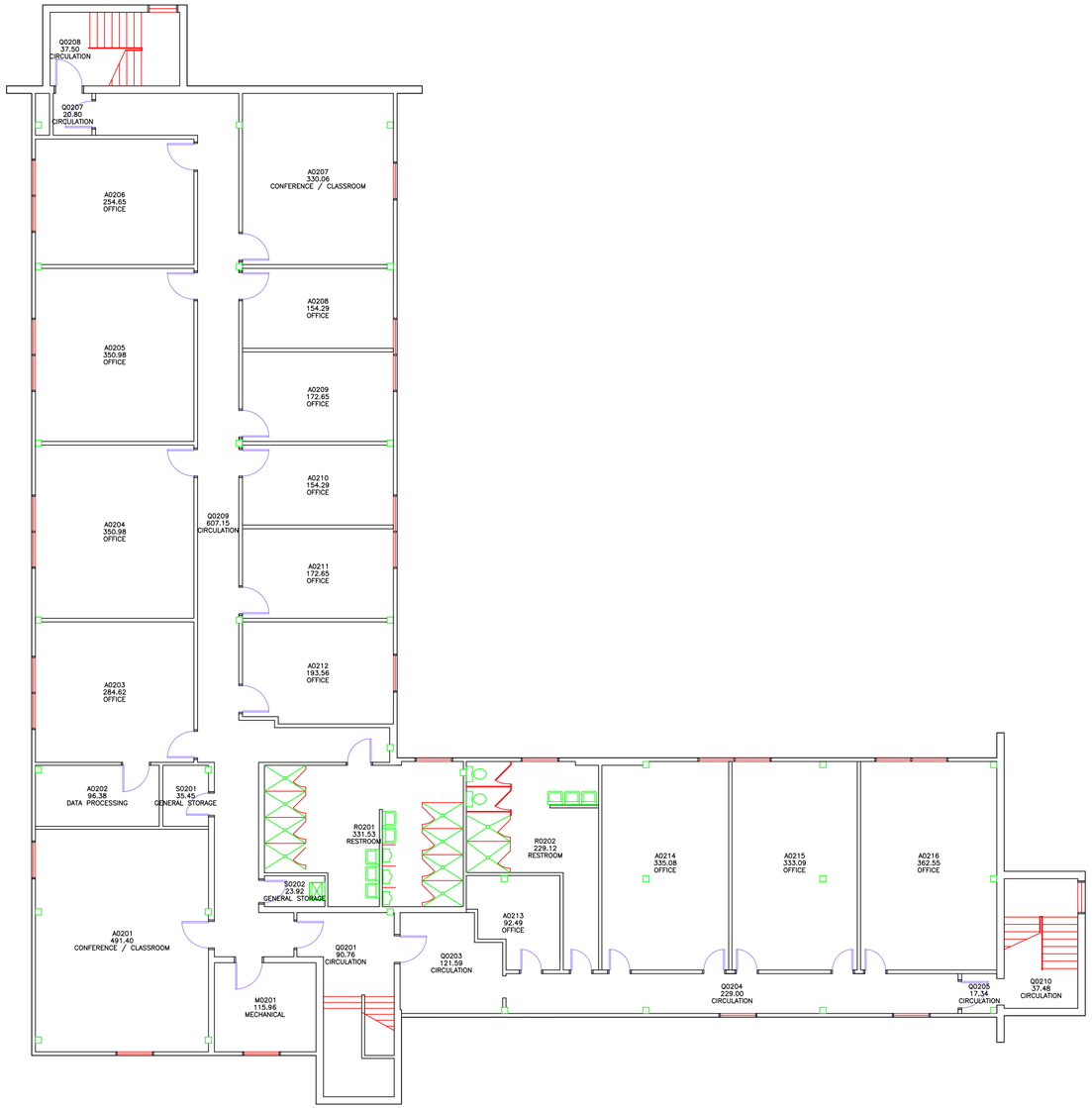
Building T111
First Floor

BD-GIS Mid-Atlantic
Norfolk, VA 23511
(757) 444-4716
PWCNORVA_GIS_WEB@nmci-isf.com



1 BUILDING T111 - SECOND FLOOR PLAN

0 10' 20'

Scale: GRAPHIC

NORTH

VERIFIED FLOOR PLAN - FOR OFFICIAL USE ONLY

NFA100001075427_T111_02_FP.dwg 05 JAN 2012

NAVFAC MIDLANT GeoReadiness Center

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Building T111
Second Floor

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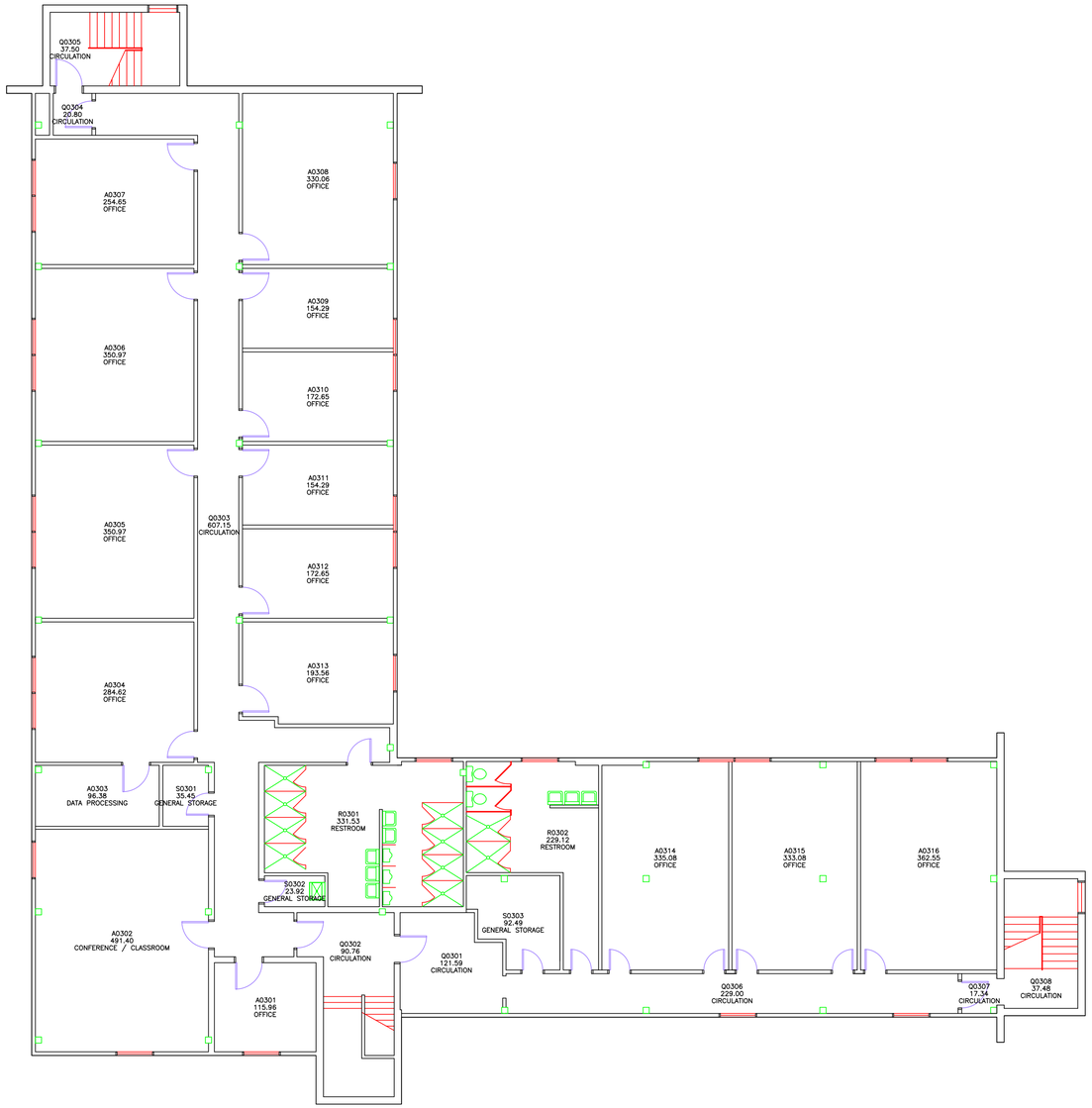
PWCNORVA_GIS_WEB@nmci-isf.com



1 BUILDING T111 - THIRD FLOOR PLAN

0 10' 20'
Scale: GRAPHIC

NORTH

VERIFIED FLOOR PLAN - FOR OFFICIAL USE ONLY

NFA100001075427_T111_03_FP.dwg 05 JAN 2012

NAVFAC MIDLANT GeoReadiness Center

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Building T111
Third Floor

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Norfolk, VA 23511
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Part 6 - Attachments
Option 1 - Building 3016

1. Initial Building Survey Data
2. Building Plan

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/5/2015	**Building No.**	3016
Building Name:	Personnel support facility	**Facility Type:**	Library / Continuing Education
Facility Manager:	Laveren Rushin	**Jacobs CX Lead:**	Ross Watson
Building Monitor:	Maria Rowe	**Jacobs CX Junior:**	Andy Huynh
		Jacobs Mech Engineer:	Trevor Behar
		Jacobs Elec Engineer:	David Williams

1. Facility Investigation Narrative:	
Description:	The building is located north of the base. The two story facility is used as a library, a parlor recreation facility, and a continuing education facility with classrooms and computer labs. The facility is about 38,000 square feet.
Facility Usage History:	The building is being used as originally intended. An average of 2500 people use the facility weekly.
Renovation History:	None
As-Built Documents:	Control Drawings, Floor Plans & TAB documents were downloaded from the BAS when available. Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	The building BM and FMS had knowledge of the facility.
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	A single outdoor air cooled chiller provides chilled water to the building. A steam to hot water heat exchanger provides heating hot water to the building. Currently the condensate pump has failed and condensate is flowing out of the condensate vent on the exterior of the building. The air handling units has hot water and chilled water coils. The air handling units have a variable speed supply fan and a variable speed return fan. The chiller has a primary and secondary pumping system with the secondary pump on VFDs. The building is separated into zones served by VAVs with
DDC Description:	The heating and cooling system are controlled by the automated logic system while the ventilation system is controlled by Siemens. This requires a separate computer to be used in the BAS control room for the Siemens system. The DDC had eight room sensors in failure. The AHU-1 zone has a very high CO2 reading of 1992 ppm with 100% OA. There are 17 sensor failures on the AHU.
Lighting Description:	Lighting consists of a large amount of 2x4, 2 lamp and 4 lamp diffuser and parabolic lay-in T8 fluorescent fixtures. There are also 1x4, 2 lamp, T8 surface mount, pendant mount, and lay-in fluorescent fixtures used. Recessed 6" recessed CFL units were also used. Many of the spaces have motion detector or daylighting control. Exit fixtures are well positioned and the batteries responded to test conditions.
Equipment Deficiencies:	The condensate pumps have failed and has backed up into the HX, flooding the HX. CO2 levels for AHU-1 are at 1900ppm with 100% OA damper open and RA damper closed. It is possible the CO2 sensor needs recalibration but the AFMS is reading a negative flow. The AHU-4 AFMS is reporting an error.
Other Information:	

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/5/2015	**Building No.**	3016
Building Name:	Personnel support facility	**Facility Type:**	Library / Continuing Education
Facility Manager:	Laveren Rushin	**Jacobs CX Lead:**	Ross Watson
Building Monitor:	Maria Rowe	**Jacobs CX Junior:**	Andy Huynh
		Jacobs Mech Engineer:	Trevor Behar
		Jacobs Elec Engineer:	David Williams

2. ECM Study Recommendations:	Priority
a. VAV systems not properly re-heating, spaces being overcooled.	M
b. Replace chiller with variable flow chiller	M
c. Change all lay-in fixtures to LED equivalent using exiting circuits and switching	M
d.	
e.	
f.	

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning
a. AHU 1,2,3 and 4
b. Heating hot water system
c.
d.
e.
f.

4. Corrective Actions	Action Code
a. The condensate pumps have failed and are not pumping condensate back to the steam plant. The liquid has risen up the steam vent from the condensate	1
b. Ceiling fans run 24/7 because the pull cords have broken off. No switches were ever provided for the fans.	1
c. All AHUs have dirty filters and coils.	1
d. Numerous fan belts are loose.	1
e. Repair motion control in 1st floor administrative area.	1
f. Correct eight (8) failed room temperature sensors and 17 AHU sensor failures on Siemens BAS.	2

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a. Lighting monitoring at the switch level would require approximately 40 points.
b. Lighting monitoring at the circuit level would require approximately 25 points. This would avoid recircuiting non-lighting circuits from Lighting panels
c. Lighting monitoring at the panel level would require approximately 2 points. This may require recircuiting non-lighting circuits away from lighting panels.
d.
e.
f.

6. Recommended Mechanical Control Points:
a. Place the Siemens system onto the Automated Logic.
b.
c.
d.
e.
f.

COOLING PLANT

Building Name: 3016

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Chillers

Tag					
Type	W (A) HR	W A HR	W A HR	W A HR	W A HR
Compressor	A C (R) S	A C R S	A C R S	A C R S	A C R S
Manufacturer	York				
Model Number	YCAL0104				
Tons					
Age	2003 - 12 yrs				
(Temp) Pressure gauges	Yes ✓ No___	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___
CHW Temp	Supply 43.9 Return 47.8	Supply___ Return___	Supply___ Return___	Supply___ Return___	Supply___ Return___
CHW Reset	OA L T	OA L T	OA L T	OA L T	OA L T
Equipment Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Chiller Types
W - Water Cooled
A - Air Cooled
HR - Heat Recovery

Compressor Types
A - Absorption
C - Centrifugal
R - Reciprocating
S - Screw

CHW Reset
OA - Outside Air
L - Load
T - CHWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New
3.+ 4. Repair / RetroCx

Heat Rejection

Cooling Towers

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5

Condensing Units

Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
DR- Dry Cooler
C - Condensing Unit
EC - Evaporative Cooling
HP - Air to Air HP
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC

(1) (2) (3)
24748/24852/25530

Notes / Potential ECM's: STPT - 45.0 ± 1.5 °F

System 1 49645/49645/49645 (3

(1) (2)
System 2 34752/34751 Starts

15016/15169 Hours

Z-22

AIRSIDE INFORMATION

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Mech Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU-1	YORK	BC006	Return Fan HP		VFD__	Preheat	E (HW) NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	(CHW) DX	2 3	DCV	(Y) N	RA WA EW PL
Condition	1 2 (3) 4 5		% Outside Air			Reheat	E (HW) NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU-2	YORK	BC006	Return Fan HP		VFD__	Preheat	E (HW) NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	(CHW) DX	2 3	DCV	(Y) N	RA WA EW PL
Condition	1 2 (3) 4 5		% Outside Air			Reheat	E (HW) NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU-3	YORK		Return Fan HP		VFD__	Preheat	E (HW) NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	(CHW) DX	2 3	DCV	(Y) N	RA WA EW PL
Condition	1 2 (3) 4 5		% Outside Air			Reheat	E (HW) NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Central AHU Type
CAV - Constant Volume
DD - Dual Duct
HV - Heating and Vent Unit
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VPFP - Var. Vol. w Parallel FP Boxes
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H - DDC Pneumatic
P - Pneumatic

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P - Static Pressure Reset
SA - Supply Air Reset
T - Unoccupied Space Temp

Energy Recovery
RA - Runaround Loop
WA - Wraparound Loop
EW - Enthalpy Wheel
PL - Plate Heat Exchanger

Flow Control
CV - Constant Volume
Int - Interminent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive

Building Name:_____

Air Handling Units (Cont.)

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU 8			Return Fan HP		VFD__	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 (3) 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Central AHU Type
CAV - Constant Volume
DD - Dual Duct
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MZ - Multizone
SZ - Single Zone
VRH - Var. Vol. w Reheat
VPFP - Var. Vol. w/Parallel FP Boxes
VSFP - Var. Vol. w Series FP Boxes
VVVT - Var. Vol. Var. Temp.

Local AHU Type
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4P FCU - 4 pipe FCU
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CRAC - Computer Room AC
GSHP - Ground Source HP
HP - Air to Air HP
PCB - Passive Chilled Beam
PTAC - Packaged Terminal AC
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC
WSHP - Water Source HP

Source
E - Electric
HW - Hot Water
NG - Natural Gas
ST - Steam
CHW - Chilled Water
DX - Direct Expansion

Controls
DDC - Direct Digital Controls
E - Electric Local
H - DDC/Pneumatic
P - Pneumatic

Setbacks
P - Static Pressure Reset
SA - Supply Air Reset
T - Unoccupied Space Temp

Energy Recovery
RA - Runaround Loop
WA - Wraparound Loop
EW - Enthalpy Wheel
PL - Plate Heat Exchanger

Flow Control
CV - Constant Volume
Int - Interminent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive

3016

- Chiller has 2 stages (1st uses 3 compressors & 2nd uses 2)

- AHU 1 (York Model BC0060822)
  - Uses both OA & RA (100% OA @ visit running @ 60 Hz, 6.6A, 50%
  - Filter is dirty
  - Coils are dirty and beginning to show signs of corrosion
  - Supply CHW pipe is damaged
  - No supply / return CHW thermometer & gauges
  - 2 stage (Both Cooling & Heating)
  - One of the supply fan belts is loose

- RA 1 (Return Fan) 48.2 Hz, 1.3 A
  - Bad bearings

AHU 2 (York BC0061222)
- ~~Label~~ Written "Change filter once a year)
- Some coil condition
- RA 100%, OA 0% (On Reheat)
- Running @ 59.7 Hz, 4.8 A

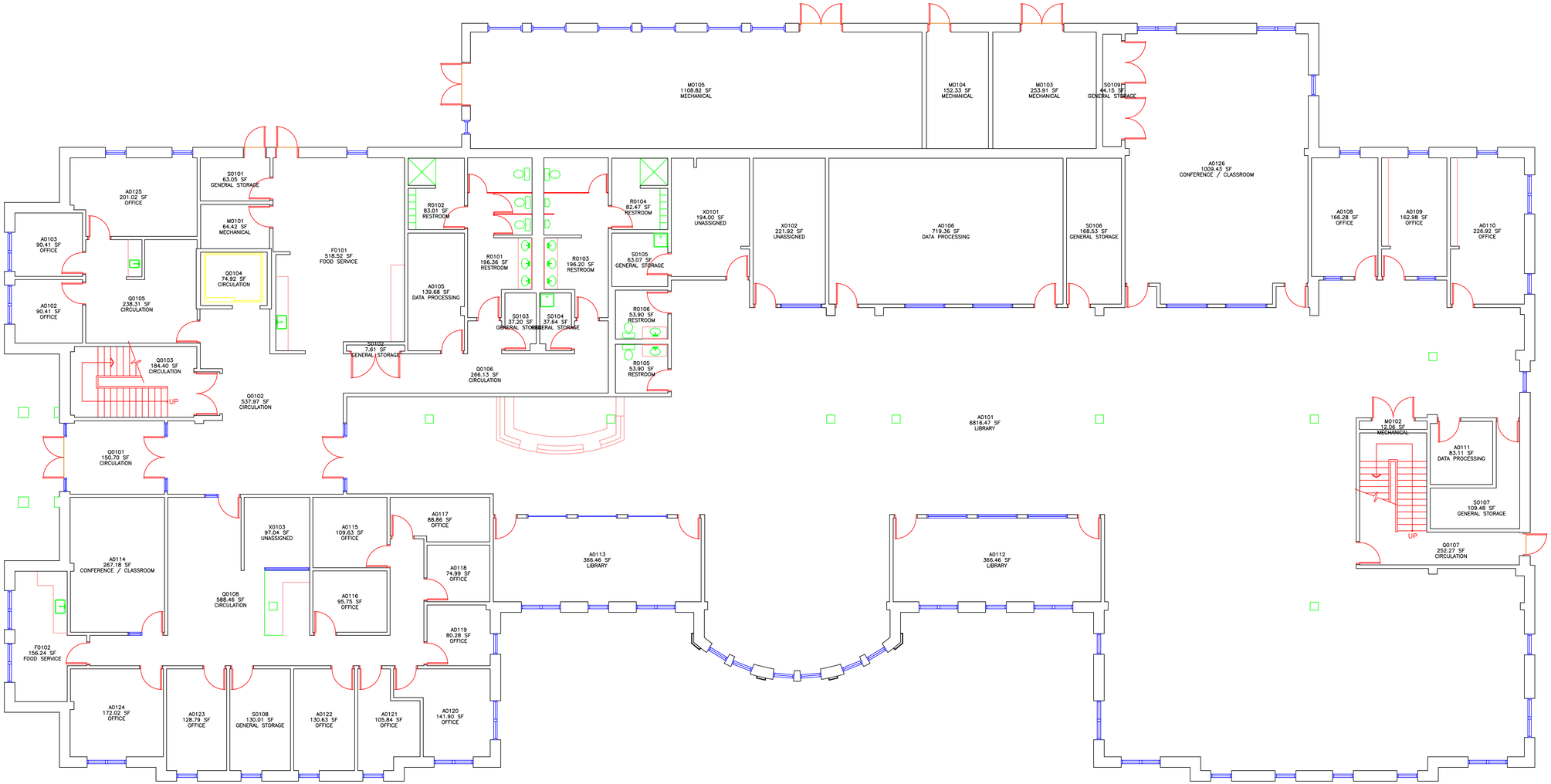
- RA 2 (51.1 Hz, 1.8 A)

- AHU 3
- 36.0 Hz, 5.1 A, 1056 RPM
- Coil same as above
- OA partially open?? or Closed

- RA 3 (50.8 Hz, 1.3 A)
- Loose belt, Bad bearing

CHW Pump
- P-2 5 HP, Base-Mounted, Emmerson AD77
- P-1 Century, 5 HP, EJ4AA16, Base mounted
- HW P Emmerson, 5 HP AD77, ~~85~~ GPM, 75 ft hd

268 GPM, 33 ft head



1 BUILDING 3016 - FIRST FLOOR PLAN

0 10′ 20′

Scale: GRAPHIC

NORTH

VERIFIED FLOOR PLAN 2006 - Source Unknown

Note: UOM is INCH for Adobe measuring tool

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Building 3016
First Floor

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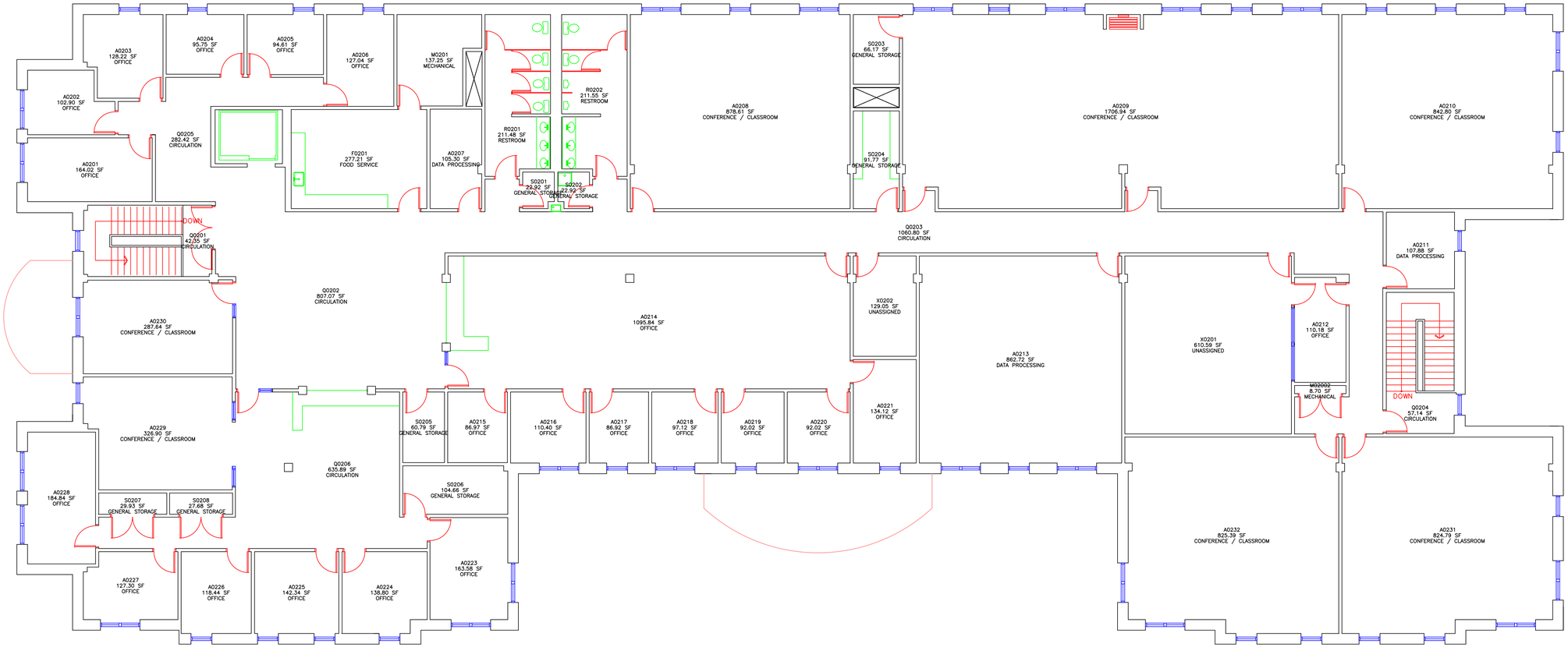

1 BUILDING 3016 - SECOND FLOOR PLAN

0 10′ 20′
Scale: GRAPHIC

NORTH

VERIFIED FLOOR PLAN 2006 - Source Unknown
Note: UOM is INCH for Adobe measuring tool

NFA20000344780_3016_02_Fp.dwg 06 SEP 2012

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Building 3016
Second Floor

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Part 6 - Attachments
Option 1 - Building 3854

1. Initial Building Survey Data
2. Building Plan

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/10/2015	**Building No.**	3854
Building Name:	Operations Support Building	**Facility Type:**	Admin / Training
Facility Manager:	Robert Jackson	**Jacobs CX Lead:**	Ross Watson
Building Monitor:	Tom Landreth	**Jacobs CX Junior:**	Andy Huynh
		Jacobs Mech Engineer:	Trevor Behar
		Jacobs Elec Engineer:	David Williams

1. Facility Investigation Narrative:	
Description:	The building is located near the center of the base, next to the Seal Buildings Perimeter. The two story facility is used as an operations facility with classroom training and administrative offices. The facility is about 59,000 square feet.
Facility Usage History:	The building was constructed in 1999 and has always been used as seal operation support space.
Renovation History:	A major interior renovation of the front of the building was completed 3 years ago encompassing roughly 5000 square feet. Most additional renovations have been to interior walls to accommodate various admin spaces over the years.
As-Built Documents:	Control Drawings, Floor Plans & TAB documents were downloaded from the BAS when available. Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	Wally Walpa was knowledgeable of the facility along with having access to Automated Logic.
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	The air handling units uses a dual temperature system. The air handling units deliver conditioned outside air to VAV boxes. The chilled water system consist of a chiller with two constant volume primary pumps. The heating loop uses two constant volume primary pumps.
DDC Description:	The equipment has electronic controls and were found on the DDC.
Lighting Description:	Lighting consists of a large amount of 2x4, 3 lamp, parabolic T8 fluorescent fixtures. 1x4 2 lamp, T8 surface mount fluorescent fixtures are used in stairwells, locker rooms, and bathrooms. There were some areas that had indirect lay in fixtures. Two level switching is used for most areas with three lamp fixtures. Lighting levels seemed appropriate for most areas with a few sights over lit. There is no motion detector or daylighting control. Exit fixtures are well positioned . Our spot checking of operation in the test battery mode confirmed proper operation. Occupants from several
Equipment Deficiencies:	The VAV within the quarter deck is inoperable. AHU-2's supply fan cage has been damaged causing the unit to be inoperable. VAV-7 trips offline electronically consistently. AHU-6 has freezing issues and is set in alarm. VAV-32 has been offline for months. AHU-3 has dirty coils and has chilled water pipe insulation damage.
Other Information:	The mechanical room were filled with tenant storage, dirty air filters, discarded HVAC parts and generally showed lack of responsibility for the space.

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/10/2015	**Building No.**	3854
Building Name:	Operations Support Building	**Facility Type:**	Admin / Training
Facility Manager:	Robert Jackson	**Jacobs CX Lead:**	Ross Watson
Building Monitor:	Tom Landreth	**Jacobs CX Junior:**	Andy Huynh
		Jacobs Mech Engineer:	Trevor Behar
		Jacobs Elec Engineer:	David Williams

2. ECM Study Recommendations:	Priority
a. Replace (2) 7.5 HP Pump motors with more energy efficient pumps	M
b. Place 5.0HP HW Supply pump on VFD, install pressure sensor in HW loop	M
d. Change all lay-in fixtures to LED equivalent using exiting circuits and switching	M
e. Install wireless to switch, ceiling mounted motion sensor control for rooms where 24 hour operation is not used.	M
f. Change High Bay Mercury Vapor fixtures with LED Equivalent using existing circuits and switching. Install motion sensor control.	M
g.	

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning
a. All AHU and RTU
b. Heating water system
c. Chilled water system
d.
e.
f.

4. Corrective Actions	Action Code
a. AHU-2 supply fan	1
b. AHU-6 (RTU) require refrigerant	1
c. Repair VAV's that are offline	1
d. Relamp main stairway decorative naval lantern CFL fixtures to improve occupant morale.	2
e. AHU-1&2 Co2 setpoint set to 1500ppm, reduce to base standard.	1
f. AHU-1 in low static alarm and fan at full speed.	1
g. AHU-2 has a supply fan failure.	1

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a.
b.
c.
d.
e.
f.

6. Recommended Mechanical Control Points:
a. Humidity sensors in locker rooms.
b. CO2 control on RTU-2
c.
d.
e.
f.

3854

JACOBS

FACILITY MANAGEMENT SPECIALIST (FMS) QUESTIONNAIRE

BUILDING NUMBER: [3854] **FACILITY MANAGEMENT SPECIALIST:** Robert Jackson

BUILDING MONITOR (BM): _____

Please complete the following. Space is provided at end of form for Additional/detailed comments.

General Building Condition: 5 = Good Condition 1 = Poor (Circle Answer)

1.	What is the general condition of the building?	5	(4)	3	2	1	N/A
2.	What is the general condition of the HVAC equipment?	5	(4)	3	2	1	N/A
3.	What is the general condition of the HVAC controls?	5	(4)	3	2	1	N/A
4.	What is the general condition of the Plumbing/Domestic water?	5	(4)	3	2	1	N/A
5.	What is the general condition of the Electrical gear and distribution?	5	(4)	3	2	1	N/A
6.	Have there been any recent renovations? (Indicate yes/no, year)	YES	(NO)	Year:			
7.	Have there been any recent major equipment replacements?	YES	(NO)	Year:			
8.	What is the approximate occupancy of the building?	No. of People: 500					
9.	What type of HVAC controls are installed (Pneumatic, Electric, DDC, None)?						
10.	Does the building have Lighting Controls?	YES	(NO)				
11.	Who Maintains the building (Contact Info):						
12.	Is the building or any space of the building a SCIF?	(YES)	NO				

Building Thermal Comfort: 5=Good 1=Poor

1.	Winter – Spaces maintain temperature. (No or Low number of cold calls. No or low number of complaints of static and stuffiness.)	5	4	(3)	2	1	N/A
2.	Spring - Spaces maintain temperature. (No or Low number of hot/cold calls. No or low number of complaints of humidity and stuffiness.)	5	4	(3)	2	1	N/A
3.	Summer - Spaces maintain temperature. (No or Low number of hot/cold calls. No or low number of complaints of humidity and stuffiness.)	5	4	(3)	2	1	N/A
4.	Fall - Spaces maintain temperature. (No or Low number of hot/cold calls. No or low number of complaints of humidity and stuffiness.)	5	4	(3)	2	1	N/A

- MANY MOTORS BURNED UP IN PAST DUE TO BROWN OUT. MOTORS REPLACED BUT NOT ALIGNED AND BELTS ARE CONSTANTLY ERODED.

1999 LIGHTING UPGRAD

VAU TRIPPING OFFLINE ELECTRICAL
VAU-7

AHU-2
AHU-6 NO FREON MAJOR LEAK

BM ARE CHANGING FILTER CHANGING EVERY THREE MONTHS.

AHU 4+5 IN SCIF

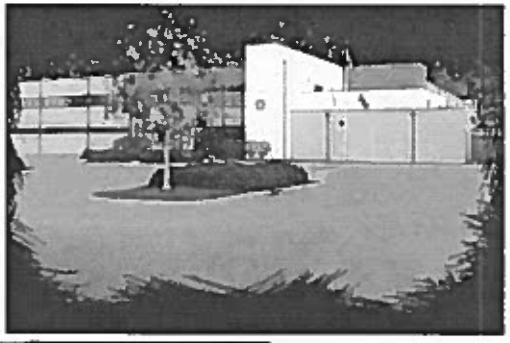
BOILER VENT ISSUE

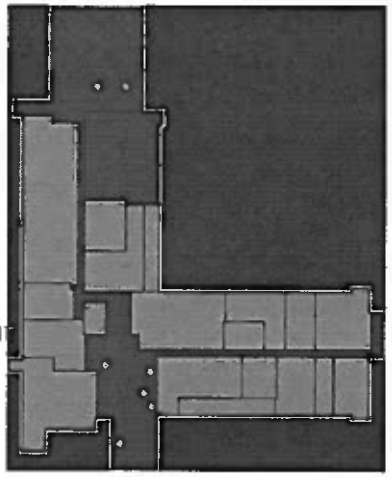
WALLY - 462-5195

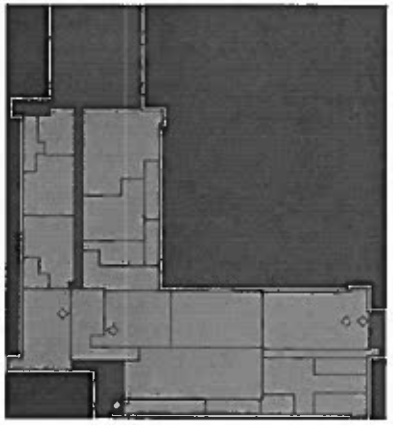
? °F
? %rh

Documentation

3854 Naval Special Warfare Group 2 (NSWG2)







First Floor

Second Floor

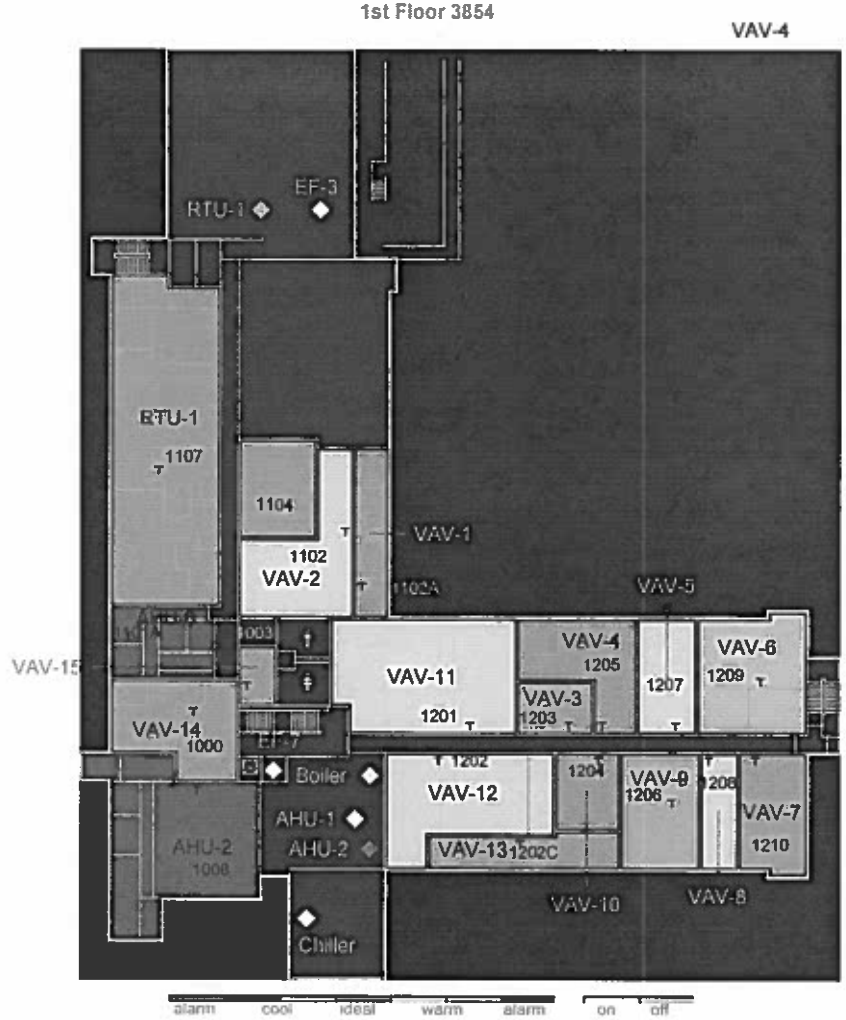
alarm cool ideal warm alarm

on off

65.0 °F
82.5 %rh

1st Floor 3854

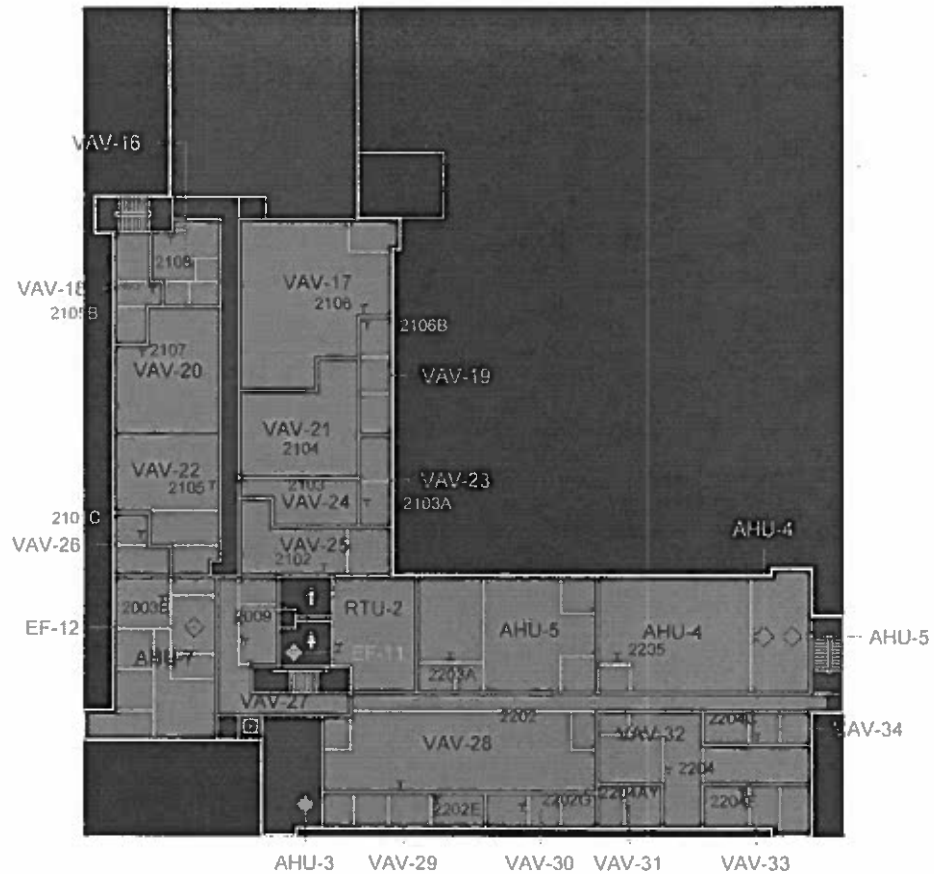
To: Summary
First Floor
Second Floor



? °F
? %rh

2nd Floor 3854

To: Summary
First Floor
Second Floor



alarm cool ideal warm alarm on off

Mech Room 3854

Color	Name	Status	Address	Reference Name	Type
	..Up to '3854 Naval Special Warfare Group 2 (NSWG2)'				
	Chiller 3854	?	24075:92	#chiller_3854	csac-1-2p-3854
	Boiler 3854	?	24075:91	#boiler_3854	boiler-1-2p-mxvlv
	AHU-1 3854	?	24075:61	#ahu-1_3854	vav-ahu-econ-oafms-fbhw-cw-dehum-co2
	AHU-2 3854	?	24075:62	#ahu-2_3854	szahu-econ-hw-cw-3
	OA Conditions 3854	?	24000:172.16.9.7	#oa_conditions_3854	oa_conditions_local_net_41

3854

VAV w/in quarterdeck does not work

AHU2 squirrel cage is broken causing fan blades to be broken

AHU 2 & AHU 3 could have the same deficiencies

- VAV 2 reading 74°F / occupied
- VAV tripping offline electrically constantly
  ↳ VAV 7

Robert Jackson
↳ knows the issues of the facility

- AHU2 & AHU 6 are in alarm
  ↳ AHU 6 (RTU freeze issue / Leaking freezer)
  ↳ (Process of change)
- VAV 32 has been offline for sometime now.
- Lack of maintenance
  ↳ Filter change once every 3 months

- Dam stars control room lacks cooling
- AHU 3
  - Coils are dirty
  - Leaking filter change
  - DC Voltage 100.90%
  - Output current 39.67%
  - 37.19 Hz
  - Insulation is damaged

25 HP Supply fan motor

- AHU 9 & 5 are above ceiling and in secured area w/out access

Chiller

York YLAA0141 HE46

R 410 A

2 stage (3 comp / 2 comp) hermetic

AHU 1 60.00 Hz VFD (800 CFM OA)

70.3 F OA

AHU 2

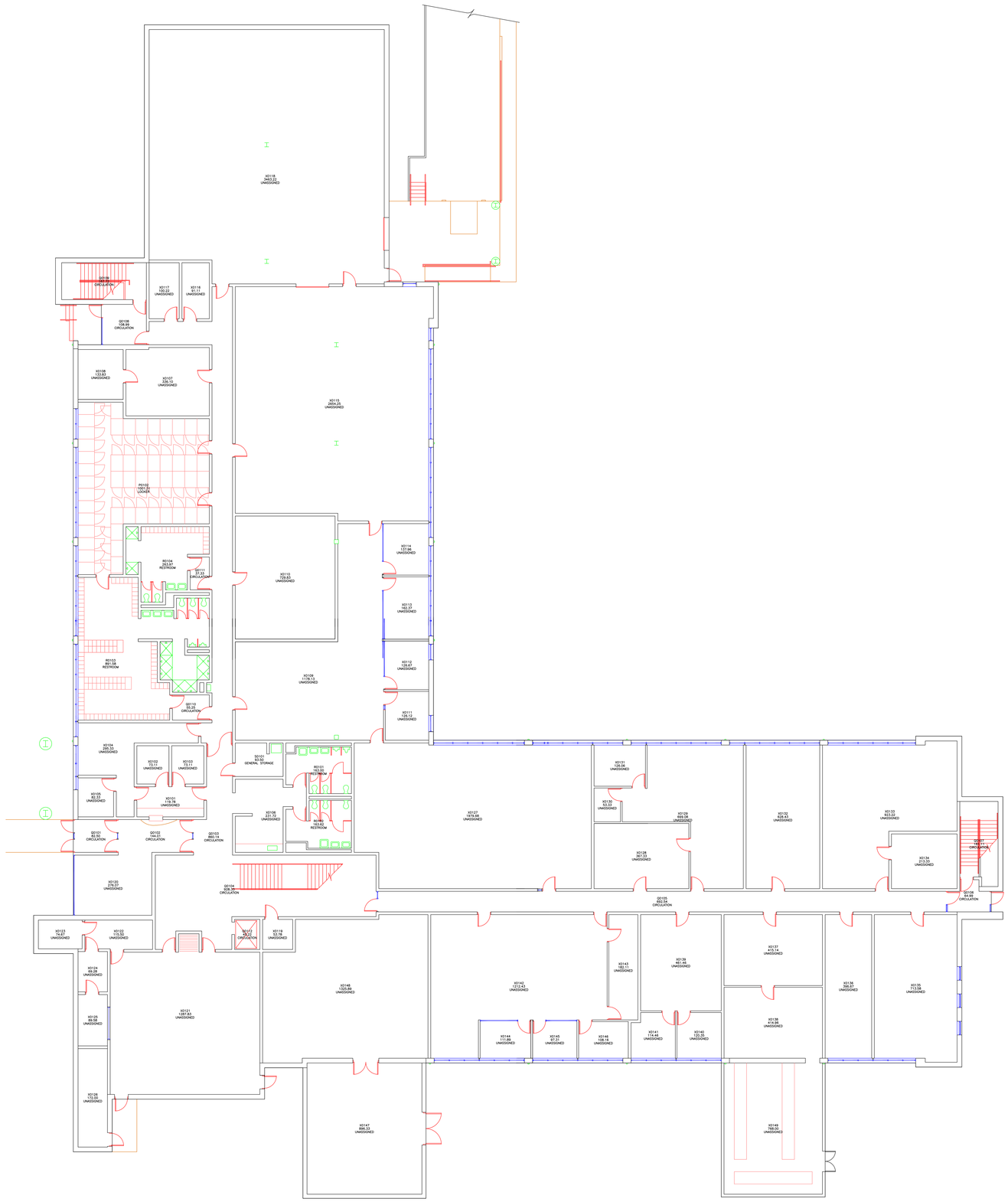
OA CFM 1 & CFM 2 AHU 3 (757 CFM OA)

Main Drain issues (usually snaked out)

P-1A 7.5 HP
P-1B-C 7.5 HP } CWS

P-2A 5 HP
P-2B-S 5 HP } HWS

2 Generators for control rooms w/in facility



1 BUILDING 3854 - FIRST FLOOR PLAN

VERIFIED FLOOR PLAN

0 20' 40'

Scale: GRAPHIC

NORTH

2006 - Contractor Collected

Note: UOM is INCH for Adobe measuring tool

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Building 3854

First Floor

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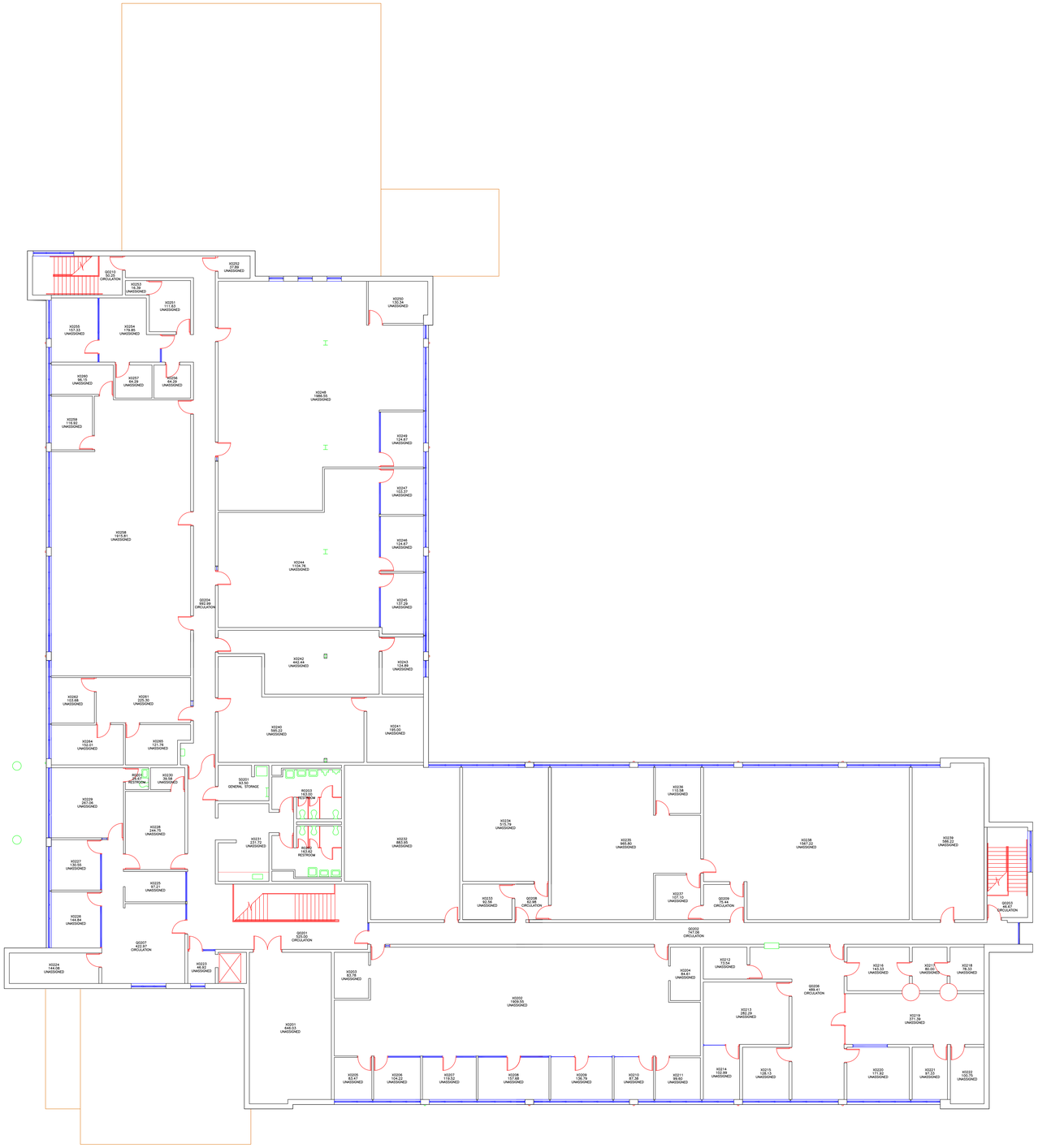

1 BUILDING 3854 - SECOND FLOOR PLAN

Scale: GRAPHIC 0 20' 40'

NORTH

VERIFIED FLOOR PLAN

2006 - Contractor Collected

Note: UOM is INCH for Adobe measuring tool

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Building 3854
Second Floor

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Part 6 - Attachments
Option 2 - Building 3504

1. Initial Building Survey Data
2. Building Plan

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/9/2015	**Building No.**	3504
Building Name:	EWTGLANT/NECC/THEATER	**Facility Type:**	Theater, Offices and conference/auditoriur
Facility Manager:	Bryan Rhodes	**Jacobs CX Lead:**	Paul Nelson
Building Monitor:	Willie Showell/Rick Pokorny	**Jacobs CX Junior:**	Artheley 'Lee' Weeks
		Jacobs Mech Engineer:	Carlos Teran
		Jacobs Elec Engineer:	David Williams

FACILITY PHOTO

1. Facility Investigation Narrative:	
Description:	Building 3504 EWTGLANT/NECC/THEATER is a 161,238 gross SQFT facility consisting primarily of command administartion offices, classrooms and several secure office areas. The building was constructed in 1955.
Facility Usage History:	The facility is primarily used as an administration building.
Renovation History:	Several pieces of equipment that have been upgraded. Two new package units and two new chillers have been installed in recent years. 14 mini split AC units have been added in recent years.
As-Built Documents:	Control Drawings and Sequence of Operation documents where downloaded from the BAS . Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	The FMS indicated that they experience consistent issues with the control and sequencing of the mechanical heat and cooling equipment. This in turn creates comfort issues within the building.
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	The mechanical cooling for the facility is primarily handled by air cooled chillers. Heating is provided by a steam/hot water heat exchanger. Direct steam from the central plant is provided to the Theater. AHUs, FCUs and DX units provide most of the conditioned air to the building. Chilled water and hot water pumps circulate the water required by the HVAC units.
DDC Description:	The facility HVAC is primarily controlled by an Automated Logic DDC. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Lighting Description:	Lighting consists of a large amount of 2x4, 2 lamp, 3 lamp and 4 lamp diffuser and parabolic lay-in T8 flourescent fixtures. 1x4 2 lamp, T8 surface mount flourescent fixtures are also used. 2x2 u-tube flourescent fixtures were also used. There is no motion detector or daylighting control. Exit fixtures are well positioned, however some of the emergcy lighting did not work when tested on battery power. The theeater main seating areas were lit with incandescent recessed fixtures and CFL wall scounces. The front lobby contained pendant mounted spot LED lighting. Other theator
Equipment Deficiencies:	The front end of the BAS does not fully reflect what is actually on site. The control sequence of certain mechanical equipment requires revision. A high percentage of exhaust fans are not operating. AHU-17 not properly working as evident by spot coolers located through out the are served.
Other Information:	

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/9/2015	**Building No.**	3504
Building Name:	EWTGLANT/NECC/THEATER	**Facility Type:**	Theater, Offices and conference/auditoriur
Facility Manager:	Bryan Rhodes	**Jacobs CX Lead:**	Paul Nelson
Building Monitor:	Willie Showell/Rick Pokorny	**Jacobs CX Junior:**	Artheley 'Lee' Weeks
		Jacobs Mech Engineer:	Carlos Teran
		Jacobs Elec Engineer:	David Williams

FACILITY PHOTO

2. ECM Study Recommendations:	Priority
a. Install VFD on supply fan (>=5 HP) of VAV AHUs	H
b. Change all lay-in fixtures to LED equivilent using exiting circuits and switching	M
c. Install motion sensor control for rooms where 24 hour operation is not used.	M
d. Replace the exit and emergency lighting system with new LED units using wireless monitoring. Use existing power circuits.	M
e. Replace Aisle mounted cove lighting with lay-in fixtures.	M
f.	

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning
a. Chillers
b. Chilled water pumps
c. Chilled water AHUs
b. Full DDC Retro-commissioning
e.
f.

4. Corrective Actions	Action Code
a. Review control sequence of mechanical systems	2
b. Replace non-functioning exhaust fans	2
c. Install isolation valves of chillers and control valve on chiller bypass.	2
c. Install missing temperature and pressure gauges of HVAC equipment	1
e. Repair insulation of chilled water and steam pipe of Theater HVAC	2
f. Replace batteries in exit/emergency lamp fixtures to provide emergency exiting during loss of power. (Alternate - see ECM above)	1

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a. Lighting monitoring at the switch level would require approximately 300 points.
b. Lighting monitoring at the circuit level would require approximately 95 points. This would avoid recircuiting non-lighting circuits from Lighting panels
c. Lighting monitoring at the panel level would require approximately 6 points. This may require recircuiting non-lighting circuits away from lighting panels.
d.
e.
f.

6. Recommended Mechanical Control Points:
a. Provide control points for feedback status of mechanical equipment
b. Provide control points for variable air flow in AHUs. See ECM (a)
c.
d.
e.
f.

:SIDE INFORMATION

Building Name: SJ04

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Mech Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
	Carrier		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	39LC15KA		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units: 1		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: Uninsulated HW pipe run
Unit above projection room

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Central AHU Type
CAV - Constant Volume
DD - Dual Duct
HV - Heating and Vent Unit
MZ - Multizone
SZ - Single Zone
VRH - Var. Vol. w Reheat
VPFP - Var. Vol. w Parallel FP Boxes
VSFP - Var. Vol. w Series FP Boxes
VVVT - Var. Vol. Var. Temp

Local AHU Type
2P FCU - 2 pipe FCU
4P FCU - 4 pipe FCU
ACB - Active Chilled Beam
CRAC - Computer Room AC
GSHP - Ground Source HP
HP - Air to Air HP
PCB - Passive Chilled Beam
PTAC - Packaged Terminal AC
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC
WSHP - Water Source HP

Source
E - Electric
HW - Hot Water
NG - Natural Gas
ST - Steam
CHW - Chilled Water
DX - Direct Expansion

Controls
DDC - Direct Digital Controls
E - Electric Local
H - DDC Pneumatic
P - Pneumatic

Setbacks
P - Static Pressure Reset
SA - Supply Air Reset
T - Unoccupied Space Temp

Energy Recovery
RA - Runaround Loop
WA - Wraparound Loop
EW - Enthalpy Wheel
PL - Plate Heat Exchanger

Flow Control
CV - Constant Volume
Int - Interminent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive

RM 190 - Allerton T-STAT,
AHU ABOVE Clg. CHW 3-way
HW 3-way.
Carrier.
Appears in good condition, may be under
sized. or has trouble DO to occupied/unoccupied

CHILLER - Carrier AQUASNAP 30RAN050
CH-2 Good condition.
no gauges.

AHU-17 Good cond. 3way CHW + 3way HW
HX. SHELL/TUBE.
NOT wired in line circ. Pump.
2-way STEAM VALVE.
SUPPLY DUCT MODIFICATION LOOKS LIKE REDUCED AIR
FLOW TO A MAIN BRANCH

AHU-30 3 way CHW + HW COILS.
Duct insulation in poor condition (1)
AHU Leaky water may be condensate DRAIN pan
issue ~~[illegible]~~ Loose Belts.

Small FCU - in UTILITY Closet AREA B,
Serves Break Rm. w/ Programable T-STAT.

JET AREA - Server Room Fed by ~~[illegible]~~ AHU.
Not may need split system.

---

2 ~~[illegible]~~ SPLIT syst. in Server Room on 2ND FLR
Classroom FCU ABOVE Clg. CW Divided to Ext. wall
CHW 3-way, HW 3-way, unit observed ACTUATORS REMOVED
FCU-242 ?

COOLING PLANT

Building Name: 3504

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Area A

Asbestos _____ Mold _____ Lead _____ Other _____

OFF OFF Running

Chillers

Tag	Chiller Theater		Chiller 1		Chiller 1
Type	W (A) HR	W A HR	W (A) HR	W A HR	W (A) HR
Compressor	A C R S	A C R S	A C R S	A C R S	A C R S
Manufacturer	Trane		Trane		CGAM 120F 2CØ2
Model Number	RTAC 155A IRØN		RTAC 1404 UYØN		Trane
Tons	150		140		120
Age	2005				
~~Temp~~ / Pressure gauges	Yes___ No___	Yes___ No___	Yes✓ No___	Yes___ No___	Yes✓ No___
CHW Temp	Supply ? Return ?	Supply___ Return___	Supply 47 Return 48	Supply___ Return___	Supply 45 Return 68 ✓
CHW Reset	OA L T	OA L T	OA L T	OA L T	OA L T
Equipment Condition	1 2 3 (4) 5	1 2 3 4 5	1 2 3 4 (5)	1 2 3 4 5	1 2 3 4 (5)

Chiller Types
W - Water Cooled
A - Air Cooled
HR - Heat Recovery

Compressor Types
A - Absorption
C - Centrifugal
R - Reciprocating
S - Screw

JCI A419 (OATsmo)

CHW Reset
OA - Outside Air
L - Load
T - CHWR Temp

Works ≈ New

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New
3 + 4. Repair / RetroCx

looks new

Heat Rejection

Cooling Towers

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5

Condensing Units

Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
DR- Dry Cooler
C - Condensing Unit
EC - Evaporative Cooling
HP - Air to Air HP
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC

Notes / Potential ECM's: _____

Heat/cool (A) issues
① Dec. sensors not working (some)
Maint. issues

Yr 1955

CHW Pump Theater

M3313T (Cat)

10 Hp

85.5% eff.

Corroded pipes

Missing insulation

HEATING PLANT

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___ No___
Falls / Trips / Overhead	Yes___ No___
Extreme Boiler Room Temp	Yes___ No___
High Press Steam present	Yes___ No___
Hazardous Materials	Yes___ No___

Asbestos _____ Mold _____ Other _____

Boilers

Tag				
Type				
Fuel	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P
Manufacturer				
Model Number				
Capacity (mbh/lbsh)				
Age				
Delivery Temp/Pressure				
Return Temp				
Steam Trap Type	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT
Steam Trap Condition	1 2 3 5	1 2 3 5	1 2 3 5	1 2 3 5
Breaching Type	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL
Breaching Condition	1 2 3 5	1 2 3 5	1 2 3 5	1 2 3 5
Boiler Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
HW Reset	OA L T	OA L T	OA L T	OA L T

Fuel Type
- **B** - Bio
- **C** - Coal
- **E** - Electric
- **FO2** - Fuel Oil#2
- **FO6** - Fuel Oil#6
- **NG** - Natural Gas
- **P** - Propane

Steam Trap Type
- **TS** - Thermostatic
- **F&T** - Float and Thermostatic
- **IB** - Inverted Bucket
- **OB** - Open bucket
- **DT** - Disk Trap
- **PT** - Piston Trap
- **OT** - Orifice Trap

Breaching Type
- **BRK** - Brick / Block
- **SS** - Stainless Steel
- **GAL** - Galvanized Steel
- **PLA** - Poly, PVC, CPVC
- **AL** - Aluminum AL29-4C

Note: ALL larger condensing boilers (>1000 MBH) **MUST** use AL29-4C

HW Reset
- **OA** - Outside Air
- **L** - Load
- **T** - HWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New

3 + 4. Repair / RetroCx

Notes / Potential ECM's: _____

Area A.

CHW Pump 1 Chiller 1A
Emerson D40E2D (cat)
Model: T661
40 Hp
Eff. 93%

CHW Pump 2 Chiller 1
Nidec Motor D40P2D (cat)
Model: DC27
40 Hp
Eff: 94.1

* Pump covered in damaged insulation

AIRSIDE INFORMATION

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Mech Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

Tag	Manufacturer	Type	Supply ~~Fan~~ HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
	American St.		Return ~~Fan~~ HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	CGA120B300FA		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 (4) 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units: 1		Avg Capacity: ≈ 5 Tons				CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: Condensing Unit. East side o Area C.

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
	Trane		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	2TTA0030A000AA		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 (3) 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units: 2		Avg Capacity: Tons				CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: West side of ~~bldg~~ - Area C

Tag	Manufacturer	Type	Supply ~~Fan~~ HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
	Trane		Return ~~Fan~~ HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	4TWR3021E1000AA		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 (4) 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units: 1		Avg Capacity: Tons				CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: Condensing Unit East ~~of centrifugal~~ side of Area B

Central AHU Type
- **CAV** - Constant Volume
- **DD** - Dual Duct
- **HV** - Heating and Vent Unit
- **MZ** - Multizone
- **SZ** - Single Zone
- **VRH** - Var. Vol. w Reheat
- **VPFP** - Var. Vol. w Parallel FP Boxes
- **VSFP** - Var. Vol. w Series FP Boxes
- **VVVT** - Var. Vol. Var. Temp

Local AHU Type
- **2P FCU** - 2 pipe FCU
- **4P FCU** - 4 pipe FCU
- **ACB** - Active Chilled Beam
- **CRAC** - Computer Room AC
- **GSHP** - Ground Source HP
- **HP** - Air to Air HP
- **PCB** - Passive Chilled Beam
- **PTAC** - Packaged Terminal AC
- **SS** - Mini Split System
- **VRF** - Variable Refrig. Flow
- **WU** - Window AC
- **WSHP** - Water Source HP

Source
- **E** - Electric
- **HW** - Hot Water
- **NG** - Natural Gas
- **ST** - Steam
- **CHW** - Chilled Water
- **DX** - Direct Expansion

Controls
- **DDC** - Direct Digital Controls
- **E** - Electric Local
- **H** - DDC Pneumatic
- **P** - Pneumatic

Setbacks
- **P** - Static Pressure Reset
- **SA** - Supply Air Reset
- **T** - Unoccupied Space Temp

Energy Recovery
- **RA** - Runaround Loop
- **WA** - Wraparound Loop
- **EW** - Enthalpy Wheel
- **PL** - Plate Heat Exchanger

Flow Control
- **CV** - Constant Volume
- **Int** - Interminent
- **3SPD** - 3 Speed Control
- **VFD** - Variable Frequency Drive

AHU - Theater (Mech Room - Back)
Motor 40 HP AO Smith 83.8%
Centrifugal Fan } Good shape

Condensing Units - front of Area A.

Mitsubishi

PUY-A18NHAY

40W output

(4)

Mitsubishi

PUY-A30NHAY

80W

(4)

Mitsubishi

PUZ-A24NHA3 x2

80W

(4)

1265/1126

Building Name:_____

Air Handling Units (Cont.)

Tag	Manufacturer	Type	Supply Fan HP	X	VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
	Mitsubishi		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	MUZ-GE12NA		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 (4) 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units: 1		Avg Capacity:		Tons			CFM	Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: Condensing Units. East of Area B ~~Center Isle~~

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
	MUZ-GE18NA		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	Mitsubishi		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 (4) 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units: 1		Avg Capacity:		Tons			CFM	Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: Condensing Unit East of Area B

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
	MUZ-GE24A		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	Mitsubishi		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 (4) 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units: 1		Avg Capacity:		Tons			CFM	Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: West of Center Aisle - Area A

Tag	Manufacturer	Type	Supply Fan HP	0.33	VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
	EMI		Return ~~Fan~~ HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	S1CA6000D02		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 (4) 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units: 1		Avg Capacity:		Tons			CFM	Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: Condensing Unit

Central AHU Type
CAV - Constant Volume
DD - Dual Duct
HV - Heating and Vent Unit
MZ - Multizone
SZ - Single Zone
VRH - Var. Vol. w Reheat
VPFP - Var. Vol. w/Parallel FP Boxes
VSFP - Var. Vol. w/Series FP Boxes
VVVT - Var. Vol. Var. Temp.

Local AHU Type
2P FCU - 2 pipe FCU
4P FCU - 4 pipe FCU
ACB - Active Chilled Beam
CRAC - Computer Room AC
GSHP - Ground Source HP
HP - Air to Air HP
PCB - Passive Chilled Beam
PTAC - Packaged Terminal AC
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC
WSHP - Water Source HP

Source
E - Electric
HW - Hot Water
NG - Natural Gas
ST - Steam
CHW - Chilled Water
DX - Direct Expansion

Controls
DDC - Direct Digital Controls
E - Electric Local
H - DDC/Pneumatic
P - Pneumatic

Setbacks
P - Static Pressure Reset
SA - Supply Air Reset
T - Unoccupied Space Temp

Energy Recovery
RA - Runaround Loop
WA - Wraparound Loop
EW - Enthalpy Wheel
PL - Plate Heat Exchanger

Flow Control
CV - Constant Volume
Int - Interminent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive

		#
Condensing units East side Cont. Aisle A	EMI S1CA6000D2 0.33 Hp 1.. (3)..5	1
	Mitsubishi PUZ-A24NHA3 8GW (Fan) (3)	2
	EMI S1HG4000D10-U 0.12 Hp (3)	1
Cond. Units Back side of East Aisle A	Mitsubishi PUZ-A24NHA4 8GW Motor (3)	1
	LG LSU093CE (2)	
	LG MultiV ARUN036GS2 (3)	
	EMI S1GH4000D10-U 0.12 Hp (3)	
	Mitsubishi MUY-GE24NA 7GW Motor (3)	

1 BUILDING 3504 - FIRST FLOOR PLAN

Scale: GRAPHIC 0 20' 40'

NORTH

VERIFIED FLOOR PLAN 2006 - Contractor Collected

Note: UOM is INCH for Adobe measuring tool

NAVFAC MIDLANT GeoReadiness Center

NFA100001074151_3504_01_fp.dwg 11 MAR 2013

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Building 3504
First Floor

BD-GIS Mid-Atlantic
Norfolk, VA 23511
(757) 444-4716
PWCNORVA_GIS_WEB@nmci-isf.com

1 BUILDING 3504 - SECOND FLOOR PLAN

Scale: GRAPHIC 0 20' 40'

NORTH

VERIFIED FLOOR PLAN 2006 - Contractor Collected

Note: UOM is INCH for Adobe measuring tool

NAVFAC MIDLANT GeoReadiness Center

NFA100001074151_3504_02_fp.dwg 11 MAR 2013

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Building 3504
Second Floor

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1 BUILDING 3504 - THIRD FLOOR PLAN

Scale: GRAPHIC 0 20' 40'

NORTH

VERIFIED FLOOR PLAN

2006 - Contractor Collected

Note: UOM is INCH for Adobe measuring tool

NAVFAC MIDLANT GeoReadiness Center

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Building 3504
Third Floor

BD-GIS Mid-Atlantic
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Part 6 - Attachments
Option 2 - Building 3814

1. Initial Building Survey Data
(Note: No plans were available for this building)

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/10/2015	**Building No.**	3814
Building Name:	DDS Training /SDVT 2	**Facility Type:**	Adimn / WH / Maint / Training
Facility Manager:		**Jacobs CX Lead:**	Paul Nelson
Building Monitor:		**Jacobs CX Junior:**	Artheley 'Lee' Weeks
		Jacobs Mech Engineer:	Carlos Teran
		Jacobs Elec Engineer:	David Williams

FACILITY PHOTO

1. Facility Investigation Narrative:	
Description:	
Facility Usage History:	The facility is being used as a training facility. Original use is unknown.
Renovation History:	A new AC unit (Carrier) was installed in 2013.
As-Built Documents:	Control Drawings and Sequence of Operation documents where downloaded from the BAS. Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	The FMS indicated that they experience consistent issues with the control and sequencing of the mechanical heating and cooling equipment, creating comfort issues within the building.
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	DX units provide most of the conditioned air to the building. Unit heaters condition the high bay space. A dedicated outside air unit provides air to the shower/locker rooms. Hot water for the HVAC equipment is generated by a newer gas boiler plant.
DDC Description:	The facility HVAC is primarily controlled by an Automated Logic DDC. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Lighting Description:	
Equipment Deficiencies:	The front end of the BAS does not fully reflect what is actually on site. The control sequence of certain mechanical equipment requires revision. One of the newer boiler is constantly in alarm so no redundancy is provided. Shower Locker room units appear to be under sized or improperly controlled to remove excess humidity.
Other Information:	

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/10/2015	**Building No.**	3814
Building Name:	DDS Training /SDVT 2	**Facility Type:**	Adimn / WH / Maint / Training
Facility Manager:		**Jacobs CX Lead:**	Paul Nelson
Building Monitor:		**Jacobs CX Junior:**	Artheley 'Lee' Weeks
		Jacobs Mech Engineer:	Carlos Teran
		Jacobs Elec Engineer:	David Williams

FACILITY PHOTO

2. ECM Study Recommendations:	Priority
a.	
b.	
c.	
d.	
e.	
f.	

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning
a. DDC Retro-commissioning
b. Boilers
c. Air Handling Units
d. Shower / Locker Room AHUs
e.
f.

4. Corrective Actions	Action Code
a. Review control sequence of mechanical systems	2
b. Repair HVAC system	2
c.	
d.	
e.	
f.	

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a.
b.
c.
d.
e.
f.

6. Recommended Mechanical Control Points:
a. Provide control points for feedback status of mechanical equipment
b.
c.
d.
e.
f.

COOLING PLANT

Building Name: 3814

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___ No___
Falls / Trips / Overhead	Yes___ No___
Extreme Room Temp	Yes___ No___
Hazardous Materials	Yes___ No___

Asbestos _____ Mold _____ Lead _____ Other _____

Chillers

Tag					
Type	W A HR	W A HR	W A HR	W A HR	W A HR
Compressor	A C R S	A C R S	A C R S	A C R S	A C R S
Manufacturer					
Model Number					
Tons					
Age					
Temp / Pressure gauges	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___
CHW Temp	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___
CHW Reset	OA L T	OA L T	OA L T	OA L T	OA L T
Equipment Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Chiller Types
W - Water Cooled
A - Air Cooled
HR - Heat Recovery

Compressor Types
A - Absorption
C - Centrifugal
R - Reciprocating
S - Screw

CHW Reset
OA - Outside Air
L - Load
T - CHWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New
3.+ 4. Repair / RetroCx

Heat Rejection

Cooling Towers

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5

Condensing Units

Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
DR- Dry Cooler
C - Condensing Unit
EC - Evaporative Cooling
HP - Air to Air HP
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC

Notes / Potential ECM's: _____

Prog. T-stat.

HEATING PLANT

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___ No___
Falls / Trips / Overhead	Yes___ No___
Extreme Boiler Room Temp	Yes___ No___
High Press Steam present	Yes___ No___
Hazardous Materials	Yes___ No___

Asbestos _____ Mold _____ Other _____

Boilers

Tag	Boiler			
Type	Gas Fired			
Fuel	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P
Manufacturer	Knight Lochinvar			
Model Number	XL			
Capacity (mbh/lbsh)	800 mbh			
Age	≈ 3yr			
Delivery Temp/Pressure	160 psi			
Return Temp	?			
Steam Trap Type	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT
Steam Trap Condition	1 2 ~~3~~ 4 5	1 2 3 5	1 2 3 5	1 2 3 5
Breaching Type	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL
Breaching Condition	1 2 3 5	1 2 3 5	1 2 3 5	1 2 3 5
Boiler Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
HW Reset	OA L T	OA L T	OA L T	OA L T

Fuel Type
- **B** - Bio
- **C** - Coal
- **E** - Electric
- **FO2** - Fuel Oil#2
- **FO6** - Fuel Oil#6
- **NG** - Natural Gas
- **P** - Propane

Steam Trap Type
- **TS** - Thermostatic
- **F&T** - Float and Thermostatic
- **IB** - Inverted Bucket
- **OB** - Open bucket
- **DT** - Disk Trap
- **PT** - Piston Trap
- **OT** - Orifice Trap

Breaching Type
- **BRK** - Brick / Block
- **SS** - Stainless Steel
- **GAL** - Galvanized Steel
- **PLA** - Poly, PVC, CPVC
- **AL** - Aluminum AL29-4C

Note: ALL larger condensing boilers (>1000 MBH) **MUST** use AL29-4C

HW Reset
- **OA** - Outside Air
- **L** - Load
- **T** - HWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New

3.+ 4. Repair / RetroCx

Notes / Potential ECM's: _____

AIRSIDE INFORMATION

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Mech Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

Tag	Manufacturer	Type	Supply Fan HP		VFD~~X~~	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU-2	Carrier	DX	Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	Y2BHE		CFM			Cooling	CHW (DX)	~~2~~ 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 (5)		% Outside Air			Reheat	E (HW) NG ST	2 (3)	Airside Economizer		Y N
For Local AHUs Only:	# of units: 1		Avg Capacity:		Tons		CFM		Flow Control	(CV) Int 3SPD VFD	

Notes/Potential ECMs: New Unit

Tag	Manufacturer	Type	Supply Fan HP		VFD~~X~~	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
DOA		DX	Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW (DX)	~~2~~ 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 (4) 5		% Outside Air			Reheat	E (HW) NG ST	2 (3)	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	(CV) Int 3SPD VFD	

Notes/Potential ECMs: Condensate line is dripping. Needs insulation

Tag	Manufacturer	Type	Supply Fan HP		VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Central AHU Type
- **CAV** - Constant Volume
- **DD** - Dual Duct
- **HV** - Heating and Vent Unit
- **MZ** - Multizone
- **SZ** - Single Zone
- **VRH** - Var. Vol. w Reheat
- **VPFP** - Var. Vol. w Parallel FP Boxes
- **VSFP** - Var. Vol. w Series FP Boxes
- **VVVT** - Var. Vol. Var. Temp

Local AHU Type
- **2P FCU** - 2 pipe FCU
- **4P FCU** - 4 pipe FCU
- **ACB** - Active Chilled Beam
- **CRAC** - Computer Room AC
- **GSHP** - Ground Source HP
- **HP** - Air to Air HP
- **PCB** - Passive Chilled Beam
- **PTAC** - Packaged Terminal AC
- **SS** - Mini Split System
- **VRF** - Variable Refrig. Flow
- **WU** - Window AC
- **WSHP** - Water Source HP

Source
- **E** - Electric
- **HW** - Hot Water
- **NG** - Natural Gas
- **ST** - Steam
- **CHW** - Chilled Water
- **DX** - Direct Expansion

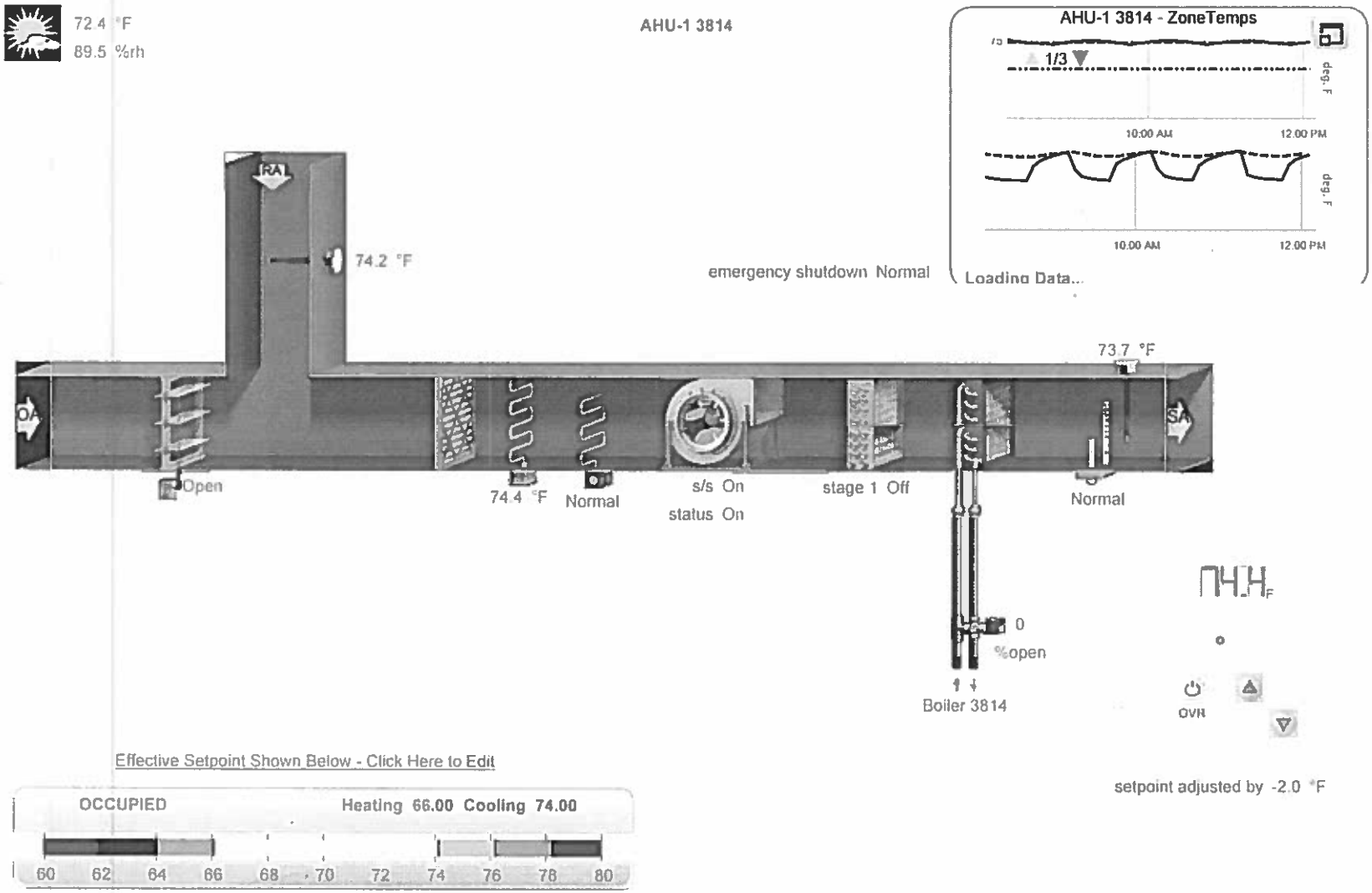
Controls
- **DDC** - Direct Digital Controls
- **E** - Electric Local
- **H** - DDC Pneumatic
- **P** - Pneumatic

Setbacks
- **P** - Static Pressure Reset
- **SA** - Supply Air Reset
- **T** - Unoccupied Space Temp

Energy Recovery
- **RA** - Runaround Loop
- **WA** - Wraparound Loop
- **EW** - Enthalpy Wheel
- **PL** - Plate Heat Exchanger

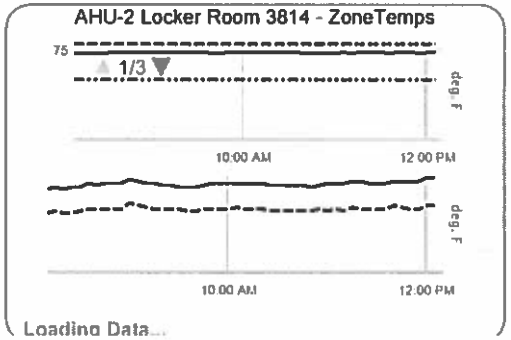
Flow Control
- **CV** - Constant Volume
- **Int** - Interminent
- **3SPD** - 3 Speed Control
- **VFD** - Variable Frequency Drive

Bay area
4 ~~fans~~ HW Heaters Axial fans. Not working due to missing Pump.
Missing HW pump.
2 Exhaust Fans. 1 Fan ON

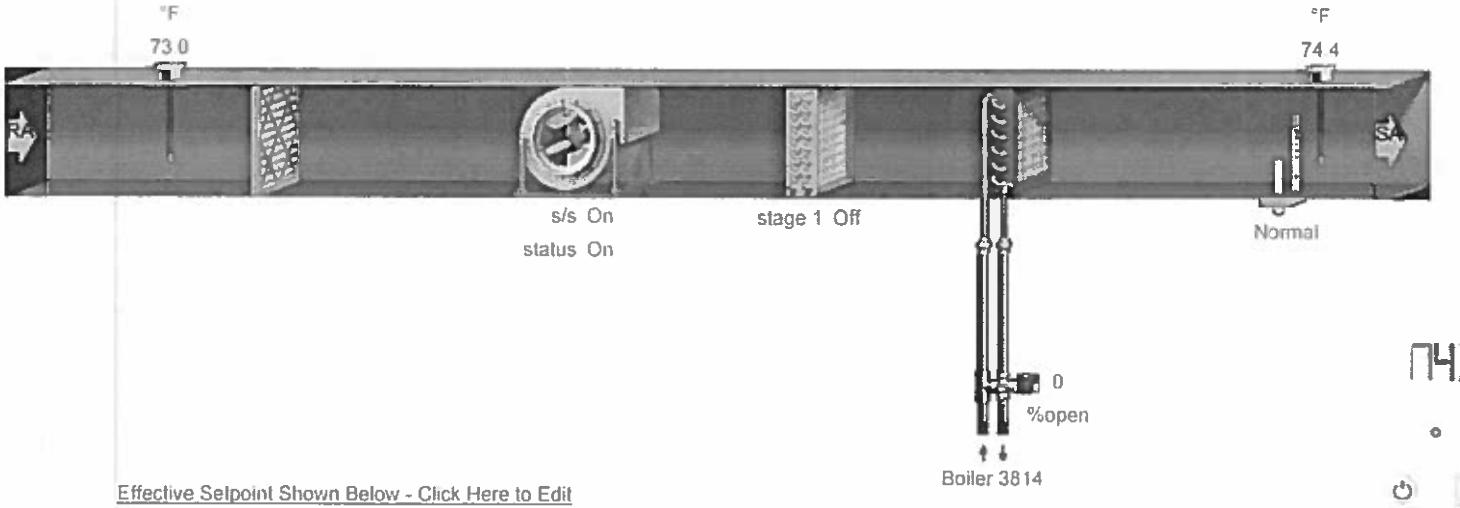

72.4 °F
89.5 %rh
AHU-1 3814
AHU-1 3814 - ZoneTemps
1/3
deg. F
10:00 AM
12:00 PM
Loading Data...
RA
74.2 °F
emergency shutdown Normal
73.7 °F
OA
SA
Open
74.4 °F
Normal
s/s On
status On
stage 1 Off
Normal
0
%open
Boiler 3814
OVR
Effective Setpoint Shown Below - Click Here to Edit
OCCUPIED
Heating 66.00 Cooling 74.00
60 62 64 66 68 70 72 74 76 78 80
setpoint adjusted by -2.0 °F

72.4 °F
89.5 %rh

AHU-2 Locker Room 3814



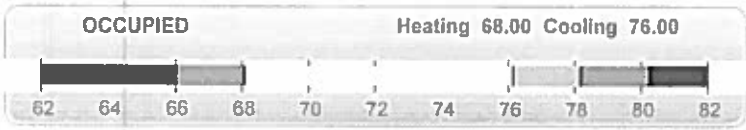
emergency shutdown Normal



74.2 °F

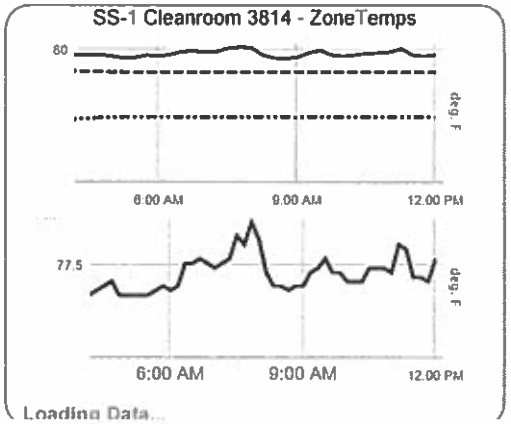
OVR

Effective Setpoint Shown Below - Click Here to Edit



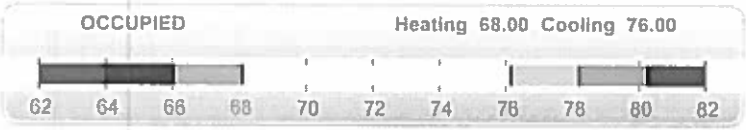
72.4 °F
89.5 %rh

SS-1 Cleanroom 3814



Heating is not allowed.
Cooling is allowed.

Effective Setpoint Shown Below - Click Here to Edit

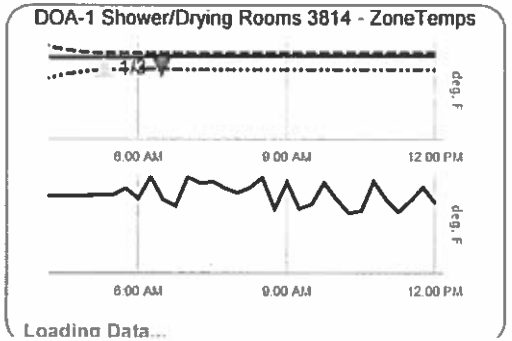


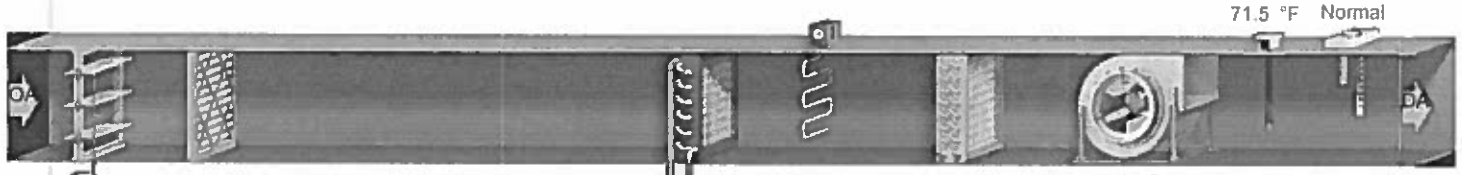
72.4 °F
89.5 %rh

DOA-1 Shower/Drying Rooms 3814

emergency shutdown Normal

Unit Mode: Dehum Cool





cmd Open

Clg Coil Temp
39.1 °F
stpt 35.0 °F
Stage 1 On
Stage 2 Off

s/s On
status On

0
%open

Boiler 3814

AAON OA temp 74 °F
AAON OA Hum 88 %rh
AAON Dewpt 69
Dewpt stpt 51

74.6

OVR

Effective Setpoint Shown Below - Click Here to Edit

OCCUPIED Heating 68.00 Cooling 76.00

72.4 °F
89.5 %rh

HWS 3814

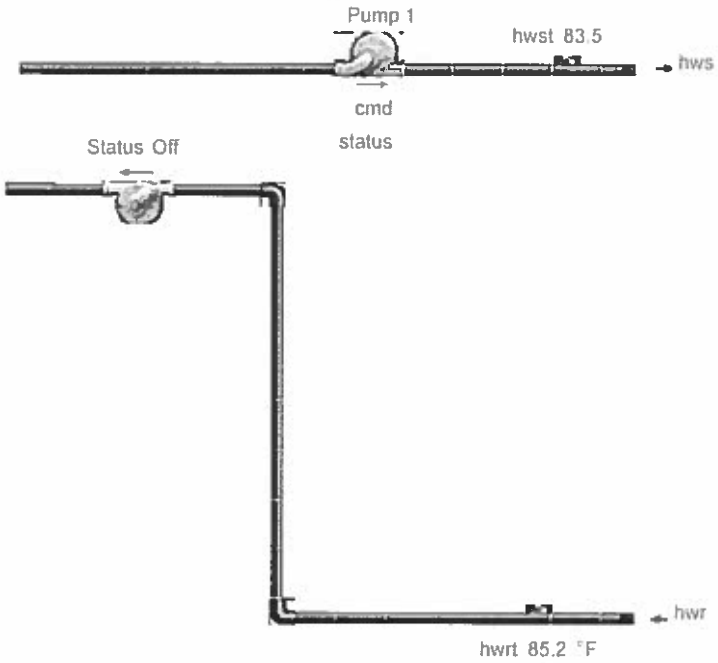
This Hot Water System is Always Enabled

FireRate %
Status

off
on auto

The HWS is not allowed to run based on current OA Temperature

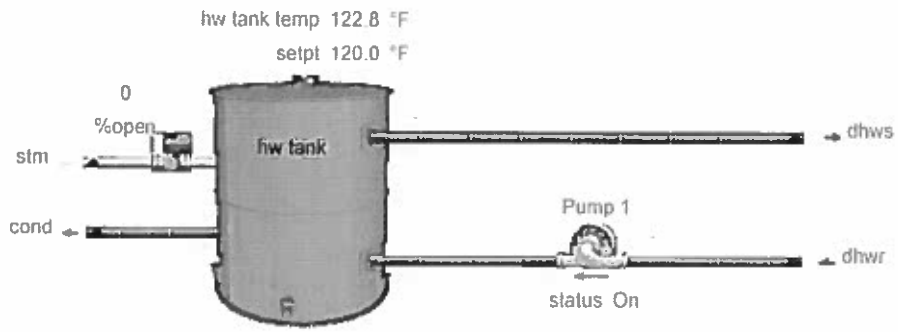
Boiler System Enable



72.4 °F
89.5 %rh

Domestic Heat Exchanger 3814

This Domestic Hot Water System is Always Enabled

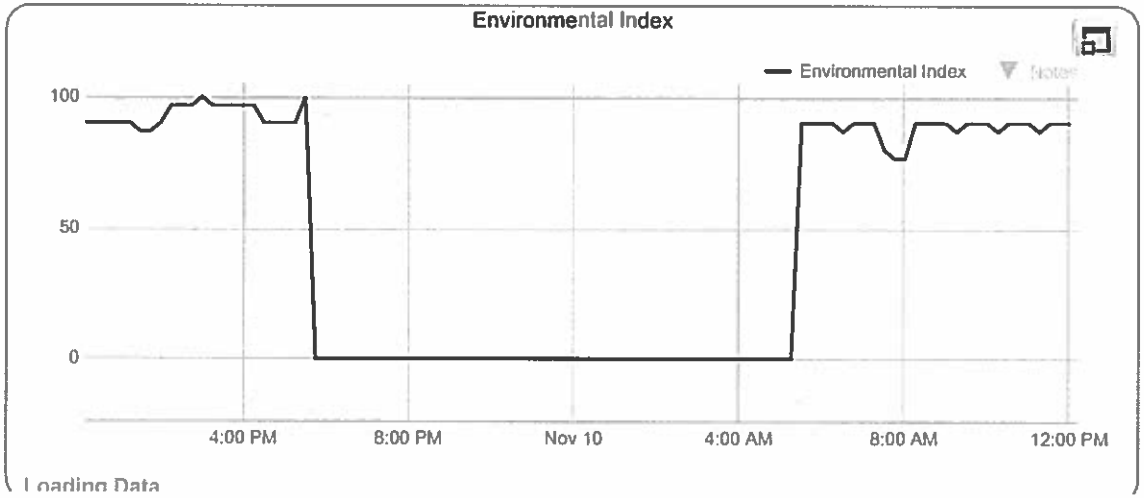


EI Rollup 3814

Conditions Satisfied

52 % of Time

3 Zones Reporting (100 % of total)



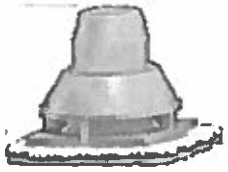
White Paper - 'Cost Effective HVAC' - by Steve Tom, Ph.D

Cut Sheet- Environmental Index

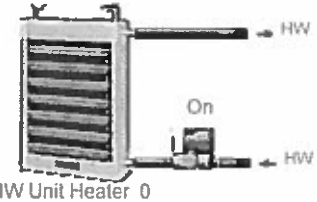
Cut Sheet- Energy Reports

72.4 °F
90 %rh

EF 6&8



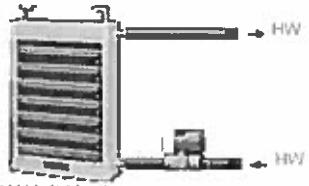
EF 0 Cmd
Status Off



HW Unit Heater 0
On

Room 0
Zone Temp 45.0 °F

EF 8 Cmd On
Status On



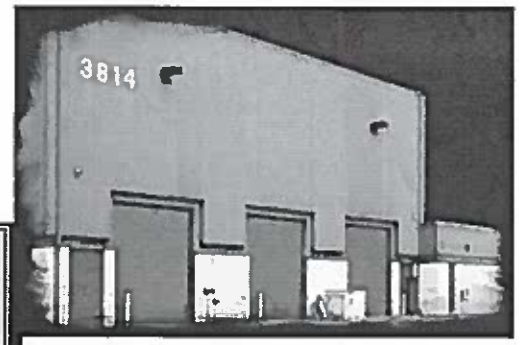
HW Unit Heater

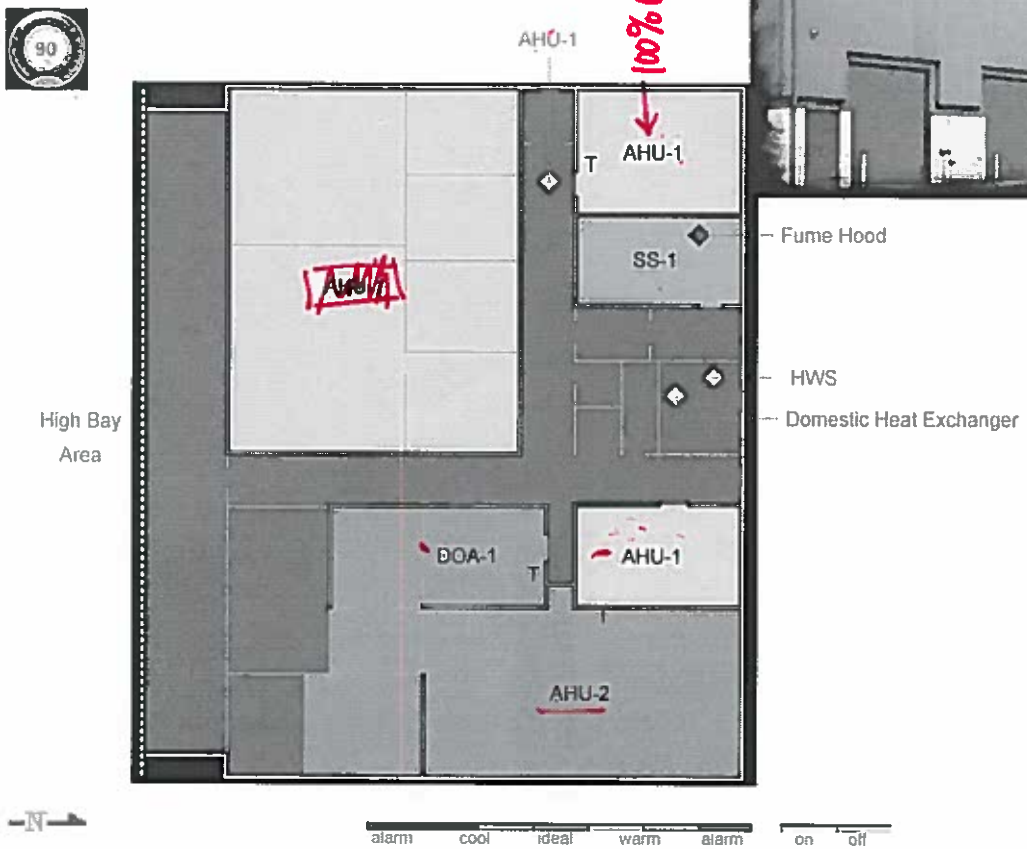
Room 0
Zone Temp 0.0 °F

72.4 °F
89.5 %rh

3814 DDS Training / SDVT-2

Documentation:





ACCU's

Temp star N4A318GKB200
(split sys. - 1) 2009.

ACCU-1 Carrier 38AUZA08A0A5
Feb. 2013

Commercial Comfort CAC060NAC ACCU-1
" " ACCU-2

Carrier (ACCU-2) 24ABB324W310

AHU-1 3-way NW, DX cooling
(New) in corridor cy. No access to sides of unit

Has shop Rooms w/ wall supply (Laminar Flow Room)
w/ HEPA Fans.

McQuay. DX Cooling STM 2 way valve
LSL103CH.

AHU2 -- 3 way Valve on hot water Coil.
DX Cooling - Hot water heat.

AAON - AHU ACCU AAON CC-B-004-3-D-1

Maint. Bay 4 vert Down Blast.
2 Exhaust Fans T-stat control
O.A. Dampers @ each corner interlocked to Fan.
Fans in Hand mode.
North Fan works South Fan Did not.

Building Name:________________

DDC Points List - Electrical

FUNCTION	NAME	Note

FUNCTION	NAME	Note

FUNCTION	NAME	Note

FUNCTION	NAME	Note

Part 6 - Attachments
Option 3 - Building 3603

1. Initial Building Survey Data
2. Building Plan

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:		**Building No.**	3603
Building Name:	HAMMOND HALL	**Facility Type:**	Residence
Facility Manager:	Lavern Rushin	**Jacobs CX Lead:**	Paul Nelson
Building Monitor:	Troy Wagers	**Jacobs CX Junior:**	Artheley "Lee" Weeks
		Jacobs Mech Engineer:	Carlos Teran
		Jacobs Elec Engineer:	David Williams

FACILITY PHOTO

1. Facility Investigation Narrative:	
Description:	Facility is approximately 62,145 square feet, consisting of a central multipurpose buiding with main mechanical room, electrical service room and toilet, and three adjacent three-story residence buildings or wings.
Facility Usage History:	Building use has remained the same since constructed.
Renovation History:	New thermostats were installed for the room fan coil units. However these do not communicate with the BAS
As-Built Documents:	Control Drawings, TAB, and Sequence of Operation documents where downloaded from the BAS . Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	The mechanical cooling for the facility is handled by an air cooled chiller. Heating is provided by a steam to hot water heat exchanger. AHUs and fan coils distribute air throughout the building to maintain comfort level. Chilled water and hot water pumps circulate the water required by the AHUs.
DDC Description:	The facility Make up Air Units, Exhaust fans, chiller, heat exchanger control valve and pumps are controlled by an Automated Logic DDC. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Lighting Description:	Lighting in rooms consists of of 1x4, diffuser, surface mount fixtures with 2 T8 flourescent lamps. Clousets use a 1x2, 2 lamp flourescent fixture. Hallways use 12' round wall mount, CFL units. Lobby areas use 2x2 lay-in 2 u-tube flourescent fixtures with 6" round CFL units around the outside. Motion sensor controls are used for closet lighting. Exit and emergency lighting were well placed but some did not light during test condition.
Equipment Deficiencies:	HVAC equipment is in poor condition. Condensate return system needs repair. Exhaust fans partially operating and with bearing issues and loose belts.
Other Information:	

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:		**Building No.**	3603
Building Name:	HAMMOND HALL	**Facility Type:**	Residence
Facility Manager:	Lavern Rushin	**Jacobs CX Lead:**	Paul Nelson
Building Monitor:	Troy Wagers	**Jacobs CX Junior:**	Artheley "Lee" Weeks
		Jacobs Mech Engineer:	Carlos Teran
		Jacobs Elec Engineer:	David Williams

FACILITY PHOTO

2. ECM Study Recommendations:	Priority
a. Install variable flow chilled water system	M
b. Intall variable volume hot water system	M
c. Replace existing FCU system with Variable Refrigerant System	L
d. Provide 1/3 - 2/3 steam control valve arrangement on heat exchanger	M
e. Change all fixtures to LED equivilent using exiting circuits and switching.	M
f. Install ceiling mounted motion sensor control for rooms where appropriate.	M

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning	
a. Chiller and chilled water pumps	
b. Heat exchanger control	
c. Heating hot water pump control	
d. MAU controls	
e. Exhaust fan control	
f. Full DDC retro-commissioning	

4. Corrective Actions	Action Code
a. Replace chiller and its associated air cooled condenser and chilled water pumps	2
b. Replace hot water pumps	2
c. Repair condensate return system.	2
d. Replace emergency and exit light batteries that are not working	1
e.	
f.	

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a. Lighting monitoring at the switch level would require approximately 200 points.
b. Lighting monitoring at the circuit level would require approximately 40 points. This would avoid recircuiting non-lighting circuits from Lighting panels
c. Lighting monitoring at the panel level would require approximately 12 points. This may require recircuiting non-lighting circuits away from lighting panels.
d.
e.
f.

6. Recommended Mechanical Control Points:
a. Add control points to connect fan coil thermostats to building DDC
b. Provide additional control points associated to recommended ECMs
c.
d.
e.
f.

COOLING PLANT

Building Name: 3603

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Chillers

Tag	CHILLER				
Type	W (A) HR	W A HR	W A HR	W A HR	W A HR
Compressor	A C R (S)	A C R S	A C R S	A C R S	A C R S
Manufacturer	YORK				
Model Number	YCRS0180SCH7				
Tons	180				
Age	12 yrs.				
Temp / Pressure gauges	Yes ✓ No___	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___
CHW Temp	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___
CHW Reset	NA OA L T	OA L T	OA L T	OA L T	OA L T
Equipment Condition	1 2 (3) 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Chiller Types
W - Water Cooled
A - Air Cooled
HR - Heat Recovery

Compressor Types
A - Absorption
C - Centrifugal
R - Reciprocating
S - Screw

CHW Reset
OA - Outside Air
L - Load
T - CHWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New
3.+ 4. Repair / RetroCx

Heat Rejection

Cooling Towers

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5

Condensing Units

Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
DR- Dry Cooler
C - Condensing Unit
EC - Evaporative Cooling
HP - Air to Air HP
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC

Notes / Potential ECM's:

Temp/Press Gages wrong type / Broken.

2 pumps END SUCTION. one w/ Dead motor Fair Condition.
10 Hp.

Scrolling thru CHILLER starter shows Alarm, Comp. on., But not Running.

(1) 2 Air cooled condensing units, ~~Fair~~ ~~GOOD~~ Poor condition

(3) Coil fins floky off

Not labled.

(2) Exhaust fans on center Bldg.
1 serves mech Room T-stat control. (Exc).

EF-1 - mech Rm. Model DB-1610 115V
11 yrs old. Make BREIDERT Air Products.

EF-17 - Toilet DB 805
11 yrs For 0603

No occupancy sensors in corridors.

HEATING PLANT

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No✓
Falls / Trips / Overhead	Yes___	No✓
Extreme Boiler Room Temp	Yes___	No✓
High Press Steam present	Yes___	No✓
Hazardous Materials	Yes___	No✓

Asbestos _____ Mold _____ Other _____

Boilers

Tag	Heat Exch.			
Type	Shell / Tube			
Fuel	B C E FO2 FO6 NG P STM	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P
Manufacturer	N/A			
Model Number				
Capacity (mbh/lbsh)				
Age				
Delivery Temp/Pressure				
Return Temp				
Steam Trap Type	TS F&T (IB) OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT
Steam Trap Condition	1 (2) 3 5	1 2 3 5	1 2 3 5	1 2 3 5
Breaching Type	N/A BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL
Breaching Condition	1 2 3 5	1 2 3 5	1 2 3 5	1 2 3 5
Boiler Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
HW Reset	OA L T	OA L T	OA L T	OA L T

Fuel Type
- **B** - Bio
- **C** - Coal
- **E** - Electric
- **FO2** - Fuel Oil#2
- **FO6** - Fuel Oil#6
- **NG** - Natural Gas
- **P** - Propane

Steam Trap Type
- **TS** - Thermostatic
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Breaching Type
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Note: ALL larger condensing boilers (>1000 MBH) **MUST** use AL29-4C

HW Reset
- **OA** - Outside Air
- **L** - Load
- **T** - HWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New

3.+ 4. Repair / RetroCx

Notes / Potential ECM's: _____

2 pumps Fair condition. 5 Hp
Gauges Broken
Pipe corrosion copper/steel., Leaking @ joint of air sep.

1. Cond. Pump. Duplex w/ one missing Pump motor. very poor condition.
2. Steam meter.
3. Single Stage PRV Dist. Down to 12 psig

1 - GREENECK S-123 [illegible]
BEARINGS [illegible] 8AD

AIRSIDE INFORMATION

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Mech Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
SAU-3	York		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	CP 65 DWDI AF		50208 CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 (2) 3 4 5		% Outside Air	100%		Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Bldg. 2

Notes/Potential ECMs: 1973 yr. Temps 66/76 ~~Pump~~ CHILLED water.
EXT. Insulation on Duct very Poor. 60/60 - ~~HOT~~ water

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU-1	York		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	CP 65 DWDI AF		50208 CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 (2) 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Bldg. 2

Notes/Potential ECMs: NO Press. GAUGES/Temp GAUGES.
EXT. insulation poor.

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
	York		Return Fan HP		VFD__	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	CP 65 DWDI AF		50208 CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 (2) 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Bldg. 2

Notes/Potential ECMs:
EXTERIOR insulation poor; Bottom of unit Rotten. out.

Central AHU Type
- **CAV** - Constant Volume
- **DD** - Dual Duct
- **HV** - Heating and Vent Unit
- **MZ** - Multizone
- **SZ** - Single Zone
- **VRH** - Var. Vol. w Reheat
- **VPFP** - Var. Vol. w Parallel FP Boxes
- **VSFP** - Var. Vol. w Series FP Boxes
- **VVVT** - Var. Vol. Var. Temp

Local AHU Type
- **2P FCU** - 2 pipe FCU
- **4P FCU** - 4 pipe FCU
- **ACB** - Active Chilled Beam
- **CRAC** - Computer Room AC
- **GSHP** - Ground Source HP
- **HP** - Air to Air HP
- **PCB** - Passive Chilled Beam
- **PTAC** - Packaged Terminal AC
- **SS** - Mini Split System
- **VRF** - Variable Refrig. Flow
- **WU** - Window AC
- **WSHP** - Water Source HP

Source
- **E** - Electric
- **HW** - Hot Water
- **NG** - Natural Gas
- **ST** - Steam
- **CHW** - Chilled Water
- **DX** - Direct Expansion

Controls
- **DDC** - Direct Digital Controls
- **E** - Electric/Local
- **H** - DDC/Pneumatic
- **P** - Pneumatic

Setbacks
- **P** - Static Pressure Reset
- **SA** - Supply Air Reset
- **T** - Unoccupied Space Temp

Energy Recovery
- **RA** - Runaround Loop
- **WA** - Wraparound Loop
- **EW** - Enthalpy Wheel
- **PL** - Plate Heat Exchanger

Flow Control
- **CV** - Constant Volume
- **Int** - Intermittent
- **3SPD** - 3 Speed Control
- **VFD** - Variable Frequency Drive

F BLDG.

make up Air unit Fair / Good cond. (3)

EXH. FANS

1. Green Neck G 123 AX QD (4)
2. " G-123-AX QD (4)
3. " DB 814 EF 9. (3)
4. DB814 EF-10 (3)
5. DB814 EF-11 (3)

EFs Not Running

occ sensors in Toilets + Closets.
No occ. in corridors.

E BLDG

make up air unit poor cond. Belt squeaking. (2)
Rotten Drain Pan / Bottom
air.

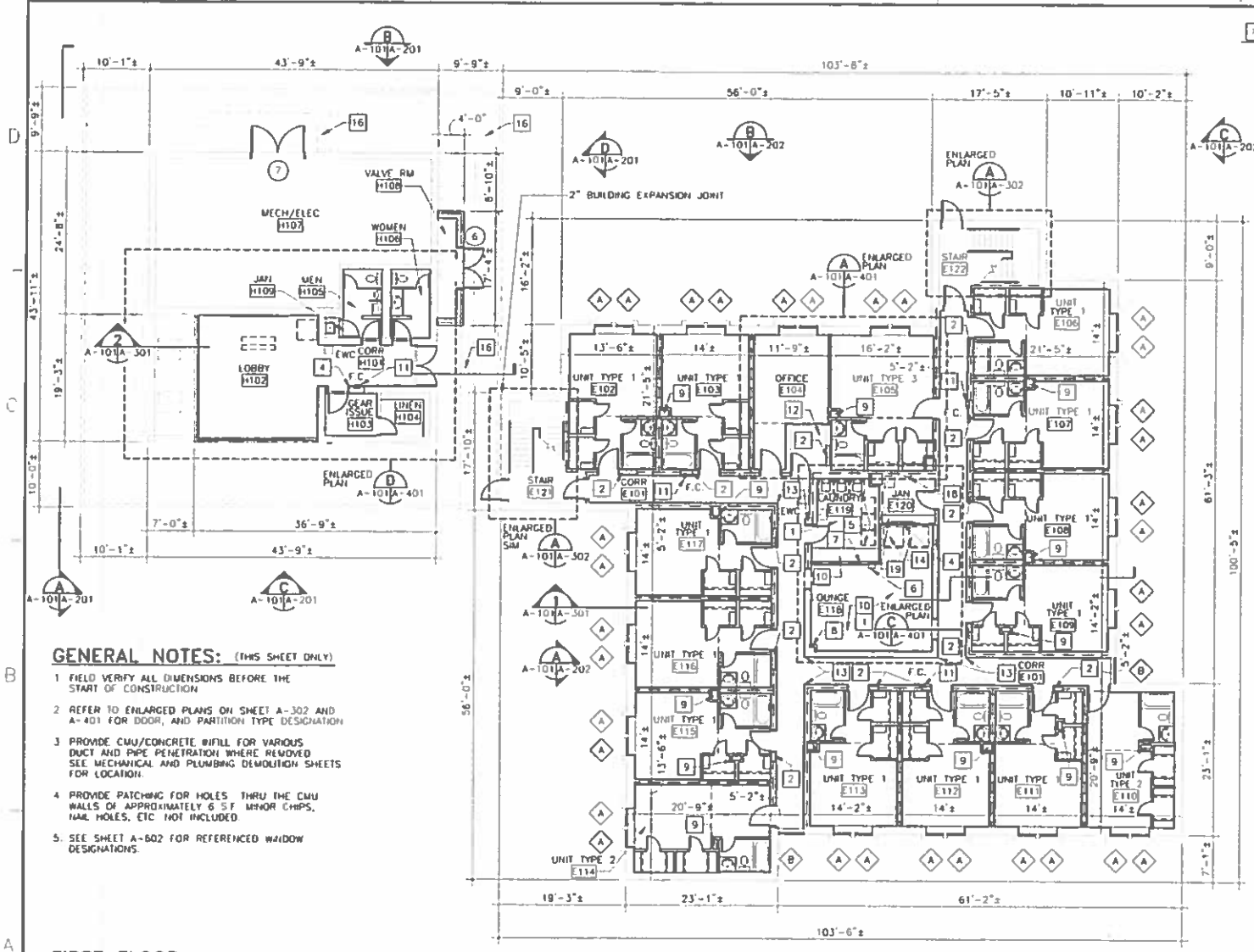
EXH FANS. - Running

1. Green Neck G-123-AX-DQ (1)
2. B. DB 814, EF-5 (3)
3. Green Neck G-123-AX-DQ (4)
4. B DB814 EF-7 (3)
5. Green Neck G-123-AX-DQ (4)

G BLDG.

EXH. FANS not Running.

(2) Green Neck G-123-AX DQ
(3) B DB 814 EF-13 (3)
EF-15 (3)
EF-16 (3)



FIRST FLOOR NEW WORK PLAN—WINGS 'H' AND 'E'

SCALE: 1/8"=1'-0"

GENERAL NOTES: (THIS SHEET ONLY)

1. FIELD VERIFY ALL DIMENSIONS BEFORE THE START OF CONSTRUCTION
2. REFER TO ENLARGED PLANS ON SHEET A-302 AND A-401 FOR DOOR, AND PARTITION TYPE DESIGNATION
3. PROVIDE CMU/CONCRETE INFILL FOR VARIOUS DUCT AND PIPE PENETRATION WHERE REMOVED SEE MECHANICAL AND PLUMBING DEMOLITION SHEETS FOR LOCATION.
4. PROVIDE PATCHING FOR HOLES THRU THE CMU WALLS OF APPROXIMATELY 6 S.F. MINOR CHIPS, NAIL HOLES, ETC NOT INCLUDED.
5. SEE SHEET A-602 FOR REFERENCED WINDOW DESIGNATIONS.

LEGEND:

— — — — — — 1 HOUR RATED PARTITION

CONSTRUCTION NOTES:

(SHEETS A-101 THRU A-105 ONLY)

1. PROVIDE SELF-LEVELING UNDERLAYMENT WHERE EXISTING WALLS, MARBLE THRESHOLDS AND CERAMIC TILE FLOOR ARE REMOVED. PROVIDE THICKNESS TO LEVEL WITH ADJACENT SURFACES.
2. PROVIDE CMU INFILL AT VOID WHERE DOOR OR CMU WALL IS REMOVED. MATCH EXISTING WALL THICKNESS. SEE DEMOLITION DRAWINGS FOR AMOUNT OF INFILL. SEE TYPICAL DETAIL SHEET A-102.
3. REPOINT VERTICAL JOINT FROM FLOOR TO CEILING WHERE MORTAR JOINT IS TO BE REMOVED. SEE DEMOLITION NOTE
4. PROVIDE 8" CMU INFILL AT EXISTING OPENING. FILL OPENING COMPLETELY AND MATCH EXISTING WALL THICKNESS. SEE TYPICAL DETAIL SHEET A-102.
5. WASHERS AND DRYERS PROVIDED BY THE GOVERNMENT INSTALLED BY THE CONTRACTOR
6. PAY PHONE AND SURROUND. SEE DETAIL A/A-402.
7. PROVIDE 4' x 8' TACK BOARD
8. PROVIDE CHASE WALL AROUND EXISTING PLUMBING PIPES. SEE ENLARGED PLAN FOR DETAILS.
9. PROVIDE CHASE WALL AS REQUIRED BY MECHANICAL OR PLUMBING SYSTEM. SEE ENLARGED PLANS FOR DIMENSION.
10. PATCH FLOOR WHERE PLUMBING FIXTURES ARE REMOVED TO MATCH ADJACENT FLOOR SURFACE. SEE PLUMBING DRAWINGS, FOR REMOVAL OF PLUMBING FIXTURES.
11. REINSTALL FIRE EXTINGUISHER UNITS THAT WERE REMOVED AND STORED FROM PREVIOUS LOCATIONS INTO THE NEW FIRE EXTINGUISHER CABINETS. SEE DETAIL B/A-402.
12. MODIFY EXISTING OPENING LOCATED IN CONCRETE PLANK FLOOR TO FIT NEW VERTICAL DUCT. SEE STRUCTURAL SHEETS FOR STANDARD CONCRETE PLANK FLOOR OPENING MODIFICATION OR NEW OPENING
13. PROVIDE CORNER GUARD, SEE DETAIL FOR SIZE AND MATERIAL.
14. VENDING MACHINES NOT IN CONTRACT
15. REPLACE CMU WHERE REMOVED WITH THE SAME SIZE, THICKNESS, AND SHAPE
16. PATCH STUCCO CEILING ON METAL LATH WHERE REMOVED FOR DEMOLITION, APPROXIMATELY 280 S.F. PATCH CEILING TO MATCH ADJACENT STUCCO CEILING.
17. REPOINT CRACKED CMU JOINTS WHERE MORTAR WAS REMOVED. SEE DEMOLITION PLAN FOR AMOUNT OF REPOINTING.
18. REINSTALL CLEANING FLUID DISPENSER.
19. PROVIDE 6 PIECES 1'-2" WIDE PLYWOOD SHELVING WITH HARDWOOD EDGE, PAINTED FINISH AND EQUALLY SPACED FOR THE HEIGHT OF THE ROOM. SEE SHEET A-701 FOR TYPICAL ELEVATION

KEY PLAN:

NTS

GRAPHIC SCALE:

1/8"=1'-0"

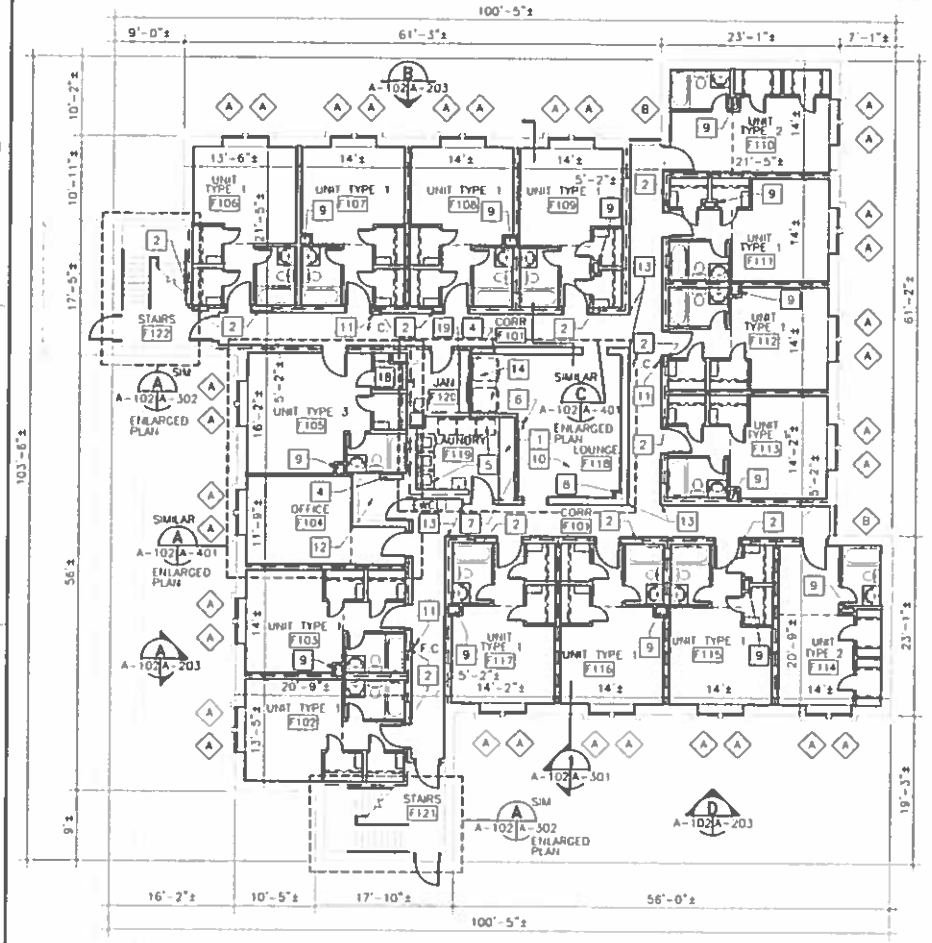
NAVY PUBLIC WORKS CENTER
NAVAL AMPHIBIOUS BASE, LITTLE CREEK VIRGINIA BEACH, VA

REPAIRS AND RENOVATIONS TO CONSOLIDATED BACHELOR QUARTERS (CBQ) BUILDING 3603
FIRST FLOOR NEW WORK PLAN WINGS 'H' AND 'E'

COLLIS ARMSTRONG CLOPP ANSELL COLLINS ASTRIN

COMMONWEALTH OF VIRGINIA
08-19-02
ARCHITECT

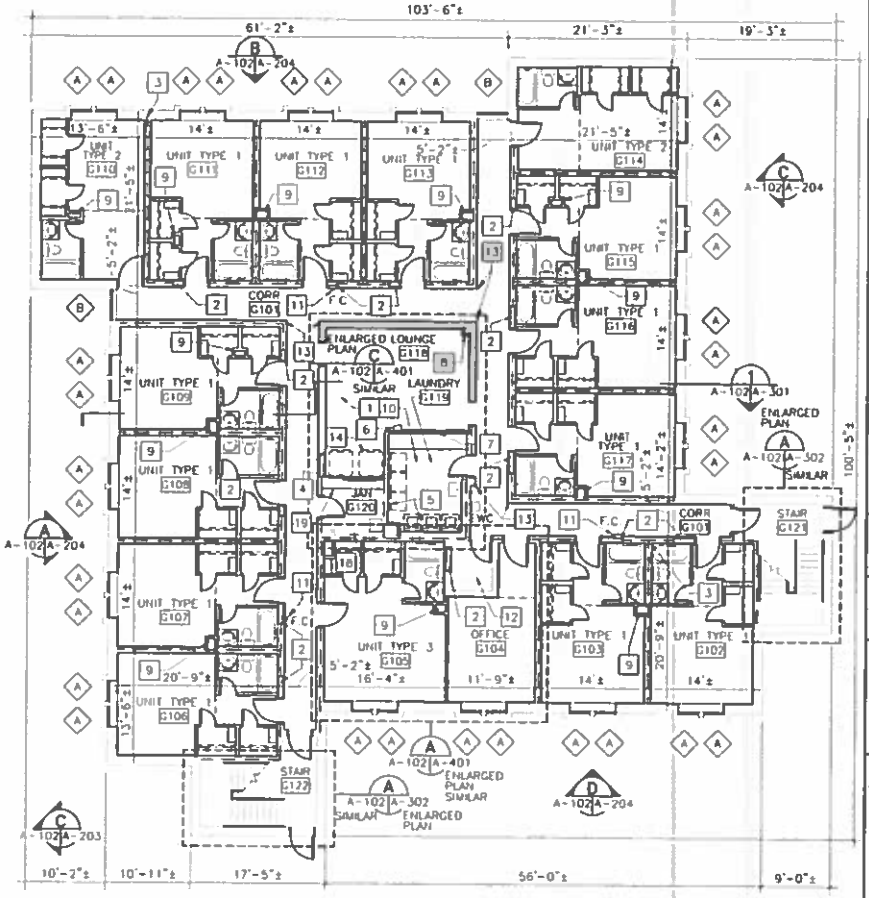
AS NOTED
A-101



FIRST FLOOR NEW WORK PLAN–WING 'F'

SCALE 1/8"=1'-0"

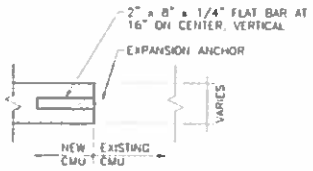
NORTH



FIRST FLOOR NEW WORK PLAN–WING 'G'

SCALE 1/8"=1'-0"

NORTH



TYPICAL DETAIL

N.T.S.

LEGEND:

— — — — — — 1 HOUR RATED PARTITION

GENERAL NOTES: (THIS SHEET ONLY)

1. FIELD VERIFY ALL DIMENSIONS BEFORE THE START OF CONSTRUCTION.
2. REFER TO ENLARGED PLANS ON SHEET A-301 AND A-401 FOR DOOR, ROOM AND PARTITION TYPE DESIGNATION.
3. REFER TO A-101 FOR CONSTRUCTION NOTES.
4. PROVIDE CMU/CONCRETE INFILL FOR VARIOUS DUCT AND PIPE PENETRATION WHERE REMOVED. SEE MECHANICAL AND PLUMBING DEMOLITION SHEETS FOR LOCATION.
5. PROVIDE PATCHING FOR HOLES THRU THE CMU WALLS OF APPROXIMATELY 6 SQUARE FEET MINOR CHIPS, NAIL HOLES, ETC. NOT INCLUDED.
6. SEE SHEET A-602 FOR REFERENCED WINDOW DESIGNATIONS

KEY PLAN:

N.T.S.

GRAPHIC SCALE:

1/8"=1'-0"

0 1' 5' 10' 20' 40'

DILLS ARMOUR CLIFF ANGELL COLLINS ARTHUR

COMMONWEALTH OF VIRGINIA
DANIEL C. DILLS
08-19-02
ARCHITECT

NAVY PUBLIC WORKS CENTER
NAVAL AMPHIBIOUS BASE, LITTLE CREEK VIRGINIA BEACH, VA

REPAIRS AND RENOVATIONS TO CONSOLIDATED BACHELOR QUARTERS (CBQ) BUILDING 3603

FIRST FLOOR NEW WORK PLAN WINGS 'F' AND 'G'

SCALE AS NOTED

164452

RC198-00

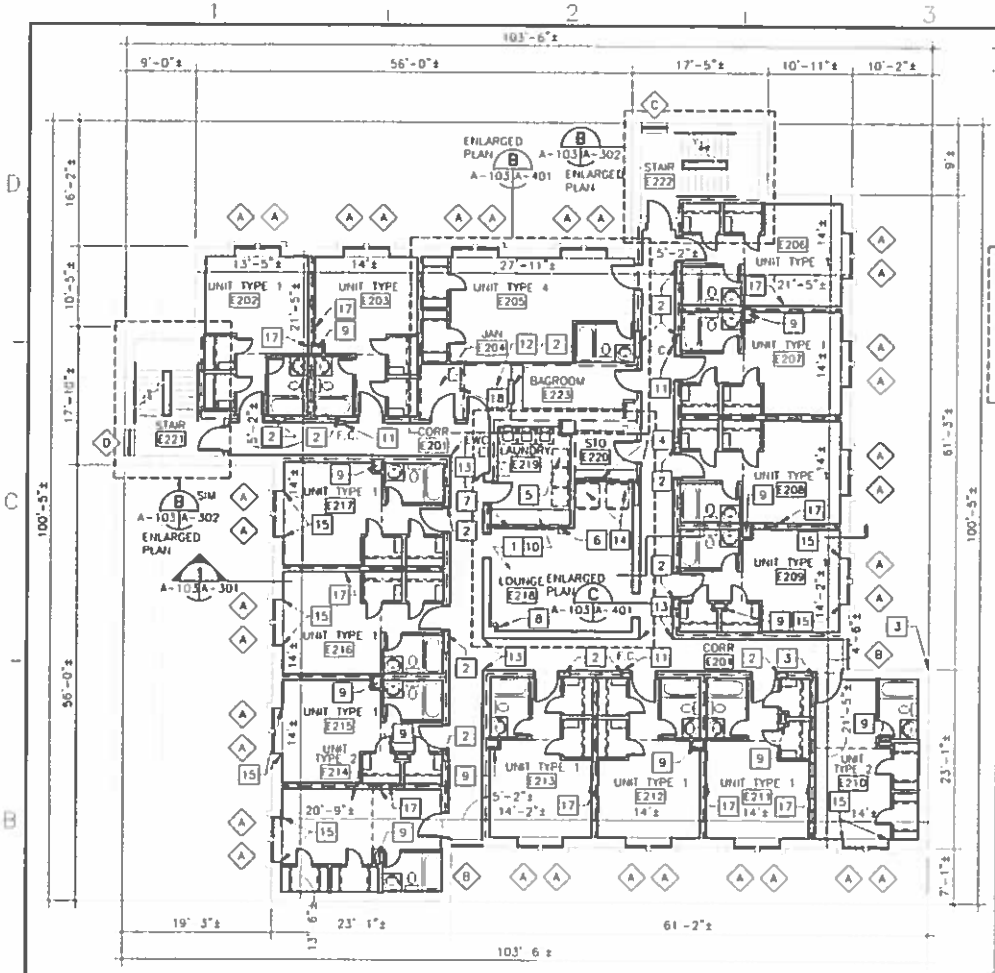
05-02-5855

N62470-02-B-5855

4468018

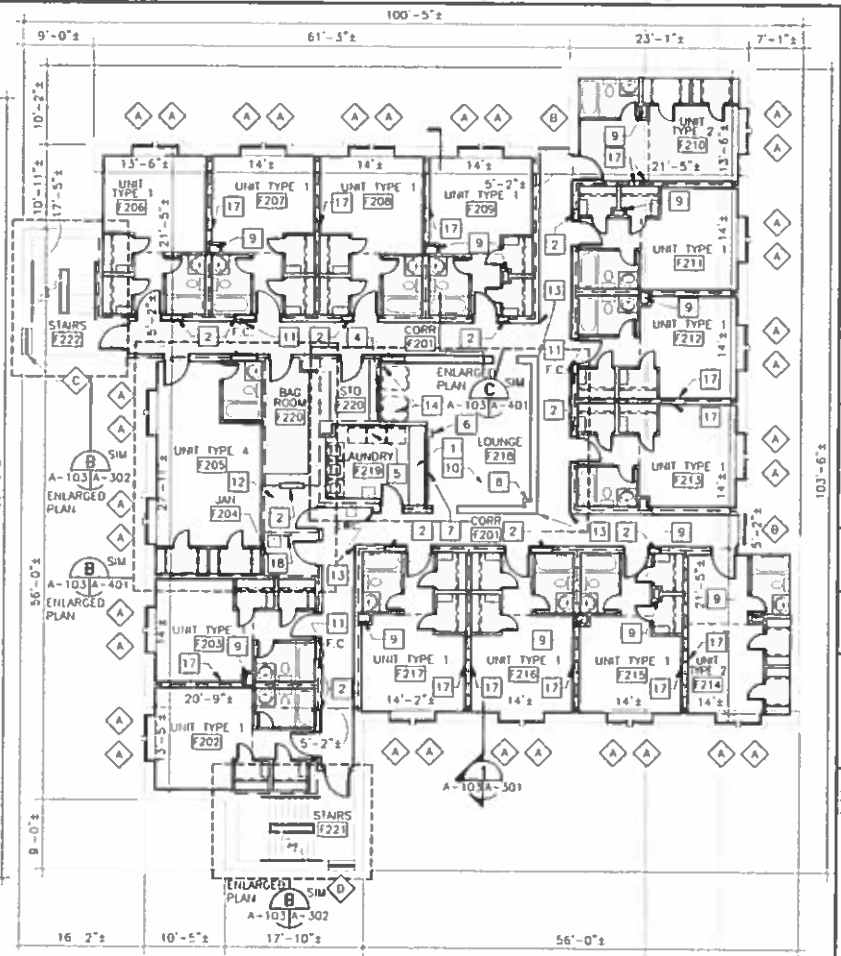
SHEET 37 OF 119

A-102



SECOND FLOOR NEW WORK PLAN—WING 'E'

SCALE: 1/8"=1'-0"



SECOND FLOOR NEW WORK PLAN—WING 'F'

SCALE: 1/8"=1'-0"

LEGEND:

— — — — — — — 1 HOUR RATED PARTITION

GENERAL NOTES: (THIS SHEET ONLY)

1. FIELD VERIFY ALL DIMENSIONS BEFORE THE START OF CONSTRUCTION
2. REFER TO ENLARGED PLANS ON SHEET A-301 AND A-401 FOR DOOR, ROOM AND PARTITION TYPE DESIGNATION
3. REFER TO A-101 FOR CONSTRUCTION NOTES
4. PROVIDE CMU/CONCRETE INFILL FOR VARIOUS DUCT AND PIPE PENETRATION WHERE REMOVED. SEE MECHANICAL AND PLUMBING DEMOLITION SHEETS FOR LOCATION
5. PROVIDE PATCHING FOR HOLES THRU THE CMU WALLS OF APPROXIMATELY 6 SQUARE FEET MINOR CHIPS, NAIL HOLES, ETC. NOT INCLUDED
6. SEE SHEET A-602 FOR REFERENCED WINDOW DESIGNATIONS

KEY PLAN:

NTS

GRAPHIC SCALE:

1/8"=1'-0" 0 2' 4' 10' 20' 40'

CELLS ABRAMSON DUFF ANSELL COLLINS ARVIN

COMMONWEALTH OF VIRGINIA
DANIEL C. ELLIS
08-19-02
ARCHITECT

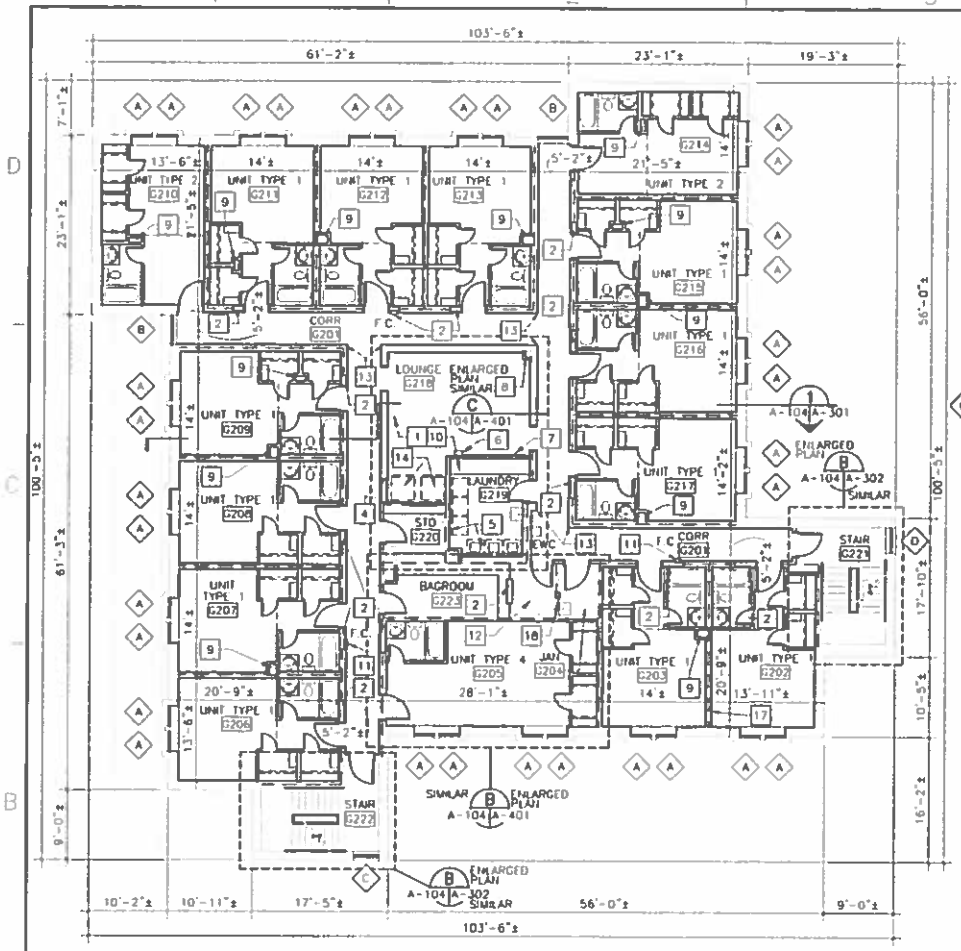
NAVY PUBLIC WORKS CENTER
NAVAL AMPHIBIOUS BASE, LITTLE CREEK VIRGINIA BEACH, VA

REPAIRS AND RENOVATIONS TO CONSOLIDATED BACHELOR QUARTERS (CBQ) BUILDING 3603

SECOND FLOOR NEW WORK PLAN WINGS 'E' AND 'F'

SCALE: AS NOTED
FMS BLDG. NO. 1644584
A/E WORK NO. RC198-00
SPEC. NO. 05-02-5855
CONTRACT NO. N62470-02-B-5855
CONTRACT DRAWING NO. 4496018
SHEET 28 OF 119

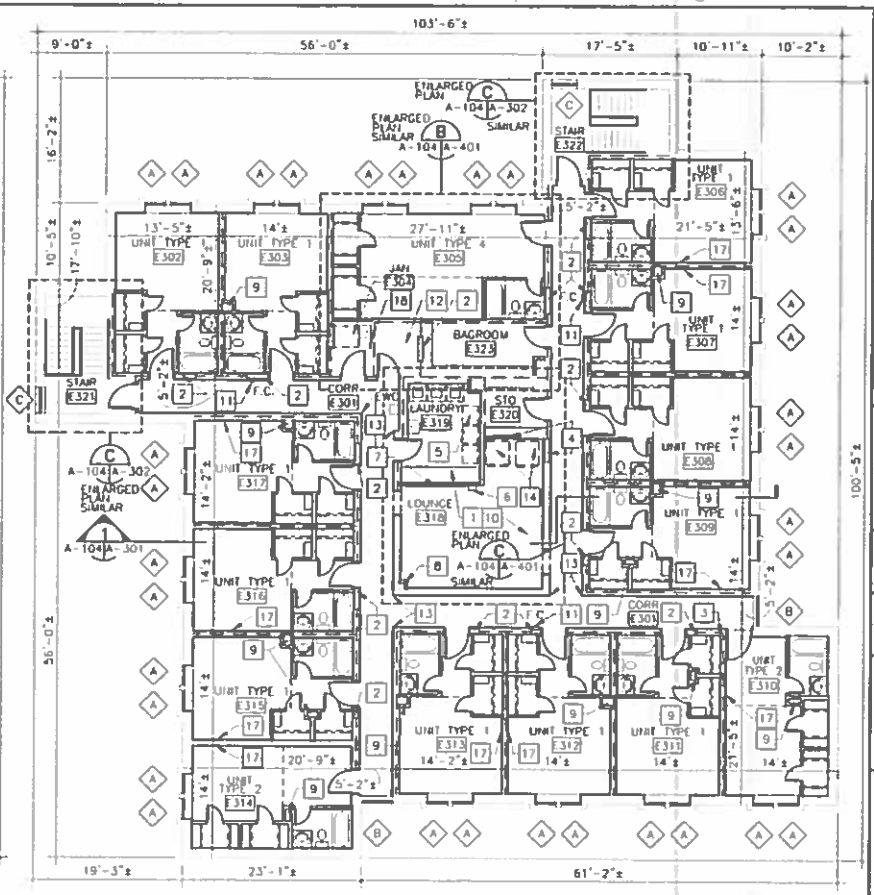
A-103



SECOND FLOOR NEW WORK PLAN–WING 'G'

SCALE 1/8"=1'-0"

NORTH



THIRD FLOOR NEW WORK PLAN–WING 'E'

SCALE 1/8"=1'-0"

NORTH

LEGEND:

— — — — — — 1 HOUR RATED PARTITION

GENERAL NOTES: (THIS SHEET ONLY)

1. FIELD VERIFY ALL DIMENSIONS BEFORE THE START OF CONSTRUCTION
2. REFER TO ENLARGED PLANS ON SHEET A-301 AND A-401 FOR DOOR, ROOM AND PARTITION TYPE DESIGNATION
3. REFER TO A-101 FOR CONSTRUCTION NOTES
4. PROVIDE CMU/CONCRETE INFILL FOR VARIOUS DUCT AND PIPE PENETRATION WHERE REMOVED. SEE MECHANICAL AND PLUMBING DEMOLITION SHEETS FOR LOCATION
5. PROVIDE PATCHING FOR HOLES THRU THE CMU WALLS OF APPROXIMATELY 6 SQUARE FEET MINOR CHIPS, NAIL HOLES, ETC NOT INCLUDED
6. SEE SHEET A-602 FOR REFERENCED WINDOW DESIGNATIONS.

KEY PLAN:

NTS

GRAPHIC SCALE:

1/8"=1'-0" 0 5' 10' 20' 40'

DILLS ARMSTRONG DUFF ANSELL COLLINS ARTHUR

COMMONWEALTH OF VIRGINIA DANIEL C. DILLS REGISTERED ARCHITECT 08-19-02

NAVY PUBLIC WORKS CENTER
NAVAL AMPHIBIOUS BASE, LITTLE CREEK VIRGINIA BEACH, VA

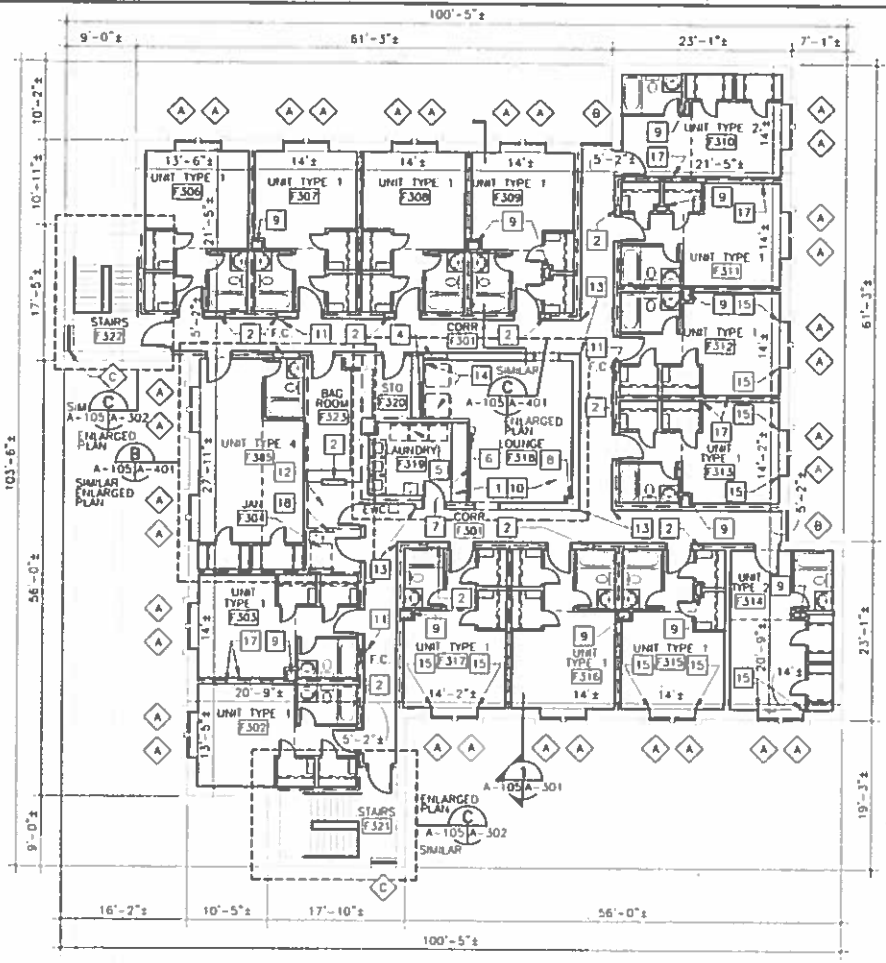
REPAIRS AND RENOVATIONS TO CONSOLIDATED BACHELOR QUARTERS (CBQ) BUILDING 3603

SECOND AND THIRD FLOOR NEW WORK PLAN WINGS 'G' AND 'E'

SCALE AS NOTED

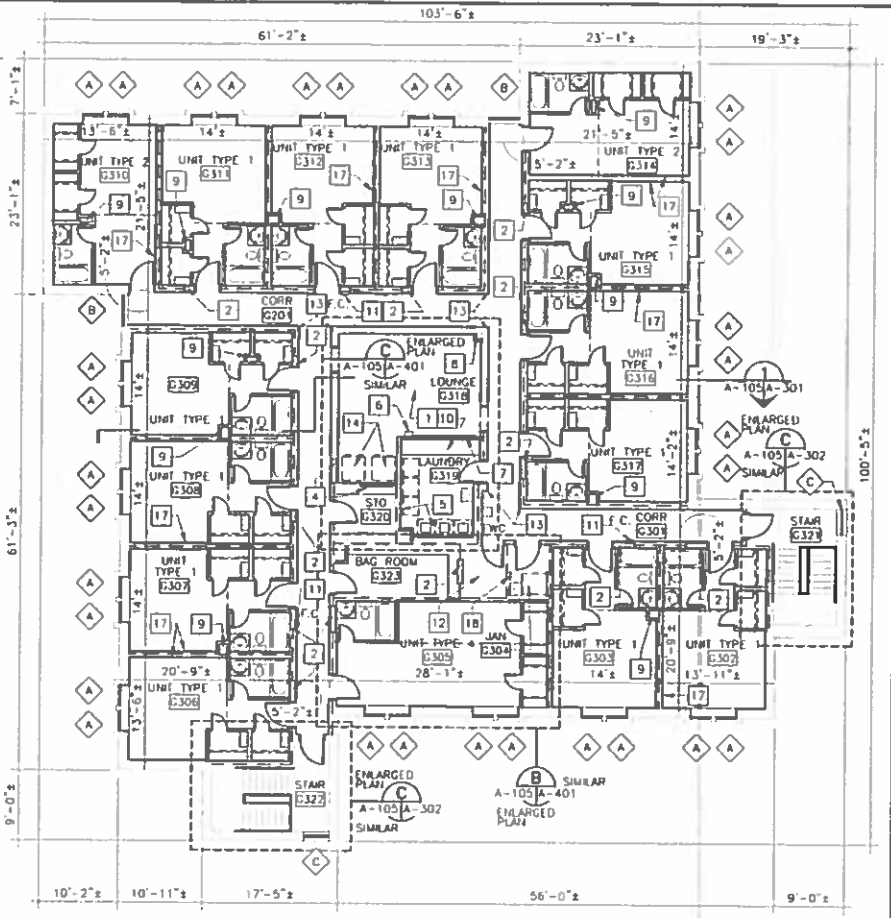
N62470-02-B-5855

A-104



THIRD FLOOR
NEW WORK PLAN-WING 'F'
SCALE 1/8"=1'-0"

NORTH



THIRD FLOOR
NEW WORK PLAN-WING 'G'
SCALE 1/8"=1'-0"

NORTH

LEGEND:

— — — — — — 1 HOUR RATED PARTITION

GENERAL NOTES: (THIS SHEET ONLY)

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2. REFER TO ENLARGED PLANS ON SHEET A-301 AND A-401 FOR DOOR, ROOM AND PARTITION TYPE DESIGNATION.
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6. SEE SHEET A-602 FOR REFERENCED WINDOW DESIGNATIONS

KEY PLAN:

NTS

GRAPHIC SCALE:

1/8"=1'-0" 0 5' 10' 20' 40'

DELLS MARCHUK DUPP
ANSELL COLLINS ALTON
A PROF CORPORATION

COMMONWEALTH OF VIRGINIA
DANIEL E. DELLS
AIA 013063
08-19-02
ARCHITECT

NAVY PUBLIC WORKS CENTER
NAVAL AMPHIBIOUS BASE, LITTLE CREEK VIRGINIA BEACH, VA

REPAIRS AND RENOVATIONS TO CONSOLIDATED BACHELOR QUARTERS (CBQ) BUILDING 3603

THIRD FLOOR NEW WORK PLAN WINGS "F" AND "G"

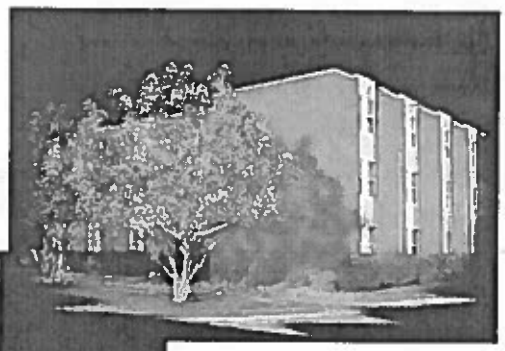
SCALE: AS NOTED
FIN. ASSY. NO. 1B49SAC
A/E WORK NO. PC198-00
SPEC. NO. 03-03-5859
CONTRACT NO. N62470-02-B-5859
DRAWING NO. 448621
SHEET 30 OF 110

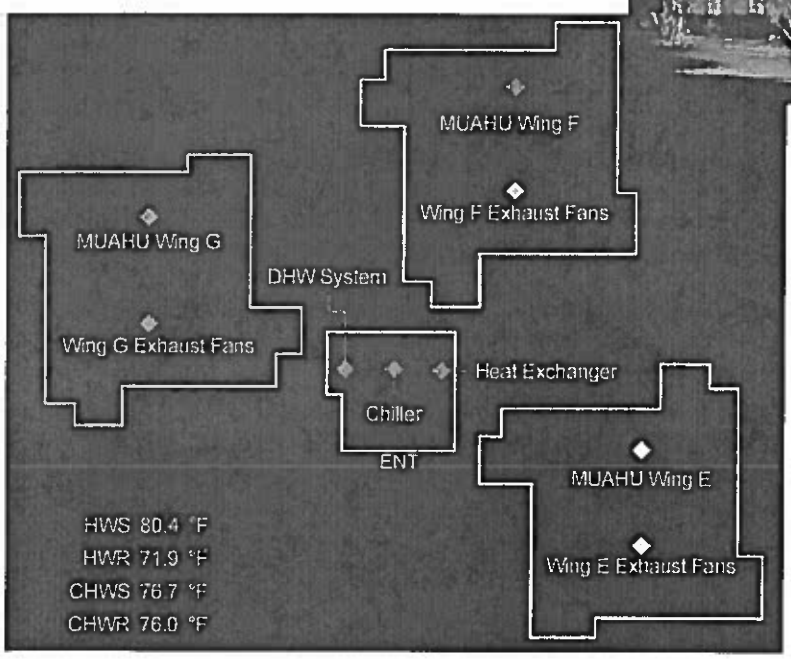
A-105

60.0 °F
88.4 %rh

Documentation

3603 Hammond Hall





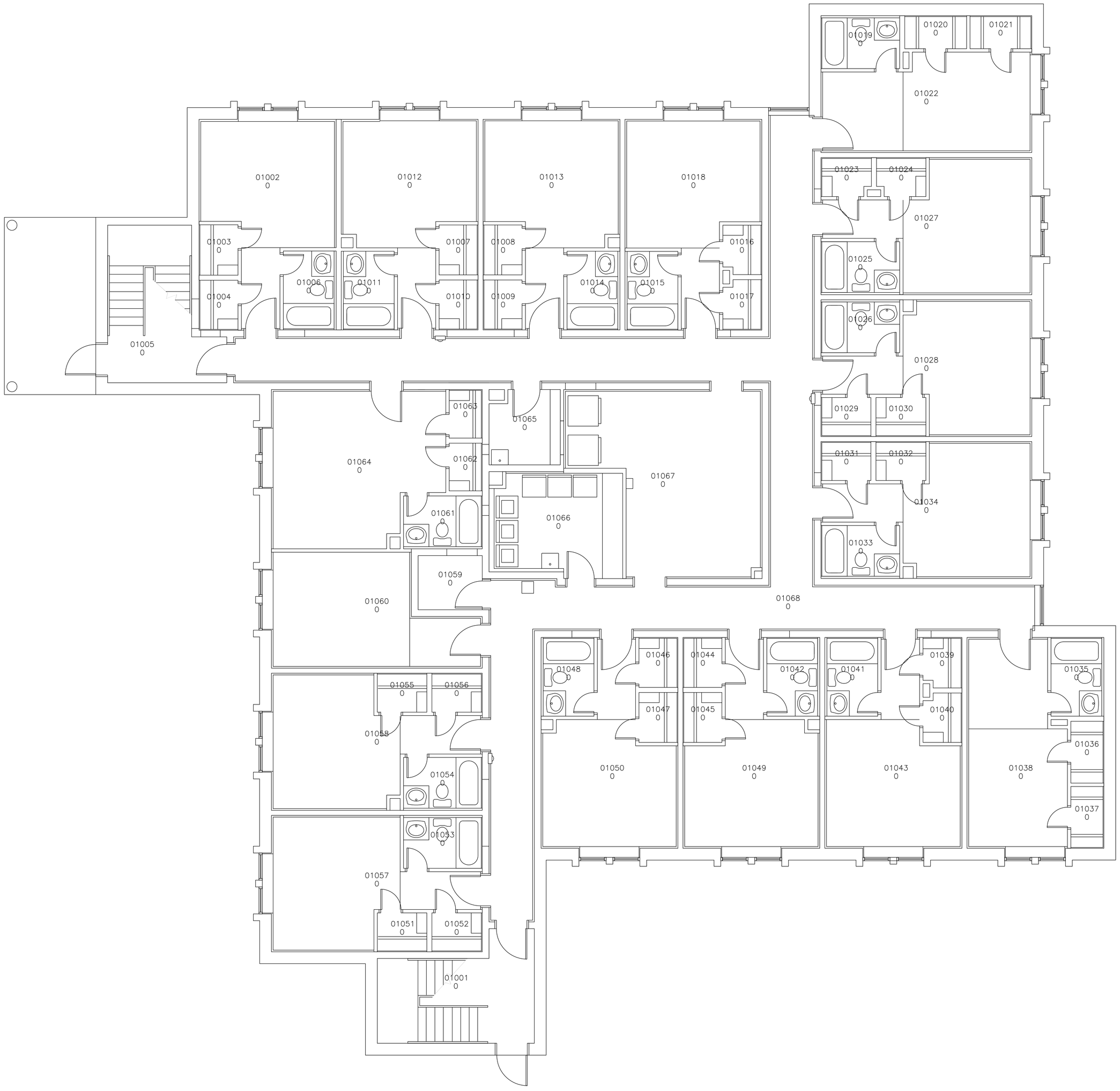
N

alarm cool ideal warm alarm on off

Building 3603
First Floor Plan

Commander Navy
Region Mid-Atlantic
GeoReadiness Center

Legend / Notes



1 BUILDING 3603 - FIRST FLOOR PLAN

Scale: GRAPHIC 0 5' 10'

NORTH

FOR OFFICIAL USE ONLY

Print Date: 21 September 2015

GeoReadiness Center

BD-GIS Mid-Atlantic
Norfolk, VA 23511
(757) 444-4716
PWCNORVA_GIS_WEB@nmci-isf.com

..\..\..\..\GeoreadinessLogo.JPG

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Part 6 - Attachments
Option 3 - Building 3604

1. Initial Building Survey Data
2. Building Plan

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:		**Building No.**	3604
Building Name:	SCOTT HALL	**Facility Type:**	Residence
Facility Manager:	Lavern Rushin	**Jacobs CX Lead:**	Paul Nelson
Building Monitor:	Troy Wagers	**Jacobs CX Junior:**	Artheley "Lee" Weeks
		Jacobs Mech Engineer:	Carlos Teran
		Jacobs Elec Engineer:	David Williams

FACILITY PHOTO

1. Facility Investigation Narrative:	
Description:	Facility is approximately 62,145 square feet, consisting of a central multipurpose buiding with main mechanical room, electrical service room and toilet, and three adjacent three-story residence buildings or wings.
Facility Usage History:	Building use has remained the same since constructed.
Renovation History:	New thermostats were installed for the room fan coil units. However these do not communicate with the BAS
As-Built Documents:	Control Drawings and Sequence of Operation documents where downloaded from the BAS . Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	The mechanical cooling for the facility is handled by an air cooled chiller. Heating is provided by a steam to hot water heat exchanger. AHUs and fan coils distribute air throughout the building to maintain comfort level. Chilled water and hot water pumps circulate the water required by the AHUs.
DDC Description:	The facility Make up Air units, Chiller, heat exchanger control valve and pumps are primarily controlled by an Automated Logic DDC. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Lighting Description:	Lighting in rooms consists of of 1x4, diffuser, surface mount fixtures with 2 T8 flourescent lamps. Clousets use a 1x2, 2 lamp flourescent fixture. Hallways use 12' round wall mount, CFL units. Lobby areas use 2x2 lay-in 2 u-tube flourescent fixtures with 6" round CFL units around the outside. Motion sensor controls are used for closet lighting. Exit and emergency lighting were well placed but some did not light during test condition.
Equipment Deficiencies:	HVAC equipment is in poor condition. Condensate return system needs repair. Exhaust fans partially operating and with bearing issues and loose belts. Exhaust fan operation is not monitored by the BAS.
Other Information:	

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:		**Building No.**	3604
Building Name:	SCOTT HALL	**Facility Type:**	Residence
Facility Manager:	Lavern Rushin	**Jacobs CX Lead:**	Paul Nelson
Building Monitor:	Troy Wagers	**Jacobs CX Junior:**	Artheley "Lee" Weeks
		Jacobs Mech Engineer:	Carlos Teran
		Jacobs Elec Engineer:	David Williams

FACILITY PHOTO

2. ECM Study Recommendations:	Priority
a. Install variable flow chilled water system	M
b. Intall variable volume hot water system	M
c. Replace existing FCU system with Variable Refrigerant System	L
d. Provide 1/3 - 2/3 steam control valve arrangement on heat exchanger	M
e. Change all fixtures to LED equivilent using exiting circuits and switching.	M
f. Install ceiling mounted motion sensor control for rooms where appropriate.	M

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning	
a. Chiller and chilled water pumps	
b. Heat exchanger control	
c. Heating hot water pump control	
d. MAU controls	
e. Exhaust fan control	
f. Full DDC retro-commissioning	

4. Corrective Actions	Action Code
a. Replace chiller and its associated air cooled condenser and chilled water pumps	2
b. Replace hot water pumps	2
c. Repair condensate return system.	2
d. Replace emergency and exit light batteries where not working	1
e.	
f.	

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a. Lighting monitoring at the switch level would require approximately 200 points.
b. Lighting monitoring at the circuit level would require approximately 40 points. This would avoid recircuiting non-lighting circuits from Lighting panels
c. Lighting monitoring at the panel level would require approximately 12 points. This may require recircuiting non-lighting circuits away from lighting panels.
d.
e.
f.

6. Recommended Mechanical Control Points:
a. Add control points to connect fan coil thermostats to building DDC
b. Provide additional control points associated to recommended ECMs
c. Provide status, start/stop control points for exhaust fans.
d.
e.
f.

COOLING PLANT

Building Name: 3604

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Room Temp	Yes___	No ✓
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Chillers

Tag					
Type	W (A) HR	W A HR	W A HR	W A HR	W A HR
Compressor	A C R (S)	A C R S	A C R S	A C R S	A C R S
Manufacturer	TRANE				
Model Number	RTUA1254E01	(2) compressors.			
Tons	125				
Age	23 yrs.				
Temp / Pressure gauges	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___
CHW Temp	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___	Supply___Return___
CHW Reset	OA L T	OA L T	OA L T	OA L T	OA L T
Equipment Condition	1 (2) 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Chiller Types
W - Water Cooled
A - Air Cooled
HR - Heat Recovery

Compressor Types
A - Absorption
C - Centrifugal
R - Reciprocating
S - Screw

CHW Reset
OA - Outside Air
L - Load
T - CHWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New
3.+ 4. Repair / RetroCx

Heat Rejection

Cooling Towers

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5

Condensing Units

Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
DR- Dry Cooler
C - Condensing Unit
EC - Evaporative Cooling
HP - Air to Air HP
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC

Notes / Potential ECM's:

Roof / 3604 AC-1 CAUCC060G2C03 Bad Cond. Fan. Rotiz (3) / EF (1) Greenheck 4YC506 (2) 5995 BLOF x 6-BD Rotiz. (3)

AC-2 1993 ISN

1

CHILLER PUMPS.

2 PUMPS. 1 W/ BAD BEARING.
7.5 HP. INSULATION ON PIPES MISSING.
HAS NEW MOTOR

OTHER PUMP APPEARS OKAY.

CHILLER IN AUTO W/ ~~AUTO BUT~~ LOCAL SETPOINT.
COMPRESSORS NOT RUNNING BUT COND. FANS
OPERATING. LOCAL SET. PT: 44, BPS @ 47.

HEATING PLANT

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Boiler Room Temp	Yes___	No___
High Press Steam present	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Other _____

Boilers

Tag	Hx - ?			
Type	SHELL/TUBE			
Fuel	STM B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P
Manufacturer	N/A			
Model Number				
Capacity (mbh/lbsh)				
Age	Orig. To Bldg.			
Delivery Temp/Pressure				
Return Temp				
Steam Trap Type	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT
Steam Trap Condition	1 2 3 5	1 2 3 5	1 2 3 5	1 2 3 5
Breaching Type	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL
Breaching Condition	1 2 3 5	1 2 3 5	1 2 3 5	1 2 3 5
Boiler Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
HW Reset	OA L T	OA L T	OA L T	OA L T

Fuel Type
- **B** - Bio
- **C** - Coal
- **E** - Electric
- **FO2** - Fuel Oil#2
- **FO6** - Fuel Oil#6
- **NG** - Natural Gas
- **P** - Propane

Steam Trap Type
- **TS** - Thermostatic
- **F&T** - Float and Thermostatic
- **IB** - Inverted Bucket
- **OB** - Open bucket
- **DT** - Disk Trap
- **PT** - Piston Trap
- **OT** - Orifice Trap

Breaching Type
- **BRK** - Brick / Block
- **SS** - Stainless Steel
- **GAL** - Galvanized Steel
- **PLA** - Poly, PVC, CPVC
- **AL** - Aluminum AL29-4C

Note: ALL larger condensing boilers (>1000 MBH) **MUST** use AL29-4C

HW Reset
- **OA** - Outside Air
- **L** - Load
- **T** - HWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New

3.+ 4. Repair / RetroCx

Notes / Potential ECM's: _____

Single stage PRV to 12 psig. From 115 psig STM meter.
2 pumps. 5 Hp.

AIRSIDE INFORMATION

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Mech Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

B40 C

Tag	Manufacturer	Type	Supply Fan HP		VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
RTU-1	AAON		Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	RM01580AAS2		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air	100% OA		Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: R-22 (2) scroll comp. Cooling only. 58701 Bottom of unit Rusted out!.

B

Tag	Manufacturer	Type	Supply Fan HP		VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
	Sunmaster		Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM	100% OA		Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

A

Tag	Manufacturer	Type	Supply Fan HP		VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	Sunmaster		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:	# of units:		Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Central AHU Type
- **CAV** - Constant Volume
- **DD** - Dual Duct
- **HV** - Heating and Vent Unit
- **MZ** - Multizone
- **SZ** - Single Zone
- **VRH** - Var. Vol. w Reheat
- **VPFP** - Var. Vol. w Parallel FP Boxes
- **VSFP** - Var. Vol. w Series FP Boxes
- **VVVT** - Var. Vol. Var. Temp

Local AHU Type
- **2P FCU** - 2 pipe FCU
- **4P FCU** - 4 pipe FCU
- **ACB** - Active Chilled Beam
- **CRAC** - Computer Room AC
- **GSHP** - Ground Source HP
- **HP** - Air to Air HP
- **PCB** - Passive Chilled Beam
- **PTAC** - Packaged Terminal AC
- **SS** - Mini Split System
- **VRF** - Variable Refrig. Flow
- **WU** - Window AC
- **WSHP** - Water Source HP

Source
- **E** - Electric
- **HW** - Hot Water
- **NG** - Natural Gas
- **ST** - Steam
- **CHW** - Chilled Water
- **DX** - Direct Expansion

Controls
- **DDC** - Direct Digital Controls
- **E** - Electric/Local
- **H** - DDC/Pneumatic
- **P** - Pneumatic

Setbacks
- **P** - Static Pressure Reset
- **SA** - Supply Air Reset
- **T** - Unoccupied Space Temp

Energy Recovery
- **RA** - Runaround Loop
- **WA** - Wraparound Loop
- **EW** - Enthalpy Wheel
- **PL** - Plate Heat Exchanger

Flow Control
- **CV** - Constant Volume
- **Int** - Intermittent
- **3SPD** - 3 Speed Control
- **VFD** - Variable Frequency Drive

BLDG C

EFs Running

1. SW. GB-081-6X
2. " " Loose Belts.
3. CUBE 098-4-X
4. SW. GB-081-6X
5. " "

BLDG. B.

MAU - AROUND

EFs

1. Screen Neck CUBE 098-4-X
2. " GB-081-6X
3. "
4. "

BLDG A

• BAD Bearings on Condenser FANS.

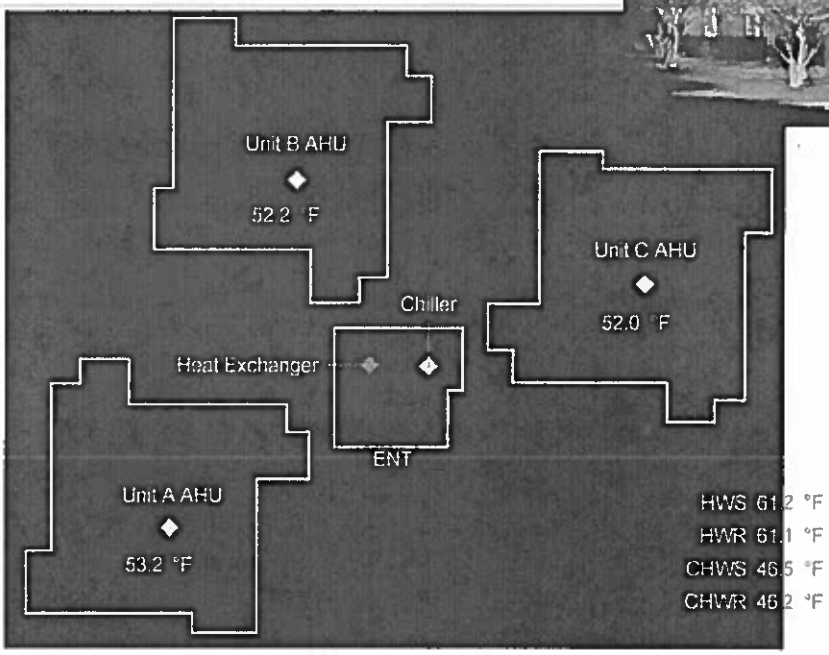
EXHAUST FANS.

1- Screen Neck. CUBE 098-4-X
GB-081-6X.

60.0 °F
88.4 %rh

3604 Scott Hall

Documentation:



N

alarm cool ideal warm alarm

on off

1 BUILDING 3604 - FIRST FLOOR PLAN

UNVERIFIED FLOOR PLAN Year Unknown - Source Unknown

Note: UOM is INCH for Adobe measuring tool

NFA100001075515_3604_01_FP.dwg 04 MAR 2013

NAVFAC MIDLANT GeoReadiness Center

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Building 3604
First Floor

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Norfolk, VA 23511
(757) 444-4716
PWCNORVA_GIS_WEB@nmci-isf.com

1 BUILDING 3604 - SECOND FLOOR PLAN

UNVERIFIED FLOOR PLAN Year Unknown - Source Unknown

Note: UOM is INCH for Adobe measuring tool

NFA1000010755I5_3604_02_FP.dwg 04 MAR 2013

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Building 3604 Second Floor

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1 BUILDING 3604 - THIRD FLOOR PLAN

UNVERIFIED FLOOR PLAN Year Unknown - Source Unknown

Note: UOM is INCH for Adobe measuring tool

NAVFAC MIDLANT GeoReadiness Center

NFA1000010755I5_3604_03_FP.dwg 04 MAR 2013

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Building 3604
Third Floor

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Part 6 - Attachments
Option 4 - Building 3650

1. Initial Building Survey Data
2. Building Plan

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/4/2015	**Building No.**	3560
Building Name:	Bowling Center	**Facility Type:**	Recreation
Facility Manager:	Robert Jackson	**Jacobs CX Lead:**	Sam Ehreth
Building Monitor:	Sheila Smith	**Jacobs CX Junior:**	Phil Dabrowski
		Jacobs Mech Engineer:	
		Jacobs Elec Engineer:	David WIlliams

1. Facility Investigation Narrative:	
Description:	The building is centrally located near the EMCS building. The single story facility is used as a Bowling Alley The facility is about 29,990 square feet.
Facility Usage History:	The facility was originally designed/constructed as a bowling alley.
Renovation History:	N/A
As-Built Documents:	Control Drawings, Floor Plans & TABs documents where downloaded from the BAS when available. Jacobs was unable to verify the accuracy of the documents. During performance of SOW of phase 2, as-built documents will be revisited.
BM / FMS Knowledge:	The BM stated that humidity control is a big problem in the bowling lanes area that causes customers to stick to the floor when bowling.
O&M Procedures:	Preventive maintenance is not being performed in a consistent or comprehensive manner. In most cases, any preventative maintenance performed is done when addressing emergency maintenance/repair calls.
HVAC Description:	The building is installed with a 4-pipe system that is connected to modular geothermal heat pumps. Conditioned air is delivered to the spaces via (2) Air Handling Units. Exhaust and relief air is provided by exhaust fans and relief dampers. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
DDC Description:	Approximately 50% of the facility equipment has pneumatic controls, the other 50% is electric/electronic controls. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Lighting Description:	Lighting consists of a wide array of 2x4 and 2x2 parabolic and diffuser and 1x4, T8 flourescent fixtures. Other fixtures used include decorative ceiling mounted fixtures, recessed CFL and ceiling mounted halogen fixtures. Black light flourescent and strobe fixtures are used for special occasion bowling. Metal halide wall mount fixtures are used in the mechanical room but do not operate. Some areas have motion sensor contol.
Equipment Deficiencies:	Generally, equipment was found to be in need of routine maintenance and cleaning. Primary HVAC system issues included poor water treatment, chilled water/hot water flows, and temperature and humidity control. Refer to Section 2 & 4 for corrective issues and energy conversion measures.
Other Information:	The modular heat pumps have required a lot of attention from NAVFAC.

PHASE I FACILITY INVESTIGATION SUMMARY REPORT

Date of Visit:	11/4/2015	**Building No.**	3560
Building Name:	Bowling Center	**Facility Type:**	Recreation
Facility Manager:	Robert Jackson	**Jacobs CX Lead:**	Sam Ehreth
Building Monitor:	Sheila Smith	**Jacobs CX Junior:**	Phil Dabrowski
		Jacobs Mech Engineer:	
		Jacobs Elec Engineer:	David WIlliams

2. ECM Study Recommendations:	Priority
a. Insulate Chilled water coils on 2 AHUs. Aproximately 20' of 2" pipe.	H
b. Replace air compressor and pneumatic controls with Electronic DDC	H
c. Repair defective 3-way chilled water valve in mechanical room on AHU-2	H
d.	
e.	
f.	

ECM PRIORITY CODES:
H. High potential for energy savings and low implementation or maintenance costs.
M. Some energy savings and average implementation or maintenance costs.
L. Low potential energy savings and/or high implementation or maintenance costs.

3. Systems Requiring Retro-Commissioning
a. AHU-1 and 2
b. Chiller
c. Pumps
d.
e.
f.

4. Corrective Actions	Action Code
a. Revise operating schedules to accommodate business hours.	2
b. Repair / replace AHU-2 chilled water control valve.	2
c. Insulate approximately 20' of 2" pipe.	2
d. Install humidity sensors and integrate humidity into AHU / heat pump sequence of operation.	2
e. Cleaning coils for chiller and air handling units	2
f.	2

CORRECTIVE ACTION CODES:
1. No / Low Cost Corrective Actions
2. Equipment Repair and System Modifications
3. Capital Improvement Recommendation

5. Recommended Electrical Control Points:
a.
b.
c.
d.
e.
f.

6. Recommended Mechanical Control Points:
a. Add humidity sensors and communications (6 points).
b.
c.
d.
e.
f.

COOLING PLANT

Building Name: 3560

Retro-Commissioning Safety Hazards:

2 EXAUST FANS

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Chillers

Tag	HW/ SYSTEM			
Type	W A HR HP	W A HR	W A HR	W A HR
Compressor	A C (R) S	A C R S	A C R S	A C R S
Manufacturer	CLIMA COOL			
Model Number	UCH030 AHASNS BOS			
Tons	GEOTHERMAL			
Age				
Temp / Pressure gauges	Yes P No T	Yes___ No___	Yes___ No___	Yes___ No___
CHW Temp	Supply ? Return ?	Supply___ Return___	Supply___ Return___	Supply___ Returns___
~~CHW Reset~~ NO RESET	OA L (T)	OA L T	OA L T	OA L T
Equipment Condition	1 2 3 (4) 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

3 MODS

RESET FOR BOTH CHW/HW TEMP

Pumps

HP	CP	GEO PUMP	
2	5	15	
WKG			
	AO SA	P	
TFC TEFC BASE MOUNT 5	ASSUME	BALDOR 4	

AHU2 - BY STORE CONTRACTS BOWLING ALLEY

Chiller Types
- W - Water Cooled
- A - Air Cooled
- HR - Heat Recovery

Compressor Types
- A - Absorption
- C - Centrifugal
- R - Reciprocating
- S - Screw

CHW Reset
- OA - Outside Air
- L - Load
- T - CHWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New

3.+ 4. Repair / RetroCx

Heat Rejection

Cooling Towers

Tag	Age	Quantity & Capacity	Fan Control	Flow Control	Waterside Econ.	Condition
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Flow Control**	**Waterside Econ.**	**Condition**
		#___@ _____Tons ___Cells	__Constant __VFD __Two Speed	__Constant __VFD	__ Yes __ No OA Temp___	1 2 3 4 5

Condensing Units

Tag	Age	Quantity & Capacity	Fan Control	Condition
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5
Tag	**Age**	**Quantity & Capacity**	**Fan Control**	**Condition**
		#___@ _____Tons	__Constant __VFD __Two Speed	1 2 3 4 5

Small Condensing Units

Tag	Age	Type	Quantity & Capacity	Compressor Control	Condition
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5
Tag	**Age**	**Type**	**Quantity & Capacity**	**Fan Control**	**Condition**
			#___@ _____Tons	__Constant __Digital __Two Speed	1 2 3 4 5

Small Condensing Unit Type
- DR- Dry Cooler
- C - Condensing Unit
- EC - Evaporative Cooling
- HP - Air to Air HP
- SS - Mini Split System
- VRF - Variable Refrig. Flow
- WU - Window AC

Notes / Potential ECM's:

NIGHTS NEED SETBACK NOT OFF

HUMIDITY IN MORNING

WINTER MORE PEOPLE
BAD WEATHER ↑ PEOPLE } AT LEAST 50% MOST NIGHTS
LABOR NIGHT 80%

DOESN'T

HEATING PLANT

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___ No___
Falls / Trips / Overhead	Yes___ No___
Extreme Boiler Room Temp	Yes___ No___
High Press Steam present	Yes___ No___
Hazardous Materials	Yes___ No___

Asbestos _____ Mold _____ Other _____

Boilers				Pumps
Tag				
Type				
Fuel	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	B C E FO2 FO6 NG P	
Manufacturer				
Model Number				
Capacity (mbh/lbsh)				
Age				
Delivery Temp/Pressure				
Return Temp				
Steam Trap Type	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	TS F&T IB OB DT PT OT	
Steam Trap Condition	1 2 3 5	1 2 3 5	1 2 3 5	
Breaching Type	BRK SS GAL PLA AL	BRK SS GAL PLA AL	BRK SS GAL PLA AL	
Breaching Condition	1 2 3 5	1 2 3 5	1 2 3 5	
Boiler Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
HW Reset	OA L T	OA L T	OA L T	

Fuel Type
- **B** - Bio
- **C** - Coal
- **E** - Electric
- **FO2** - Fuel Oil#2
- **FO6** - Fuel Oil#6
- **NG** - Natural Gas
- **P** - Propane

Steam Trap Type
- **TS** - Thermostatic
- **F&T** - Float and Thermostatic
- **IB** - Inverted Bucket
- **OB** - Open bucket
- **DT** - Disk Trap
- **PT** - Piston Trap
- **OT** - Orifice Trap

Breaching Type
- **BRK** - Brick / Block
- **SS** - Stainless Steel
- **GAL** - Galvanized Steel
- **PLA** - Poly, PVC, CPVC
- **AL** - Aluminum AL29-4C

Note: ALL larger condensing boilers (>1000 MBH) **MUST** use AL29-4C

HW Reset
- **OA** - Outside Air
- **L** - Load
- **T** - HWR Temp

Condition
1. Non-functional/Replace
2. Functional / Replace
3. Functional / Repair
4. Functional / RetroCx
5. Functional / New

3.+ 4. Repair / RetroCx

Notes / Potential ECM's: _____

AIRSIDE INFORMATION

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___	No___
Falls / Trips / Overhead	Yes___	No___
Extreme Mech Room Temp	Yes___	No___
Hazardous Materials	Yes___	No___

Asbestos _____ Mold _____ Lead _____ Other _____

Air Handling Units

BOWLING LANES

Tag	Manufacturer	Type	Supply Fan HP	10	VFD Y	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU2	TRANE	4PIPE	Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	MCCA014GA20BCB		CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer	Y N	
For Local AHUs Only:	# of units:		Avg Capacity:	Tons			CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: (8) 35 x 16 x 2
20 FT OF INSULATION

SNACK BAR

Tag	Manufacturer	Type	Supply Fan HP	15	VFD X	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
AHU1	MCCA017GEK D20BAMAD	4	Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #	TRANE	5	CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer	Y N	
For Local AHUs Only:	# of units:		Avg Capacity:	Tons			CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs: CHILLED WATER VALVE IS DISCONNECTED

MODEL

MAYBE SLAVE

Tag	Manufacturer	Type	Supply Fan HP		VFD___	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD___	Preheat	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			Cooling	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			Reheat	E HW NG ST	2 3	Airside Economizer	Y N	
For Local AHUs Only:	# of units:		Avg Capacity:	Tons			CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Central AHU Type
CAV - Constant Volume
DD - Dual Duct
HV - Heating and Vent Unit
MZ - Multizone
SZ - Single Zone
VRH - Var. Vol. w/Reheat
VPFP - Var. Vol. w/Parallel FP Boxes
VSFP - Var. Vol. w/Series FP Boxes
VVVT - Var. Vol. Var. Temp.

Local AHU Type
2P FCU - 2 pipe FCU
4P FCU - 4 pipe FCU
ACB - Active Chilled Beam
CRAC - Computer Room AC
GSHP - Ground Source HP
HP - Air to Air HP
PCB - Passive Chilled Beam
PTAC - Packaged Terminal AC
SS - Mini Split System
VRF - Variable Refrig. Flow
WU - Window AC
WSHP - Water Source HP

Source
E - Electric
HW - Hot Water
NG - Natural Gas
ST - Steam
CHW - Chilled Water
DX - Direct Expansion

Controls
DDC - Direct Digital Controls
E - Electric/Local
H - DDC/Pneumatic
P - Pneumatic

Setbacks
P - Static Pressure Reset
SA - Supply Air Reset
T - Unoccupied Space Temp

Energy Recovery
RA - Runaround Loop
WA - Wraparound Loop
EW - Enthalpy Wheel
PL - Plate Heat Exchanger

Flow Control
CV - Constant Volume
Int - Interminent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive

Building Name:_____

Air Handling Units (Cont.)

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:		# of units:	Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:		# of units:	Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:		# of units:	Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

Tag	Manufacturer	Type	Supply Fan HP		VFD__	AHU Coil	Source	Valve Type	Controls	DDC E H P	Energy Recov.
			Return Fan HP		VFD__	*Preheat*	E HW NG ST	2 3	Setbacks	P SA T	
Model #			CFM			*Cooling*	CHW DX	2 3	DCV	Y N	RA WA EW PL
Condition	1 2 3 4 5		% Outside Air			*Reheat*	E HW NG ST	2 3	Airside Economizer		Y N
For Local AHUs Only:		# of units:	Avg Capacity:		Tons		CFM		Flow Control	CV Int 3SPD VFD	

Notes/Potential ECMs:

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Flow Control
CV - Constant Volume
Int - Interminent
3SPD - 3 Speed Control
VFD - Variable Frequency Drive

ELECTRICAL SERVICE

Building Name:_____

Retro-Commissioning Safety Hazards:

Lockout / Tagout	Yes___ No___
Falls / Trips / Overhead	Yes___ No___
Extreme Elec Room Temp	Yes___ No___
Exposed / Bare Wiring	Yes___ No___
Hazardous Materials	Yes___ No___

Asbestos _____ Mold _____ Other _____

Main Utility Feeder(s)

Tag		
Type		
Manufacturer		
Model Number		
Capacity		
Age		
Voltage/phase/hertz		
Equipment Condition	1 2 3 4 5	1 2 3 4 5

Condition

1. Non-functional/Replace 2. Functional / Replace 3. Functional / Repair 4. Functional / RetroCx 5. Functional / New

Main Switchgear

Tag				
Type				
Manufacturer				
Model Number				
Capacity				
Age				
Voltage/phase/hertz				
Equipment Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Distribution Panels / Motor Panels

Tag				
Type				
Location / Service				
Capacity				
Age				
Voltage/phase/hertz				
Equipment Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Notes/Potential ECMs:

Building Name:_____

Distribution Panels / Motor Panels (Cont.)

Condition

1. Non-functional/Replace 2. Functional / Replace 3. Functional / Repair 4. Functional / RetroCx 5. Functional / New

Tag				
Type				
Location / Service				
Capacity				
Age				
Voltage/phase/hertz				
Equipment Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Notes / Potential ECMs:

Tag				
Type				
Location / Service				
Capacity				
Age				
Voltage/phase/hertz				
Equipment Condition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

Notes / Potential ECMs:

Energy / Smart Meter(s)

Tag				
Type				
Location / Service				
Manufacturer				
Model Number				
Communication Method				
Equipment Condition	1 2 3 5	1 2 3 5	1 2 3 5	1 2 3 5

Notes / Potential ECMs:

1 BUILDING 3560 - FIRST FLOOR PLAN

0 10' 20'
Scale: GRAPHIC

NORTH

VERIFIED FLOOR PLAN - FOR OFFICIAL USE ONLY

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NAVFAC MIDLANT GeoReadiness Center

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