GENERAL MECHANICAL SYMBOLS

- REVISION NUMBER - SHOWN ON PLANS
- POINT WHERE NEW CONNECTS TO EXISTING
- NUMBER OF DETAIL ON SHEET / NUMBER OF SHEET WHERE DETAIL APPEARS
- KEYNOTE
- CONTINUATION SYMBOL
- Room / 1 — ROOM NAME AND NUMBER
- ITEM TO BE DEMOLISHED
- AREA NOT IN CONTRACT

HVAC SYMBOLS

- 16"x8" — SQUARE DUCT SIZE TAG (WIDTH x HEIGHT)
- 16"/8" — OVAL DUCT SIZE TAG (WIDTH / HEIGHT)
- 16"Ø — ROUND DUCT SIZE TAG (DIAMETER)
- (E) — EXISTING DUCT TAG
- DUCT BEING DEMOLISHED
- S/A — SUPPLY AIR
- S-O/A — SUPPLY AIR (100% OUTSIDE AIR)
- O/A — OUTSIDE AIR
- R/A — RETURN AIR
- T/A — TRANSFER AIR
- E/A — EXHAUST AIR
- L/A — RELIEF AIR
- GE/A — GREASE EXHAUST AIR
- SE/A — SMOKE EXHAUST AIR
- FLUE — EXHAUST GAS FLUE
- C/A — COMBUSTION AIR
- DROP — RECTANGULAR SUPPLY/OUTSIDE AIR DUCT RISE
- DROP — ROUND SUPPLY/OUTSIDE AIR DUCT RISE
- DROP — RECTANGULAR RETURN/TRANSFER AIR DUCT RISE
- DROP — ROUND RETURN/TRANSFER AIR DUCT RISE
- DROP — RECTANGULAR EXHAUST/RELIEF AIR DUCT RISE
- DROP — ROUND EXHAUST/RELIEF AIR DUCT RISE
- SUPPLY OUTLET — RETURN/EXHAUST INLET
- SECTORIZING BAFFLE OR BLANKOFF PANEL
- S2 / 0 — TYPE (SEE SCHEDULE) / GRILLES, REGISTERS, AND DIFFUSERS TAG
- CFM
- LINEAR DIFFUSER
- S6 / 0 — TYPE (SEE SCHEDULE) / LINEAR DIFFUSER TAG
- CFM
- MECHANICAL EQUIPMENT
- VAV-XX — MECHANICAL EQUIPMENT TAG
- EXISTING MECHANICAL EQUIPMENT
- (X)VAV-XX — EXISTING MECHANICAL EQUIPMENT TAG (TYPICAL FOR ALL EXISTING TAGS)
- MECHANICAL EQUIPMENT FOR REFERENCE
- VAV-XX — MECHANICAL EQUIPMENT TAG (REFER TO OTHER DISCIPLINE FOR ADDITIONAL INFORMATION)
- CO2 — CARBON DIOXIDE SENSOR
- D — DUCT SMOKE DETECTOR
- H — HUMIDITY SENSOR
- E — E-STOP
- T — TEMPERATURE SENSOR
- FIRE DAMPER (F) — MANUAL BALANCING DAMPER (B)
- SMOKE DAMPER (S) — BACKDRAFT DAMPER (D)
- MOTORIZED DAMPER (M) — COMBINATION FIRE/SMOKE DAMPER (C)

PIPING SYMBOLS

- 1/8" / 12" SLOPE — PIPE SLOPE TAG
- INVERT: -10' - 1" — PIPE INVERT ELEVATION TAG
- PIPE SIZE TAG (DIAMETER)
- ABOVE GROUND PIPING
- BELOW GROUND PIPING
- EXISTING PIPE TAG
- PIPING BEING DEMOLISHED
- CD — CONDENSATE DRAINAGE
- PG — PROPANE GAS
- PIPE DROP
- PIPE RISE
- PIPE TEE
- CAP
- 4" / 4" / 2" — PLUG
- REDUCING 45 DEGREE TEE
- 45 DEGREE TEE
- DOMESTIC WATER METER
- FLOW MEASURING AND BALANCING DEVICE
- BALL VALVE
- CHECK VALVE
- THREE WAY VALVE
- MOTORIZED CONTROL VALVE
- THREE WAY MOTORIZED CONTROL VALVE
- PRESSURE REDUCING VALVE
- SOLENOID VALVE
- BUTTERFLY VALVE

EQUIPMENT ABBREVIATIONS

AC AIR CONDITIONING UNIT	FP FIRE PUMP
ACC AIR COOLED CONDENSER	GI GREASE INTERCEPTOR
ACCU AIR COOLING CONDENSING UNIT	GRV GRAVITY ROOF VENTILATOR
AFMS AIR FLOW MEASURING STATION	H HUMIDIFIER
AHU AIR HANDLING UNIT	HWP HEATING WATER PUMP
AS AIR SEPARATOR	HX HEAT EXCHANGER
B BOILER	HPU HEAT PUMP UNIT
CF CABINET FAN	HRU HEAT RECOVERY UNIT
CF CHEMICAL FEEDER	ILC INLINE CENTRIFUGAL
CFP CHEMICAL FEEDER PUMP	PF PROPELLER FAN
CH CHILLER	PV POWER VENTILATOR
CRU CONDENSATE RETURN UNIT	PWF POWER WALL FAN
CT COOLING TOWER	RE RETURN/EXHAUST FAN
CUH CABINET UNIT HEATER	RTU ROOFTOP UNIT
CWP CONDENSER WATER PUMP	SA SHOCK ABSORBER
CHWP CHILLED WATER PUMP	SAT SOUND ATTENUATOR
DAH DUCTLESS AIR HANDLER	SEP SEWAGE EJECTOR PUMP
DHP DUCTLESS HEAT PUMP	SF SUPPLY FAN
DCP DOMESTIC WATER CIRCULATING PUMP	SP SUMP PUMP
EUH ELECTRIC UNIT HEATER	UH UNIT HEATER
EDC ELECTRIC DUCT COIL	US UTILITY SET
ET EXPANSION TANK	UV UNIT VENTILATOR
EWH ELECTRIC WATER HEATER	VAV VARIABLE AIR VOLUME
FCU FAN COIL UNIT	WH WATER HEATER

ABBREVIATIONS

& AND	ID INDIRECT
Ø ROUND	IN INCH
A AIR	INL INLET
AB ABOVE BASE	INSUL INSULATION
ABV ABOVE	INT INTERIOR
AC AIR CONDITIONING	INV INVERT
ACOUS ACOUSTICAL	INWG INCHES WATER GAUGE
AD AREA DRAIN	JST SPC JOIST SPACE
ADD ADDENDUM	JT JOINT
ADDL ADDITIONAL	LAB LABORATORY
AFF ABOVE FINISHED FLOOR	LB POUND
AFUE ANNUAL FUEL UTILIZATION EFFICIENCY	LB/HR POUNDS PER HOUR
AG ABOVE GROUND	LAT LEAVING AIR TEMPERATURE
ALT ALTERNATE	LF LINEAL FOOT
ALUM ALUMINUM	LOC LOCATION
AP ACCESS PANEL	LP LOW PRESSURE
APPROX APPROXIMATE	LPG LIQUEFIED PETROLEUM GAS
ARCH ARCHITECT/ARCHITECTURAL	LR LIQUID REFRIGERANT
AV ACID RESISTANT VENT	LS LAWN SPRINKLER
AW ACID RESISTANT WASTE	L LOUVER
AUTO AUTOMATIC	LWT LEAVING WATER TEMPERATURE
BFF BELOW FINISHED FLOOR	MIA MIXED AIR
BLDG BUILDING	MAN MANUAL
BLW BELOW	MATL MATERIAL
BM BEAM	MAV MANUAL AIR VENT
BO BY OTHER	MAX MAXIMUM
BOT BOTTOM	MBD MOTORIZED BYPASS DAMPER
BSMT BASEMENT	MBH ONE THOUSAND BTU PER HOUR
BTU BRITISH THERMAL UNITS	MCF ONE THOUSAND CUBIC FEET
BTUH BRITISH THERMAL UNITS PER HOUR	MCW MAKE-UP COLD WATER
BTWN BETWEEN	MD MOTORIZED DAMPER
CAP CAPACITY	MECH MECHANICAL
CB CATCH BASIN	MFR MANUFACTURER
CCW COUNTER CLOCKWISE	MH MANHOLE
CFCV CONSTANT FLOW CONTROL VALVE	MIN MINIMUM
CFM CUBIC FEET PER MINUTE	MISC MISCELLANEOUS
CHW CIRCULATING HOT WATER	MTR MOTOR
CI CAST IRON	MU/A MAKE-UP/AIR
CLG CEILING	N NECK
CLG COOLING	NC NOISE CRITERIA
CO CLEAN OUT	NC NORMALLY CLOSED
COL COLUMN	NIC NOT IN CONTRACT
COMB COMBINATION	NO NUMBER
CONC CONCRETE	NO NORMALLY OPEN
COND CONDENSATE	NOM NOMINAL
CONF CONFERENCE	NTS NOT TO SCALE
CONN CONNECT	O OXYGEN
CONST CONSTRUCTION	O/A OUTSIDE AIR
CONT CONTINUE/CONTINUATION	OC ON CENTER
CONTR CONTRACT/CONTRACTOR	OF OVERFLOW
COORD COORDINATE	OPNG OPENING
CTR CENTER	ORD OVERFLOW ROOF DRAIN
CUFT CUBIC FEET	PD PRESSURE DROP
CV CHECK VALVE	PIV POST INDICATOR VALVE
CW COLD WATER	PLBG PLUMBING
CW CLOCKWISE	PR PAIR
D DEGREE	PREL PRELIMINARY
DB DRY BULB	PRESS PRESSURE
DET DETAIL	PRIM PRIMARY
DIA DIAMETER	PRV PRESSURE REDUCING VALVE
DIAG DIAGONAL	PSI POUNDS PER SQUARE INCH
DISCH DISCHARGE	PSIG POUNDS PER SQUARE INCH GAUGE
DIV DIVISION	PW POTABLE WATER
DI DEIONIZED WATER	PWR POWER
DMPR DAMPER	R DUCT RISER
DN DOWN	R/A RETURN AIR
DWG DRAWING	RCP RADIANT CEILING PANEL
DW DISTILLED WATER	RD ROOF DRAIN
EA EACH	REC RECESSED
EAT ENTERING AIR TEMPERATURE	RED REDUCER
EL ELBOW	REFR REFRIGERATION
ELEC ELECTRICAL	RH RELATIVE HUMIDITY
ELEV ELEVATION	REQD REQUIRED
EP EXPLOSION PROOF	REV REVERSE
EQ EQUAL	RL/A RELIEF AIR
EQUIP EQUIPMENT	RM ROOM
EWC ELECTRIC WATER COOLER	RPM REVOLUTIONS PER MINUTE
EWT ENTERING WATER TEMPERATURE	RW RAIN WATER
EA EXHAUST AIR	SF SQUARE FOOT
EAH EXHAUST HOOD	S/A SUPPLY AIR
EXIST EXISTING	SAN SANITARY
EXP EXPANSION	SCHED SCHEDULE
EXPJT EXPANSION JOINT	SECT SECTION
EXT EXTERIOR	SF SQUARE FOOT
F DEGREES FAHRENHEIT	SD SMOKE DAMPER
FCO FLOOR CLEAN OUT	SHT SHEET
FD FLOOR DRAIN	SIM SIMILAR
FD FIRE DAMPER	SLV SLEEVE
FDV FIRE DEPARTMENT VALVE	SM SURFACE MOUNT
FHC FIRE HOSE CABINET	SP STANDPIPE
FL FLOOR	SP STATIC PRESSURE
FLEX FLEXIBLE	SPEC SPECIFICATION
FLG FLANGE	SPS STATIC PRESSURE STATION
FO FUEL OIL	SQ SQUARE
FOV FUEL OIL VENT	SR SUCTION REFRIGERANT
FOR FUEL OIL RETURN	SSD SOIL SUBDRAIN
FOS FUEL OIL SUPPLY	SS STAINLESS STEEL
FPM FEET PER MINUTE	STD STANDARD
FRP FIBERGLASS REINFORCED PIPE	STM STEAM
FS FULL SIZE	STRUCT STRUCTURAL
FS FLOOR SINK	SUCT SUCTION
FT FOOT/FEET	SUSP SUSPENDED
FTG FOOTING	T THERMOSTAT
FTR FIN TUBE RADIATION	TCP TEMPERATURE CONTROL PANEL
FUT FUTURE	TD TEMPERATURE DROP
GA GAGE/GAUGE	TDR TRENCH DRAIN
GAL GALLON	TEFC TOTALLY ENCLOSED FAN COOLED
GALV GALVANIZED	TEMP TEMPERATURE
GC GENERAL CONTRACTOR	TYP TYPICAL
GEN GENERATOR	UFD UNDER FLOOR DUCT
GENL GENERAL	UG UNDERGROUND
GPH GALLONS PER MINUTE	VAC VACUUM
GR GRADE	V VENT
GW GREASE WASTE	VAV VARIABLE AIR VOLUME
HB HOSE BIB	VEL VELOCITY
HD HEAD	VENT VENTILATION
HORZ HORIZONTAL	VERT VERTICAL
HP HORSE POWER	VOL VOLUME
HP HIGH PRESSURE	VTR VENT THROUGH ROOF
HTG HEATING	W WASTE
HTR HEATER	WB WET BULB
HW HOT WATER	WCO WALL CLEAN OUT
HYD HYDRANT	WH WALL HYDRANT

PHASING REQUIREMENTS

REFER TO ARCHITECTURAL DRAWING SET FOR CONSTRUCTION PHASING REQUIREMENTS. COORDINATE WORK CLOSELY WITH GENERAL CONTRACTOR AND ALL OTHER TRADES.

ALTERNATES COORDINATION NOTE

REFER TO SPECIFICATION SECTION 012300 "ALTERNATES" AND ARCHITECTURAL DRAWINGS FOR THE LOCATION, EXTENT, AND DESCRIPTION OF ALL ALTERNATE SCOPE ITEMS. MECHANICAL, ELECTRICAL, AND PLUMBING SYSTEMS SERVING THESE AREAS SHALL BE MODIFIED ACCORDINGLY BASED ON ACCEPTED ALTERNATES. COORDINATE WITH ALL DISCIPLINES AND INCLUDE PROVISIONS FOR AFFECTED SYSTEMS AS REQUIRED.

FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

MECHANICAL SUMMARY (RENOVATION & EXPANSION, PHASE 1 ONLY)

MECHANICAL SYSTEMS, SERVICE SYSTEMS AND EQUIPMENT

CLIMATE ZONE	3A - WARM/HUMID
WINTER DRY BULB:	23 °F
SUMMER DRY BULB	93 °F
INTERIOR DESIGN CONDITIONS	
WINTER DRY BULB	70 °F
SUMMER DRY BULB	75 °F
RELATIVE HUMIDITY	60"RH*
	*DESIGN- NOT CONTROLLED
BUILDING HEATING LOAD:	791.6 MBH
BUILDING COOLING LOAD:	2,030.7 MBH
MECHANICAL SPACING CONDITIONING SYSTEM	
UNITARY	
DESCRIPTION OF UNIT:	SEE SCHEDULES
HEATING EFFICIENCY:	SEE SCHEDULES
COOLING EFFICIENCY:	SEE SCHEDULES
SIZE CATEGORY OF UNIT:	SEE SCHEDULES
BOILER	
SIZE CATEGORY, IF OVERSIZED STATE REASON:	N/A
CHILLER	
SIZE CATEGORY, IF OVERSIZED STATE REASON:	N/A
LIST EQUIPMENT EFFICIENCIES:	SEE SCHEDULES

MECHANICAL SUMMARY (NEW GENERATOR BUILDING ONLY)

MECHANICAL SYSTEMS, SERVICE SYSTEMS AND EQUIPMENT

CLIMATE ZONE	3A - WARM/HUMID
WINTER DRY BULB:	23 °F
SUMMER DRY BULB	93 °F
INTERIOR DESIGN CONDITIONS	
WINTER DRY BULB	70 °F
SUMMER DRY BULB	75 °F
RELATIVE HUMIDITY	60"RH*
	*DESIGN- NOT CONTROLLED
BUILDING HEATING LOAD:	32.3 MBH
BUILDING COOLING LOAD:	43.4 MBH
MECHANICAL SPACING CONDITIONING SYSTEM	
UNITARY	
DESCRIPTION OF UNIT:	SEE SCHEDULES
HEATING EFFICIENCY:	SEE SCHEDULES
COOLING EFFICIENCY:	SEE SCHEDULES
SIZE CATEGORY OF UNIT:	SEE SCHEDULES
BOILER	
SIZE CATEGORY, IF OVERSIZED STATE REASON:	N/A
CHILLER	
SIZE CATEGORY, IF OVERSIZED STATE REASON:	N/A
LIST EQUIPMENT EFFICIENCIES:	SEE SCHEDULES

MECHANICAL SUMMARY (NEW PUMP BUILDINGS ONLY)

MECHANICAL SYSTEMS, SERVICE SYSTEMS AND EQUIPMENT

CLIMATE ZONE	3A - WARM/HUMID
WINTER DRY BULB:	23 °F
SUMMER DRY BULB	93 °F
INTERIOR DESIGN CONDITIONS	
WINTER DRY BULB	70 °F
SUMMER DRY BULB	75 °F
RELATIVE HUMIDITY	60"RH*
	*DESIGN- NOT CONTROLLED
BUILDING HEATING LOAD:	36.8 MBH
BUILDING COOLING LOAD:	44.6 MBH
MECHANICAL SPACING CONDITIONING SYSTEM	
UNITARY	
DESCRIPTION OF UNIT:	SEE SCHEDULES
HEATING EFFICIENCY:	SEE SCHEDULES
COOLING EFFICIENCY:	SEE SCHEDULES
SIZE CATEGORY OF UNIT:	SEE SCHEDULES
BOILER	
SIZE CATEGORY, IF OVERSIZED STATE REASON:	N/A
CHILLER	
SIZE CATEGORY, IF OVERSIZED STATE REASON:	N/A
LIST EQUIPMENT EFFICIENCIES:	SEE SCHEDULES

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SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

900 LOGGERHEAD RD,
KURE BEACH, NC 28449

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NORTH CAROLINA REGISTERED PROFESSIONAL SEAL 23551 ENGINEER DAVID M. HAHN

05-Dec-25

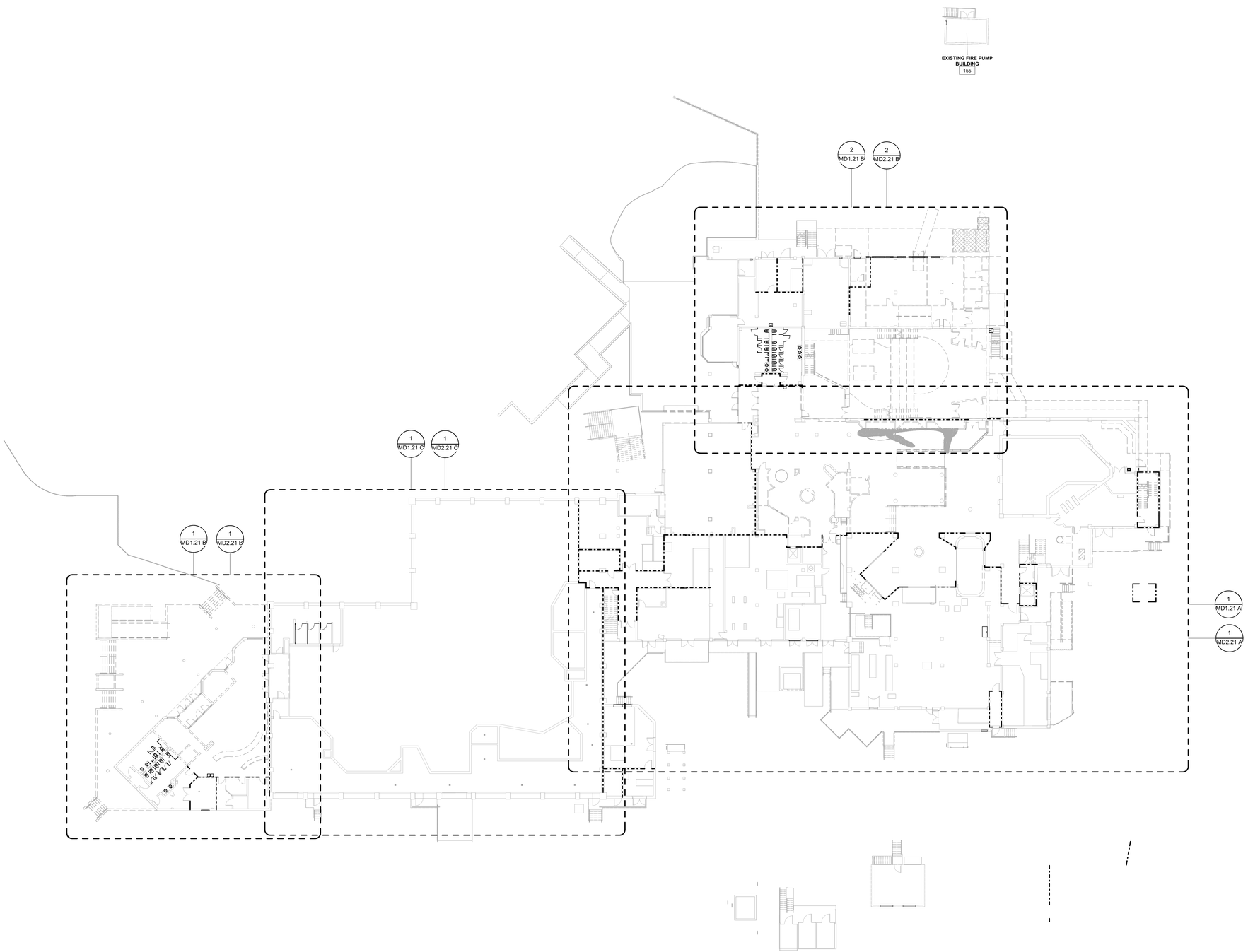
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-	12-5-25	FOR CONSTRUCTION

MECHANICAL ABBREVIATIONS, LEGEND, & SUMMARY

M-0.1

GENERAL NOTES

1. HATCHED AREAS ON DRAWINGS INDICATE EXTENT OF DEMOLITION. DEMOLITION LIMITS SHALL BE CLEARLY IDENTIFIED AND VERIFIED IN FIELD PRIOR TO WORK.
2. REFER TO HYDRONIC RISER DIAGRAMS FOR DETAILED DEMOLITION SCOPE. REMOVE PIPING, CONNECTIONS, AND TERMINATIONS AS INDICATED. COORDINATE WITH DEMOLITION OF ASSOCIATED EQUIPMENT.
3. SINGLE-LINE DUCTWORK INDICATES GENERAL ROUTING OF EXISTING SYSTEMS. FIELD-VERIFY CONDITIONS PRIOR TO DEMOLITION OR RECONNECTION.
4. REMOVE ALL ASSOCIATED HANGERS, SUPPORTS, INSULATION, SEALANTS, PIPING SPECIALTIES, CONTROLS, AND ACCESSORIES WITH DEMOLISHED HVAC EQUIPMENT, DUCTWORK, OR PIPING AS REQUIRED FOR COMPLETE REMOVAL. DO NOT REMOVE ITEMS REQUIRED FOR ACTIVE OR REUSED SYSTEMS. CONTRACTOR SHALL FIELD-VERIFY AND CONFIRM REUSE PRIOR TO REMOVAL. PATCH AND SEAL ALL PENETRATIONS IN FLOORS, WALLS, OR ROOF TO MATCH ADJACENT CONSTRUCTION.
5. WHERE PARTIAL DEMOLITION OCCURS, PREPARE SYSTEMS FOR RECONNECTION TO NEW WORK. CAP OR TEMPORARILY SUPPORT AS REQUIRED.
6. COORDINATE WITH OTHER TRADES FOR SAFE REMOVAL OF PIPING, DUCTWORK, AND EQUIPMENT.
7. PROTECT REMAINING ACTIVE SYSTEMS DURING DEMOLITION.
8. ALL EXTERIOR AND INTERIOR PENETRATIONS AFFECTED BY DEMOLITION SHALL HAVE EXISTING FLASHING, SEALANT, AND CAULKING REMOVED, SURFACES CLEANED, AND OPENINGS PREPARED FOR NEW WORK. COORDINATE WITH ARCHITECTURAL FINISHES FOR PATCHING AND REPAIR AS REQUIRED.



20' 10' 20'

SCALE : 1" = 20'-0"

OVERALL 1ST FLOOR - DEMO - HVAC

SCALE : 1" = 20'-0"

1

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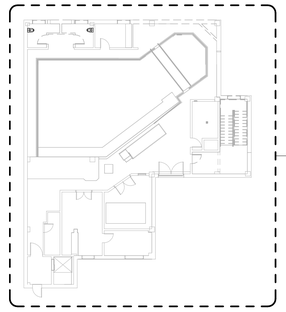
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05-Dec-25

NO.	DATE	DESCRIPTION
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FIRST FLOOR DEMO PLAN

MD1.11



1
MD2.23 A

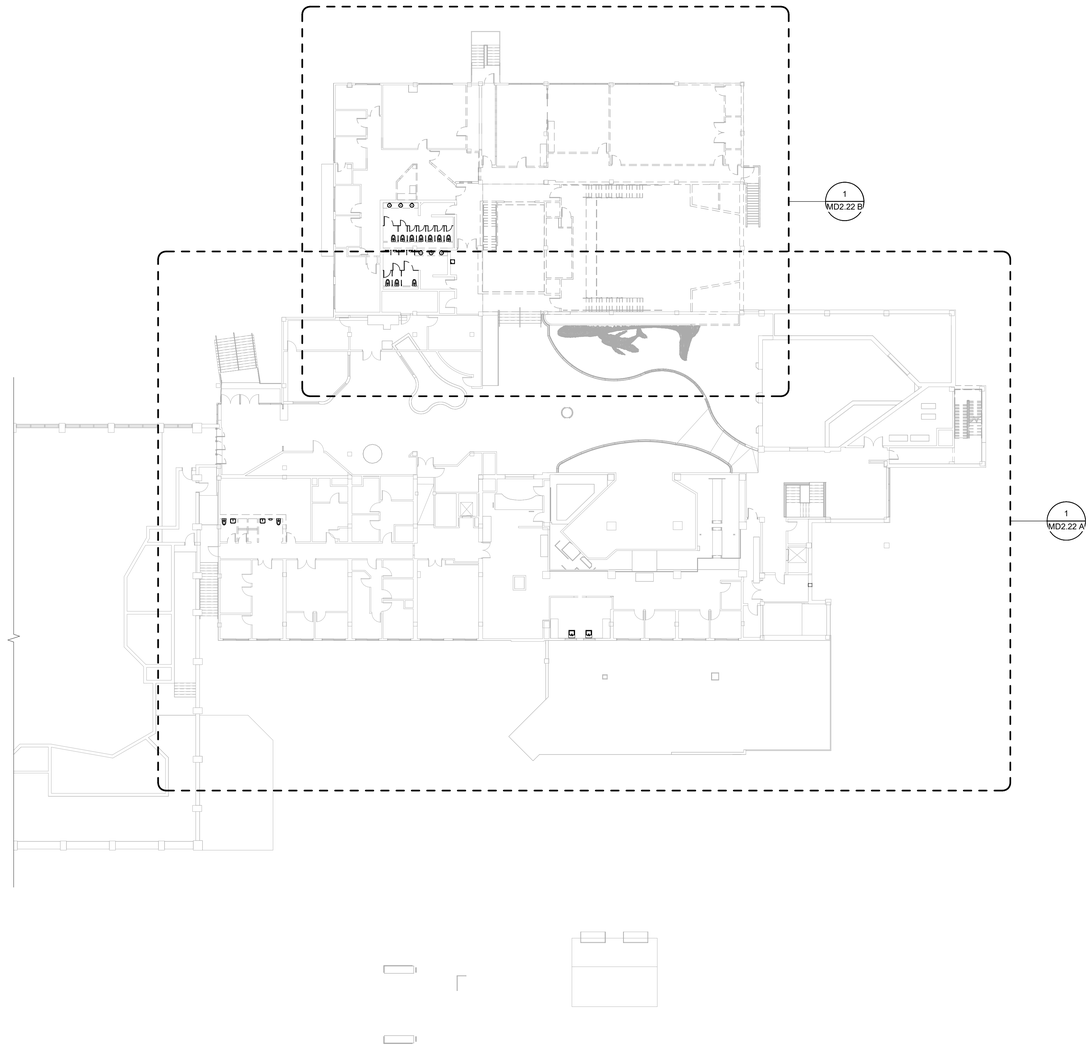
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8. ALL EXTERIOR AND INTERIOR PENETRATIONS AFFECTED BY DEMOLITION SHALL HAVE EXISTING FLASHING, SEALANT, AND CAULKING REMOVED, SURFACES CLEANED, AND OPENINGS PREPARED FOR NEW WORK. COORDINATE WITH ARCHITECTURAL FINISHES FOR PATCHING AND REPAIR AS REQUIRED.

20' 10' 20'
SCALE : 1" = 20'-0"

OVERALL 3RD FLOOR - DEMO - HVAC
SCALE : 1" = 20'-0"

2



1
MD2.22 B

1
MD2.22 A

20' 10' 20'
SCALE : 1" = 20'-0"

OVERALL 2ND FLOOR - DEMO - HVAC
SCALE : 1" = 20'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN
05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

SECOND AND THIRD FLOOR DEMO PLAN

MD1.12

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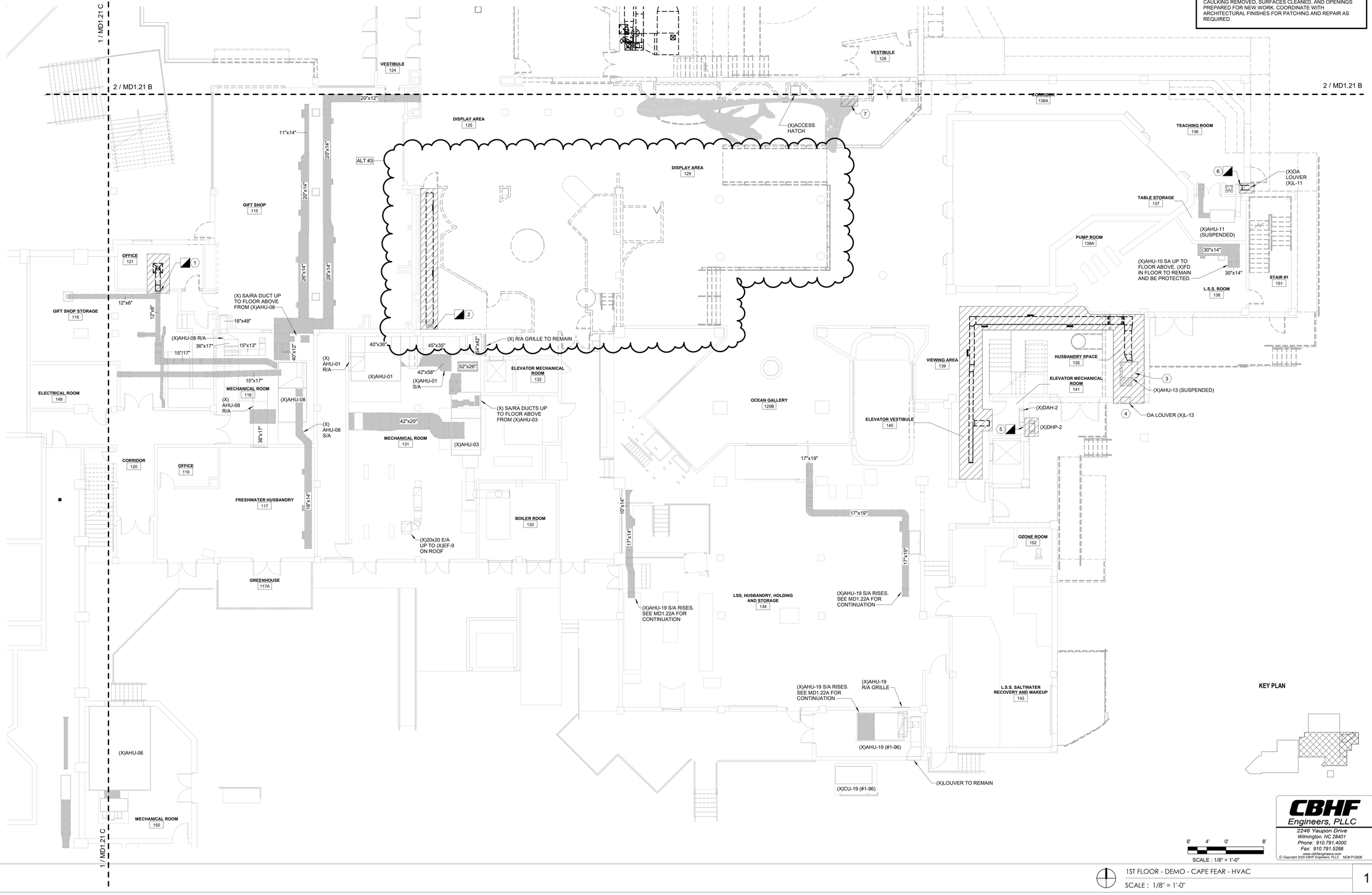
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DEMOLITION KEYED NOTES

1	REMOVE EXISTING ((X)AHU-08) DUCTWORK, DIFFUSERS, GRILLES, AND RELATED COMPONENTS BACK TO EXTENT INDICATED ON PLANS. CAP OR PREPARE DUCT ENDS FOR CONNECTION TO NEW WORK. COORDINATE WITH OTHER TRADES AS REQUIRED.
2	REMOVE EXISTING ((X)AHU-01) DUCTWORK, DIFFUSERS, GRILLES, AND RELATED COMPONENTS BACK TO EXTENT INDICATED ON PLANS. CAP OR PREPARE DUCT ENDS FOR CONNECTION TO NEW WORK. COORDINATE WITH OTHER TRADES AS REQUIRED.
3	DEMOLISH EXISTING ((X)AHU-13) SYSTEM IN ITS ENTIRETY, INCLUDING ALL DUCTWORK, SUPPORTS, CONTROLS, AND ASSOCIATED MECHANICAL INFRASTRUCTURE. SAFELY DISCONNECT, VERIFY, AND CAP ALL UTILITIES AS REQUIRED. COORDINATE DEMOLITION WITH PROJECT PHASING, SITE SAFETY REQUIREMENTS, AND OTHER TRADES.
4	REMOVE EXISTING ((X)L-13) OA LOUVER AND INFILL WALL TO MATCH ADJACENT CONSTRUCTION PER ARCHITECTURAL PLANS. REMOVE ASSOCIATED CONNECTIONS AND SUPPORTS AND SEAL PENETRATIONS AS REQUIRED.
5	DISCONNECT AND REMOVE EXISTING ((X)DHP-02) OUTDOOR HEAT PUMP UNIT AND WALL MOUNT BRACKETS. RELOCATE UNIT TO ROOF PER PLANS AND PROVIDE NEW REFRIGERANT PIPING, CONDENSATE, AND ELECTRICAL CONNECTIONS AS REQUIRED. PROTECT EXISTING ((X)DAH-2) INDOOR UNIT DURING WORK AND VERIFY PROPER RECONNECTION AND OPERATION AFTER INSTALLATION.
6	REMOVE EXISTING ((X)L-11) LOUVER, MOTORIZED OA DAMPER, AND MANUAL BALANCE DAMPER. INFILL WALL TO MATCH ADJACENT CONSTRUCTION PER ARCHITECTURAL PLANS. REMOVE ASSOCIATED DUCT CONNECTIONS AND SUPPORTS, SEAL PENETRATIONS, AND REROUTE OA DUCTWORK TO NEW LOUVER LOCATION PER PLANS.
7	REMOVE (2) EXISTING SIDEWALL RETURN GRILLES AND RETURN DUCTWORK FOR ((X)AHU-18A) AND ((X)AHU-18B). INFILL WALL OPENINGS TO MATCH ADJACENT FINISH PER ARCHITECTURAL PLANS.

GENERAL NOTES

1. HATCHED AREAS ON DRAWINGS INDICATE EXTENT OF DEMOLITION. DEMOLITION LIMITS SHALL BE CLEARLY IDENTIFIED AND VERIFIED IN FIELD PRIOR TO WORK.
2. REFER TO HYDRONIC RISER DIAGRAMS FOR DETAILED DEMOLITION SCOPE. REMOVE PIPING, CONNECTIONS, AND TERMINATIONS AS INDICATED. COORDINATE WITH DEMOLITION OF ASSOCIATED EQUIPMENT.
3. SINGLE-LINE DUCTWORK INDICATES GENERAL ROUTING OF EXISTING SYSTEMS. FIELD-VERIFY CONDITIONS PRIOR TO DEMOLITION OR RECONNECTION.
4. REMOVE ALL ASSOCIATED HANGERS, SUPPORTS, INSULATION, SEALANTS, PIPING SPECIALTIES, CONTROLS, AND ACCESSORIES WITH DEMOLISHED HVAC EQUIPMENT, DUCTWORK, OR PIPING AS REQUIRED FOR COMPLETE REMOVAL. DO NOT REMOVE ITEMS REQUIRED FOR ACTIVE OR REUSED SYSTEMS. CONTRACTOR SHALL FIELD-VERIFY AND CONFIRM REUSE PRIOR TO REMOVAL. PATCH AND SEAL ALL PENETRATIONS IN FLOORS, WALLS, OR ROOF TO MATCH ADJACENT CONSTRUCTION.
5. WHERE PARTIAL DEMOLITION OCCURS, PREPARE SYSTEMS FOR RECONNECTION TO NEW WORK. CAP OR TEMPORARILY SUPPORT AS REQUIRED.
6. COORDINATE WITH OTHER TRADES FOR SAFE REMOVAL OF PIPING, DUCTWORK, AND EQUIPMENT.
7. PROTECT REMAINING ACTIVE SYSTEMS DURING DEMOLITION.
8. ALL EXTERIOR AND INTERIOR PENETRATIONS AFFECTED BY DEMOLITION SHALL HAVE EXISTING FLASHING, SEALANT, AND CAULKING REMOVED. SURFACES CLEANED, AND OPENINGS PREPARED FOR NEW WORK. COORDINATE WITH ARCHITECTURAL FINISHES FOR PATCHING AND REPAIR AS REQUIRED.



1ST FLOOR - DEMO - CAPE FEAR - HVAC

SCALE : 1/8" = 1'-0"

1

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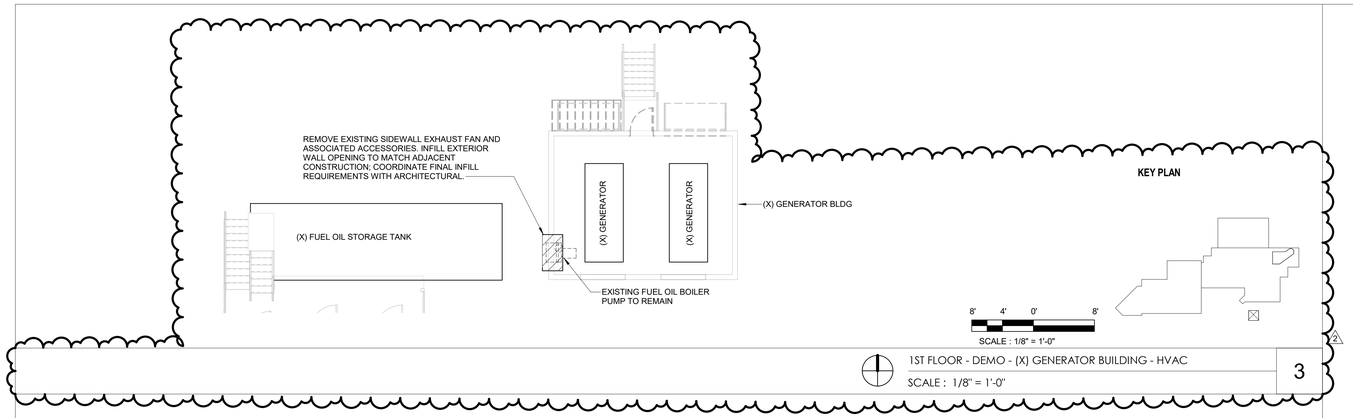
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

FIRST FLOOR DEMO PLAN - CAPE FEAR - HVAC

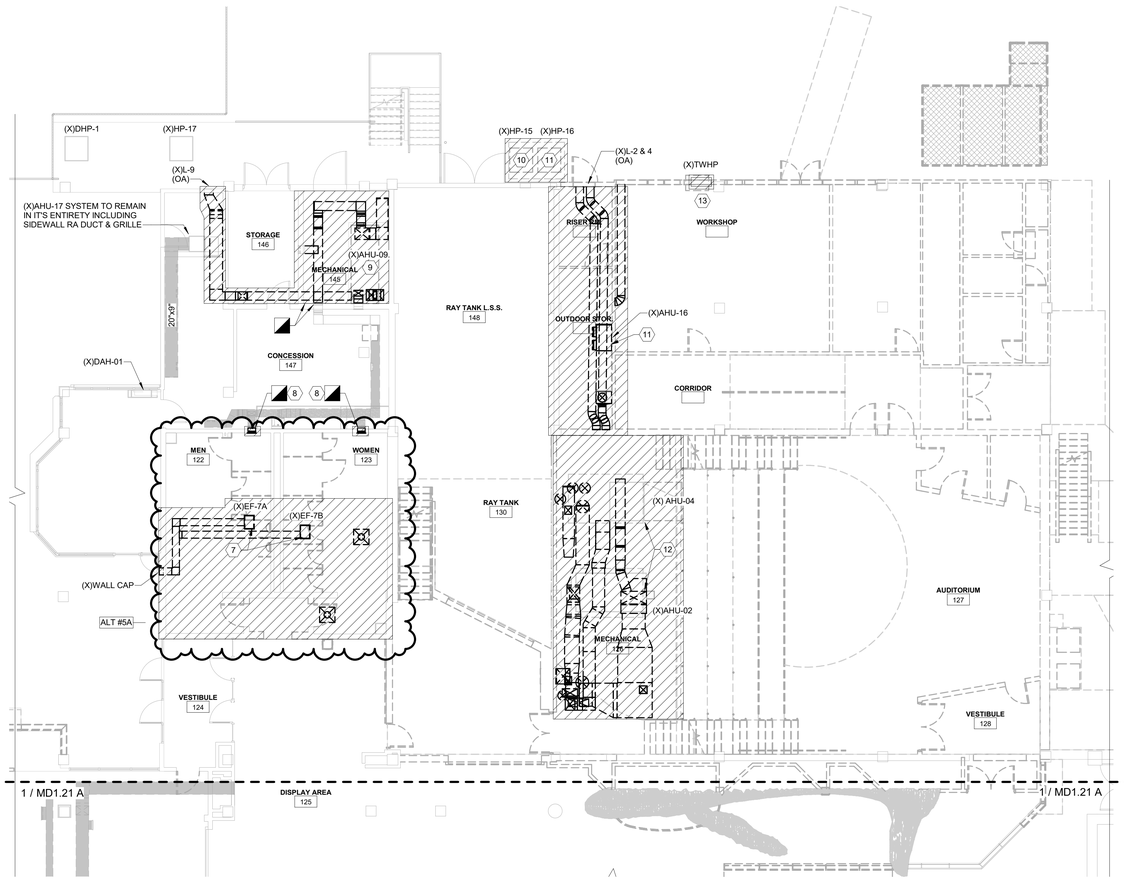
MD1.21 A



1ST FLOOR - DEMO - (X) GENERATOR BUILDING - HVAC

SCALE : 1/8" = 1'-0"

3



1ST FLOOR - DEMO - TOUCH AND SHARK TANK - HVAC

SCALE : 1/8" = 1'-0"

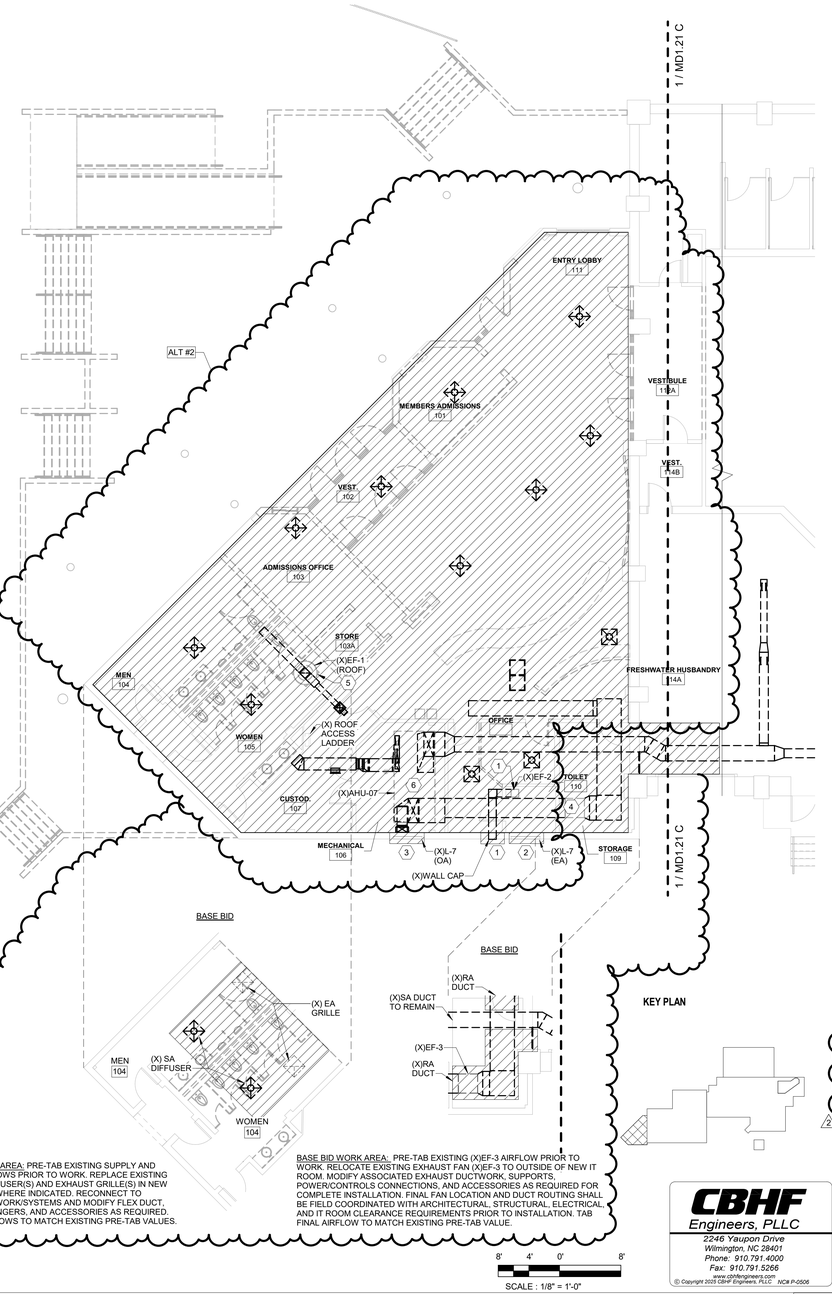
2

SHEET DEMOLITION KEYED NOTES

1	REMOVE EXISTING WALL CAP, INLINE EXHAUST FAN (X)EF-2, ASSOCIATED DUCTWORK, HANGERS, GRILLES, AND CONTROLS. PREPARE OPENING FOR NEW LIKE-SIZED WALL CAP.
2	DEMO 48"x24"x6" RELIEF LOUVER; INFILL OPENING TO MATCH ADJACENT FINISHES. COORDINATE WITH ARCHITECTURAL
3	REMOVE 48"x30"x6" OUTSIDE AIR LOUVER; PREPARE OPENING FOR NEW LIKE-SIZED LOUVER.
4	DEMO INLINE 1.5 HP SUSPENDED FAN; REMOVE SUPPORTS AND CONNECTIONS.
5	REMOVE EXISTING ROOF-MOUNTED FAN, EXHAUST DUCTWORK, GRILLES, AND CONTROLS. REUSE EXISTING ROOF OPENING FOR NEW FAN. COORDINATE ROOF FLASHING AND SEALING WITH ROOFING AND ARCHITECTURAL.
6	(ALT. #2 ONLY) REMOVE ((X)AHU-7) AND ALL ASSOCIATED DUCTWORK, PIPING, CONTROLS, GRILLES, AND DIFFUSERS SERVING THE LAY-IN CEILING AREA. RETAIN EXISTING CONCRETE HOUSEKEEPING PAD FOR NEW UNIT. COORDINATE DEMOLITION LIMITS WITH NEW WORK PLANS AND TRADES.
7	REMOVE EXISTING EXHAUST FAN ((X)EF-7A) AND ((X)7B), ASSOCIATED WALL CAPS, DUCTWORK, GRILLES, CONTROLS, AND SUPPORTS. PATCH WALLS AS REQUIRED.
8	REMOVE ALL SIDEWALL GRILLES SERVING RESTROOMS AND ASSOCIATED BRANCH DUCTS BACK TO MAIN. COORDINATE PATCHING OF WALLS AND CEILINGS.
9	REMOVE AND DISPOSE OF THE EXISTING HVAC SYSTEM ((X)AHU-09) TO THE LIMITS SHOWN INCLUDING BUT NOT LIMITED TO, EQUIPMENT, PIPING, DUCTWORK, INSULATION, DUCTWORK, AIR DISTRIBUTION, LOUVERS, HANGERS, SUPPORTS AND CONTROLS. REAPIR DUCTWORK IN CONCESSION 147 AND PREPARE FOR CONNECTION TO NEW SYSTEM.
10	REMOVE ((X)HP-15) AND MATCHING INDOOR UNITS ((X)AH-15), INCLUDING BUT NOT LIMITED TO DUCTWORK, GRILLES, REFRIGERANT PIPING, CONDENSATE, CONTROLS, AND POWER CONNECTIONS. REMOVE ROOF/WALL CURBS OR SLEEVES AND PATCH AS REQUIRED.
11	REMOVE ((X)HP-16) AND MATCHING INDOOR UNITS ((X)AH-16), INCLUDING BUT NOT LIMITED TO DUCTWORK, GRILLES, REFRIGERANT PIPING, CONDENSATE, CONTROLS, AND POWER CONNECTIONS. REMOVE ROOF/WALL CURBS OR SLEEVES AND PATCH AS REQUIRED.
12	REMOVE AND DISPOSE OF ((X)AHU-04) AND ((X)AHU-02), INCLUDING ALL ASSOCIATED HVAC COMPONENTS IN THEIR ENTIRETY. THIS INCLUDES, BUT IS NOT LIMITED TO, DUCTWORK, DAMPERS, PIPING, INSULATION, FLEXIBLE DUCT, AIR DISTRIBUTION DEVICES, LOUVERS, HANGERS, SUPPORTS, CONTROLS, THERMOSTATS, AND ACCESSORIES. PROTECT ALL ITEMS TO REMAIN FROM DAMAGE.
13	REMOVE AND DISPOSE OF (X)THRU-WALL UNIT, INCLUDING ALL ASSOCIATED HVAC COMPONENTS. THIS INCLUDES, BUT IS NOT LIMITED TO, REFRIGERANT PIPING, CONDENSATE DRAIN, WALL SLEEVE, LOUVER/GRILLE, CONTROLS, AND ELECTRICAL CONNECTIONS. PATCH WALL OPENING AND FINISH SURFACES AS REQUIRED.

GENERAL NOTES

1. HATCHED AREAS ON DRAWINGS INDICATE EXTENT OF DEMOLITION. DEMOLITION LIMITS SHALL BE CLEARLY IDENTIFIED AND VERIFIED IN FIELD PRIOR TO WORK.
2. REFER TO HYDRONIC RISER DIAGRAMS FOR DETAILED DEMOLITION SCOPE. REMOVE PIPING, CONNECTIONS, AND TERMINATIONS AS INDICATED. COORDINATE WITH DEMOLITION OF ASSOCIATED EQUIPMENT.
3. SINGLE-LINE DUCTWORK INDICATES GENERAL ROUTING OF EXISTING SYSTEMS. FIELD-VERIFY CONDITIONS PRIOR TO DEMOLITION OR RECONNECTION.
4. REMOVE ALL ASSOCIATED HANGERS, SUPPORTS, INSULATION, SEALANTS, PIPING SPECIALTIES, CONTROLS, AND ACCESSORIES WITH DEMOLISHED HVAC EQUIPMENT, DUCTWORK, OR PIPING AS REQUIRED FOR COMPLETE REMOVAL. DO NOT REMOVE ITEMS REQUIRED FOR ACTIVE OR REUSED SYSTEMS. CONTRACTOR SHALL FIELD-VERIFY AND CONFIRM REUSE PRIOR TO REMOVAL. PATCH AND SEAL ALL PENETRATIONS IN FLOORS, WALLS, OR ROOF TO MATCH ADJACENT CONSTRUCTION.
5. WHERE PARTIAL DEMOLITION OCCURS, PREPARE SYSTEMS FOR RECONNECTION TO NEW WORK. CAP OR TEMPORARILY SUPPORT AS REQUIRED.
6. COORDINATE WITH OTHER TRADES FOR SAFE REMOVAL OF PIPING, DUCTWORK, AND EQUIPMENT.
7. PROTECT REMAINING ACTIVE SYSTEMS DURING DEMOLITION.
8. ALL EXTERIOR AND INTERIOR PENETRATIONS AFFECTED BY DEMOLITION SHALL HAVE EXISTING FLASHING, SEALANT, AND CAULKING REMOVED. SURFACES CLEANED, AND OPENINGS PREPARED FOR NEW WORK. COORDINATE WITH ARCHITECTURAL FINISHES FOR PATCHING AND REPAIR AS REQUIRED.



BASE BID WORK AREA: PRE-TAB EXISTING SUPPLY AND EXHAUST AIRFLOWS PRIOR TO WORK. REPLACE EXISTING SUPPLY AIR DIFFUSER(S) AND EXHAUST GRILLE(S) IN NEW LAY-IN CEILING WHERE INDICATED. RECONNECT TO EXISTING DUCTWORK/SYSTEMS AND MODIFY FLEX DUCT, HARD DUCT, HANGERS, AND ACCESSORIES AS REQUIRED. TAB FINAL AIRFLOWS TO MATCH EXISTING PRE-TAB VALUES.

BASE BID WORK AREA: PRE-TAB EXISTING (X)EF-3 AIRFLOW PRIOR TO WORK. RELOCATE EXISTING EXHAUST FAN (X)EF-3 TO OUTSIDE OF NEW IT ROOM. MODIFY ASSOCIATED EXHAUST DUCTWORK, SUPPORTS, POWER/CONTROLS CONNECTIONS, AND ACCESSORIES AS REQUIRED FOR COMPLETE INSTALLATION. FINAL FAN LOCATION AND DUCT ROUTING SHALL BE FIELD COORDINATED WITH ARCHITECTURAL, STRUCTURAL, ELECTRICAL, AND IT ROOM CLEARANCE REQUIREMENTS PRIOR TO INSTALLATION. TAB FINAL AIRFLOW TO MATCH EXISTING PRE-TAB VALUE.

1ST FLOOR - DEMO - MAIN ENTRY - HVAC

SCALE : 1/8" = 1'-0"

1

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

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NORTH CAROLINA PROFESSIONAL SEAL 23551 ENGINEER DAVID M. HAHN

06-May-26

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
2	04-27-26	BULLETIN #2

FIRST FLOOR DEMO PLAN - MAIN ENTRY, TOUCH TANK & (X) GENERATOR BLDG - HVAC

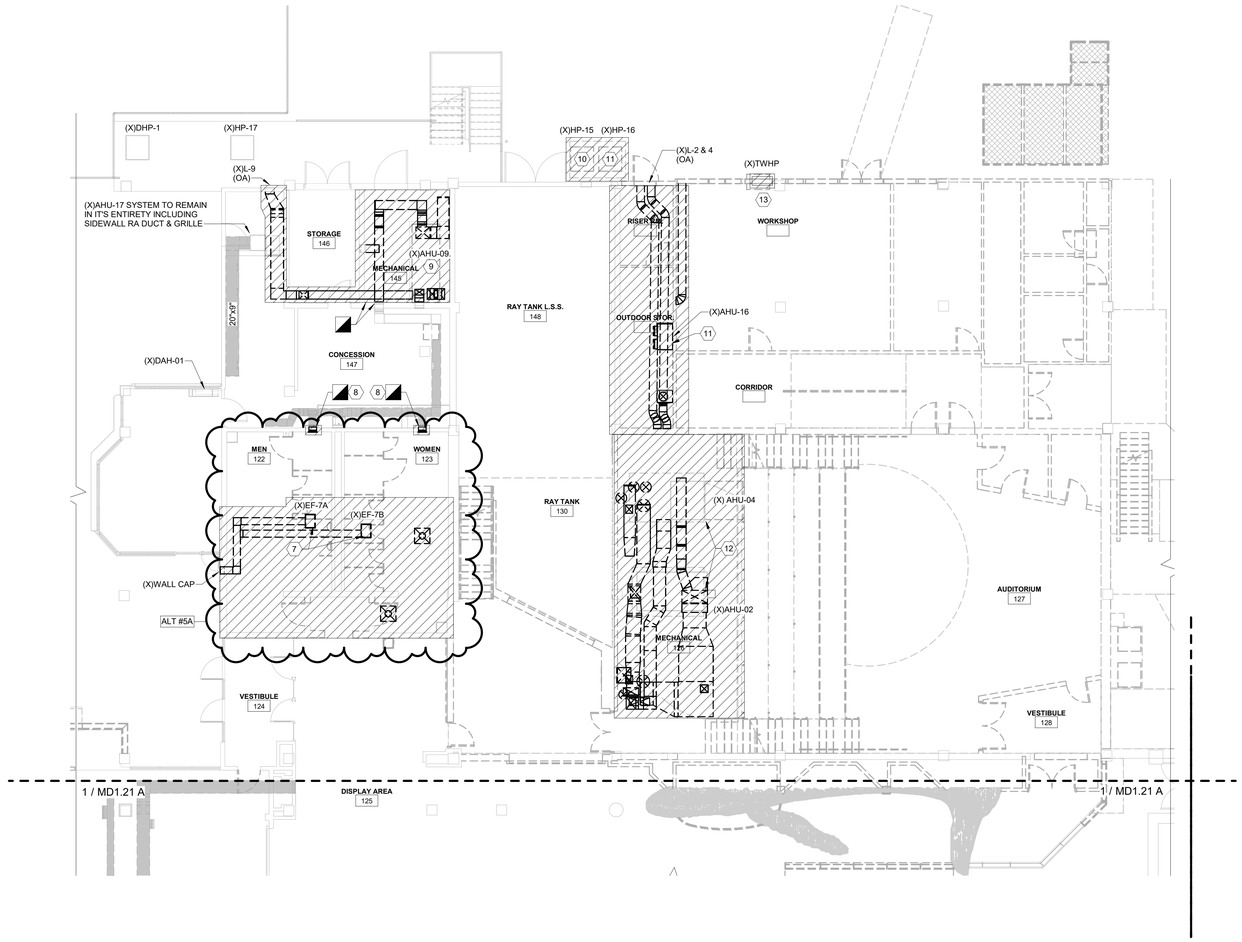
MD1.21 B

SHEET DEMOLITION KEYED NOTES

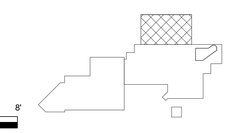
1	REMOVE EXISTING WALL CAP, INLINE EXHAUST FAN (X)EF-2, ASSOCIATED DUCTWORK, HANGERS, GRILLES, AND CONTROLS. PREPARE OPENING FOR NEW LIKE-SIZED WALL CAP.
2	DEMO 48"x24"x6" RELIEF LOUVER; INFILL OPENING TO MATCH ADJACENT FINISHES. COORDINATE WITH ARCHITECTURAL
3	REMOVE 48"x36"x6" OUTSIDE AIR LOUVER; PREPARE OPENING FOR NEW LIKE-SIZED LOUVER.
4	DEMO INLINE 1.5 HP SUSPENDED FAN; REMOVE SUPPORTS AND CONNECTIONS.
5	REMOVE EXISTING ROOF-MOUNTED FAN, EXHAUST DUCTWORK, GRILLES, AND CONTROLS. REUSE EXISTING ROOF OPENING FOR NEW FAN. COORDINATE ROOF FLASHING AND SEALING WITH ROOFING AND ARCHITECTURAL.
6	(ALT. #2 ONLY) REMOVE ((X)AHU-7) AND ALL ASSOCIATED DUCTWORK, PIPING, CONTROLS, GRILLES, AND DIFFUSERS SERVING THE LAY-IN CEILING AREA. RETAIN EXISTING CONCRETE HOUSEKEEPING PAD FOR NEW UNIT. COORDINATE DEMOLITION LIMITS WITH NEW WORK PLANS AND TRADES.
7	REMOVE EXISTING EXHAUST FAN ((X)EF-7A) AND ((X)7B), ASSOCIATED WALL CAPS, DUCTWORK, GRILLES, CONTROLS, AND SUPPORTS. PATCH WALLS AS REQUIRED.
8	REMOVE ALL SIDEWALL GRILLES SERVING RESTROOMS AND ASSOCIATED BRANCH DUCTS BACK TO MAIN. COORDINATE PATCHING OF WALLS AND CEILINGS.
9	REMOVE AND DISPOSE OF THE EXISTING HVAC SYSTEM ((X)AHU-09) TO THE LIMITS SHOWN INCLUDING BUT NOT LIMITED TO, EQUIPMENT, PIPING, DUCTWORK, INSULATION, DUCTWORK, AIR DISTRIBUTION, LOUVERS, HANGERS, SUPPORTS AND CONTROLS. REAPIR DUCTWORK IN CONCESSION 147 AND PREPARE FOR CONNECTION TO NEW SYSTEM.
10	REMOVE ((X)HP-15) AND MATCHING INDOOR UNITS ((X)AH-15), INCLUDING BUT NOT LIMITED TO DUCTWORK, GRILLES, REFRIGERANT PIPING, CONDENSATE, CONTROLS, AND POWER CONNECTIONS. REMOVE ROOF/WALL CURBS OR SLEEVES AND PATCH AS REQUIRED.
11	REMOVE ((X)HP-16) AND MATCHING INDOOR UNITS ((X)AH-16), INCLUDING BUT NOT LIMITED TO DUCTWORK, GRILLES, REFRIGERANT PIPING, CONDENSATE, CONTROLS, AND POWER CONNECTIONS. REMOVE ROOF/WALL CURBS OR SLEEVES AND PATCH AS REQUIRED.
12	REMOVE AND DISPOSE OF ((X)AHU-04) AND ((X)AHU-02), INCLUDING ALL ASSOCIATED HVAC COMPONENTS IN THEIR ENTIRETY. THIS INCLUDES, BUT IS NOT LIMITED TO, DUCTWORK, DAMPERS, PIPING, INSULATION, FLEXIBLE DUCT, AIR DISTRIBUTION DEVICES, LOUVERS, HANGERS, SUPPORTS, CONTROLS, THERMOSTATS, AND ACCESSORIES. PROTECT ALL ITEMS TO REMAIN FROM DAMAGE.
13	REMOVE AND DISPOSE OF (X)THRU-WALL UNIT, INCLUDING ALL ASSOCIATED HVAC COMPONENTS. THIS INCLUDES, BUT IS NOT LIMITED TO, REFRIGERANT PIPING, CONDENSATE DRAIN, WALL SLEEVE, LOUVER/GRILLE, CONTROLS, AND ELECTRICAL CONNECTIONS. PATCH WALL OPENING AND FINISH SURFACES AS REQUIRED.

GENERAL NOTES

1. HATCHED AREAS ON DRAWINGS INDICATE EXTENT OF DEMOLITION. DEMOLITION LIMITS SHALL BE CLEARLY IDENTIFIED AND VERIFIED IN FIELD PRIOR TO WORK.
2. REFER TO HYDRONIC RISER DIAGRAMS FOR DETAILED DEMOLITION SCOPE. REMOVE PIPING, CONNECTIONS, AND TERMINATIONS AS INDICATED. COORDINATE WITH DEMOLITION OF ASSOCIATED EQUIPMENT.
3. SINGLE-LINE DUCTWORK INDICATES GENERAL ROUTING OF EXISTING SYSTEMS. FIELD-VERIFY CONDITIONS PRIOR TO DEMOLITION OR RECONNECTION.
4. REMOVE ALL ASSOCIATED HANGERS, SUPPORTS, INSULATION, SEALANTS, PIPING SPECIALTIES, CONTROLS, AND ACCESSORIES WITH DEMOLISHED HVAC EQUIPMENT, DUCTWORK, OR PIPING AS REQUIRED FOR COMPLETE REMOVAL. DO NOT REMOVE ITEMS REQUIRED FOR ACTIVE OR REUSED SYSTEMS. CONTRACTOR SHALL FIELD-VERIFY AND CONFIRM REUSE PRIOR TO REMOVAL. PATCH AND SEAL ALL PENETRATIONS IN FLOORS, WALLS, OR ROOF TO MATCH ADJACENT CONSTRUCTION.
5. WHERE PARTIAL DEMOLITION OCCURS, PREPARE SYSTEMS FOR RECONNECTION TO NEW WORK. CAP OR TEMPORARILY SUPPORT AS REQUIRED.
6. COORDINATE WITH OTHER TRADES FOR SAFE REMOVAL OF PIPING, DUCTWORK, AND EQUIPMENT.
7. PROTECT REMAINING ACTIVE SYSTEMS DURING DEMOLITION.
8. ALL EXTERIOR AND INTERIOR PENETRATIONS AFFECTED BY DEMOLITION SHALL HAVE EXISTING FLASHING, SEALANT, AND CAULKING REMOVED. SURFACES CLEANED, AND OPENINGS PREPARED FOR NEW WORK. COORDINATE WITH ARCHITECTURAL FINISHES FOR PATCHING AND REPAIR AS REQUIRED.



KEY PLAN



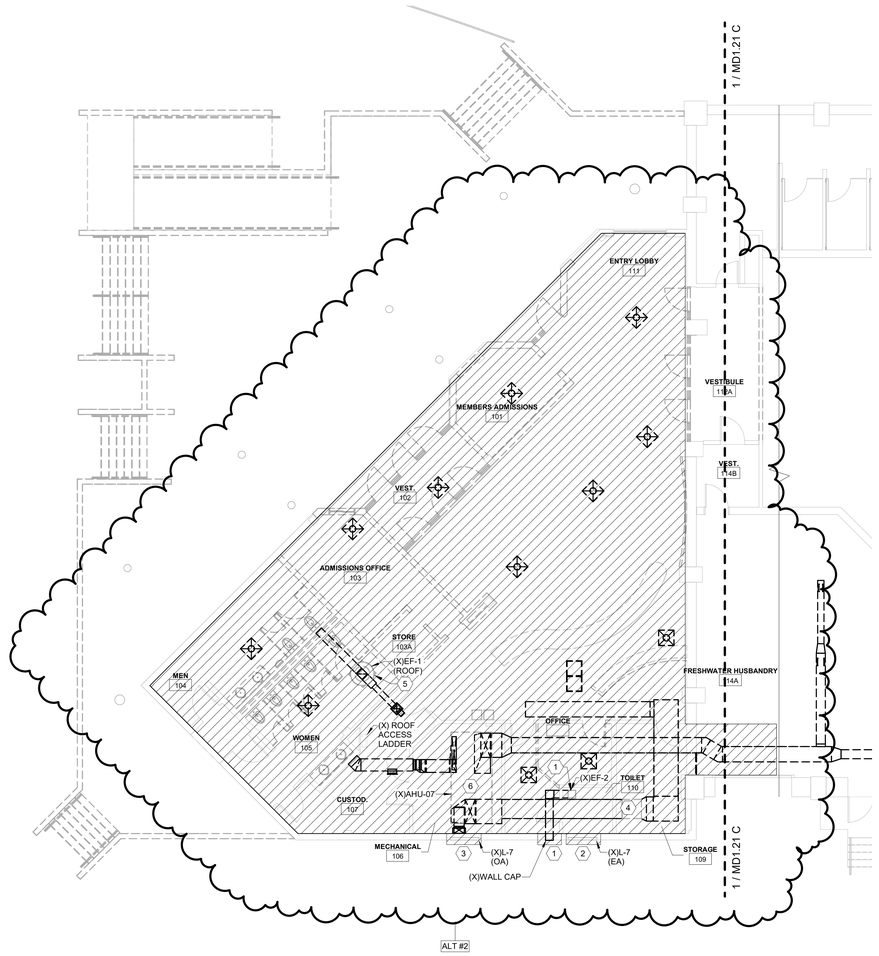
8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

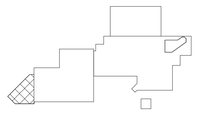
1ST FLOOR - DEMO - TOUCH AND SHARK TANK - HVAC

SCALE : 1/8" = 1'-0"

2



KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

1ST FLOOR - DEMO - MAIN ENTRY - HVAC

SCALE : 1/8" = 1'-0"

1

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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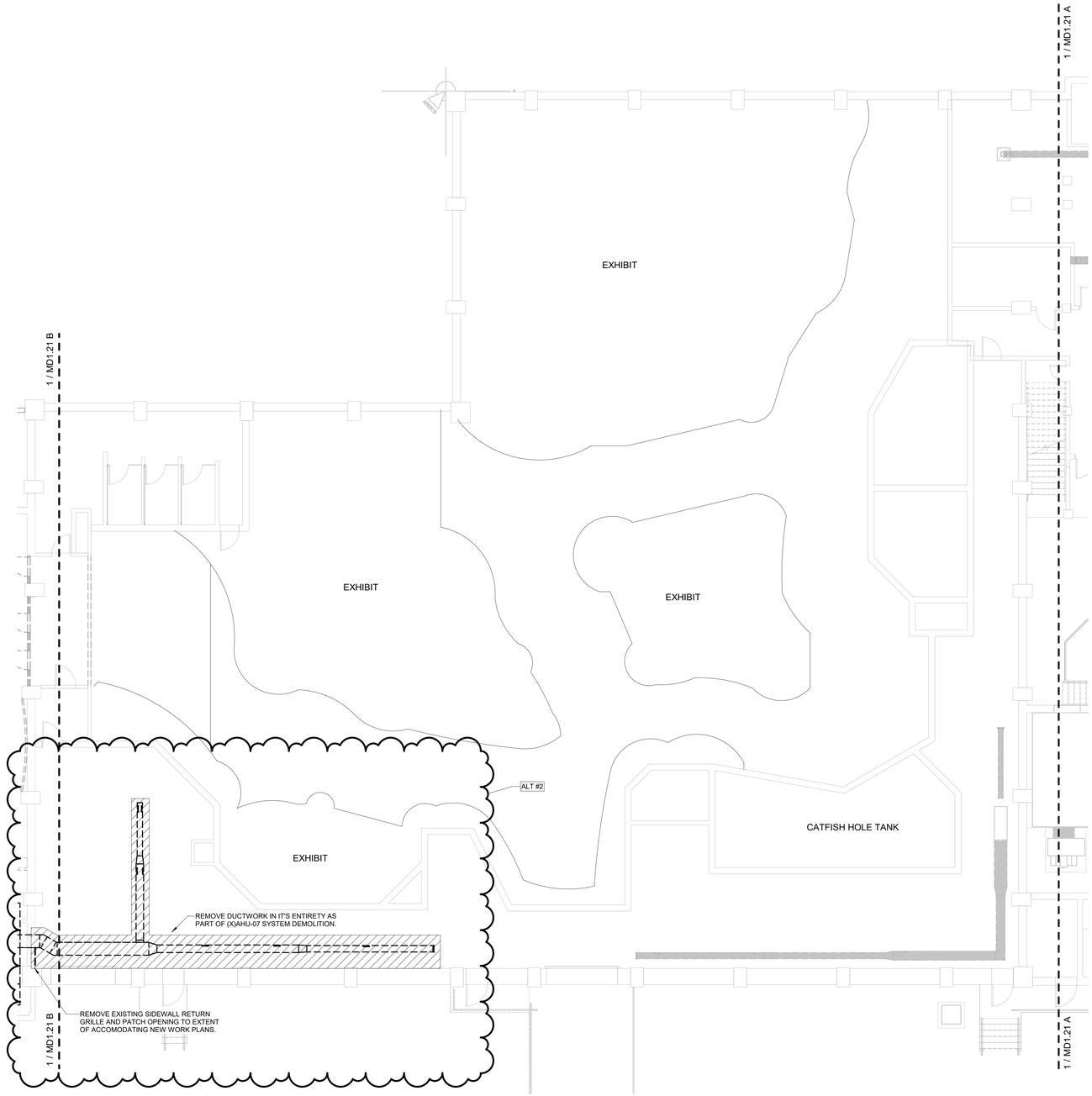
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

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FIRST FLOOR DEMO PLAN - MAIN ENTRY & TOUCH TANK - HVAC

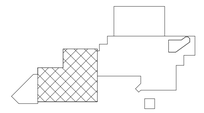
MD1.21 B



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KEY PLAN



SCALE : 1/8" = 1'-0"

1ST FLOOR - DEMO - FRESHWATER HABITAT - HVAC

SCALE : 1/8" = 1'-0"

1

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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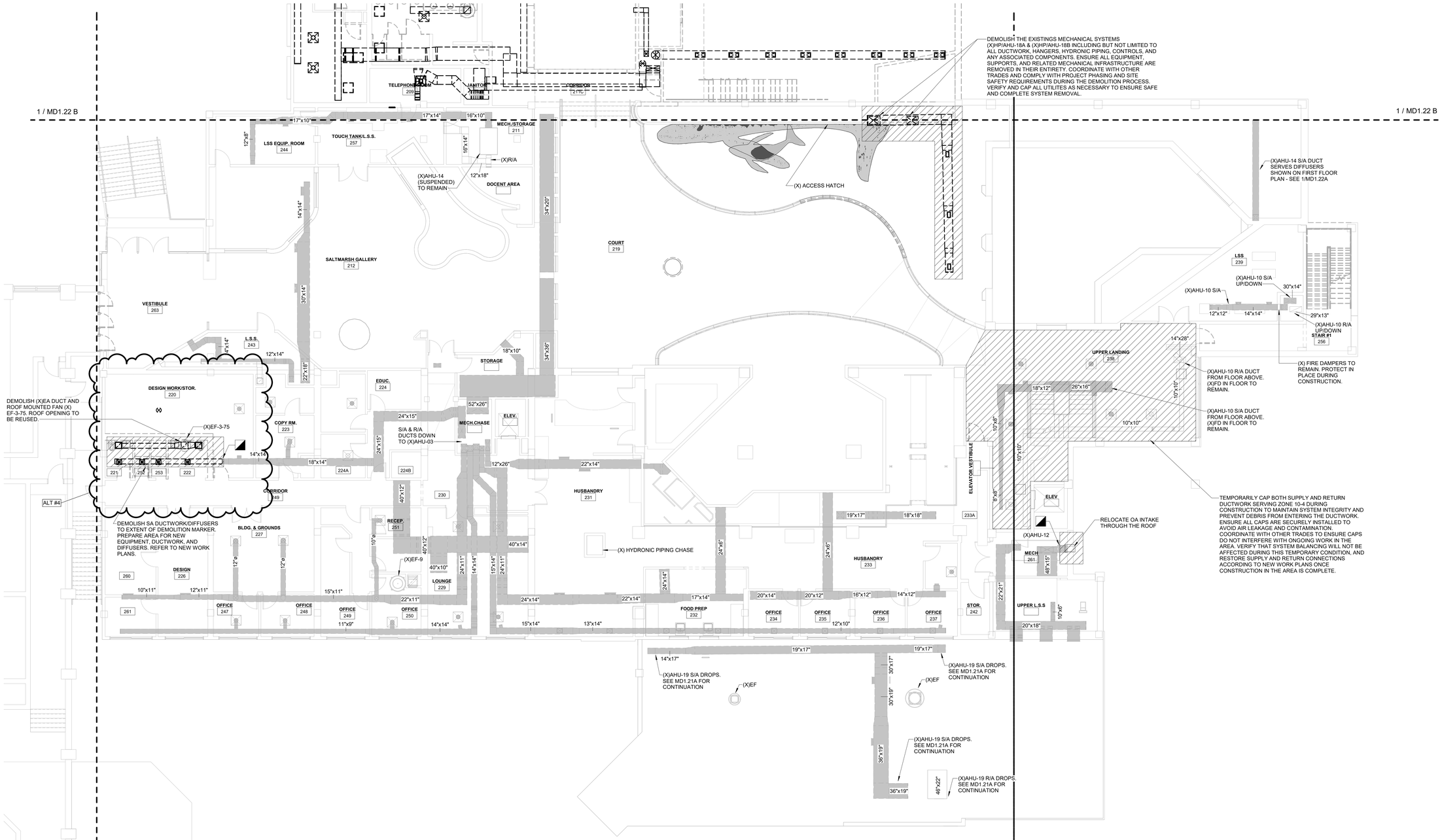
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

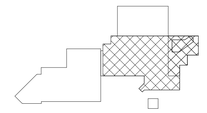
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-	12-5-25	FOR CONSTRUCTION

FIRST FLOOR DEMO PLAN - FRESHWATER HABITAT - HVAC

MD1.21 C



KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

2ND FLOOR - DEMO - CAPE FEAR - HVAC

SCALE : 1/8" = 1'-0"

1

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SCO #17-18042-02A
CODE: 42014-4G02
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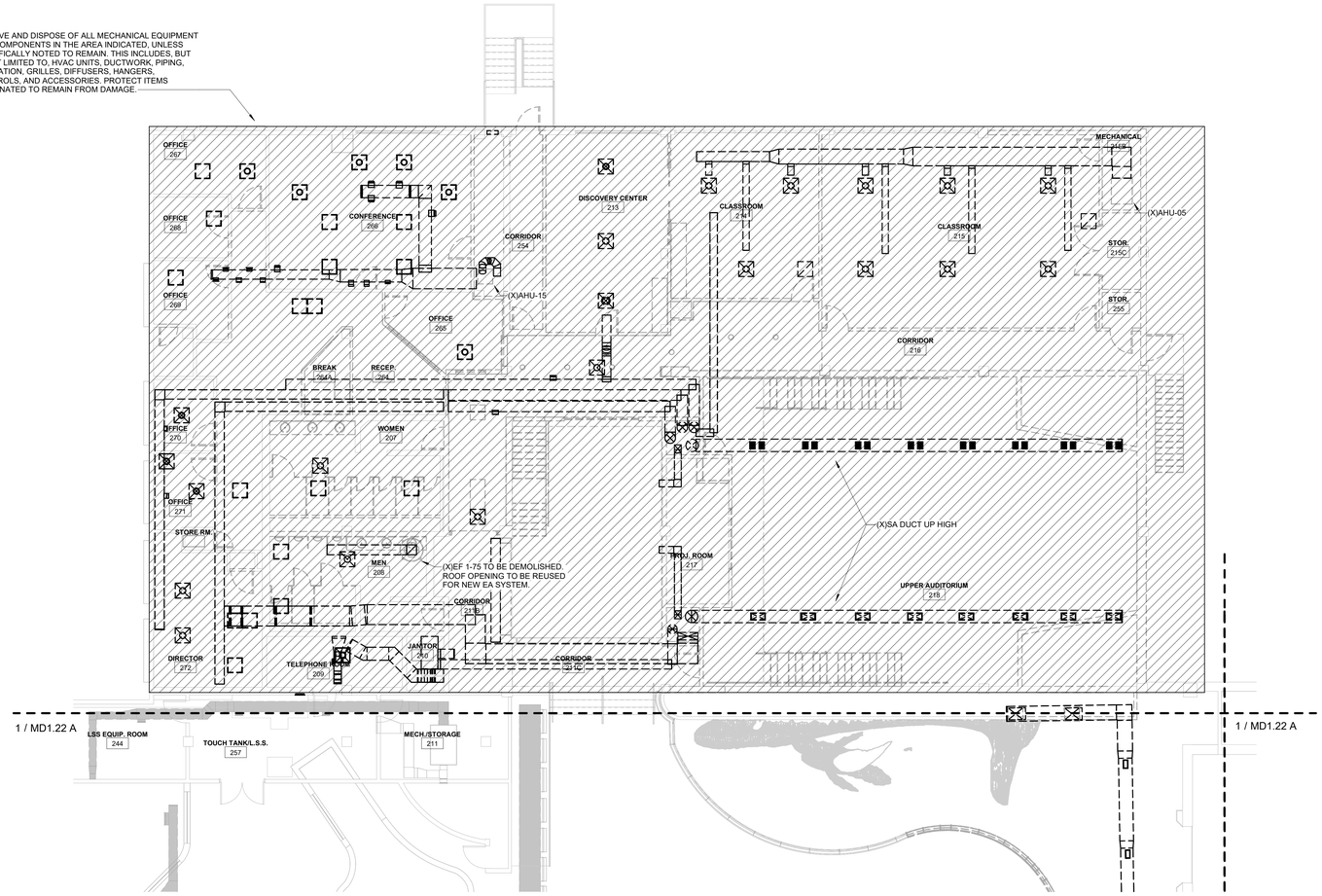
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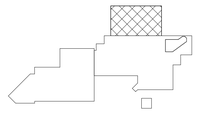
SECOND FLOOR DEMO PLAN - CAPE FEAR - HVAC

MD1.22 A

REMOVE AND DISPOSE OF ALL MECHANICAL EQUIPMENT AND COMPONENTS IN THE AREA INDICATED, UNLESS SPECIFICALLY NOTED TO REMAIN. THIS INCLUDES, BUT IS NOT LIMITED TO, HVAC UNITS, DUCTWORK, PIPING, INSULATION, GRILLES, DIFFUSERS, HANGERS, CONTROLS, AND ACCESSORIES. PROTECT ITEMS DESIGNATED TO REMAIN FROM DAMAGE.



KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

2ND FLOOR - DEMO - TOUCH AND SHARK TANK - HVAC

SCALE : 1/8" = 1'-0"

1

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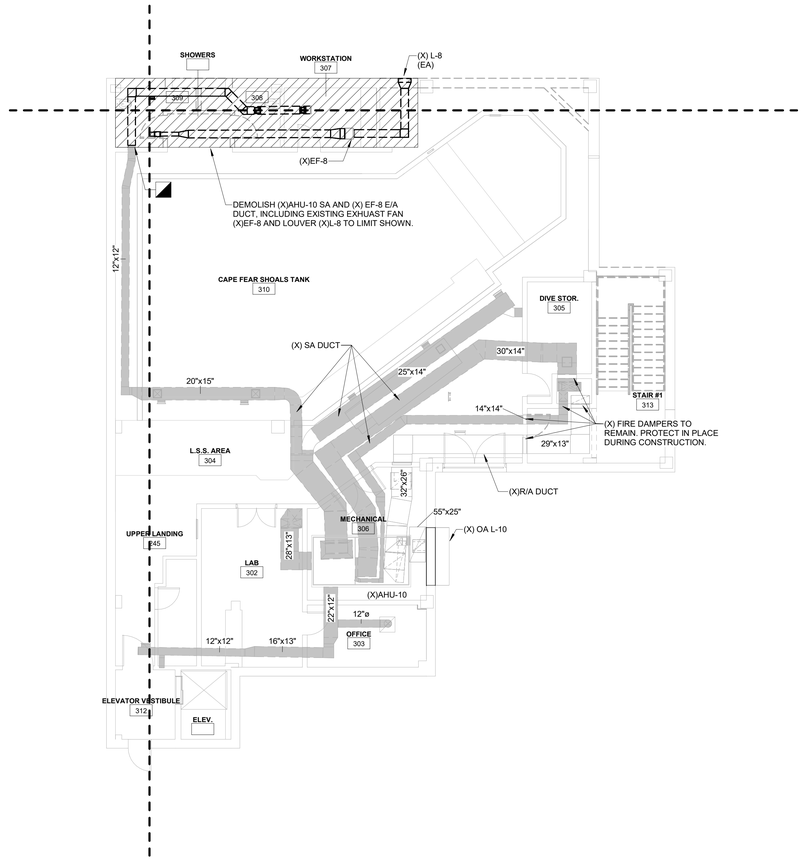
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DAVID M. HAHN
05-Dec-25

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SECOND FLOOR DEMO PLAN - TOUCH TANK - HVAC

MD1.22 B



KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

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3RD FLOOR - DEMO - CAPE FEAR - HVAC

SCALE : 1/8" = 1'-0"

1

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FORT FISHER
AQUARIUM
RENOVATION
& EXPANSION:
PHASE 1

SCO #17-18042-02A
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05-Dec-25

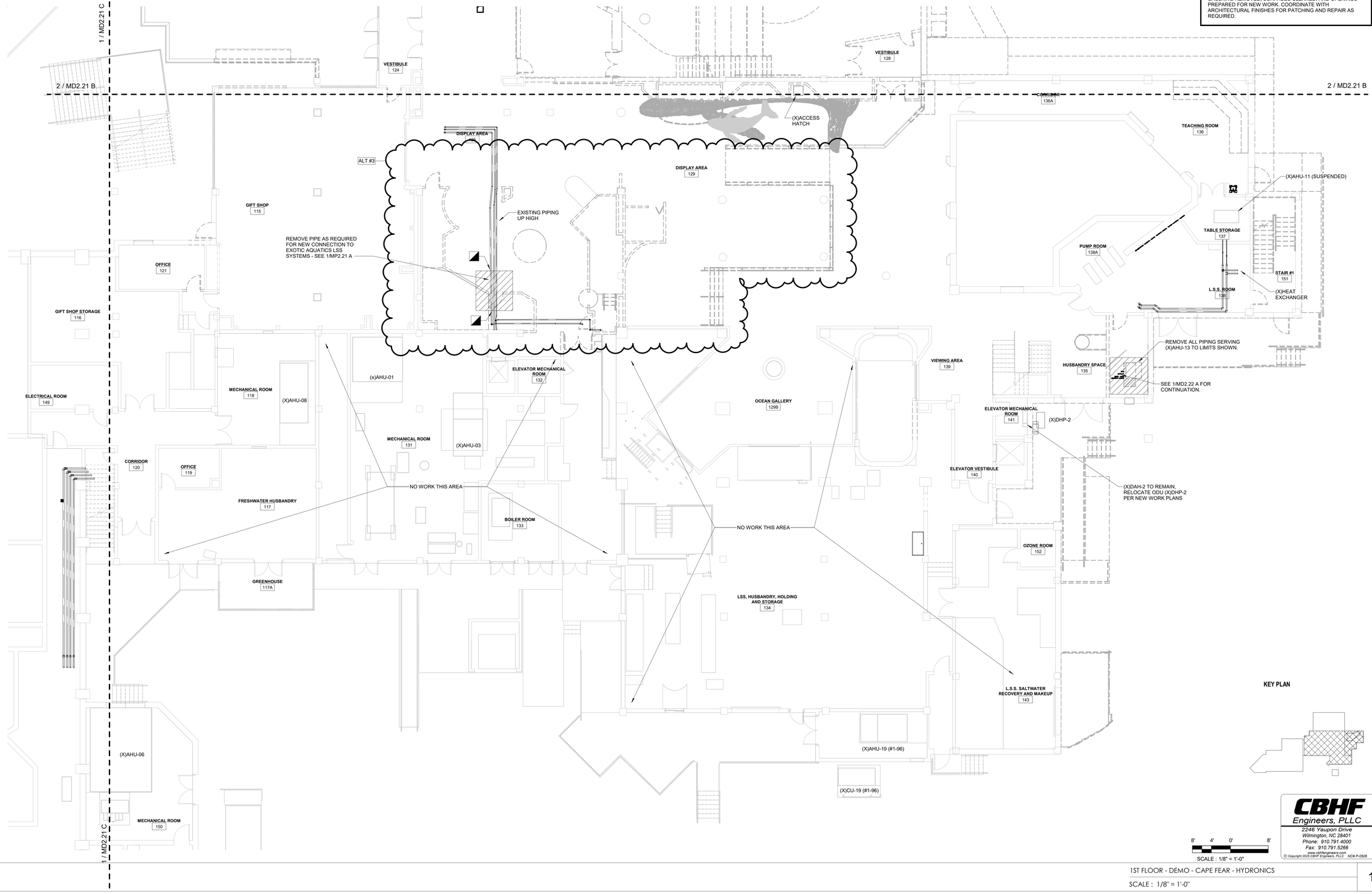
NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

THIRD FLOOR DEMO PLAN
- CAPE FEAR - HVAC

MD1.23 A

GENERAL NOTES

1. HATCHED AREAS ON DRAWINGS INDICATE EXTENT OF DEMOLITION. DEMOLITION LIMITS SHALL BE CLEARLY IDENTIFIED AND VERIFIED IN FIELD PRIOR TO WORK.
2. REFER TO HYDRONIC RISER DIAGRAMS FOR DETAILED DEMOLITION SCOPE. REMOVE PIPING, CONNECTIONS, AND TERMINATIONS AS INDICATED. COORDINATE WITH DEMOLITION OF ASSOCIATED EQUIPMENT.
3. SINGLE-LINE DUCTWORK INDICATES GENERAL ROUTING OF EXISTING SYSTEMS. FIELD-VERIFY CONDITIONS PRIOR TO DEMOLITION OR RECONNECTION.
4. REMOVE ALL ASSOCIATED HANGERS, SUPPORTS, INSULATION, SEALANTS, PIPING SPECIALTIES, CONTROLS, AND ACCESSORIES WITH DEMOLISHED HVAC EQUIPMENT, DUCTWORK, OR PIPING AS REQUIRED FOR COMPLETE REMOVAL. DO NOT REMOVE ITEMS REQUIRED FOR ACTIVE OR REUSED SYSTEMS. CONTRACTOR SHALL FIELD-VERIFY AND CONFIRM REUSE PRIOR TO REMOVAL. PATCH AND SEAL ALL PENETRATIONS IN FLOORS, WALLS, OR ROOF TO MATCH ADJACENT CONSTRUCTION.
5. WHERE PARTIAL DEMOLITION OCCURS, PREPARE SYSTEMS FOR RECONNECTION TO NEW WORK. CAP OR TEMPORARILY SUPPORT AS REQUIRED.
6. COORDINATE WITH OTHER TRADES FOR SAFE REMOVAL OF PIPING, DUCTWORK, AND EQUIPMENT.
7. PROTECT REMAINING ACTIVE SYSTEMS DURING DEMOLITION.
8. ALL EXTERIOR AND INTERIOR PENETRATIONS AFFECTED BY DEMOLITION SHALL HAVE EXISTING FLASHING, SEALANT, AND CAULKING REMOVED. SURFACES CLEANED, AND OPENINGS PREPARED FOR NEW WORK. COORDINATE WITH ARCHITECTURAL FINISHES FOR PATCHING AND REPAIR AS REQUIRED.



KEY PLAN

8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

1ST FLOOR - DEMO - CAPE FEAR - HYDRONICS

SCALE : 1/8" = 1'-0"

1

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SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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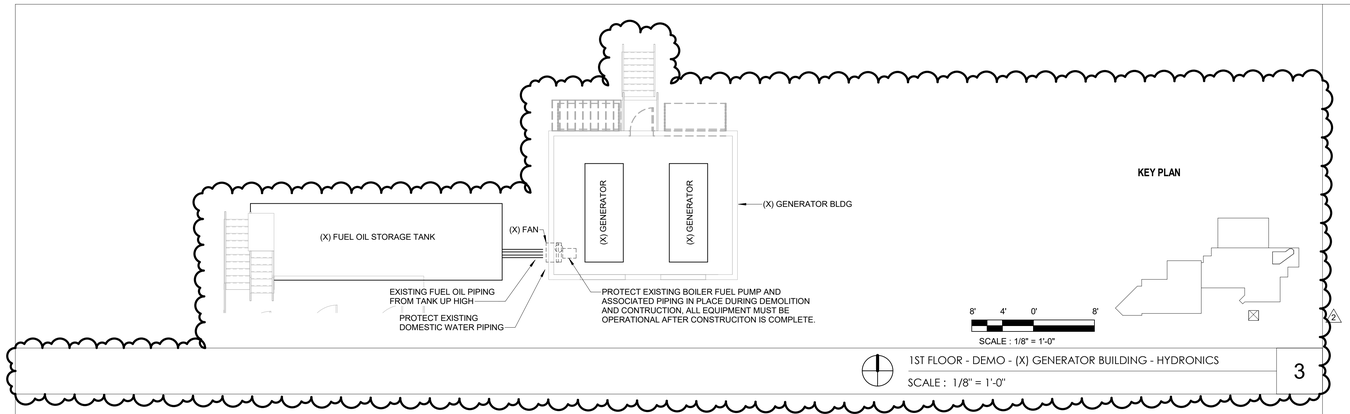
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28250 DAVID A. MARINELLI

05-Dec-25

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FIRST FLOOR DEMO PLAN - CAPE FEAR - HYDRONICS

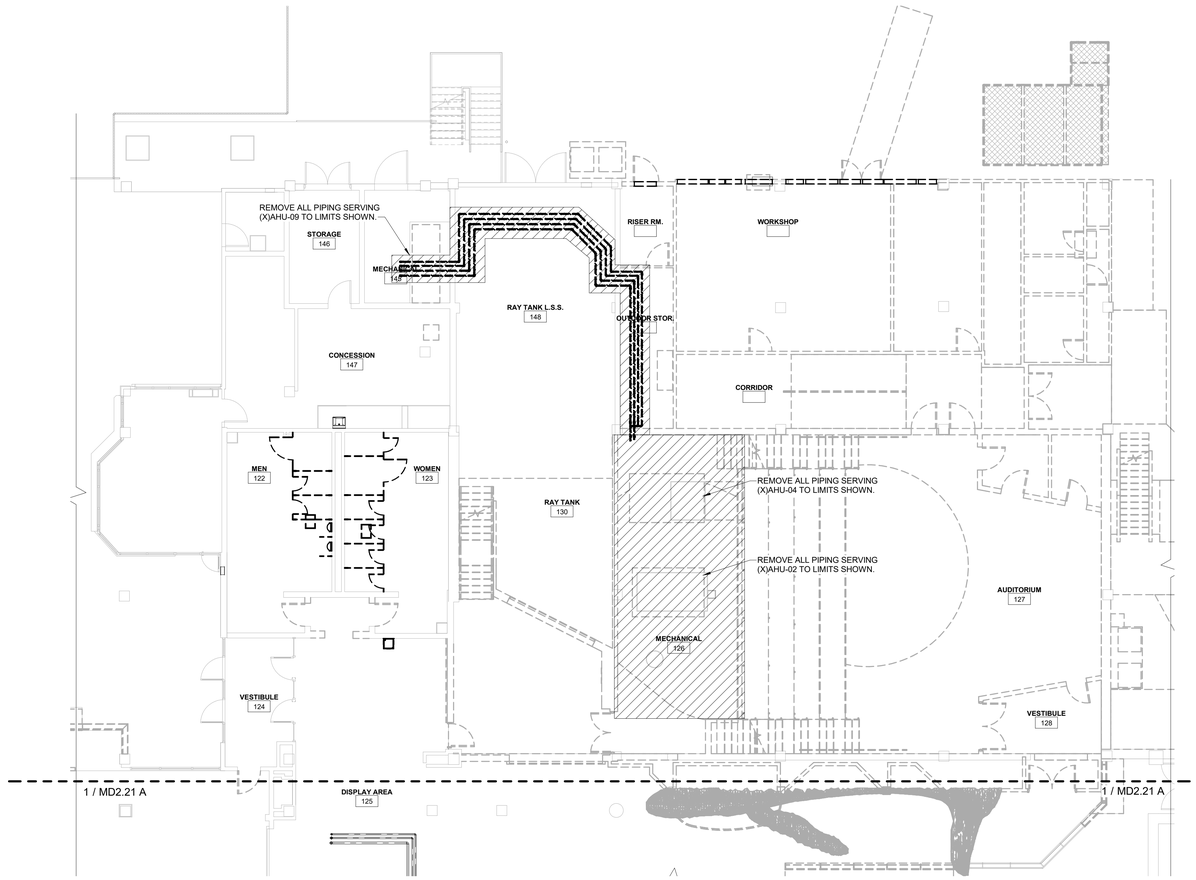
MD2.21 A

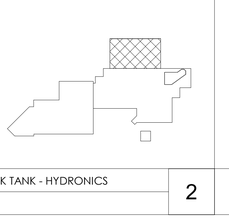


1ST FLOOR - DEMO - (X) GENERATOR BUILDING - HYDRONICS

SCALE : 1/8" = 1'-0"

3

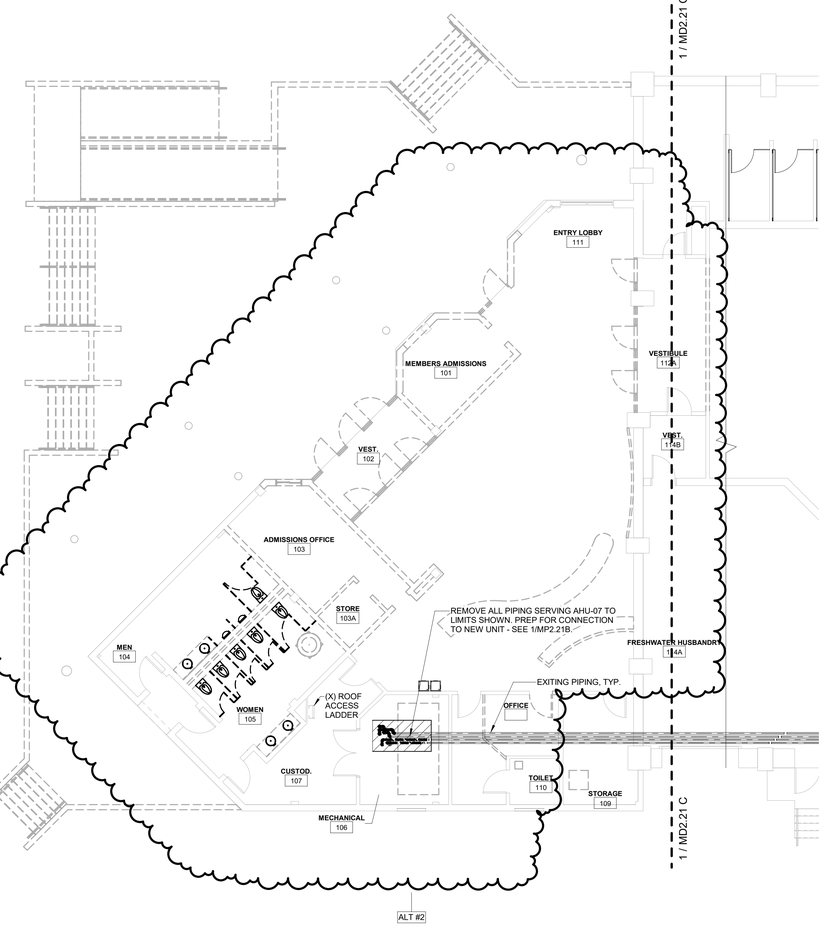


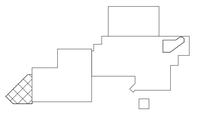


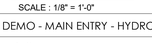
1ST FLOOR - DEMO - TOUCH AND SHARK TANK - HYDRONICS

SCALE : 1/8" = 1'-0"

2







1ST FLOOR - DEMO - MAIN ENTRY - HYDRONICS

SCALE : 1/8" = 1'-0"

1

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

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NORTH CAROLINA PROFESSIONAL SEAL 23551 ENGINEER DAVID M. HAHN

06-May-26

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
2	04-27-26	BULLETIN #2

FIRST FLOOR DEMO PLAN - MAIN ENTRY, TOUCH TANK & (X) GENERATOR BLDG - HYDRONICS

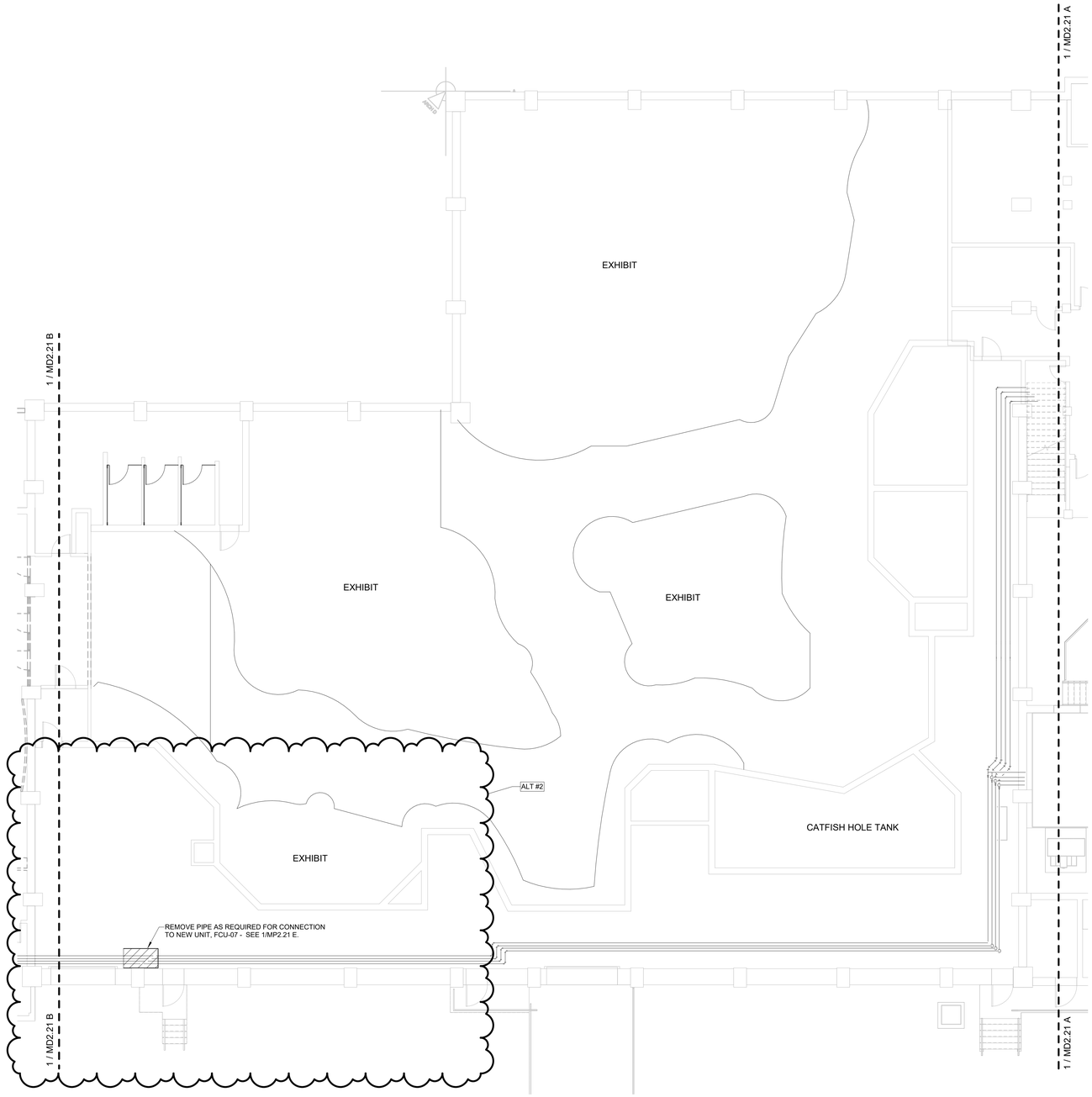
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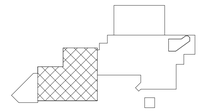
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KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

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1ST FLOOR - DEMO - FRESHWATER HABITAT - HYDRONICS

SCALE : 1/8" = 1'-0"

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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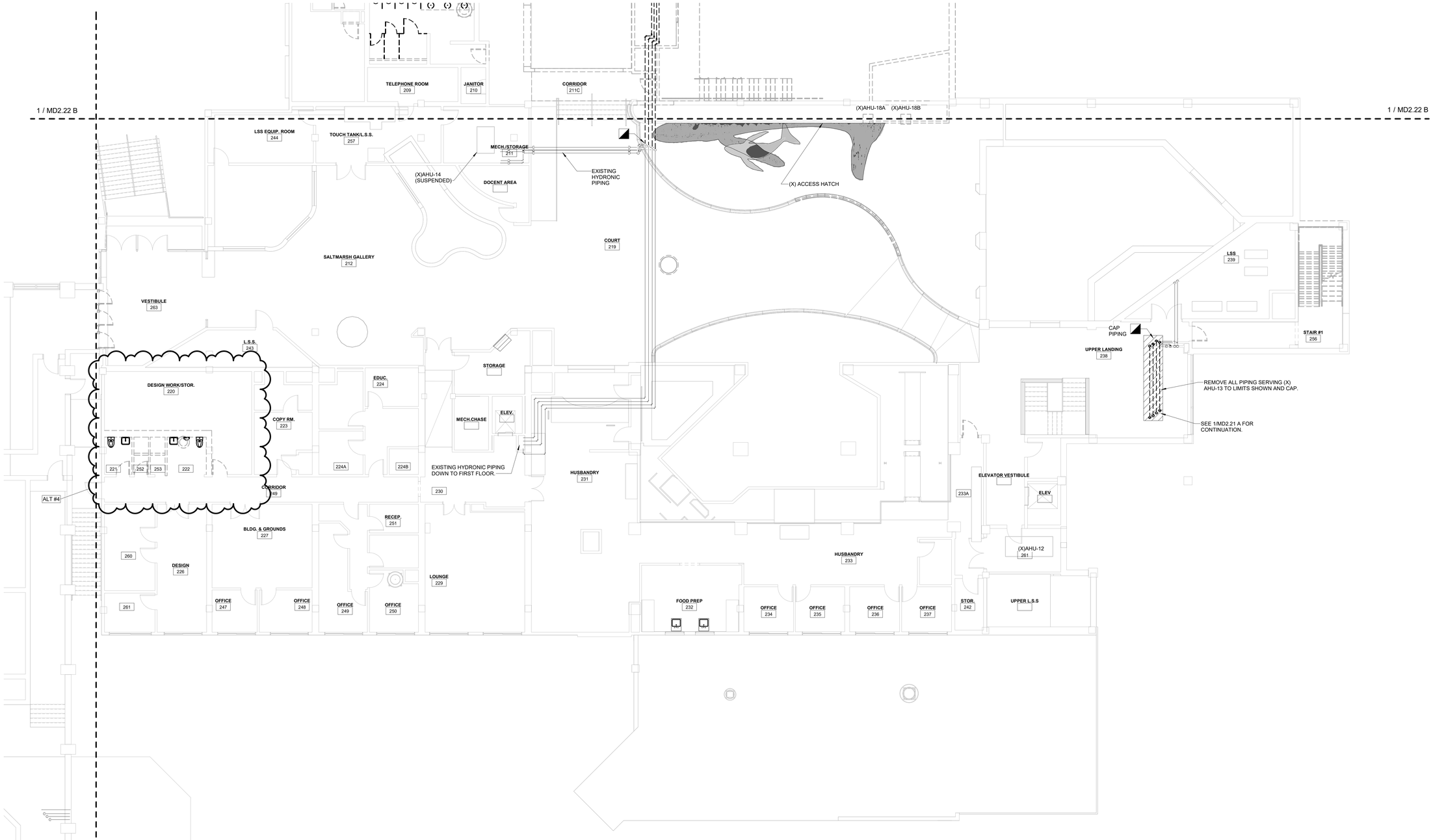
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05-Dec-25

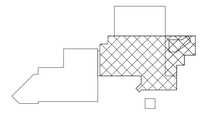
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FIRST FLOOR DEMO PLAN - FRESHWATER HABITAT - HYDRONICS

MD2.21 C



KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

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2ND FLOOR - DEMO - CAPE FEAR - HYDRONICS

SCALE : 1/8" = 1'-0"

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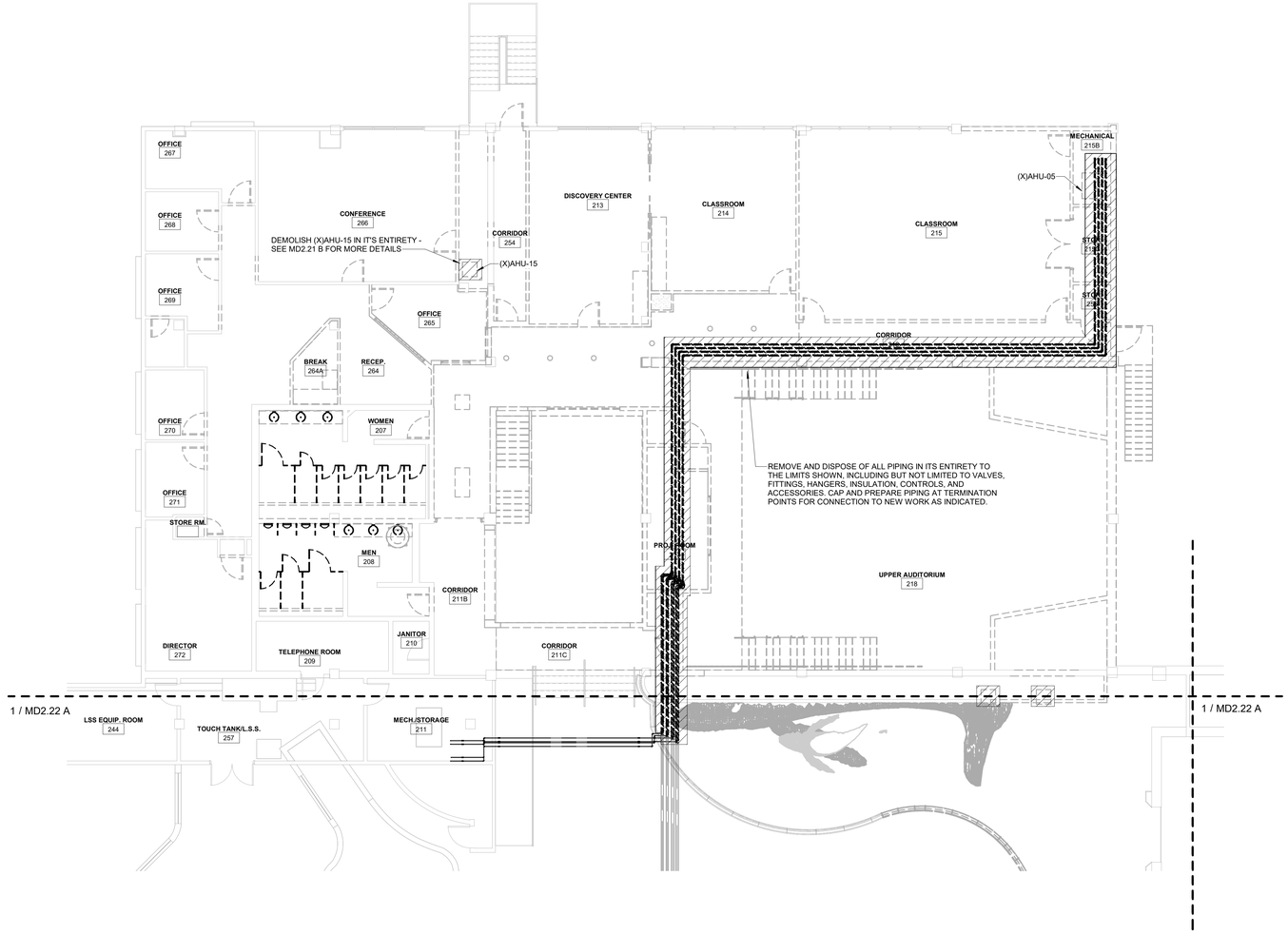
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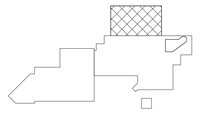
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SECOND FLOOR DEMO PLAN - CAPE FEAR - HYDRONICS

MD2.22 A



KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

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2ND FLOOR - DEMO - TOUCH AND SHARK TANK - HYDRONICS

SCALE : 1/8" = 1'-0"

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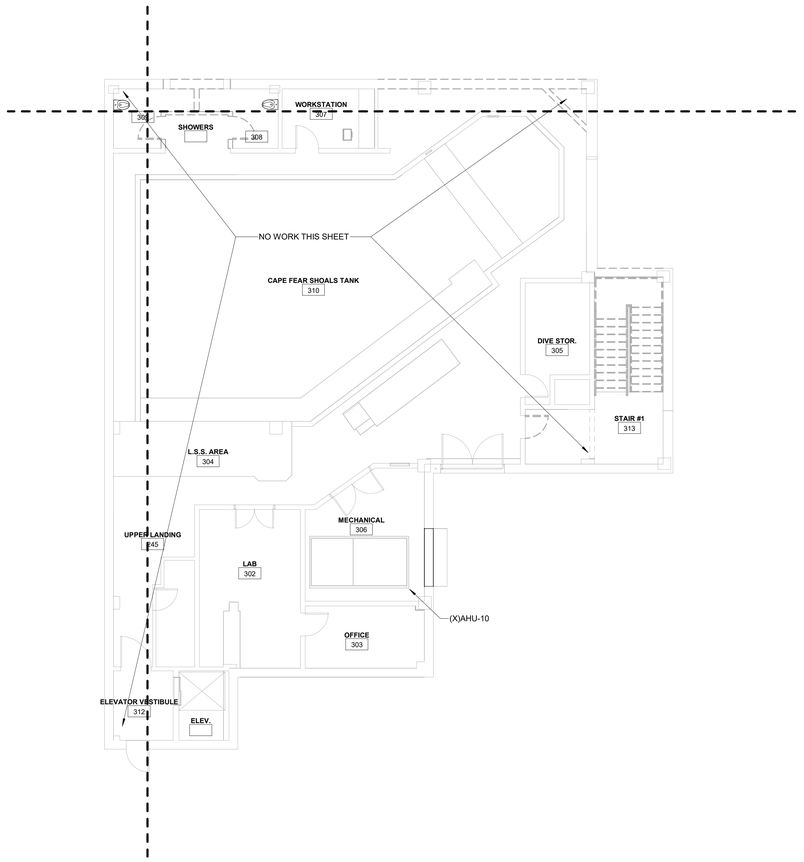
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 25250 DAVID R. MANNIETT

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

SECOND FLOOR DEMO PLAN - TOUCH TANK - HYDRONICS

MD2.22 B



KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

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3RD FLOOR - DEMO - CAPE FEAR - HYDRONICS

SCALE : 1/8" = 1'-0"

1

SZOSTAK DESIGN

FORT FISHER
AQUARIUM
RENOVATION
& EXPANSION:
PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

900 LOGGERHEAD RD,
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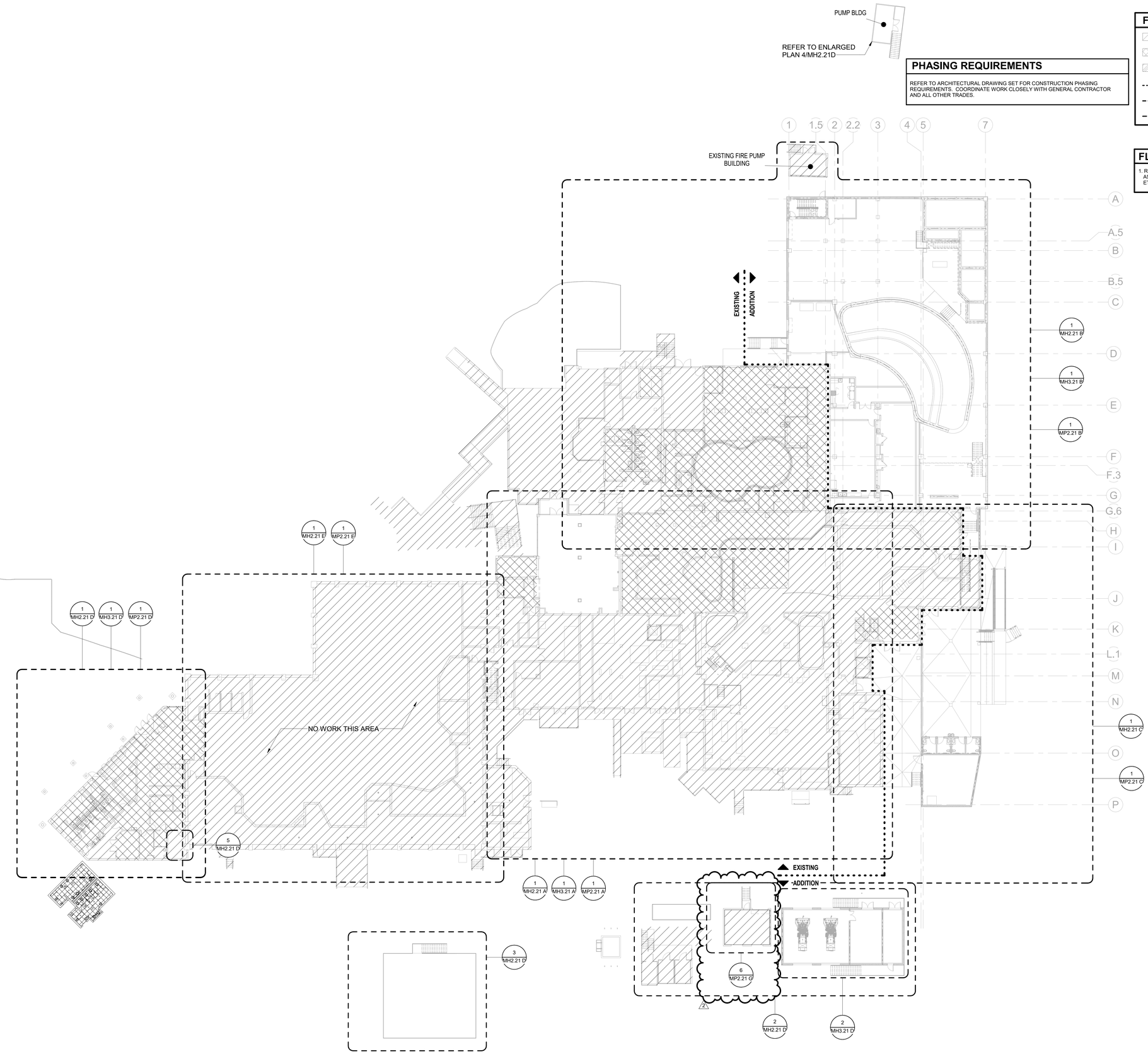
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28250 DAVID R. MANNETTI

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

THIRD FLOOR DEMO PLAN
- CAPE FEAR - HYDRONICS

MD2.23 A



PHASING REQUIREMENTS

REFER TO ARCHITECTURAL DRAWING SET FOR CONSTRUCTION PHASING REQUIREMENTS. COORDINATE WORK CLOSELY WITH GENERAL CONTRACTOR AND ALL OTHER TRADES.

FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

FLOOR PLAN SHEET NOTES

1. REFER TO ARCHITECTURAL DRAWINGS FOR RATED ASSEMBLY UL NUMBERS (WALLS, FLOOR / CEILINGS, ETC..

SCALE : 1" = 20'-0"

OVERALL 1ST FLOOR PLAN - HVAC

SCALE : 1" = 20'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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NORTH CAROLINA PROFESSIONAL SEAL 23551 ENGINEER DAVID M. HAHN

06-May-26

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
2	04-27-26	BULLETIN #2

FIRST FLOOR PLAN - HVAC

MH2.11

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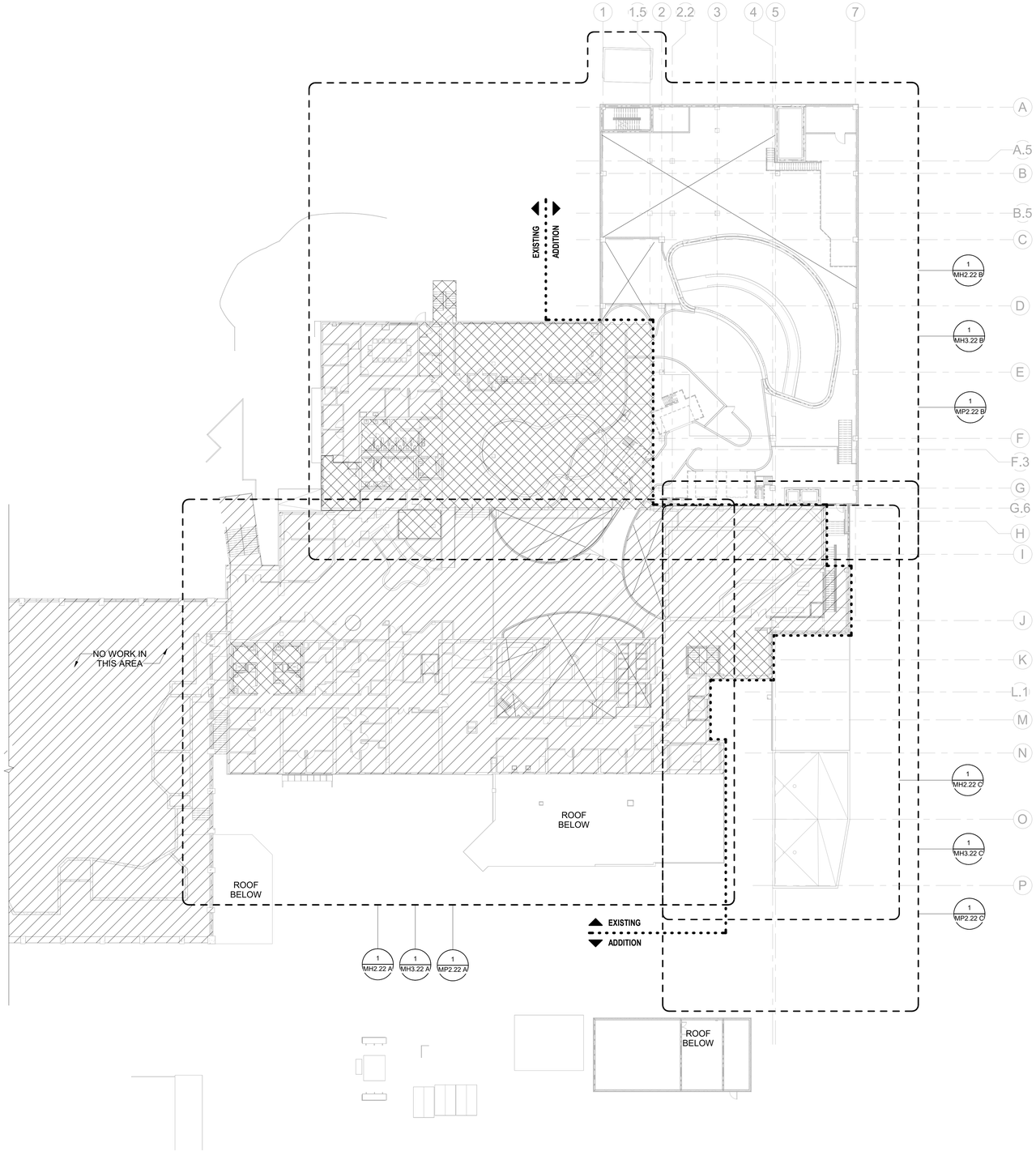
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FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

FLOOR PLAN SHEET NOTES

1. REFER TO ARCHITECTURAL DRAWINGS FOR RATED ASSEMBLY UL NUMBERS (WALLS, FLOOR / CEILINGS, ETC..



20' 10' 20'

SCALE : 1" = 20'-0"

OVERALL 2ND FLOOR PLAN - HVAC

SCALE : 1" = 20'-0"

1

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SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

SECOND FLOOR PLAN - HVAC

MH2.12

PHASING REQUIREMENTS

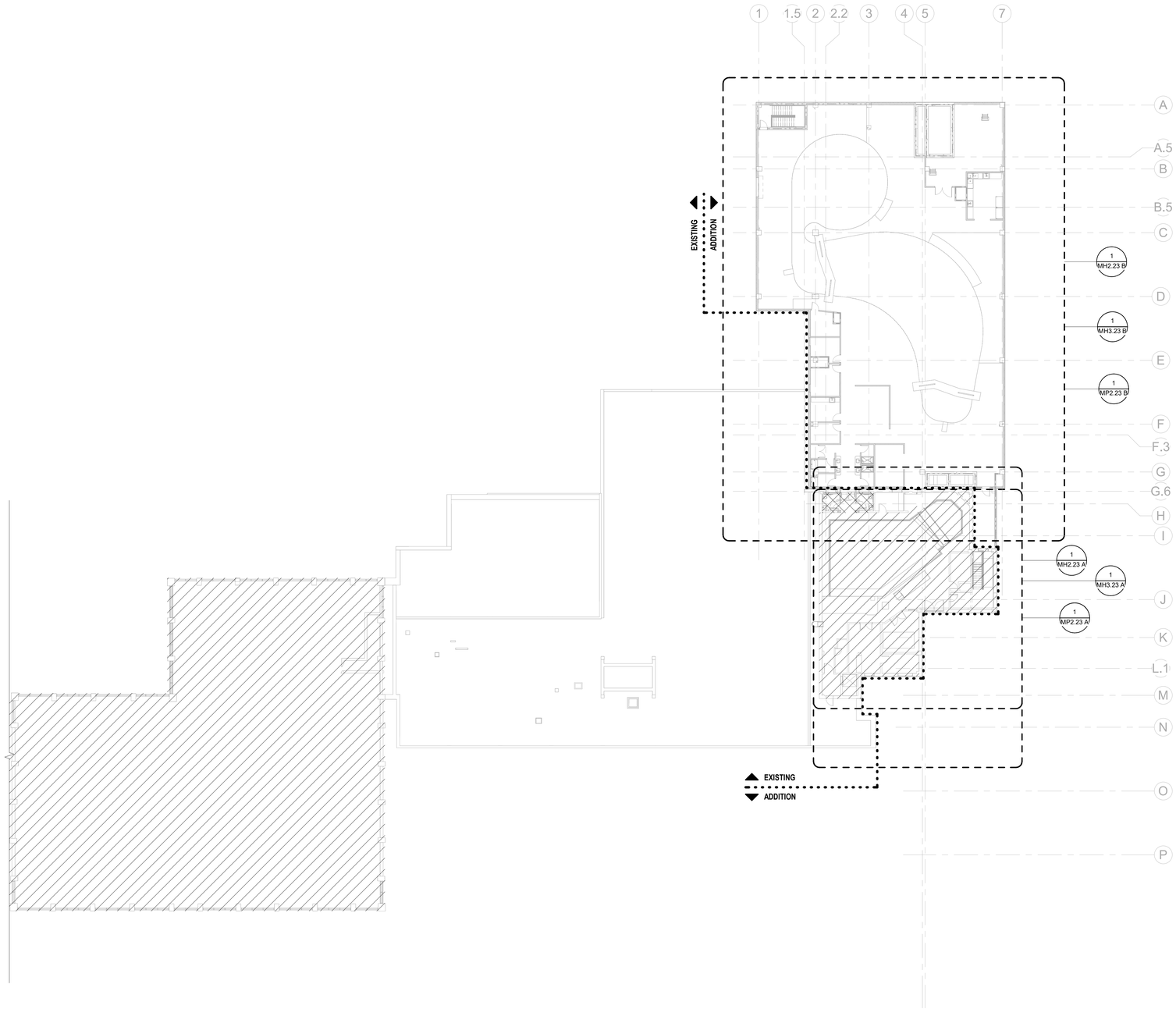
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FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

FLOOR PLAN SHEET NOTES

1. REFER TO ARCHITECTURAL DRAWINGS FOR RATED ASSEMBLY UL NUMBERS (WALLS, FLOOR / CEILINGS, ETC..



20' 10' 20'

SCALE : 1" = 20'-0"

OVERALL 3RD FLOOR PLAN - HVAC

SCALE : 1" = 20'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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NORTH CAROLINA REGISTERED PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

THIRD FLOOR PLAN - HVAC

MH2.13

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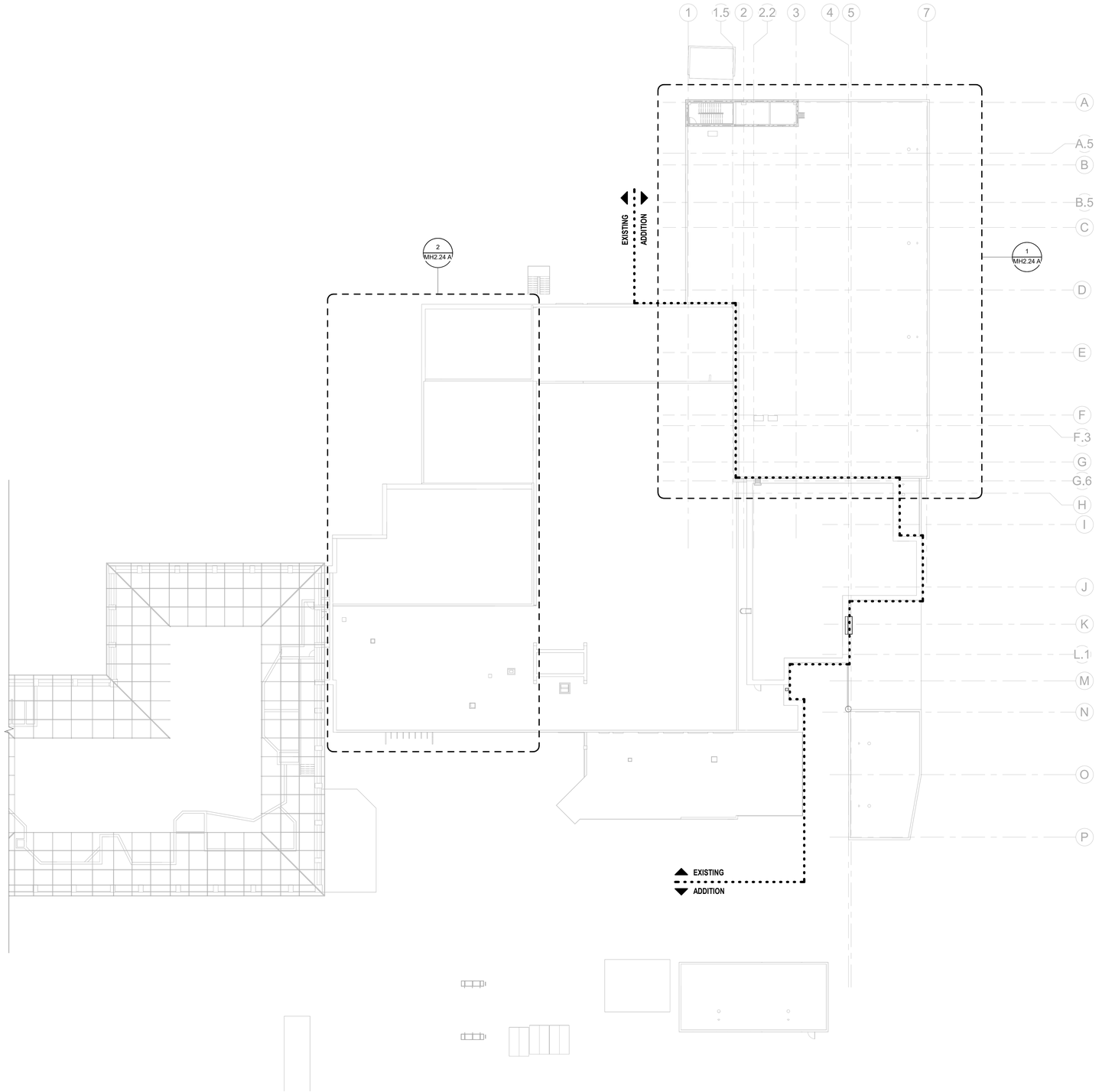
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FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

ROOF PLAN SHEET NOTES

1. REFER TO ARCHITECTURAL DRAWINGS FOR RATED ASSEMBLY UL NUMBERS (WALLS, FLOOR / CEILINGS, ETC..
2. REFER TO STRUCTURAL DRAWINGS FOR EQUIPMENT ROOF MOUNTING CONDITIONS.
3. ALL ROOF PENETRATIONS SHALL CONFORM TO ROOF MANUFACTURER'S APPROVED METHODS.
4. MAINTAIN MINIMUM 10 FOOT SEPARATION BETWEEN EXHAUST AND ANY OUTSIDE AIR INTAKES.



SCALE : 1" = 20'-0"

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OVERALL ROOF PLAN - HVAC
SCALE : 1" = 20'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAIN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

ROOF PLAN - HVAC

MH2.14

NEW WORK KEYED NOTES

1	INSTALL NEW SUPPLY AND RETURN AIR DIFFUSERS AND CONNECT TO EXISTING ((X)AHU-08) SYSTEM. PROVIDE NEW DUCTWORK, HANGERS, AND ACCESSORIES AS REQUIRED FOR COMPLETE INSTALLATION.
2	INSTALL NEW EXPOSED SUSPENDED DUCTWORK WITH DUCT-MOUNTED SUPPLY AND RETURN GRILLES AND CONNECT TO EXISTING ((X)AHU-01) SYSTEM. PROVIDE HANGERS AND ACCESSORIES AS REQUIRED FOR COMPLETE INSTALLATION.

FLOOR PLAN LEGEND

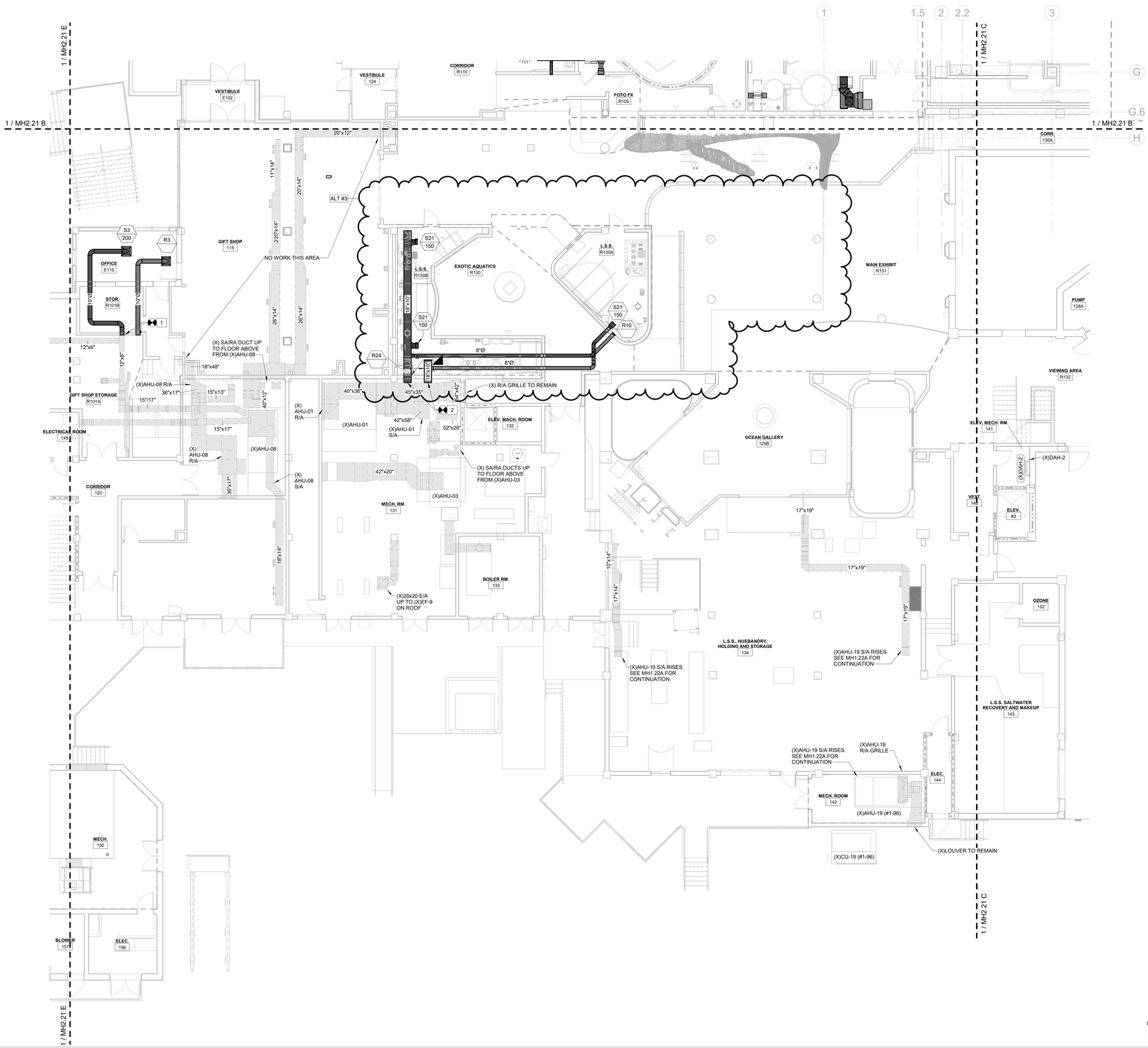
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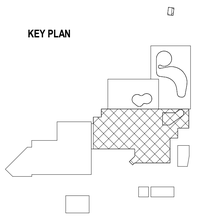
FLOOR PLAN SHEET NOTES

1. REFER TO ARCHITECTURAL DRAWINGS FOR RATED ASSEMBLY UL NUMBERS (WALLS, FLOOR / CEILINGS, ETC..
2. MAINTAIN CLEARANCES REQUIRED BY MANUFACTURERS AND CODE FOR ALL EQUIPMENT AND ACCESSORIES.
3. M.C. SHALL COORDINATE WITH OTHER TRADES PRIOR TO BEGINNING WORK.
4. M.C. SHALL COORDINATE ALL DUCT ROUTING WITH STRUCTURAL, ELECTRICAL, AND AQUATIC LIFE SUPPORT SYSTEMS PRIOR TO INSTALLATION.
5. M.C. SHALL COORDINATE CONDENSATE PIPE ROUTING WITH GENERAL CONTRACTOR.
6. REFER TO ARCHITECTURAL PLANS FOR DETAILS ON CEILING TYPE.
7. ALL DUCTWORK SHALL BE FABRICATED, INSTALLED, AND TESTED IN ACCORDANCE WITH SMACNA STANDARDS AND NFPA 90A.
8. ALL DUCT PENETRATIONS THROUGH FIRE-RESISTANCE-RATED FLOOR ASSEMBLIES SHALL BE PROVIDED WITH FIRE DAMPERS HAVING A RATING EQUAL TO THE REQUIRED FIRE-RESISTANCE RATING OF THE FLOOR ASSEMBLY, UNLESS THE DUCT IS LOCATED WITHIN A CODE-COMPLIANT FIRE-RATED SHAFT OR PROTECTED CHASE.
9. PROVIDE ACCESS DOORS FOR ALL DAMPERS, CONTROLS, AND EQUIPMENT REQUIRING SERVICE.
10. PROVIDE MARINE-GRADE OR CORROSION-RESISTANT MATERIALS IN AREAS SUBJECT TO SALT SPRAY OR HIGH HUMIDITY. SEE SPECIFICATIONS.

FIRE DAMPER REQUIREMENTS - FLOORS & ROOFS

ALL FLOOR AND ROOF DUCT PENETRATIONS SHALL BE PROVIDED WITH 1- OR 2-HOUR RATED FIRE DAMPERS AS REQUIRED. REFER TO ARCHITECTURAL FIRE-RESISTANCE PLANS FOR RATING REQUIREMENTS. FIRE DAMPERS ARE OMITTED FROM THIS PLAN FOR CLARITY.





KEY PLAN

8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

1ST FLOOR - CAPE FEAR SHOALS - RAMP - HVAC

SCALE : 1/8" = 1'-0"

1

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SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

900 LOGGERHEAD RD,
KURE BEACH, NC 28449

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SEAL 23551
DAVID M. HAHN
05-Dec-25

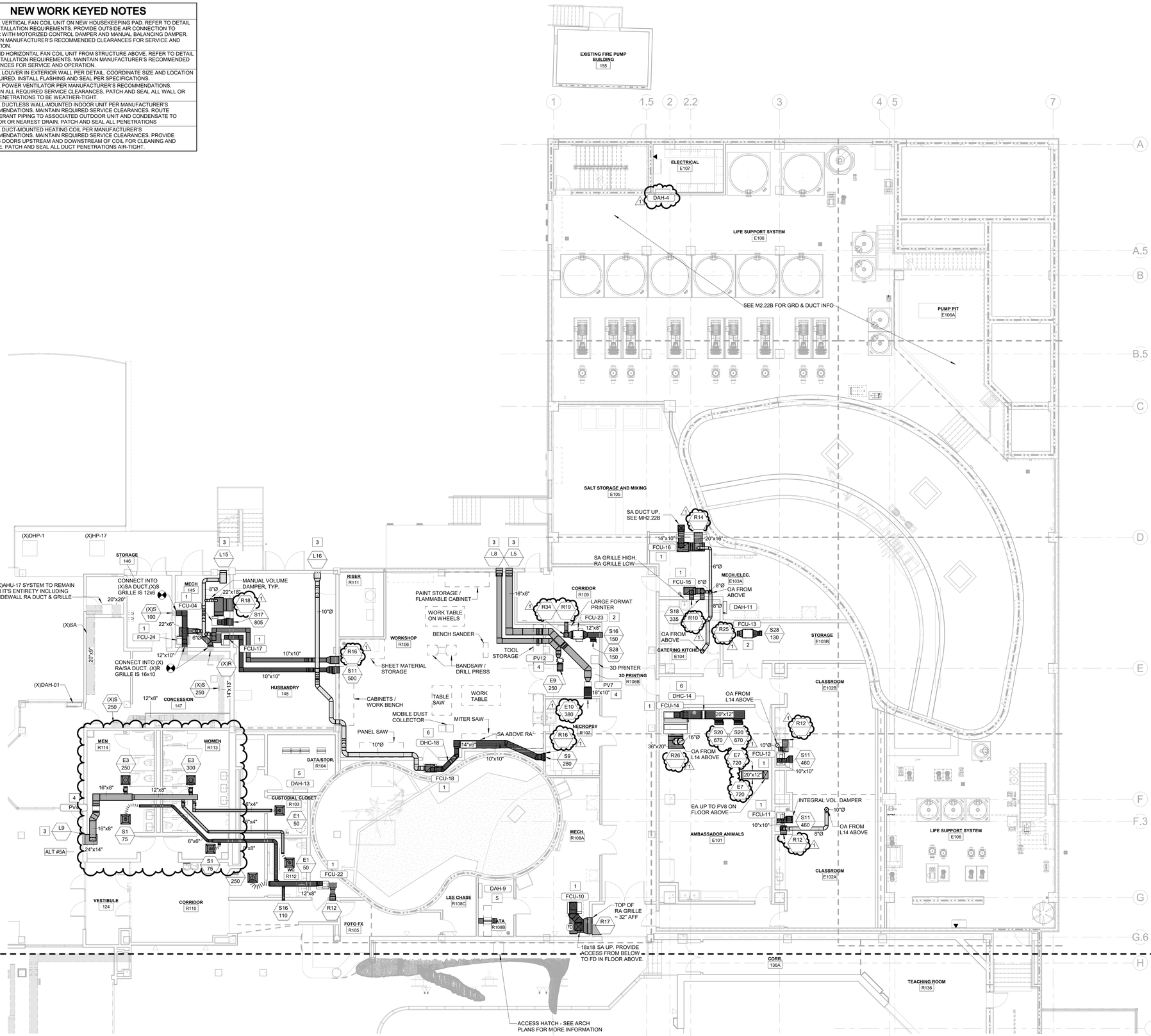
NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

FIRST FLOOR PLAN - CAPE FEAR SHOALS - HVAC

MH2.21 A

NEW WORK KEYED NOTES

1	INSTALL VERTICAL FAN COIL UNIT ON NEW HOUSEKEEPING PAD. REFER TO DETAIL FOR INSTALLATION REQUIREMENTS. PROVIDE OUTSIDE AIR CONNECTION TO LOUVER WITH MOTORIZED CONTROL DAMPER AND MANUAL BALANCING DAMPER. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES FOR SERVICE AND OPERATION.
2	SUSPEND HORIZONTAL FAN COIL UNIT FROM STRUCTURE ABOVE. REFER TO DETAIL FOR INSTALLATION REQUIREMENTS. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES FOR SERVICE AND OPERATION.
3	INSTALL LOUVER IN EXTERIOR WALL PER DETAIL. COORDINATE SIZE AND LOCATION AS REQUIRED. INSTALL FLASHING AND SEAL PER SPECIFICATIONS.
4	INSTALL POWER VENTILATOR PER MANUFACTURER'S RECOMMENDATIONS. MAINTAIN ALL REQUIRED SERVICE CLEARANCES. PATCH AND SEAL ALL WALL OR ROOF PENETRATIONS TO BE WEATHER-TIGHT.
5	INSTALL DUCTLESS WALL-MOUNTED INDOOR UNIT PER MANUFACTURER'S RECOMMENDATIONS. MAINTAIN REQUIRED SERVICE CLEARANCES. ROUTE REFRIGERANT PIPING TO ASSOCIATED OUTDOOR UNIT AND CONDENSATE TO EXTERIOR OR NEAREST DRAIN. PATCH AND SEAL ALL PENETRATIONS
6	INSTALL DUCT-MOUNTED HEATING COIL PER MANUFACTURER'S RECOMMENDATIONS. MAINTAIN REQUIRED SERVICE CLEARANCES. PROVIDE ACCESS DOORS UPSTREAM AND DOWNSTREAM OF COIL FOR CLEANING AND SERVICE. PATCH AND SEAL ALL DUCT PENETRATIONS AIR-TIGHT.



FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

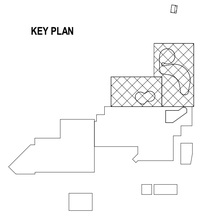
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KEY PLAN



SCALE : 1/8" = 1'-0"

1ST FLOOR PLAN - TOUCH & SHARK TANK - HVAC

SCALE : 1/8" = 1'-0"

1

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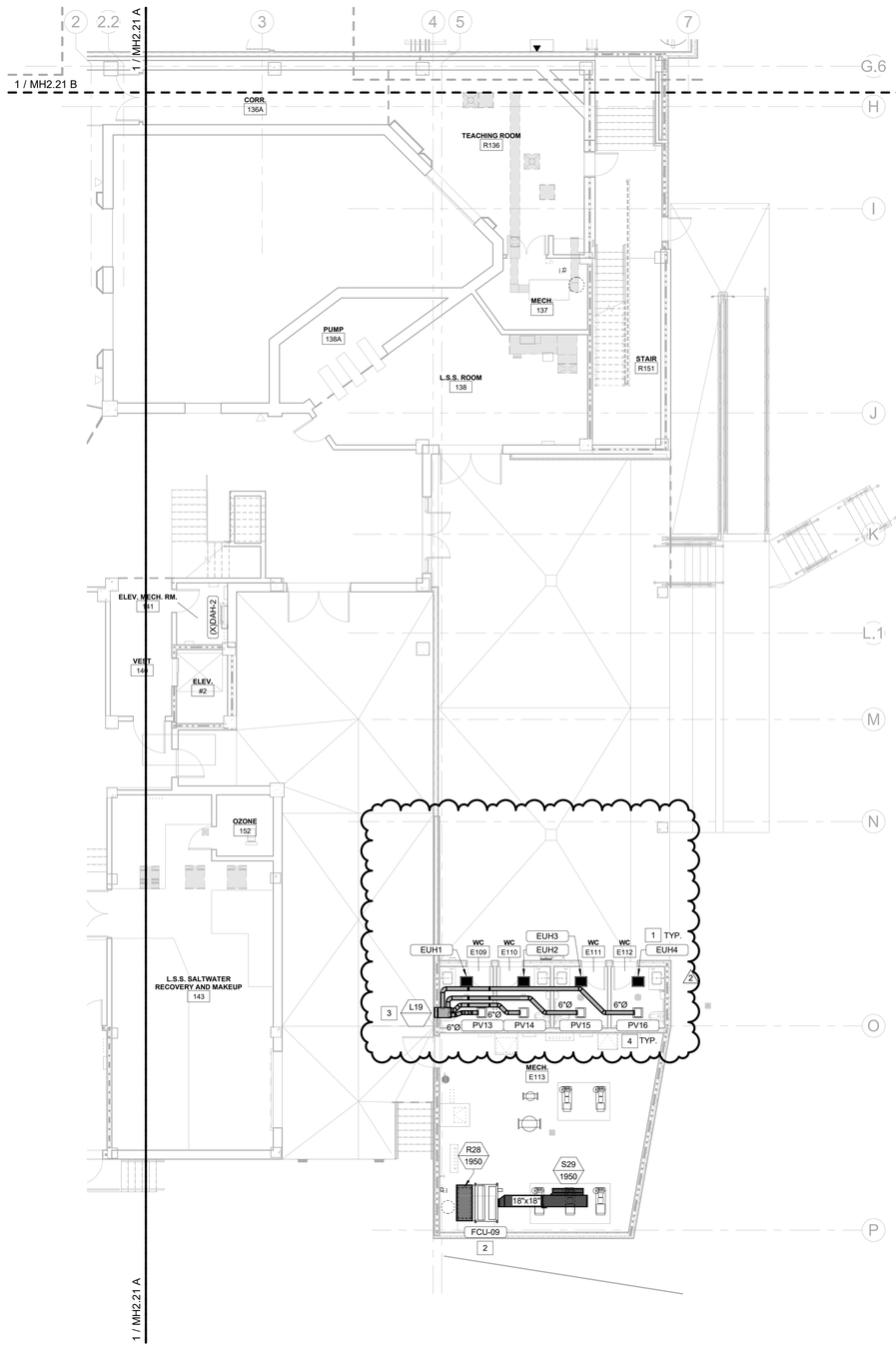
AGENT CAROLINA PROFESSIONAL 23551 ENGINEER DAVID M. HAIN

12-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1

FIRST FLOOR PLAN - TOUCH AND SHARK TANK - HVAC

MH2.21 B



FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

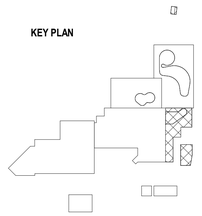
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NEW WORK KEYED NOTES

2	1	PROVIDE CEILING-MOUNTED ELECTRIC UNIT HEATER. INSTALL PER MANUFACTURER. COORDINATE WITH CEILING AND ELECTRICAL.
	2	SUSPEND HORIZONTAL FAN COIL UNIT FROM STRUCTURE ABOVE. REFER TO DETAIL FOR INSTALLATION REQUIREMENTS. PROVIDE OUTSIDE AIR CONNECTION TO LOUVER WITH MOTORIZED CONTROL DAMPER AND MANUAL BALANCING DAMPER. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES FOR SERVICE AND OPERATION.
	3	INSTALL LOUVER IN EXTERIOR WALL PER DETAIL. COORDINATE SIZE AND LOCATION AS REQUIRED. INSTALL FLASHING AND SEAL PER SPECIFICATIONS.
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KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

1ST FLOOR PLAN - SOUTHEAST WING - HVAC

SCALE : 1/8" = 1'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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NORTH CAROLINA PROFESSIONAL SEAL 23551 ENGINEER DAVID M. HAHN

06-May-26

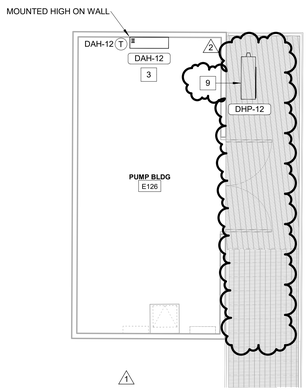
NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1
2	04-27-26	BULLETIN #2

FIRST FLOOR PLAN - SOUTHEAST WING - HVAC

MH2.21 C

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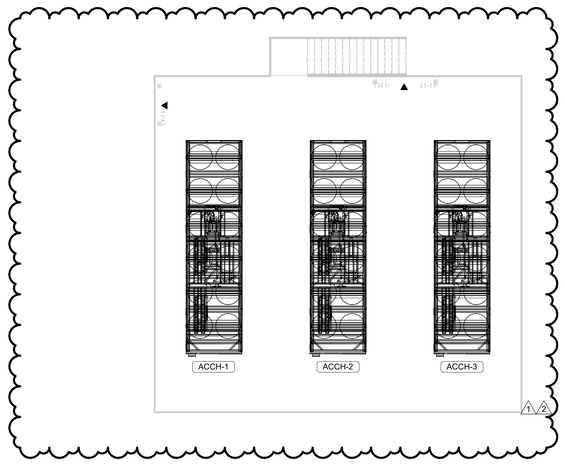
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DOMESTIC WATER BOOSTER PUMP BUILDING - HVAC

SCALE : 1/4" = 1'-0"

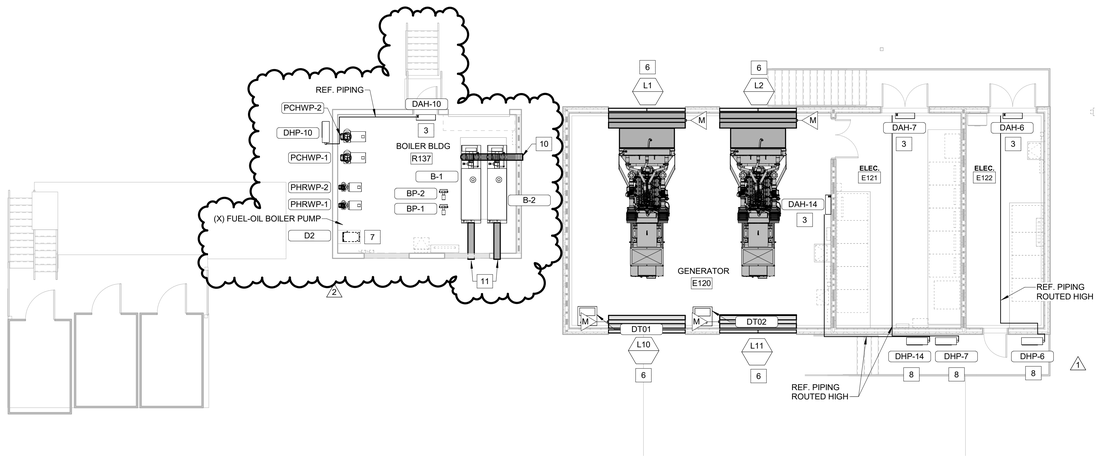
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CHILLER PLATFORM HVAC PLAN

SCALE : 1/8" = 1'-0"

3



1ST FLOOR PLAN - GENERATOR & BOILER BUILDING -HVAC

SCALE : 1/8" = 1'-0"

2

NEW WORK KEYED NOTES

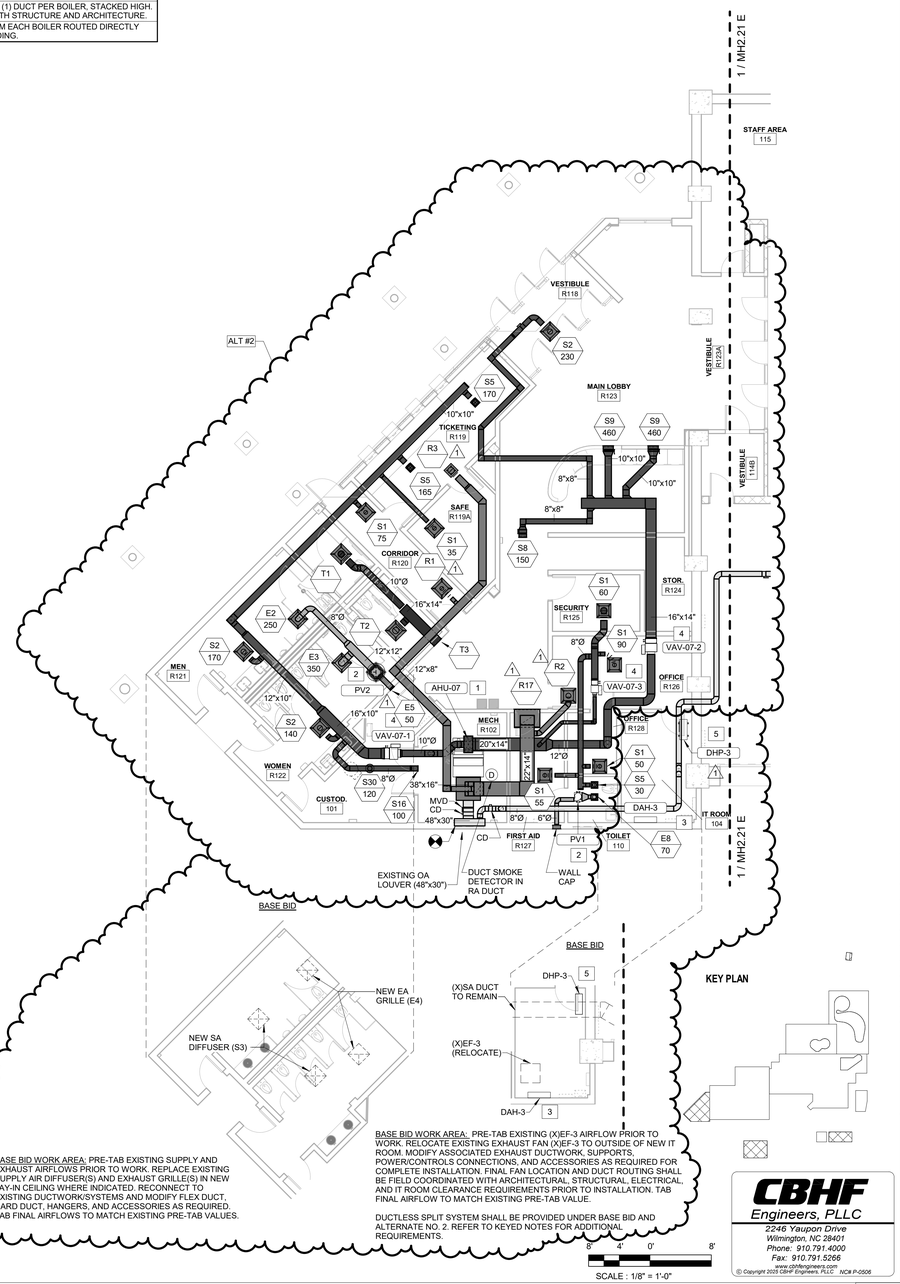
1	INSTALL AIR HANDLING UNIT ON EXISTING HOUSEKEEPING PAD IN MECHANICAL ROOM. REFER TO DETAIL FOR INSTALLATION REQUIREMENTS. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES FOR SERVICE AND OPERATION. PROVIDE NEW S/A, R/A, AND O/A DUCT CONNECTIONS AS SHOWN ON PLANS.
2	INSTALL POWER VENTILATOR PER MANUFACTURER'S RECOMMENDATIONS. MAINTAIN ALL REQUIRED SERVICE CLEARANCES. PATCH AND SEAL ALL WALL OR ROOF PENETRATIONS TO BE WEATHER-TIGHT.
3	INSTALL DUCTLESS WALL-MOUNTED INDOOR UNIT PER MANUFACTURER'S RECOMMENDATIONS. MAINTAIN REQUIRED SERVICE CLEARANCES. ROUTE REFRIGERANT PIPING TO ASSOCIATED OUTDOOR UNIT AND CONDENSATE TO EXTERIOR OR NEAREST DRAIN. PATCH AND SEAL ALL PENETRATIONS
4	INSTALL SINGLE-DUCT VAV BOX WITH HOT WATER COIL. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES FOR SERVICE AND ACCESS.
5	OUTDOOR UNIT IS MOUNTED ON MANUFACTURER'S WALL BRACKETS TO ADJACENT EXTERIOR WALL ABOVE THIS AREA ON THE EXISTING ROOF. COORDINATE FINAL MOUNTING HEIGHT AND CLEARANCES WITH ARCHITECT AND GC. CONFIRM ALL EXISTING ROOF PENETRATIONS, WALL CONDITIONS, AND POTENTIAL INTERFERENCES WITH GC AND ALL AFFECTED TRADES PRIOR TO INSTALLATION TO ENSURE THE SELECTED MOUNTING LOCATION IS NOT IMPACTED BY FIELD CONDITIONS. PROVIDE ANCHORING AND RESTRAINTS SUITABLE FOR HIGH-WIND / HURRICANE REGIONS PER MANUFACTURER, STRUCTURAL, AND LOCAL CODE REQUIREMENTS.
6	INSTALL GENERATOR INTAKE AND EXHAUST LOUVERS WITH MOTORIZED DAMPERS AS SCHEDULED. REFER TO MECHANICAL SCHEDULES AND DETAILS FOR MORE INFORMATION . COORDINATE SIZE AND LOCATION WITH ARCHITECTURAL DRAWINGS. INSTALL FLASHING AND SEAL PER SPECIFICATIONS.
7	INSTALL DEHUMIDIFICATION UNIT ON CORROSION-RESISTANT WALL BRACKETS WITH SUPPORT PLATFORM. MAINTAIN MANUFACTURER CLEARANCES. ROUTE CONDENSATE TO EXTERIOR LANDSCAPE DISCHARGE LOCATION. PATCH AND SEAL WALL PENETRATIONS WEATHER-TIGHT.
8	INSTALL OUTDOOR UNIT ON MANUFACTURER'S WALL BRACKETS ABOVE WALKING PLATFORM. COORDINATE FINAL MOUNTING HEIGHT AND CLEARANCES WITH ARCHITECT AND GC. PROVIDE ANCHORING AND RESTRAINTS SUITABLE FOR HIGH-WIND / HURRICANE REGIONS PER MANUFACTURER, STRUCTURAL, AND LOCAL CODE REQUIREMENTS.
9	INSTALL OUTDOOR UNIT ON SUPPORTS PROVIDED BY STRUCTURAL ENGINEER AND COORDINATED WITH WALKING PLATFORM FRAMING. COORDINATE FINAL MOUNTING LOCATION AND HEIGHT WITH STRUCTURAL, GC, AND ARCHITECT PRIOR TO PLATFORM FABRICATION OR ORDERING TO ENSURE ACCESS, CLEARANCES, AND INSTALLATION REQUIREMENTS ARE MET. PROVIDE ANCHORING AND RESTRAINTS SUITABLE FOR HIGH-WIND / HURRICANE REGIONS PER MANUFACTURER, STRUCTURAL, AND LOCAL CODE REQUIREMENTS.
10	PROVIDE (2) 10" Ø COMBUSTION AIR INTAKES, (1) DUCT PER BOILER, STACKED HIGH. COORDINATE ROUTING AND TERMINATION WITH STRUCTURE AND ARCHITECTURE.
11	PROVIDE 10" Ø CATEGORY IV FLUE VENT FROM EACH BOILER ROUTED DIRECTLY THROUGH EXTERIOR WALL AT REAR OF BUILDING.

FLOOR PLAN SHEET NOTES

1. REFER TO ARCHITECTURAL DRAWINGS FOR RATED ASSEMBLY UL NUMBERS (WALLS, FLOOR / CEILINGS, ETC.
2. MAINTAIN CLEARANCES REQUIRED BY MANUFACTURERS AND CODE FOR ALL EQUIPMENT AND ACCESSORIES.
3. M.C. SHALL COORDINATE WITH OTHER TRADES PRIOR TO BEGINNING WORK.
4. M.C. SHALL COORDINATE ALL DUCT ROUTING WITH STRUCTURAL, ELECTRICAL, AND AQUATIC LIFE SUPPORT SYSTEMS PRIOR TO INSTALLATION.
5. M.C. SHALL COORDINATE CONDENSATE PIPE ROUTING WITH GENERAL CONTRACTOR.
6. REFER TO ARCHITECTURAL PLANS FOR DETAILS ON CEILING TYPE.
7. ALL DUCTWORK SHALL BE FABRICATED, INSTALLED, AND TESTED IN ACCORDANCE WITH SMACNA STANDARDS AND NFPA 90A.
8. ALL DUCT PENETRATIONS THROUGH FIRE-RESISTANCE-RATED FLOOR ASSEMBLIES SHALL BE PROVIDED WITH FIRE DAMPERS HAVING A RATING EQUAL TO THE REQUIRED FIRE-RESISTANCE RATING OF THE FLOOR ASSEMBLY, UNLESS THE DUCT IS LOCATED WITHIN A CODE-COMPLIANT FIRE-RATED SHAFT OR PROTECTED CHASE.
9. PROVIDE ACCESS DOORS FOR ALL DAMPERS, CONTROLS, AND EQUIPMENT REQUIRING SERVICE.
10. PROVIDE MARINE-GRADE OR CORROSION-RESISTANT MATERIALS IN AREAS SUBJECT TO SALT SPRAY OR HIGH HUMIDITY. SEE SPECIFICATIONS.

FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL



BASE BID WORK AREA: PRE-TAB EXISTING SUPPLY AND EXHAUST AIRFLOWS PRIOR TO WORK. REPLACE EXISTING SUPPLY AIR DIFFUSER(S) AND EXHAUST GRILLE(S) IN NEW LAY-IN CEILING WHERE INDICATED. RECONNECT TO EXISTING DUCTWORK/SYSTEMS AND MODIFY FLEX DUCT, HARD DUCT, HANGERS, AND ACCESSORIES AS REQUIRED. TAB FINAL AIRFLOWS TO MATCH EXISTING PRE-TAB VALUES.

BASE BID WORK AREA: PRE-TAB EXISTING (X)EF-3 AIRFLOW PRIOR TO WORK. RELOCATE EXISTING EXHAUST FAN (X)EF-3 TO OUTSIDE OF NEW IT ROOM. MODIFY ASSOCIATED EXHAUST DUCTWORK, SUPPORTS, POWER/CONTROLS CONNECTIONS, AND ACCESSORIES AS REQUIRED FOR COMPLETE INSTALLATION. FINAL FAN LOCATION AND DUCT ROUTING SHALL BE FIELD COORDINATED WITH ARCHITECTURAL, STRUCTURAL, ELECTRICAL, AND IT ROOM CLEARANCE REQUIREMENTS PRIOR TO INSTALLATION. TAB FINAL AIRFLOW TO MATCH EXISTING PRE-TAB VALUE.

DUCTLESS SPLIT SYSTEM SHALL BE PROVIDED UNDER BASE BID AND ALTERNATE NO. 2. REFER TO KEYED NOTES FOR ADDITIONAL REQUIREMENTS.

1ST FLOOR PLAN - MAIN ENTRY - HVAC

SCALE : 1/8" = 1'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

900 LOGGERHEAD RD,
KURE BEACH, NC 28449

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

06-May-26

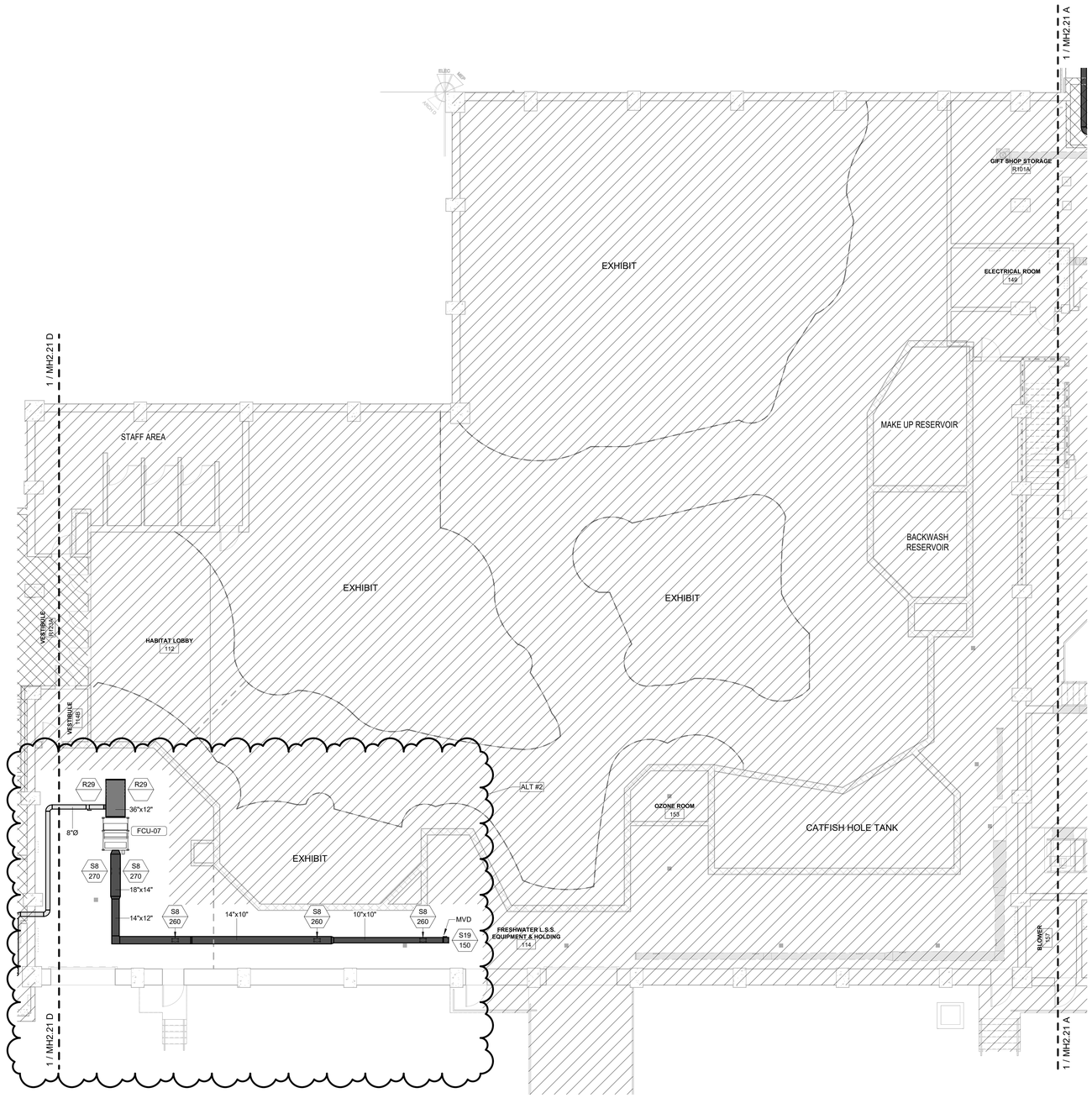
NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1
2	04-27-26	BULLETIN #2

FIRST FLOOR PLAN - MAIN ENTRY & MECH BLDG - HVAC

MH2.21 D

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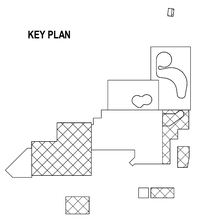
FLOOR PLAN LEGEND

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KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

1ST FLOOR PLAN - FRESHWATER HABITAT - HVAC

SCALE : 1/8" = 1'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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NORTH CAROLINA REGISTERED PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

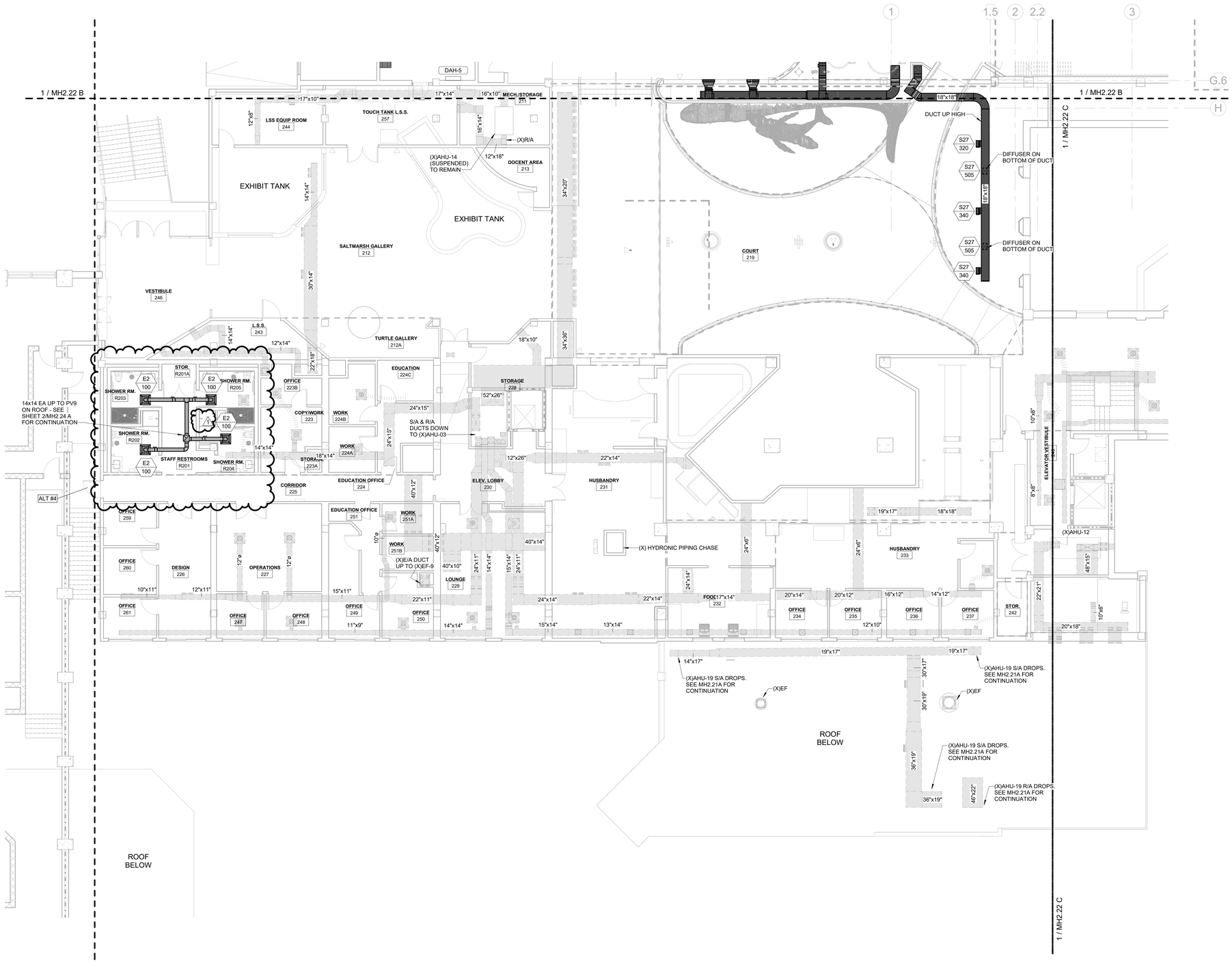
NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

FIRST FLOOR PLAN - FRESHWATER HABITAT - HVAC

MH2.21 E

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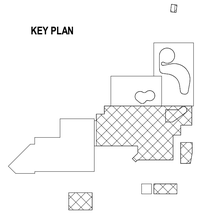
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KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

2ND FLOOR PLAN - CAPE FEAR SHOALS - HVAC

SCALE : 1/8" = 1'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
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NORTH CAROLINA PROFESSIONAL ENGINEER 23551 DAVID M. HAHN

12-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1

SECOND FLOOR PLAN - CAPE FEAR SHOALS - HVAC

MH2.22 A

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NEW WORK KEYED NOTES

1	INSTALL VERTICAL FAN COIL UNIT ON NEW HOUSEKEEPING PAD. REFER TO DETAIL FOR INSTALLATION REQUIREMENTS. PROVIDE OUTSIDE AIR CONNECTION TO LOUVER WITH MOTORIZED CONTROL DAMPER AND MANUAL BALANCING DAMPER. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES FOR SERVICE AND OPERATION.
2	SUSPEND HORIZONTAL FAN COIL UNIT FROM STRUCTURE ABOVE. REFER TO DETAIL FOR INSTALLATION REQUIREMENTS. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES FOR SERVICE AND OPERATION.
3	INSTALL LOUVER IN EXTERIOR WALL PER DETAIL. COORDINATE SIZE AND LOCATION AS REQUIRED. INSTALL FLASHING AND SEAL PER SPECIFICATIONS.
4	INSTALL POWER VENTILATOR PER MANUFACTURER'S RECOMMENDATIONS. MAINTAIN ALL REQUIRED SERVICE CLEARANCES. PATCH AND SEAL ALL WALL OR ROOF PENETRATIONS TO BE WEATHER-TIGHT.
5	INSTALL DUCTLESS WALL-MOUNTED INDOOR UNIT PER MANUFACTURER'S RECOMMENDATIONS. MAINTAIN REQUIRED SERVICE CLEARANCES. ROUTE REFRIGERANT PIPING TO ASSOCIATED OUTDOOR UNIT AND CONDENSATE TO EXTERIOR OR NEAREST DRAIN. PATCH AND SEAL ALL PENETRATIONS

FLOOR PLAN LEGEND

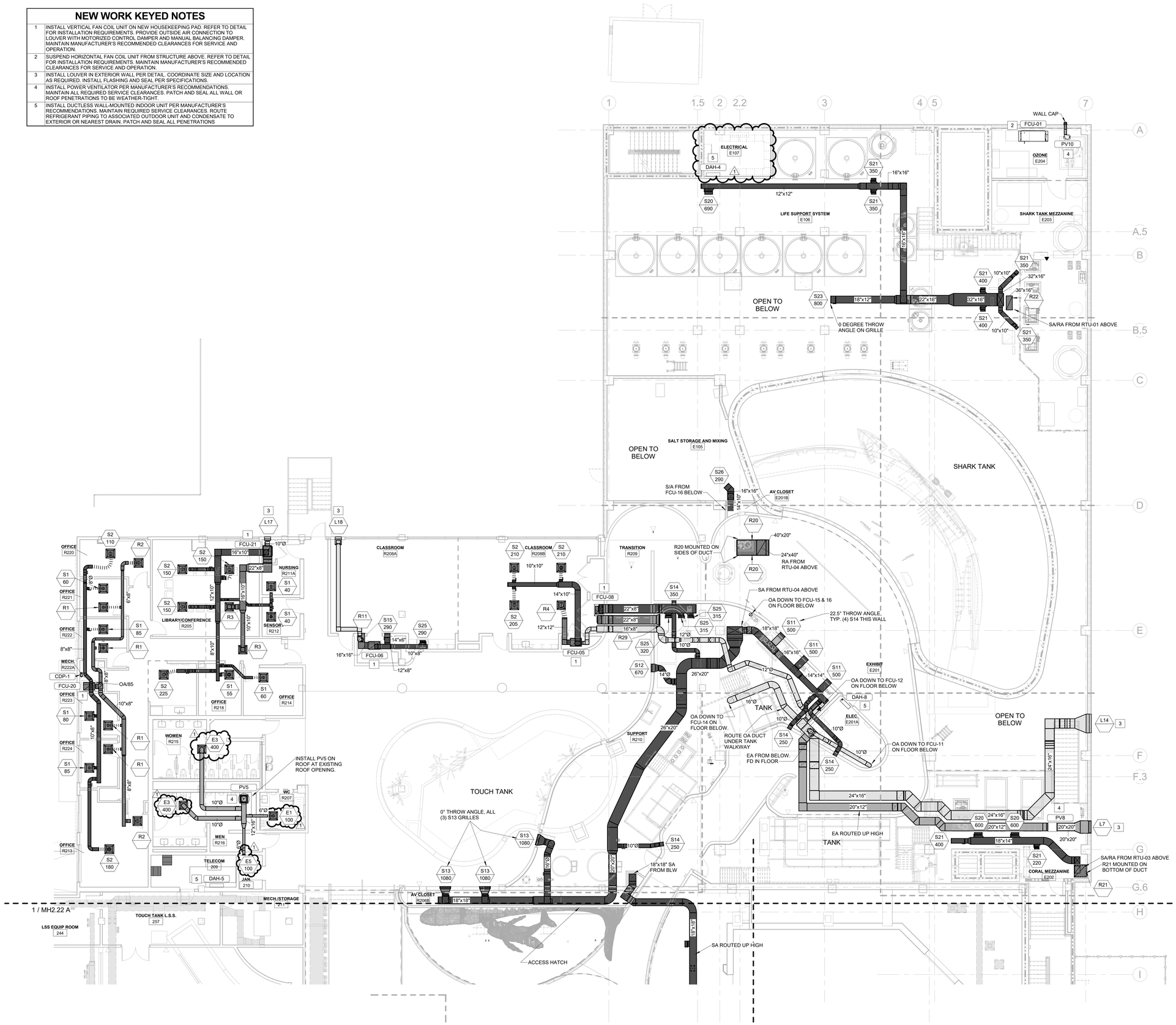
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FIRE DAMPER REQUIREMENTS - FLOORS & ROOFS

ALL FLOOR AND ROOF DUCT PENETRATIONS SHALL BE PROVIDED WITH 1- OR 2-HOUR RATED FIRE DAMPERS AS REQUIRED. REFER TO ARCHITECTURAL FIRE-RESISTANCE PLANS FOR RATING REQUIREMENTS. FIRE DAMPERS ARE OMITTED FROM THIS PLAN FOR CLARITY.



SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
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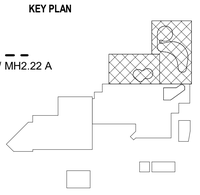
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

12-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1

KEY PLAN



SECOND FLOOR PLAN - TOUCH AND SHARK TANK - HVAC

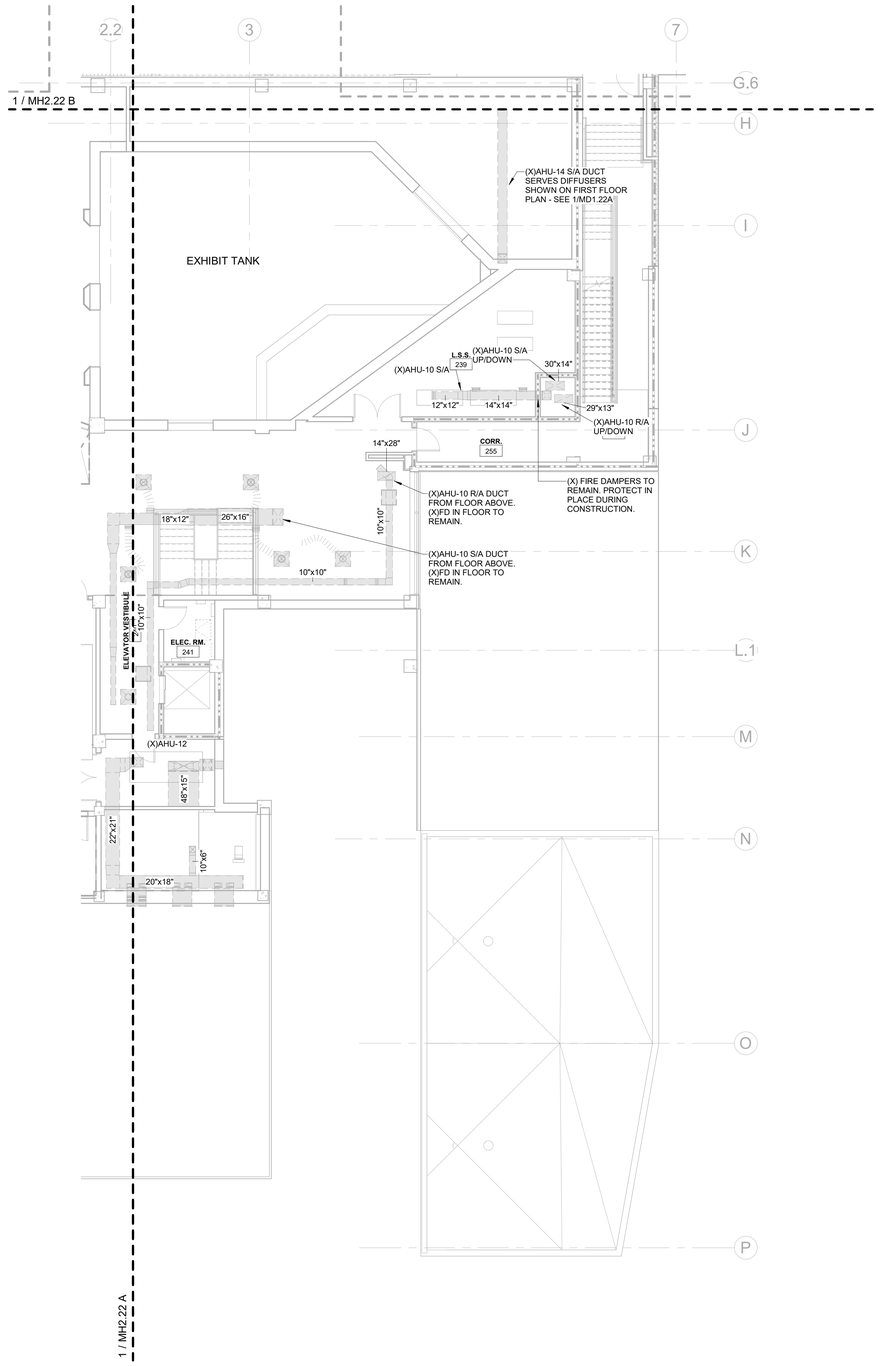
MH2.22 B

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8' 4' 0' 8'
SCALE : 1/8" = 1'-0"

2ND FLOOR PLAN - TOUCH & SHARK TANK - HVAC
SCALE : 1/8" = 1'-0"



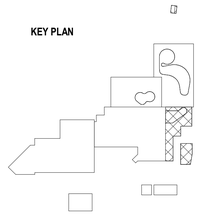
FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

FLOOR PLAN SHEET NOTES

1. REFER TO ARCHITECTURAL DRAWINGS FOR RATED ASSEMBLY UL NUMBERS (WALLS, FLOOR / CEILINGS, ETC..
2. MAINTAIN CLEARANCES REQUIRED BY MANUFACTURERS AND CODE FOR ALL EQUIPMENT AND ACCESSORIES.
3. M.C. SHALL COORDINATE WITH OTHER TRADES PRIOR TO BEGINNING WORK.
4. M.C. SHALL COORDINATE ALL DUCT ROUTING WITH STRUCTURAL, ELECTRICAL, AND AQUATIC LIFE SUPPORT SYSTEMS PRIOR TO INSTALLATION.
5. M.C. SHALL COORDINATE CONDENSATE PIPE ROUTING WITH GENERAL CONTRACTOR.
6. REFER TO ARCHITECTURAL PLANS FOR DETAILS ON CEILING TYPE.
7. ALL DUCTWORK SHALL BE FABRICATED, INSTALLED, AND TESTED IN ACCORDANCE WITH SMACNA STANDARDS AND NFPA 90A.
8. ALL DUCT PENETRATIONS THROUGH FIRE-RESISTANCE-RATED FLOOR ASSEMBLIES SHALL BE PROVIDED WITH FIRE DAMPERS HAVING A RATING EQUAL TO THE REQUIRED FIRE-RESISTANCE RATING OF THE FLOOR ASSEMBLY, UNLESS THE DUCT IS LOCATED WITHIN A CODE-COMPLIANT FIRE-RATED SHAFT OR PROTECTED CHASE.
9. PROVIDE ACCESS DOORS FOR ALL DAMPERS, CONTROLS, AND EQUIPMENT REQUIRING SERVICE.
10. PROVIDE MARINE-GRADE OR CORROSION-RESISTANT MATERIALS IN AREAS SUBJECT TO SALT SPRAY OR HIGH HUMIDITY. SEE SPECIFICATIONS.

KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

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2ND FLOOR PLAN - SOUTHEAST WING - HVAC

SCALE : 1/8" = 1'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

900 LOGGERHEAD RD,
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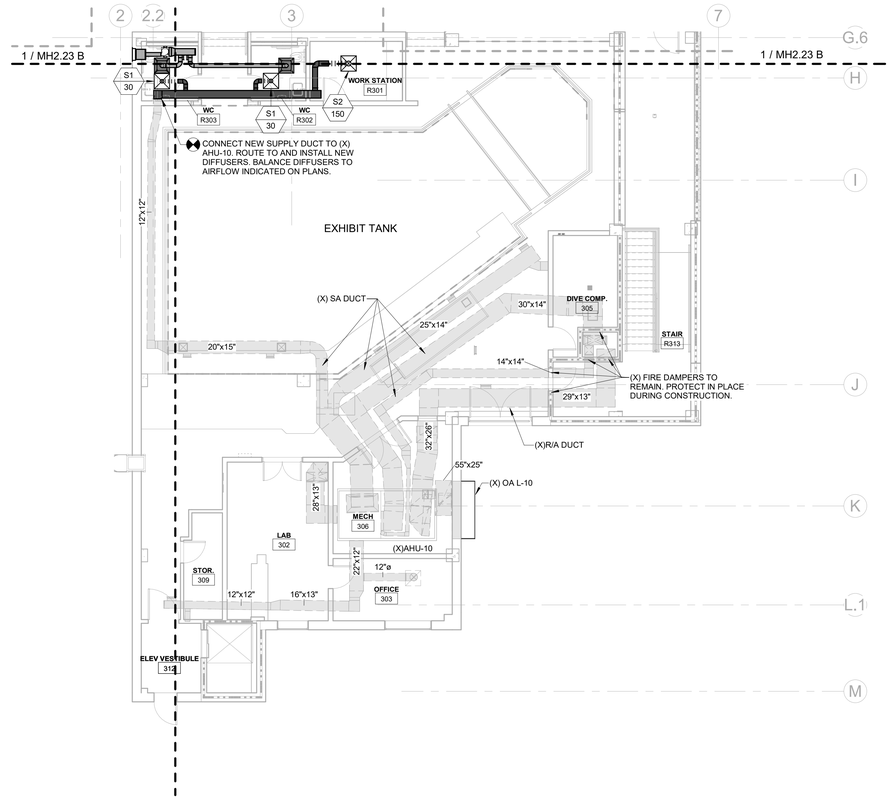
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

SECOND FLOOR PLAN - SOUTHEAST WING - HVAC

MH2.22 C



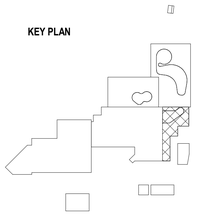
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- UPFIT BY OTHERS
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KEY PLAN



8' 4' 0' 8'

3RD FLOOR PLAN - SOUTHEAST WING - HVAC

SCALE : 1/8" = 1'-0"

SCALE : 1/8" = 1'-0"

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1

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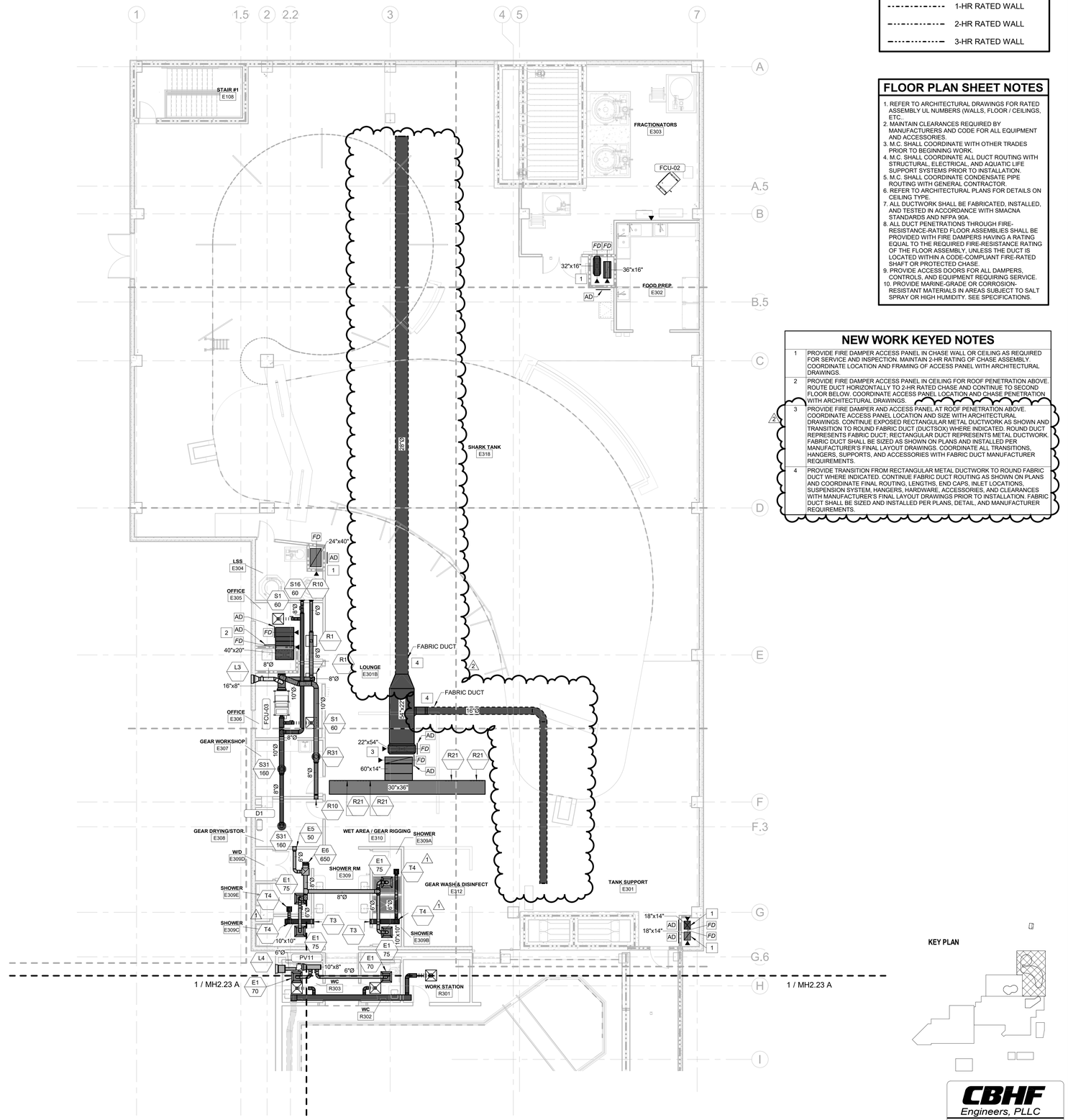
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

THIRD FLOOR PLAN - SOUTHEAST WING - HVAC

MH2.23 A



FLOOR PLAN LEGEND

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- RENOVATED AREA
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NEW WORK KEYED NOTES

1	PROVIDE FIRE DAMPER ACCESS PANEL IN CHASE WALL OR CEILING AS REQUIRED FOR SERVICE AND INSPECTION. MAINTAIN 2-HR RATING OF CHASE ASSEMBLY. COORDINATE LOCATION AND FRAMING OF ACCESS PANEL WITH ARCHITECTURAL DRAWINGS.
2	PROVIDE FIRE DAMPER ACCESS PANEL IN CEILING FOR ROOF PENETRATION ABOVE. ROUTE DUCT HORIZONTALLY TO 2-HR RATED CHASE AND CONTINUE TO SECOND FLOOR BELOW. COORDINATE ACCESS PANEL LOCATION AND CHASE PENETRATION WITH ARCHITECTURAL DRAWINGS.
3	PROVIDE FIRE DAMPER AND ACCESS PANEL AT ROOF PENETRATION ABOVE. COORDINATE ACCESS PANEL LOCATION AND SIZE WITH ARCHITECTURAL DRAWINGS. CONTINUE EXPOSED RECTANGULAR METAL DUCTWORK AS SHOWN AND TRANSITION TO ROUND FABRIC DUCT (DUCTSOX) WHERE INDICATED. ROUND DUCT REPRESENTS FABRIC DUCT. RECTANGULAR DUCT REPRESENTS METAL DUCTWORK. FABRIC DUCT SHALL BE SIZED AS SHOWN ON PLANS AND INSTALLED PER MANUFACTURER'S FINAL LAYOUT DRAWINGS. COORDINATE ALL TRANSITIONS, HANGERS, SUPPORTS, AND ACCESSORIES WITH FABRIC DUCT MANUFACTURER REQUIREMENTS.
4	PROVIDE TRANSITION FROM RECTANGULAR METAL DUCTWORK TO ROUND FABRIC DUCT WHERE INDICATED. CONTINUE FABRIC DUCT ROUTING AS SHOWN ON PLANS AND COORDINATE FINAL ROUTING, LENGTHS, END CAPS, INLET LOCATIONS, SUSPENSION SYSTEM, HANGERS, HARDWARE, ACCESSORIES, AND CLEARANCES WITH MANUFACTURER'S FINAL LAYOUT DRAWINGS PRIOR TO INSTALLATION. FABRIC DUCT SHALL BE SIZED AND INSTALLED PER PLANS, DETAIL, AND MANUFACTURER REQUIREMENTS.

KEY PLAN

8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

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3RD FLOOR PLAN - SHARK TANK

SCALE : 1/8" = 1'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

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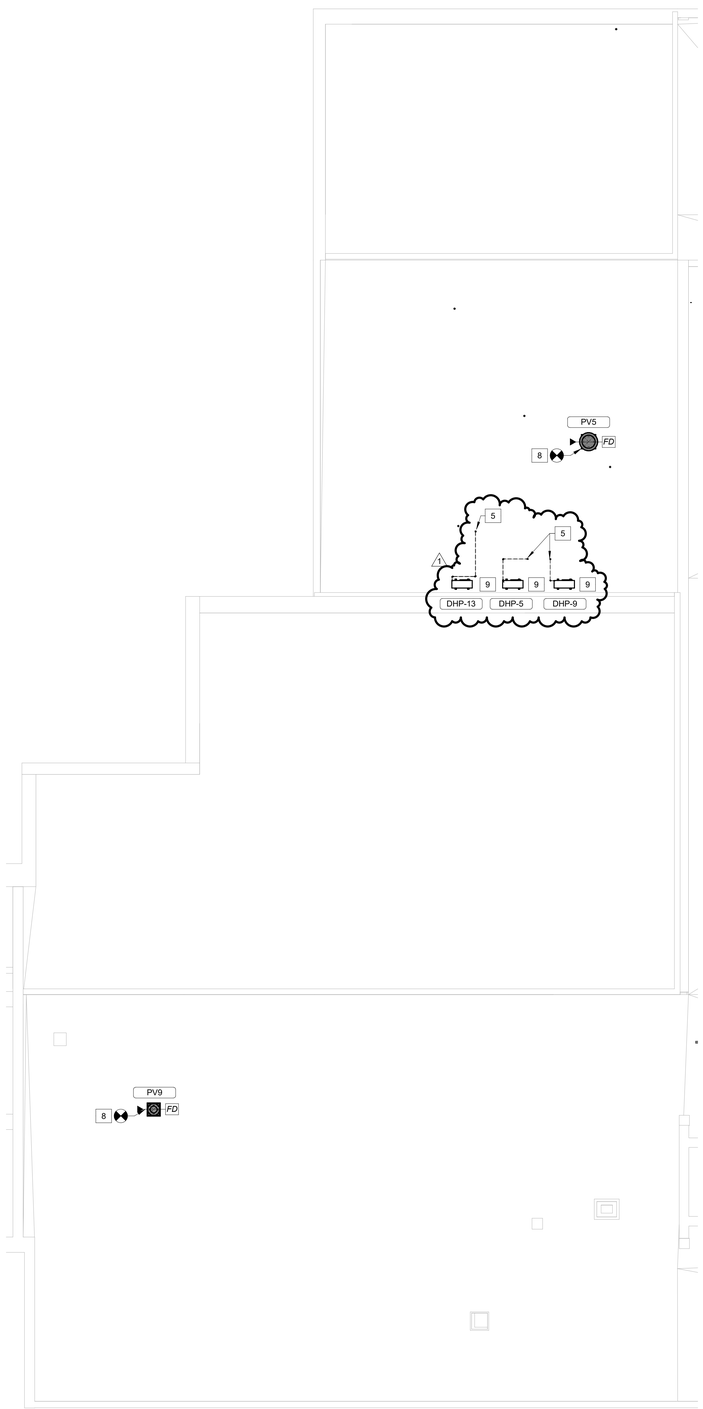
NORTH CAROLINA PROFESSIONAL SEAL 23551 ENGINEER DAVID M. HAHN

06-May-26

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1
2	04-27-26	BULLETIN #2

THIRD FLOOR PLAN - SHARK TANK - HVAC

MH2.23 B



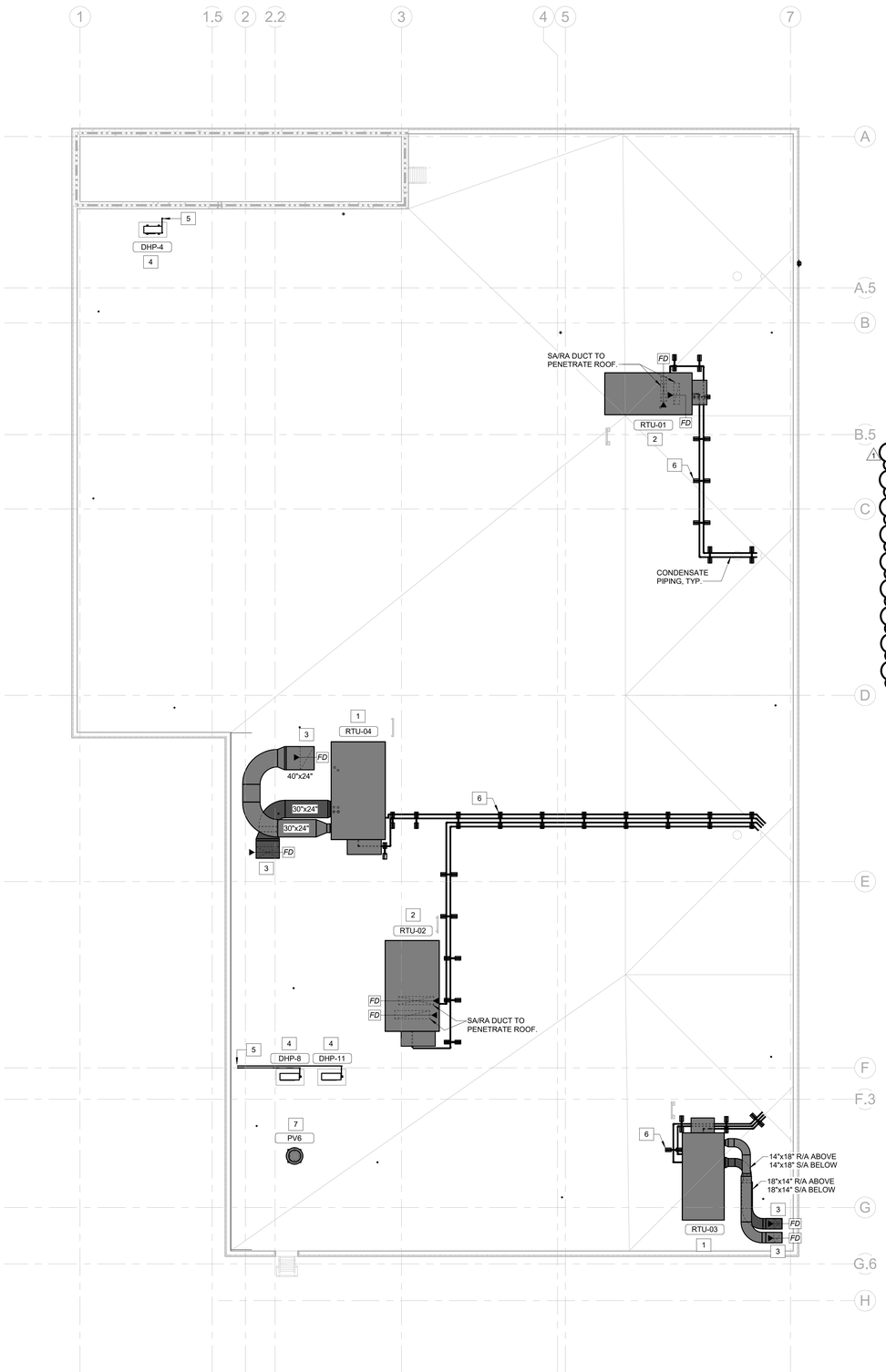
8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

ROOF PLAN - TOUCH & SHARK TANK - HVAC

SCALE : 1/8" = 1'-0"

2



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

ROOF PLAN - SHARK TANK - HVAC

SCALE : 1/8" = 1'-0"

1

FLOOR PLAN LEGEND

- EXISTING BUILDING
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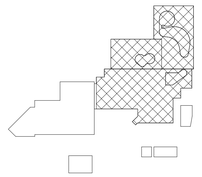
ROOF PLAN SHEET NOTES

1. REFER TO ARCHITECTURAL DRAWINGS FOR RATED ASSEMBLY UL NUMBERS (WALLS, FLOOR / CEILINGS, ETC..
2. REFER TO STRUCTURAL DRAWINGS FOR EQUIPMENT ROOF MOUNTING CONDITIONS.
3. ALL ROOF PENETRATIONS SHALL CONFORM TO ROOF MANUFACTURER'S APPROVED METHODS.
4. MAINTAIN MINIMUM 10' FOOT SEPARATION BETWEEN EXHAUST AND ANY OUTSIDE AIR INTAKES.

NEW WORK KEYED NOTES

1	INSTALL NEW SIDE-DISCHARGE ROOFTOP UNIT ON NEW CURB AS SCHEDULED. REFER TO MECHANICAL SCHEDULE FOR UNIT DATA AND ACCESSORIES. PIPE CONDENSATE TO ROOF DRAIN AS SHOWN. SEE DETAIL 8/M-5.2 FOR INSTALLATION REQUIREMENTS. SA/RA DUCTWORK ON ROOF TO BE EXTERIOR-RATED; SEE SPECIFICATIONS FOR CONSTRUCTION REQUIREMENTS.
2	INSTALL NEW DOWNFLOW ROOFTOP UNIT ON NEW CURB AS SCHEDULED. REFER TO MECHANICAL SCHEDULE FOR UNIT DATA AND ACCESSORIES. PIPE CONDENSATE TO ROOF DRAIN AS SHOWN. SEE DETAIL 7/M-5.2 FOR INSTALLATION REQUIREMENTS. PROVIDE FIRE DAMPER AT 1-HR RATED ROOF PENETRATION. SEE 3RD FLOOR PLAN 1/MH2.23B FOR FIRE DAMPER ACCESS AND DUCT CONTINUATION.
3	DUCTWORK PENETRATES ROOF; PROVIDE FIRE DAMPER AT 1-HR RATED ROOF PENETRATION. SEE 3RD FLOOR PLAN 1/MH2.23B FOR FIRE DAMPER ACCESS AND DUCT CONTINUATION.
4	INSTALL OUTDOOR UNIT ON HOUSEKEEPING PAD AS SHOWN. VERIFY PAD DIMENSIONS AND SUPPORTS WITH STRUCTURAL. PROVIDE ANCHORING AND RESTRAINTS SUITABLE FOR HIGH-WIND / HURRICANE REGIONS PER MANUFACTURER, STRUCTURAL, AND LOCAL CODE REQUIREMENTS. COORDINATE FINAL CLEARANCES AND ACCESS WITH ARCHITECT AND GC.
5	ROUTE REFRIGERANT PIPING THROUGH 1-HR RATED ROOF USING UL-LISTED THROUGH-PENETRATION FIRESTOP SYSTEM. PROVIDE SLEEVES, SEALANT, AND INSULATION PER SPECIFICATIONS. MAINTAIN FIRE-RESISTIVE RATING OF ROOF ASSEMBLY.
6	PROVIDE MANUFACTURED ROOFTOP SUPPORT BASE WITH B22 CHANNEL, SPACED MAXIMUM 6'-0" O.C., TYPICAL.
7	INSTALL ROOF-MOUNTED POWER VENTILATOR ON NEW CURB AS SCHEDULED. COORDINATE CURB LOCATION AND OPENING WITH ROOFING AND STRUCTURAL DRAWINGS. CURB TO BE FLASHED AND SEALED BY ROOFING CONTRACTOR. PROVIDE FIRE DAMPER AT 1-HR RATED ROOF PENETRATION PER CODE.
8	INSTALL ROOF-MOUNTED POWER VENTILATOR ON EXISTING ROOF CURB AND OPENING AS SHOWN. VERIFY INTEGRITY OF EXISTING CURB AND COORDINATE WITH ROOFING CONTRACTOR FOR ANY FLASHING AND SEALING. PROVIDE FIRE DAMPER AT 1-HR RATED ROOF PENETRATION PER CODE.
9	OUTDOOR UNIT IS MOUNTED ON MANUFACTURER'S WALL BRACKETS TO ADJACENT EXTERIOR WALL ON THE EXISTING ROOF. COORDINATE FINAL MOUNTING HEIGHT AND CLEARANCES WITH ARCHITECT AND GC. CONFIRM ALL EXISTING ROOF PENETRATIONS, WALL CONDITIONS, AND POTENTIAL INTERFERENCES WITH GC AND ALL AFFECTED TRADES PRIOR TO INSTALLATION TO ENSURE THE SELECTED MOUNTING LOCATION IS NOT IMPACTED BY FIELD CONDITIONS. PROVIDE ANCHORING AND RESTRAINTS SUITABLE FOR HIGH-WIND / HURRICANE REGIONS PER MANUFACTURER, STRUCTURAL, AND LOCAL CODE REQUIREMENTS.

KEY PLAN



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SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

900 LOGGERHEAD RD,
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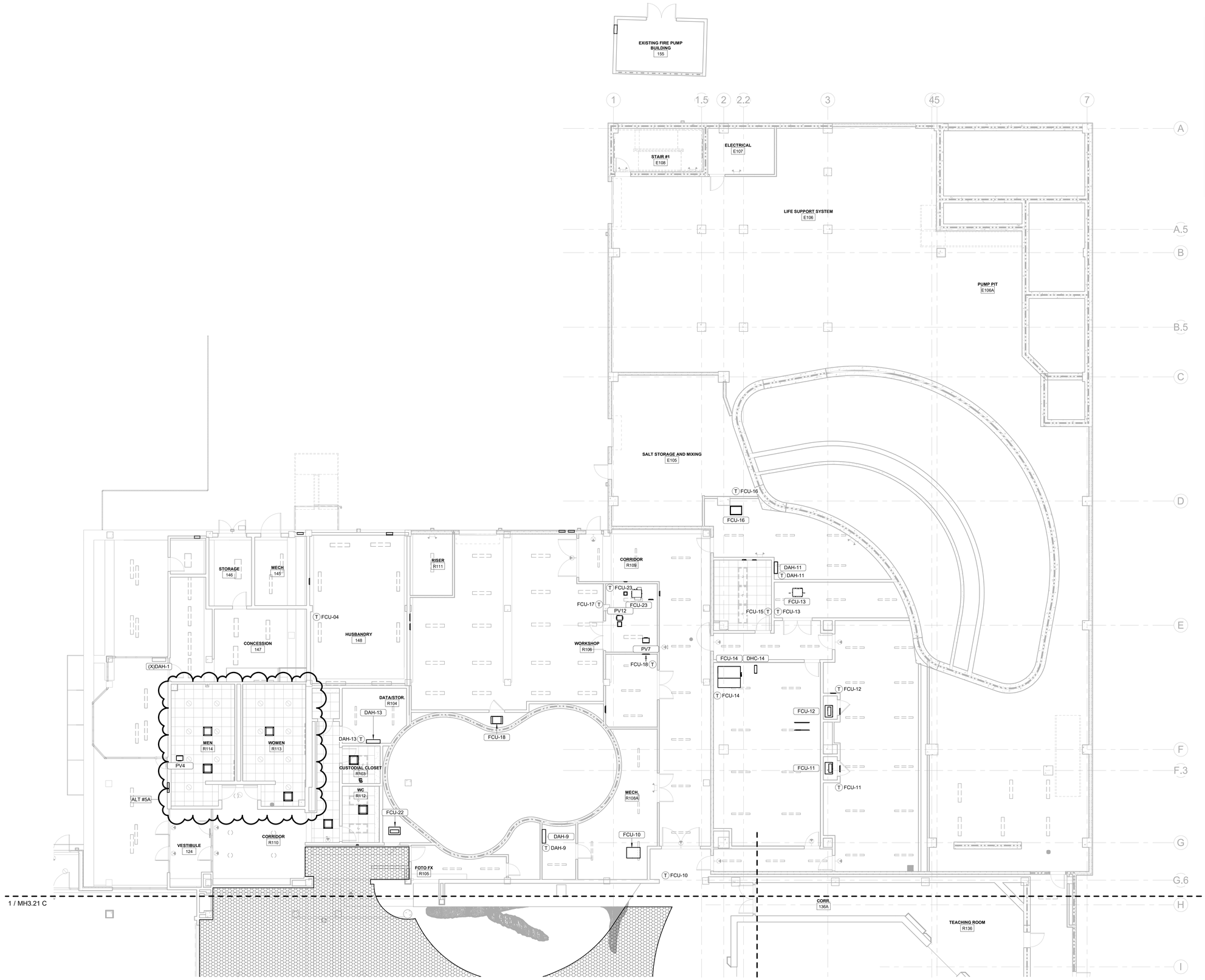
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

12-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1

ROOF PLANS - TOUCH & SHARK TANK - HVAC

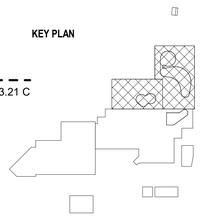
MH2.24 A



RCP LEGEND

ACT 2	2' x 2' ACOUSTIC CEILING TILES
EXP	EXPOSED STRUCTURE
ASI	ACOUSTIC SPRAY INSULATION
GWB	GYPSUM BOARD
EIFS	EIFS SOFFIT
	EXISTING CEILING, NO CHANGES
	UPFIT BY OTHERS

KEY PLAN



SCALE : 1/8" = 1'-0"

1ST FLOOR RCP - TOUCH AND SHARK TANK - HVAC

SCALE : 1/8" = 1'-0"

1

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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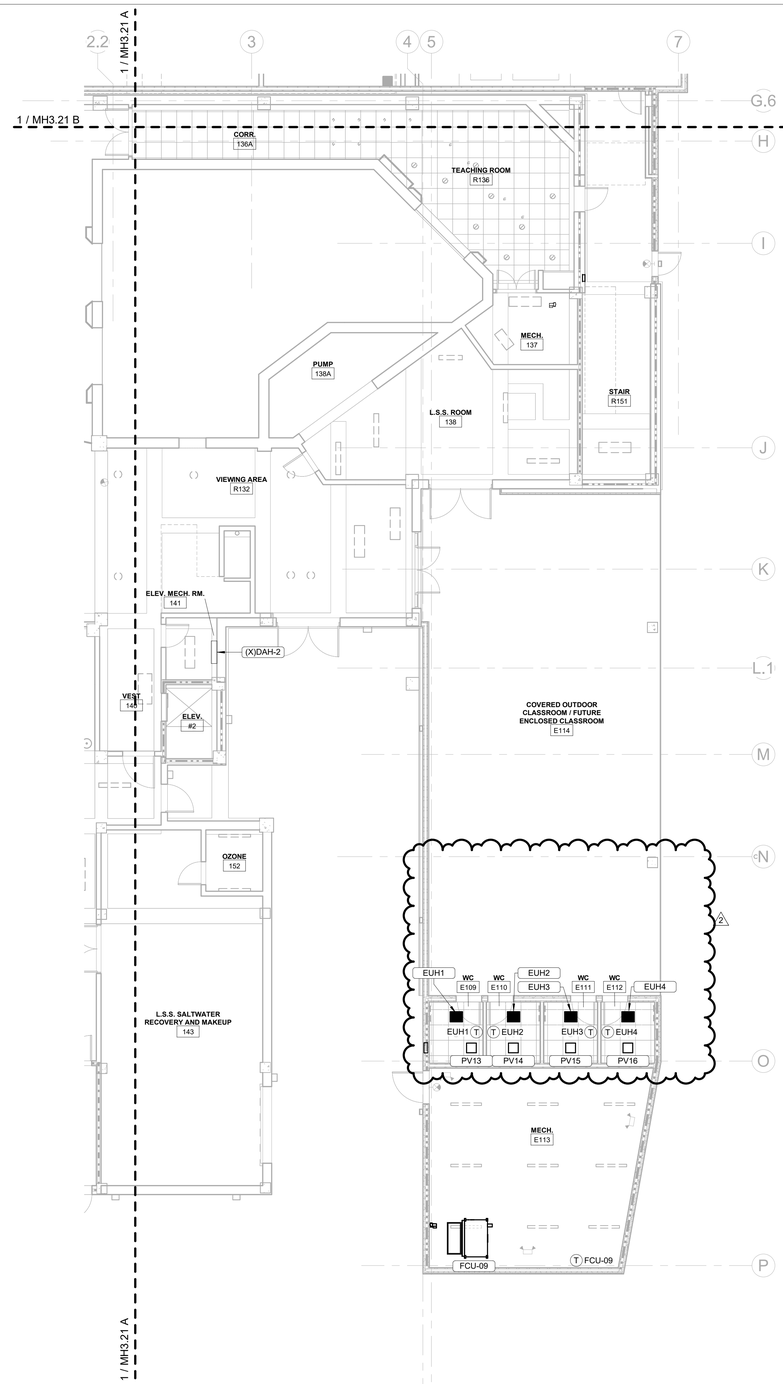
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

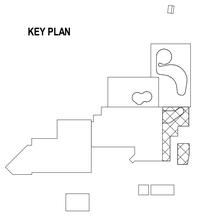
FIRST FLOOR -RCP- TOUCH & SHARK TANK - HVAC

MH3.21 B



RCP LEGEND

ACT 2	2' x 2' ACOUSTIC CEILING TILES
EXP	EXPOSED STRUCTURE
ASI	ACOUSTIC SPRAY INSULATION
GWB	GYPSUM BOARD
EIFS	EIFS SOFFIT
	EXISTING CEILING, NO CHANGES
	UPFIT BY OTHERS



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

1ST FLOOR RCP - SOUTHEAST WING - HVAC (VE)

SCALE : 1/8" = 1'-0"

1

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SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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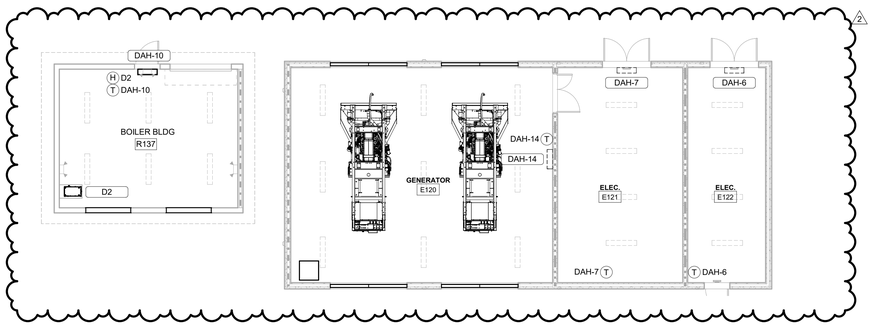
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23205 DONALD RAMSEY BETT

06-May-26

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
2	04-27-26	BULLETIN #2

FIRST FLOOR -RCP- SOUTHEAST WING - HVAC

MH3.21 C



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

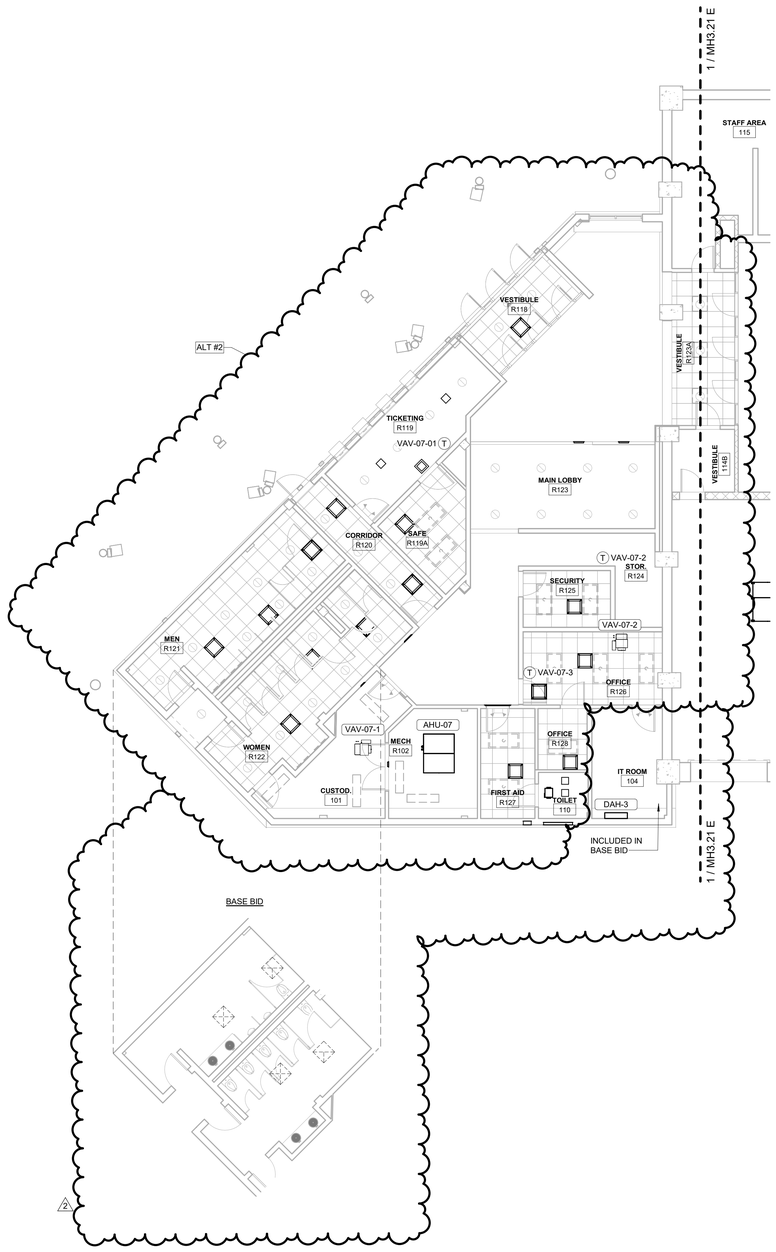
1ST FLOOR RCP - GENERATOR & BOILER BUILDING - HVAC

SCALE : 1/8" = 1'-0"

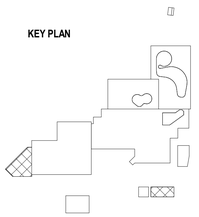
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RCP LEGEND

	ACT 2	2' x 2' ACOUSTIC CEILING TILES
	EXP	EXPOSED STRUCTURE
	ASI	ACOUSTIC SPRAY INSULATION
	GWB	GYPSUM BOARD
	EIFS	EIFS SOFFIT
		EXISTING CEILING, NO CHANGES
		UPFIT BY OTHERS



KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

1ST FLOOR RCP - MAIN ENTRY - HVAC

SCALE : 1/8" = 1'-0"

1

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SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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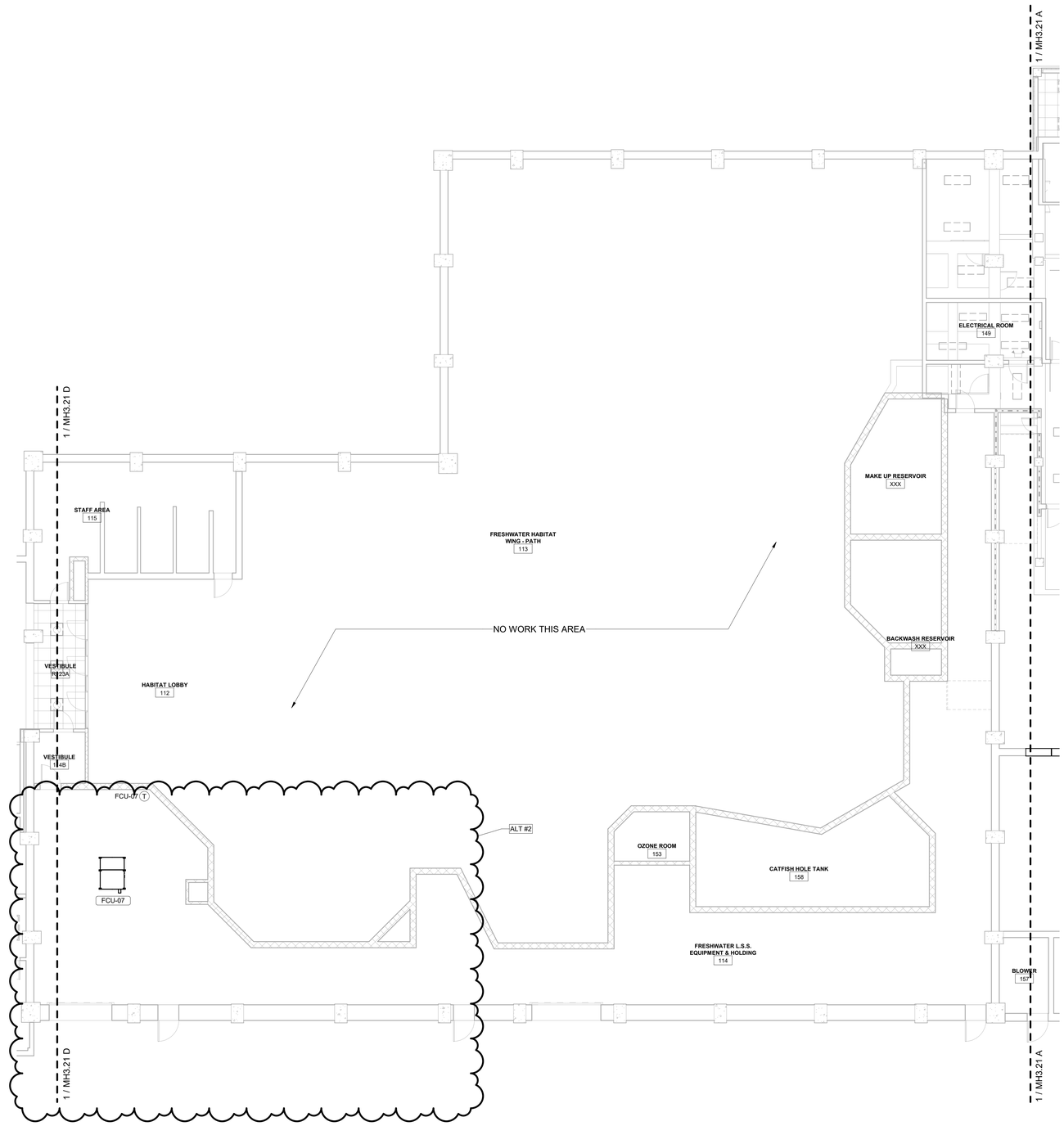
NORTH CAROLINA PROFESSIONAL SEAL 23551 ENGINEER DAVID M. HAHN

06-May-26

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
2	04-27-26	BULLETIN #2

FIRST FLOOR -RCP- MAIN ENTRY & MECH BLDG - HVAC

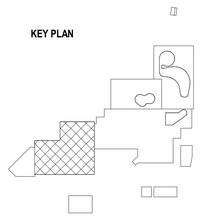
MH3.21 D



RCP LEGEND

ACT 2	2' x 2' ACOUSTIC CEILING TILES
EXP	EXPOSED STRUCTURE
ASI	ACOUSTIC SPRAY INSULATION
GWB	GYPSUM BOARD
EIFS	EIFS SOFFIT
	EXISTING CEILING, NO CHANGES
	UPFIT BY OTHERS

KEY PLAN



SCALE : 1/8" = 1'-0"

1ST FLOOR RCP - FRESHWATER HABITAT - HVAC

SCALE : 1/8" = 1'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 25205 JASON DAVID BARNETT
05-Dec-25

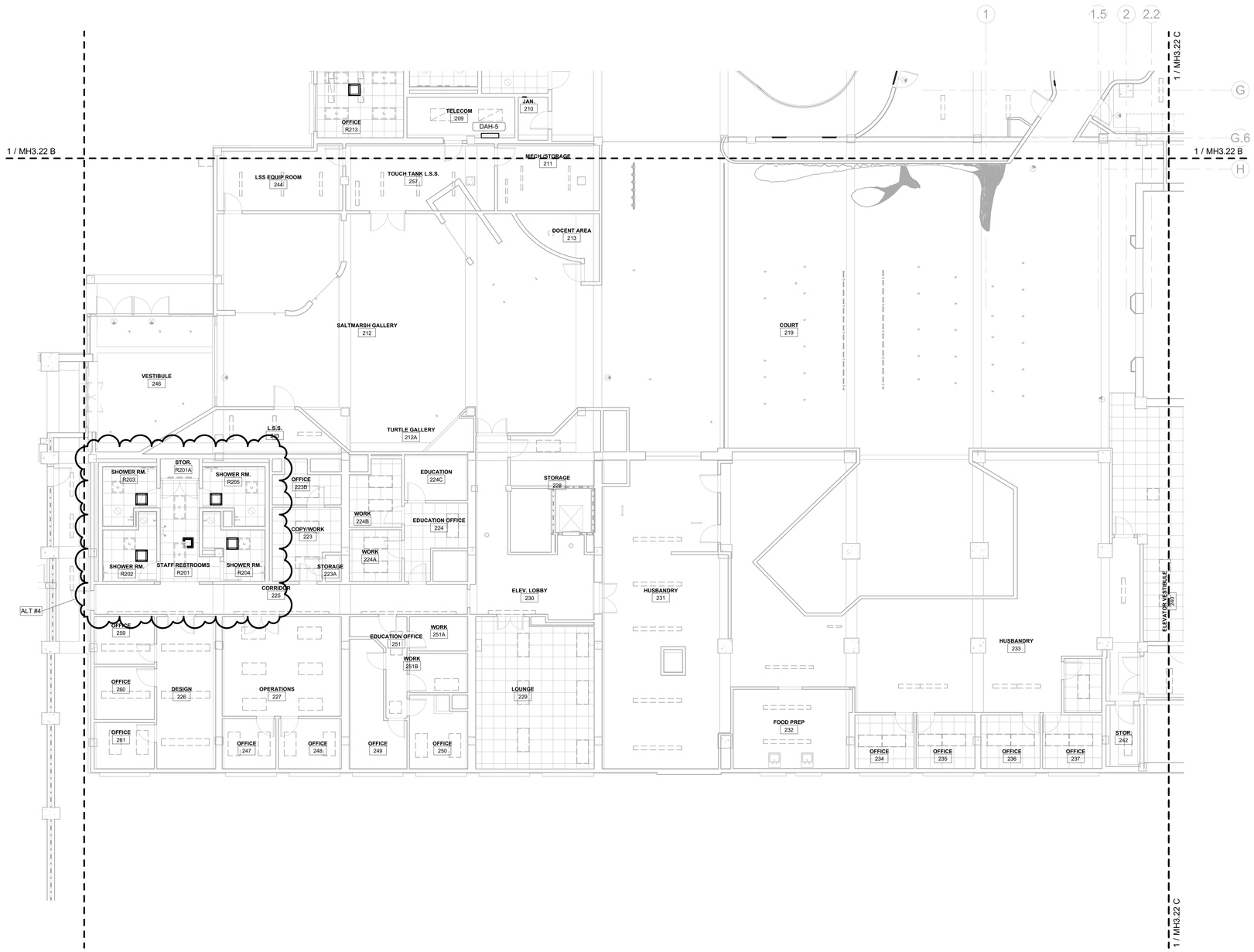
NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

FIRST FLOOR -RCP- FRESHWATER HABITAT - HVAC

MH3.21 E

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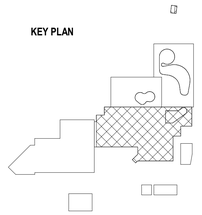
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RCP LEGEND

	ACT 2	2' x 2' ACOUSTIC CEILING TILES
	EXP	EXPOSED STRUCTURE
	ASI	ACOUSTIC SPRAY INSULATION
	GWB	GYPSUM BOARD
	EIFS	EIFS SOFFIT
		EXISTING CEILING, NO CHANGES
		UPFIT BY OTHERS

KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

2ND FLOOR RCP - CAPE FEAR SHOALS HVAC

SCALE : 1/8" = 1'-0"

1

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

900 LOGGERHEAD RD,
KURE BEACH, NC 28449

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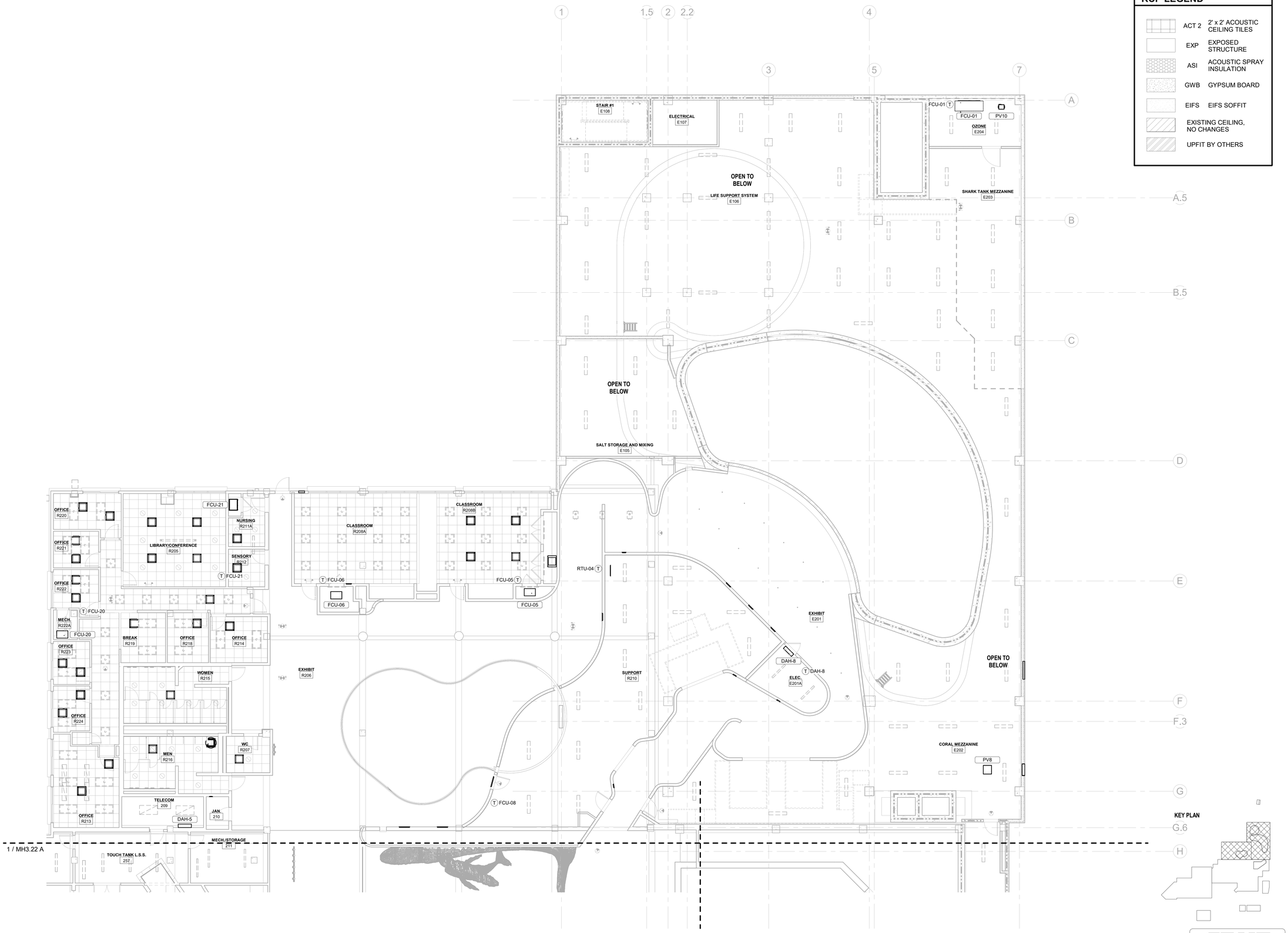
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

SECOND FLOOR - RCP - CAPE FEAR SHOALS - HVAC

MH3.22 A



RCP LEGEND

ACT 2	2' x 2' ACOUSTIC CEILING TILES
EXP	EXPOSED STRUCTURE
ASI	ACOUSTIC SPRAY INSULATION
GWB	GYPSUM BOARD
EIFS	EIFS SOFFIT
	EXISTING CEILING, NO CHANGES
	UPFIT BY OTHERS

8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

2ND FLOOR RCP - TOUCH AND SHARK TANK - HVAC

SCALE : 1/8" = 1'-0"

1

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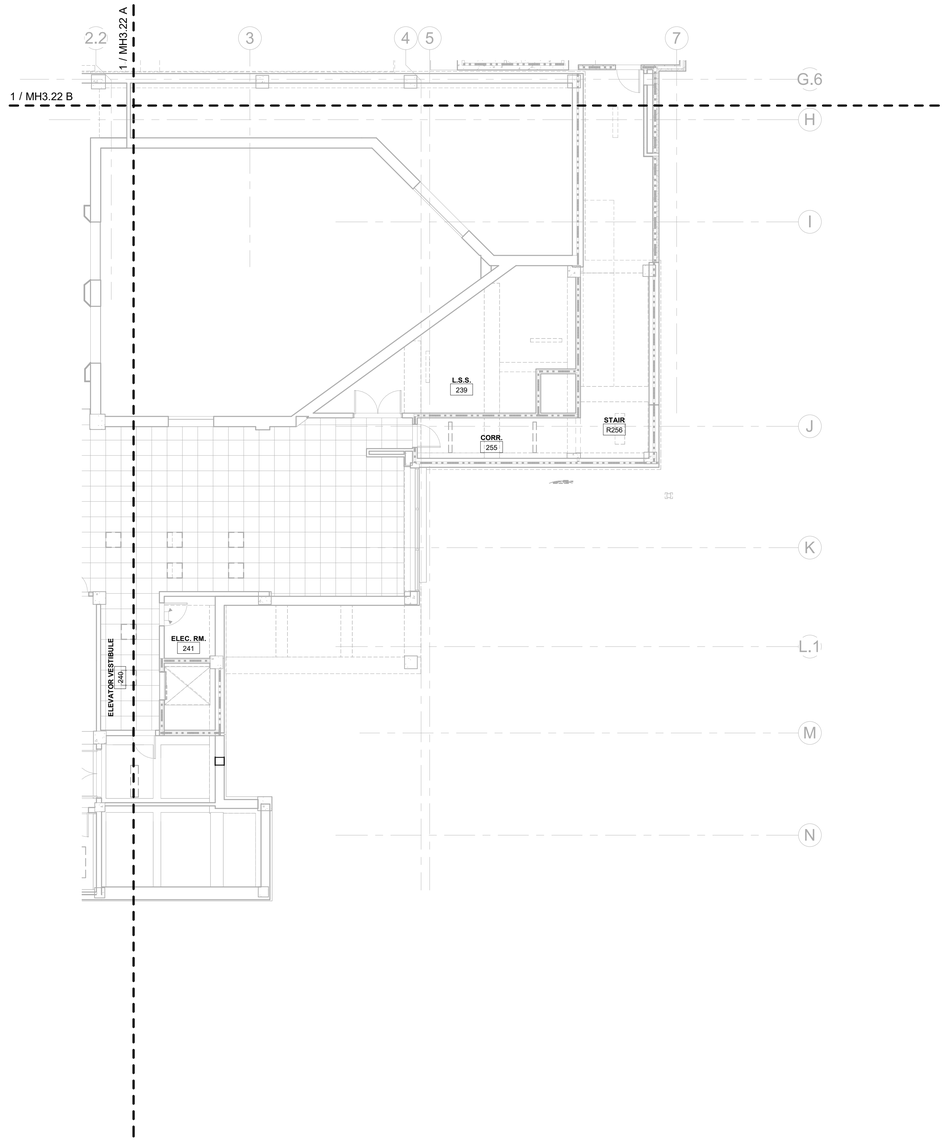
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 29295 DAVID R. MARRIOTT

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

SECOND FLOOR - RCP - TOUCH AND SHARK TANK - HVAC

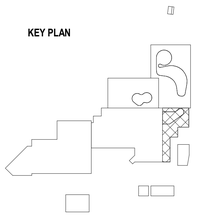
MH3.22 B



RCP LEGEND

	ACT 2	2' x 2' ACOUSTIC CEILING TILES
	EXP	EXPOSED STRUCTURE
	ASI	ACOUSTIC SPRAY INSULATION
	GWB	GYPSUM BOARD
	EIFS	EIFS SOFFIT
		EXISTING CEILING, NO CHANGES
		UPFIT BY OTHERS

KEY PLAN



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2ND FLOOR RCP - SOUTHEAST WING - HVAC

SCALE : 1/8" = 1'-0"

1

SZOSTAK DESIGN

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SCO #17-18042-02A
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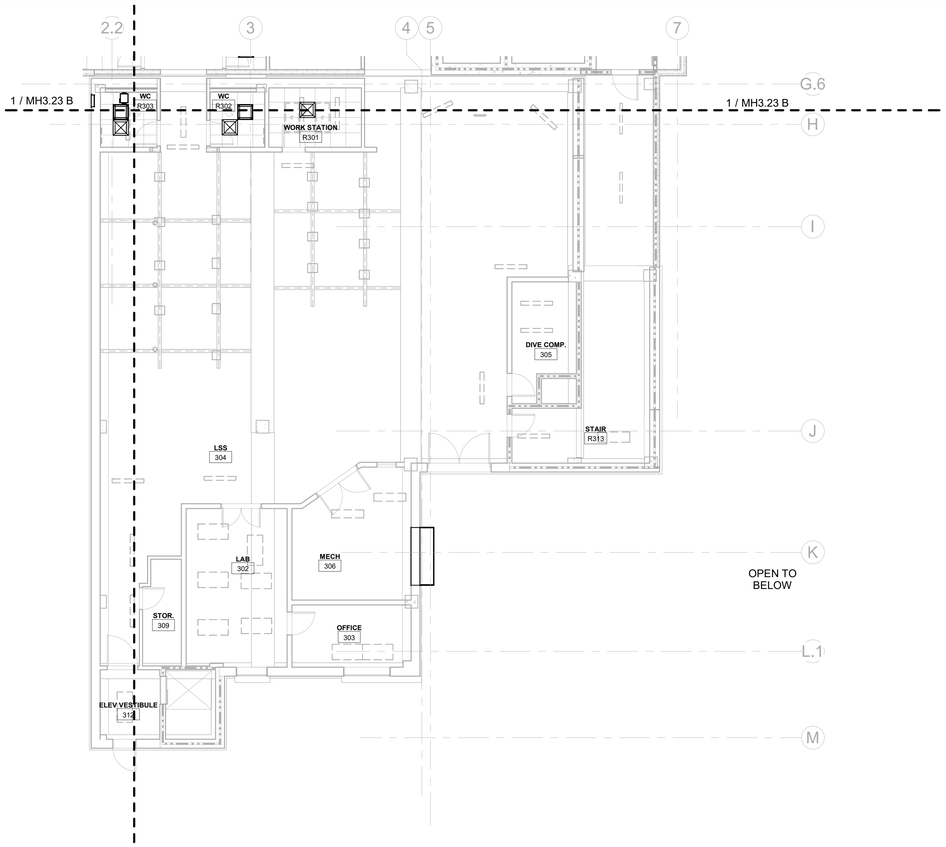
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

SECOND FLOOR - RCP - SOUTHEAST WING - HVAC

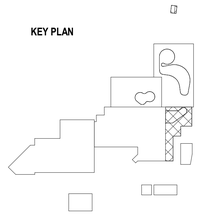
MH3.22 C



RCP LEGEND

ACT 2	2' x 2' ACOUSTIC CEILING TILES
EXP	EXPOSED STRUCTURE
ASI	ACOUSTIC SPRAY INSULATION
GWB	GYPSUM BOARD
EIFS	EIFS SOFFIT
	EXISTING CEILING, NO CHANGES
	UPFIT BY OTHERS

KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

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3RD FLOOR RCP - SOUTHEAST WING - HVAC

SCALE : 1/8" = 1'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
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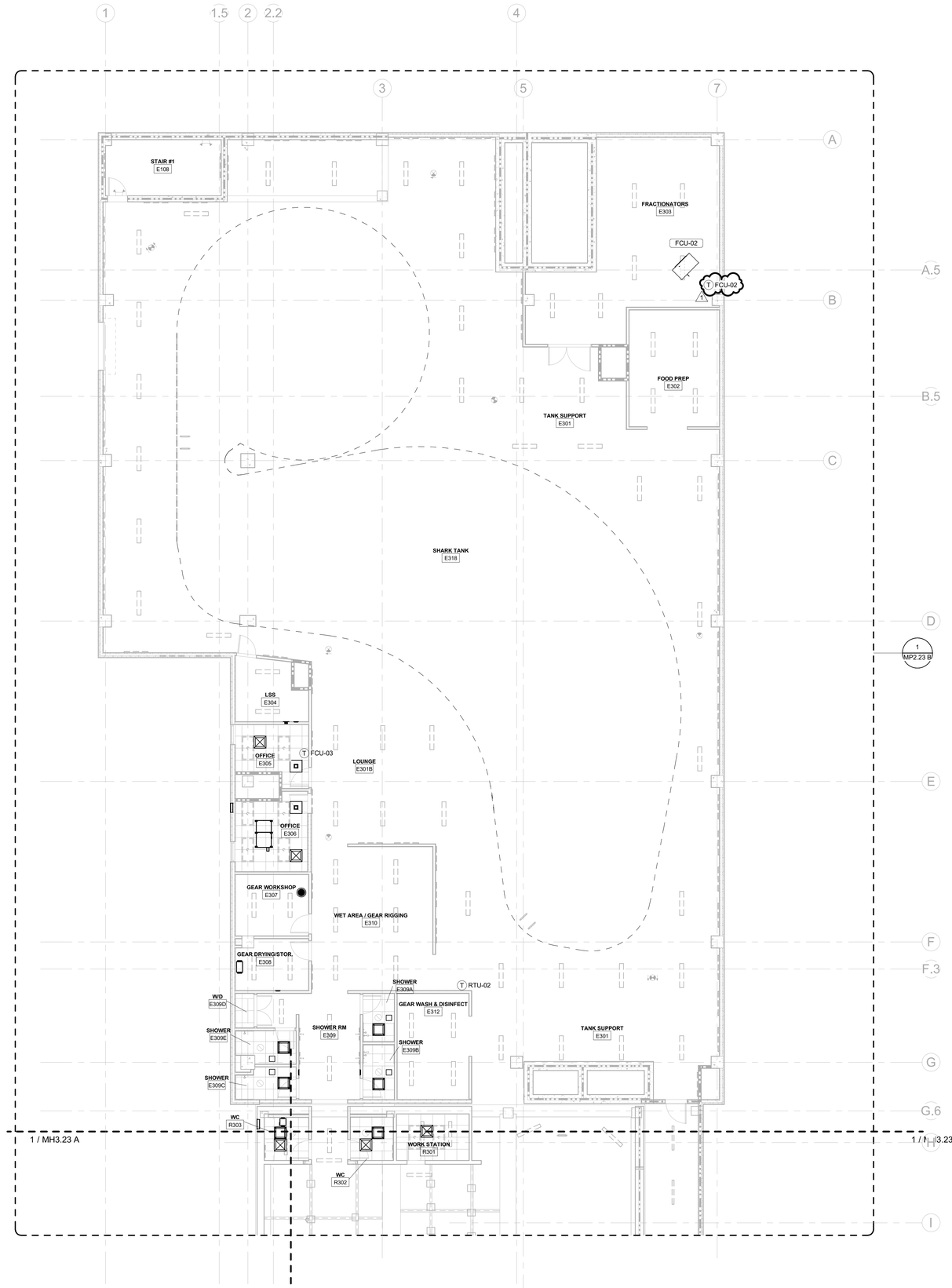
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

THIRD FLOOR - RCP - SOUTHEAST WING - HVAC

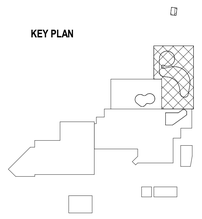
MH3.23 A



RCP LEGEND

ACT 2	2' x 2' ACOUSTIC CEILING TILES
EXP	EXPOSED STRUCTURE
ASI	ACOUSTIC SPRAY INSULATION
GWB	GYPSUM BOARD
EIFS	EIFS SOFFIT
	EXISTING CEILING, NO CHANGES
	UPFIT BY OTHERS

KEY PLAN



SCALE : 1/8" = 1'-0"

3RD FLOOR - RCP - SHARK TANK - HVAC

SCALE : 1/8" = 1'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
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12-Dec-25

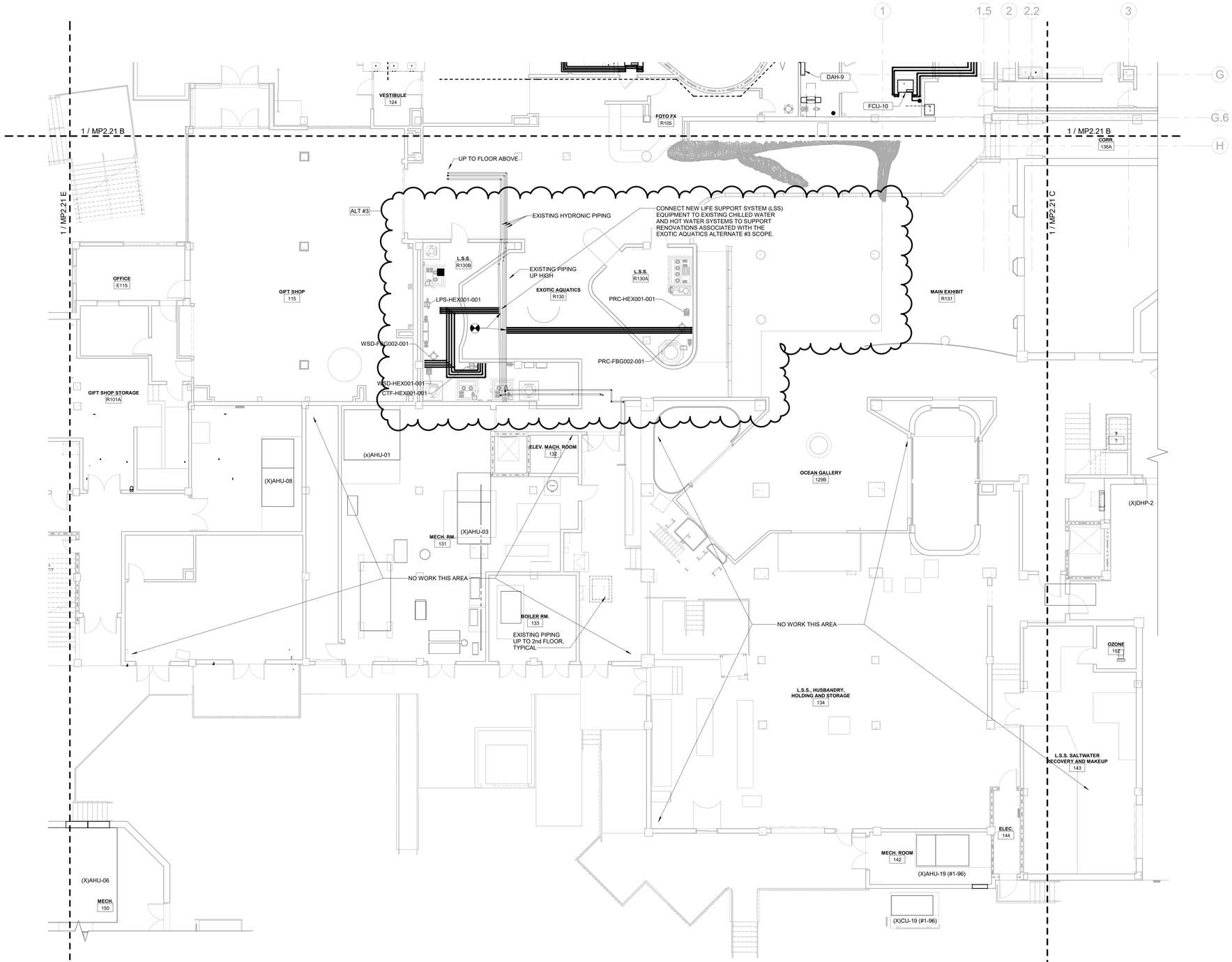
NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1

THIRD FLOOR - RCP - SHARK TANK - HVAC

MH3.23 B

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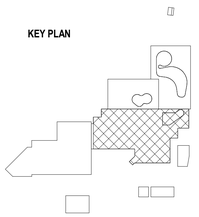
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FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

1ST FLOOR - CAPE FEAR SHOALS - RAMP - HYDRONICS

SCALE : 1/8" = 1'-0"

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

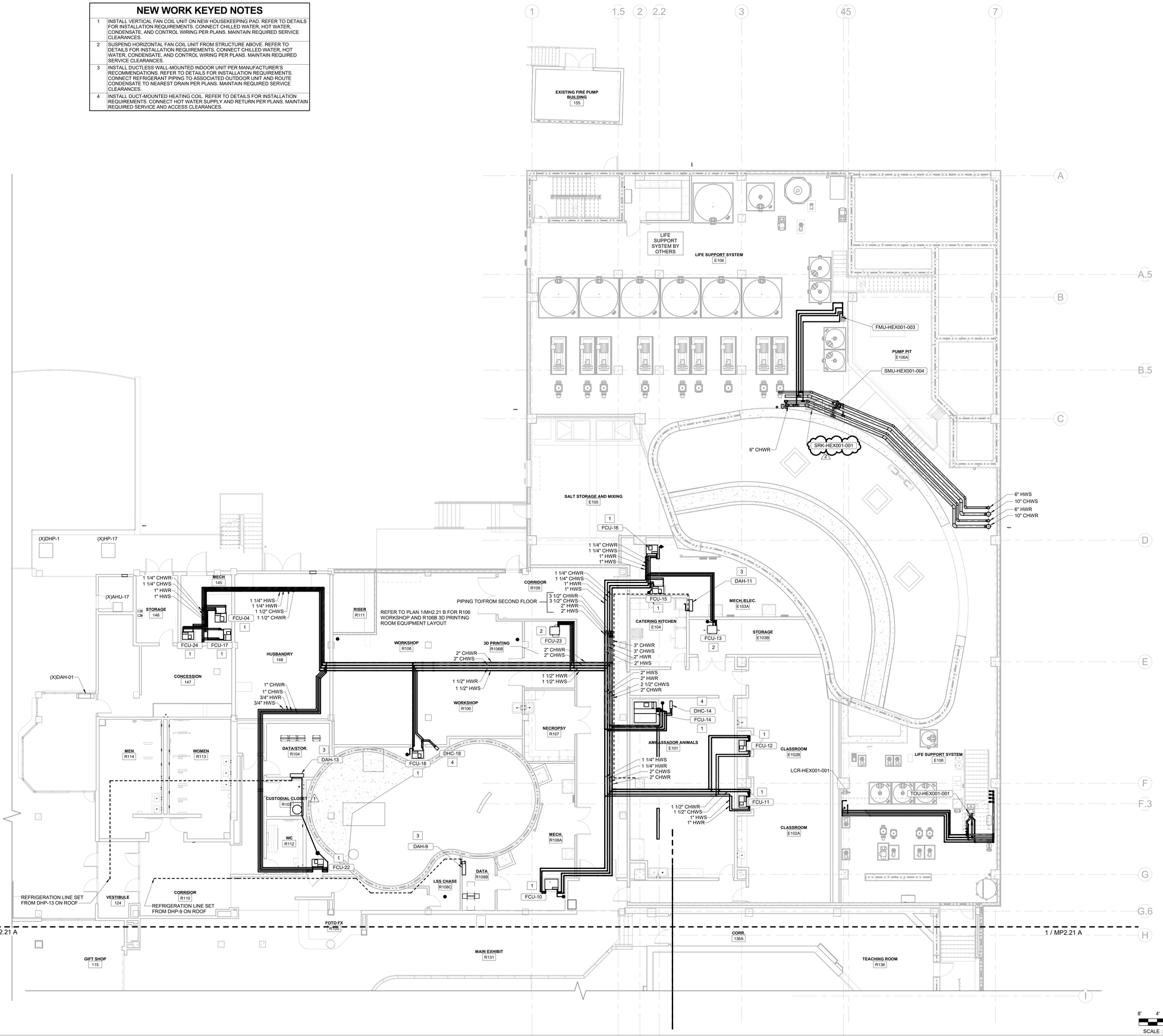
NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

FIRST FLOOR PLAN - CAPE FEAR SHOALS - HYDRONICS

MP2.21 A

NEW WORK KEYED NOTES

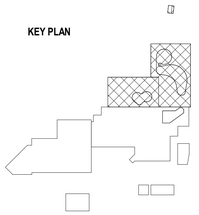
1	INSTALL VERTICAL FAN COIL UNIT ON NEW HOUSEKEEPING PAD. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT CHILLED WATER, HOT WATER, CONDENSATE, AND CONTROL WIRING PER PLANS. MAINTAIN REQUIRED SERVICE CLEARANCES.
2	SUSPEND HORIZONTAL FAN COIL UNIT FROM STRUCTURE ABOVE. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT CHILLED WATER, HOT WATER, CONDENSATE, AND CONTROL WIRING PER PLANS. MAINTAIN REQUIRED SERVICE CLEARANCES.
3	INSTALL DUCTLESS WALL-MOUNTED INDOOR UNIT PER MANUFACTURER'S RECOMMENDATIONS. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT REFRIGERANT PIPING TO ASSOCIATED OUTDOOR UNIT AND ROUTE CONDENSATE TO NEAREST DRAIN PER PLANS. MAINTAIN REQUIRED SERVICE CLEARANCES.
4	INSTALL DUCT-MOUNTED HEATING COIL. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT HOT WATER SUPPLY AND RETURN PER PLANS. MAINTAIN REQUIRED SERVICE AND ACCESS CLEARANCES.



FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

KEY PLAN



SCALE : 1/8" = 1'-0"

1ST FLOOR PLAN - TOUCH & SHARK TANK - HYDRONICS

SCALE : 1/8" = 1'-0"

1

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

900 LOGGERHEAD RD,
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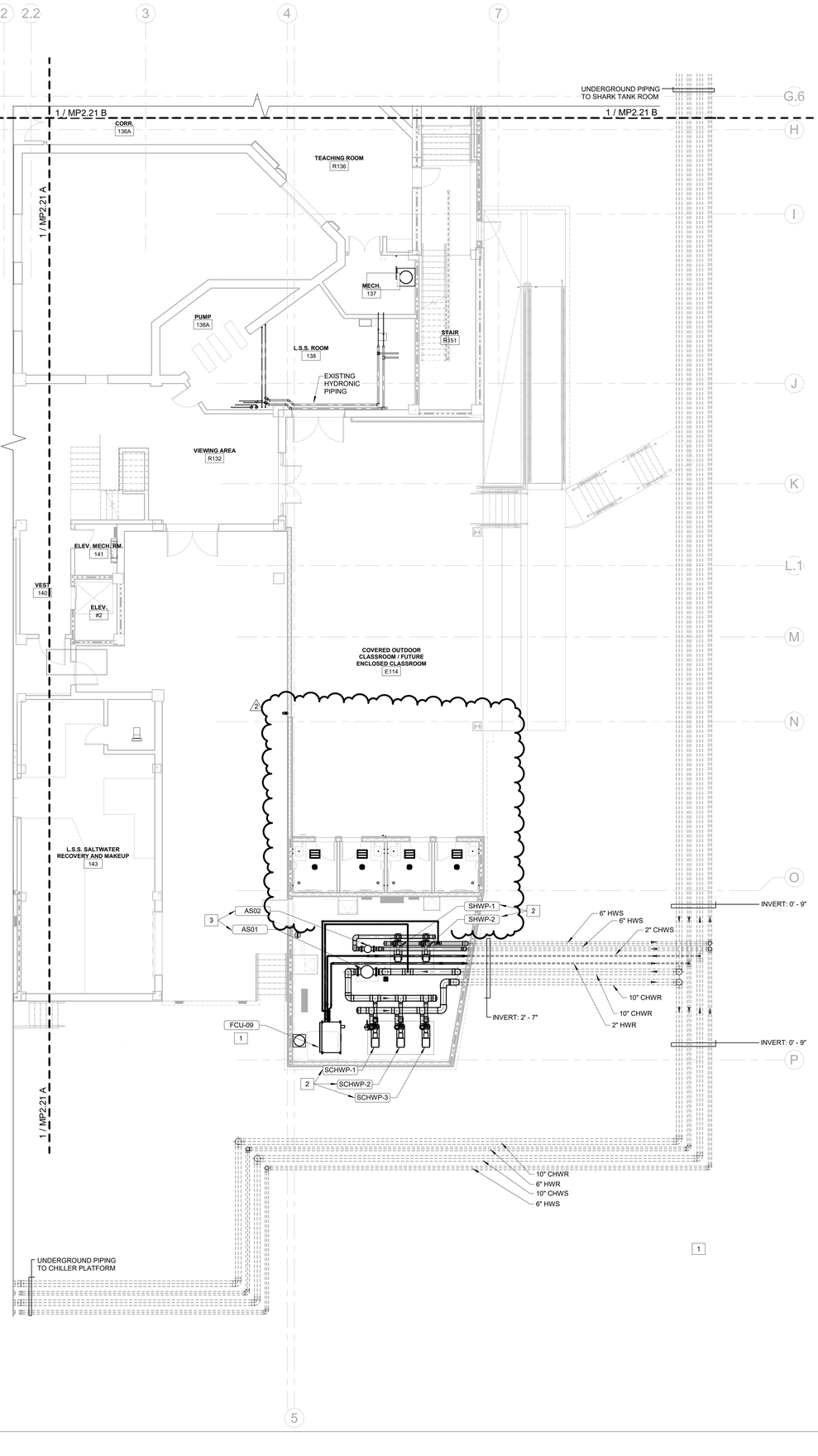
NORTH CAROLINA PROFESSIONAL SEAL 23551 ENGINEER DAVID M. HAHN

06-May-26

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1
2	04-27-26	BULLETIN #2

FIRST FLOOR PLAN - TOUCH AND SHARK TANK - HYDRONICS

MP2.21 B



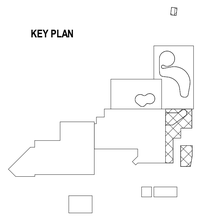
FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

NEW WORK KEYED NOTES

1	SUSPEND HORIZONTAL FAN COIL UNIT FROM STRUCTURE ABOVE. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT CHILLED WATER, HOT WATER, CONDENSATE, AND CONTROL WIRING PER PLANS. MAINTAIN REQUIRED SERVICE CLEARANCES
2	INSTALL BASE-MOUNTED CHILLED WATER AND HOT WATER PUMPS FOR SECONDARY BUILDING LOOP. REFER TO DETAILS AND PIPING DIAGRAMS FOR INSTALLATION AND CONNECTION REQUIREMENTS. ALIGN AND GROUT PUMP BASES PER MANUFACTURER'S RECOMMENDATIONS. MAINTAIN REQUIRED SERVICE CLEARANCES.
3	INSTALL AIR SEPARATOR IN LOCATION SHOWN. REFER TO DETAILS AND PIPING DIAGRAMS FOR INSTALLATION AND CONNECTION REQUIREMENTS. MAINTAIN REQUIRED SERVICE CLEARANCES.

KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

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1ST FLOOR PLAN - SOUTHEAST WING - HYDRONICS

SCALE : 1/8" = 1'-0"

1

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

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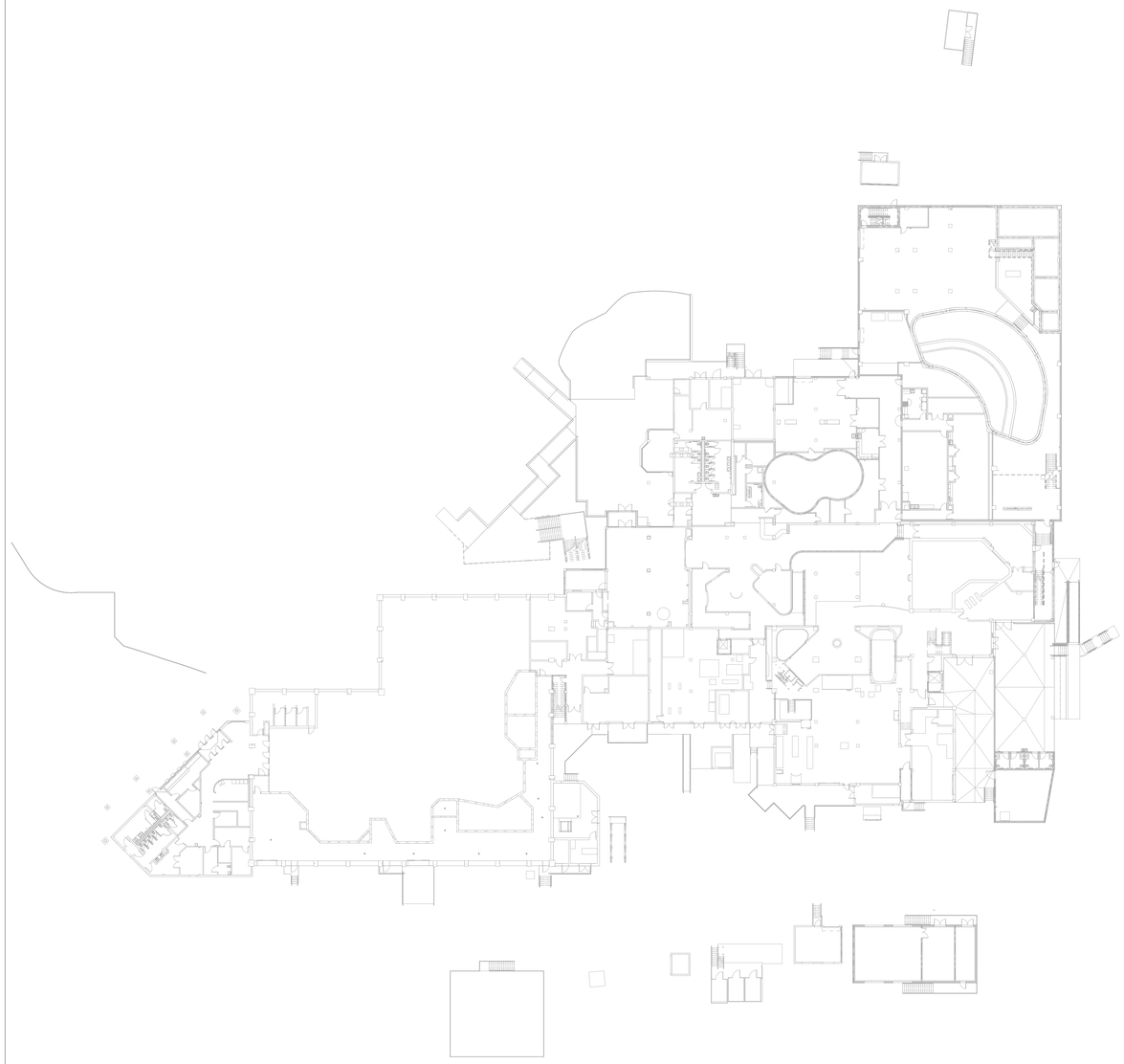
NORTH CAROLINA PROFESSIONAL SEAL 25950 ENGINEER DAVID A. MANNINETTI

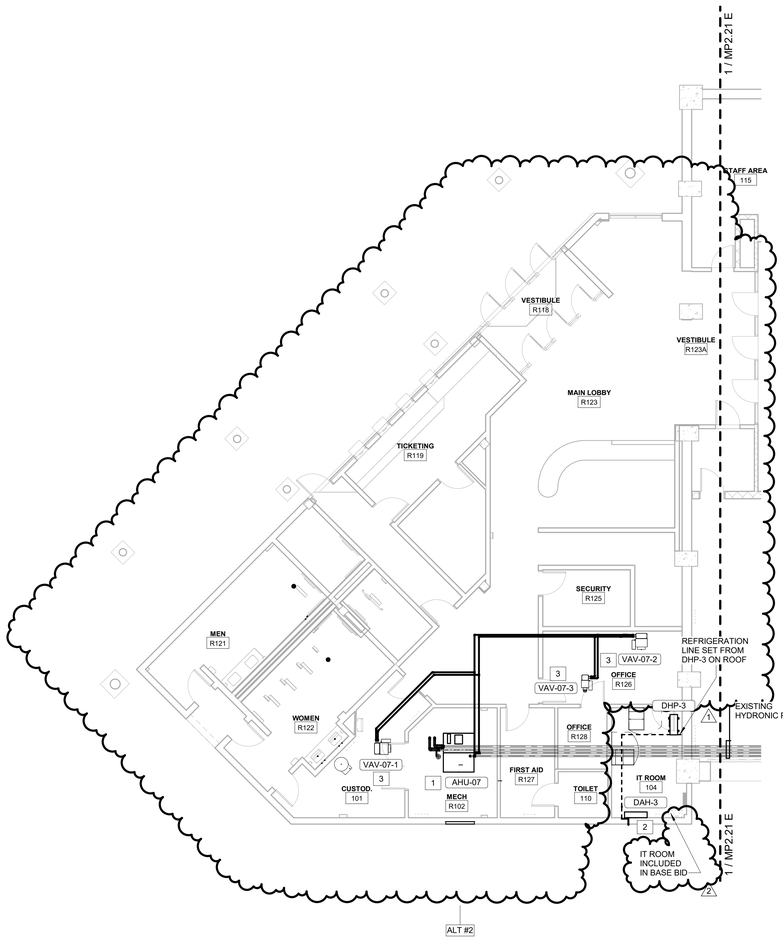
06-May-26

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
2	04-27-26	BULLETIN #2

FIRST FLOOR PLAN - SOUTHEAST WING - HYDRONICS

MP2.21 C





FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

FUEL OIL SYSTEM GENERAL NARRATIVE – FOR BIDDING PURPOSES

FURNISH AND INSTALL A COMPLETE FUEL OIL STORAGE AND TRANSFER SYSTEM TO SERVE TWO NEW GENERATORS AND AN EXISTING FUEL-OIL-FIRED BOILER. WORK SHALL INCLUDE ALL FUEL OIL PIPING, PUMPS, CONTROLS, TANKS, VALVES, AND ACCESSORIES REQUIRED FOR A FULLY OPERATIONAL SYSTEM. SYSTEM COMPONENTS ARE SPECIFIED ELSEWHERE IN THESE DOCUMENTS; ROUTING AND COORDINATION SHALL BE DETERMINED IN THE FIELD AND COORDINATED WITH OTHER TRADES.

THE SYSTEM SHALL INCLUDE A NEW ABOVEGROUND FUEL OIL STORAGE TANK (AST) INSTALLED AT GRADE AND LOCATED IN A FLOOD ZONE. THE TANK SHALL BE EQUIPPED WITH A SUBMERSIBLE TURBINE PUMP SYSTEM AND TANK MONITORING SYSTEM AS SPECIFIED. PROVIDE FLOOD-RESISTANT INSTALLATION PER LOCAL CODE.

PROVIDE DUPLEX SUBMERSIBLE TURBINE PUMPS WITH LEAD/LAG OPERATION AND AUTOMATIC ROTATION CAPABILITIES. PUMPS SHALL BE CONTROLLED BY A DUPLEX CONTROLLER WITH FLOW SWITCH MONITORING, ALARM REPORTING, AND MODBUS INTEGRATION FOR REMOTE STATUS. CONTROLLER SHALL BE SPCP1.2 OR EQUAL.

FUEL OIL SHALL BE DELIVERED FROM THE AST TO TWO NEW GENERATOR DAY TANKS LOCATED IN A NEW GENERATOR BUILDING. DAY TANKS WILL BE PROVIDED BY DIVISION 26 WITH RETURN PUMPS TO MAINTAIN PROPER LEVELS AND CIRCULATE FUEL TO PREVENT STRATIFICATION OR COOLING. SYSTEM SHALL ALLOW FOR SIMULTANEOUS OPERATION OF BOTH GENERATORS. INCLUDE ALL REQUIRED LEVEL SENSORS, OVERFILL ALARMS, VENTS, AND EMERGENCY SHUTDOWNS.

IN ADDITION, MAINTAIN OPERATION OF AN EXISTING FUEL OIL-FIRED BOILER SERVED BY A SEPARATE EXISTING DAY TANK AND SUPPLY PUMP LOCATED INSIDE THE EXISTING GENERATOR BUILDING. PROVIDE NEW FUEL OIL SUPPLY AND RETURN PIPING BETWEEN THE NEW AST AND THE EXISTING DAY TANK. FIELD-VERIFY CONNECTION DETAILS.

FUEL SYSTEM MONITORING SHALL BE VIA TMS3000 TANK MONITORING SYSTEM OR APPROVED EQUIVALENT. SYSTEM SHALL MONITOR TANK INVENTORY, HIGH/LOW LEVELS, WATER PRESENCE, AND LEAK CONDITIONS. PROVIDE PROBES AND SENSORS FOR PRIMARY AND SECONDARY CONTAINMENT IN COMPLIANCE WITH EPA REQUIREMENTS.

CONTRACTOR SHALL COORDINATE ALL PENETRATIONS THROUGH FLOOD-RATED ENCLOSURES AND ENSURE ALL WORK IS IN COMPLIANCE WITH APPLICABLE CODE REQUIREMENTS FOR FLOOD ZONE INSTALLATION, INCLUDING SUPPORTS, VENTING, AND EQUIPMENT MOUNTING HEIGHTS.

ALL POWER, CONTROL, AND ALARM WIRING SHALL BE PROVIDED UNDER THIS CONTRACT. FINAL WIRING TERMINATIONS SHALL BE COORDINATED WITH THE ELECTRICAL CONTRACTOR.

30' 15' 30'

SCALE : 1" = 30'-0"

MECHANICAL SITE PLAN

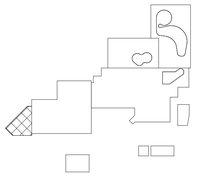
SCALE : 1" = 30'-0"

2

NEW WORK KEYED NOTES

1	INSTALL AIR HANDLING UNIT ON EXISTING HOUSEKEEPING PAD IN MECHANICAL ROOM. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT CHILLED WATER, HOT WATER, CONDENSATE, AND CONTROL WIRING AS SHOWN ON PLANS. MAINTAIN MANUFACTURER'S RECOMMENDED SERVICE CLEARANCES.
2	INSTALL DUCTLESS WALL-MOUNTED INDOOR UNIT PER MANUFACTURER'S RECOMMENDATIONS. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT REFRIGERANT PIPING TO ASSOCIATED OUTDOOR UNIT AND ROUTE CONDENSATE TO NEAREST DRAIN PER PLANS. MAINTAIN REQUIRED SERVICE CLEARANCES.
3	INSTALL SINGLE-DUCT VAV BOX WITH HOT WATER COIL. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT HOT WATER SUPPLY AND RETURN PER PLANS. MAINTAIN SERVICE AND ACCESS CLEARANCES.

KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

1ST FLOOR PLAN - MAIN ENTRY - HYDRONICS

SCALE : 1/8" = 1'-0"

1

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAIN

06-May-26

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
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2	04-27-26	BULLETIN #2

FIRST FLOOR PLAN - MAIN ENTRY, MECH SITE PLAN AND FUEL OIL SYSTEM NARRATIVE - HYDRONICS

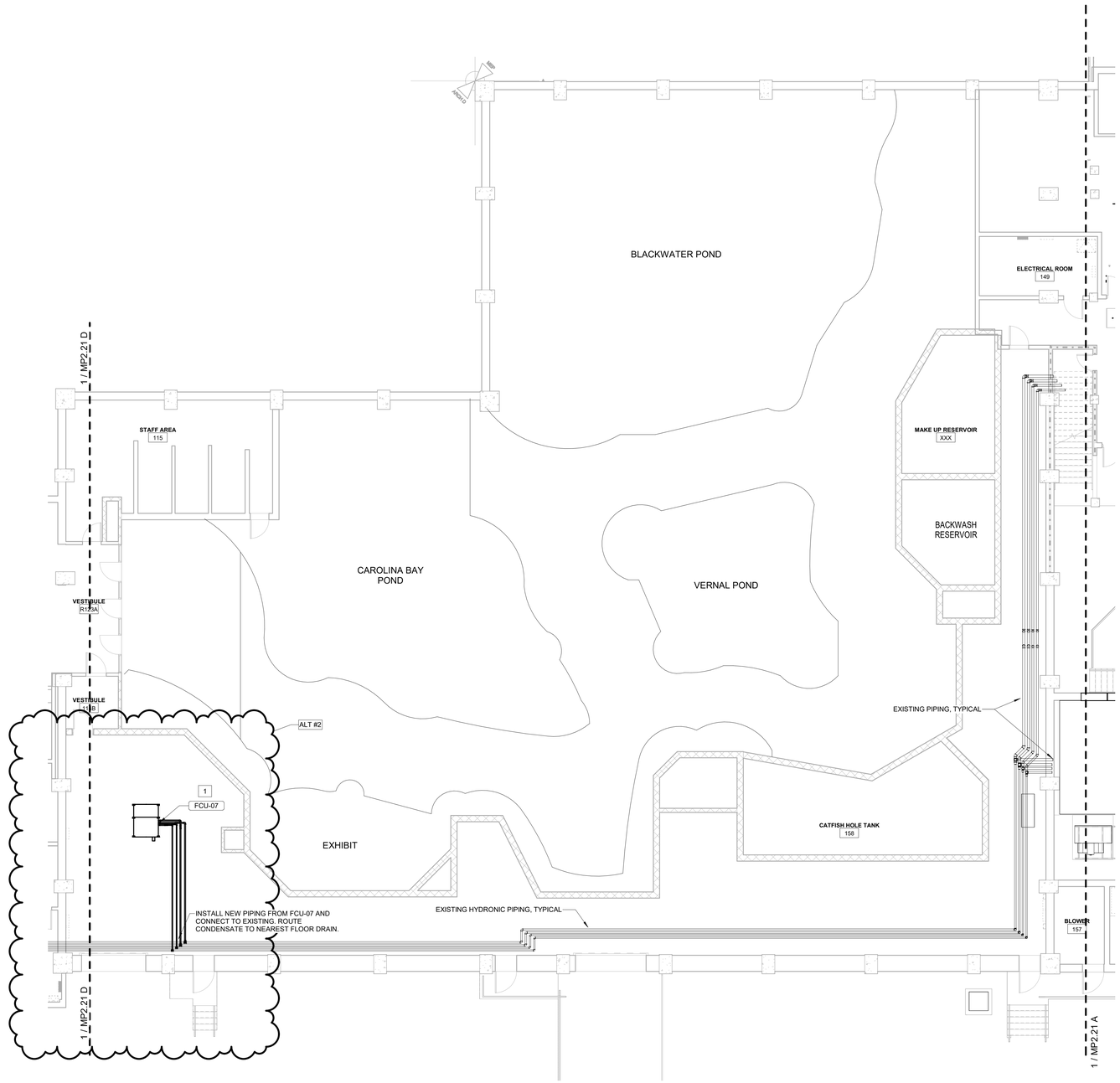
MP2.21 D

FLOOR PLAN LEGEND

- EXISTING BUILDING
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- 3-HR RATED WALL

NEW WORK KEYED NOTES

1	SUSPEND HORIZONTAL FAN COIL UNIT FROM STRUCTURE ABOVE. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT CHILLED WATER, HOT WATER, CONDENSATE, AND CONTROL WIRING PER PLANS. MAINTAIN REQUIRED SERVICE CLEARANCES.



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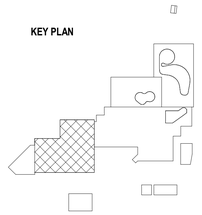
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

KEY PLAN



FIRST FLOOR PLAN - FRESHWATER HABITAT - HYDRONICS

MP2.21 E

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8' 4' 0' 8'
SCALE : 1/8" = 1'-0"

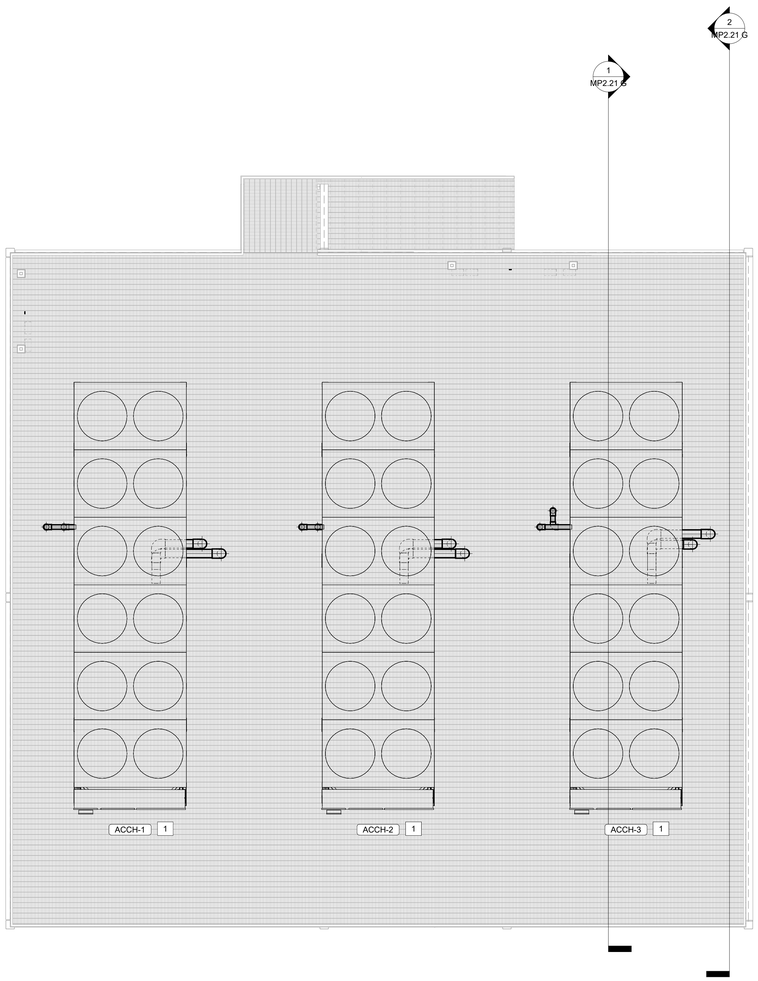
1ST FLOOR PLAN - FRESHWATER HABITAT - HYDRONICS
SCALE : 1/8" = 1'-0"

NEW WORK KEYED NOTES

1	INSTALL AIR-COOLED HEAT RECOVERY CHILLER ON ELEVATED PLATFORM. REFER TO DETAILS AND PIPING DIAGRAMS FOR INSTALLATION AND CONNECTION REQUIREMENTS. MAINTAIN MANUFACTURER'S RECOMMENDED SERVICE CLEARANCES.

FLOOR PLAN LEGEND

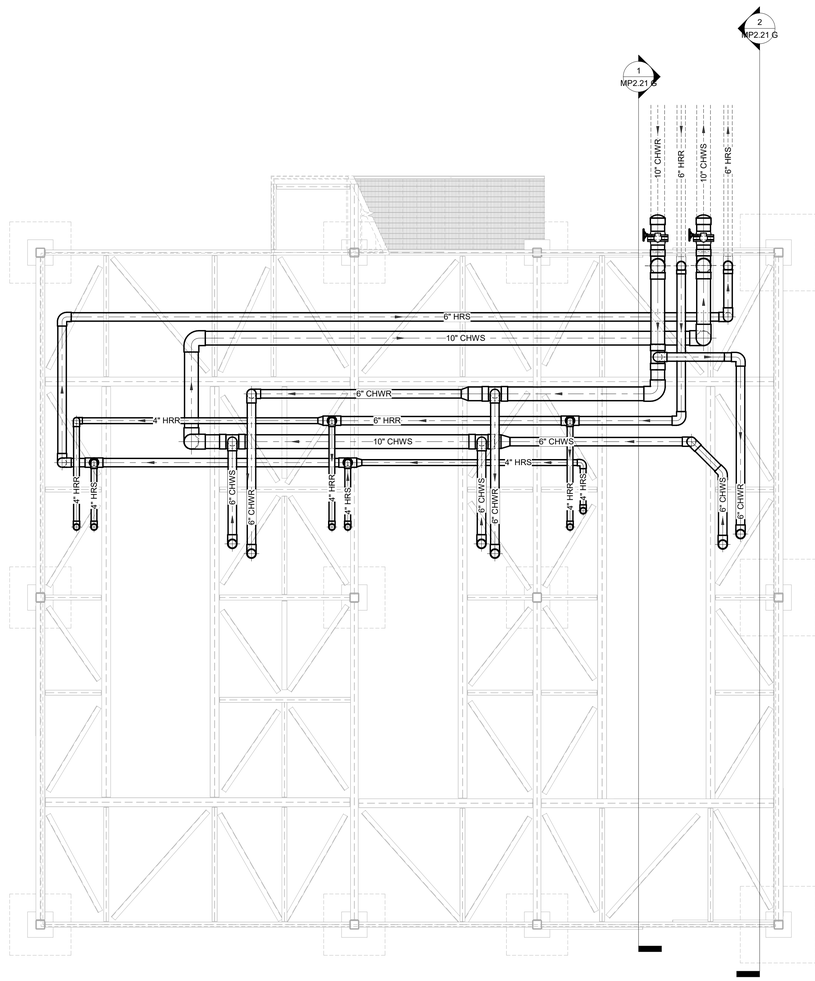
- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL



CHILLER ABOVE PLATFORM HYDRONIC PIPING PLAN

SCALE : 1/4" = 1'-0"

2

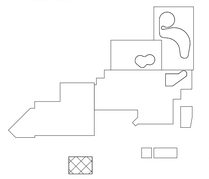


CHILLER BELOW PLATFORM HYDRONIC PIPING PLAN

SCALE : 1/4" = 1'-0"

1

KEY PLAN



4' 2' 0' 4'

SCALE : 1/4" = 1'-0"

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
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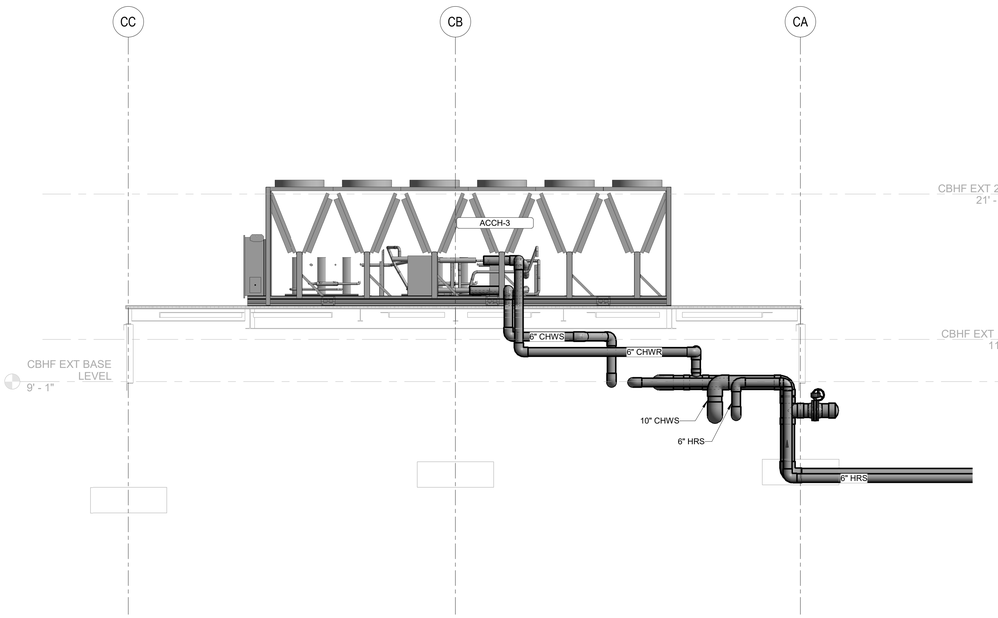
NORTH CAROLINA PROFESSIONAL SEAL 23551 ENGINEER DAVID M. HAHN

06-May-26

NO.	DATE	DESCRIPTION
	12-5-25	FOR CONSTRUCTION
2	04-27-26	BULLETIN #2

CHILLER PLATFORM - HYDRONICS

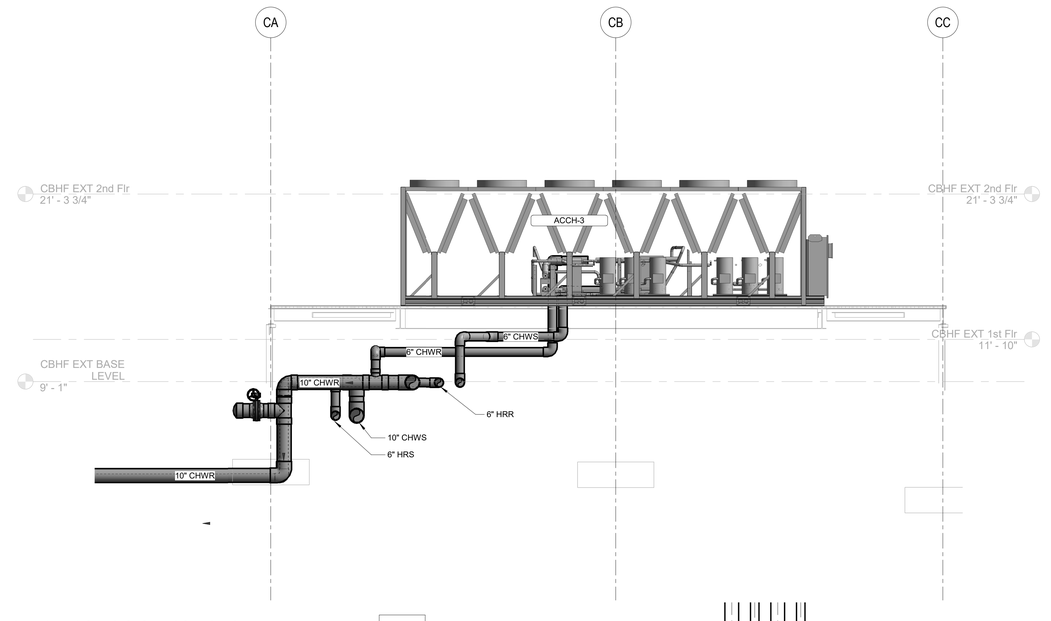
MP2.21 F



CHILLER PLATFORM SECTION - LOOKING WEST

SCALE : 1/4" = 1'-0"

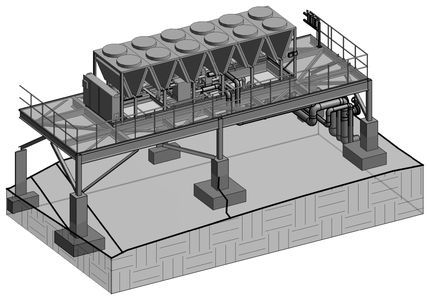
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CHILLER PLATFORM SECTION - LOOKING EAST

SCALE : 1/4" = 1'-0"

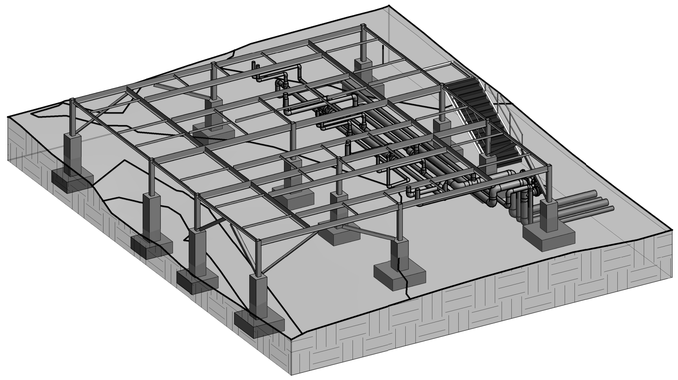
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CHILLER PLATFORM 3D - LOOKING NORTH-WEST

SCALE :

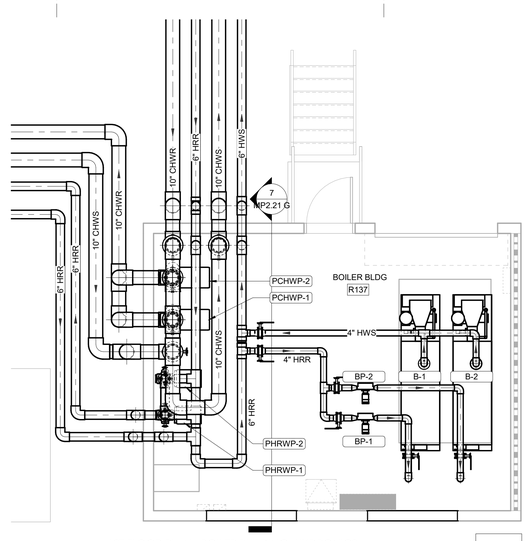
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CHILLER PLATFORM BELOW FRAMES - LOOKING NORTH-WEST

SCALE :

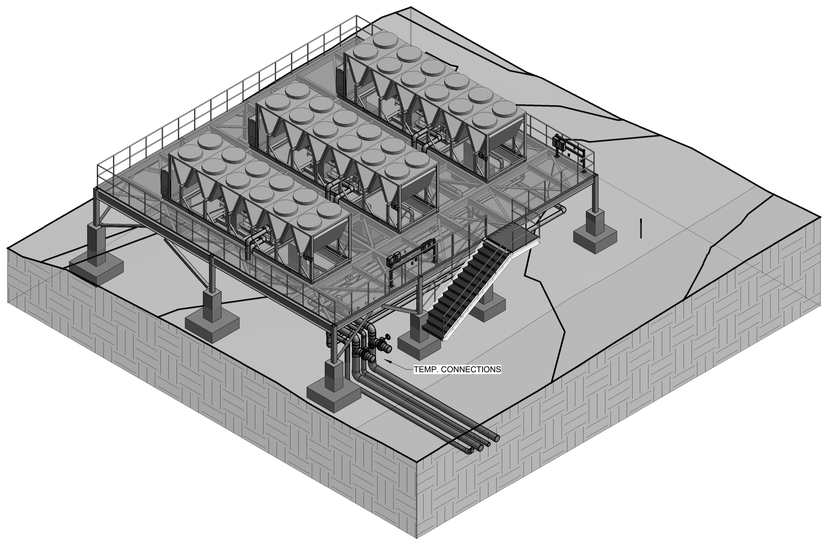
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1ST FLOOR PLAN - BOILER BUILDING -HYDRONICS

SCALE : 1/4" = 1'-0"

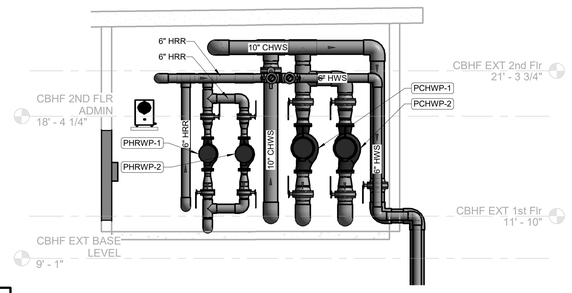
6



CHILLER PLATFORM 3D - LOOKING SOUTH-WEST

SCALE :

3



CENTRAL PLANT SECTION - LOOKING EAST

SCALE : 1/4" = 1'-0"

7

FLOOR PLAN LEGEND	
	EXISTING BUILDING
	RENOVATED AREA
	UPFIT BY OTHERS
	1-HR RATED WALL
	2-HR RATED WALL
	3-HR RATED WALL

4' 2' 0' 4'

SCALE : 1/4" = 1'-0"

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06-May-26

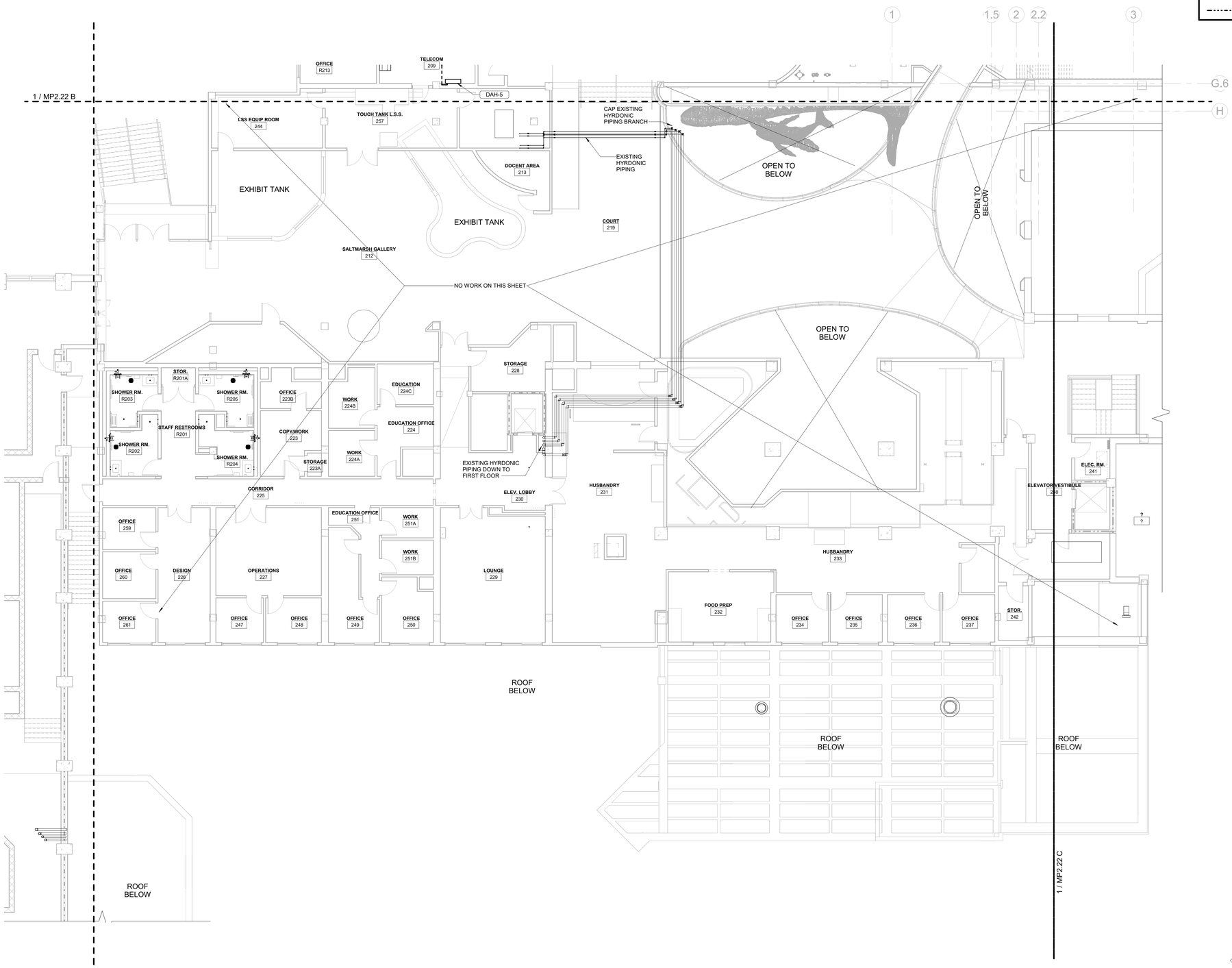
NO.	DATE	DESCRIPTION
	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1
2	04-27-26	BULLETIN #2

CHILLER PLATFORM AND PUMP BUILDING - HYDRONICS SECTIONS AND 3D VIEWS

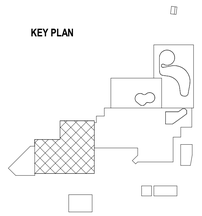
MP2.21 G

FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL



KEY PLAN



SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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05-Dec-25

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SECOND FLOOR PLAN - CAPE FEAR SHOALS - HYDRONICS

MP2.22 A

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2ND FLOOR PLAN - CAPE FEAR - HYDRONICS

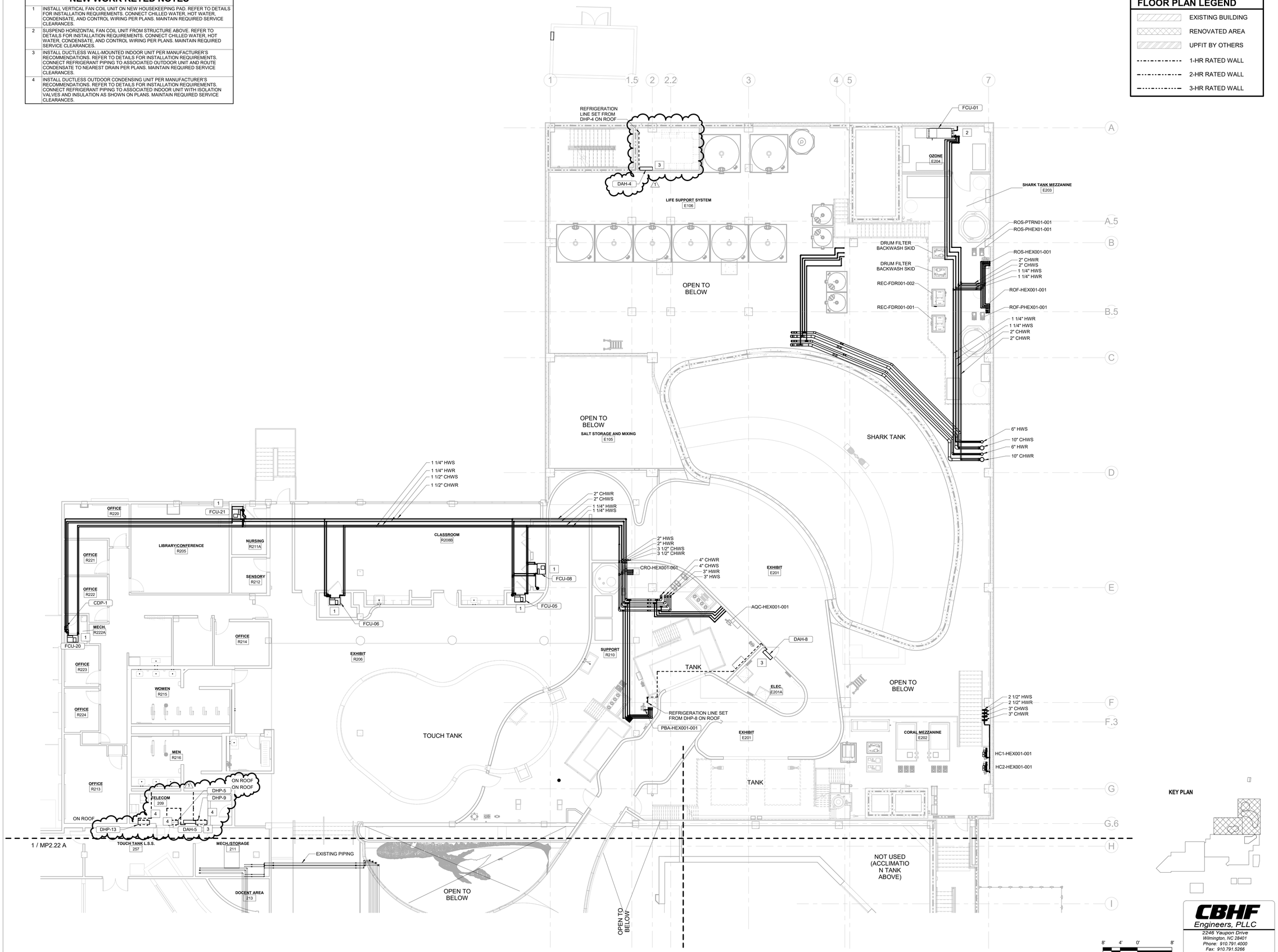
SCALE : 1/8" = 1'-0"

NEW WORK KEYED NOTES

1	INSTALL VERTICAL FAN COIL UNIT ON NEW HOUSEKEEPING PAD. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT CHILLED WATER, HOT WATER, CONDENSATE, AND CONTROL WIRING PER PLANS. MAINTAIN REQUIRED SERVICE CLEARANCES.
2	SUSPEND HORIZONTAL FAN COIL UNIT FROM STRUCTURE ABOVE. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT CHILLED WATER, HOT WATER, CONDENSATE, AND CONTROL WIRING PER PLANS. MAINTAIN REQUIRED SERVICE CLEARANCES.
3	INSTALL DUCTLESS WALL-MOUNTED INDOOR UNIT PER MANUFACTURER'S RECOMMENDATIONS. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT REFRIGERANT PIPING TO ASSOCIATED OUTDOOR UNIT AND ROUTE CONDENSATE TO NEAREST DRAIN PER PLANS. MAINTAIN REQUIRED SERVICE CLEARANCES.
4	INSTALL DUCTLESS OUTDOOR CONDENSING UNIT PER MANUFACTURER'S RECOMMENDATIONS. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT REFRIGERANT PIPING TO ASSOCIATED INDOOR UNIT WITH ISOLATION VALVES AND INSULATION AS SHOWN ON PLANS. MAINTAIN REQUIRED SERVICE CLEARANCES.

FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL



SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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NORTH CAROLINA PROFESSIONAL ENGINEER 23551 DAVID M. HAINI

12-Dec-25

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1	12-12-25	BULLETIN #1

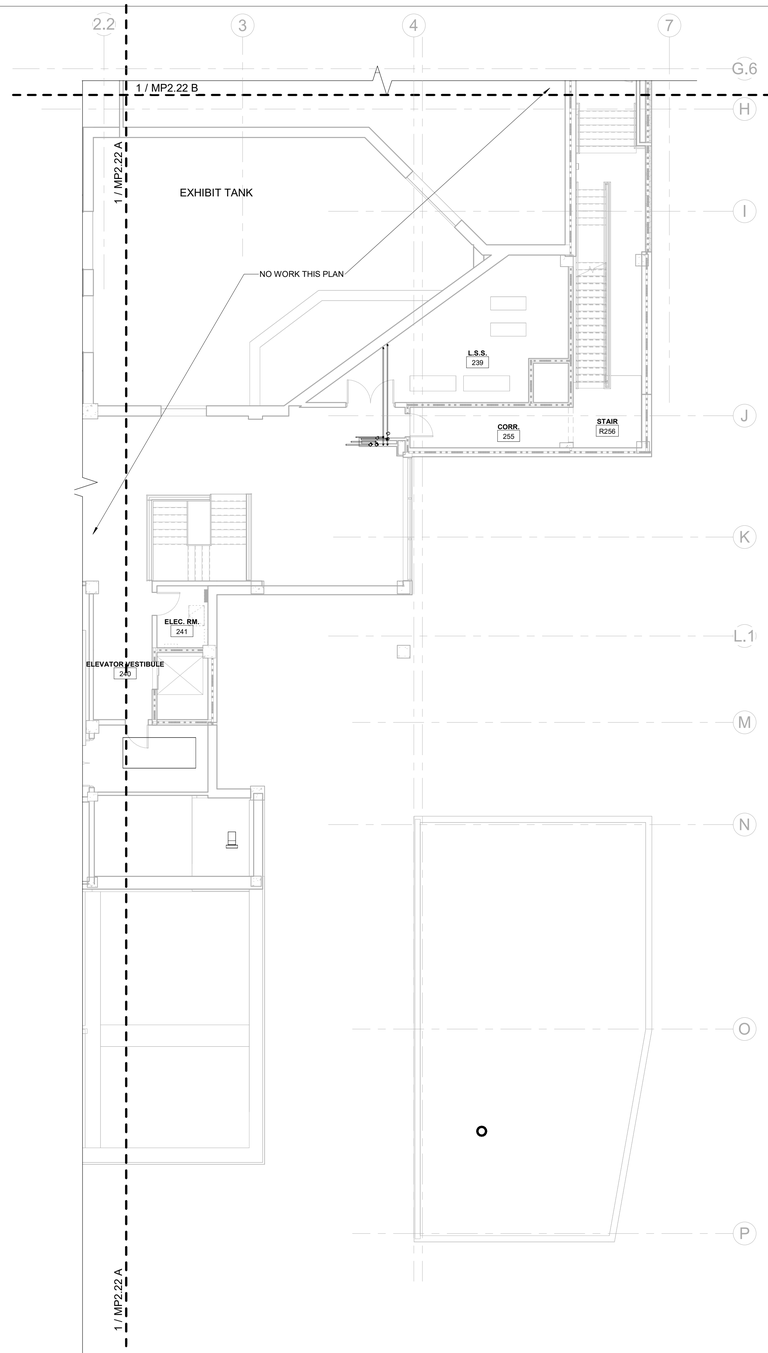
SECOND FLOOR PLAN - TOUCH AND SHARK TANK - HYDRONICS

MP2.22 B

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2ND FLOOR PLAN - TOUCH & SHARK TANK - HYDRONICS
SCALE : 1/8" = 1'-0"



FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

SZOSTAK DESIGN

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SCO #17-18042-02A
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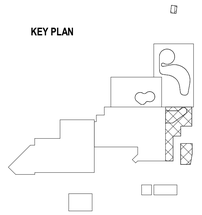
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05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

KEY PLAN



SECOND FLOOR PLAN - SOUTHEAST WING - HYDRONICS

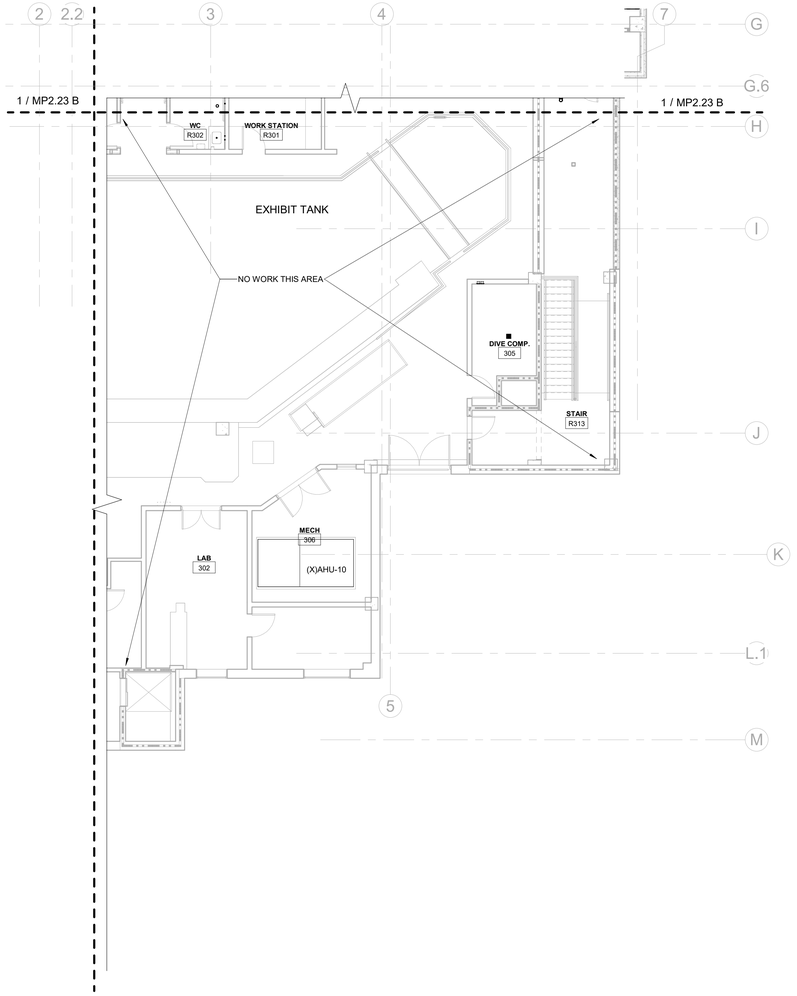
MP2.22 C

8' 4' 0' 8'
SCALE : 1/8" = 1'-0"

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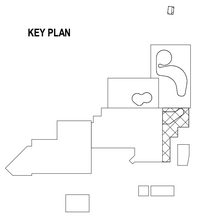
2ND FLOOR PLAN - SOUTHEAST WING - HYDRONICS
SCALE : 1/8" = 1'-0"



FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

3RD FLOOR PLAN - SOUTHEAST WING - HYDRONICS

SCALE : 1/8" = 1'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

900 LOGGERHEAD RD,
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NORTH CAROLINA REGISTERED PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

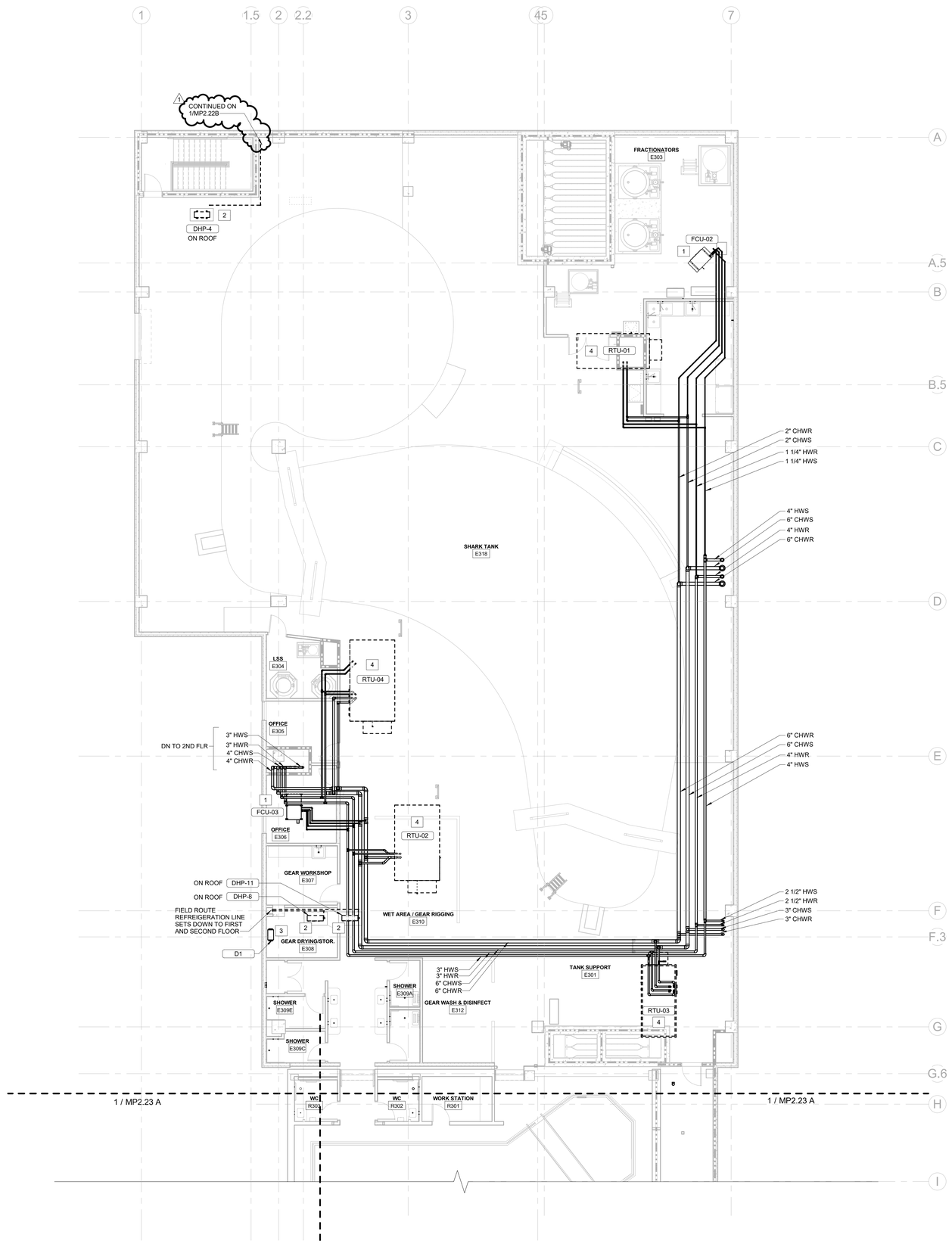
NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

THIRD FLOOR PLAN - SOUTHEAST WING - HYDRONICS

MP2.23 A

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FLOOR PLAN LEGEND

- EXISTING BUILDING
- RENOVATED AREA
- UPFIT BY OTHERS
- 1-HR RATED WALL
- 2-HR RATED WALL
- 3-HR RATED WALL

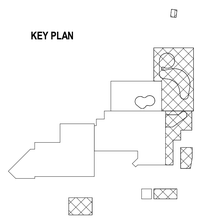
ROOF PLAN SHEET NOTES

1. REFER TO ARCHITECTURAL DRAWINGS FOR RATED ASSEMBLY UL NUMBERS (WALLS, FLOOR / CEILINGS, ETC..
2. REFER TO STRUCTURAL DRAWINGS FOR EQUIPMENT ROOF MOUNTING CONDITIONS.
3. ALL ROOF PENETRATIONS SHALL CONFORM TO ROOF MANUFACTURER'S APPROVED METHODS.
4. MAINTAIN MINIMUM 10 FOOT SEPARATION BETWEEN EXHAUST AND ANY OUTSIDE AIR INTAKES.

NEW WORK KEYED NOTES

1	SUSPEND HORIZONTAL FAN COIL UNIT FROM STRUCTURE ABOVE. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT CHILLED WATER, HOT WATER, CONDENSATE, AND CONTROL WIRING PER PLANS. MAINTAIN REQUIRED SERVICE CLEARANCES.
2	INSTALL DUCTLESS OUTDOOR CONDENSING UNIT PER MANUFACTURER'S RECOMMENDATIONS. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT REFRIGERANT PIPING TO ASSOCIATED INDOOR UNIT WITH ISOLATION VALVES AND INSULATION AS SHOWN ON PLANS. MAINTAIN REQUIRED SERVICE CLEARANCES.
3	INSTALL DEHUMIDIFICATION UNIT ON CORROSION-RESISTANT WALL BRACKETS WITH SUPPORT PLATFORM. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS. CONNECT CHILLED WATER, CONDENSATE, AND CONTROL WIRING PER PLANS. MAINTAIN SERVICE CLEARANCES.
4	INSTALL ROOFTOP UNIT ON STRUCTURAL ROOF CURB. REFER TO DETAILS AND PIPING DIAGRAMS FOR INSTALLATION AND CONNECTION REQUIREMENTS. MAINTAIN MANUFACTURER'S RECOMMENDED SERVICE CLEARANCES AND PROVIDE CONDENSATE DRAIN AS SHOWN ON PLANS.

KEY PLAN



8' 4' 0' 8'

SCALE : 1/8" = 1'-0"

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3RD FLOOR PLAN - SHARK TANK - HYDRONICS

SCALE : 1/8" = 1'-0"

1

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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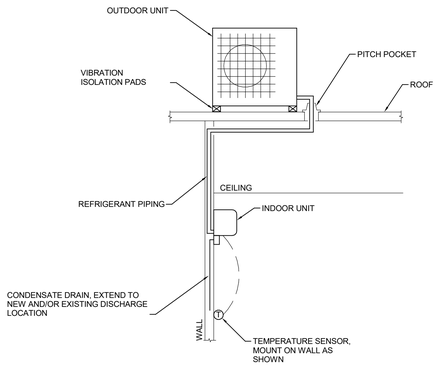
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

12-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1

THIRD FLOOR PLAN - SHARK TANK - HYDRONICS

MP2.23 B

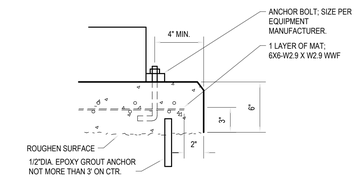


DUCTLESS SPLIT SYSTEM DETAIL

SCALE : NO SCALE

1

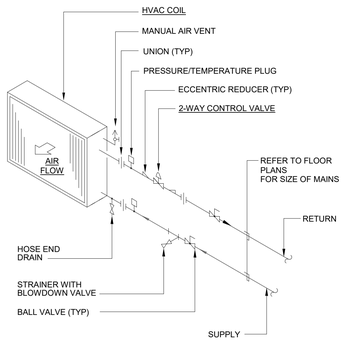
NOTE:
1. MESH SHALL BE FURNISHED IN SHEETS.
2. ALL PAD EDGES SHALL BE CHAMFERED.
3. CONCRETE COMPRESSIVE STRENGTH SHALL BE 3,000 PSI AT 28 DAYS
4. ONLY ANCHOR EQUIPMENT WITH MANUFACTURER SUPPLIED ANCHOR MOUNTS



EQUIPMENT HOUSEKEEPING PAD DETAIL

SCALE : NO SCALE

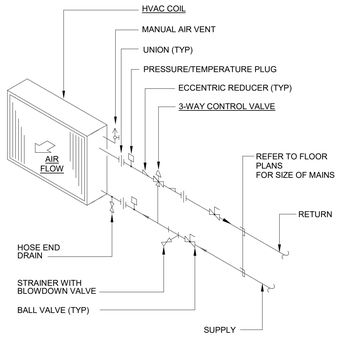
2



HVAC COIL (2-WAY VALVE) DETAIL

SCALE : NO SCALE

3



HVAC COIL (3-WAY VALVE) DETAIL

SCALE : NO SCALE

4

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
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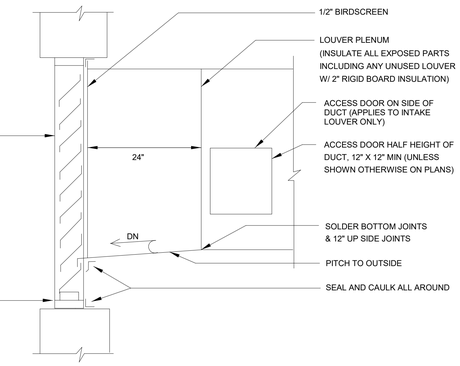
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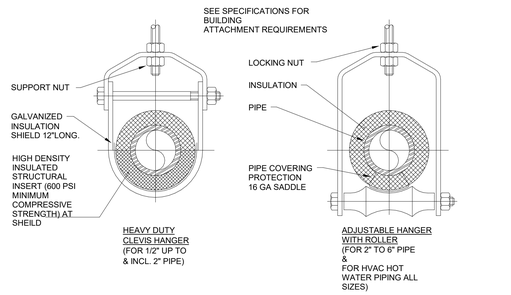
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LOUVER PLENUM DETAIL

SCALE : NO SCALE

5



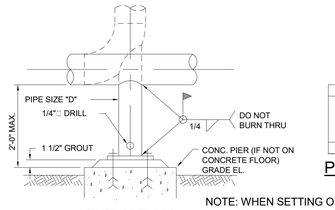
LOAD SCHEDULE		
PIPE SIZE	MAXIMUM SPACING	ROD SIZE
1/2" - 2"	8'	1/2"Ø
2 1/2"	10'	5/8"Ø
3"	10'	5/8"Ø
4"	14'	5/8"Ø
5"	14'	5/8"Ø

NOTES:
1. THIS DETAIL SHALL BE USED AS A GUIDE. ALL HANGERS SHALL MEET THE REQUIREMENTS OF THE SPECIFICATIONS.
2. PIPE 6" AND LARGER SHALL HAVE ROLLER SUPPORTED WITH DUAL RODS.
3. FOR CHW SERVICE OVER 3" REPLACE SADDLE WITH 12" LONG 14 GA SHIELD WITH RIGID INSULATION BETWEEN PIPE AND SHIELD.
4. WHERE TRAPEZE HANGERS ARE USED FOR HEATING HOT WATER PROVIDE ROLLERS.

PIPE HANGER SUPPORT DETAIL

SCALE : NO SCALE

6



ELEVATION

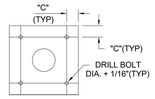


PLATE "A"

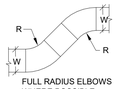
NOTE: WHEN SETTING ON STEEL, DELETE ANCHOR BOLTS AND WELD BASE PLATE TO STEEL WITH 1/4" FILLET ALL AROUND.

PIPE SIZE	STANCHION SIZE "D"	PLATE "A"	DIM "C"	ANCHOR BOLT SIZE
2"	1 1/2" SCH. 40	6"x1/2"x6"	1"	1/2"
3"-4"	2" SCH. 40	6"x5/8"x6"	1"	1/2"
6"-8"	3" SCH. 40	10"x3/4"x10"	1"	5/8"
10"-14"	4" SCH. 40	10"x3/4"x10"	1"	5/8"
16"-20"	6" SCH. 40	12"x1"x12"	1"	3/4"

PIPE SUPPORT DETAIL

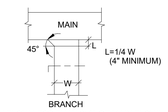
SCALE : NO SCALE

7



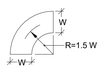
FULL RADIUS ELBOWS WHERE POSSIBLE (R = W)

DUCT OFFSETS

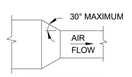


(BRANCH FLOW LESS THAN 25% OF MAIN FLOW)

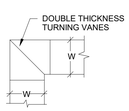
BRANCH TAKE-OFFS



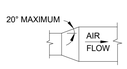
RADIUS ELBOW



CONVERGING FLOW



RECTANGULAR ELBOW

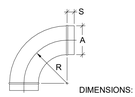


DIVERGING FLOW

RECTANGULAR DUCT FITTING DETAILS

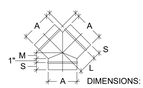
SCALE : NO SCALE

8



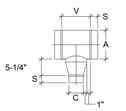
DIMENSIONS:
CR = 1.5A
S = 2"-L

DIE-STAMPED 45° AND 90°



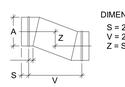
DIMENSIONS:
S = 2"
L = A/2+1"
M = .207A

Y-BRANCH 90°



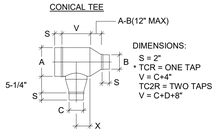
DIMENSIONS:
S = 2"
TC = ONE TAP
V = C+4"
* TC2 = TWO TAPS
V = C+D+8"

CONICAL TEE



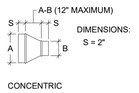
DIMENSIONS:
S = 2"
V = 2A UNLESS SPECIFIED
Z = SPECIFY OFFSET

OFFSET



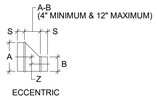
DIMENSIONS:
S = 2"
* TCR = ONE TAP
V = C+4"
TC2R = TWO TAPS
V = C+D+8"

REDUCING CONICAL TEE



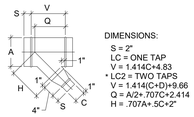
DIMENSIONS:
S = 2"

CONCENTRIC



ECCENTRIC

REDUCERS



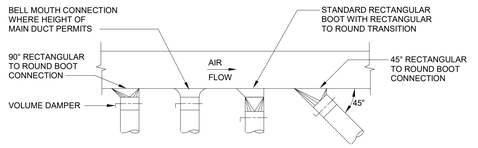
DIMENSIONS:
S = 2"
LC = ONE TAP
V = 1.414C+4.83
* LC2 = TWO TAPS
V = 1.414(C+D)+8.66
Q = A/2+.707C+2.414
H = .707A+.5C+2"

CONICAL LATERAL

ROUND DUCT FITTING DETAILS

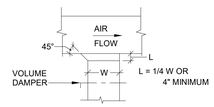
SCALE : NO SCALE

9



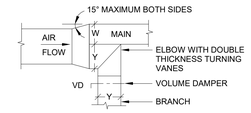
ALTERNATE RECTANGULAR TO ROUND DUCT BRANCH CONNECTIONS

(BRANCH FLOW LESS THEN 25% OF MAIN FLOW)



STANDARD RECTANGULAR DUCT BRANCH TAKE-OFF

(BRANCH FLOW LESS THAN 25% OF MAIN FLOW)



STANDARD RECTANGULAR BRANCH TAKE-OFF

(BRANCH FLOW GREATER THAN 25% OF MAIN FLOW)

ROUND/RECT. DUCT TAKE-OFF FITTING DETAILS

SCALE : NO SCALE

10

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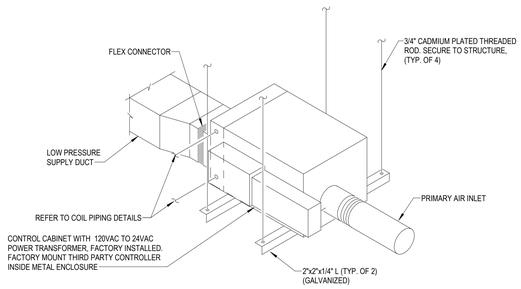
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

MECHANICAL DETAILS

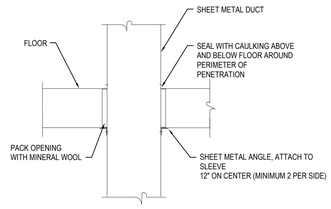
M-5.1



NOTE:
MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCE AND VERIFY INSTALLATION INSTRUCTIONS FOR HANGING SO THAT ALL NECESSARY ACCESS PANELS ARE NOT OBSTRUCTED.

TYPICAL SINGLE DUCT TERMINAL WITH HOT WATER COIL — 1

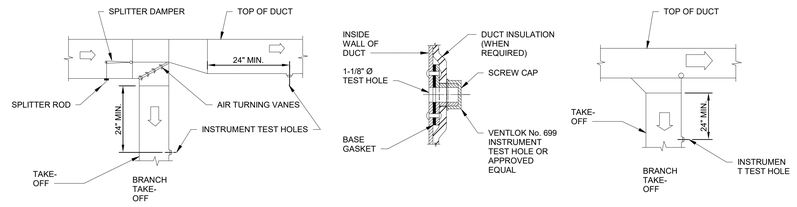
SCALE : NO SCALE



NOTE: EXTERNALLY WRAPPED DUCT INSTALLED SIMILARLY. BLANKET INSULATION SHALL BE INSTALLED OVER ANGLES AND SEALED TO FLOOR BARRIER.

TYPICAL DUCT THROUGH NON-RATED WALL — 2

SCALE : NO SCALE

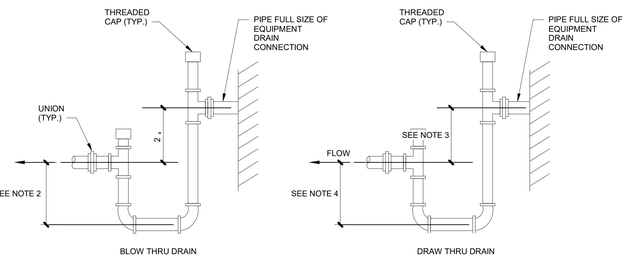


TYPICAL LOW PRESSURE DUCT DETAILS — 3

SCALE : NO SCALE

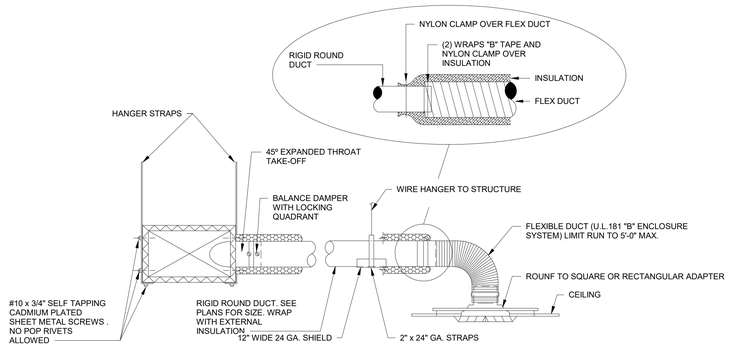
NOTES:

1. LOCATE TRAPS SO AS TO BE ACCESSIBLE FOR CLEANING.
2. HEIGHT SHALL BE EQUAL TO UNIT MAXIMUM TOTAL STATIC PRESSURE PLUS 1/2".
3. HEIGHT SHALL BE EQUAL TO UNIT MAXIMUM NEGATIVE STATIC PRESSURE PLUS 1".
4. HEIGHT SHALL BE 1/2" OF HEIGHT INSTALLED ON NOTE 3.
5. PIPE TO NEAREST DRAIN.
6. TRAP SHALL NOT BLOCK ACCESS TO EQUIPMENT.
7. PROVIDE UNIONS AT INLET AND OUTLET OF TRAP.



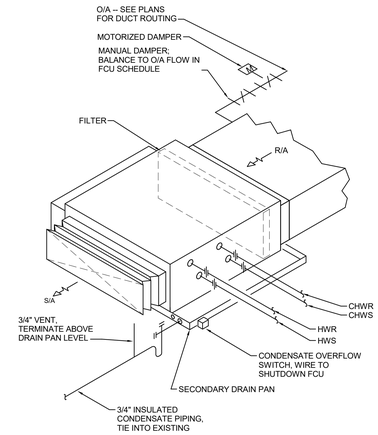
TYPICAL EQUIPMENT CONDENSATE DRAIN DETAIL — 4

SCALE : NO SCALE



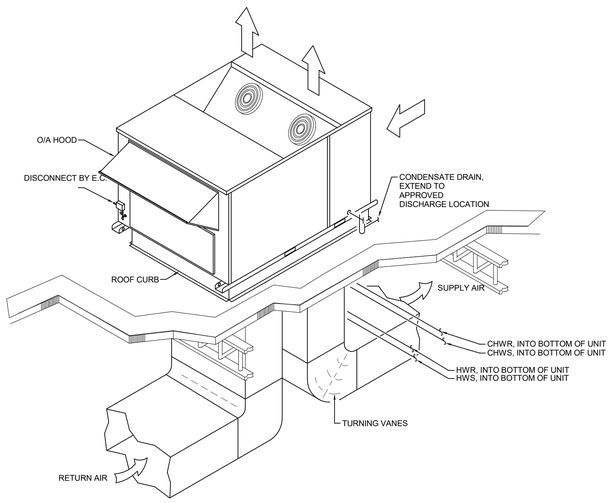
TYPICAL DIFFUSER CONNECTION DETAIL — 5

SCALE : NO SCALE



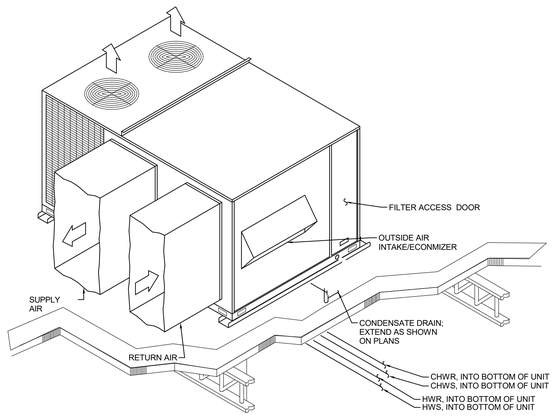
FAN COIL DETAIL — 6

SCALE : 12" = 1'-0"



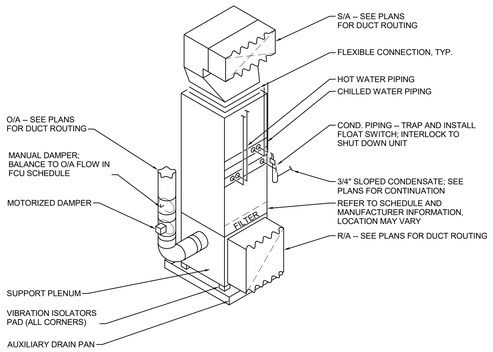
ROOFTOP UNIT BOTTOM DISCHARGE DETAIL — 7

SCALE : 12" = 1'-0"



ROOFTOP UNIT SIDE DISCHARGE DETAIL — 8

SCALE : 12" = 1'-0"



TYPICAL VERTICAL FCU DETAIL — 9

SCALE : 12" = 1'-0"

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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NOTE: IF THIS DRAWING IS NOT 30" X 42", IT IS A REDUCED PRINT. REFER TO GRAPHIC SCALE.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

MECHANICAL DETAILS

M-5.2

AIR COOLED HEAT RECOVERY CHILLER SCHEDULE

DRAWING CODE	BOD MFR.	BOD MODEL	ALTERNATE APPROVED MFR	NOMINAL CAPACITY (TONS)	PERFOMANCE - COOLING MODE CAPACITY (TONS)	MIN EER	MIN IPLV (BTU/W-h)	MAX POWER INPUT (KW)	AMBIENT TEMP (°F db)	EWT (°F)	LWT (°F)	DESIGN FLOW (GPM)	HX HEAD LOSS (FT H20)	STRAINER HEAD LOSS (FT H20)	VPF MIN. FLOW (GPM)	PERFOMANCE - HEAT RECOVERY COOLING CAPACITY (TONS)	HEAT CAPACITY (MBH)	MIN EFFIC. RATIO (kW/kW)	MAX POWER INPUT (KW)	AMBIENT TEMP (°F db)	EWT (°F)	LWT (°F)	DESIGN FLOW (GPM)	HX HEAD LOSS (FT H20)	PIPE SIZE (IN.)	REFRIGERANT TYPE	CIRCUIT SQTY	CHARGE PER CKT (LBS)	COMPRESSOR TYPE	QTY	EVAPORATOR FLUID	TYPE	FOULING FACTOR	PIPE SIZE (IN.)	CONDENSER EAT (°F)	NUMBER OF FANS	SOUND AT FULL LOAD POWER LEVEL (dBA)	PRESS. LEVEL (dBA)	ELECTRICAL VOLTAGE (V/PH/HZ)	MCA (A)	MOCP (A)	COMP. (KW)	FANS (KW)	STARTER TYPE	COMP. RLA CKT. 1A/B/C (EA.) (A)	COMP. RLA CKT. 2A/B/C (EA.) (A)	PHYSICAL DIMS. (IN.) L	W	H	WEIGHT (LBS)	NOTES	ACCESS
ACCH-1	TRANE	ACSA230	PETRA, CLIMACOOL	230	216.0	10.30	18.06	251.7	95.0	54.00	44.00	516.5	13.30	2.40	315.40	186.8	914.4	3.44	269.0	80.0	126.00	140.00	140.5	3.83	3.00	R-454B	2	108.0	SCREW	6	WATER	BRAZED PLATE	0.00010	4	95.0	12	99	72	460/3/60	466.0	500	226.3	20.8	ACROSS-THE-LI...	69.0	69.0	338	88	98	11,406	1 - 10	A - M
ACCH-2	TRANE	ACSA230	PETRA, CLIMACOOL	230	216.0	10.30	18.06	251.7	95.0	54.00	44.00	516.5	13.30	2.40	315.40	186.8	914.4	3.44	269.0	80.0	126.00	140.00	140.5	3.83	3.00	R-454B	2	108.0	SCREW	6	WATER	BRAZED PLATE	0.00010	4	95.0	12	99	72	460/3/60	466.0	500	226.3	20.8	ACROSS-THE-LI...	69.0	69.0	338	88	98	11,406	1 - 10	A - M
ACCH-3	TRANE	ACSA230	PETRA, CLIMACOOL	230	216.0	10.30	18.06	251.7	95.0	54.00	44.00	516.5	13.30	2.40	315.40	186.8	914.4	3.44	269.0	80.0	126.00	140.00	140.5	3.83	3.00	R-454B	2	108.0	SCREW	6	WATER	BRAZED PLATE	0.00010	4	95.0	12	99	72	460/3/60	466.0	500	226.3	20.8	ACROSS-THE-LI...	69.0	69.0	338	88	98	11,406	1 - 10	A - M

NOTES:
1. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2. PROVIDE 120V/1Ø POWER FOR CHILLER EVAPORATOR FREEZE PROTECTION/HEAT TRACE PER MANUFACTURER. CIRCUIT BY ELECTRICAL.
3. WEIGHT LISTED IS OPERATING WEIGHT.
4. MANUFACTURER PROVIDED 5 YEAR PARTS, LABOR AND REFRIGERANT WARRANTY.
5. PROVIDE NEXT-GEN REFRIGERANT.
6. CONDENSER FIN: COATED COPPER ROUND TUBE, ALUMINUM PLATE FIN
7. ADVANCED DEFROST LOGIC INCLUDING LOSS OF FLOW LOGIC DURING DEFROST CHANGEOVER AND WARM-UP CYCLE.
8. FACTORY INTEGRATED PARTIAL HEAT RECOVERY BRAZED PLATE HEAT EXCHANGER FOR HEAT RECOVERY WATER LOOP CONNECTIONS.
9. SOUND PRESSURE MEASURED AT 30 FEET FROM THE BROADSIDE OF THE UNIT.
10. PROVIDE FIELD-INSTALLED HEAT TRACE AND WEATHERPROOF INSULATION/JACKETING ON EXTERIOR ABOVE-GRADE HYDRONIC PIPING. POWER BY ELECTRICAL CONTRACTOR.

ACCESS:
- A FACTORY-PROVIDED EPOXY-COATED CONDENSER COILS MEETING 10,000-HOUR ASTM B117 SALT SPRAY TEST. CABINET AND STRUCTURAL ELEMENTS WITH BAKED-ON POWDER COAT FINISH. INCLUDE FULL MANUFACTURER COASTAL PROTECTION PACKAGE.
- B BACNET MS/TP CONTROL INTERFACE
- C ARCHITECTURAL LOUVERED PANELS COMPLETELY COVERING CONDENSING COIL AND SERVICE AREA BENEATH THE CONDENSER
- D MOLDED ELASTOMERIC ISOLATORS
- E FACTORY INSTALLED WATER STRAINER
- F FACTORY INSTALLED FLOW SWITCH
- G AMBIENT CONTROL FOR OPERATION FROM 0 TO 125 DEG F
- H WIRELESS LTE MODEM
- I FACTORY STARTUP
- J FACTORY INSTALLED MINIMUM 1-1/4 INCH INSULATION, ALL COLDED SURFACES
- K PHASE VOLTAGE MONITOR
- L CONVENIENCE OUTLET: 115V / 60HZ / 20A
- M TOUCH SCREEN CONTROL PANEL

FIRETUBE CONDENSING BOILER SCHEDULE (DUAL-FUEL - #2 OIL / GAS)

DRAWING CODE	BASIS OF DESIGN MANUFACTURER	BASIS OF DESIGN MODEL	ALTERNATE APPROVED MANUFACTURERS	TYPE	SERVICE	FUEL TYPE	CONSUMPTION (GPH)	INPUT (MBH)	OUTPUT (MBH)	THERMAL EFFICIENCY	TURNDOWN	WATER LWT / EWT (°F)	DESIGN PRESS. (PSIG)	FLOW @ 20°F DELTA T (GPM)	HEAD LOSS BOILER (FT. H20)	COMBUSTION AIRFLOW (SCFM)	FLUE GAS FLOW (SCFM)	CONNECTIONS OIL SUPPLY / RETURN (IN.)	WATER SUPPLY / RETURN (IN.)	AIR INLET / VENT (IN.)	COND. (IN.)	POWER SUPPLY VOLTAGE (V/PH/HZ)	FLA (A)	WEIGHT (LBS.)	NOTES	ACCESSORIES
B-1	FULTON	VTG-2000DF	ARECO, BUDERUS	FIRETUBE, CONDENSING, DUAL-FUEL	HEATING HOT WATER	#2 FUEL OIL	14.4	2,000	1,936	96.8%	5:1	140 / 120	160	192	2.1	391	424	3/8 / 3/8	4 / 4	10 / 10	1	460/3/60	8.0	5,100	1 -5	A,B,C,D
B-2	FULTON	VTG-2000DF	ARECO, BUDERUS	FIRETUBE, CONDENSING, DUAL-FUEL	HEATING HOT WATER	#2 FUEL OIL	14.4	2,000	1,936	96.8%	5:1	140 / 120	160	192	2.1	391	424	3/8 / 3/8	4 / 4	10 / 10	1	460/3/60	8.0	5,100	1 -5	A,B,C,D

NOTES:
1. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2. PROVIDE DEDICATED COMBUSTION AIR INTAKE AND FLUE VENT SYSTEM PER BOILER AND VENT MANUFACTURER REQUIREMENTS. FLUE VENTING SHALL BE A LISTED CATEGORY IV, POSITIVE PRESSURE, CONDENSING VENT SYSTEM SUITABLE FOR COASTAL/SALT-AIR SERVICE; BASIS OF DESIGN: SELKIRK PS10-304/316 OR APPROVED EQUAL. COMBUSTION AIR INTAKE SHALL BE 316 STAINLESS STEEL DUCTWORK, BASIS OF DESIGN: SELKIRK G10-316 OR APPROVED EQUAL.
3. COORDINATE VENT AND INTAKE TERMINATIONS, CLEARANCES, AND ROUTING WITH MANUFACTURER AND ARCHITECTURAL CONDITIONS. COMBUSTION AIR INTAKE SHALL BE UNOBSTRUCTED, DAMPERS SHALL NOT BE INSTALLED UNLESS APPROVED BY BOILER MANUFACTURER.
4. ROUTE CONDENSATE OF BOTH BOILERS THROUGH MULTI-BOILER NEUTRALIZATION KIT PRIOR TO DISCHARGE.
5. MOUNT BOILERS ON 6" HIGH CONCRETE HOUSEKEEPING PAD UNLESS OTHERWISE INDICATED. COORDINATE FINAL PAD SIZE AND REINFORCEMENT WITH STRUCTURAL.

ACCESSORIES:
- A MULTI-BOILER CONDENSATE NEUTRALIZATION KIT
- B BAS INTERFACE
- C PROVIDE DEDICATED PRIMARY BOILER CIRCULATOR WITH EACH BOILER. PUMPS SHALL BE FURNISHED WITH THE BOILER PACKAGE (FULTON OR APPROVED EQUAL), MODEL 2-30-001762, INCLUDING FLANGE KITS (P/N 2-35-001762), AND SHALL BE CONTROL-COMPATIBLE AND MODULATING (0–10V OR 4–20mA). CONTRACTOR SHALL PROVIDE INSTALLATION, POWER, CONTROLS COORDINATION, AND PIPING CONNECTIONS. SEE PUMP SCHEDULE FOR ADDITIONAL INFORMATION.
- D BACNET GATEWAY FOR BAS INTEGRATION; BOILER CONTROLS ARE MODBUS NATIVE.

DIFFUSERS, REGISTERS AND GRILLES SCHEDULE

DRAWING CODE	BOD MFR	BOD MODEL	ALTERNATE APPROVED MFRS	TYPE	SERVICE	NECK SIZE (IN.)	BRANCH CONN. SIZE (IN.)	MODULE SIZE (IN.)	MATERIAL	FINISH	MOUNTING	NOTES	ACCESS
S1	PRICE	ASPD	GREENHECK, TITUS	SQUARE CEILING DIFFUSER	SUPPLY	6%%C		24 X 24	ALUMINUM	WHITE	T-BAR	1,2	A
S2	PRICE	ASPD	GREENHECK, TITUS	SQUARE CEILING DIFFUSER	SUPPLY	8%%C		24 X 24	ALUMINUM	WHITE	T-BAR	1,2	A
S3	PRICE	ASPD	GREENHECK, TITUS	SQUARE CEILING DIFFUSER	SUPPLY	10%%C		24 X 24	ALUMINUM	WHITE	T-BAR	1,2	A
S5	PRICE	620	GREENHECK, TITUS	SQUARE CEILING DIFFUSER	SUPPLY	6%%C		12 X 12	ALUMINUM	WHITE	CEILING SURFACE	1,2	A
S8	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	12 X 6		14 X 8	ALUMINUM	MATCH	WALL SURFACE	1,2,3	A
S9	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	16 x 10		18 x 12	ALUMINUM	MATCH	WALL SURFACE	1,2,3	B
S10	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	12 X 6		14 X 8	ALUMINUM	MATCH	WALL SURFACE	1,2,3	B
S11	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	16 x 10		18 x 12	ALUMINUM	MATCH	WALL SURFACE	1,2,3	A
S12	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	20 X 10		22 X 12	ALUMINUM	MATCH	WALL SURFACE	1,2,3	A
S13	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	28 X 12		30 X 14	ALUMINUM	MATCH	WALL SURFACE	1,2,3	A
S14	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	12 X 8		14 x 10	ALUMINUM	MATCH	WALL SURFACE	1,2,3	A
S15	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	14 X 6		16 X 8	ALUMINUM	MATCH	WALL SURFACE	1,2,3	A
S16	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	8 X 8		10 X 10	ALUMINUM	MATCH	WALL SURFACE	1,2,3	A
S17	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	16 X 16		18 X 18	ALUMINUM	MATCH	WALL SURFACE	1,2,3	A
S18	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	10 X 10		12 X 12	ALUMINUM	MATCH	WALL SURFACE	1,2,3	A
S19	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	6 X 6		8 X 8	ALUMINUM	MATCH	DUCT SURFACE	1,2	A
S20	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	20 X 10			ALUMINUM	MATCH	DUCT SURFACE	1,2	A
S21	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	12 X 8			ALUMINUM	MATCH	DUCT SURFACE	1,2	A
S23	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	18 X 12			ALUMINUM	MATCH	DUCT SURFACE	1,2	A
S25	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	16 X 6		16 X 8	ALUMINUM	MATCH	DUCT SURFACE	1,2	A
S26	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	16 X 16		18 X 18	ALUMINUM	MATCH	DUCT SURFACE	1,2	A
S27	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	14 X 10		16 X 12	ALUMINUM	MATCH	DUCT SURFACE	1,2	A
S28	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	10 X 4		12 X 6	ALUMINUM	MATCH	DUCT SURFACE	1,2	A
S29	PRICE	620	GREENHECK, TITUS	DBL DEFLECTTION	SUPPLY	48 X 12		50 X 14	ALUMINUM	MATCH	DUCT SURFACE	1,2	A
S30	PRICE	ARCD	GREENHECK, TITUS	ROUND CONE DIFFUSER	SUPPLY	6%%C			ALUMINUM	MATCH	DUCT SURFACE	1,2	A
S31	PRICE	ARCD	GREENHECK, TITUS	ROUND CONE DIFFUSER	SUPPLY	8%%C			ALUMINUM	MATCH	DUCT SURFACE	1,2	A
T1	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	TRANSFER	22 X 22	8%%C	24 X 24	ALUMINUM	WHITE	T-BAR	1,2,3	-
T2	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	TRANSFER	22 X 22	10%%C	24 X 24	ALUMINUM	WHITE	T-BAR	1,2,3	-
T3	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	10 X 10		12 X 12	ALUMINUM	MATCH	WALL SURFACE	1,2,3	-
T4	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	TRANSFER	10 X 10	6%%C	12 X 12	ALUMINUM	WHITE	T-BAR	1,2,3	-
R1	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	22 X 22	6%%C	24 X 24	ALUMINUM	WHITE	T-BAR	1,2,3	-
R2	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	22 X 22	8%%C	24 X 24	ALUMINUM	WHITE	T-BAR	1,2,3	-
R3	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	22 X 22	10%%C	24 X 24	ALUMINUM	WHITE	T-BAR	1,2,3	-
R4	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	22 X 22	12%%C	24 X 24	ALUMINUM	WHITE	T-BAR	1,2,3	-
R5	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	22 X 22	NOTE 2	24 X 24	ALUMINUM	WHITE	T-BAR	1,2,3	-
R10	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	10 X 10		12 X 12	ALUMINUM	MATCH	WALL SURFACE	1,2,3	-
R11	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	16 X 16		18 X 18	ALUMINUM	MATCH	WALL SURFACE	1,2,3	-
R12	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	14 X 14		16 X 16	ALUMINUM	MATCH	WALL SURFACE	1,2,3	-
R14	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	20 X 16		22 X 18	ALUMINUM	MATCH	WALL SURFACE	1,2,3	-
R16	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	18 X 10		20 X 12	ALUMINUM	MATCH	WALL SURFACE	1,2,3	-
R17	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	40 x 24		40 x 26	ALUMINUM	MATCH	WALL SURFACE	1,2,3	-
R18	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	30 X 14		32 X 16	ALUMINUM	MATCH	WALL SURFACE	1,2,3	-
R19	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	8 X 8		10 X 10	ALUMINUM	MATCH	WALL SURFACE	1,2,3	-
R20	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	72 x 16			ALUMINUM	MATCH	DUCT SURFACE	1,2	-
R21	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	28 X 28			ALUMINUM	MATCH	DUCT SURFACE	1,2	-
R24	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	16 X 8			ALUMINUM	MATCH	DUCT SURFACE	1,2	-
R25	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	12 X 6			ALUMINUM	MATCH	DUCT SURFACE	1,2	-
R26	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	36 X 20			ALUMINUM	MATCH	DUCT SURFACE	1,2	-
R28	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	48 X 20			ALUMINUM	MATCH	DUCT SURFACE	1,2	-
R29	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	28 X 12		30 X 14	ALUMINUM	MATCH	DUCT SURFACE	1,2	-
R31	PRICE	ARCD	GREENHECK, TITUS	ROUND CONE DIFFUSER	RETURN	8%%C			ALUMINUM	MATCH	DUCT SURFACE	1,2	-
R34	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	8 X 8		10 X 10	ALUMINUM	MATCH	DUCT SURFACE	1,2	-
E1	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	EXHAUST	22 X 22	6%%C	24 X 24	ALUMINUM	WHITE	T-BAR	1,2,3	A
E2	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	EXHAUST	22 X 22	8%%C	24 X 24	ALUMINUM	WHITE	T-BAR	1,2,3	A
E3	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	EXHAUST	22 X 22	10%%C	24 X 24	ALUMINUM	WHITE	T-BAR	1,2,3	A
E4	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	EXHAUST	22 X 22	12%%C	24 X 24	ALUMINUM	WHITE	T-BAR	1,2,3	A
E5	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	EXHAUST	8 X 8		10 X 10	ALUMINUM	MATCH	WALL SURFACE	1,2,3	A
E6	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	EXHAUST	24 X 12		26 X 14	ALUMINUM	MATCH	DUCT SURFACE	1,2	A
E7	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	EXHAUST	38 X 10		40 X 12	ALUMINUM	MATCH	DUCT SURFACE	1,2	A
E8	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	EXHAUST	10 X 10		12 X 12	ALUMINUM	WHITE	CEILING SURFACE	1,2,3	A
E9	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	EXHAUST	12 X 10		14 X 10	ALUMINUM	MATCH	DUCT SURFACE	1,2	A
E10	PRICE	630	GREENHECK, TITUS	FIXED FACE GRILLE	RETURN	18 X 10		20 X 12	ALUMINUM	MATCH	WALL SURFACE	1,2,3	-

NOTES:
1. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2. DUCT BRANCH CONNECTION SIZE TO BE EQUAL TO THE NECK SIZE OF DIFFUSER UNLESS NOTED OTHERWISE ON PLANS.
3. PAINT ALL VISIBLE DUCTWORK THROUGH GRILLES AND REGISTERS FLAT BLACK.

ACCESS:
- A MANUAL VOLUME DAMPER
- B INTEGRAL VOLUME DAMPER

MINI-SPLIT SYSTEM SCHEDULE

DRAWING CODE (IDU / ODU)	INDOOR UNIT LOCATION	BOD MFR	BOD MODEL (IDU / ODU)	ALTERNATE APPROVED MFRS	INDOOR UNIT CONFIG.	SYSTEM TYPE	ARI COOLING 80/67/95 TOTAL (MBH)	MIN (MBH)	ARI HEAT 70/47 TOTAL (MBH)	MIN SEER 2	MIN HSPF 2	INDOOR UNIT FAN SA MIN-MAX (CFM)	ELECTRICAL VOLTAGE (V/PH/HZ)	MCA (A)	WEIGHT (LBS)	OUTDOOR UNIT ELECTRICAL VOLTAGE (V/PH/HZ)	MCA (A)	MANUF. REC. BKR SIZE (A)	WEIGHT (LBS)	LSS EMERG. POWER?	REF. PIPING TYPE	MAX LENGTH (FT.)	MAX HEIGHT DIFF. (FT.)	MAX SYSTEM CHARGE (LB)	MIN. APPLIED FLOOR AREA (SF)	ACTUAL APPLIED FLOOR AREA (SF)	NOTES	ACCESS
DAH-3 / DHP-3	(104) IT ROOM	MITSUBISHI	PKA-AL18NL / PUY-AK18NL	DAIKIN, LG	WALL MTD	A/C	18.0	4.3	-	19.5	-	265 - 450	208/1/60	1.0	28	208/1/60	16.0	20	99	NO	R-454B	165	100	4.41	79.8	145	1 - 7, 9	A - C
DAH-4 / DHP-4	(E103B) ELECTRICAL	MITSUBISHI	PKA-AL18NL / PUY-AK18NL	DAIKIN, LG	WALL MTD	A/C	18.0	4.3	-	19.5	-	265 - 450	208/1/60	1.0	28	208/1/60	16.0	20	99	NO	R-454B	165	100	4.41	79.8	140	1 - 6, 9	A - C
DAH-5 / DHP-5	(209) TELECOM	MITSUBISHI	PKA-AL18NL / PUY-AK18NL	DAIKIN, LG	WALL MTD	A/C	18.0	4.3	-	19.5	-	265 - 450	208/1/60	1.0	28	208/1/60	16.0	20	99	NO	R-454B	165	100	4.41	79.8	125	1 - 6, 9	A - C
DAH-6 / DHP-6	GENERATOR BLDG	MITSUBISHI	PKA-AL24NL / PUZ-AH24NL	DAIKIN, LG	WALL MTD	HP	24.0	10.1	28.0	21.1	9.2	635 - 775	208/1/60	1.0	46	208/1/60	22.0	25	155	YES	R-454B	165	100	7.72	139.6	285	1 - 6, 9	A - C
DAH-7 / DHP-7	GENERATOR BLDG	MITSUBISHI	PKA-AL24NL / PUZ-AH24NL	DAIKIN, LG	WALL MTD	HP	24.0	10.1	28.0	21.1	9.2	635 - 775	208/1/60	1.0	46	208/1/60	22.0	25	155	YES	R-454B	165	100	7.72	139.6	460	1 - 6, 9	A - C
DAH-8 / DHP-8	(E201A) ELECTRICAL	MITSUBISHI	PKA-AL24NL / PUY-AH24NL	DAIKIN, LG	WALL MTD	A/C	24.0	10.1	-	21.1		635 - 775	208/1/60	1.0	46	208/1/60	22.0	25	155	NO	R-454B	225	100	7.72	139.6	145	1 - 6, 9	A - C
DAH-9 / DHP-9	(R108B) DATA	MITSUBISHI	PKA-AL18NL / PUY-AK18NL	DAIKIN, LG	WALL MTD	A/C	18.0	4.3	-	19.5	-	265 - 450	208/1/60	1.0	28	208/1/60	16.0	20	99	YES	R-454B	165	100	4.41	79.8	85	1 - 6, 9	A - C
DAH-10 / DHP-10	EXISTING GEN. BLDG	MITSUBISHI	PKA-AL24NL / PUZ-AH24NL	DAIKIN, LG	WALL MTD	HP	24.0	10.1	28.0	21.1	9.2	635 - 775	208/1/60	1.0	46	208/1/60	22.0	25	155	YES	R-454B	225	100	7.72	139.6	370	1 - 6, 9	A - C
DAH-11 / DHP-11	(E103A) MECH./ELEC.	MITSUBISHI	PKA-AL24NL / PUY-AH24NL	DAIKIN, LG	WALL MTD	A/C	24.0	10.1	-	21.1		635 - 775	208/1/60	1.0	46	208/1/60	22.0	25	155	NO	R-454B	225	100	7.72	139.6	415	1 - 6, 9	A - C
DAH-12 / DHP-12	DOM. BOOSTER PUMP BLDG	MITSUBISHI	PKA-AL24NL / PUZ-AH24NL	DAIKIN, LG	WALL MTD	HP	24.0	10.1	28.0	21.1	9.2	635 - 775	208/1/60	1.0	46	208/1/60	22.0	25	155	YES	R-454B	225	100	7.72	139.6	180	1 - 6, 9	A - C
DAH-13 / DHP-13	(R104) DATA/STOR.	MITSUBISHI	PKA-AL18NL / PUY-AK18NL	DAIKIN, LG	WALL MTD	A/C	12.0	4.3	-	21.1	-	215 - 375	208/1/60	1.0	28	208/1/60	16.0	20	99	NO	R-454B	165	100	4.41	79.8	156	1 - 6, 9	A - C
DAH-14 / DHP-14	GENERATOR BLDG	MITSUBISHI	PKA-AL24NL / PUZ-AH24NL	DAIKIN, LG	WALL MTD	HP	24.0	10.1	28.0	21.1	9.2	635 - 775	208/1/60	1.0	46	208/1/60	22.0	25	155	YES	R-454B	225	100	7.72	139.6	960	1 - 6, 8, 9	A - C

NOTES:
1. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT AND CONDUCTOR FROM OUTDOOR UNIT TO INDOOR UNIT.
3. MOUNT INDOOR UNIT AT MAX ALLOWED HEIGHT WHILE MAINTAINING MANUFACTURERS RECOMMENDED CLEARANCES.
4. REFER TO DRAWINGS FOR MOUNTING ARRANGEMENT. PROVIDE HURRICANE-RATED ANCHORAGE FOR ALL EQUIPMENT SUPPORTS, INCLUDING WALL-MOUNTED BRACKETS, PAD, OR RAIL-MOUNTED INSTALLATIONS, PER MANUFACTURER AND STRUCTURAL REQUIREMENTS. COORDINATE WITH GC FOR FINAL MOUNTING LOCATION.
5. LOW AMBIENT COOLING
6. CONTROLS BY DDC CONTRACTOR
7. INCLUDED IN ALTERNATE #2 ONLY
8. DUCTLESS SYSTEM TO SHUT DOWN UPON GENERATOR START-UP, COINCIDING WITH THE OPENING OF GENERATOR INTAKE LOUVERS
9. SYSTEM USES R-454B (A2L). MINIMUM APPLIED FLOOR AREA IS BASED ON INSTALLED REFRIGERANT CHARGE AND RCL PER ASHRAE 15-2022 USING A 6 FT MOUNTING HEIGHT

ACCESS:
- A FACTORY-APPLIED EPOXY-COATED COILS AND COASTAL-RATED CASING FINISH
- B WIRED WALL-MOUNTED REMOTE CONTROLLER
- C BACNET MSTP DDC CONTROL SYSTEM INTERFACE

POWER VENTILATOR SCHEDULE

DRAWING CODE	UNIT LOCATION	BOD MFR	BOD MODEL	ALTERNATE APPROVED MFRS	FAN TYPE	SERVICE	DRIVE TYPE	SPEED CONTROL	FAN DIAM. (IN)	DAMPER	MOTOR ENCLOSURE	CAPACITIES AIRFLOW (CFM)	ESP (IN. WG.)	FAN RPM	MOTOR RPM	ELECTRICAL MOTOR TYPE	MOTOR SIZE (HP)	V/PH/HZ	MOCP (A)	SONES	WEIGHT (LBS.)	NOTES	ACCESS
PV1	MAIN ENTRY - R129	COOK	GNVF-100	GREENHECK, TWIN CITY	CENTRIFUGAL INLINE CABINET	EXHAUST	DIRECT	EC	7.63	BACKDRAFT	-	70	0.35	846	1,000	ECM	0.13	120/1/60	15	2	17	1,2,5	A,B,C,D,E,F
PV2	MAIN ENTRY (ROOF)	COOK	120 ACED OR91	GREENHECK, TWIN CITY	DOWNBLAST CENTRIFUGAL EXHAUST	EXHAUST	DIRECT	EC	12.00	BACKDRAFT	OPEN	650	0.60	1,334	1,725	ECM	0.25	120/1/60	15	10	80	1,2,4,5	E,G,H,I,J,K,L,M,N,O
PV4	CONCESSIONS	COOK	GNVF-700	GREENHECK, TWIN CITY	CENTRIFUGAL INLINE CABINET	EXHAUST	DIRECT	EC	6.31	BACKDRAFT	-	650	0.75	1,724	1,778	ECM	0.33	120/1/60	15	6	38	1,2	A,B,D,E,P
PV5	TOUCH 2ND FLR	COOK	120 ACED	GREENHECK, TWIN CITY	DOWNBLAST CENTRIFUGAL EXHAUST	EXHAUST	DIRECT	EC	12.00	BACKDRAFT	OPEN	1,000	0.60	1,309	1,725	ECM	0.25	120/1/60	15	9	79	1,2,4	E,G,H,I,J,L,M,N,O
PV6	3RD FLR SHARK (ROOF)	COOK	120 ACED	GREENHECK, TWIN CITY	DOWNBLAST CENTRIFUGAL EXHAUST	EXHAUST	DIRECT	EC	12.00	BACKDRAFT	OPEN	1,000	0.60	1,309	1,725	ECM	0.25	120/1/60	15	9	79	1,2	E,G,H,I,J,L,M,N,O
PV7	NECROPSY	COOK	GNVF-700	GREENHECK, TWIN CITY	CENTRIFUGAL INLINE CABINET	EXHAUST	DIRECT	EC	6.31	BACKDRAFT	-	380	0.75	1,519	1,778	ECM	0.33	120/1/60	15	4	39	1,3	A,B,D,E,P
PV8	CORAL MEZZ (AMB.AN)	COOK	135 SQN-D GALV	GREENHECK, TWIN CITY	SQUARE CENTRIFUGAL INLINE BLOWER	EXHAUST	DIRECT	EC	13.50	BACKDRAFT	OPEN	1,440	0.75	1,390	1,725	ECM	0.50	120/1/60	15	9	124	1,3	E,G,H,M,N,R
PV9	CF STAFF 2ND FLR (ROOF)	COOK	100 ACEH	GREENHECK, TWIN CITY	DOWNBLAST CENTRIFUGAL EXHAUST	EXHAUST	DIRECT	EC	10.00	BACKDRAFT	OPEN	400	0.60	1,515	1,725	ECM	0.25	120/1/60	15	8	67	1,2,4,6	E,G,H,I,J,M,N,Q
PV10	OZONE	COOK	GNVF-180	GREENHECK, TWIN CITY	CENTRIFUGAL INLINE CABINET	EXHAUST	DIRECT	EC	7.63	BACKDRAFT	-	250	0.35	1,572	1,675	ECM	0.13	120/1/60	15	7	17	1,2,5	A,B,D,E,F,S
PV11	3RD FLOOR CFS REST.	COOK	GNVF-180	GREENHECK, TWIN CITY	CENTRIFUGAL INLINE CABINET	EXHAUST	DIRECT	EC	7.63	BACKDRAFT	-	100	0.35	1,058	1,675	ECM	0.13	120/1/60	15	3	17	1,2	-
PV12	3D PRINTING	COOK	GNVF-180	GREENHECK, TWIN CITY	CENTRIFUGAL INLINE CABINET	EXHAUST	DIRECT	EC	7.63	BACKDRAFT	-	250	0.35	1,572	1,675	ECM	0.13	120/1/60	15	7	17	1,7	A,B,D,E,F,S
PV13	SE WING CHANGING ROOM	COOK	GNCF-100	GREENHECK, TWIN CITY	CEILING-MOUNTED VENTILATORS	EXHAUST	DIRECT	EC	7.63	BACKDRAFT	-	70	0.35	846	1,000	ECM	0.13	120/1/60	15	2	17	1,8	A,B,C,D,E,F,T
PV14	SE WING CHANGING ROOM	COOK	GNCF-100	GREENHECK, TWIN CITY	CEILING-MOUNTED VENTILATORS	EXHAUST	DIRECT	EC	7.63	BACKDRAFT	-	70	0.35	846	1,000	ECM	0.13	120/1/60	15	2	17	1,8	A,B,C,D,E,F,T
PV15	SE WING CHANGING ROOM	COOK	GNCF-100	GREENHECK, TWIN CITY	CEILING-MOUNTED VENTILATORS	EXHAUST	DIRECT	EC	7.63	BACKDRAFT	-	70	0.35	846	1,000	ECM	0.13	120/1/60	15	2	17	1,8	A,B,C,D,E,F,T
PV16	SE WING CHANGING ROOM	COOK	GNCF-100	GREENHECK, TWIN CITY	CEILING-MOUNTED VENTILATORS	EXHAUST	DIRECT	EC	7.63	BACKDRAFT	-	70	0.35	846	1,000	ECM	0.13	120/1/60	15	2	17	1,8	A,B,C,D,E,F,T

NOTES:
1. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2. UNIT TO RUN ON SCHEDULE. REFER TO CONTROL SEQUENCE FOR ADDITIONAL INFORMATION.
3. UNIT TO RUN ON WALL SWITCH AND INTERLOCK WITH ASSOCIATED AHU. REFER TO CONTROL SEQUENCE FOR ADDITIONAL INFORMATION.
4. REPLACES EXISTING FAN IN SAME LOCATION; SAME VOLTAGE IS USED, VERIFY SIZE DIFFERENCES AND ADJUST CONNECTIONS AS NEEDED.
5. ALTERNATE #2 ONLY.
6. ALTERNATE #4 ONLY.
7. UNIT TO RUN ON ON/OFF WALL SWITCH. REFER TO CONTROL SEQUENCE FOR FURTHER INFORMATION.
8. UNIT TO RUN ON OCCUPANCY SENSORS. REFER TO CONTROL SEQUENCE FOR FURTHER INFORMATION.

ACCESS:
- A COATING: NO COAT - GALVANIZED STEEL - ALUMINUM HOUSING
- B SERVICE SWITCH: PLUG DISCONNECT
- C SPEED CONTROL: FAN MOUNTED CONTROLLER (GEMINI)
- D ISOLATOR: GEMINI ISOLATOR KIT
- E UL 705 - POWER VENTILATOR
- F INTEGRAL BACKDRAFT DAMPER
- G SPEED CONTROL: FAN MOUNTED CONTROLLER
- H SERVICE SWITCH: NEMA 1, LOOSE
- I BIRD SCREEN - ALUMINUM
- J HURRICANE RATED CURB / ADAPTER CURB
- K ORIFICE PLATE 91
- L STAINLESS STEEL HARDWARE
- M DAMPER: MOTORIZED BACKDRAFT DAMPER
- N. COATING: LORENIZED OR EQUIVALENT FACTORY PROVIDED CORROSION RESISTANCE MEETING 1,000 HOURS ASTM B117 SALT SPRAY TEST.
- O. CURB: RCG 18
- P. SPEED CONTROL: TYPE M1 INTERNAL CONTROL
- Q. CURB: RCG 16
- R. ISOLATOR: SC-35 SET(4)
- S. SPEED CONTROL: TYPE P1 INTERNAL CONTROL
- T. 277V TO 120V TRANSFORMER. COORDINATE WITH ELECTRICAL CONTRACTOR.

ELECTRIC HEATER SCHEDULE

DRAWING CODE	BASIS OF DESIGN MANUFACTURER	BASIS OF DESIGN MODEL	ALTERNATE APPROVED MANUFACTURERS	DESCRIPTION TYPE	FAN	DISCHARGE	ELECTRIC COIL CAPACITY (KW)	STEPS	SUPPLY AIR AIRFLOW (CFM)	TEMP RISE (°F)	FAN MOTOR SPEED (RPM)	MOTOR (HP)	ELECTRICAL POWER (V/PH/HZ)	MAX AMP (A)	WEIGHT (LBS)	MOUNTING HEIGHT (FT)	NOTES	ACCESSORIES
EUH1	MARKEL	E3383D-RP	QMARK, INDEECO	CEILING HEATER	AXIAL	DOWNFLOW	1.5	1	175	27.0	700	INTEGRAL	120/1/60	12.5	22	IN CEILING	1,2	A,B
EUH2	MARKEL	E3383D-RP	QMARK, INDEECO	CEILING HEATER	AXIAL	DOWNFLOW	1.5	1	175	27.0	700	INTEGRAL	120/1/60	12.5	22	IN CEILING	1,2	A,B
EUH3	MARKEL	E3383D-RP	QMARK, INDEECO	CEILING HEATER	AXIAL	DOWNFLOW	1.5	1	175	27.0	700	INTEGRAL	120/1/60	12.5	22	IN CEILING	1,2	A,B
EUH4	MARKEL	E3383D-RP	QMARK, INDEECO	CEILING HEATER	AXIAL	DOWNFLOW	1.5	1	175	27.0	700	INTEGRAL	120/1/60	12.5	22	IN CEILING	1,2	A,B

NOTES:
1. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2. UNIT SHALL INCLUDE INTEGRAL HIGH LIMIT (OVERHEAT) PROTECTION AND FAN DELAY CONTROL.

ACCESSORIES:
- A TAMPER-RESISTANT LINE VOLTAGE SINGLE-POLE WALL THERMOSTAT
- B T-BAR MOUNTING KIT

PUMP SCHEDULE

DRAWING CODE	BOD MFR	BOD MODEL	ALTERNATE APPROVED MFRS	PUMP TYPE	SERVICE	FLUID	DUTY POINT FLOW (GPM)	DUTY POINT EFFICIENCY (%)	TOTAL DYNAMIC HEAD (FT)	MAX OPER. PRESS. (PSIG)	MAX OPER. TEMP. (°F)	INLET / OUTLET SIZE (IN.)	CONNECTION TYPE	IMPELLER SIZE (IN.)	MOTOR ENCLOSURE TYPE	MATERIALS	OPER. SPEED (RPM)	MOTOR POWER (HP)	DUTY POINT POWER (HP)	ELECTRICAL (V/PH/HZ)	EST. WEIGHT (LBS)	NOTES	ACCESS.
PCHWP-1	B&G	E-80	TACO, ARMSTRONG	IN-LINE CENTRIFUGAL	CHILLED WATER PLANT LOOP	WATER	1,030	84.60	35	175	250	8 / 8	FLANGED	10.75	ODP	CAST IRON	1,061	15	10.7	460/3/60	705	1	A,B,C
PCHWP-2	B&G	E-80	TACO, ARMSTRONG	IN-LINE CENTRIFUGAL	CHILLED WATER PLANT LOOP	WATER	1,030	84.60	35	175	250	8 / 8	FLANGED	10.75	ODP	CAST IRON	1,061	15	10.7	460/3/60	705	1	A,B,C
PHRWP-1	B&G	E-80	TACO, ARMSTRONG	IN-LINE CENTRIFUGAL	HEATING HOT WATER PLANT HEAT RECOVERY LOOP	WATER	281	77.70	30	175	250	4 / 4	FLANGED	9.5	ODP	CAST IRON	1,586	5	2.7	460/3/60	415	1	A,B,C
PHRWP-2	B&G	E-80	TACO, ARMSTRONG	IN-LINE CENTRIFUGAL	HEATING HOT WATER PLANT HEAT RECOVERY LOOP STANDBY	WATER	281	77.70	30	175	250	4 / 4	FLANGED	9.5	ODP	CAST IRON	1,586	5	2.7	460/3/60	415	1	A,B,C
SCHWP-1	B&G	E-1510	TACO, ARMSTRONG	BASE-MOUNTED, END-SUCTION CENTRIFUGAL	CHILLED WATER BUILDING LOOP	WATER	550	84.80	55	175	250	5 / 4	FLANGED	9.25	ODP	CAST IRON	1,544	15	8.99	460/3/60	530	1	A,B,C
SCHWP-2	B&G	E-1510	TACO, ARMSTRONG	BASE-MOUNTED, END-SUCTION CENTRIFUGAL	CHILLED WATER BUILDING LOOP	WATER	550	84.80	55	175	250	5 / 4	FLANGED	9.25	ODP	CAST IRON	1,544	15	8.99	460/3/60	530	1	A,B,C
SCHWP-3	B&G	E-1510	TACO, ARMSTRONG	BASE-MOUNTED, END-SUCTION CENTRIFUGAL	CHILLED WATER BUILDING LOOP STANDBY	WATER	550	84.80	55	175	250	5 / 4	FLANGED	9.25	ODP	CAST IRON	1,544	15	8.99	460/3/60	530	1	A,B,C
SHWP-1	B&G	E-1510	TACO, ARMSTRONG	BASE-MOUNTED, END-SUCTION CENTRIFUGAL	HEATING HOT WATER BUILDING LOOP	WATER	550	84.20	50	175	250	3	FLANGED	8.25	ODP	CAST IRON	1,711	10	8.26	460/3/60	390	1	A,B,C
SHWP-2	B&G	E-1510	TACO, ARMSTRONG	BASE-MOUNTED, END-SUCTION CENTRIFUGAL	HEATING HOT WATER BUILDING LOOP STANDBY	WATER	550	84.20	50	175	250	3	FLANGED	8.25	ODP	CAST IRON	1,711	10	8.26	460/3/60	390	1	A,B,C
CDP-1	LITTLE GIANT	VCMA-20ULST-PRO	ASPEN, HARTELL	VERTICALLY MOUNTED, TURBINE CENTRIFUGAL	CONDENSATE	WATER	10	-	20	9	140	1 / 3/8	BARBED	-	ODP	PLASTIC	-	1/30	-	120/1/60	6	1	-
BP-1	FULTON	2-30-001762	B&G, TACO	IN-LINE ECM CENTRIFUGAL CIRCULATOR	HEATING HOT WATER PLANT BOILER LOOP	WATER	192	-	7	175	230	2 1/2 / 2 1/2	FLANGED	-		CAST IRON	-	1/6	-	208/1/60	49	1,2	-
BP-2	FULTON	2-30-001762	B&G, TACO	IN-LINE ECM CENTRIFUGAL CIRCULATOR	HEATING HOT WATER PLANT BOILER LOOP STANDBY	WATER	192	-	7	175	230	2 1/2 / 2 1/2	FLANGED	-		CAST IRON	-	1/6	-	208/1/60	49	1,2	-

NOTES:
1. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2. BOILER PRIMARY PUMPS SHALL BE FURNISHED WITH BOILER PACKAGE (FULTON OR APPROVED EQUAL), INCLUDING FLANGE KITS. PUMPS SHALL BE CONTROL-COMPATIBLE AND MODULATING (0–10V OR 4–20mA). CONTRACTOR SHALL PROVIDE INSTALLATION, POWER, CONTROLS COORDINATION, AND PIPING CONNECTIONS.

ACCESS:
- A PREMIUM EFFICIENT MOTOR
- B CAST IRON BODY, STAINLESS STEEL FITTED.
- C VFD

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SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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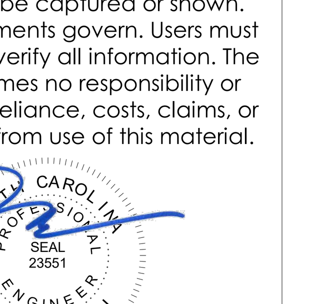
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NOTE: IF THIS DRAWING IS NOT 30" X 42", IT IS A REDUCED PRINT. REFER TO GRAPHIC SCALE.

Bulletin #2 issued solely to identify revisions to the Bulletin #1 drawings within the 12/05/2025 signed and sealed set. Not all changes may be captured or shown. Contract Documents govern. Users must independently verify all information. The Engineer assumes no responsibility or liability for any reliance, costs, claims, or actions arising from use of this material.



06-May-26

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1
2	04-27-26	BULLETIN #2

MECHANICAL SCHEDULES

M-6.1

ROOFTOP UNIT SCHEDULE

DRAWING CODE	UNIT LOCATION	BOD MFR	BOD MODEL	ALTERNATE APPROVED MFRS (SEE NOTE 18)	SYSTEM TYPE	AIRFLOW CONDITIONS SA	SA ESP (IN. WG.)	MAX OA	MIN OA	RA	SUPPLY FAN QTY	TYPE	AIRFLOW	TOTAL ESP (IN. WG.)	RPM	HP	BHP	MOTOR HEAT	TOTAL ESP (IN.WG.)
RTU-01	N.E. SHARK ROOF	ANNEXAIR	AHU-E-03-C-H	TRANE, PETRA, CAHS	4-PIPE CAV	3,690	1.5	610	-	3,080	2	PLUG	1,845	4.91	2,734	4.14	3.76	5.26	4.91
RTU-02	CENTER SHARK ROOF	ANNEXAIR	AHU-E-07-C-H	TRANE, PETRA, CAHS	4-PIPE CAV	8,295	1.5	1,025	185	7,270	3	PLUG	2,765	4.91	2,338	4.88	4.44	4.27	4.91
RTU-03	S.E. SHARK ROOF	ANNEXAIR	AHU-E-02-C-H	TRANE, PETRA, CAHS	4-PIPE CAV	1,820	1.5	540	220	1,280	2	PLUG	910	4.91	2,735	2.19	1.99	6.06	4.91
RTU-04	S.W. SHARK ROOF	ANNEXAIR	AHU-E-07-H-C-H	TRANE, PETRA, CAHS	4-PIPE VAV	6,510	1.5	2,230	2,300	4,280	2	PLUG	3,255	5.13	2,323	7.74	7.04	5.69	5.13

DRAWING CODE	CHILLED WATER COIL AIRFLOW MAX	EAT (db)	EAT (wb)	LAT (db)	LAT (wb)	SENS CAP (MBH)	TOTAL CAP (MBH)	EWT	LWT	FLOW (GPM)	TOTAL CAP (TON)	WPD (FT. H20)	PIPE CONN. (IN)	PREHEAT AND/OR REHEAT COIL COIL POSITION (SEE NOTE 9)	AIRFLOW	EAT	LAT	EWT	LWT	FLOW (GPM)	TOTAL CAP (MBH)	WPD (FT. H20)	PIPE CONN. (IN)
RTU-01	3,690	79.0	64.6	53.0	52.2	106	135	44	54	27.0	11.3	20.0	1.5	REHEAT	3,690	50.0	75.0	120	100	10.0	102.0	10.0	1
RTU-02	8,295	78.6	67.2	52.7	51.8	237	387	44	54	77.0	32.3	20.0	2	REHEAT	8,295	50.0	75.0	120	100	23.0	229.0	10.0	1.25
RTU-03	1,820	81.6	69.0	53.0	52.5	58	94	44	54	19.0	7.9	20.0	1.25	REHEAT	1,820	50.0	75.0	120	100	5.0	51.0	10.0	3/4
RTU-04	6,510	80.9	69.9	51.1	50.5	214	390	44	54	78.0	32.5	20.0	2	PRE / REHEAT	2230 / 6510	23.0 / 50.0	50.0 / 75.0	120	100	7.0 / 18.0	67.0 / 180.0	10.0 /10.0	.75 / 1.25

DRAWING CODE	FILTERS PRE FILTERS SA & EA	FINAL FILTERS SA	ELECTRICAL POWER SUPPLY (V/PH/HZ)	UNIT FLA (A)	MCA (A)	MOCP (A)	LSS EMERG. BACKUP	EST. WEIGHT (LBS)	OCCUP. CONTROL METHOD	NOTES	ACCESS
RTU-01	2" MERV 10	4" MERV 15	460/3/60	16.0	18.0	25	YES	2,800	24 HR	1 - 18	A - H
RTU-02	2" MERV 10	4" MERV 15	460/3/60	25.0	27.0	35	YES	4,500	24 HR	1 - 18	A - H
RTU-03	2" MERV 10	4" MERV 15	460/3/60	9.0	10.0	15	YES	2,500	24 HR	1 - 18	A - H
RTU-04	2" MERV 10	4" MERV 15	460/3/60	22.0	25.0	35	NO	4,600	DCV	1 - 18	A - H

NOTES:
1 REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2 AIRFLOW IN CFM; TEMPERATURES IN °F
3 COIL, DRAIN AND MOTOR SIDE ACCESS TO BE FIELD CONFIRMED PRIOR TO SUBMITTING FOR APPROVAL.
4 MAX COIL FACE VELOCITY SHALL NOT EXCEED SCHEDULED VALUES.
5 ALL CONTROLS SENSORS, ACTUATORS AND WIRING PROVIDED AND INSTALLED BY DDC CONTRACTOR.
6 REFER TO PLANS AND SECTION FOR UNIT ARRANGEMENTS.
7 FAN SHALL BE DIRECT DRIVE ECM W/ CORROSION COATED MOTORS W/ MODULATING SPEED CONTROLLER PER MOTOR. SEE EQUIPMENT SCHEDULE FOR SIZES AND QUANTITIES.
8 N+1 FAN REDUNDANCY WITH BACKDRAFT DAMPERS.
9 CONSTRUCTION TYPE: BIOCOMPOSITE
10 CASING: DEFLECTION OF L/300
11 CASING: 0.5% LEAKAGE RATE AT 6 INCHES (ASHRAE 111 CLASS 2)
12 CASING: R-13 THERMAL PERFORMANCE W/ FOAM INSULATION
13 CASING: SHALL HAVE NO EXTERIOR CONDENSATION W/ INTERIOR AHU TEMPERATURE DOWN TO 42.5 °F WHILE EXTERIOR CONDITIONS ARE 95.0°F db / 85.0°F wb
14 CASING SHALL BE COMPLETELY PROTECTED AGAINST WEATHERIZATION W/ MINIMUM 15-YEAR WARRANTY AGAINST CORROSION
15 EQUIPMENT SPECIFIC SEISMIC & WIND RATED CURB, RESTRAINT & FASTENERS W/ ENGINEER CERTIFICATION
16 FILTER FRAMES SHALL BE CORROSION COATED
17 ALL COILS SHALL BE CORROSION COATED
18 ALTERNATE 11 - ALTERNATE APPROVED MANUFACTURERS SHALL MEET ALL OF THE CONSTRUCTION LEVEL REQUIREMENTS AS PER SCHEDULE, NOTES & ACCESSORIES INCLUDING MINIMUM 15-YEAR CASING WARRANTY
(18.1) MINIMUM 18 GAUGE MARINE GRADE POWDER COATED ALUMINUM EXTERIOR AND INTERIOR CABINET.
(18.2) EXTERIOR COATINGS MUST BE HIGH-PERFORMANCE EPOXY OR POLYURETHANE BASED WITH A MINIMUM OF 5,000 HOUR SALT SPRAY RATING (ASTM B117), IF A HIGHER RATED COATING IS AVAILABLE, INCLUDE THE ASSOCIATED COST INCREASE AS A SEPERATE LINE ITEM IN THE SUBMITTAL.

ACCESS:
A COOLING COIL SECTIONS SHALL BE PROVIDED WITH AN INSULATED, DOUBLE WALL, BIOCOMPOSITE OR 316 STAINLESS STEEL DRAIN PAN WITH POSITVE DRAINAGE MEETING INDOOR AIR QUALITY (IAQ) IN ACCORDANCE WITH ASHRAE 62.1.
B COPPER COIL, ALUMINUM FIN, STAINLESS STEEL COIL CASING.
C PROVIDE FILTERS AS SPECIFIED, THREE SETS OF EACH TYPE. PROVIDE ONE SET IN UNIT, PROVIDE ONE SET FOR INSTALLATION AFTER SYSTEM IS BALANCED AND BUILDING IS CLEANED, AND ONE SET FOR TURN OVER TO OWNER.
D PROVIDE RETURN AIR AND OUTDOOR AIR DAMPERS. ALL DAMPERS SHALL BE ALL ALUMINUM CONSTRUCTION.
E HINGED ACCESS DOORS
F PROVIDE MARINE LIGHTS AND GFI RECEPTACLE, REQUIRES SEPEARATE 120V CIRCUIT PROVIDED/INSTALLED BY ELECTRICAL CONTRACTOR
G SINGLE POINT POWER W/ FACTORY DISCONNECT SWITCH
H 316 STAINLESS STEEL OR NON-CORROSIVE COATED FASTENERS THROUGHOUT UNIT CABINET

INDOOR AIR HANDLER SCHEDULE

DRAWING CODE	AREA SERVED	BOD MFR	MODEL	ALTERNATE APPROVED MFRS	CONFIGURATION (4 PIPE)	COOLING COIL TOTAL CAP (MBH)	SENSIBLE CAP (MBH)	EAT (°F db)	EAT (°F wb)	LAT (°F db)	LAT (°F wb)	EWT (°F)	LWT (°F)	FLOW (GPM)	COIL PD (FT. H2O)
FCU-01	E204 - OZONE	TRANE	FCDB120	DAIKIN, IEC	HORIZONTAL CAB	35.0	26.8	76.9	64.1	53.4	52.7	44.0	55.6	6.0	11.4
FCU-02	E303 - FRACTIONATORS	TRANE	FCDB060	DAIKIN, IEC	HORIZONTAL CAB	11.5	11.5	74.8	45.8	53.8	34.9	44.0	55.4	2.0	2.1
FCU-03	E306 - OFFICES	TRANE	BCHE024	DAIKIN, IEC	HORIZONTAL	29.2	16.2	81.5	69.8	52.1	50.9	44.0	54.0	6.0	6.4
FCU-04	148 - HUSBANDRY	TRANE	BCVE036	DAIKIN, IEC	VERT / FRONT RET.	34.9	21.9	76.6	65.6	51.8	50.9	44.0	53.6	7.5	4.5
FCU-05	R208B - CLASSROOM	TRANE	BCVE024	DAIKIN, IEC	VERTICAL	41.6	21.6	84.7	72.7	53.5	52.2	44.0	54.1	8.5	11.0
FCU-06	R208A - CLASSROOM	TRANE	BCVE024	DAIKIN, IEC	VERTICAL	40.0	20.6	85.1	73.1	53.1	51.9	44.0	54.3	8.0	9.9
FCU-07	114A - FW HUSBANDRY	TRANE	BCHE054	DAIKIN, IEC	HORIZONTAL	43.2	37.6	76.3	62.3	53.0	52.0	44.0	54.7	8.5	2.1
FCU-08	R210 - SUPPORT	TRANE	BCVE036	DAIKIN, IEC	VERTICAL	51.9	29.4	80.9	69.5	52.9	52.0	44.0	54.1	10.5	8.2
FCU-09	E113 - MECH.	TRANE	BCHE072	DAIKIN, IEC	HORIZONTAL	56.8	56.8	76.7	46.8	50.4	33.0	44.0	54.5	11.5	4.2
FCU-10	R131 - CFS EXHIBIT	TRANE	BCVE060	DAIKIN, IEC	VERT / FRONT RET.	63.8	45.0	74.3	63.3	52.7	51.7	44.0	54.3	13.0	7.9
FCU-11	E102A - CLASSROOM	TRANE	BCVE024	DAIKIN, IEC	VERTICAL	33.0	16.7	84.6	73.1	51.9	50.8	44.0	54.4	6.5	6.8
FCU-12	E102B - CLASSROOM	TRANE	BCVE024	DAIKIN, IEC	VERTICAL	33.0	16.6	84.4	73.1	51.9	50.8	44.0	54.4	6.5	6.8
FCU-13	E103B - STORAGE	TRANE	FCCB020	DAIKIN, IEC	HORIZONTAL CONC	3.8	3.2	74.9	62.2	52.5	51.9	44.0	54.0	0.8	1.3
FCU-14	E101 - AMB. ANIMALS	TRANE	BCVE072	DAIKIN, IEC	VERTICAL	138.2	63.4	91.5	78.9	52.1	51.2	44.0	55.9	23.5	15.2
FCU-15	E104 - CATERING KITCHEN	TRANE	BCVE024	DAIKIN, IEC	VERTICAL	19.7	11.5	82.1	69.2	50.9	49.9	44.0	54.1	4.0	2.9
FCU-16	E105 - SALT STORAGE	TRANE	BCVE036	DAIKIN, IEC	VERTICAL	30.6	20.0	75.7	64.7	51.7	50.7	44.0	53.7	6.5	3.5
FCU-17	R106 - WORKSHOP	TRANE	BCVE024	DAIKIN, IEC	VERTICAL	22.3	14.4	78.6	66.3	52.5	51.3	44.0	54.3	4.5	3.6
FCU-18	R107 - NECROPSPY	TRANE	BCVE024	DAIKIN, IEC	VERTICAL	38.1	17.9	93.0	79.0	50.9	49.8	44.0	54.3	7.5	8.8
FCU-20	R213 - TOUCH TANK OFFICES	TRANE	BCVE024	DAIKIN, IEC	VERTICAL	22.3	15.7	77.0	64.5	53.3	51.9	44.0	54.4	4.5	3.6
FCU-21	R205 - LIBRARY / CONF. / OFF.	TRANE	BCVE036	DAIKIN, IEC	VERTICAL	44.5	25.6	79.3	68.3	52.6	51.6	44.0	54.2	9.0	6.3
FCU-22	R110 - CORRIDOR	TRANE	BCVE024	DAIKIN, IEC	VERTICAL	22.9	14.5	79.0	66.7	52.6	51.4	44.0	54.5	4.5	3.6
FCU-23	R106B - CNC/3D PRINTING	TRANE	FCCB030	DAIKIN, IEC	HORIZONTAL CONC	7.6	7.0	74.9	61.6	53.4	52.6	44.0	54.1	1.5	4.3
FCU-24	147 - CONCESSION	TRANE	BCVE024	DAIKIN, IEC	VERTICAL	25.2	16.1	77.8	66.2	53.4	52.2	44.0	54.6	5.0	4.3
AHU-07	R123 - MAIN LOBBY	TRANE	BCVE090	DAIKIN, IEC	HORIZ. MZ VAV	131.5	74.0	80.4	69.3	53.5	52.4	44.0	54.1	27.0	7.7

DRAWING CODE	PREHEAT / REHEAT COIL COIL POS. PH	COIL POS. RH	CAP (MBH)	EAT (°F)	LAT (°F)	EWT (°F)	LWT (°F)	FLOW (GPM)	COIL PD (FT. H2O)	FAN SECTION SUPPLY AIR (CFM)	OUTSIDE AIR (CFM)	ESP (IN.H20)	MOTOR QTY	(W)	(HP)	VOLTAGE (V/PH/HZ)	MCA (A)	MOCP (A)	UNIT DIMENSIONS L (IN.)	W (IN.)	H (IN.)	OPERATING WEIGHT (LBS.)	LSS EMERGENCY POWER	FILTER	NOTES	ACCESS
FCU-01	-	RH	14.8	60.4	73.4	120.0	100.2	1.5	1.0	1,050	210	0.00	1	277	-	120/1/60	6.1	15	83.0	26.0	10.0	218	YES	1" MERV 13	1 - 9	-
FCU-02	-	RH	5.6	69.5	79.8	120.0	105.0	0.8	0.2	505	-	0.00	1	110	-	120/1/60	3.9	15	58.0	26.0	10.0	155	YES	1" MERV 13	1 - 9	-
FCU-03	-	RH	24.2	50.8	95.6	120.0	101.3	2.5	3.2	500	200	0.50	1	-	.5	120/1/60	9.3	15	53.7	30.0	17.0	226	NO	2" MERV 13	1 - 8,10	C
FCU-04	-	RH	31.1	55.0	90.7	120.0	102.8	3.5	0.6	805	85	0.50	1	-	.5	120/1/60	9.3	15	23.0	29.8	49.9	244	YES	2" MERV 13	1 - 8,10	-
FCU-05	-	RH	26.9	44.3	84.0	120.0	99.5	2.5	0.5	625	340	0.50	1	-	.5	120/1/60	9.3	15	19.5	29.8	45.9	204	NO	2" MERV 13	1 - 8,10	-
FCU-06	-	RH	26.3	42.9	84.7	120.0	99.9	2.5	0.5	580	330	0.50	1	-	.5	120/1/60	9.3	15	19.5	29.8	45.9	204	NO	2" MERV 13	1 - 8,10	-
FCU-07	-	RH	32.7	55.0	75.5	120.0	102.6	3.5	0.6	1,470	125	0.50	1	-	1	120/1/60	16.6	25	59.9	46.0	18.0	337	YES	2" MERV 13	1 - 8,10,12	C
FCU-08	-	RH	33.0	56.8	88.9	120.0	102.0	3.5	0.6	950	260	0.50	1	-	.5	120/1/60	9.3	15	23.0	29.8	49.9	244	YES	2" MERV 13	1 - 8,10	-
FCU-09	-	RH	45.6	55.0	76.0	120.0	101.3	4.5	1.0	1,900	-	0.50	1	-	1.5	460/60/3	4.1	15	59.9	58.0	18.0	424	YES	2" MERV 13	1 - 8,10	C
FCU-10	-	RH	67.6	54.0	86.9	120.0	100.2	6.5	1.3	1,900	-	0.75	1	-	1.5	460/60/3	4.1	15	27.5	34.8	58.6	372	NO	2" MERV 13	1 - 8,10	-
FCU-11	-	RH	21.5	43.0	86.1	120.0	99.3	2.0	0.4	460	265	0.50	1	-	.5	120/1/60	9.3	15	19.5	29.8	45.9	204	NO	2" MERV 13	1 - 8,10	-
FCU-12	-	RH	21.5	43.0	86.1	120.0	99.3	2.0	0.4	460	265	0.50	1	-	.5	120/1/60	9.3	15	19.5	29.8	45.9	204	NO	2" MERV 13	1 - 8,10	-
FCU-13	-	RH	3.1	57.0	79.2	120.0	111.6	0.8	0.1	130	-	0.25	1	42	-	120/1/60	2.8	15	32.7	25.0	10.0	81	NO	1" MERV 13	1 - 8,10	-
FCU-14	PH	-	61.7	23.0	62.5	120.0	100.1	6.0	1.8	1,440	1,440	1.00	1	-	1	460/60/3	3.1	15	54.6	58.0	53.8	500	YES	2" MERV 13	1,2,3,5,6,7,8,10,11	C
FCU-15	-	RH	10.3	50.8	79.2	120.0	100.4	1.0	0.3	335	100	0.50	1	-	.5	120/1/60	9.3	15	19.5	29.8	45.9	200	NO	2" MERV 13	1 - 8,10	-
FCU-16	-	RH	30.0	55.0	91.7	120.0	103.4	3.5	0.6	755	55	0.50	1	-	.5	120/1/60	9.3	15	23.0	29.8	49.9	244	NO	2" MERV 13	1 - 8,10	-
FCU-17	-	RH	19.2	50.3	95.1	120.0	105.3	2.5	0.5	500	105	0.50	1	-	.5	120/1/60	9.3	15	19.5	29.8	45.9	204	NO	2" MERV 13	1 - 8,10	-
FCU-18	PH	-	17.1	23.0	64.5	120.0	98.0	1.5	0.6	380	380	0.50	1	-	.5	120/1/60	9.3	15	19.5	29.8	45.9	200	NO	2" MERV 13	1,2,3,5,6,7,8,10,11	-
FCU-20	-	RH	21.2	55.0	87.4	120.0	100.0	2.0	0.4	605	85	0.50	1	-	.5	120/1/60	9.3	15	19.5	29.8	45.9	204	NO	2" MERV 13	1 - 8,10	B
FCU-21	-	RH	30.9	54.4	87.2	120.0	100.2	3.0	0.4	870	280	0.50	1	-	.5	120/1/60	9.3	15	23.0	29.8	49.9	244	NO	2" MERV 13	1 - 8,10	-
FCU-22	-	RH	12.5	55.0	78.0	120.0	101.5	1.3	0.4	500	120	0.50	1	-	.5	120/1/60	9.3	15	19.5	29.8	45.9	200	NO	2" MERV 13	1 - 8,10	-
FCU-23	-	RH	3.9	65.0	77.0	120.0	112.2	1.0	0.2	300	-	0.25	1	113	-	120/1/60	2.8	15	32.7	25.0	10.0	81	NO	1" MERV 13	1 - 9	-
FCU-24	-	RH	20.8	61.2	93.3	120.0	104.3	2.5	0.5	600	105	0.50	1	-	0.5	120/1/60	9.3	15	19.5	29.8	45.9	204	NO	2" MERV 13	1 - 8,10	
AHU-07	-	-								2,490	855	1.50	1	-	3.0	460/60/3	6.9	15	60.8	48.0	66.7	574	NO	2" MERV 13	1 - 8,10,12	A, C

NOTES:
1 REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2 PROVIDE FACTORY INSTALLED DISCONNECT SWITCH.
3 PROVIDE ECM FAN MOTOR.
4 PROVIDE HEATING COIL IN REHEAT POSITION.
5 PROVIDE STAINLESS STEEL DRAIN PAN WITH WATER-LEVEL DETECTION DEVICE CONFORMING TO UL 508 IN ACCORDANCE WITH NCMC DECTION 307.2.3.
6 CONTROL VALVE SUPPLIED BY CONTROLS CONTRACTOR.
7 DOUBLE WALL PANELS
8 FIELD-APPLY CORROSION-RESISTANT COATING TO ALL COILS AND INTERIOR AND EXTERIOR CABINETS PRIOR TO INSTALLATION TO MEET ASTM-B117 15,000 HR
9 PROVIDE 1" MERV 13 FILTER WHERE RETURN GRILLE NOT PROVIDED WITH FILTER GRILLE.
10 PROVIDE 2" MERV 13 FILTER WHERE RETURN GRILLE NOT PROVIDED WITH FILTER GRILLE.
11 UNIT INCLUDES AN INTERNAL PREHEAT COIL AND A DUCT-MOUNTED REHEAT COIL.
12 INCLUDED IN ALTERNATE #2 ONLY

ACCESS:
A DUCT SMOKE DETECTOR INSTALLED IN RETURN AIR DUCT.
B 120V CONDENSATE PUMP
C FACTORY OR FIELD-FABRICATED ANGLED FILTER BOX

LOUVER SCHEDULE

DRAWING CODE	BOD MFR	BOD MODEL	ALTERNATE APPROVED MFRS	TYPE	FRAME	DESCRIPTION	MATERIAL	LOUVER DEPTH (IN.)	SIZE (W x H) (IN.)	SERVICE	AIRFLOW (CFM)	PERFORMANCE RATINGS FREE AREA (SF)	FREE AREA VEL (FPM)	S.P. LOSS (IN. H20)	WATER PEN. (OZ./SF)	LOCATION	CONNECTED UNIT/S	NOTES	ACCESS
L1	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	120 X 120	EXHAUST	50,570	60.02	843	0.14	0.00	GEN, BLDG	GENERATOR 1	1,2,3,6,7	B
L2	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	120 X 120	EXHAUST	50,570	60.02	843	0.14	0.00	GEN, BLDG	GENERATOR 2	1,2,3,6,7	B
L3	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	16 X 16	EXHAUST	200	0.63	318	0.02	0.00	E306 - OFFICE	FCU-03	1,2,3,4,5	A
L4	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	16 X 16	EXHAUST	140	0.63	223	0.01	0.00	R303- WC	PV11	1,2,3,4,5	A
L5	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	16 X 16	EXHAUST	380	0.63	605	0.07	0.00	R106 WORKSHOP	PV7	1,2,3,4,5	A
L7	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	6	32 X 32	EXHAUST	1,440	3.54	407	0.03	0.00	E202 - CORAL MEZZ.	PV8	1,2,3,4,5	A
L8	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	16 X 16	EXHAUST	250	0.63	398	0.03	0.00	R106B 3D PRINTING	PV12	1,2,3,4,5	A
L9	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	24 X 14	EXHAUST	650	0.93	701	0.10	0.00	R114 MEN	PV4	1,2,3,4,5	A
L10	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	120 X 120	INTAKE	54,740	60.02	912	0.17	0.00	GEN, BLDG	GENERATOR 1	1,2,3,6,7	B
L11	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	120 X 120	INTAKE	54,740	60.02	912	0.17	0.00	GEN, BLDG	GENERATOR 2	1,2,3,6,7	B
L14	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	48 X 32	INTAKE	2,725	5.53	492	0.05	0.00	E202 - CORAL MEZZ.	FCU-05/08/11/12/14/15/16	1,2,3,4,5	A
L15	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	16 X 16	INTAKE	295	0.63	470	0.04	0.00	145 - MECH	FCU-04/17/24	1,2,3,4,5	A
L16	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	16 X 16	INTAKE	380	0.63	605	0.07	0.00	R106 - WORKSHOP	FCU-18	1,2,3,4,5	A
L17	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	16 X 16	INTAKE	280	0.63	446	0.04	0.00	R211A - NURSING	FCU-21	1,2,3,4,5	A
L18	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	16 X 16	INTAKE	330	0.63	525	0.06	0.00	R208A CLASSROOM	FCU-06	1,2,3,4,5	A
L19	RUSKIN	EME5625MDE	GREENHECK, VENT PRDOUCTS	FIXED	STANDARD	VERTICAL, WIND-DRIVEN-RAIN-RESISTANT	ALUMINUM	5	16 X 16	EXHAUST	280	0.63	410	0.04	0.00	SE WING	PV13/14/15/16	1,2,3,4,5	A

NOTES:
1 REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2 AMCA 540 LISTED (IMPACT RESISTANCE)
3 AMCA 550 LISTED (WATER PENETRATION) WITHOUT RELYING ON A SEPARATE DAMPER TO ACHIEVE THE LISTING.
4 SEACOAST RATED FINISH AS SELECTED BY ARCHITECT FROM MANUFACTURER'S FULL RANGE OF COLOR AND GLOSS.
5 INTERLOCK WITH ASSOCIATED POWER VENTILATOR OR AHU/FCU
6 LOUVERS SERVING LEVEL 1 GENERATOR SHALL BE SPRING-LOADED TO OPEN AND MOTOR-POWERED TO CLOSE IN COMPLIANCE WITH NFPA 110 REQUIREMENTS.
7 MOTORIZED DAMPERS SHALL BE SPRING-OPEN / MOTORIZED-CLOSE WITH 8-SECOND SPRING-RETURN ACTUATORS. DAMPERS SHALL BE NORMALLY POWERED CLOSED AND SHALL DE-ENERGIZE AND SPRING OPEN UPON LOSS OF POWER OR UPON RECEIPT OF A GENERATOR RUN SIGNAL, INCLUDING DURING GENERATOR TEST OR MANUAL OPERATION WHEN NORMAL BUILDING POWER IS PRESENT. PROVIDE CONTROL INTERFACE BETWEEN DAMPER ACTUATOR AND GENERATOR CONTROL BOARD. COORDINATE CONTROL SIGNALS AND WIRING WITH CONTROLS CONTRACTOR, ELECTRICAL CONTRACTOR, AND GENERATOR SUPPLIER.

ACCESS:
A BIRD SCREENING (MATERIAL TO MATCH LOUVER MATERIAL)
B LOW-LEAK COASTAL ENVIRONMENT DAMPERS WITH FAST-ACTING GENSET 8-SECOND SPRING OPEN ACTUATOR, RUSKIN MODEL #CD50CE

PACKAGED DEHUMIDIFIER SCHEDULE

DRAWING CODE	BOD MFR	BOD MODEL	ALTERNATE APPROVED MFRS	DEHUMID. CAPACITY @ 80°F/60%RH (PINTS/DAY)	INDOOR SECTION FAN SA (CFM)	OA (CFM)	ESP (IN H2O)	ELECTRICAL VOLTAGE (V/PH/HZ)	MCA (A)	MOCP (A)	WEIGHT (LBS)	NOTES	ACCESS
D1	SANTA-FE	COMPACT 70	APRILAIRE, QUEST	70.0	150	-	0.00	120/1/60	3.7	15	55	1,2,3,4,5	A
D2	SANTA-FE	OASIS 105	APRILAIRE, QUEST	100.0	320		0.00	120/1/60	5.6	15	81	1,2,3,4,6	A

NOTES:
1 REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2 9' CORD PLUGS INTO DEDICATED DUPLEX OUTLET.
3 WALL MOUNT OR SUSPEND WITH HANGING KIT
4 ON-BOARD CONTROLS
5 UNIT DIMENSION: 12" X 12" X 21"
6 UNIT DIMENSION: 14.5" X 19.5" X 32.4"

ACCESS A MERV 13 FILTER

AIR/DIRT SEPARATOR SCHEDULE

DRAWING CODE	BASIS OF DESIGN MANUFACTURER	BASIS OF DESIGN MODEL	ALTERNATE APPROVED MANUFACTURERS	TYPE	FLOW (GPM)	WATER CONNECTIONS SIZE (IN)	STYLE	WEIGHT (LBS)	NOTES	ACCESSORIES
AS1	B&G	CRS-10F	WESSELS, TACO	COALESCING, HIGH VELOCITY	550.00	10"	FLANGED	1,614	1,2,3	A-D
AS2	B&G	CRS-6F	WESSELS, TACO	COALESCING, HIGH VELOCITY	550.00	6"	FLANGED	499	1,2,3	

NOTES:
1 REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2 ASME CERTIFIED, CONSTRUCTED AND STAMPED FOR 125 PSI WORKING PRESSURE @ 200°F.
3 WEIGHT LISTED IS FILLED WEIGHT.

ACCESSORI...
A MANUAL BLOWDOWN VALVE
B SKIM VALVE
C REMOVABLE COALECING MEDIUM
D 304 STAINLESS STEEL COALESCENCE PALL RINGS

SINGLE DUCT VAV TERMINAL BOX SCHEDULE

DRAWING CODE	BOD MFR	BOD MODEL	ALTERNATE APPROVED MFRS	PRIMARY AIRFLOW COOLING MAX (CFM)	COOLING MIN (CFM)	HEATING (CFM)	INLET DIA. (IN)	AIR PRESSURE...	COOLING INLET VELOCITY (FPM)	HEATING COIL CAPACITY (MBH)	ROWS	EAT (°F)	LAT (°F)	EWT (°F)	FLOW (GPM)	WPD (FT H2O)	RUNOUT SIZE (SUP/RET) (IN)	NOISE CRITERIA DISCH (NC)	RAD (NC)	WEIGHT OPERATING (LBS.)	UNIT SERVED FROM	NOTES	ACCESS
VAV-07-1	TRANE	VCWF12	PRICE, IEC	960	750	750	12	0.33	1,222	29.0	3 ROW	55.0	90.6	120.0	3.0	0.66	7/8 / 7/8	34.0	23.0	58	AHU-7	1 - 7	A - D
VAV-07-2	TRANE	VCWF12	PRICE, IEC	1,300	635	635	12	0.53	1,655	25.2	3 ROW	55.0	91.5	120.0	2.5	0.48	7/8 / 7/8	35.0	24.0	58	AHU-7	1 - 7	A - D
VAV-07-3	TRANE	VCWF06	PRICE, IEC	285	160	160	6	0.33	1,452	6.6	3 ROW	55.0	92.9	120.0	0.5	0.28	7/8 / 7/8	31.0	21.0	30	AHU-7	1 - 7	A - D

NOTES:
1 REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2 COIL CONNECTION AND CONTROL ENCLOSURE SHALL BE ON SAME SIDE OF THE UNIT.
3 REFER TO PIPING DIAGRAMS FOR CONTROL VALVE TYPE (2-WAY VS 3-WAY)
4 CONTROLS BY DDC CONTRACTOR.
5 A MINIMUM OF 2 DUCT DIAMETERS OF STRAIGHT-RUN DUCTWORK PRIOR TO INLET CONNECTION.
6 A MINIMUM OF 3 DUCT DIAMETERS OF STRAIGHT DUCT FROM THE DISCHARGE OF THE UNITS PRIOR TO ANY TAKE-OFFS OR TRANSITIONS.
7 INCLUDED IN ALTERNATE #2 ONLY

ACCESS:
A NON-FUSED DISCONNECT SWITCH, FACTORY INSTALLED BY VAV MANUFACTURER
B FACTORY-WIRED AND TAGGED HOT-WATER VALVE AND PIPING PACKAGE.
C CONTRACTOR SHALL PROVIDE 120 VAC TO 24 VAC TRANSFORMER TO POWER UNITS ALONG WITH WIRING FROM TRANSFORMER TO UNITS. REFER TO ELECTRICAL DRAWINGS FOR CIRCUIT LOCATION.
D 1" FOIL FACED INSULATION

EXPANSION TANK SCHEDULE

DRAWING CODE	BASIS OF DESIGN MANUFACTURER	BASIS OF DESIGN MODEL	ALTERNATE APPROVED MANUFACTURERS	SERVICE	WORKING PRESSURE...	VOLUME (GAL)	ACCEPTANCE VOLUME (GAL)	TYPE	CONFIGURATION	DIM. H/D (IN.)	WEIGHT... (LBS)	WEIGHT... (LBS)	NOTES	ACCESSORIES
ET1	B&G	D-240	WESSELS, TACO	CHILLED WATER	125	140.0	113.5	DIAPHRAGM	VERTICAL	78/24	362	1,528	1,2,3	A,B
ET2	B&G	D-240	WESSELS, TACO	HEATING HOT WATER	125	140.0	113.5	DIAPHRAGM	VERTICAL	78/24	362	1,528	1,2,3	A,B

NOTES:
1 REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2 FACTORY PRECHARGE 12 PSIG
3 ASME BOILER AND PRESSURE VESSEL CODE: SECTION VIII, DIVISION 1.

ACCESSORI...
A FULL ACCEPTANCE EXPANSION TANK
B PRESSURE GAUGE

DUCT MOUNTED HEATING COIL

DRAWING CODE	SERVING UNIT	BOD MFR	MODEL	ALTERNATE APPROVED MFRS	PERFORMANCE CAPACITY (MBH)	SUPPLY AIR (CFM)	EAT (°F)	LAT (°F)	AIR PD (FT. H20)	FACE VEL. (FPM)	EWT (°F)	LWT (°F)	FLOW (GPM)	FLUID PD (FT. H2O)	PIPE RUN-OUT (IN.)
DHC-14	FCU-14	TRANE	D5WB12024G0BA129HABB	DAIKIN, IEC	39.0	1,440	50.0	75.0	0.4	720	120.0	100.4	4.0	0.4	2
DHC-18	FCU-18	TRANE	DT0B09012G0BA110BABB	DAIKIN, IEC	10.3	380	50.0	75.1	0.2	507	120.0	99.3	1.0	0.3	3/4

DRAWING CODE	CONSTRUCTION SYSTEM TYPE	ROWS	TUBE MATERIAL	TUBE WALL THICKNESS (IN.)	FIN SPACING (FINS/FT)	FIN MATERIAL	FIN TYPE	COIL FACE AREA (SF)	NOM. COIL HEIGHT (IN.)	FINNED LENGTH (IN.)	UNIT DIMENSIONS LENGTH (IN.)	INSIDE WIDTH (IN.)	OUTSIDE WIDTH (IN.)	HEIGHT (IN.)	OPERATING WEIGHT (LBS.)	NOTES	ACCESS
DHC-14	5/8" SHIPPING COIL, (5W)	2	COPPER	0.020	129	ALUMINUM	PRIMA-FLO H .01"	2.00	12.0	24.0	6.5	25.4	38.1	13.5	46	1 - 5	-
DHC-18	5/8" DUCT COIL, LOW WATER FLOW (T)	2	COPPER	0.020	110	ALUMINUM	PRIMA-FLO E	0.75	9.0	12.0	6.5	13.4	16.9	10.5	15	1 - 3, 5	-

NOTES:
1 REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
2 COMPLETECOAT EPOXY E-COAT OR EQUIVALENT CORROSION RESISTANT COATING
3 STAINLESS STEEL CASING
4 TURBULATORS
5 MAINTAIN MANUFACTURER'S RECOMMENDED STRAIGHT DUCT IN AND OUT OF COIL.

ACCESS: A. N/A

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SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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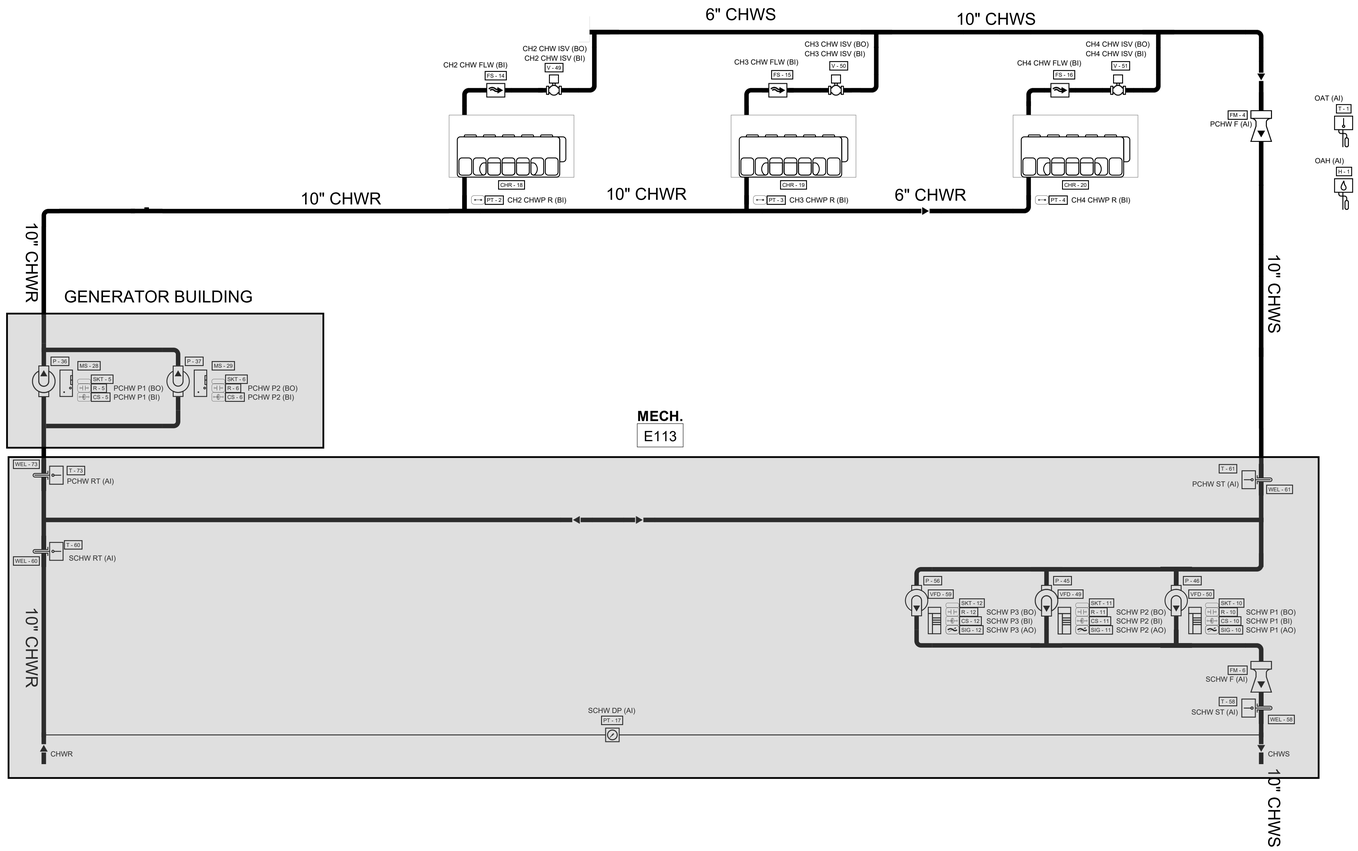
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN
06-May-26

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1
2	04-27-26	BULLETIN #2

MECHANICAL SCHEDULES

M-6.2

Flow Diagram: COOLING PLANT SYSTEMS



CHILLERS (CH-1, CH-2, CH-3)

For each chiller:

Analog Inputs (AI)

- CHx Chilled Water Differential Pressure
- CHx Chilled Water Supply Temperature (if provided by chiller)
- CHx Chilled Water Return Temperature (if provided by chiller)

Binary Inputs (BI)

- CHx Chilled Water Flow Status
- CHx Isolation Valve Open Status
- CHx Chiller Run Status
- CHx General Alarm

Binary Outputs (BO)

- CHx Enable Command
- CHx Isolation Valve Command

Software Points (SFT)

- CHx Pump Request from Chiller
- CHx Availability Status

Alarms

- CHx Failure
- CHx Loss of Flow
- CHx Isolation Valve Failure

PRIMARY CHILLED WATER PUMPS (PCHWP-1, PCHWP-2)

Analog Inputs (AI)

- Primary CHW Supply Temperature
- Primary CHW Return Temperature
- Primary CHW Flow Meter

Binary Inputs (BI)

- PCHWP-x Run Status
- PCHWP-x VFD Fault
- PCHWP-x Failure

Analog Outputs (AO)

- PCHWP-x Speed Command

Binary Outputs (BO)

- PCHWP-x Start/Stop Command

Alarms

- Primary Pump Failure
- Primary Pump VFD Fault

SECONDARY CHILLED WATER PUMPS (SCHWP-1, SCHWP-2, SCHWP-3)

Analog Inputs (AI)

- Secondary CHW Differential Pressure
- Secondary CHW Supply Temperature
- Secondary CHW Return Temperature
- Secondary CHW Flow Meter

Binary Inputs (BI)

- SCHWP-x Run Status
- SCHWP-x VFD Fault
- SCHWP-x Failure

Analog Outputs (AO)

- SCHWP-x Speed Command

Binary Outputs (BO)

- SCHWP-x Start/Stop Command

Alarms

- Secondary Pump Failure
- Secondary Pump VFD Fault
- Differential Pressure Sensor Failure

SYSTEM LEVEL POINTS

Analog Inputs (AI)

- Outdoor Air Temperature
- Outdoor Air Humidity

Binary Inputs (BI)

- BAS Communication Status

Analog Setpoints (SFT)

- Chilled Water Supply Temperature Setpoint
- Outdoor Air Enable Setpoint

Binary Outputs (BO)

- Chiller Plant Enable

Software Points (SFT)

- Lead/Lag Rotation
- Plant Status
- Plant Mode

Alarms

- Chilled Water High Temperature
- Chilled Water Low Temperature
- Sensor Failure
- Communication Failure

Sequence of Operation: COOLING PLANT SYSTEMS

System General Description:

The cooling plant control system shall monitor and control the system's chiller(s), pump(s), and control valves as shown on the cooling plant flow diagram, in the cooling plant points list and as detailed in the sequence of operation listed below.

The cooling plant system consists of air-cooled chiller(s) with its piping configuration arranged as a primary / secondary loop supplying chilled water to the facility.

The manifolded chilled water distribution pumps are configured as lead / lag control.

Cooling Plant System Enable/Disable:

The cooling plant system shall be enabled/disabled by the cooling plant controller as requested by the Building Automation System (BAS) operator interface panel or the BAS time of day schedule. The cooling plant control system shall start and stop the chilled water pumps and chillers based upon system load.

When the cooling plant system is enabled the system shall enable the lead secondary chilled water pump to start based on a call for cooling from the BAS. When flow status for the pump is proven, the system shall report running status to the BAS.

When the cooling plant system is enabled the system shall send an enable signal to the lead chiller. Upon receiving the enable signal the chiller shall send a chilled water pump request signal to the control system to enable the chilled water pumping sequence.

When the cooling plant system is enabled, the system shall respond to a chilled water pump request from any system chiller. The system shall command the associated chilled water isolation valve open and enable the lead primary chilled water pump to start. As additional chillers make chilled water pump requests, open the associated chilled water isolation valve and enable the next (lag) primary chilled water pump to start.

The cooling plant is disabled when all chillers are disabled and there is not an active chilled water pump request. When the plant is disabled, the chilled water pumps shall be commanded off and the chiller isolation valves shall be closed.

Chiller Staging:

Chillers shall operate in a lead/lag sequence, so that the last chiller enabled is the first to be disabled. The cooling plant system shall initiate the start of the next chiller in the sequence whenever the chilled water load, as determined by the system supply water temperature, is not met for 20 minutes (adj.). The system shall initiate the shut down of the next chiller in the sequence whenever excess chilled water capacity exists, as determined by percent run load amps, for 20 minutes (adj.). Chiller lead/lag sequence order shall be based on a round robin logic. (Round robin logic example: 1-2-3, then 2-3-1, then 3-1-2, then 1-2-3, etc.).

The chiller sequence order can be rotated on a schedule. Chiller rotations shall be programmed to occur at one of the following operator-defined intervals:

NEVER: Chillers shall always have the same sequence number.

DAY OF WEEK: Chillers shall rotate on a user-specified day and time once per week.

FIXED NUMBER OF DAYS: Chillers shall rotate after the number of days specified has elapsed.

RUN HOURS: Chillers rotate to attempt to even out the amount of time each chiller runs. When any chiller reaches the user-defined run hours setpoint (which is measured only from the last rotation), the system controller can re-sequence the chillers, if necessary, to put the chiller with the least total run hours into a higher-use position in the sequence.

ROTATIONAL INPUT: Chillers shall rotate when the specified reference commands them to rotate.

From the BAS operator interface, an operator shall be able to manually change the lead/lag sequence or request any chiller to be unavailable which would remove it from the rotation sequence.

Chiller Isolation Valves:

Chiller isolation valves shall prevent the flow of fluid through non-operating chillers. When the system receives a chiller water pump request from a chiller, the chiller isolation valve shall be controlled to 100% open. Chiller isolation valve stroke time shall be (60-120) seconds (adj.) to reduce operating chiller flow transients. When the valve is confirmed to be 100% open the system shall start the respective chilled water pump. If the chiller's isolation valve is not confirmed open after (valve stroke time plus 60 sec) 180 seconds (adj.), the system shall annunciate a chiller isolation valve failure alarm to the BAS operator interface.

Primary Chilled Water Pump Commands:

When the chilled water system is enabled, the system shall start a chilled water pump through a contact closure of the pumps motor starter enable contacts. The system shall detect primary chilled water pump run status by a current switch.

The manifolded primary chilled water pumps shall operate in a lead/lag sequence that shall be rotated on a weekly schedule. The rotation sequence shall be based on calculated run time with the pump having the least run time designated as lead, the pump with the next lowest run time shall be the second in the sequence (or lag pump) and so on. From the BAS operator interface, an operator shall be able to manually change the lead/lag sequence or request any pump to be unavailable which would remove it from the rotation sequence.

Primary Chilled Water Pump Failure:

If the lead start/stop relay is enabled and the pump's running status is off for more than 30 seconds (adj.), the system shall annunciate a chilled water pump failure alarm to the BAS and start the next pump in the sequence. Once the problem has been corrected, the operator shall be able to clear the alarm failure from the BAS operator interface or by manually overriding the pump on. This shall re-enable the lead/standby sequence.

Secondary Chilled Water Pump Commands:

The system shall start a secondary chilled water pump through a contact closure of the pump's variable speed drive run-enable contacts. The system shall detect secondary chilled water pump run status by a variable speed drive current switch.

The secondary chilled water pump(s) lead/lag sequence shall be rotated on a weekly schedule. The rotation sequence shall be based on calculated run time with the pump having the least run time designated as lead, the pump with the next lowest run time shall be the second in the sequence (or lag pump) and so on. From the BAS operator interface, an operator shall be able to manually change the lead/lag sequence or request any pump to be unavailable which would remove it from the rotation sequence.

If the chilled water system differential pressure falls 0.5 psig (adj.) below setpoint and the lead pump is at 100% (adj.) for more than 5 minutes (adj.), the next pump in the sequence shall start. If the pump speed control output is below 65% (adj.) for more than 5 minutes (adj.), the last operating pump in the sequence shall be disabled.

Secondary Chilled Water Pump Speed:

The system shall monitor the secondary chilled water system differential pressure sensor. When the pump variable speed drive is enabled, the system shall control the analog speed signal that is sent to the variable speed drives of operating pumps to maintain a chilled water system differential pressure setpoint of 15 psig (adj.).

Secondary Chilled Water Pump Failure:

If the lead start/stop relay is enabled and the pump's running status is off for more than 30 seconds (adj.), the system shall annunciate a secondary chilled water pump failure alarm to the BAS and start the lag pump. When a secondary chilled water pump failure exists, lead/lag/standby automation shall be disabled and the currently running pump becomes the lead pump. Once the problem has been corrected, the operator shall be able to clear the alarm failure from the BAS operator interface. This shall re-enable the lead/lag/standby sequence.

Optimized Distribution Pump Differential Pressure Control:

The system shall monitor the chilled water system differential pressure sensor. The system shall control the chilled water pump(s) variable speed drive to maintain the chilled water system differential pressure to its setpoint. The BAS shall monitor the position of all chilled water control valves served by the cooling plant. At chilled water system startup, the chilled water system pressure setpoint shall be set to the system design value of XX psi (adj). In all cases the distribution pump(s) differential pressure setpoint shall be bound between a minimum of 30 psi (adj) and a maximum of the system design value.

The setpoint control shall be based on ASHRAE Guideline 36 "Trim and Respond Logic": At a frequency of once every 10 minutes (adj), the control system shall calculate requests for cooling based on the criteria shown below:

1) The air handler unit (AHU) other equipment served by the cooling plant has been running in a Cooling Mode for 15 minutes (adj).

2) If an AHU's (or other equipment) chilled water valve is greater than 95%, send 1 request until the chilled water valve is less than 70%.

3) If an AHU's (or other equipment) chilled water valve is serving a critical load (i.e data center) , send 2 requests (adj) if an AHU's chilled water valve is greater than 95%, send 1 request when the chilled water valve is between 80% and 95%. Send zero requests when the chilled water valve is less than 65%.

4) Else if the chilled water valve is less than 95%, send 0 requests.

The BAS shall default to ignoring the first 2 requests (adj).
(Note: At startup set Ignore value to at least 40% of the number of AHUs served).

When (Requests greater than Ignores) the system shall respond by adjusting the chilled water pump differential pressure setpoint upward by ((Requests – Ignores) * (3) psi) (adj), but no larger than 10 psi (adj). When requests are equal to, or less than Ignores, the setpoint shall be reset downward by 2 psi (adj).

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

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MECHANICAL CONTROLS

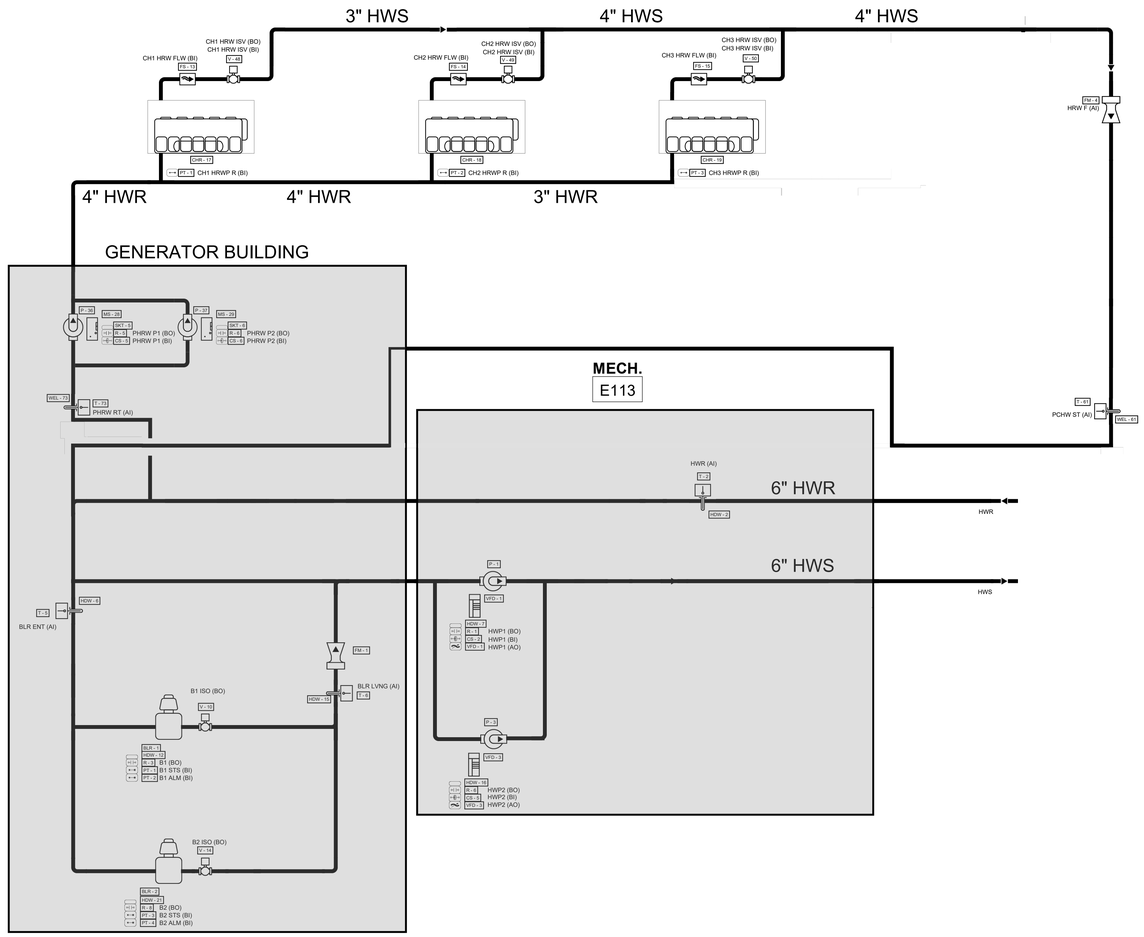
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HEAT RECOVERY CHILLER SYSTEM SEQUENCE OF OPERATIONS

SCALE : 12" = 1'-0"



SEQUENCE OF OPERATION: HEATING PLANT SYSTEM

SYSTEM GENERAL DESCRIPTION:
The heating plant system controller provides stand-alone control or control from an optional higher level Building Automation System (BAS). The heating plant control system shall monitor and control the system's condensing boiler(s), heating water distribution pump(s), heat recovery pump(s), chiller heat recovery isolation valves, and associated control devices as shown on the heating plant flow diagram, in the heating plant points list, and as detailed in the sequence of operation listed below. The heating plant system consists of a primary/secondary loop supplying heating water to the facility. Heat recovery from 3 or 4 air cooled chillers shall be utilized as a first stage heat source to preheat heating water in series upstream of the boiler return header. The heating system includes flow metering capabilities for the building supply loop. The manifolded heating water distribution pumps are configured as lead/lag control. The factory boiler system controller shall provide stand-alone control or BAS workstation control of the heating water supply temperature setpoint (adjustable). The maximum heating water leaving temperature shall be limited to 130°F.

HEATING SYSTEM ENABLE/DISABLE:
The heating system shall be enabled/disabled by the heating plant controller as requested by the BAS human interface panel or the BAS time of day schedule. When enabled, the system shall enable the lead heating water distribution pump and enable heat recovery operation when available. Boilers shall be enabled only as required to maintain the heating water distribution system supply temperature setpoint after heat recovery has been utilized. The heating plant is disabled when all boilers are disabled, heat recovery is disabled, and there is not an active heating water distribution pump request. When the plant is disabled, the heating water distribution pumps shall be commanded off except as required by freeze protection, and heat recovery pumps shall be commanded off with all chiller heat recovery isolation valves commanded closed.

HOT WATER RESET (HEATING WATER SUPPLY TEMPERATURE RESET):
The heating water distribution system supply temperature setpoint shall be linearly reset from 95°F (adj.) to 130°F (adj.) as the outside air temperature falls from 60°F (adj.) to 0°F (adj.). The maximum heating water supply temperature setpoint shall be limited to 130°F. Adjustable parameters shall be provided for reset endpoints and outdoor air breakpoints.

HEAT RECOVERY SYSTEM GENERAL OPERATION (SERIES UPSTREAM OF BOILERS):
Heating water return from the building shall be routed through the heat recovery circuit in series upstream of the boiler return header such that heat recovery, when enabled, preheats the heating water return prior to entry into the boilers. The heat recovery chillers shall be connected in parallel to common heat recovery headers. Each chiller shall be provided with a two-position heat recovery isolation valve and flow proof device. Heat recovery pumps shall be provided in a lead/lag configuration with variable frequency drives to maintain differential pressure across the heat recovery headers and to provide required minimum flow through active chiller heat recovery bundles. Heat recovery shall be the first stage heating source, and boilers shall provide trim and backup heating.

HEAT RECOVERY ENABLE/DISABLE:
When the heating plant is enabled, heat recovery shall be enabled when at least 1 chiller reports heat recovery available and heating water distribution pump operation is proven. Upon a heat recovery enable condition, the BAS shall enable the lead heat recovery pump and command open the heat recovery isolation valve(s) for any chiller(s) that are enabled for heat recovery. If provided, a heat recovery bypass valve shall be commanded closed whenever at least 1 chiller heat recovery isolation valve is commanded open, and the bypass valve shall be commanded open when no chillers are enabled for heat recovery. Heat recovery shall be disabled upon loss of all heat recovery available signals, loss of required pump proof, or a heat recovery alarm condition that inhibits operation.

HEAT RECOVERY PUMP CONTROL (DP CONTROL):
The heat recovery pumps shall be configured as lead/lag and shall be controlled by VFD to maintain a differential pressure setpoint measured across the heat recovery supply and return headers (adjustable). The BAS shall modulate the operating heat recovery pump speed to maintain the differential pressure setpoint as chiller heat recovery isolation valves open and close. Upon a lead heat recovery pump failure, the BAS shall annunciate an alarm and start the lag heat recovery pump. Heat recovery pumps shall include minimum run time and minimum off time of 10 minutes (adj.), except that safeties shall override and stop the pumps as required.

CHILLER HEAT RECOVERY ISOLATION VALVES AND FLOW PROOF:
Each heat recovery chiller shall be provided with a two-position isolation valve. The BAS shall command the isolation valve open when the associated chiller is enabled in heat recovery mode and heat recovery pump operation is proven. The BAS shall command the isolation valve closed when the associated chiller is not enabled in heat recovery mode or when the heat recovery pumps are disabled. Each chiller shall prove flow via flow switch or equivalent device. The BAS shall require flow proof prior to enabling heat recovery operation for that chiller. If flow proof is not established within 60 seconds (adj.) after commanding the isolation valve open and enabling the heat recovery pump(s), the BAS shall annunciate an alarm and disable heat recovery enable to that chiller until the condition is corrected and the alarm is reset.

MINIMUM HEAT RECOVERY FLOW REQUIREMENT:
The heat recovery pumping and control strategy shall be arranged to provide not less than GPM through each active chiller heat recovery bundle (design). The BAS shall utilize differential pressure control and valve positioning status to satisfy this requirement, and commissioning shall verify minimum flow to each active chiller. Where flow measurement is provided, the BAS shall alarm upon low flow below the minimum required for an active chiller.

BOILER CONTROL (CONDENSING BOILERS, TRIM AND BACKUP):
The boiler lead/lag sequence shall be based on a weekly schedule. From the system controller or a BAS workstation, an operator shall be able to manually change the lead/lag sequence. The boilers shall operate as trim and backup heat sources after heat recovery has been utilized. When the heating plant is enabled, the lead boiler shall be enabled when heat recovery is unavailable, or when heat recovery is enabled and operating but is insufficient to maintain the heating water distribution system supply temperature setpoint. Heat recovery shall be considered insufficient when the heat recovery pump(s) are at 100% speed for 10 minutes (adj.) and the heating water distribution system supply temperature remains more than 3°F (adj.) below the active setpoint. Upon a call for boiler operation, the BAS shall enable the lead boiler and the associated boiler primary pump (if provided). Once the lead boiler is enabled, the add sequence of additional boilers shall be disabled for a period of 30 minutes (adj.). Additional boilers shall be enabled if the heating water distribution system supply temperature remains more than 5°F (adj.) below the active setpoint for 10 minutes (adj.) while the lead boiler is enabled and at high fire (or maximum capacity command) for 10 minutes (adj.). The last boiler enabled shall be disabled when the heating water distribution system supply temperature rises more than 2°F (adj.) above the active setpoint for 10 minutes (adj.) and the boiler minimum runtime has been satisfied. Additional boilers shall be disabled in reverse order using the same criteria. Each boiler shall include a minimum on time of 15 minutes (adj.) and minimum off time of 15 minutes (adj.). If an active boiler signals a failure alarm, the system controller shall enable the next available boiler, signal an alarm, and continue operation as available. When a boiler failure exists, lead/lag automation shall be disabled and the currently running boiler shall become the lead boiler. Once the problem is corrected, the operator shall be able to clear the alarm failure from the system controller or BAS workstation, which shall re-enable the lead/lag sequence.

HEATING WATER DISTRIBUTION PUMP START/STOP:
The system shall start a heating water distribution pump through a contact closure of the pump VFD run-enable contacts. When the heating plant is enabled, the BAS shall enable the lead heating water distribution pump. The heating water distribution pumps may operate continuously when required by freeze protection or low limit conditions. The lag pump shall be enabled upon lead pump failure or manual selection. If the distribution pumps are controlled to differential pressure (where provided), the BAS shall modulate pump speed to maintain the system differential pressure setpoint.

HEATING WATER DISTRIBUTION PUMP STATUS:
The system shall detect heating water pump run status by a VFD current switch or run status input.

HEATING WATER DISTRIBUTION PUMP FAILURE:
If the lead start/stop relay is enabled and the current switch status is off for more than 30 seconds (adj.), the system shall annunciate a heating water pump failure alarm to the BAS workstation and start the lag pump. When a pump failure exists, lead/lag automation shall be disabled and the currently running pump becomes the lead pump. Once the problem has been corrected, the operator shall be able to clear the alarm failure from the BAS controller or BAS workstation, which shall re-enable the lead/lag sequence.

FREEZE PROTECTION:
When the outdoor air temperature falls below 35°F (adj.), the heating water distribution pump shall operate continuously to provide heating water circulation to all associated hot water coils. If the heating water supply temperature falls below 100°F (adj.) during unoccupied periods, the heating plant shall enable, if disabled, and heat recovery and/or boilers shall operate as required to maintain the heating water supply temperature setpoint subject to all safeties and interlocks. In the event that a hydronic

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

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06-May-26

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MECHANICAL CONTROLS

M-7.2

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BOILER SYSTEM SEQUENCE OF OPERATIONS

SCALE : 12" = 1'-0"

Sequence of Operation: RTU04

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Morning Warm-up/Pre-Cool, Occupied/Unoccupied and Heat/Cool modes. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints.

Occupied:

During occupied periods, the supply fan shall run continuously and the mixed air dampers shall open to maintain minimum ventilation requirements.

In the cooling mode The chilled water valve shall modulate to control the discharge air setpoint.

In the heating mode the hot water valve shall modulate to control the discharge air setpoint.

If the discharge air temperature sensor fails, the chilled water valve should close, the heating valve should close, the outdoor air should close, and an alarm should annunciate at the BAS

Unoccupied:

During the unoccupied periods, the supply fan shall be disabled, the outside air damper shall close, the mechanical cooling shall be disabled, the mechanical heating shall be disabled, to conserve energy.

Optimal Stop:

Outside air damper shall remain enabled to provide minimum ventilation.

Morning Warm-Up Mode:

The outside air damper shall remain closed.

Pre-Cool Mode:

During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Occupied Humidity Control:

If the space relative humidity is greater than 50% (adj.), the chilled water valve shall modulate to maintain space relative humidity setpoint of 50% (adj.) and the reheat valve shall modulate to maintain the discharge air temperature setpoint. Mode shall terminate when the space relative humidity falls below the relative humidity setpoint of 50% (adj.) minus 3% (adj.). If the space relative humidity sensor fails the dehumidification sequence shall be terminated and an alarm shall annunciate at the BAS.

Demand Control Ventilation:

Using a return CO2 input (local sensor or network communicated value), the controller shall monitor and compare the measured return CO2 to the return CO2 concentration setpoint (adj.). When the measured return CO2 concentration reaches the setpoint (adj.), the outside air damper shall modulate open incrementally until the return air CO2 level is satisfied or the outside air damper reaches the full open position. If the measured CO2 concentration falls, the outside air damper shall modulate toward minimum outdoor air position setpoint. If the mixed air temperature drops below the mixed air low limit setpoint the CO2 sensor input is overridden and the outside air damper will be modulated closed to maintain the mixed air temperature setpoint. When the mixed air temperature rises above the mixed air low limit setpoint, CO2 operation is restored.

Discharge Air Temperature Control:

Also, the BAS shall override this reset function whenever outdoor dew point is higher than 60.0 deg. F (adj.) or indoor humidity (measured at the source of control) is higher than 60% RH (adj.). If the discharge air temperature drops below the minimum limit, a low temperature alarm shall annunciate, and the unit shall shut down. If the discharge air temperature rises above the maximum limit, a high temperature alarm shall annunciate.

Supply Fan:

The supply fan shall be off in the unoccupied mode. The supply fan shall be on if the control is heating or cooling in the unoccupied mode. When the controller is in the occupied mode, the supply fan shall operate continuously. The supply fan should be modulated to maintain a constant air flow setpoint. The supply fan should be modulated to maintain a constant speed. The speed will be determined by the test and balance contractor.

If the supply fan fails to prove status for 30 seconds (adj.), the fan shall be commanded off, the outside air damper shall close, cooling shall be disabled, all heating shall be disabled, and an alarm shall annunciate at the BAS. A manual reset shall be required to restart the fan.

Preheat Control:

When the fan is off, if the outdoor air temperature is below 40.0 deg. F (adj.) or the outside air temperature sensor is failed, the preheat valve shall modulate to maintain a mixed air temperature of 45.0 deg. F (adj.). If the outdoor air temperature is above 40.0 deg. F (adj.) and the outdoor air temperature sensor is not failed the preheat valve shall be closed. If the mixed air temperature sensor fails the preheat valve shall be 10% open.

When the fan is on, the preheat shall control to maintain a leaving preheat temperature of 45.0 deg. F (adj.). If the preheat temperature sensor fails and the mixed air temperature is below 45.0 deg. F (adj.) the preheat valve shall be 10% open. If the preheat temperature sensor fails and the mixed air temperature is above 50.0 deg. F (adj.) the preheat valve shall be commanded closed. An alarm shall annunciate at the BAS if the leaving preheat temperature sensor, the mixed air temperature sensor or the outside air temperature sensor are failed.

Mixed Air Low Limit:

The initial damper opening rate shall be limited to 2% per minute (adj.) until the damper has reached its minimum ventilation position. The outside air damper shall modulate to a position less than the minimum damper position if the mixed air temperature drops below 50.0 deg. F (adj.). If the mixed air temperature sensor fails an alarm shall annunciate at the BAS and the outside air damper shall return to the minimum position.

Freeze Protection:

A hardwired, low limit temperature switch shall be electrically interlocked with the motor starter. If the low limit temperature switch is tripped 38.0 deg. F (adj.), the fan shall be commanded off and the outside air damper shall close. All valves shall be commanded open to 100% open (adjust per climate). An alarm shall annunciate at the BAS and manual reset of the low limit temperature switch shall be required to restart the fan.

Condensate Overflow Monitoring:

If the condensate level reaches the trip point, a condensate overflow diagnostic shall annunciate at the BAS. To prevent the condensate drain pan from overflowing and causing water damage to the building the fan shall be disabled and the chilled water valve shall close.

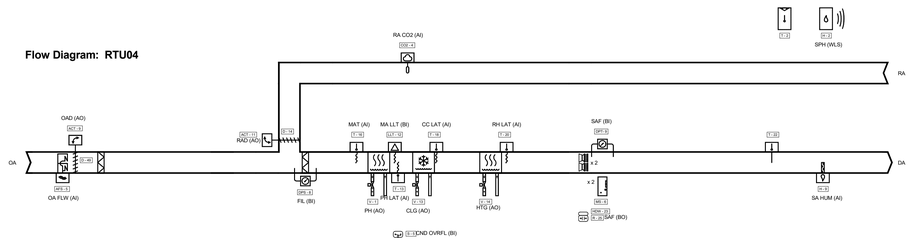
Filter Status:

A differential pressure switch shall monitor the differential pressure across the filter(s) when the fan is running. If the switch closes during normal operation a dirty filter alarm shall annunciate at the BAS.

Points List - RTU04

System Point Description	POINTS											ALARMS					
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT...	BINARY HARDWARE OUTPUT...	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
AIR CLEANING ACCESS DOOR INTERLOCK...							X								
AIR CLEANING ACCESS DOOR INTERLOCK...							X								
CHANGEOVER COIL LEAVING AIR TEMPERATURE...	X	X								X	X			X	
COIL LEAVING AIR LOW TEMP CUTOUT ALARM...			X										X		
COMPRESSOR 1 COMMAND...	X				X										
COMPRESSOR 2 COMMAND...	X				X										
COMPRESSOR 3 COMMAND...	X				X										
COMPRESSOR 4 COMMAND...	X				X										
CONDENSATE OVERFLOW DETECTION LOCAL...	X		X									X	X		
COOLING COIL LEAVING TEMPERATURE...	X	X								X	X			X	
COOLING OUTPUT COMMAND...	X			X											
FILTER STATUS...	X		X									X			
HEATING OUTPUT COMMAND...	X			X											
MIXED AIR DAMPER COMMAND...	X			X											
MIXED AIR LOW TEMPERATURE CUTOUT ALARM...			X										X		
MIXED AIR TEMPERATURE LOCAL...	X	X								X				X	
OUTDOOR AIR DAMPER COMMAND...	X			X											
OUTDOOR AIR FLOW...	X	X													
OUTDOOR AIR RELATIVE HUMIDITY LOCAL...	X	X													
OUTDOOR AIR TEMPERATURE LOCAL...	X	X													
PREHEAT LEAVING COIL TEMPERATURE LOCAL...	X	X												X	
PREHEAT OUTPUT COMMAND...	X			X											
REHEAT LEAVING COIL TEMPERATURE LOCAL...	X	X								X	X			X	
REHEAT OUTPUT COMMAND...	X			X											
RETURN AIR CO2 LOCAL...	X	X								X					
RETURN AIR DAMPER COMMAND...	X			X											
RETURN AIR HUMIDITY LOCAL...	X	X								X					
RETURN AIR TEMPERATURE LOCAL...	X	X								X					
SPACE HUMIDITY LOCAL...	X						X							X	
SPACE TEMPERATURE LOCAL...	X						X			X	X			X	
SPACE TEMPERATURE SETPOINT LOCAL...	X						X								
SUPPLY AIR HUMIDITY LOCAL...	X	X								X	X			X	
SUPPLY FAN START STOP COMMAND...	X				X										
SUPPLY FAN STATUS...	X		X												
SUPPLY FAN 2 SPEED COMMAND...	X			X											
SUPPLY FAN 2 START STOP COMMAND...	X				X										
SUPPLY FAN 2 STATUS...	X		X												
BAS COMMUNICATION STATE...						X									X
MAINTENANCE REQUIRED...						X									
MIXED AIR TEMPERATURE LOW LIMIT SETPOINT...						X									
OCCUPIED COOLING SETPOINT...	X					X									
OCCUPIED HEATING SETPOINT...	X					X									
SUPPLY FAN FAILURE...	X					X									
UNOCCUPIED COOLING SETPOINT...	X					X									
UNOCCUPIED HEATING SETPOINT...	X					X									

Flow Diagram: RTU04



Sequence of Operation: RTU01, 02, 03 [QTY: 3]

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Morning Warm-up/Pre-Cool, Occupied/Unoccupied and Heat/Cool modes. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints.

Occupied:

During occupied periods, the supply fan shall run continuously and the mixed air dampers shall open to maintain minimum ventilation requirements.

In the cooling mode The chilled water valve shall modulate to control the discharge air setpoint.

In the heating mode the hot water valve shall modulate to control the discharge air setpoint.

If the discharge air temperature sensor fails, the chilled water valve should close, the heating valve should close, the outdoor air should close, and an alarm should annunciate at the BAS

Unoccupied:

During the unoccupied periods, the supply fan shall be disabled, the outside air damper shall close, the mechanical cooling shall be disabled, the mechanical heating shall be disabled, to conserve energy.

Optimal Stop:

Outside air damper shall remain enabled to provide minimum ventilation.

Morning Warm-Up Mode:

The outside air damper shall remain closed.

Pre-Cool Mode:

During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Occupied Humidity Control:

If the space relative humidity is greater than 50% (adj.), the chilled water valve shall modulate to maintain space relative humidity setpoint of 50% (adj.) and the reheat valve shall modulate to maintain the discharge air temperature setpoint. Mode shall terminate when the space relative humidity falls below the relative humidity setpoint of 50% (adj.) minus 3% (adj.). If the space relative humidity sensor fails the dehumidification sequence shall be terminated and an alarm shall annunciate at the BAS.

Discharge Air Temperature Control:

Also, the BAS shall override this reset function whenever outdoor dew point is higher than 60.0 deg. F (adj.) or indoor humidity (measured at the source of control) is higher than 60% RH (adj.). If the discharge air temperature drops below the minimum limit, a low temperature alarm shall annunciate, and the unit shall shut down. If the discharge air temperature rises above the maximum limit, a high temperature alarm shall annunciate.

Supply Fan:

The supply fan shall be off in the unoccupied mode. The supply fan shall be on if the control is heating or cooling in the unoccupied mode. When the controller is in the occupied mode, the supply fan shall operate continuously. The supply fan should be modulated to maintain a constant air flow setpoint. The supply fan should be modulated to maintain a constant speed. The speed will be determined by the test and balance contractor.

If the supply fan fails to prove status for 30 seconds (adj.), the fan shall be commanded off, the outside air damper shall close, cooling shall be disabled, all heating shall be disabled, and an alarm shall annunciate at the BAS. A manual reset shall be required to restart the fan.

Mixed Air Low Limit:

The initial damper opening rate shall be limited to 2% per minute (adj.) until the damper has reached its minimum ventilation position. The outside air damper shall modulate to a position less than the minimum damper position if the mixed air temperature drops below 50.0 deg. F (adj.). If the mixed air temperature sensor fails an alarm shall annunciate at the BAS and the outside air damper shall return to the minimum position.

Freeze Protection:

A hardwired, low limit temperature switch shall be electrically interlocked with the motor starter. If the low limit temperature switch is tripped 38.0 deg. F (adj.), the fan shall be commanded off and the outside air damper shall close. All valves shall be commanded open to 100% open (adjust per climate). An alarm shall annunciate at the BAS and manual reset of the low limit temperature switch shall be required to restart the fan.

Condensate Overflow Monitoring:

If the condensate level reaches the trip point, a condensate overflow diagnostic shall annunciate at the BAS. To prevent the condensate drain pan from overflowing and causing water damage to the building the fan shall be disabled and the chilled water valve shall close.

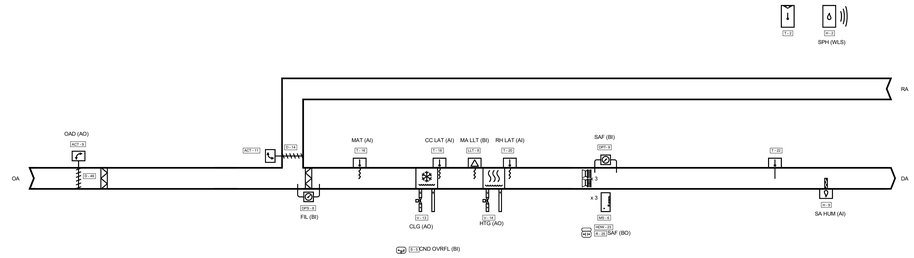
Filter Status:

A differential pressure switch shall monitor the differential pressure across the filter(s) when the fan is running. If the switch closes during normal operation a dirty filter alarm shall annunciate at the BAS.

Points List - RTU01, 02, 03 [QTY: 3]

System Point Description	POINTS									ALARMS					
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT...	BINARY HARDWARE OUTPUT...	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
AIR CLEANING ACCESS DOOR INTERLOCK...							X								
AIR CLEANING ACCESS DOOR INTERLOCK...							X								
CHANGEOVER COIL LEAVING AIR TEMPERATURE...	X	X								X	X			X	
COIL LEAVING AIR LOW TEMP CUTOUT ALARM...			X										X		
COMPRESSOR 1 COMMAND...	X				X										
COMPRESSOR 2 COMMAND...	X				X										
COMPRESSOR 3 COMMAND...	X				X										
COMPRESSOR 4 COMMAND...	X				X										
CONDENSATE OVERFLOW DETECTION LOCAL...	X		X									X	X		
COOLING COIL LEAVING TEMPERATURE...	X	X								X	X			X	
COOLING OUTPUT COMMAND...	X			X											
FILTER STATUS...	X		X									X			
HEATING OUTPUT COMMAND...	X			X											
MIXED AIR LOW TEMPERATURE CUTOUT ALARM...			X										X		
MIXED AIR TEMPERATURE LOCAL...	X	X								X				X	
OUTDOOR AIR DAMPER COMMAND...	X			X											
OUTDOOR AIR RELATIVE HUMIDITY LOCAL...	X	X													
OUTDOOR AIR TEMPERATURE LOCAL...	X	X													
REHEAT LEAVING COIL TEMPERATURE LOCAL...	X	X								X	X			X	
REHEAT OUTPUT COMMAND...	X			X											
RETURN AIR HUMIDITY LOCAL...	X	X								X					
RETURN AIR TEMPERATURE LOCAL...	X	X													
SPACE HUMIDITY LOCAL...	X						X							X	
SPACE TEMPERATURE LOCAL...	X						X			X	X			X	
SPACE TEMPERATURE SETPOINT LOCAL...	X						X								
SUPPLY AIR HUMIDITY LOCAL...	X	X								X	X			X	
SUPPLY FAN START STOP COMMAND...	X				X										
SUPPLY FAN STATUS...	X		X												
SUPPLY FAN 2 SPEED COMMAND...	X			X											
SUPPLY FAN 2 START STOP COMMAND...	X				X										
SUPPLY FAN 2 STATUS...	X		X												
SUPPLY FAN 3 SPEED COMMAND...	X			X											
SUPPLY FAN 3 START STOP COMMAND...	X				X										
SUPPLY FAN 3 STATUS...	X		X												
BAS COMMUNICATION STATE...						X									X
MAINTENANCE REQUIRED...						X						X			
MIXED AIR TEMPERATURE LOW LIMIT SETPOINT...						X									
OCCUPIED COOLING SETPOINT...	X					X									
OCCUPIED HEATING SETPOINT...	X					X									
SUPPLY FAN FAILURE...	X					X						X			
UNOCCUPIED COOLING SETPOINT...	X					X									
UNOCCUPIED HEATING SETPOINT...	X					X									

Flow Diagram: RTU01, 02, 03 [QTY: 3]



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SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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NOTE: IF THIS DRAWING IS NOT 30" X 42", IT IS A REDUCED PRINT. REFER TO GRAPHIC SCALE.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

MECHANICAL CONTROLS

M-7.3

Sequence of Operation: VAV07-1, 2, 3 [QTY: 3]

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied, and Unoccupied commands. The BAS may also send a Heat/Cool mode, priority shutdown commands, space temperature and/or space temperature setpoint. If communication is lost with the BAS, the controller shall operate using its local setpoints.

Occupied:

The occupancy mode will be communicated or hardwired to the controller via a binary input. When the unit is in the occupied mode the VAV will maintain the space temperature at the active occupied heating or cooling setpoint. Applicable ventilation and airflow setpoints will be enforced. The occupied mode will be the default mode of the VAV. Applicable ventilation and airflow setpoints will be enforced. The occupied mode will be the default mode of the VAV.

Occupied Standby:

The occupancy mode will be communicated or hardwired to the controller via a binary input, even though the BAS has scheduled the space as occupied. In the occupied standby mode, the active cooling and heating setpoints shall be relaxed (see cooling and heating mode) and both the ventilation airflow and minimum airflow setpoints shall be lowered (see VAV schedule).

Occupied Bypass:

Mode used to temporarily place the unit into the occupied operation. Tenants shall be able to override the unoccupied mode from the space sensor. The override shall last for a maximum of 4 hours (adj.). The tenants shall be able to cancel the override from the space sensor at any time. During the override the unit shall operate in occupied mode.

Heat/Cool Mode:

The Heat/Cool mode shall be set by a communicated value or automatically by the VAV. In standalone or auto mode the VAV shall compare the primary air temperature with the configured auto changeover setpoint to determine if the air is "hot" or "cold". Heating mode implies the primary air temperature is hot. Cooling mode implies the primary air temperature is cold.

Cooling Mode:

When the unit is in cooling mode, the VAV controller shall maintain the space temperature at the active cooling setpoint by modulating the airflow between the active cooling minimum airflow setpoint to the maximum cooling airflow setpoint. The VAV shall use the measured space temperature and the active cooling setpoint to determine the requested cooling capacity of the unit. The outputs will be controlled based on the unit configuration and the requested cooling capacity.

Based on the VAV controller occupancy mode, the active cooling setpoint will be one of the following:

Setpoint	Default Value
Occupied Cooling Setpoint	74.0 deg. F
Unoccupied Cooling Setpoint	85.0 deg. F
Occupied Standby Cooling Setpoint	78.0 deg. F
Occupied Min Cooling Airflow Setpoint	See VAV Schedule
Occupied Max Cooling Airflow Setpoint	See VAV Schedule

Heat/Cool Setpoint:

The space temperature setpoint shall be determined either by a local (e.g., thumbwheel) setpoint, the VAV default setpoint or a communicated value. The VAV shall use the locally stored default setpoints when neither a local setpoint nor communicated setpoint is present. If both a local setpoint and communicated setpoint exist, the VAV shall use the communicated value.

Reheat Control Mode:

Reheat will only be allowed when the supply air temperature is 5.0 deg. F below the configured reheat enable setpoint of 70.0 deg. F (adj.). The reheat will be enabled when the space temperature drops below the active heating setpoint and the minimum airflow requirements are met. During reheat the VAV will operate at its minimum heating airflow setpoint and energize the heat as follows:

Setpoint	Default Value
Occupied Heating Setpoint	71.0 deg. F
Unoccupied Heating Setpoint	60.0 deg. F
Occupied Standby Heating Setpoint	67.0 deg. F
Occupied Min Heating Airflow Setpoint	See VAV Schedule
Occupied Max Heating Airflow Setpoint	See VAV Schedule

Reheat will only be allowed when the supply air temperature is 5.0 deg. F below the configured reheat enable setpoint of 70.0 deg. F (adj.). Reheat Control:
In heat mode, reheat will be enabled when:

- Primary air temperature is 5.0 deg. F below the configured reheat enable setpoint of 70.0 deg. F (adj.).
- Space temperature drops below the active heating setpoint and the minimum airflow requirements are met.
- Supply air temperature is below the configured reheat enable setpoint.

When reheat enabled, the VAV will operate at its minimum heating airflow setpoint and control the heat as follows:

Modulating Hot Water Reheat:

If the space temperature is below the heating setpoint the hot water reheat valve will modulate as required to maintain space temperature at the active heating setpoint while the VAV operates at its minimum heating airflow setpoint. If the discharge air temperature reaches the design heating discharge air temperature setpoint (adj.), the VAV will modulate airflow between the minimum heating airflow setpoint and the maximum heating airflow setpoint as required to maintain space temperature at the active heating setpoint, while the hot water reheat valve modulates to maintain discharge air temperature at the design heating discharge air temperature setpoint. If the airflow reaches the maximum heating airflow setpoint, the VAV will modulate the hot water reheat valve as required to maintain space temperature at the active heating setpoint, while the VAV operates at its maximum heating airflow setpoint.

Heating Mode:
When the unit is in heating mode, the VAV controller will maintain the space temperature at the active heating setpoint by modulating the VAV damper (between the active heating minimum and maximum airflow setpoints). Based on the VAV controller occupancy mode, the active heating setpoint will be one of the following:

Setpoint	Default Value
Occupied Heating Setpoint	71.0 deg. F
Unoccupied Heating Setpoint	60.0 deg. F
Occupied Standby Heating Setpoint	67.0 deg. F
Occupied Min Heating Airflow Setpoint	See VAV Schedule
Occupied Max Heating Airflow Setpoint	See VAV Schedule

Local Reheat Control:

Reheat will only be allowed when the primary air temperature is 5.0 deg. F below the configured reheat enable setpoint of 70.0 deg. F (adj.). The reheat shall be enabled when the space temperature drops below the active heating setpoint and the minimum airflow requirements are met. During reheat the VAV shall operate at its minimum heating airflow setpoint and energize the heat as follows:

Proportional Hot Water Reheat:

If the space temperature is below the heating setpoint the hot water reheat valve shall control as required to maintain the active heating setpoint.

Demand Control Ventilation:

When the unit is in unoccupied mode, the ventilation airflow setpoint will be zero. When the unit is in occupied mode, the ventilation airflow setpoint shall equal the design outdoor airflow (see VAV schedule).

The current ventilation airflow setpoint shall be communicated to the BAS for control of the system outdoor-air intake.

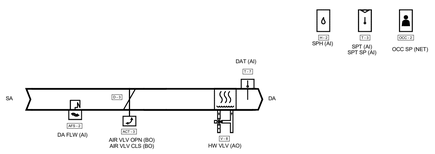
Space Sensor Failure:

If there is a fault with the operation of the zone sensor an alarm shall be annunciated at the BAS. Space sensor failure shall cause the VAV to drive the damper to minimum air flow if the VAV is in the occupied mode, or drive it closed if the VAV is in the unoccupied mode.

Space Humidity Monitoring:

The VAV Box will monitor the space humidity.

Flow Diagram: VAV07-1, 2, 3 [QTY: 3]



Points List - VAV07-1, 2, 3 [QTY: 3]

System Point Description	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT...	BINARY HARDWARE OUTPUT...	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
AIR VALVE DRIVE OPEN COMMAND...	X				X										
AIR VALVE DRIVE CLOSE COMMAND...	X				X										
DISCHARGE AIR TEMPERATURE...	X	X								X	X			X	
LOCAL HEAT VALVE COMMAND...	X			X											
SPACE HUMIDITY LOCAL...	X	X								X					
SPACE OCCUPANCY INPUT...	X		X												
SPACE TEMPERATURE LOCAL...	X	X													
SPACE TEMPERATURE SETPOINT LOCAL...	X	X													
SUPPLY AIRFLOW...	X	X								X	X				
BAS COMMUNICATION STATE...						X									X
DESIGN HEAT DISCHARGE AIR TEMP SETPOINT...						X									
MAXIMUM COOLING AIRFLOW SETPOINT...						X									
MINIMUM COOLING AIRFLOW SETPOINT...						X									
MAXIMUM HEATING AIRFLOW SETPOINT...						X									
MINIMUM HEATING AIRFLOW SETPOINT...						X									
OCCUPIED BYPASS TIMER...	X					X									
OCCUPIED COOLING SETPOINT...	X					X									
OCCUPIED HEATING SETPOINT...	X					X									
UNOCCUPIED COOLING SETPOINT...	X					X									
SPACE OCCUPANCY (COMMUNICATED)...	X								X						
UNOCCUPIED HEATING SETPOINT...	X					X									

VAV TERMINAL UNITS CONTROLS

SCALE : 1/8" = 1'-0"

2

Sequence of Operation: AHU07

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Pre-Cool, Occupied/Unoccupied and Heat/Cool modes. The BAS shall also send the discharge air temperature setpoint and the duct static pressure setpoint. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints.

Occupied:

During occupied periods, the supply fan shall run continuously and the mixed air dampers shall open to maintain minimum ventilation requirements.

In the cooling mode The chilled water valve shall modulate to control the discharge air setpoint.

to control the discharge air setpoint.

If the discharge air temperature sensor fails, the cooling will fallback to control to the active space temperature setpoint and an alarm shall be annunciated at the BAS

If the discharge air temperature sensor fails, and the space temperature sensor fails, the chilled water valve should close, the outdoor air should close, and an alarm should annunciate at the BAS

Unoccupied:

During the unoccupied periods, the supply fan shall be disabled, the outside air damper shall close, the mechanical cooling shall be disabled, to conserve energy.

Optimal Start:

The BAS shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Optimal Stop:

The BAS shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall switch to the unoccupied mode. Outside air damper shall remain enabled to provide minimum ventilation.

Occupied Bypass:

The BAS shall monitor the status of the ON and CANCEL buttons of the space temperature sensor. When an occupied bypass request is received from a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Heat/Cool Mode:

When the space temperature rises above the occupied cooling setpoint the mode shall transition to cooling. When the space temperature falls below the occupied heating setpoint the mode shall transition to heating. When the space temperature is below the occupied cooling setpoint and above the occupied heating setpoint the mode shall remain in its last state. If the space temperature sensor fails the mode shall remain in its last state and an alarm shall annunciate at the BAS. If the local and communicated setpoints fail the controller shall disable the supply fan and an alarm shall annunciate at the BAS.

Morning Warm-Up Mode:

During optimal start, if the average space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. The outside air damper shall remain closed. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Daytime Warm-Up Control:

During Occupied periods, when the space temperature is below the Daytime Warm-up Initiate setpoint, a daytime warm-up sequence shall be activated. The outside air damper shall modulate to maintain minimum ventilation requirements, and the heating shall enable to maintain the discharge air temperature heating setpoint. Daytime Warm-up shall terminate when the average space temperature reaches the Occupied heating setpoint.

Pre-Cool Mode:

During optimal start, if the average space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Discharge Air Temperature Control:

The discharge air temperature setpoint shall be reset to the optimal setpoint communicated by the BAS. The Space Temperature BAS and the Space Temperature Setpoint BAS shall be communicated to the unit controller by the BAS. The discharge air temperature setpoint shall be reset based upon the deviation of the Space Temperature BAS from the Space Temperature Setpoint BAS. If the discharge air temperature drops below the minimum limit, a low temperature alarm shall annunciate, and the unit shall shut down.

Supply Fan:

The supply fan shall be off in the unoccupied mode. The supply fan shall be on if the control is heating or cooling in the unoccupied mode. When the controller is in the occupied mode, the supply fan shall operate continuously. The supply fan speed shall be modulated to maintain the duct static pressure setpoint. The supply fan should be modulated to maintain a constant air flow setpoint. The supply fan should be modulated to maintain a constant speed. The speed will be determined by the test and balance contractor. The duct static pressure setpoint shall be sent by the BAS and is reset between the minimum and maximum static pressure limits to maintain the critical zone VAV air damper in a position between 65% and 75% open.

If the supply fan fails to prove status for 30 seconds (adj.), the fan shall be commanded off, the outside air damper shall close, cooling shall be disabled, and an alarm shall annunciate at the BAS. A manual reset shall be required to restart the fan.

A hardwired, high static pressure cut-off switch shall be electrically interlocked with the variable speed drive. If the high static pressure cut-off switch is tripped the fan shall be commanded off, cooling should be disabled, and an alarm shall annunciate at the BAS. A manual reset of the high static pressure cut-off switch shall be required to restart the fan.

Mixed Air Low Limit:

The initial damper opening rate shall be limited to 2% per minute (adj.) until the damper has reached its minimum ventilation position. The outside air damper shall modulate to a position less than the minimum damper position if the mixed air temperature drops below 50.0 deg. F (adj.). If the mixed air temperature sensor fails an alarm shall annunciate at the BAS and the outside air damper shall return to the minimum position.

Freeze Protection:

A hardwired, low limit temperature switch shall be electrically interlocked with the variable speed drive. If the low limit temperature switch is tripped 38.0 deg. F (adj.), the fan shall be commanded off and the outside air damper shall close. All valves shall be commanded open to 100% open (adjust per climate). An alarm shall annunciate at the BAS and manual reset of the low limit temperature switch shall be required to restart the fan.

Condensate Overflow Monitoring:

If the condensate level reaches the trip point, a condensate overflow diagnostic shall annunciate at the BAS. To prevent the condensate drain pan from overflowing and causing water damage to the building the fan shall be disabled and the chilled water valve shall close.

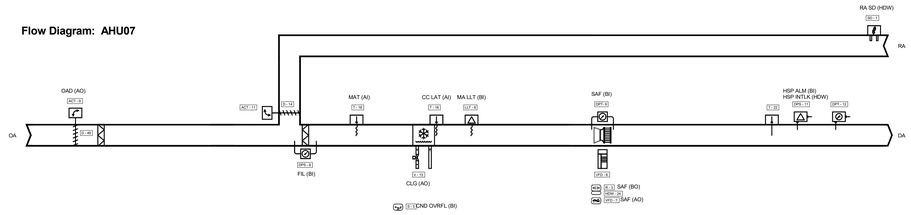
Filter Status:

A differential pressure switch shall monitor the differential pressure across the filter(s) when the fan is running. If the switch closes during normal operation a dirty filter alarm shall annunciate at the BAS.

Smoke Detector Shutdown:

The unit shall shut down in response to a signal from the smoke detector indicating the presence of smoke. The smoke detector shall be interlocked to the unit through the dry contacts of the smoke detector. A manual reset of the smoke detector shall be required to restart the unit.

Flow Diagram: AHU07



Points List - AHU07

System Point Description	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT (AO)	BINARY HARDWARE OUTPUT (BO)	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
AIR CLEANING ACCESS DOOR INTERLOCK...							X								
AIR CLEANING ACCESS DOOR INTERLOCK...							X								
CHANGEOVER COIL LEAVING AIR TEMPERATURE...	X	X								X	X			X	
COIL LEAVING AIR LOW TEMP CUTOUT ALARM...			X										X		
COMPRESSOR 1 COMMAND...	X				X										
COMPRESSOR 2 COMMAND...	X				X										
COMPRESSOR 3 COMMAND...	X				X										
COMPRESSOR 4 COMMAND...	X				X										
CONDENSATE OVERFLOW DETECTION LOCAL...	X		X									X	X		
COOLING COIL LEAVING TEMPERATURE...	X	X								X	X			X	
COOLING OUTPUT COMMAND...	X			X											
FILTER STATUS...	X		X									X			
HIGH STATIC ALARM...	X		X									X	X		
HIGH STATIC ALARM INTERLOCK...							X								
MIXED AIR LOW TEMPERATURE CUTOUT ALARM...			X										X		
MIXED AIR TEMPERATURE LOCAL...	X	X								X				X	
OUTDOOR AIR DAMPER COMMAND...	X			X											
RETURN AIR TEMPERATURE LOCAL...	X	X													
RETURN SMOKE DETECTOR INPUT...							X								
SUPPLY FAN SPEED COMMAND...	X			X											
SUPPLY FAN START STOP COMMAND...	X				X										
SUPPLY FAN STATUS...	X		X												
BAS COMMUNICATION STATE...						X									X
DISCHARGE AIR COOLING SETPOINT...						X									
DISCHARGE AIR HEATING SETPOINT...						X									
MAINTENANCE REQUIRED...						X						X			
MIXED AIR TEMPERATURE LOW LIMIT SETPOINT...						X									
OCCUPIED COOLING SETPOINT...	X					X									
SUPPLY FAN FAILURE...	X					X						X			
UNOCCUPIED COOLING SETPOINT...	X					X									

AHU07 CONTROLS

SCALE : 1/8" = 1'-0"

1

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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NOTE: IF THIS DRAWING IS NOT 30" X 42", IT IS A REDUCED PRINT. REFER TO GRAPHIC SCALE.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN
05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

MECHANICAL CONTROLS

M-7.4

Sequence of Operation: FCU03, 15, 17, 20, 21 [QTY: 5]

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Morning Warm-up/Pre-Cool, Occupied/Unoccupied and Heat/Cool modes. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints

Occupied:

During occupied periods, the supply fan shall run continuously and the outdoor air damper shall open to maintain minimum ventilation requirements. The chilled water valve and the hot water valve shall control to maintain the active space temperature setpoint.

Unoccupied:

When the space temperature is above the unoccupied cooling setpoint of 85.0 deg. F (adj.) the supply fan shall start and the DX cooling shall be enabled. When the space temperature falls below the unoccupied cooling setpoint of 85.0 deg. F minus the unoccupied differential 4.0 deg. F (adj.) the supply fan shall stop and the DX cooling shall be disabled. Test for bug reporting

Optimal Start:

The BAS shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Morning Warm-Up Mode

During optimal start, if the space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. The outside air damper shall remain closed. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Pre-Cool Mode:

During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Optimal Stop:

The BAS shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint. Outside air damper shall remain enabled to provide minimum ventilation.

Occupied Bypass:

The BAS shall monitor the status of the ON and CANCEL buttons of the space temperature sensor. When an occupied bypass request is received from a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Space Temperature Control:

Cascade zone control shall be used in the occupied, occupied bypass, and occupied standby modes. It maintains zone temperature by controlling the discharge air temperature to control the zone temperature while minimizing the fan speed. The space temperature shall be maintained between the occupied cooling setpoint of 74.0 deg. F (adj.) and the occupied heating setpoint of 71.0 deg. F (adj.). The unit shall transition to the cooling mode when the space temperature rises one degree above the occupied cooling setpoint of 74.0 deg. F (adj.). The unit shall transition to the heating mode when the space temperature drops one degree below the occupied heating setpoint of 71.0 deg. F (adj.).

Occupied Humidity Control:

Dehumidification mode shall terminate when the space relative humidity falls below the relative humidity setpoint minus the relative humidity offset. If the space relative humidity sensor fails the dehumidification sequence shall be terminated and an alarm shall annunciate at the BAS.

Supply Fan Operation:

The supply fan shall cycle on demand during the unoccupied mode. When the controller transitions to the occupied mode, the supply fan shall start at high speed before transitioning to continuous operation at the selected speed. The supply fan status shall be monitored by a differential pressure switch. If the supply fan fails the fan shall be commanded off and an alarm shall annunciate at the BAS. A manual reset shall be required to restart the fan.

Condensate Overflow Monitoring:

If the condensate level reaches the trip point, a condensate overflow diagnostic shall annunciate at the BAS. To prevent the condensate drain pan from overflowing and causing water damage to the building the fan shall be disabled and the chilled water valve shall close.

Freeze Protection:

A hardwired, low limit temperature switch shall be electrically interlocked with the safety circuit. If the low limit temperature switch is tripped 38.0 deg. F (adj.), the supply fan shall be commanded off, water valves shall open to 100%, outside air damper shall close, and an alarm shall annunciate at the BAS.

The controller shall automatically attempt to restart the unit after 30 minutes. If the unit restarts successfully with no low temperature condition, the diagnostic is cleared. If a second low temperature condition occurs within a 24 hour period the unit shall be locked out until manually reset.

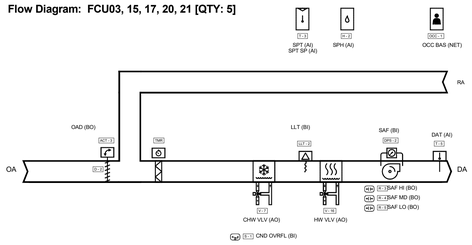
Filter Timer:

The fan-run time (hrs) shall be compared to the filter maintenance timer setpoint. Once the setpoint is reached a filter timer alarm diagnostic shall annunciate at the BAS. When the diagnostic is cleared, the filter-maintenance timer is reset to zero, and the timer begins accumulating fan-run time again.

Points List - FCU03, 15, 17, 20, 21 [QTY: 5]

System Point Description	POINTS										ALARMS					
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT...	BINARY HARDWARE OUTPUT...	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
CHILLED WATER VALVE...	X			X											
CONDENSATE OVERFLOW DETECTION LOCAL...	X		X									X	X		
DISCHARGE AIR TEMPERATURE...	X	X								X	X			X	
HOT WATER VALVE...	X			X											
LOW LIMIT CUTOUT...	X		X									X	X		
OUTDOOR AIR DAMPER...	X				X										
SPACE HUMIDITY SENSOR LOCAL...	X	X								X				X	
SPACE TEMPERATURE LOCAL...	X	X								X	X			X	
SPACE TEMPERATURE SETPOINT LOCAL...	X	X													
SUPPLY FAN STATUS LOCAL...	X		X												
SUPPLY FAN OUTPUT HIGH...	X				X										
SUPPLY FAN OUTPUT MEDIUM...	X				X										
SUPPLY FAN OUTPUT LOW...	X				X										
BAS COMMUNICATION STATE...						X									X
FILTER TIMER HOURS...						X						X	X		
MAINTENANCE REQUIRED...						X						X			
SPACE DEHUMIDIFICATION SETPOINT...						X									
SPACE TEMPERATURE SETPOINT ACTIVE...	X					X									
OCCUPIED BYPASS TIMER...						X									
OCCUPIED COOLING SETPOINT...	X					X									
OCCUPIED HEATING SETPOINT...	X					X									
UNOCCUPIED COOLING SETPOINT...	X					X									
OCCUPANCY BAS...	X							X							
UNOCCUPIED HEATING SETPOINT...	X					X									

Flow Diagram: FCU03, 15, 17, 20, 21 [QTY: 5]



Sequence of Operation: FCU01, 02 [QTY: 2]

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Morning Warm-up/Pre-Cool, Occupied/Unoccupied and Heat/Cool modes. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints

Occupied:

During occupied periods, the supply fan shall run continuously and the outdoor air damper shall open to maintain minimum ventilation requirements. The chilled water valve and the hot water valve shall control to maintain the active space temperature setpoint.

Unoccupied:

When the space temperature is below the unoccupied heating setpoint of 60.0 deg. F (adj.) the supply fan shall start, the outside air damper shall remain closed and the hot water valve shall open. When the space temperature rises above the unoccupied heating setpoint of 60.0 deg. F (adj.) plus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop and the hot water valve shall close. When the space temperature is above the unoccupied cooling setpoint of 85.0 deg. F (adj.) the supply fan shall start, the outside air damper shall remain closed and the chilled water valve shall open. When the space temperature falls below the unoccupied cooling setpoint of 85.0 deg. F (adj.) minus the Unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop, the chilled water valve shall close and the outside air damper shall remain closed.

Optimal Start:

The BAS shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Morning Warm-Up Mode

During optimal start, if the space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. The outside air damper shall remain closed. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Pre-Cool Mode:

During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Optimal Stop:

The BAS shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint. Outside air damper shall remain enabled to provide minimum ventilation.

Occupied Bypass:

The BAS shall monitor the status of the ON and CANCEL buttons of the space temperature sensor. When an occupied bypass request is received from a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Space Temperature Control:

Cascade zone control shall be used in the occupied, occupied bypass, and occupied standby modes. It maintains zone temperature by controlling the discharge air temperature to control the zone temperature while minimizing the fan speed. The space temperature shall be maintained between the occupied cooling setpoint of 74.0 deg. F (adj.) and the occupied heating setpoint of 71.0 deg. F (adj.). The unit shall transition to the cooling mode when the space temperature rises one degree above the occupied cooling setpoint of 74.0 deg. F (adj.). The unit shall transition to the heating mode when the space temperature drops one degree below the occupied heating setpoint of 71.0 deg. F (adj.).

Occupied Humidity Control:

If the space relative humidity is greater than the humidity setpoint, the chilled water valve shall modulate to maintain space relative humidity and the hot water valve shall modulate to maintain the space temperature cooling setpoint. Dehumidification mode shall terminate when the space relative humidity falls below the relative humidity setpoint minus the relative humidity offset. If the space relative humidity sensor fails the dehumidification sequence shall be terminated and an alarm shall annunciate at the BAS.

Supply Fan Operation:

The supply fan shall cycle on demand during the unoccupied mode. When the controller transitions to the occupied mode, the supply fan shall start and run continuously. The supply fan status shall be monitored by a differential pressure switch. If the supply fan fails the fan shall be commanded off and an alarm shall annunciate at the BAS. A manual reset shall be required to restart the fan.

Condensate Overflow Monitoring:

If the condensate level reaches the trip point, a condensate overflow diagnostic shall annunciate at the BAS. To prevent the condensate drain pan from overflowing and causing water damage to the building the fan shall be disabled and the chilled water valve shall close.

Freeze Protection:

A hardwired, low limit temperature switch shall be electrically interlocked with the safety circuit. If the low limit temperature switch is tripped 38.0 deg. F (adj.), the supply fan shall be commanded off, water valves shall open to 100%, outside air damper shall close, and an alarm shall annunciate at the BAS.

The controller shall automatically attempt to restart the unit after 30 minutes. If the unit restarts successfully with no low temperature condition, the diagnostic is cleared. If a second low temperature condition occurs within a 24 hour period the unit shall be locked out until manually reset.

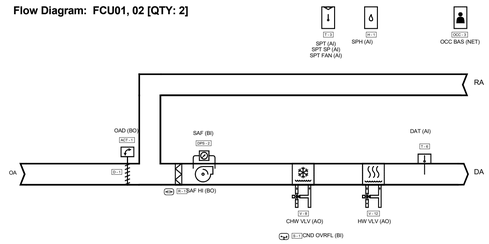
Filter Timer:

The fan-run time (hrs) shall be compared to the filter maintenance timer setpoint. Once the setpoint is reached a filter timer alarm diagnostic shall annunciate at the BAS. When the diagnostic is cleared, the filter-maintenance timer is reset to zero, and the timer begins accumulating fan-run time again.

Points List - FCU01, 02 [QTY: 2]

System Point Description	POINTS									ALARMS					
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT...	BINARY HARDWARE OUTPUT...	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
CHILLED WATER VALVE...	X			X											
CONDENSATE OVERFLOW DETECTION LOCAL...	X		X									X	X		
DISCHARGE AIR TEMPERATURE...	X	X								X	X			X	
HOT WATER VALVE...	X			X											
LOW LIMIT CUTOUT...	X		X									X	X		
OUTDOOR AIR DAMPER...	X				X										
SPACE HUMIDITY SENSOR LOCAL...	X	X								X				X	
SPACE TEMPERATURE LOCAL...	X	X								X	X			X	
SPACE TEMPERATURE SETPOINT LOCAL...	X	X													
SUPPLY FAN STATUS LOCAL...	X		X												
SUPPLY FAN OUTPUT HIGH...	X				X										
BAS COMMUNICATION STATE...						X									X
FILTER TIMER HOURS...						X						X	X		
MAINTENANCE REQUIRED...						X						X			
OCCUPANCY BAS...	X								X						
OCCUPIED BYPASS TIMER...						X									
OCCUPIED COOLING SETPOINT...	X					X									
OCCUPIED HEATING SETPOINT...	X					X									
SPACE DEHUMIDIFICATION SETPOINT...						X									
SPACE TEMPERATURE SETPOINT ACTIVE...	X					X									
UNOCCUPIED COOLING SETPOINT...	X					X									
UNOCCUPIED HEATING SETPOINT...	X					X									
SPACE FAN SETPOINT...		X													

Flow Diagram: FCU01, 02 [QTY: 2]



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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN
05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

MECHANICAL CONTROLS

M-7.5

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Sequence of Operation: FCU05, 06, 11, 12 [QTY: 4]

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Morning Warm-up/Pre-Cool, Occupied/Unoccupied and Heat/Cool modes. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints

Occupied:

During occupied periods, the supply fan shall run continuously and the outdoor air damper shall open to maintain minimum ventilation requirements. The chilled water valve and the hot water valve shall control to maintain the active space temperature setpoint.

Unoccupied:

When the space temperature is above the unoccupied cooling setpoint of 85.0 deg. F (adj.) the supply fan shall start and the DX cooling shall be enabled. When the space temperature falls below the unoccupied cooling setpoint of 85.0 deg. F minus the unoccupied differential 4.0 deg. F (adj.) the supply fan shall stop and the DX cooling shall be disabled. Test for bug reporting

Optimal Start:

The BAS shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Morning Warm-Up Mode

During optimal start, if the space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. The outside air damper shall remain closed. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Pre-Cool Mode:

During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Optimal Stop:

The BAS shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint. Outside air damper shall remain enabled to provide minimum ventilation.

Occupied Bypass:

The BAS shall monitor the status of the ON and CANCEL buttons of the space temperature sensor. When an occupied bypass request is received from a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Space Temperature Control:

Cascade zone control shall be used in the occupied, occupied bypass, and occupied standby modes. It maintains zone temperature by controlling the discharge air temperature to control the zone temperature while minimizing the fan speed. The space temperature shall be maintained between the occupied cooling setpoint of 74.0 deg. F (adj.) and the occupied heating setpoint of 71.0 deg. F (adj.). The unit shall transition to the cooling mode when the space temperature rises one degree above the occupied cooling setpoint of 74.0 deg. F (adj.). The unit shall transition to the heating mode when the space temperature drops one degree below the occupied heating setpoint of 71.0 deg. F (adj.).

Occupied Humidity Control:

Dehumidification mode shall terminate when the space relative humidity falls below the relative humidity setpoint minus the relative humidity offset. If the space relative humidity sensor fails the dehumidification sequence shall be terminated and an alarm shall annunciate at the BAS.

Supply Fan Operation:

The supply fan shall cycle on demand during the unoccupied mode. When the controller transitions to the occupied mode, the supply fan shall start at high speed before transitioning to continuous operation at the selected speed. The supply fan status shall be monitored by a differential pressure switch. If the supply fan fails the fan shall be commanded off and an alarm shall annunciate at the BAS. A manual reset shall be required to restart the fan.

Condensate Overflow Monitoring:

If the condensate level reaches the trip point, a condensate overflow diagnostic shall annunciate at the BAS. To prevent the condensate drain pan from overflowing and causing water damage to the building the fan shall be disabled and the chilled water valve shall close.

Freeze Protection:

A hardwired, low limit temperature switch shall be electrically interlocked with the safety circuit. If the low limit temperature switch is tripped 38.0 deg. F (adj.), the supply fan shall be commanded off, water valves shall open to 100%, outside air damper shall close, and an alarm shall annunciate at the BAS.

The controller shall automatically attempt to restart the unit after 30 minutes. If the unit restarts successfully with no low temperature condition, the diagnostic is cleared. If a second low temperature condition occurs within a 24 hour period the unit shall be locked out until manually reset.

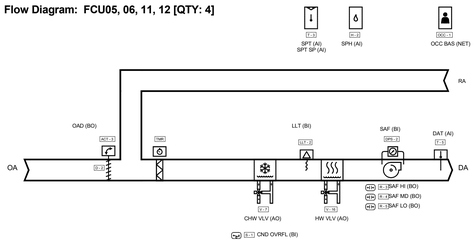
Filter Timer:

The fan-run time (hrs) shall be compared to the filter maintenance timer setpoint. Once the setpoint is reached a filter timer alarm diagnostic shall annunciate at the BAS. When the diagnostic is cleared, the filter-maintenance timer is reset to zero, and the timer begins accumulating fan-run time again.

Points List - FCU05, 06, 11, 12 [QTY: 4]

System Point Description	POINTS										ALARMS					
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT....	BINARY HARDWARE OUTPUT....	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
CHILLED WATER VALVE...	X			X											
CONDENSATE OVERFLOW DETECTION LOCAL...	X		X									X	X		
DISCHARGE AIR TEMPERATURE...	X	X								X	X			X	
HOT WATER VALVE...	X			X											
LOW LIMIT CUTOUT...	X		X									X	X		
OUTDOOR AIR DAMPER...	X				X										
SPACE HUMIDITY SENSOR LOCAL...	X	X								X				X	
SPACE TEMPERATURE LOCAL...	X	X								X	X			X	
SPACE TEMPERATURE SETPOINT LOCAL...	X	X													
SUPPLY FAN STATUS LOCAL...	X		X												
SUPPLY FAN OUTPUT HIGH...	X				X										
SUPPLY FAN OUTPUT MEDIUM...	X				X										
SUPPLY FAN OUTPUT LOW...	X				X										
BAS COMMUNICATION STATE...						X									X
FILTER TIMER HOURS...						X						X	X		
MAINTENANCE REQUIRED...						X						X			
SPACE DEHUMIDIFICATION SETPOINT...						X									
SPACE TEMPERATURE SETPOINT ACTIVE...	X					X									
OCCUPIED BYPASS TIMER...						X									
OCCUPIED COOLING SETPOINT...	X					X									
OCCUPIED HEATING SETPOINT...	X					X									
UNOCCUPIED COOLING SETPOINT...	X					X									
OCCUPANCY BAS...	X								X						
UNOCCUPIED HEATING SETPOINT...	X					X									

Flow Diagram: FCU05, 06, 11, 12 [QTY: 4]



Sequence of Operation: FCU04, 07, 08, 16 [QTY: 4]

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Morning Warm-up/Pre-Cool, Occupied/Unoccupied and Heat/Cool modes. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints

Occupied:

During occupied periods, the supply fan shall run continuously and the outdoor air damper shall open to maintain minimum ventilation requirements. The chilled water valve and the hot water valve shall control to maintain the active space temperature setpoint.

Unoccupied:

When the space temperature is above the unoccupied cooling setpoint of 85.0 deg. F (adj.) the supply fan shall start and the DX cooling shall be enabled. When the space temperature falls below the unoccupied cooling setpoint of 85.0 deg. F minus the unoccupied differential 4.0 deg. F (adj.) the supply fan shall stop and the DX cooling shall be disabled. Test for bug reporting

Optimal Start:

The BAS shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Morning Warm-Up Mode

During optimal start, if the space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. The outside air damper shall remain closed. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Pre-Cool Mode:

During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Optimal Stop:

The BAS shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint. Outside air damper shall remain enabled to provide minimum ventilation.

Occupied Bypass:

The BAS shall monitor the status of the ON and CANCEL buttons of the space temperature sensor. When an occupied bypass request is received from a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Space Temperature Control:

Cascade zone control shall be used in the occupied, occupied bypass, and occupied standby modes. It maintains zone temperature by controlling the discharge air temperature to control the zone temperature while minimizing the fan speed. The space temperature shall be maintained between the occupied cooling setpoint of 74.0 deg. F (adj.) and the occupied heating setpoint of 71.0 deg. F (adj.). The unit shall transition to the cooling mode when the space temperature rises one degree above the occupied cooling setpoint of 74.0 deg. F (adj.). The unit shall transition to the heating mode when the space temperature drops one degree below the occupied heating setpoint of 71.0 deg. F (adj.).

Occupied Humidity Control:

Dehumidification mode shall terminate when the space relative humidity falls below the relative humidity setpoint minus the relative humidity offset. If the space relative humidity sensor fails the dehumidification sequence shall be terminated and an alarm shall annunciate at the BAS.

Supply Fan Operation:

The supply fan shall cycle on demand during the unoccupied mode. When the controller transitions to the occupied mode, the supply fan shall start at high speed before transitioning to continuous operation at the selected speed. The supply fan status shall be monitored by a differential pressure switch. If the supply fan fails the fan shall be commanded off and an alarm shall annunciate at the BAS. A manual reset shall be required to restart the fan.

Condensate Overflow Monitoring:

If the condensate level reaches the trip point, a condensate overflow diagnostic shall annunciate at the BAS. To prevent the condensate drain pan from overflowing and causing water damage to the building the fan shall be disabled and the chilled water valve shall close.

Freeze Protection:

A hardwired, low limit temperature switch shall be electrically interlocked with the safety circuit. If the low limit temperature switch is tripped 38.0 deg. F (adj.), the supply fan shall be commanded off, water valves shall open to 100%, outside air damper shall close, and an alarm shall annunciate at the BAS.

The controller shall automatically attempt to restart the unit after 30 minutes. If the unit restarts successfully with no low temperature condition, the diagnostic is cleared. If a second low temperature condition occurs within a 24 hour period the unit shall be locked out until manually reset.

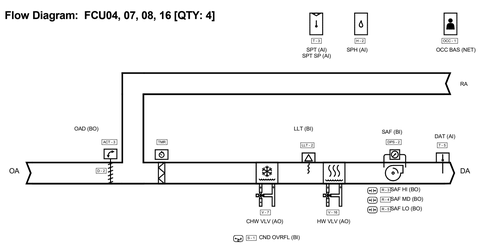
Filter Timer:

The fan-run time (hrs) shall be compared to the filter maintenance timer setpoint. Once the setpoint is reached a filter timer alarm diagnostic shall annunciate at the BAS. When the diagnostic is cleared, the filter-maintenance timer is reset to zero, and the timer begins accumulating fan-run time again.

Points List - FCU04, 07, 08, 16 [QTY: 4]

System Point Description	POINTS										ALARMS					
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT....	BINARY HARDWARE OUTPUT....	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
CHILLED WATER VALVE...	X			X											
CONDENSATE OVERFLOW DETECTION LOCAL...	X		X									X	X		
DISCHARGE AIR TEMPERATURE...	X	X								X	X			X	
HOT WATER VALVE...	X			X											
LOW LIMIT CUTOUT...	X		X									X	X		
OUTDOOR AIR DAMPER...	X				X										
SPACE HUMIDITY SENSOR LOCAL...	X	X								X				X	
SPACE TEMPERATURE LOCAL...	X	X								X	X			X	
SPACE TEMPERATURE SETPOINT LOCAL...	X	X													
SUPPLY FAN STATUS LOCAL...	X		X												
SUPPLY FAN OUTPUT HIGH...	X				X										
SUPPLY FAN OUTPUT MEDIUM...	X				X										
SUPPLY FAN OUTPUT LOW...	X				X										
BAS COMMUNICATION STATE...						X									X
FILTER TIMER HOURS...						X						X	X		
MAINTENANCE REQUIRED...						X						X			
SPACE DEHUMIDIFICATION SETPOINT...						X									
SPACE TEMPERATURE SETPOINT ACTIVE...	X					X									
OCCUPIED BYPASS TIMER...						X									
OCCUPIED COOLING SETPOINT...	X					X									
OCCUPIED HEATING SETPOINT...	X					X									
UNOCCUPIED COOLING SETPOINT...	X					X									
OCCUPANCY BAS...	X								X						
UNOCCUPIED HEATING SETPOINT...	X					X									

Flow Diagram: FCU04, 07, 08, 16 [QTY: 4]



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SCO #17-18042-02A
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NORTH CAROLINA REGISTERED PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAHN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

MECHANICAL CONTROLS

M-7.6

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Sequence of Operation: FCU10

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Morning Warm-up/Pre-Cool, Occupied/Unoccupied and Heat/Cool modes. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints

Occupied:

During occupied periods, the supply fan shall run continuously and the outdoor air damper shall open to maintain minimum ventilation requirements. The chilled water valve and the hot water valve shall control to maintain the active space temperature setpoint.

Unoccupied:

When the space temperature is above the unoccupied cooling setpoint of 85.0 deg. F (adj.) the supply fan shall start and the DX cooling shall be enabled. When the space temperature falls below the unoccupied cooling setpoint of 85.0 deg. F minus the unoccupied differential 4.0 deg. F (adj.) the supply fan shall stop and the DX cooling shall be disabled. Test for bug reporting

Optimal Start:

The BAS shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Morning Warm-Up Mode

During optimal start, if the space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. The outside air damper shall remain closed. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Pre-Cool Mode:

During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When the space temperature are reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Optimal Stop:

The BAS shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint. Outside air damper shall remain enabled to provide minimum ventilation.

Occupied Bypass:

The BAS shall monitor the status of the ON and CANCEL buttons of the space temperature sensor. When an occupied bypass request is received from a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Space Temperature Control:

Cascade zone control shall be used in the occupied, occupied bypass, and occupied standby modes. It maintains zone temperature by controlling the discharge air temperature to control the zone temperature while minimizing the fan speed. The space temperature shall be maintained between the occupied cooling setpoint of 74.0 deg. F (adj.) and the occupied heating setpoint of 71.0 deg. F (adj.). The unit shall transition to the cooling mode when the space temperature rises one degree above the occupied cooling setpoint of 74.0 deg. F (adj.). The unit shall transition to the heating mode when the space temperature drops one degree below the occupied heating setpoint of 71.0 deg. F (adj.).

Occupied Humidity Control:

Dehumidification mode shall terminate when the space relative humidity falls below the relative humidity setpoint minus the relative humidity offset. If the space relative humidity sensor fails the dehumidification sequence shall be terminated and an alarm shall annunciate at the BAS.

Supply Fan Operation:

The supply fan shall cycle on demand during the unoccupied mode. When the controller transitions to the occupied mode, the supply fan shall start at high speed before transitioning to continuous operation at the selected speed. The supply fan status shall be monitored by a differential pressure switch. If the supply fan fails the fan shall be commanded off and an alarm shall annunciate at the BAS. A manual reset shall be required to restart the fan.

Condensate Overflow Monitoring:

If the condensate level reaches the trip point, a condensate overflow diagnostic shall annunciate at the BAS. To prevent the condensate drain pan from overflowing and causing water damage to the building the fan shall be disabled and the chilled water valve shall close.

Freeze Protection:

A hardwired, low limit temperature switch shall be electrically interlocked with the safety circuit. If the low limit temperature switch is tripped 38.0 deg. F (adj.), the supply fan shall be commanded off, water valves shall open to 100%, outside air damper shall close, and an alarm shall annunciate at the BAS.

The controller shall automatically attempt to restart the unit after 30 minutes. If the unit restarts successfully with no low temperature condition, the diagnostic is cleared. If a second low temperature condition occurs within a 24 hour period the unit shall be locked out until manually reset.

Smoke Detector Shutdown:

The unit shall shut down in response to a signal from the smoke detector indicating the presence of smoke. The smoke detector shall be interlocked to the unit through the dry contacts of the smoke detector. A manual reset of the smoke detector shall be required to restart the unit.

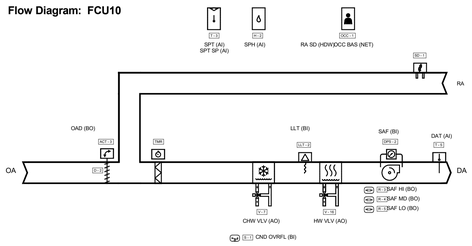
Filter Timer:

The fan-run time (hrs) shall be compared to the filter maintenance timer setpoint. Once the setpoint is reached a filter timer alarm diagnostic shall annunciate at the BAS. When the diagnostic is cleared, the filter-maintenance timer is reset to zero, and the timer begins accumulating fan-run time again.

Points List - FCU10

System Point Description	POINTS											ALARMS				
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT...	BINARY HARDWARE OUTPUT...	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
CHILLED WATER VALVE...	X				X										
CONDENSATE OVERFLOW DETECTION LOCAL...	X		X									X	X		
DISCHARGE AIR TEMPERATURE...	X	X								X	X			X	
HOT WATER VALVE...	X				X										
LOW LIMIT CUTOUT...	X		X									X	X		
OUTDOOR AIR DAMPER...	X					X									
RETURN AIR SMOKE DETECTOR...							X								
SPACE HUMIDITY SENSOR LOCAL...	X	X								X				X	
SPACE TEMPERATURE LOCAL...	X	X								X	X			X	
SPACE TEMPERATURE SETPOINT LOCAL...	X	X													
SUPPLY FAN STATUS LOCAL...	X		X												
SUPPLY FAN OUTPUT HIGH...	X					X									
SUPPLY FAN OUTPUT MEDIUM...	X					X									
SUPPLY FAN OUTPUT LOW...	X					X									
BAS COMMUNICATION STATE...							X								X
FILTER TIMER HOURS...							X					X	X		
MAINTENANCE REQUIRED...							X					X			
SPACE DEHUMIDIFICATION SETPOINT...							X								
SPACE TEMPERATURE SETPOINT ACTIVE...	X						X								
OCCUPIED BYPASS TIMER...							X								
OCCUPIED COOLING SETPOINT...	X						X								
OCCUPIED HEATING SETPOINT...	X						X								
UNOCCUPIED COOLING SETPOINT...	X						X								
OCCUPANCY BAS...	X								X						
UNOCCUPIED HEATING SETPOINT...	X						X								

Flow Diagram: FCU10



Sequence of Operation: FCU09

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Morning Warm-up/Pre-Cool, Occupied/Unoccupied and Heat/Cool modes. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints

Occupied:

During occupied periods, the supply fan shall run continuously. The chilled water valve and the hot water valve shall control to maintain the active space temperature setpoint.

Unoccupied:

When the space temperature is below the unoccupied heating setpoint of 60.0 deg. F (adj.) and hot water is detected, the supply fan shall start and the Heat/Cool water valve shall open. If hot water is not available, the electric heat shall be energized. When the space temperature rises above the unoccupied heating setpoint of 60.0 deg. F (adj.) plus the unoccupied differential of 2.0 deg. F (adj.) the supply fan shall stop and the Heat/Cool water valve shall close. When the space temperature is above the unoccupied cooling setpoint of 85.0 deg. F (adj.) the supply fan shall start and the chilled water valve shall open. When the space temperature falls below the unoccupied cooling setpoint of 85.0 deg. F (adj.) minus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop and the chilled water valve shall close. Test for bug reporting

Optimal Start:

The BAS shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Morning Warm-Up Mode

During optimal start, if the space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Pre-Cool Mode:

During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Optimal Stop:

The BAS shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint.

Occupied Bypass:

The BAS shall monitor the status of the ON and CANCEL buttons of the space temperature sensor. When an occupied bypass request is received from a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Space Temperature Control:

Cascade zone control shall be used in the occupied, occupied bypass, and occupied standby modes. It maintains zone temperature by controlling the discharge air temperature to control the zone temperature while minimizing the fan speed. The space temperature shall be maintained between the occupied cooling setpoint of 74.0 deg. F (adj.) and the occupied heating setpoint of 71.0 deg. F (adj.). The unit shall transition to the cooling mode when the space temperature rises one degree above the occupied cooling setpoint of 74.0 deg. F (adj.). The unit shall transition to the heating mode when the space temperature drops one degree below the occupied heating setpoint of 71.0 deg. F (adj.).

Occupied Humidity Control:

Dehumidification mode shall terminate when the space relative humidity falls below the relative humidity setpoint minus the relative humidity offset. If the space relative humidity sensor fails the dehumidification sequence shall be terminated and an alarm shall annunciate at the BAS.

Supply Fan Operation:

The supply fan shall cycle on demand during the unoccupied mode. When the controller transitions to the occupied mode, the supply fan shall start at high speed before transitioning to continuous operation at the selected speed. The supply fan status shall be monitored by a differential pressure switch. If the supply fan fails the fan shall be commanded off and an alarm shall annunciate at the BAS. A manual reset shall be required to restart the fan.

Condensate Overflow Monitoring:

If the condensate level reaches the trip point, a condensate overflow diagnostic shall annunciate at the BAS. To prevent the condensate drain pan from overflowing and causing water damage to the building the fan shall be disabled and the chilled water valve shall close.

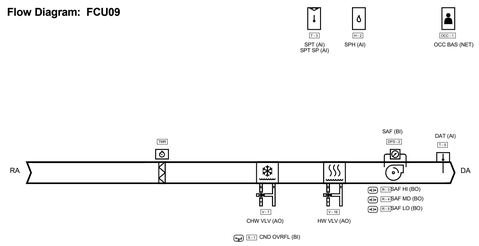
Filter Timer:

The fan-run time (hrs) shall be compared to the filter maintenance timer setpoint. Once the setpoint is reached a filter timer alarm diagnostic shall annunciate at the BAS. When the diagnostic is cleared, the filter-maintenance timer is reset to zero, and the timer begins accumulating fan-run time again.

Points List - FCU09

System Point Description	POINTS											ALARMS				
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT...	BINARY HARDWARE OUTPUT...	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
CHILLED WATER VALVE...	X			X											
CONDENSATE OVERFLOW DETECTION LOCAL...	X		X								X	X			
DISCHARGE AIR TEMPERATURE...	X	X								X	X			X	
HOT WATER VALVE...	X			X											
SPACE HUMIDITY SENSOR LOCAL...	X	X								X				X	
SPACE TEMPERATURE LOCAL...	X	X								X	X			X	
SPACE TEMPERATURE SETPOINT LOCAL...	X	X													
SUPPLY FAN STATUS LOCAL...	X		X												
SUPPLY FAN OUTPUT HIGH...	X				X										
SUPPLY FAN OUTPUT MEDIUM...	X				X										
SUPPLY FAN OUTPUT LOW...	X				X										
BAS COMMUNICATION STATE...						X									X
FILTER TIMER HOURS...						X							X	X	
MAINTENANCE REQUIRED...						X							X		
SPACE DEHUMIDIFICATION SETPOINT...						X									
SPACE TEMPERATURE SETPOINT ACTIVE...	X					X									
OCCUPIED BYPASS TIMER...						X									
OCCUPIED COOLING SETPOINT...	X					X									
OCCUPIED HEATING SETPOINT...	X					X									
UNOCCUPIED COOLING SETPOINT...	X					X									
OCCUPANCY BAS...	X							X							
UNOCCUPIED HEATING SETPOINT...	X					X									

Flow Diagram: FCU09



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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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NORTH CAROLINA REGISTERED PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HARN

05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

MECHANICAL CONTROLS

M-7.7

Sequence of Operation: FCU14, 18 [QTY: 2]

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Morning Warm-up/Pre-Cool, Occupied/Unoccupied and Heat/Cool modes. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints

Occupied:

During occupied periods, the supply fan shall run continuously and the outdoor air damper shall open to maintain minimum ventilation requirements. The chilled water valve and the hot water valve shall control to maintain the active space temperature setpoint.

Unoccupied:

When the space temperature is above the unoccupied cooling setpoint of 85.0 deg. F (adj.) the supply fan shall start and the DX cooling shall be enabled. When the space temperature falls below the unoccupied cooling setpoint of 85.0 deg. F minus the unoccupied differential 4.0 deg. F (adj.) the supply fan shall stop and the DX cooling shall be disabled. Test for bug reporting

Optimal Start:

The BAS shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Morning Warm-Up Mode

During optimal start, if the space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. The outside air damper shall remain closed. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Pre-Cool Mode:

During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. The outside air damper shall remain closed. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Optimal Stop:

The BAS shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint. Outside air damper shall remain enabled to provide minimum ventilation.

Occupied Bypass:

The BAS shall monitor the status of the ON and CANCEL buttons of the space temperature sensor. When an occupied bypass request is received from a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Space Temperature Control:

Cascade zone control shall be used in the occupied, occupied bypass, and occupied standby modes. It maintains zone temperature by controlling the discharge air temperature to control the zone temperature while minimizing the fan speed. The space temperature shall be maintained between the occupied cooling setpoint of 74.0 deg. F (adj.) and the occupied heating setpoint of 71.0 deg. F (adj.). The unit shall transition to the cooling mode when the space temperature rises one degree above the occupied cooling setpoint of 74.0 deg. F (adj.). The unit shall transition to the heating mode when the space temperature drops one degree below the occupied heating setpoint of 71.0 deg. F (adj.).

Occupied Humidity Control:

Dehumidification mode shall terminate when the space relative humidity falls below the relative humidity setpoint minus the relative humidity offset. If the space relative humidity sensor fails the dehumidification sequence shall be terminated and an alarm shall annunciate at the BAS.

Supply Fan Operation:

The supply fan shall cycle on demand during the unoccupied mode. When the controller transitions to the occupied mode, the supply fan shall start at high speed before transitioning to continuous operation at the selected speed. The supply fan status shall be monitored by a differential pressure switch. If the supply fan fails the fan shall be commanded off and an alarm shall annunciate at the BAS. A manual reset shall be required to restart the fan.

Condensate Overflow Monitoring:

If the condensate level reaches the trip point, a condensate overflow diagnostic shall annunciate at the BAS. To prevent the condensate drain pan from overflowing and causing water damage to the building the fan shall be disabled and the chilled water valve shall close.

Freeze Protection:

A hardwired, low limit temperature switch shall be electrically interlocked with the safety circuit. If the low limit temperature switch is tripped 38.0 deg. F (adj.), the supply fan shall be commanded off, water valves shall open to 100%, outside air damper shall close, and an alarm shall annunciate at the BAS.

The controller shall automatically attempt to restart the unit after 30 minutes. If the unit restarts successfully with no low temperature condition, the diagnostic is cleared. If a second low temperature condition occurs within a 24 hour period the unit shall be locked out until manually reset.

Filter Timer:

The fan-run time (hrs) shall be compared to the filter maintenance timer setpoint. Once the setpoint is reached a filter timer alarm diagnostic shall annunciate at the BAS. When the diagnostic is cleared, the filter-maintenance timer is reset to zero, and the timer begins accumulating fan-run time again.

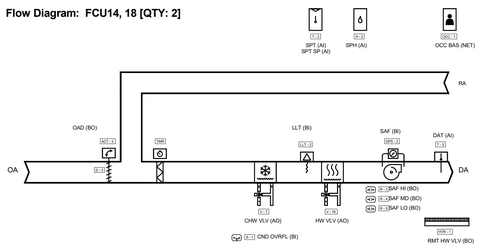
Remote Heating Source

When the space temperature falls 2.0 deg. F (adj) below the space temperature setpoint, then open the hot water valve for the remote heater to help maintain space temperature. If the outside air temperature falls below 55.0 deg. F (adj) then enable the remote heat to slow radiant heat loss around the perimeter of the building.

Points List - FCU14, 18 [QTY: 2]

System Point Description	POINTS											ALARMS				
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT...	BINARY HARDWARE OUTPUT...	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
CHILLED WATER VALVE...	X			X											
CONDENSATE OVERFLOW DETECTION LOCAL...	X		X									X	X		
DISCHARGE AIR TEMPERATURE...	X	X								X	X			X	
HOT WATER VALVE...	X			X											
LOW LIMIT CUTOUT...	X		X									X	X		
OUTDOOR AIR DAMPER...	X				X										
REMOTE HOT WATER VALVE...	X				X										
SPACE HUMIDITY SENSOR LOCAL...	X	X								X				X	
SPACE TEMPERATURE LOCAL...	X	X								X	X			X	
SPACE TEMPERATURE SETPOINT LOCAL...	X	X													
SUPPLY FAN STATUS LOCAL...	X		X												
SUPPLY FAN OUTPUT HIGH...	X				X										
SUPPLY FAN OUTPUT MEDIUM...	X				X										
SUPPLY FAN OUTPUT LOW...	X				X										
BAS COMMUNICATION STATE...						X									X
FILTER TIMER HOURS...						X						X	X		
MAINTENANCE REQUIRED...						X						X			
SPACE DEHUMIDIFICATION SETPOINT...						X									
SPACE TEMPERATURE SETPOINT ACTIVE...	X					X									
OCCUPIED BYPASS TIMER...						X									
OCCUPIED COOLING SETPOINT...	X					X									
OCCUPIED HEATING SETPOINT...	X					X									
UNOCCUPIED COOLING SETPOINT...	X					X									
OCCUPANCY BAS...	X								X						
UNOCCUPIED HEATING SETPOINT...	X					X									

Flow Diagram: FCU14, 18 [QTY: 2]



Sequence of Operation: FCU13

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller Occupied Bypass, Morning Warm-up/Pre-Cool, Occupied/Unoccupied and Heat/Cool modes. If a BAS is not present, or communication is lost with the BAS the controller shall operate using default modes and setpoints

Occupied:

During occupied periods, the supply fan shall run continuously. The chilled water valve and the hot water valve shall control to maintain the active space temperature setpoint.

Unoccupied:

When the space temperature is below the unoccupied heating setpoint of 60.0 deg. F (adj.) the supply fan shall start and the hot water valve shall open. When the space temperature rises above the unoccupied heating setpoint of 60.0 deg. F (adj.) plus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop and the hot water valve shall close. When the space temperature is above the unoccupied cooling setpoint of 85.0 deg. F (adj.) the supply fan shall start and the chilled water valve shall open. When the space temperature falls below the unoccupied cooling setpoint of 85.0 deg. F (adj.) minus the unoccupied differential of 4.0 deg. F (adj.) the supply fan shall stop and the chilled water valve shall close.

Optimal Start:

The BAS shall monitor the scheduled occupied time, occupied space setpoints and space temperature to calculate when the optimal start occurs.

Morning Warm-Up Mode

During optimal start, if the space temperature is below the occupied heating setpoint a morning warm-up mode shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. When the space temperature reaches the occupied heating setpoint (adj.), the unit shall transition to the occupied mode.

Pre-Cool Mode:

During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

Optimal Stop:

The BAS shall monitor the scheduled unoccupied time, occupied setpoints and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint.

Occupied Bypass:

The BAS shall monitor the status of the ON and CANCEL buttons of the space temperature sensor. When an occupied bypass request is received from a space sensor, the unit shall transition from its current occupancy mode to occupied bypass mode and the unit shall maintain the space temperature to the occupied setpoints (adj.).

Space Temperature Control:

Cascade zone control shall be used in the occupied, occupied bypass, and occupied standby modes. It maintains zone temperature by controlling the discharge air temperature to control the zone temperature while minimizing the fan speed. The space temperature shall be maintained between the occupied cooling setpoint of 74.0 deg. F (adj.) and the occupied heating setpoint of 71.0 deg. F (adj.). The unit shall transition to the cooling mode when the space temperature rises one degree above the occupied cooling setpoint of 74.0 deg. F (adj.). The unit shall transition to the heating mode when the space temperature drops one degree below the occupied heating setpoint of 71.0 deg. F (adj.).

Occupied Humidity Control:

If the space relative humidity is greater than the humidity setpoint, the chilled water valve shall modulate to maintain space relative humidity and the hot water valve shall modulate to maintain the space temperature cooling setpoint. Dehumidification mode shall terminate when the space relative humidity falls below the relative humidity setpoint minus the relative humidity offset. If the space relative humidity sensor fails the dehumidification sequence shall be terminated and an alarm shall annunciate at the BAS.

Supply Fan Operation:

The supply fan shall cycle on demand during the unoccupied mode. When the controller transitions to the occupied mode, the supply fan shall start and run continuously. The supply fan status shall be monitored by a differential pressure switch. If the supply fan fails the fan shall be commanded off and an alarm shall annunciate at the BAS. A manual reset shall be required to restart the fan.

Condensate Overflow Monitoring:

If the condensate level reaches the trip point, a condensate overflow diagnostic shall annunciate at the BAS. To prevent the condensate drain pan from overflowing and causing water damage to the building the fan shall be disabled and the chilled water valve shall close.

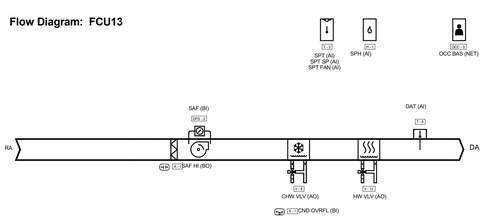
Filter Timer:

The fan-run time (hrs) shall be compared to the filter maintenance timer setpoint. Once the setpoint is reached a filter timer alarm diagnostic shall annunciate at the BAS. When the diagnostic is cleared, the filter-maintenance timer is reset to zero, and the timer begins accumulating fan-run time again.

Points List - FCU13

System Point Description	POINTS									ALARMS					
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT...	BINARY HARDWARE OUTPUT...	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
CHILLED WATER VALVE...	X			X											
CONDENSATE OVERFLOW DETECTION LOCAL...	X		X										X	X	
DISCHARGE AIR TEMPERATURE...	X	X								X	X			X	
HOT WATER VALVE...	X			X											
SPACE HUMIDITY SENSOR LOCAL...	X	X								X				X	
SPACE TEMPERATURE LOCAL...	X	X								X	X			X	
SPACE TEMPERATURE SETPOINT LOCAL...	X	X													
SUPPLY FAN STATUS LOCAL...	X		X												
SUPPLY FAN OUTPUT HIGH...	X				X										
BAS COMMUNICATION STATE...						X									X
FILTER TIMER HOURS...						X							X	X	
MAINTENANCE REQUIRED...						X							X		
OCCUPANCY BAS...	X								X						
OCCUPIED BYPASS TIMER...						X									
OCCUPIED COOLING SETPOINT...	X					X									
OCCUPIED HEATING SETPOINT...	X					X									
SPACE DEHUMIDIFICATION SETPOINT...						X									
SPACE TEMPERATURE SETPOINT ACTIVE...	X					X									
UNOCCUPIED COOLING SETPOINT...	X					X									
UNOCCUPIED HEATING SETPOINT...	X					X									
SPACE FAN SETPOINT...		X													

Flow Diagram: FCU13



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SCO #17-18042-02A
CODE: 42014-4G02
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05-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION

MECHANICAL CONTROLS

M-7.8

Sequence of Operation: PV10

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller an Occupied or Unoccupied command. If a BAS is not present, or communication is lost with the BAS, the controller shall operate in the Occupied mode.

Occupied:

During occupied periods, the exhaust fan shall run continuously.

Unoccupied:

During unoccupied periods the exhaust fan shall be disabled.

Operation:

The damper end switch shall prove fully open prior to fan start. When the exhaust fan is disabled, the exhaust air damper shall close.

the normally open exhaust air damper shall open.

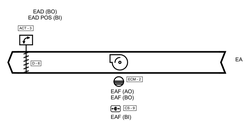
Fan Status:

The fan status shall be monitored by a current sensing switch. If the fan is signaled to start, and status is not proven within 20 seconds (adj.), an alarm shall annunciate at the BAS.

Points List - PV10

System Point Description	POINTS										ALARMS					
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT...	BINARY HARDWARE OUTPUT...	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
EXHAUST AIR DAMPER COMMAND...					X										
EXHAUST AIR DAMPER POSITION STAT...	X		X												
EXHAUST FAN SPEED COMMAND...				X											
EXHAUST FAN STATUS...	X		X												
EXHAUST FAN START STOP COMMAND...	X				X										
BAS COMMUNICATION STATE...						X									

Flow Diagram: PV10



PV10 CONTROLS

SCALE : 1/8" = 1'-0"

4

Sequence of Operation: PV02, 05, 06, 09 [QTY: 4]

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller an Occupied or Unoccupied command. If a BAS is not present, or communication is lost with the BAS, the controller shall operate in the Occupied mode.

Occupied:

During occupied periods, the exhaust fan shall run continuously.

Unoccupied:

During unoccupied periods the exhaust fan shall be disabled.

Operation:

The damper end switch shall prove fully open prior to fan start. When the exhaust fan is disabled, the exhaust air damper shall close.

the normally open exhaust air damper shall open.

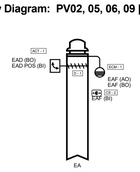
Fan Status:

The fan status shall be monitored by a current sensing switch. If the fan is signaled to start, and status is not proven within 20 seconds (adj.), an alarm shall annunciate at the BAS.

Points List - PV02, 05, 06, 09 [QTY: 4]

System Point Description	POINTS										ALARMS					
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT...	BINARY HARDWARE OUTPUT...	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
EXHAUST AIR DAMPER COMMAND...					X										
EXHAUST AIR DAMPER POSITION STAT...	X		X												
EXHAUST FAN SPEED COMMAND...				X											
EXHAUST FAN STATUS...	X		X												
EXHAUST FAN START STOP COMMAND...	X				X										
BAS COMMUNICATION STATE...						X									

Flow Diagram: PV02, 05, 06, 09 [QTY: 4]



PV02, 05, 06, 09 CONTROLS

SCALE : 1/8" = 1'-0"

3

Sequence of Operation: PV01, 03, 04 [QTY: 3]

Building Automation System Interface:

The Building Automation System (BAS) shall send the controller an Occupied or Unoccupied command. If a BAS is not present, or communication is lost with the BAS, the controller shall operate in the Occupied mode.

Occupied:

During occupied periods, the exhaust fan shall run continuously.

Unoccupied:

During unoccupied periods the exhaust fan shall be disabled.

Operation:

The damper end switch shall prove fully open prior to fan start. When the exhaust fan is disabled, the exhaust air damper shall close.

the normally open exhaust air damper shall open.

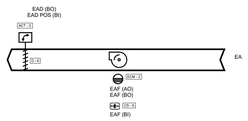
Fan Status:

The fan status shall be monitored by a current sensing switch. If the fan is signaled to start, and status is not proven within 20 seconds (adj.), an alarm shall annunciate at the BAS.

Points List - PV01, 03, 04 [QTY: 3]

System Point Description	POINTS										ALARMS					
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT...	BINARY HARDWARE OUTPUT...	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
EXHAUST AIR DAMPER COMMAND...					X										
EXHAUST AIR DAMPER POSITION STAT...	X		X												
EXHAUST FAN SPEED COMMAND...				X											
EXHAUST FAN STATUS...	X		X												
EXHAUST FAN START STOP COMMAND...	X				X										
BAS COMMUNICATION STATE...						X									

Flow Diagram: PV01, 03, 04 [QTY: 3]



PV01, 03, 04 CONTROLS

SCALE : 1/8" = 1'-0"

2

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

900 LOGGERHEAD RD,
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COST ESTIMATOR
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NOTE: IF THIS DRAWING IS NOT 30" X 42", IT IS A REDUCED PRINT. REFER TO GRAPHIC SCALE.

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23551 DAVID M. HAIN

06-May-26

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
2	04-27-26	BULLETIN #2

MECHANICAL CONTROLS

M-7.9

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SEQUENCE OF OPERATION – AIR CONDITIONER SYSTEM

MITSUBISHI PKA-AL24NL INDOOR UNIT WITH PUY-AH24NL OR PUY-AK24 OUTDOOR UNIT
COOLING-ONLY SYSTEM – BACNET MSTP DDC INTEGRATION
PROJECT 23004
1. THE AIR CONDITIONER SYSTEM SHALL BE CONTROLLED BY THE BUILDING DDC SYSTEM THROUGH A BACNET MSTP INTERFACE. THE DDC SYSTEM SHALL PROVIDE ALL OPERATING COMMANDS AND SHALL MONITOR ALL EXPOSED POINTS PROVIDED BY THE MITSUBISHI INTERFACE.
2. WHEN THE SYSTEM IS COMMANDED "ON," THE UNIT SHALL OPERATE IN COOLING MODE ONLY. WHEN THE SYSTEM IS COMMANDED "OFF," THE INDOOR FAN AND OUTDOOR UNIT SHALL SHUT DOWN PER MANUFACTURER INTERNAL LOGIC.
3. COOLING MODE:
 A. WHEN ENABLED, THE DDC SYSTEM SHALL TRANSMIT A COOLING SETPOINT.
 B. THE AIR CONDITIONER SHALL MODULATE COMPRESSOR OUTPUT AND INTERNAL REFRIGERATION CONTROLS TO MAINTAIN THE SPACE TEMPERATURE AT SETPOINT.
 C. FAN SPEED SHALL FOLLOW THE DDC FAN SPEED COMMAND OR OPERATE IN AUTO IF SELECTED BY THE DDC SYSTEM.
4. INDOOR FAN CONTROL:
 A. THE DDC SYSTEM SHALL COMMAND FAN SPEED (LOW, MEDIUM, HIGH, OR AUTO).
 B. WHEN AUTO IS SELECTED, THE FAN SHALL MODULATE INTERNALLY BASED ON SYSTEM LOAD.
 C. THE FAN SHALL RUN DURING ACTIVE COOLING OPERATION AND AS REQUIRED TO SATISFY DEMAND.
5. OCCUPIED/UNOCCUPIED SCHEDULING:
 A. THE DDC SYSTEM SHALL DETERMINE OCCUPIED AND UNOCCUPIED MODES.
 B. DURING OCCUPIED MODE, THE SYSTEM SHALL OPERATE TO MAINTAIN THE COOLING SETPOINT.
 C. DURING UNOCCUPIED MODE, THE SYSTEM SHALL OPERATE WITH A HIGHER COOLING SETPOINT OR BE COMMANDED OFF AS REQUIRED BY THE OWNER.

6. SAFETIES AND PROTECTIONS:
 A. ALL COMPRESSOR, PRESSURE, TEMPERATURE, AND FAN SAFETIES SHALL REMAIN INTERNAL TO THE MITSUBISHI AIR CONDITIONER SYSTEM.
 B. THE DDC SYSTEM SHALL NOT ATTEMPT TO RESET, OVERRIDE, OR BYPASS ANY FACTORY SAFETY.
 C. IF A FAULT OCCURS, THE UNIT SHALL SHUT DOWN AND REPORT FAULT STATUS AND FAULT CODE TO THE DDC SYSTEM.
7. ALARMS:
 A. THE DDC SYSTEM SHALL ALARM UPON RECEIPT OF A FAULT SIGNAL OR COMMUNICATION FAILURE.
 B. OPTIONAL ALARMS MAY INCLUDE HIGH SPACE TEMPERATURE OR LOW SPACE TEMPERATURE BASED ON DDC LOGIC.
8. STARTUP AND VERIFICATION:
 A. HVAC CONTRACTOR SHALL VERIFY REFRIGERANT PIPING, DRAINAGE, POWER, AND ALL MANUFACTURER REQUIREMENTS PRIOR TO INTEGRATION WITH THE BAS.
 B. CONTROLS CONTRACTOR SHALL VERIFY ALL BACNET POINTS AVAILABLE FROM THE MITSUBISHI INTERFACE AND MAP ALL REQUIRED POINTS INTO THE DDC SYSTEM.
 C. FINAL SYSTEM OPERATION SHALL BE DEMONSTRATED TO THE ENGINEER UPON REQUEST.

POINTS LIST – AIR CONDITIONER SYSTEM
MITSUBISHI PKA-AL24NL INDOOR UNIT WITH PUY-AH24NL OR PUY-AK24 OUTDOOR UNIT
COOLING-ONLY SYSTEM – BACNET MSTP INTEGRATION
PROJECT 23004

WRITABLE POINTS (DDC → MITSUBISHI)
1. SYSTEM ON/OFF COMMAND
2. COOLING MODE COMMAND (FORCED COOL)
3. COOLING SETPOINT
4. FAN SPEED COMMAND (LOW / MEDIUM / HIGH / AUTO)
5. OCCUPANCY COMMAND (OPTIONAL)

READABLE POINTS (MITSUBISHI → DDC)
1. UNIT ON/OFF STATUS
2. OPERATING MODE STATUS (COOL / STANDBY / OFF)
3. SPACE TEMPERATURE
4. RETURN AIR TEMPERATURE (IF AVAILABLE)
5. SUPPLY AIR TEMPERATURE (IF AVAILABLE)
6. FAN SPEED STATUS
7. COMPRESSOR STATUS
8. COMPRESSOR FREQUENCY / % OUTPUT (IF AVAILABLE)
9. FAULT ACTIVE (BOOLEAN)
10. FAULT CODE (INTEGER / TEXT CODE)
11. REFRIGERANT PIPE TEMPERATURE (OPTIONAL PER INTERFACE)
12. OUTDOOR UNIT OPERATING STATUS
13. BACNET COMMUNICATION HEALTH / HEARTBEAT (OPTIONAL, DEPENDING ON GATEWAY)

SEQUENCE OF OPERATION – HEAT PUMP SYSTEM

MITSUBISHI PKA-AL24NL INDOOR UNIT / PUZ-AH24NL OUTDOOR UNIT
BACNET MSTP INTEGRATION – PROJECT 23004
1. THE HEAT PUMP SYSTEM SHALL BE CONTROLLED BY THE BUILDING DDC SYSTEM THROUGH A BACNET MSTP INTERFACE. THE DDC SYSTEM SHALL PROVIDE ALL OPERATING COMMANDS AND SHALL MONITOR ALL EXPOSED POINTS PROVIDED BY THE MITSUBISHI INTERFACE.
2. WHEN THE SYSTEM IS COMMANDED "ON," THE UNIT SHALL OPERATE IN THE MODE SELECTED BY THE DDC SYSTEM (COOLING, HEATING, OR AUTO IF ALLOWED). WHEN THE SYSTEM IS COMMANDED "OFF," THE INDOOR FAN, OUTDOOR UNIT, AND COMPRESSOR SHALL SHUT DOWN PER MANUFACTURER'S INTERNAL LOGIC.
3. COOLING MODE:
 A. WHEN COOLING MODE IS SELECTED, THE DDC SYSTEM SHALL TRANSMIT A COOLING SETPOINT.
 B. THE HEAT PUMP SHALL MODULATE COMPRESSOR OUTPUT AND EXPANSION DEVICES INTERNALLY TO MAINTAIN THE SPACE TEMPERATURE AT SETPOINT.
 C. FAN SPEED SHALL FOLLOW THE DDC FAN SPEED COMMAND OR OPERATE IN AUTO IF SELECTED.
4. HEATING MODE:
 A. WHEN HEATING MODE IS SELECTED, THE DDC SYSTEM SHALL TRANSMIT A HEATING SETPOINT.
 B. THE HEAT PUMP SHALL MODULATE COMPRESSOR OPERATION AND REVERSING VALVE POSITION TO MAINTAIN THE SPACE TEMPERATURE.
 C. DEFROST OPERATION SHALL BE FULLY AUTOMATIC. DDC SHALL NOT OVERRIDE DEFROST CYCLES.
5. DEFROST OPERATION:
 A. DEFROST SHALL INITIATE BASED ON MITSUBISHI INTERNAL LOGIC USING OUTDOOR COIL TEMPERATURE AND OPERATING CONDITIONS.
 B. DURING DEFROST, THE INDOOR FAN MAY SLOW OR STOP PER FACTORY SETTINGS.
 C. THE DDC SYSTEM SHALL MONITOR DEFROST STATUS BUT SHALL NOT INTERFERE WITH THE PROCESS.
6. INDOOR FAN CONTROL:
 A. THE DDC SYSTEM SHALL COMMAND FAN SPEED (LOW, MEDIUM, HIGH, OR AUTO).
 B. WHEN AUTO IS SELECTED, FAN SPEED SHALL MODULATE INTERNALLY BASED ON SYSTEM LOAD AND OPERATING MODE.
 C. THE FAN SHALL RUN DURING ACTIVE COOLING OR HEATING OPERATION AND AS REQUIRED TO SATISFY DEMAND.
7. OCCUPIED/UNOCCUPIED SCHEDULING:
 A. THE DDC SYSTEM SHALL DETERMINE OCCUPIED AND UNOCCUPIED PERIODS.
 B. DURING OCCUPIED MODE, THE SYSTEM SHALL OPERATE WITH NORMAL HEATING AND COOLING SETPOINTS.
 C. DURING UNOCCUPIED MODE, THE SYSTEM SHALL OPERATE WITH SETBACK SETPOINTS OR BE COMMANDED OFF AS DIRECTED BY THE OWNER.
8. SAFETIES AND PROTECTIONS:
 A. ALL COMPRESSOR, TEMPERATURE, PRESSURE, AND DEFROST SAFETIES SHALL REMAIN INTERNAL TO THE MITSUBISHI UNIT.
 B. THE DDC SYSTEM SHALL NOT ATTEMPT TO RESET, OVERRIDE, OR BYPASS ANY FACTORY SAFETY.
 C. UPON A CRITICAL FAULT, THE UNIT SHALL SHUT DOWN AND REPORT FAULT STATUS VIA BACNET.
9. ALARMS:
 A. THE DDC SYSTEM SHALL ALARM UPON RECEIPT OF A FAULT SIGNAL, COMMUNICATION FAILURE, OR EXTREME SPACE TEMPERATURE CONDITION (IF PROGRAMMED).
 B. FAULT CODES PROVIDED BY THE MITSUBISHI INTERFACE SHALL BE LOGGED AND MADE AVAILABLE TO THE OWNER.
10. STARTUP AND VERIFICATION:
 A. CONTRACTOR SHALL ENSURE CORRECT REFRIGERANT LINE SET INSTALLATION, PROPER DRAINAGE, AND VERIFIED ELECTRICAL CONNECTIONS PRIOR TO BAS INTEGRATION.
 B. THE CONTROLS CONTRACTOR SHALL CONFIRM ALL POINTS AVAILABLE THROUGH THE MITSUBISHI BACNET INTERFACE AND ENSURE ALL REQUIRED POINTS ARE MAPPED INTO THE DDC SYSTEM.
 C. FINAL OPERATION SHALL BE VERIFIED IN THE PRESENCE OF THE ENGINEER WHEN REQUESTED.

POINTS LIST – HEAT PUMP SYSTEM
MITSUBISHI PKA-AL24NL INDOOR UNIT WITH PUZ-AH24NL OUTDOOR UNIT
HEAT PUMP SYSTEM – BACNET MSTP INTEGRATION
PROJECT 23004

WRITABLE POINTS (DDC → MITSUBISHI)
1. SYSTEM ON/OFF COMMAND
2. OPERATING MODE COMMAND (HEAT / COOL / AUTO)
3. COOLING SETPOINT
4. HEATING SETPOINT
5. FAN SPEED COMMAND (LOW / MEDIUM / HIGH / AUTO)
6. OCCUPANCY COMMAND (OPTIONAL)

READABLE POINTS (MITSUBISHI → DDC)
1. UNIT ON/OFF STATUS
2. OPERATING MODE STATUS (HEAT / COOL / DEFROST / OFF)
3. SPACE TEMPERATURE
4. RETURN AIR TEMPERATURE (IF AVAILABLE)
5. SUPPLY AIR TEMPERATURE (IF AVAILABLE)
6. FAN SPEED STATUS
7. COMPRESSOR STATUS
8. COMPRESSOR FREQUENCY / % OUTPUT (IF AVAILABLE)
9. REVERSING VALVE STATUS (IF AVAILABLE)
10. DEFROST STATUS (ACTIVE / INACTIVE)
11. FAULT ACTIVE (BOOLEAN)
12. FAULT CODE (INTEGER / TEXT CODE)
13. OUTDOOR UNIT OPERATING STATUS
14. REFRIGERANT PIPE TEMPERATURE (IF AVAILABLE)
15. BACNET COMMUNICATION HEALTH / HEARTBEAT (OPTIONAL PER GATEWAY)

LIFT STATION – BAS MONITORING SEQUENCE OF OPERATION (BACNET/IP)

1. LIFT STATION PUMPS SHALL BE CONTROLLED BY PACKAGED LIFT STATION CONTROL PANEL. ALL LEVEL SENSING, LEAD/LAG SEQUENCING, AND HAND/OFF/AUTO SELECTION SHALL BE LOCAL TO THE LIFT STATION PANEL.

2. BAS SHALL BE MONITORING-ONLY. BAS SHALL NOT START/STOP LIFT STATION PUMPS.

3. EACH PUMP SHALL PROVIDE A RUN STATUS SIGNAL (AUXILIARY CONTACT OR CURRENT SWITCH) TO BAS.

4. EACH PUMP SHALL PROVIDE A PUMP FAIL / FAULT DRY CONTACT TO BAS (IF AVAILABLE).

5. LIFT STATION DISCHARGE FLOW METER SHALL BE ELECTRONIC (MAG OR ULTRASONIC) WITH BACNET/IP INTERFACE AND SHALL PROVIDE:
 A. INSTANTANEOUS FLOW RATE (GPM)
 B. TOTAL FLOW (GALLONS OR FT³)

6. BAS SHALL TREND:
 A. PUMP 1 RUN STATUS, PUMP 2 RUN STATUS (RUNTIME ACCUMULATION)
 B. LIFT STATION DISCHARGE FLOW RATE (GPM)
 C. LIFT STATION TOTAL FLOW (HOURLY / DAILY / MONTHLY LOGS AS DIRECTED BY OWNER).

7. BAS SHALL GENERATE ALARMS AS FOLLOWS:
 A. PUMP 1 FAIL ALARM WHEN PUMP 1 FAIL CONTACT IS ACTIVE.
 B. PUMP 2 FAIL ALARM WHEN PUMP 2 FAIL CONTACT IS ACTIVE.
 C. FLOW METER COMMS FAULT WHEN BACNET/IP VALUES FROM FLOW METER DO NOT UPDATE WITHIN ADJUSTABLE TIME.
 D. OPTIONAL: LOGIC-BASED ALARM IF PUMP RUN STATUS IS ACTIVE BUT MEASURED FLOW IS BELOW MINIMUM THRESHOLD FOR ADJUSTABLE TIME (INDICATIVE OF LOST PRIME OR MECHANICAL FAILURE).
8. TOTALIZER RESET FOR FLOW METER SHALL BE LOCAL ONLY (NO RESET FROM BAS) UNLESS OWNER APPROVES REMOTE RESET FUNCTION.

LIFT STATION – BAS POINTS LIST (BACNET/IP)

ANALOG INPUTS (AI – FROM FLOW METER, BACNET/IP)
- AI-1 LIFT STATION DISCHARGE FLOW RATE (GPM)
- AI-2 LIFT STATION TOTAL FLOW (GALLONS OR FT³)

BINARY INPUTS (BI – FROM PANEL & FLOW METER)
- BI-1 PUMP 1 RUN STATUS
- BI-2 PUMP 2 RUN STATUS
- BI-3 PUMP 1 FAIL ALARM
- BI-4 PUMP 2 FAIL ALARM
- BI-5 FLOW METER COMMS FAULT (BACNET/IP SUPERVISION OR BAS-DERIVED)
- BI-6 OPTIONAL: LIFT STATION CONTROL PANEL POWER LOSS (IF CONTACT PROVIDED)

BINARY OUTPUTS (BO)
- NONE – BAS SHALL NOT CONTROL LIFT STATION PUMPS.

SEQUENCE OF OPERATION – DOMESTIC WATER METER

1. BUILDING DOMESTIC WATER METER SHALL BE ELECTRONIC (MAG OR ULTRASONIC) WITH INTEGRAL TOTALIZER AND BACNET/IP INTERFACE.
2. METER SHALL MEASURE INSTANTANEOUS FLOW RATE (GPM) AND TOTAL WATER VOLUME (GALLONS OR FT³) FOR THE COMPLETE BUILDING DOMESTIC SERVICE.
3. BAS SHALL MONITOR ALL VALUES VIA BACNET/IP FOR UTILITY TRACKING, LEAK DETECTION, AND REPORTING.
4. BAS SHALL GENERATE THE FOLLOWING ALARMS:
 A. HIGH-FLOW ALARM: FLOW ABOVE ADJUSTABLE SETPOINT FOR ADJUSTABLE TIME (TYPICAL LEAK OR PIPE BREAK).
 B. LOW-FLOW / NO-FLOW ALARM: FLOW BELOW MINIMUM EXPECTED VALUE DURING PERIODS OF KNOWN OCCUPANCY OR WHEN DOWNSTREAM EQUIPMENT IS ACTIVE.
 C. METER COMMS FAILURE: NO BACNET/IP UPDATE WITHIN ADJUSTABLE TIMEOUT.
5. WATER METER SHALL REQUIRE NO CONTROL OUTPUTS; BAS IS MONITORING ONLY.
6. TOTALIZER RESET SHALL BE LOCAL AT METER ONLY (NO BAS RESET) UNLESS OWNER APPROVES AND WRITES IS ENABLED.

BAS POINTS LIST – DOMESTIC WATER METER (BACNET/IP)

ANALOG INPUTS (AI – BACNET/IP)
- AI-1 DOMESTIC WATER FLOW RATE (GPM)
- AI-2 DOMESTIC WATER TOTAL VOLUME (GALLONS OR FT³)
- AI-3 OPTIONAL: BUILDING WATER PRESSURE (PSI)

BINARY INPUTS (BI – DIRECT OR BAS-DERIVED)
- BI-1 DOMESTIC HIGH-FLOW ALARM
- BI-2 DOMESTIC LOW-FLOW / NO-FLOW ALARM
- BI-3 DOMESTIC WATER METER COMMS FAULT (BACNET/IP)

LSS MAKEUP WATER METER – SEQUENCE OF OPERATION (BACNET/IP)

1. LSS WATER METER SHALL BE ELECTRONIC (MAG OR ULTRASONIC) WITH INTEGRAL TOTALIZER AND BACNET/IP INTERFACE.
2. METER SHALL MEASURE INSTANTANEOUS FLOW RATE (GPM) AND TOTAL WATER USAGE (GALLONS) FOR LSS MAKEUP / SUPPLY WATER.
3. METER SHALL OPERATE AUTONOMOUSLY; BAS/LSS CONTROLS ARE MONITORING-ONLY.
4. BAS SHALL READ FLOW RATE AND TOTAL VOLUME OVER BACNET/IP AND LOG VALUES FOR LSS REPORTING.
5. BAS SHALL GENERATE:
 A. HIGH-FLOW ALARM IF FLOW EXCEEDS ADJUSTABLE SETPOINT FOR ADJUSTABLE TIME (LEAK / LINE BREAK INDICATION).
 B. LOW-FLOW / NO-FLOW ALARM IF FLOW IS BELOW ADJUSTABLE SETPOINT WHEN LSS MAKEUP PUMP OR VALVE IS COMMANDED ON.
6. BAS SHALL GENERATE COMMUNICATIONS ALARM IF BACNET/IP POINTS FROM METER ARE NOT UPDATED WITHIN ADJUSTABLE TIMEOUT.
7. TOTALIZER RESET SHALL BE LOCAL AT METER ONLY (NO BAS RESET) UNLESS EXPLICITLY APPROVED BY OWNER.

LSS WATER METER – BAS POINTS LIST (BACNET/IP)

ANALOG INPUTS (AI – BACNET/IP)
- AI-1 LSS WATER FLOW RATE (GPM)
- AI-2 LSS WATER TOTAL VOLUME (GALLONS)
- AI-3 OPTIONAL: LSS WATER LINE PRESSURE (PSI)

BINARY INPUTS (BI – DERIVED OR DIRECT)
- BI-1 LSS HIGH-FLOW ALARM (FROM METER OR BAS LOGIC)
- BI-2 LSS LOW-FLOW / NO-FLOW ALARM (FROM METER OR BAS LOGIC)
- BI-3 LSS WATER METER COMMS FAULT (BACNET/IP)

POWER METER – SEQUENCE OF OPERATION

GENERAL
1. POWER METER SHALL BE FULLY ELECTRONIC AND PROVIDE REAL-TIME AND ACCUMULATED ELECTRICAL MEASUREMENTS FOR ALL PHASES.
2. METER SHALL SUPPORT MODBUS RTU OR BACNET IP COMMUNICATION.
3. BAS SHALL MONITOR, TREND, AND ALARM ALL CRITICAL DEMAND AND ENERGY PARAMETERS.

METER FUNCTIONS
1. METER SHALL MEASURE:
 A. REAL ENERGY (KWH), REACTIVE ENERGY (KVARH), APPARENT ENERGY (KVAH)
 B. INSTANTANEOUS KW, KVAR, KVA (PER PHASE AND TOTAL)
 C. PHASE CURRENT, PHASE-TO-PHASE & PHASE-NEUTRAL VOLTAGE
 D. POWER FACTOR (PER PHASE & AVERAGE), AC FREQUENCY
 E. NET DEMAND KW / KVAR / KVA (BLOCK OR SLIDING WINDOW)
2. METER SHALL GENERATE ALARMS FOR:
 A. PHASE LOSS / REVERSE ROTATION
 B. OVER-CURRENT, OVER-VOLTAGE, UNDER-VOLTAGE
 C. FREQUENCY OUT OF RANGE
 D. COMMUNICATIONS FAILURE

BAS INTEGRATION
1. BAS SHALL POLL METER EVERY 5 SECONDS (REAL-TIME VALUES) AND EVERY 15 SECONDS (DEMAND).
2. BAS SHALL TREND TOTAL KW, DEMAND KW, TOTAL KWH, AND POWER FACTOR.
3. BAS SHALL DISPLAY METER STATUS AND ALARMS AT OPERATOR WORKSTATION.

COMMISSIONING
1. VERIFY CT/PT RATIOS, PHASE ROTATION, AND SYSTEM TYPE.
2. VERIFY ALL BAS POINTS MATCH METER REGISTER MAP.
3. CONFIRM ENERGY ACCUMULATION NON-RESETTING WITHOUT AUTHORIZATION.

POWER METER – BAS POINTS LIST (CONDENSED)

ANALOG INPUTS (AI) – READ FROM METER
- AI-1 PHASE A CURRENT (A)
- AI-2 PHASE B CURRENT (A)
- AI-3 PHASE C CURRENT (A)
- AI-4 AVG CURRENT (A)
- AI-5 VAB VOLTAGE (V)
- AI-6 VBC VOLTAGE (V)
- AI-7 VCA VOLTAGE (V)
- AI-8 VA-N VOLTAGE (V)
- AI-9 VB-N VOLTAGE (V)
- AI-10 VC-N VOLTAGE (V)
- AI-11 FREQUENCY (HZ)
- AI-12 TOTAL KW
- AI-13 TOTAL KVAR
- AI-14 TOTAL KVA
- AI-15 TOTAL POWER FACTOR
- AI-16 ACCUMULATED KWH
- AI-17 ACCUMULATED KVARH
- AI-18 DEMAND KW
- AI-19 DEMAND KVA

BINARY INPUTS (BI) – READ FROM METER
- BI-1 PHASE LOSS ALARM
- BI-2 OVER-CURRENT ALARM
- BI-3 OVER-VOLTAGE ALARM
- BI-4 UNDER-VOLTAGE ALARM
- BI-5 FREQUENCY OUT OF RANGE
- BI-6 REVERSE PHASE ROTATION
- BI-7 METER COMMS FAILURE

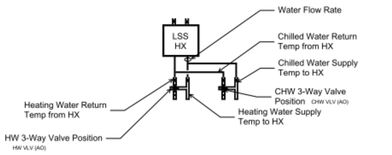
BINARY OUTPUTS (BO) – OPTIONAL
- BO-1 METER RESET ENABLE (IF USED)
- BO-2 ALARM ACKNOWLEDGE (IF USED)

DOMESTIC WATER PRESSURE BOOSTER PUMP POINTS LIST

Point Name / Type / Units / Notes			
Booster System Power Status	Binary (On/Off)		System main power status
Booster System General Fault	Binary (Fault/OK)		Any system-wide fault
System Pressure	Analog	PSI	Outlet pressure from booster system
Suction Pressure	Analog	PSI	Inlet pressure to booster system
Discharge Pressure	Analog	PSI	Pressure at discharge header
High Temp Shutdown Alarm	Binary Alarm		Triggered at overtemp
Low System Pressure Alarm	Binary Alarm		Below system pressure threshold
Low Suction Pressure Alarm	Binary Alarm		Suction drops below threshold
Low Suction Pressure Shutdown	Binary Alarm		Interlocks system shutdown
High Discharge Pressure Alarm	Binary Alarm		Above max threshold
Low Discharge Pressure Alarm	Binary Alarm		Below expected range
Pump VFD Fault – Pump 1	Binary Alarm		Specific to each pump
Pump VFD Fault – Pump 2	Binary Alarm		
Pump VFD Fault – Pump 3	Binary Alarm		
Pump Failure Detected – Pump 1	Binary Alarm		Pump unable to operate
Pump Failure Detected – Pump 2	Binary Alarm		
Pump Failure Detected – Pump 3	Binary Alarm		
VFD Running Status – Pump 1	Binary (Run/Stop)		Indicates VFD operation
VFD Running Status – Pump 2	Binary (Run/Stop)		
VFD Running Status – Pump 3	Binary (Run/Stop)		
Pump Elapsed Run Time – Pump 1	Analog	Hours	Runtime meter
Pump Elapsed Run Time – Pump 2	Analog	Hours	
Pump Elapsed Run Time – Pump 3	Analog	Hours	-

Description	Point Type	Units
Chilled Water Supply Temp to HX	Analog Input	°C / °F
Chilled Water Return Temp from HX	Analog Input	°C / °F
Chilled Water Flow Rate	Analog Input	GPM / LPM
CHW 3-Way Valve Position	Analog Input	%
CHW Side Energy Usage	Calculated / AI	kW
Heating Water Supply Temp to HX	Analog Input	°C / °F
Heating Water Return Temp from HX	Analog Input	°C / °F
Heating Water Flow Rate	Analog Input	GPM / LPM
HW 3-Way Valve Position	Analog Input	%
HW Side Energy Usage	Calculated / AI	kW

Symbols
WT (AI) — Temp
DF (AI) — Flow



HEAT EXCHANGER SEQUENCE OF OPERATIONS

SEQUENCE OF OPERATIONS (MONITORING-ONLY)

THE BAS WILL MONITOR THE OPERATING CONDITIONS OF THE HEAT EXCHANGER SYSTEM TO:
- TRACK ENERGY USAGE
- LOG THERMAL PERFORMANCE
- RAISE ALARMS IF CONDITIONS DEVIATE FROM ACCEPTABLE RANGES

COOLING MODE (INITIATED BY LSS)
- WHEN THE CHILLED WATER 3-WAY VALVE OPENS (BY LSS CONTROL), BAS:
  - MONITORS CHW SUPPLY/RETURN TEMPERATURES
  - MONITORS CHW FLOW RATE
  - CALCULATES COOLING ENERGY (BTU/KW) VIA ΔT × FLOW
  - MONITORS VALVE POSITION (READ-ONLY)

HEATING MODE (INITIATED BY LSS)
- WHEN THE HEATING WATER 3-WAY VALVE OPENS (BY LSS CONTROL), BAS:
  - MONITORS HW SUPPLY/RETURN TEMPERATURES
  - MONITORS HW FLOW RATE
  - CALCULATES HEATING ENERGY DELIVERED
  - MONITORS VALVE POSITION (READ-ONLY)

ALARMS & MONITORING FUNCTIONS
BAS GENERATES ALARMS INDEPENDENTLY OF VALVE CONTROL:
- NO FLOW ON CHW/HW SIDE WHILE VALVE INDICATES OPEN POSITION
- UNEXPECTED ΔT (I.E., FLOW WITH NO SIGNIFICANT HEAT TRANSFER)
- ENERGY USE TRENDS FOR DIAGNOSTIC/TRENDING

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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12-Dec-25

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-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1

MECHANICAL CONTROLS

M-7.10

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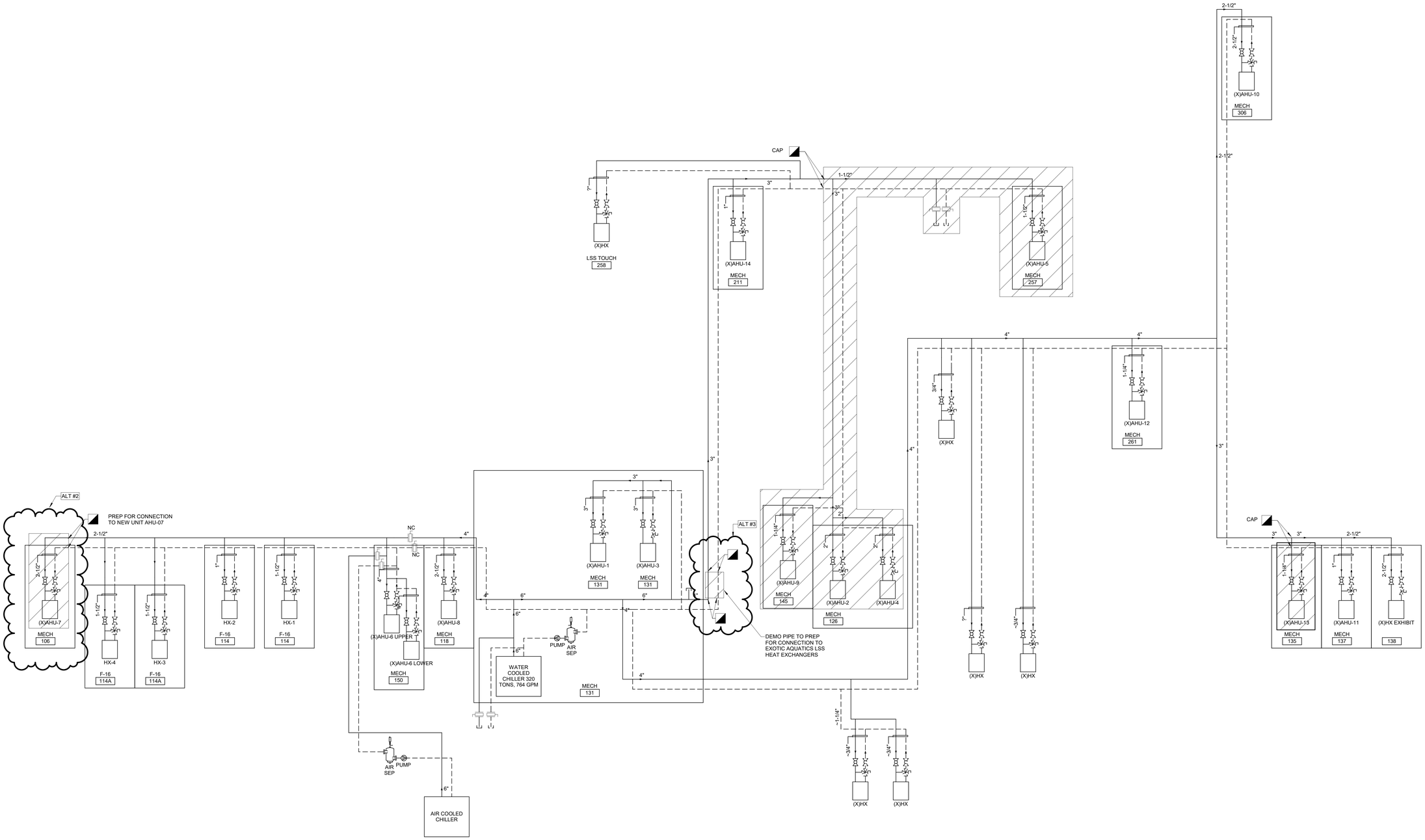
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DOMESTIC WATER PUMP CONTROLS
SCALE : 1/8" = 1'-0"

2

HX CONTROLS
SCALE : 1/8" = 1'-0"

1



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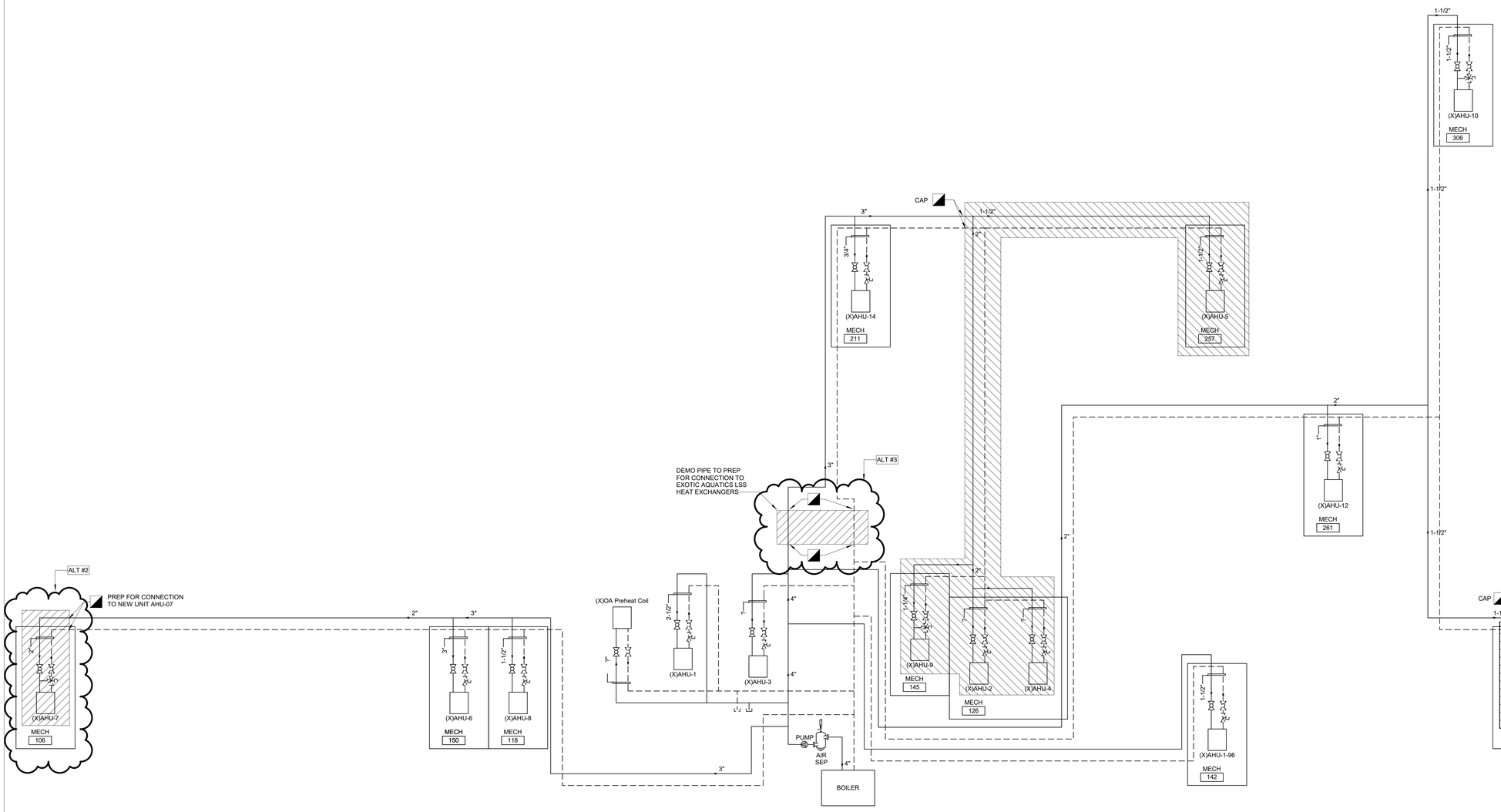
MECHANICAL CHILLED WATER PIPING FLOW DIAGRAM DEMO

M-8.1

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CHILLED WATER PIPING FLOW DIAGRAM DEMO
SCALE : NO SCALE



SZOSTAK DESIGN

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05-Dec-25

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MECHANICAL HEATING
HOT WATER PIPING FLOW
DIAGRAM DEMO

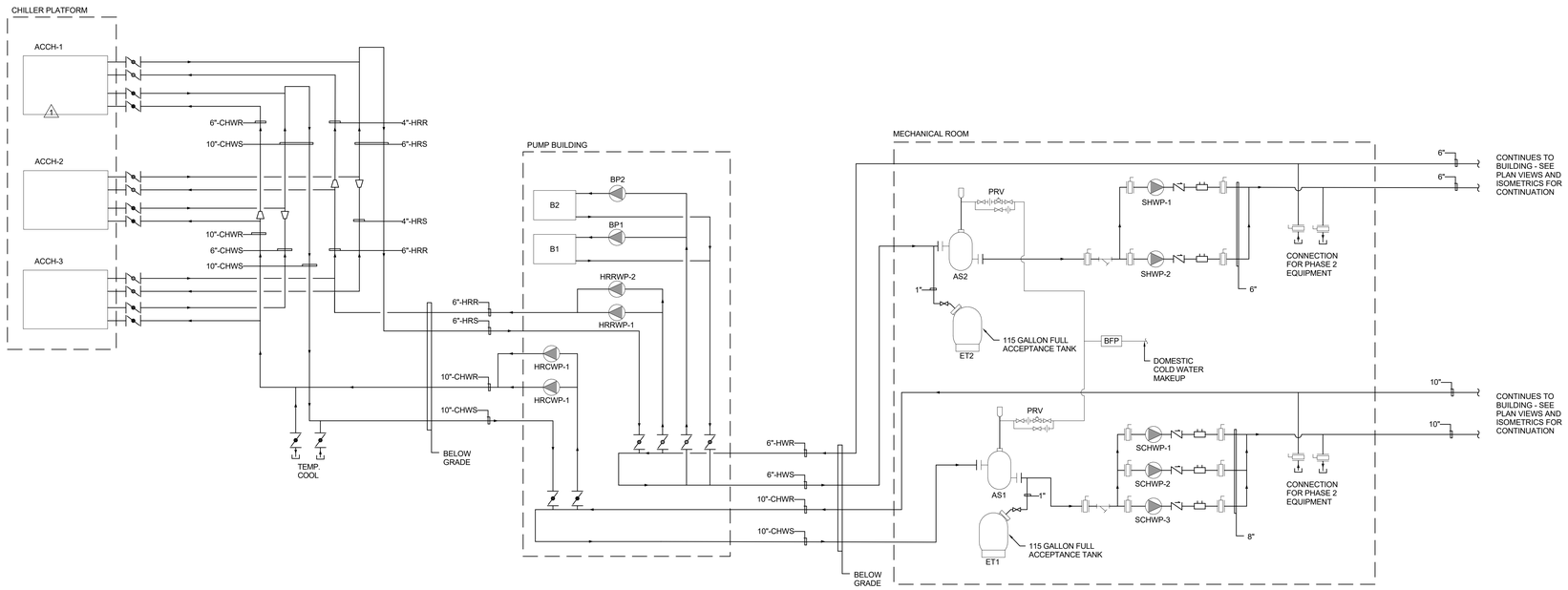
M-8.2

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HEATING HOT WATER PIPING FLOW DIAGRAM DEMO

SCALE : NO SCALE



HYDRONIC PIPING DIAGRAM

SCALE : 12" = 1'-0"

1

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
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06-May-26

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2	04-27-26	BULLETIN #2

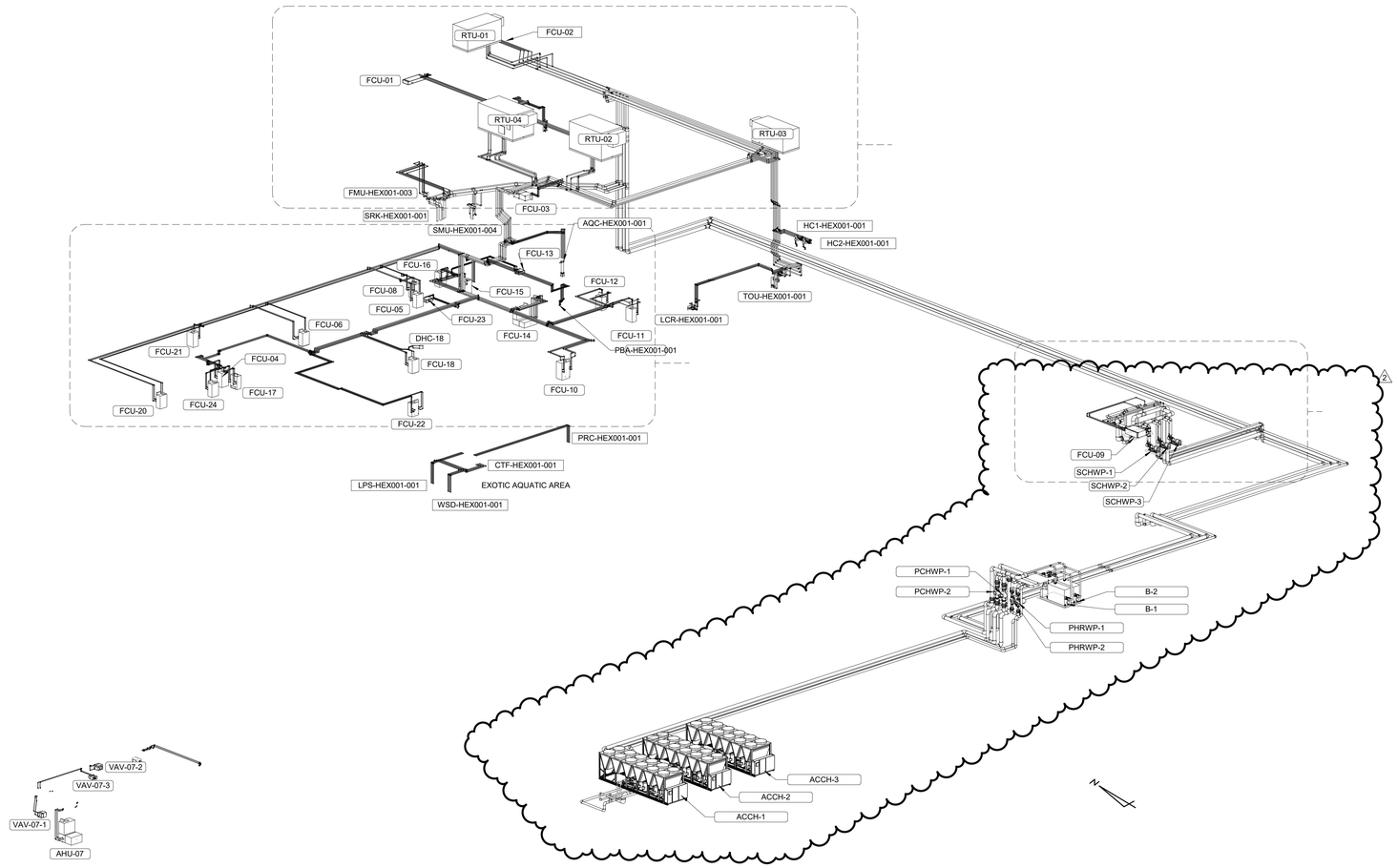
MECHANICAL CHILLED AND HOT WATER PIPING FLOW DIAGRAM

2

M-8.3

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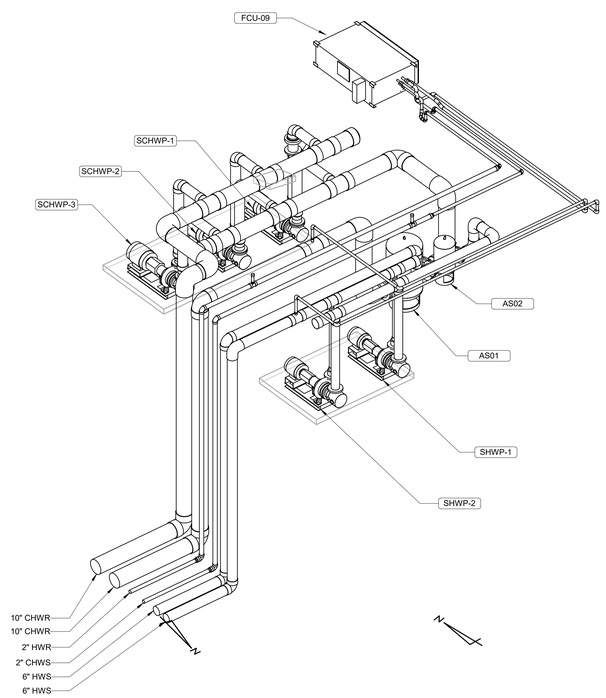
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HYDRONIC WATER ISOMETRIC

SCALE :

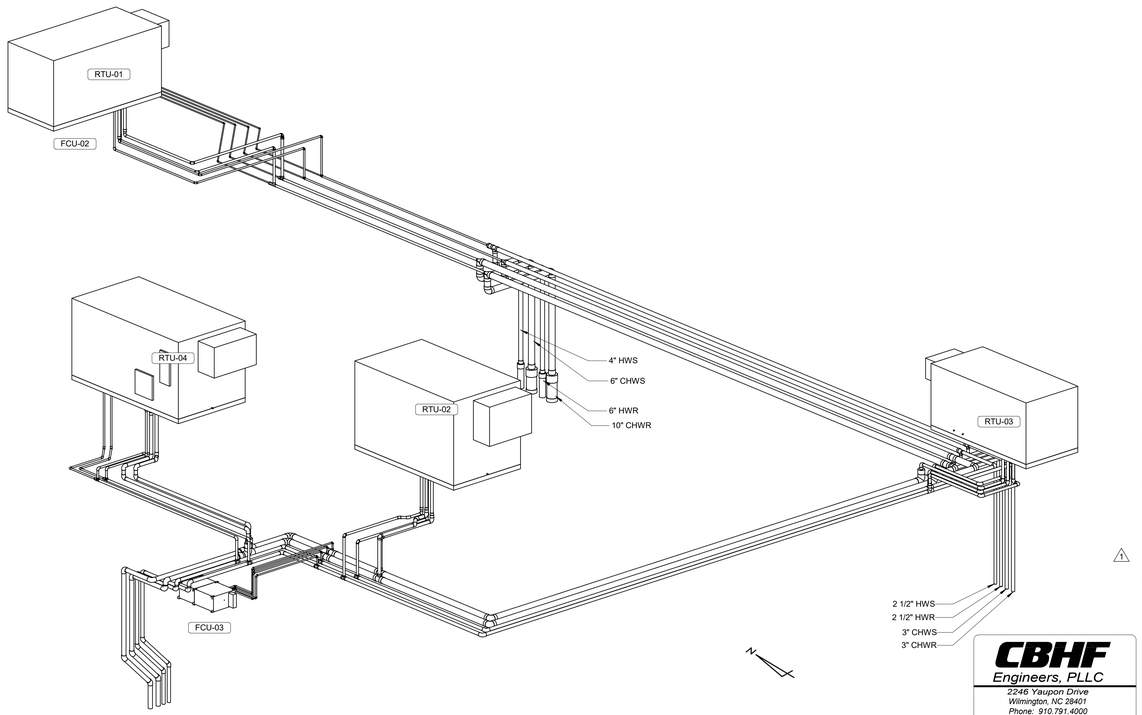
1



HYDRONIC WATER ISOMETRIC - MECHANICAL ROOM

SCALE :

2



HYDRONIC WATER ISOMETRIC - SHARK - THIRD FLR AND ROOF

SCALE :

3

SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

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06-May-26

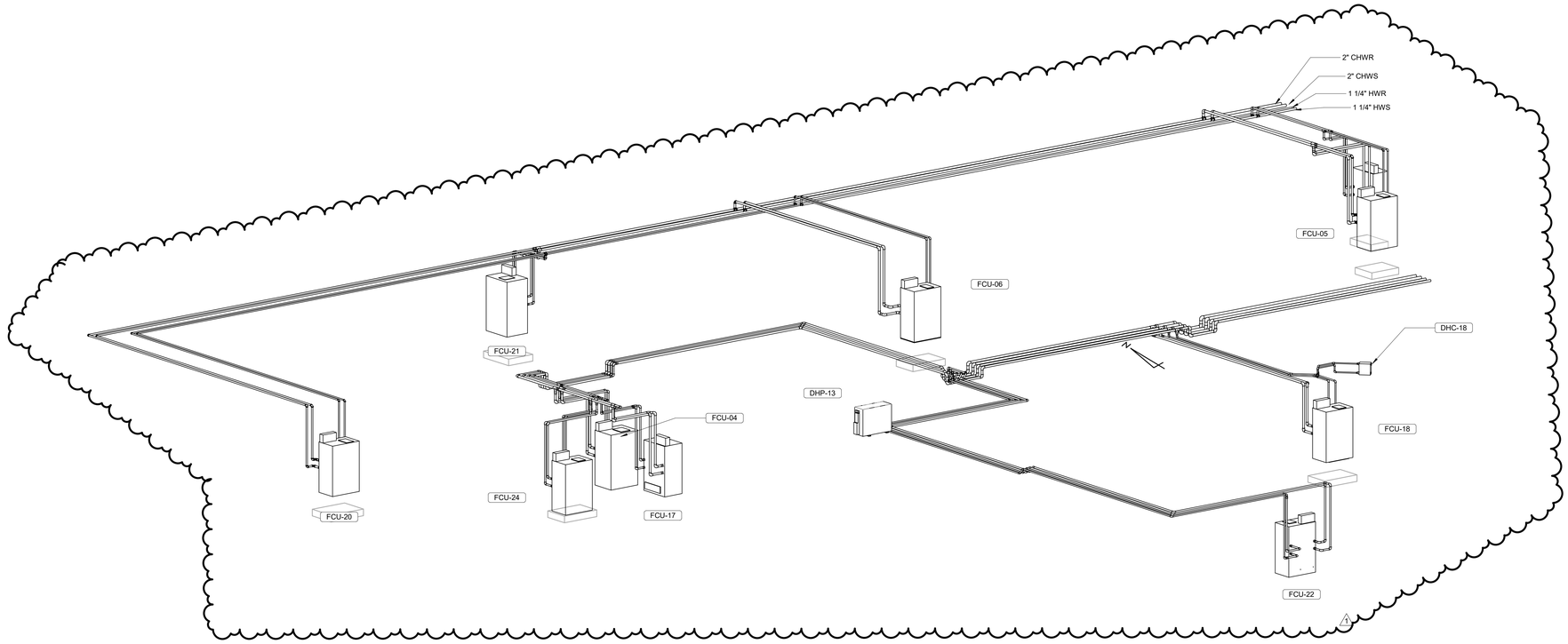
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2	04-27-26	BULLETIN #2

MECHANICAL ISOMETRICS

M-8.4

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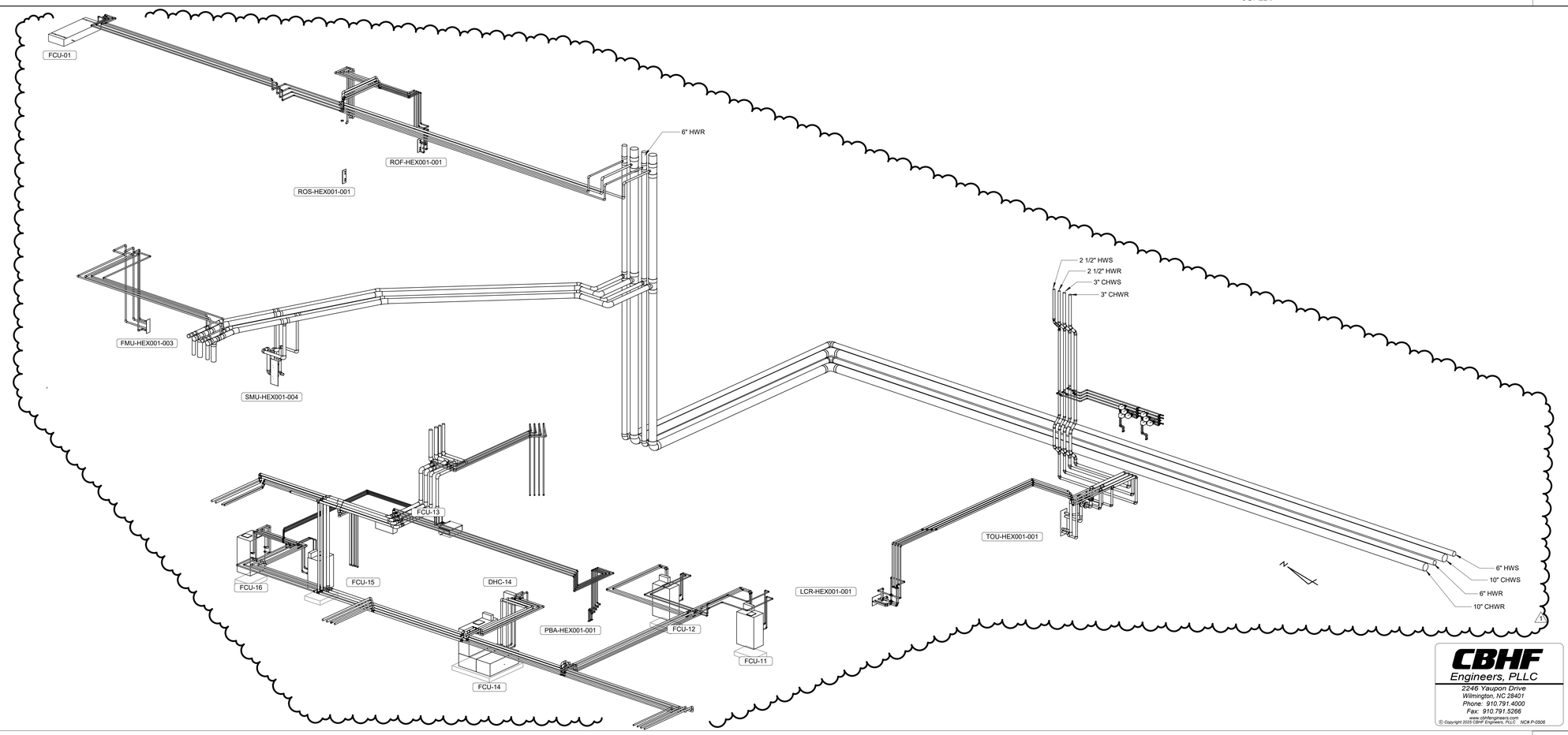
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HYDRONIC WATER ISOMETRIC - TOUCH - FIRST AND SECOND FLOOR

SCALE :

2



HYDRONIC WATER ISOMETRIC - SHARK - FIRST AND SECOND FLOOR

SCALE :

1

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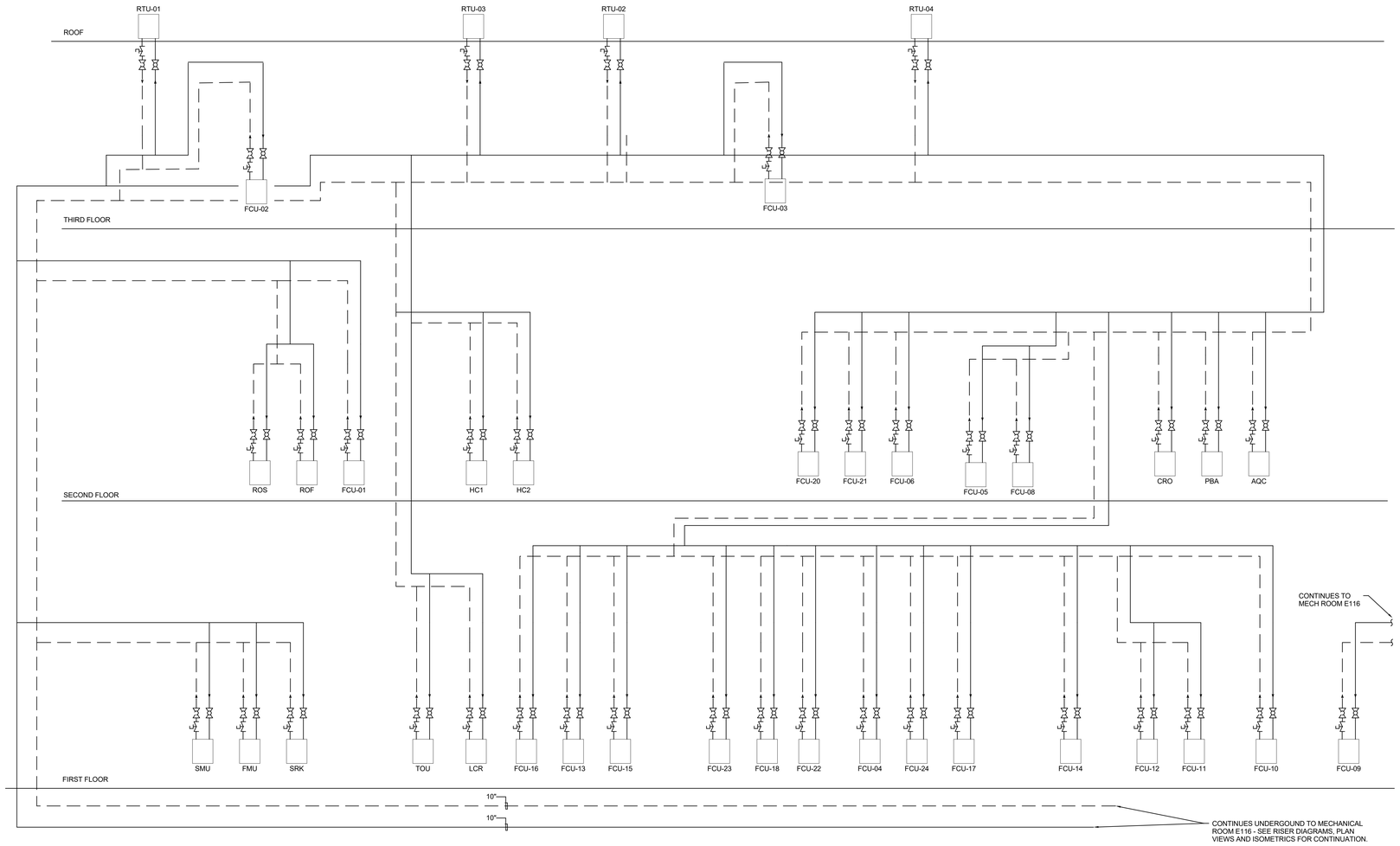
NORTH CAROLINA PROFESSIONAL ENGINEER 23561 DAVID M. HAHN

12-Dec-25

NO.	DATE	DESCRIPTION
-	12-5-25	FOR CONSTRUCTION
1	12-12-25	BULLETIN #1

MECHANICAL ISOMETRICS

M-8.5



SZOSTAK DESIGN

FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
CODE: 42014-4G02
ITEM: 41414-4Y4A

900 LOGGERHEAD RD,
KURE BEACH, NC 28449

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06-May-26

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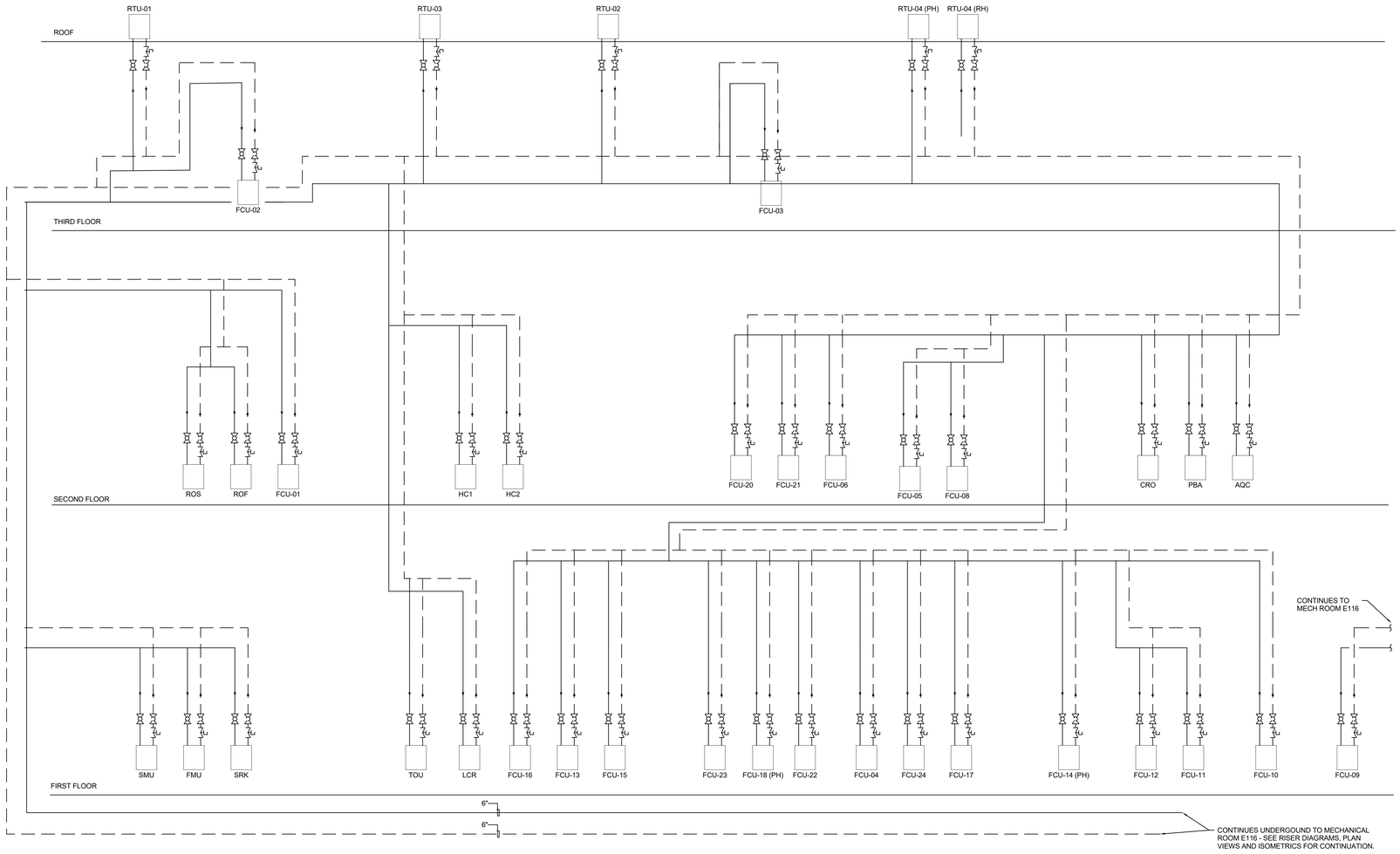
CHILLED WATER PIPING FLOW DIAGRAM - BUILDING LOOP

M-8.6

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FORT FISHER AQUARIUM RENOVATION & EXPANSION: PHASE 1

SCO #17-18042-02A
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HEATING HOT WATER PIPING FLOW DIAGRAM - BUILDING LOOP

M-8.7

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HEATING HOT WATER PIPING FLOW DIAGRAM - BUILDING LOOP
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