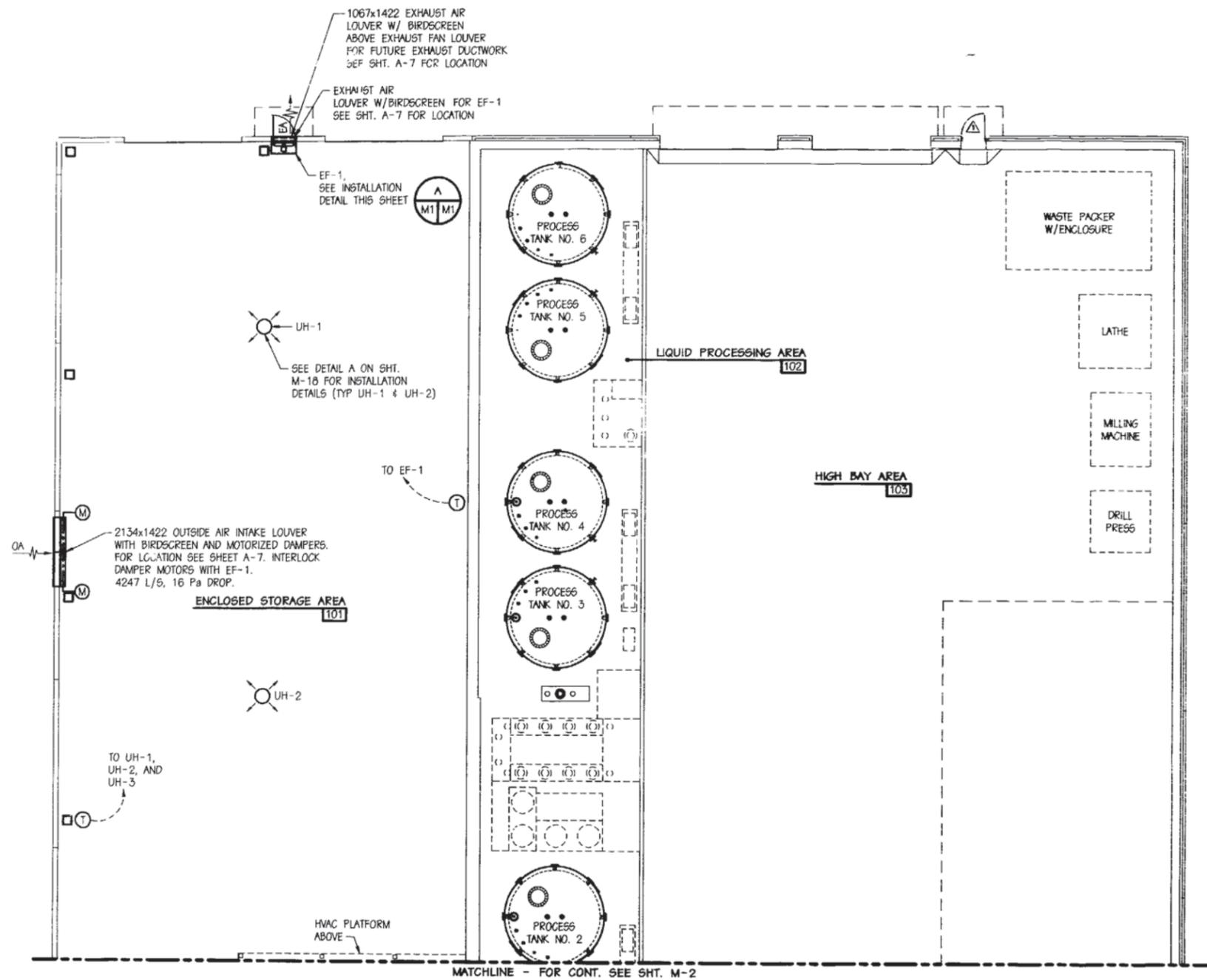
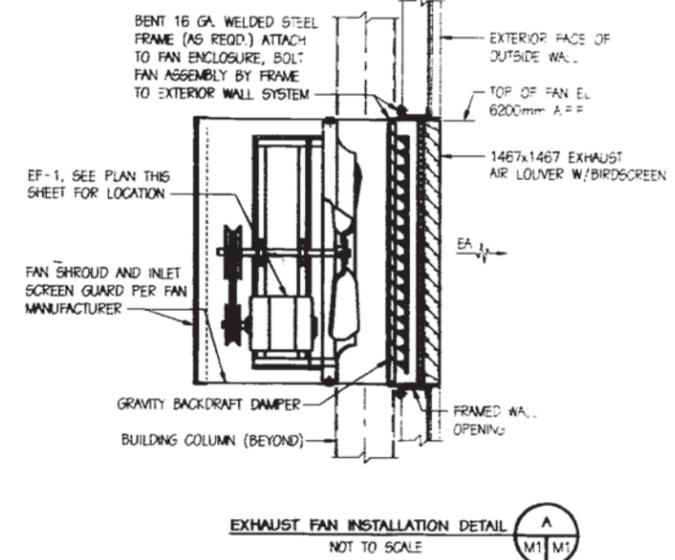


CEP-198 Record Drawings



HVAC PLAN - AREA A
SCALE: 1:100



JLM

REVISIONS

KEY PER AS BUILT CONDITIONS

CONTINUE TO PART RECORD

CRF
LJM
JMS
JTS

APPROVED: *[Signature]*

DATE: 01/29/99

PROJECT: NORFOLK NAVAL STATION CONTROLLED INDUSTRIAL FACILITY (CIF)

NO. OF SHEETS: 14

SHEET NO.: 04

DATE: 05-94-4180

PROJECT NO.: N62470-94-B-4180

DRAWING NO.: 4334695

SHEET: 04 OF 140

M-1

LETTER DATED 6 JAN 99
RECORD DRAWING

GRAPHIC SCALE



8

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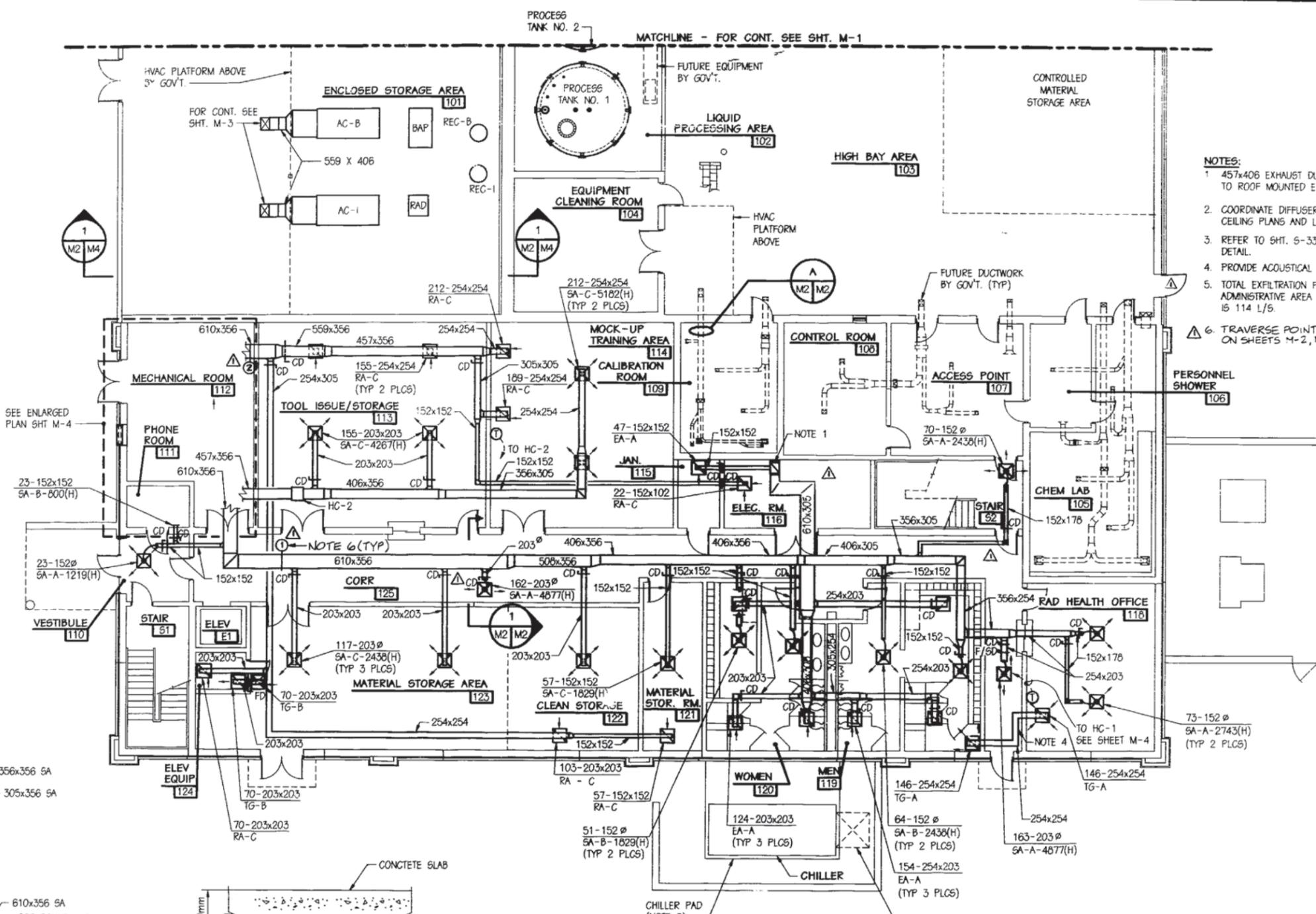
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C

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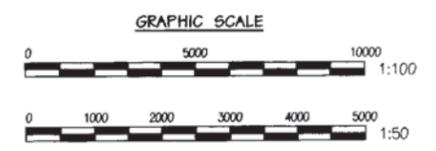
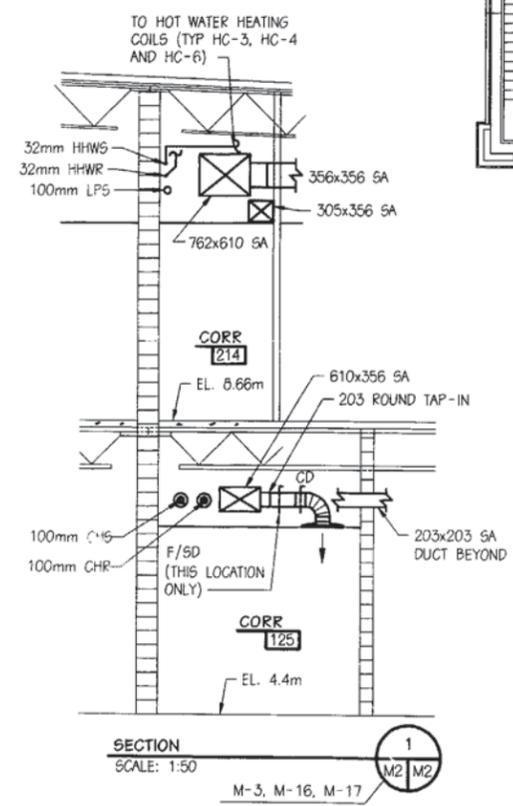
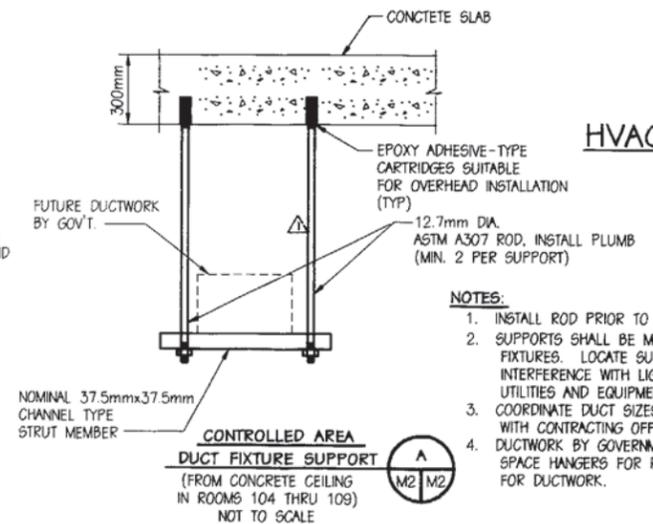


HVAC PLAN - AREA B
SCALE: 1:100



- NOTES:**
- 457x406 EXHAUST DUCT UP TO SECOND FLOOR TO ROOF MOUNTED EF-4, FOR CONT. SEE SHT. M-3.
 - COORDINATE DIFFUSER LOCATIONS WITH ARCHITECTURAL CEILING PLANS AND LIGHTING PLANS.
 - REFER TO SHT. 6-33 FOR TYPICAL EQUIPMENT PAD DETAIL.
 - PROVIDE ACOUSTICAL DUCT LINING IN TRANSFER AIR DUCT.
 - TOTAL EXFILTRATION FOR THE FIRST FLOOR OF THE ADMINISTRATIVE AREA OF BUILDING SERVED BY AHU-1 IS 114 L/S.
 - TRAVERSE POINT (TYP) 1 THRU 8 AS SHOWN ON SHEETS M-2, M-3 AND M-4.

- NOTES:**
- INSTALL ROD PRIOR TO PAINTING CEILING.
 - SUPPORTS SHALL BE MOUNTED ABOVE LIGHT FIXTURES. LOCATE SUPPORT RODS TO AVOID INTERFERENCE WITH LIGHT FIXTURES AND OTHER UTILITIES AND EQUIPMENT.
 - COORDINATE DUCT SIZES, LOCATIONS AND ROUTING WITH CONTRACTING OFFICER.
 - DUCTWORK BY GOVERNMENT AS SHOWN IS APPROX. SPACE HANGERS FOR ROUTING SHOWN AS SPECIFIED FOR DUCTWORK.



REV. PER AS-BUILT CONDITIONS

ATLANTIC DIVISION
NORFOLK NAVAL STATION
CONTROLLED INDUSTRIAL FACILITY (CIF)
FY 97 MCON PROJECT P-318
HVAC PLAN - AREA B

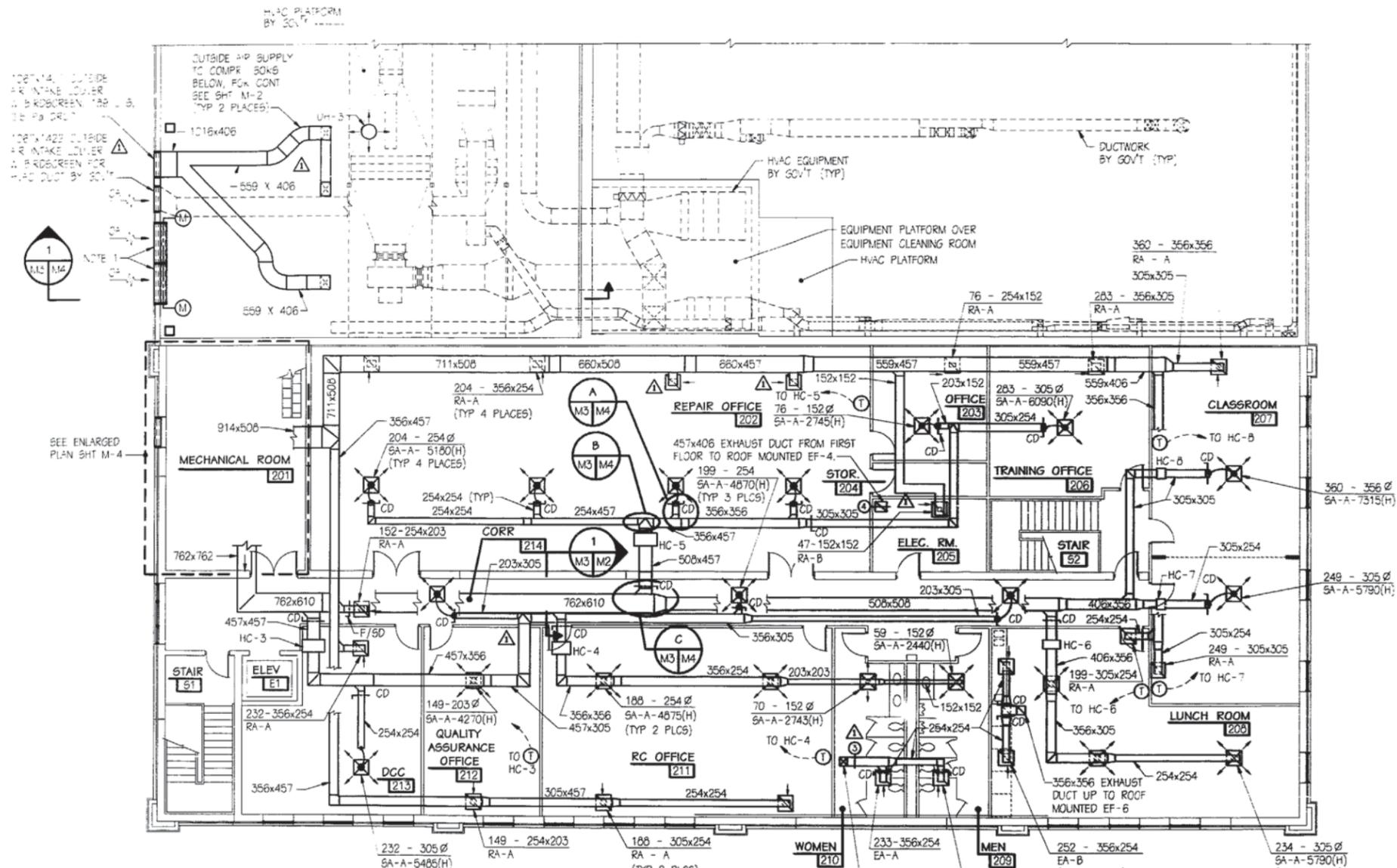
LETTER DATED 6 JAN 99
RECORD DRAWING

GRAPHIC SCALE

0 5000 10000 1:100
0 1000 2000 3000 4000 5000 1:50

SECTION SCALE: 1:50

1
M-2



- NOTES:**
- 325x1422 OUTSIDE AIR INTAKE LOUVER WITH BIRDSCREEN AND MOTORIZED DAMPERS, FOR LOCATION SEE SHEET A-7. INTERLOCK DAMPER MOTORS WITH EF-1, 4247 L/S, 16 Pa DROP.
 - COORDINATE DIFFUSER LOCATIONS WITH ARCHITECTURAL CEILING PLAN.
 - TOTAL EXFILTRATION FOR THE SECOND FLOOR OF THE ADMINISTRATIVE AREA OF THE BUILDING SERVED BY AHU-2 IS 101 L/S.

SECOND FLOOR HVAC PLAN
SCALE: 1:100



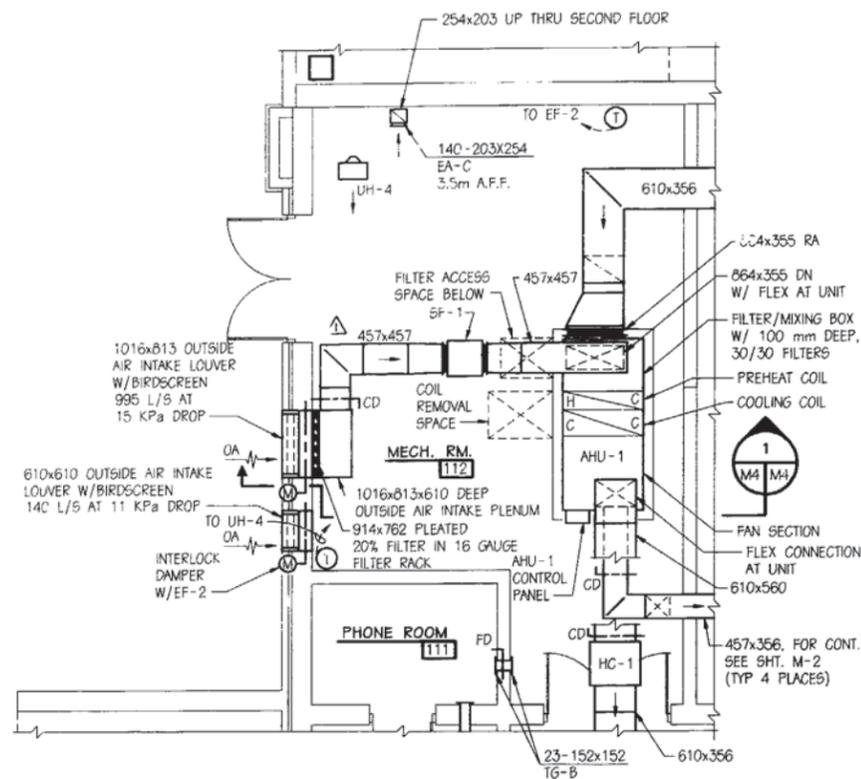
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 PREPARED BY: [Signature] DATE: 01/08/99
 CHECKED BY: [Signature] DATE: 01/08/99
 DRAWN BY: [Signature] DATE: 01/08/99
 PROJECT NO. 82470-94-B-4190
 SHEET NO. 4399154
 TOTAL SHEETS 86 OF 140
 M-3

ATLANTIC DIVISION
 NORFOLK NAVAL STATION
 CONTROLLED INDUSTRIAL FACILITY (CIF)
 BY 97 MCON PROJECT P-316
 HVAC PLAN - 5I COND FLOOR

THIS DRAWING IS THE PROPERTY OF THE U.S. NAVY. IT IS TO BE KEPT IN THE OFFICE OF THE ARCHITECT AND ENGINEER. IT IS TO BE RETURNED TO THE ARCHITECT AND ENGINEER UPON COMPLETION OF THE PROJECT. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM.

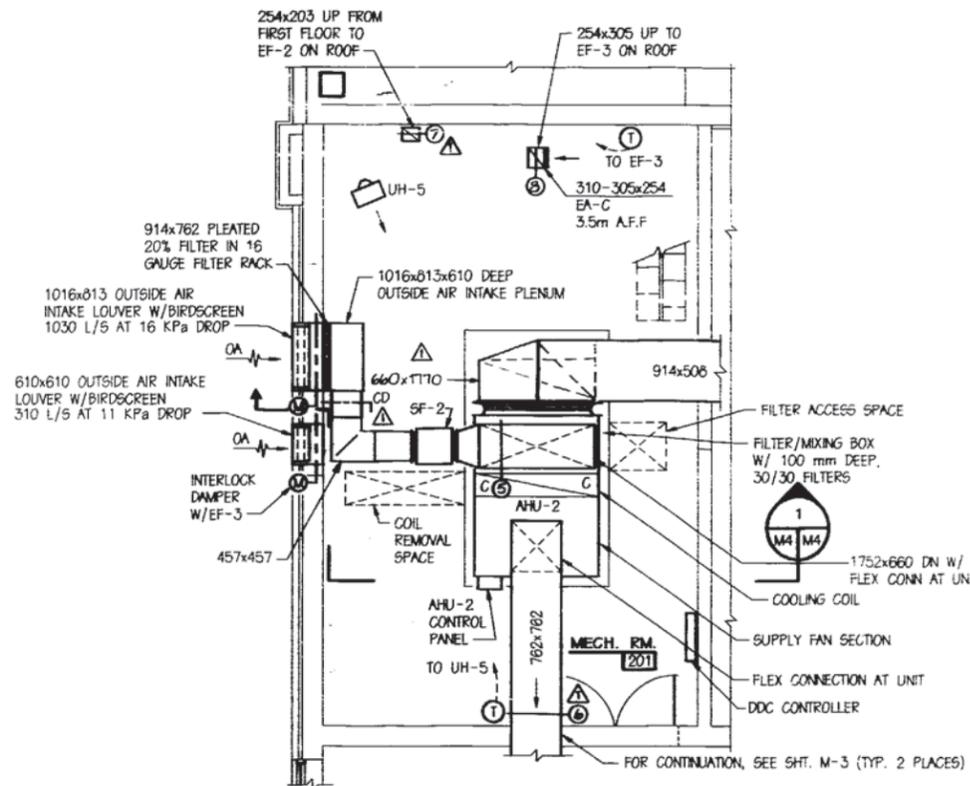
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RECORD DRAWING





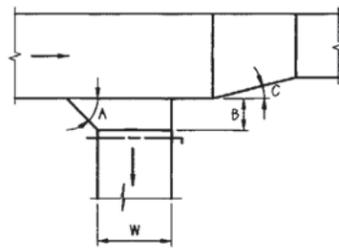
HVAC PART PLAN
FIRST FLOOR MECHANICAL ROOM
 SCALE: 1:50

- NOTES:**
1. SEE SHEET M-22 FOR HVAC PIPING.
 2. REFER TO SHEET S-31 FOR TYPICAL EQUIPMENT PAD DETAIL.



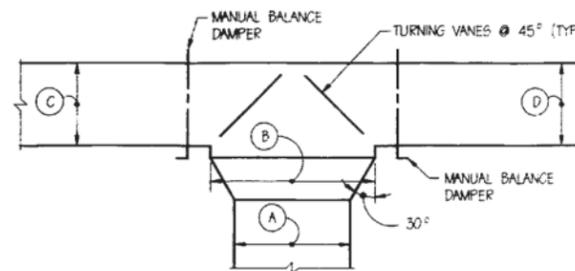
HVAC PART PLAN
SECOND FLOOR MECHANICAL ROOM
 SCALE: 1:50

- NOTES:**
1. SEE SHEET M-22 FOR HVAC PIPING.
 2. REFER TO SHEET S-31 FOR TYPICAL EQUIPMENT PAD DETAIL.



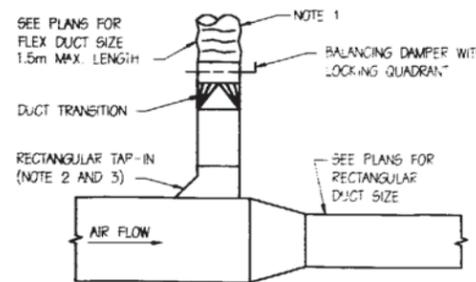
TYPICAL BRANCH TAKE-OFF
 (SUPPLY AIR)

NOTE:
 FOLLOW SMACNA MANUAL FOR CONSTRUCTION DETAILS. BALANCE ACCORDING TO DRAWINGS.



TYPICAL LOW PRESSURE "TEE" DUCT FITTING

NOT TO SCALE



TYPICAL DIFFUSER TAKE-OFF
 NOT TO SCALE

SEE PLANS FOR FLEX DUCT SIZE 1.5m MAX. LENGTH

NOTE 1: BALANCING DAMPER WITH LOCKING QUADRANT

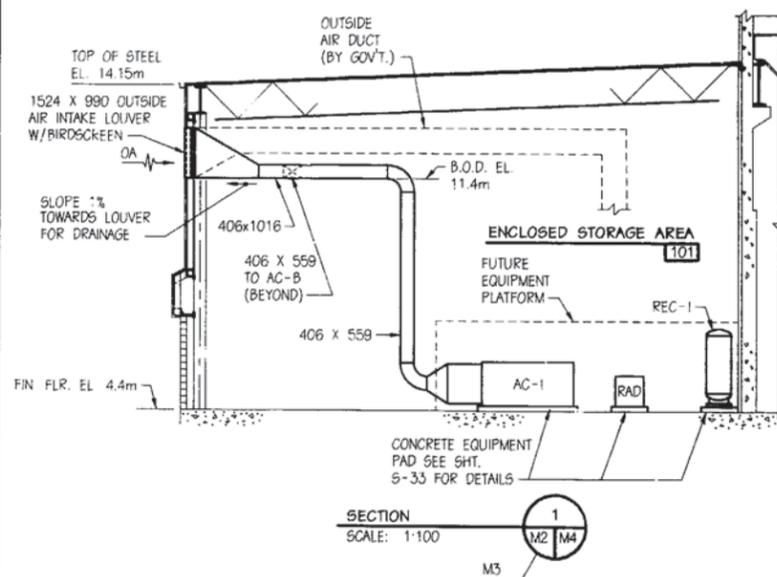
DUCT TRANSITION

RECTANGULAR TAP-IN (NOTE 2 AND 3)

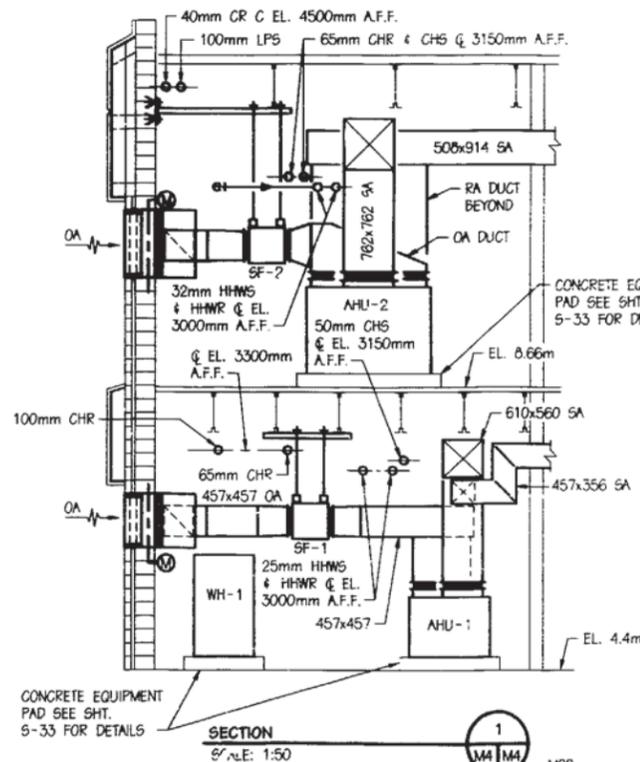
SEE PLANS FOR RECTANGULAR DUCT SIZE

AIR FLOW

- NOTES:**
1. TAKEOFF ON BOTH SIDES OR SINGLE SIDE AS REQUIRED BY PLANS.
 2. TAP-IN TO BE RECTANGULAR. SEE SMACNA MANUAL FOR DETAILS.
 3. CLUNCH LOCK CONNECTION TO DUCT SHALL HAVE CORNER SEALS (SEE SMACNA MANUAL).

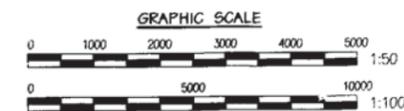


SECTION 1-1
 SCALE: 1:100



SECTION 1-1
 SCALE: 1:50

LETTER DATED 6 JAN 99
 RECORD DRAWING



3/24/99 ALB

REVISIONS

REV. PER AS-BUILT CONDITIONS

ATLANTIC DIVISION

NORFOLK INVAL STATION

CONTROLLED INDUSTRIAL FACILITY (CIF)

BY 97 MCON PROJECT P-315

HVAC PART PLANS AND DETAILS

AS NOTED

434698

P-315

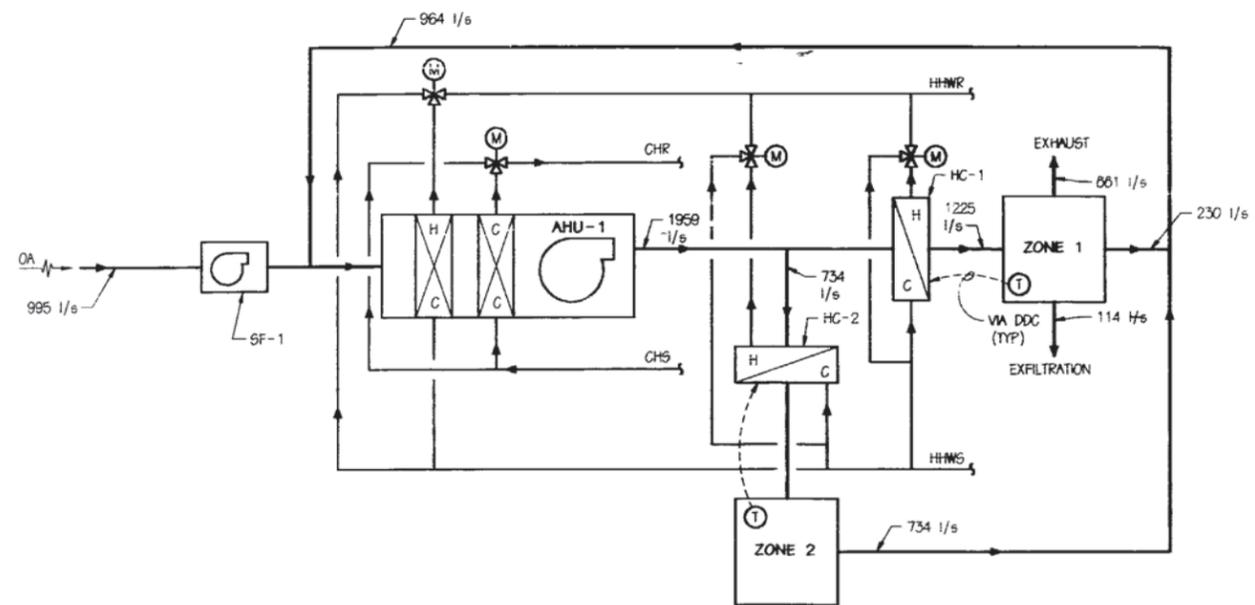
05-94-4190

N62470-94-B-4190

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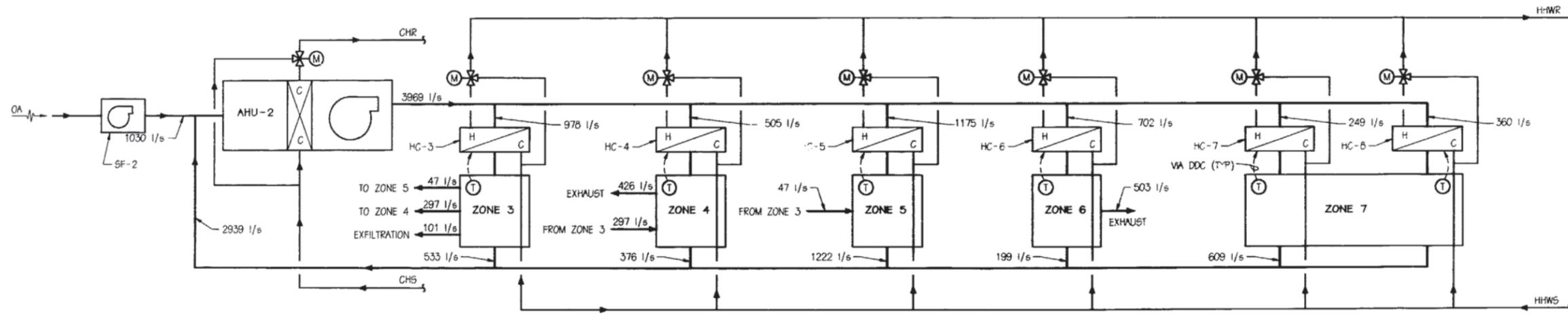
67 140

M-4



AHU-1 FLOW SCHEMATIC
NOT TO SCALE

AHU-1		
ZONE	ROOM NO.	ROOM NAME
1	110	VESTIBULE
	111	TELEPHONE
	118	RAD HEALTH OFFICE
	119	MEN
	120	WOMEN
	121	MATERIAL STORAGE ROOM
	122	CLEAN STORAGE
	123	MATERIAL STORAGE AREA
	124	ELEVATOR EQUIPMENT
	125	CORRIDOR
	52	STAIR
2	113	TOOL ISSUE/STORAGE
	114	MOCK-UP TRAINING
	115	JANITOR
	116	ELECTRICAL



AHU-2 FLOW SCHEMATIC
NOT TO SCALE

AHU-2		
ZONE	ROOM NO.	ROOM NAME
3	212	QA OFFICE
	213	DCC
	214	CORRIDOR
4	209	MEN
	210	WOMEN
	211	RC OFFICE
5	202	REPAIR OFFICE
	203	OFFICE
	205	ELECTRICAL ROOM
	206	TRAINING OFFICE
6	208	LUNCH ROOM
7	207	CLASSROOM (NORTH)
8	207	CLASS ROOM (SOUTH)

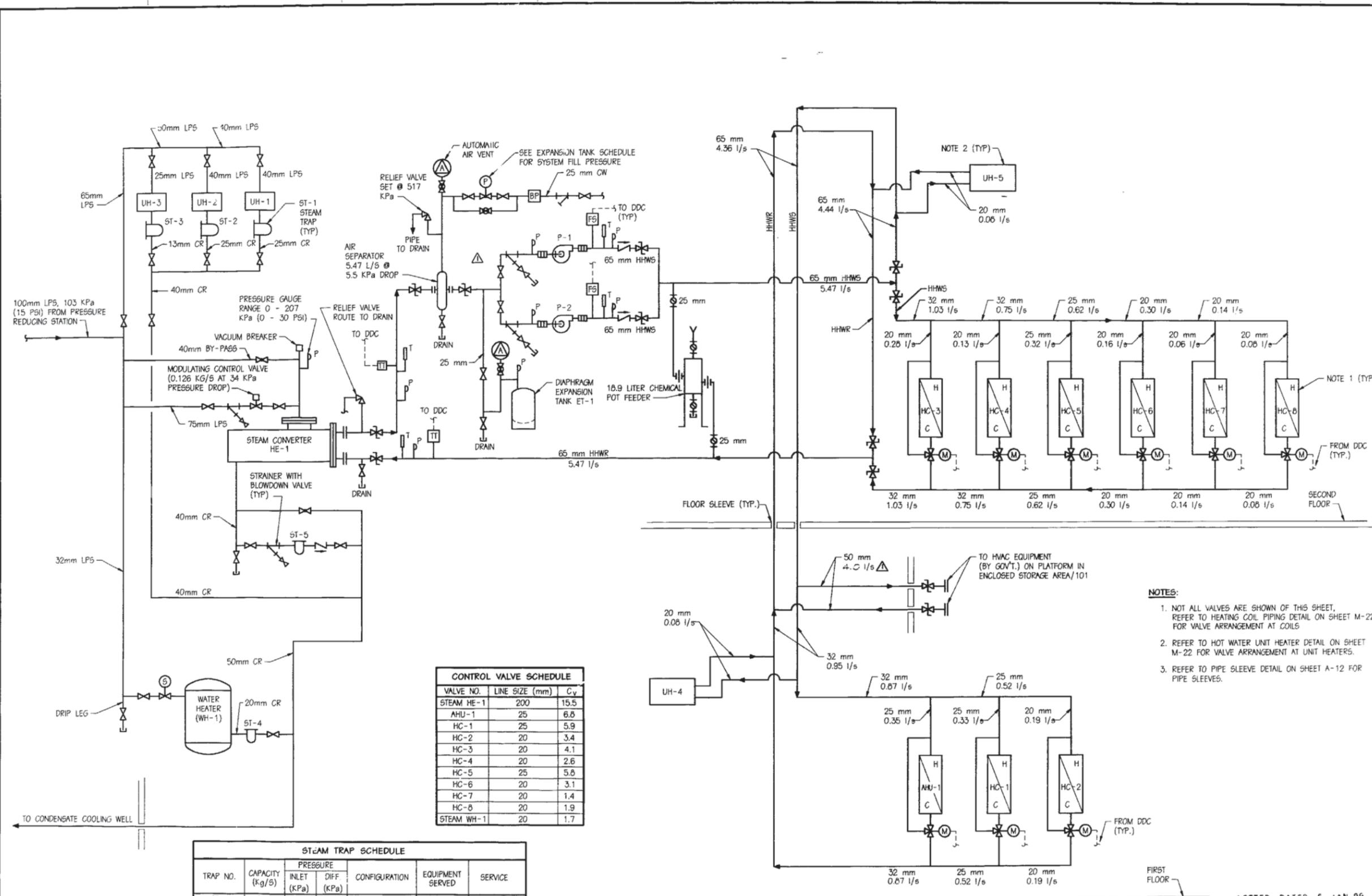
LETTER DATED 6 JAN 99
RECORD DRAWING

ATLANTIC DIVISION
NORFOLK NAVAL STATION
CONTROLLED INDUSTRIAL FACILITY (CIF)
NORFOLK, VIRGINIA
FY 97 MCON PROJECT P-310
HVAC FLOW SCHEMATICS

REVISIONS

NO.	DATE	BY	DESCRIPTION
1			
2			
3			
4			
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9			
10			

M-5



VALVE NO.	LINE SIZE (mm)	C _v
STEAM HE-1	200	15.5
AHU-1	25	6.8
HC-1	25	5.9
HC-2	20	3.4
HC-3	20	4.1
HC-4	20	2.6
HC-5	25	5.6
HC-6	20	3.1
HC-7	20	1.4
HC-8	20	1.9
STEAM WH-1	20	1.7

TRAP NO.	CAPACITY (kg/s)	PRESSURE		CONFIGURATION	EQUIPMENT SERVED	SERVICE
		INLET (kPa)	DIFF (kPa)			
ST-1	0.10	103.4	103.4	F & T	UH-1	CONSTANT
ST-2	0.10	103.4	103.4	F & T	UH-2	CONSTANT
ST-3	0.035	103.4	103.4	F & T	UH-3	CONSTANT
ST-4	0.033	103.4	103.4	F & T	WH-1	CONSTANT
ST-5	0.30	103.4	103.4	F & T	HE-1	MODULATING
ST-6	0.30	1724	1724	INVERTED BUCKET	HP6	UNDERGROUND DRIP LEG

HOT WATER HEATING SYSTEM SCHEMATIC
NOT TO SCALE

- NOTES:
- NOT ALL VALVES ARE SHOWN OF THIS SHEET, REFER TO HEATING COIL PIPING DETAIL ON SHEET M-22 FOR VALVE ARRANGEMENT AT COILS.
 - REFER TO HOT WATER UNIT HEATER DETAIL ON SHEET M-22 FOR VALVE ARRANGEMENT AT UNIT HEATERS.
 - REFER TO PIPE SLEEVE DETAIL ON SHEET A-12 FOR PIPE SLEEVES.

3/24/99 ALB

REV. PER AS-BUILT CONDITIONS

CONTINUING TO NEXT RECORD

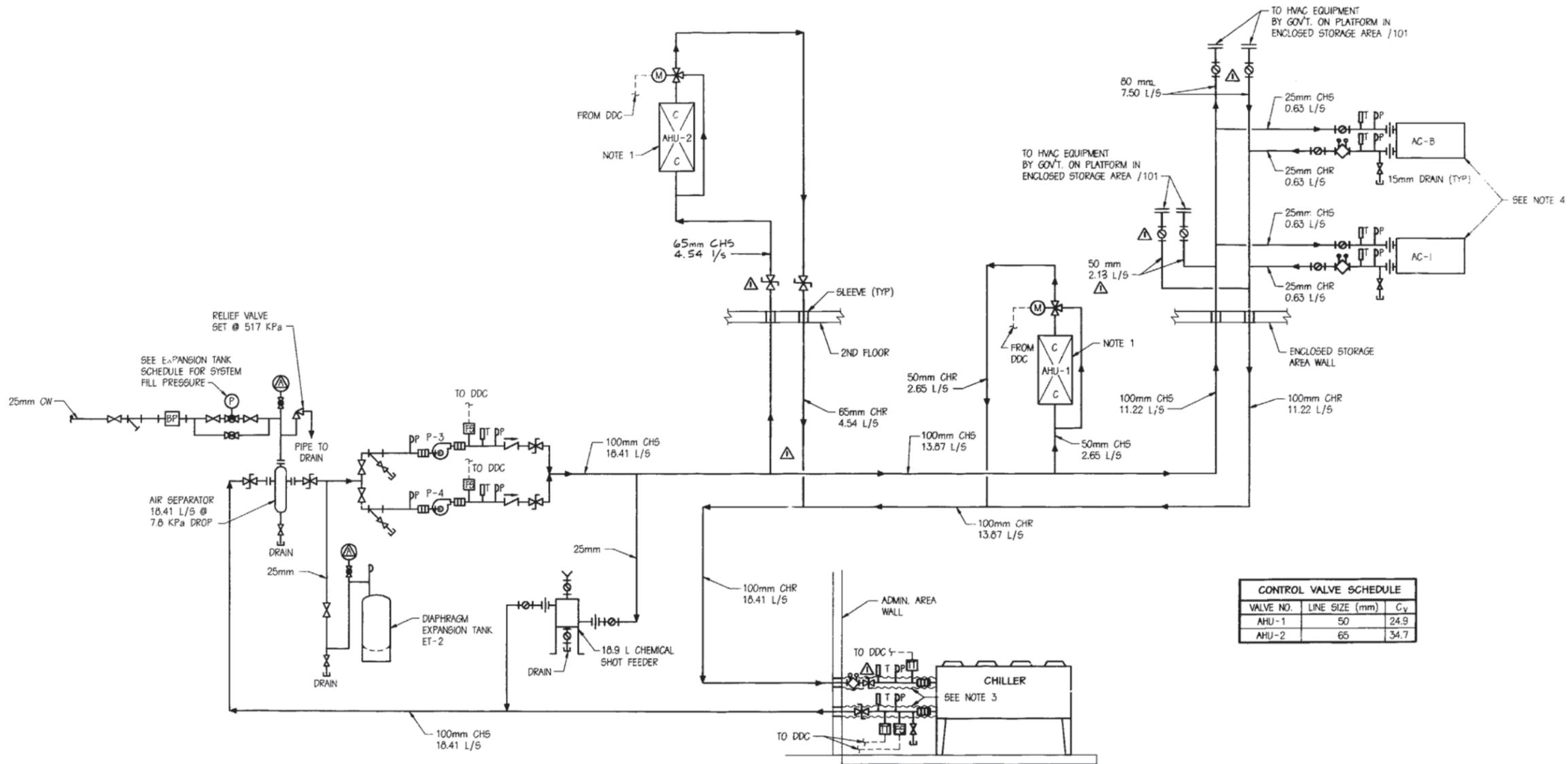
ATLANTIC DIVISION

NORFOLK NAVAL STATION
CONTROLLED INDUSTRIAL FACILITY (CIF)
NORFOLK, VIRGINIA
BY 97 MCON PROJECT P-310
HOT WATER HEATING SYSTEM SCHEMATIC AND SCHEDULES

NONE
434700
P-316
05-94-4190
N62470-94-B-4190
4334700
89 140

M-6

LETTER DATED 6 JAN 99
RECORD DRAWING



CONTROL VALVE SCHEDULE		
VALVE NO.	LINE SIZE (mm)	C _v
AHU-1	50	24.9
AHU-2	65	34.7

CHILLED WATER SYSTEM SCHEMATIC
NOT TO SCALE

NOTES:

1. NOT ALL VALVES ARE SHOWN ON THIS SHEET, REFER TO COOLING COIL PIPING DETAIL ON SHEET M-22 FOR VALVE ARRANGEMENT AT COILS.
2. REFER TO PIPE SLEEVE DETAIL ON SHEET A-12.
3. HEAT TRACE ALL OUTDOOR CHILLED WATER PIPING AND VALVES.
4. A CHILLED WATER PUMP MUST BE IN OPERATION TO ALLOW STARTING AND CONTINUED OPERATION OF THE BREATHING AND INDUSTRIAL AIR COMPRESSORS.

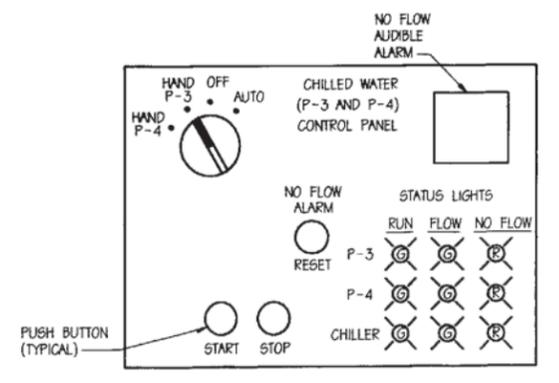
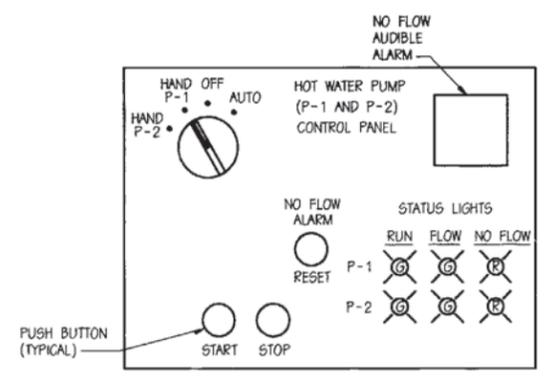
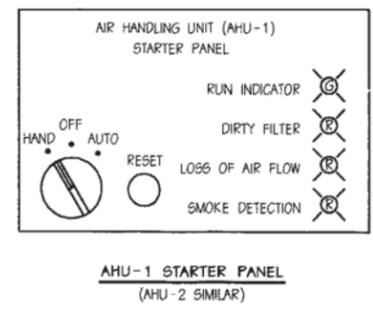
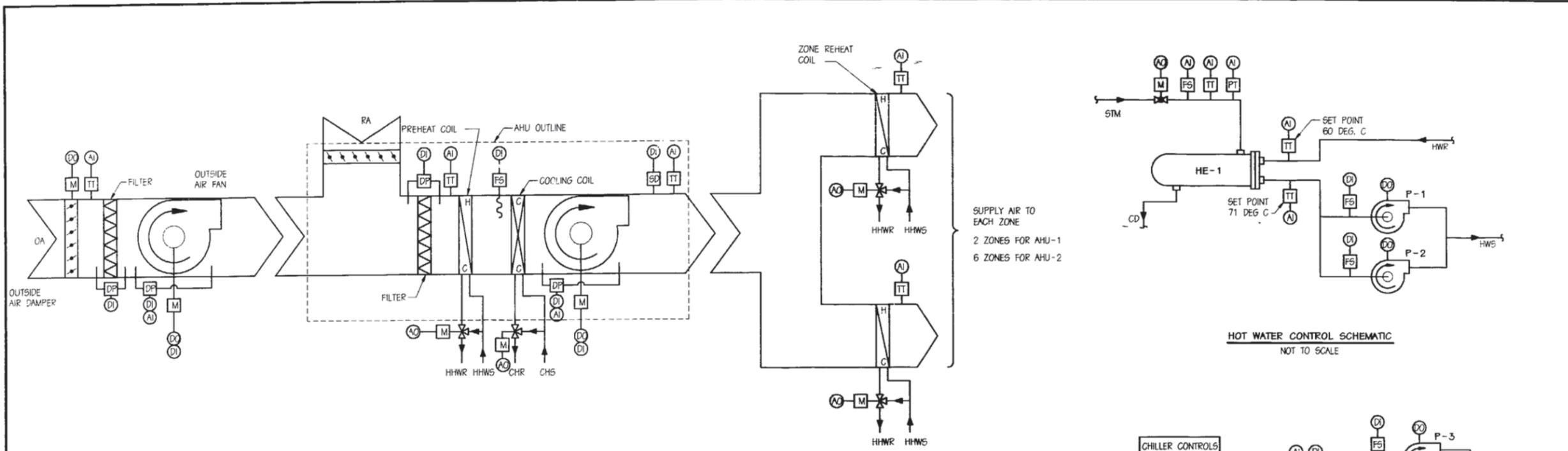
LETTER DATED 6 JAN 99
RECORD DRAWING

ATLANTIC DIVISION
NORFOLK NAVAL STATION
CONTROLLED INDUSTRIAL FACILITY (CIF)
BY 97 MCON PROJECT P-310
CHILLED WATER SYSTEM SCHEMATIC AND SCHEDULE

DATE: 05-94-4190
DRAWING NO: 4334701
REV: 140

REV. PER AS-BUILT CONDITIONS
REVISIONS

3/24/99 ALB



NOTE:
SEE SHEET M-4 FOR CONTROL PANEL LOCATIONS.
ROOM 111 FOR AHU-1 AND ROOM 201 FOR AHU-2.

NOTE:
SEE SHEET M-22, ROOM 201 FOR CONTROL PANEL LOCATION.

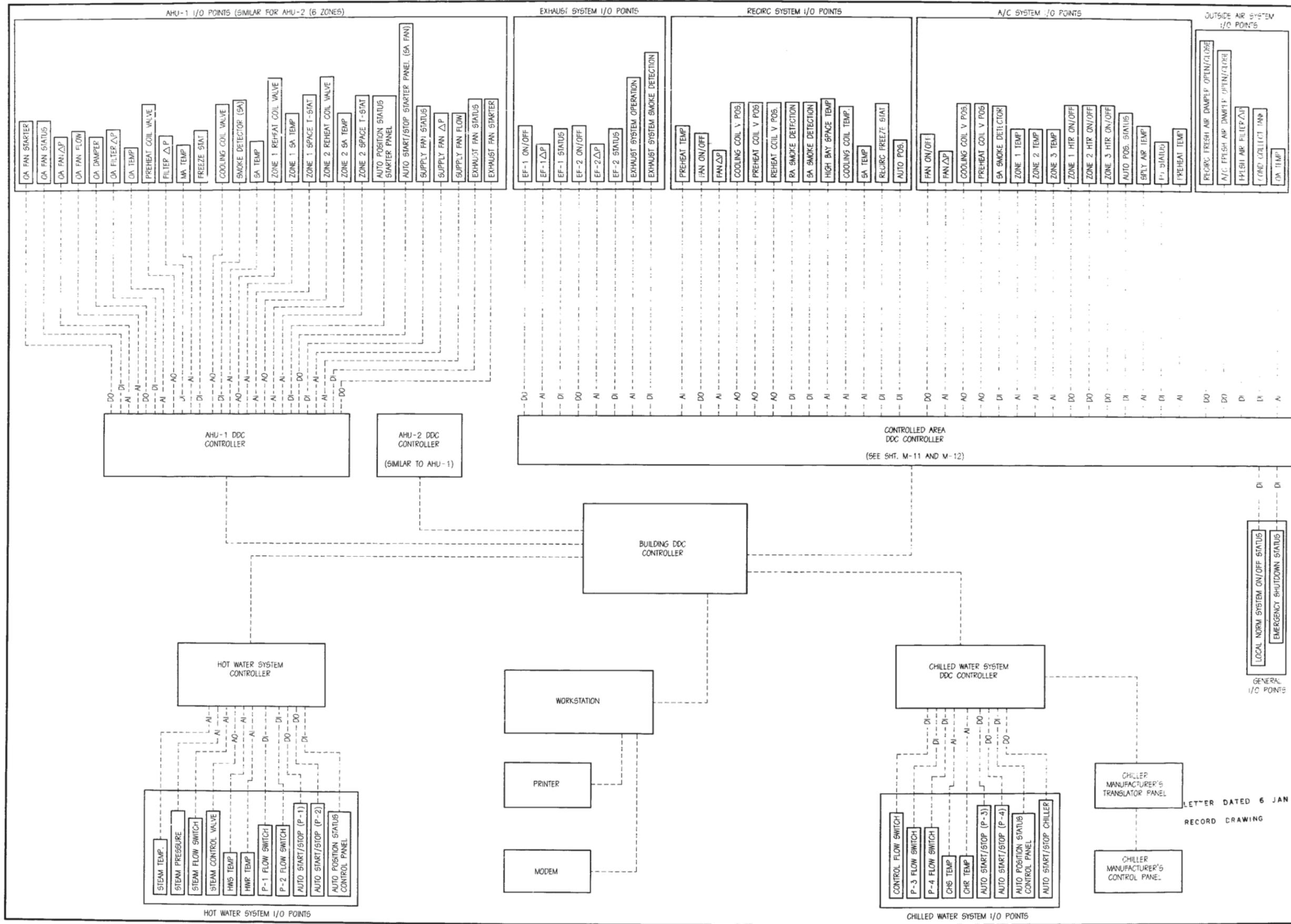
NOTE:
SEE SHEET M-22, ROOM 111 FOR CONTROL PANEL LOCATION.

ATLANTIC DIVISION
NORFOLK NAVAL STATION
NORFOLK, VIRGINIA
CONTROLLED INDUSTRIAL FACILITY (CIF)
PROJECT P-318
DDC CONTROL DIAGRAMS - SHEET 1

REVISIONS

DATE: 05-94-4180
SHEET 91 OF 140
M-8

LETTER DATED 6 JAN 95
RECORD DRAWING



ATLANTIC DIVISION NORFOLK MAIN STATION CONTROLLED INDUSTRIAL FACILITY (CIF) NORFOLK, VIRGINIA FY 97 MCON PROJECT P-316 DDC CONTROL DIAGRAMS SHEET 2		JTI MPT RB
LETTER DATED 6 JAN 99 RECORD DRAWING		LUD JMS JMS JMS
NONE 434703 P-316 05-94-4190 N62470-94-B-4190 434703 92 140		APPROVED [Signature] ALL WORK TO BE DONE IN ACCORDANCE WITH THE SPECIFICATIONS AND CONTRACT DOCUMENTS. DATE: 1/11/99
M-9		REV. 001

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1

GENERAL SEQUENCE OF OPERATION

THE HEATING, VENTILATING AND AIR CONDITIONING (HVAC) SYSTEM SHALL BE CONTROLLED AUTOMATICALLY FROM THE DIRECT DIGITAL CONTROL (DDC) SYSTEM. ALL SET POINTS SHALL BE ADJUSTABLE (ADJ.).

AIR HANDLING UNITS (AHU-1 AND AHU-2)

(AHU-2 IS WITHOUT PREHEAT COIL)

GENERAL

THE HVAC SYSTEM SHALL HAVE THE FOLLOWING MODES OF OPERATION: OFF, HAND, AND AUTOMATIC. MODES OF OPERATION SHALL BE INITIATED BY THE DDC SYSTEM OR BY MANUAL OVERRIDE. EXHAUST FAN EF-4 SHALL BE INTERLOCKED WITH AHU-1 EXHAUST FANS EF-5 AND EF-6 SHALL BE INTERLOCKED WITH AHU-2. SPACE TEMPERATURE HIGH LIMIT AND LOW LIMIT SET POINTS ARE 0.3 DEG C ABOVE AND BELOW (RESPECTIVELY) NOMINAL SET POINT INDICATED.

OFF

AIR HANDLING UNIT SUPPLY FAN AND OUTSIDE AIR FAN SHALL BE OFF. OUTSIDE AIR DAMPER SHALL BE CLOSED. INTERLOCKED EXHAUST FANS SHALL BE OFF. CHILLED WATER 3-WAY VALVE SHALL BE 100% BYPASS. HOT WATER PREHEAT 3-WAY VALVE SHALL BE 100% OPEN TO COIL. HOT WATER REHEAT 3-WAY VALVES SHALL BE 100% BYPASS.

HAND

AIR HANDLING UNIT SUPPLY FAN SHALL BE ON. OUTSIDE AIR FAN SHALL BE ON. OUTSIDE AIR DAMPER SHALL BE OPEN. INTERLOCKED EXHAUST FANS SHALL BE ON. VALVE POSITIONS SHALL BE AS INDICATED IN THE "OFF" MODE. ALARM SHALL BE SENT TO DDC SYSTEM IF DIFFERENTIAL PRESSURE SENSOR DETECTS NO AIRFLOW 30 SECONDS AFTER FAN IS STARTED.

AUTOMATIC - UNOCCUPIED MODE:

UNOCCUPIED MODE SHALL BE INITIATED BY THE DDC SYSTEM BASED ON A TIME SCHEDULE OR BY MANUAL OVERRIDE. UNIT SHALL INITIALLY BE IN "OFF" MODE.

WHEN ANY SPACE TEMPERATURE RISES ABOVE UNOCCUPIED COOLING HIGH LIMIT SET POINT, SUPPLY FAN SHALL ENERGIZE ON AND CHILLED WATER 3-WAY VALVE SHALL MODULATE TO SATISFY LEAVING AIR TEMPERATURE OF 55 DEG F. OUTSIDE AIR DAMPER SHALL REMAIN CLOSED. OUTSIDE AIR FAN SHALL BE OFF. PREHEAT COIL 3-WAY VALVE SHALL REMAIN 100% BYPASS. INTERLOCKED EXHAUST FANS SHALL REMAIN OFF. AND ZONE REHEAT COILS 3-WAY VALVES SHALL REMAIN 100% BYPASS. WHEN ALL SPACE TEMPERATURES FALL BELOW UNOCCUPIED COOLING LOW LIMIT SET POINT, UNIT SHALL GO INTO "OFF" MODE.

WHEN ANY SPACE TEMPERATURE FALLS BELOW THE UNOCCUPIED HEATING LOW LIMIT SET POINT, SUPPLY FAN SHALL ENERGIZE ON AND ZONE REHEAT COILS 3-WAY VALVES SHALL MODULATE TO SATISFY ZONE TEMPERATURE SET POINTS. OUTSIDE AIR DAMPER SHALL REMAIN CLOSED. OUTSIDE AIR FAN SHALL BE OFF. PREHEAT COIL 3-WAY VALVE SHALL MODULATE TO SATISFY LEAVING AIR TEMPERATURE. INTERLOCKED EXHAUST FANS SHALL REMAIN OFF AND CHILLED WATER 3-WAY VALVE SHALL REMAIN 100% BYPASS. WHEN ALL SPACE TEMPERATURES RISE ABOVE THE UNOCCUPIED HEATING HIGH LIMIT SET POINT, UNIT SHALL GO INTO "OFF" MODE.

ALARM SHALL BE SENT TO DDC SYSTEM IF DIFFERENTIAL PRESSURE SENSOR DETECTS NO AIRFLOW 30 SECONDS AFTER SA FAN IS STARTED. FIVE MINUTE TIME DELAY BETWEEN STARTS SHALL PREVENT FAN FROM FREQUENT CYCLING. IF SMOKE DETECTOR SENSES SMOKE IN THE SUPPLY AIR STREAM, ALARM SHALL BE SENT TO THE DDC AND FIRE ALARM SYSTEMS AND UNIT SHALL GO INTO "OFF" MODE.

AUTOMATIC - OCCUPIED MODE:

OCCUPIED MODE SHALL BE INITIATED BY THE DDC SYSTEM BASED ON A TIME SCHEDULE OR BY MANUAL OVERRIDE. SUPPLY FAN SHALL BE ON, INTERLOCKED EXHAUST FANS SHALL BE ON. OUTSIDE AIR FAN SHALL BE ON AND OUTSIDE AIR DAMPER SHALL BE OPEN. ALARM SHALL BE SENT TO DDC SYSTEM IF DIFFERENTIAL PRESSURE SENSOR DETECTS NO AIRFLOW 30 SECONDS AFTER SA OR OA FAN IS STARTED.

PREHEAT COIL 3-WAY VALVE SHALL MODULATE TO SATISFY MIXED AIR TEMPERATURE. IF FREEZE STAT SENSES A MIXED AIR TEMPERATURE BELOW 4 DEG C, AN ALARM SHALL BE SENT TO THE DDC SYSTEM.

WHEN ANY SPACE TEMPERATURE RISES ABOVE THE COOLING HIGH LIMIT SET POINT, THE AHU CHILLED WATER 3-WAY VALVE SHALL MODULATE FLOW THROUGH THE CHILLED WATER COIL TO SATISFY AHU LEAVING AIR TEMPERATURE. DDC SHALL POLL ALL SPACE TEMPERATURE SENSORS AND RESET SUPPLY AIR TEMPERATURE IF ALL SPACES ARE BELOW THE COOLING LOW LIMIT SET POINT. RESET SCHEDULE SHALL BE IN 2 DEG C INTERVALS WITH A TIME DELAY OF 5 MINUTES BETWEEN RESETS.

WHEN ANY SPACE TEMPERATURE FALLS BELOW THE HEATING LOW LIMIT SET POINT, ITS ZONE HOT WATER REHEAT 3-WAY VALVE SHALL INCREMENTALLY INCREASE FLOW THROUGH THE REHEAT COIL TO SATISFY THE SPACE HEATING SET POINT. SUPPLY AIR TEMPERATURE SHALL BE RESET IN 5 MINUTE INTERVALS, WITH A MAXIMUM SUPPLY AIR TEMPERATURE TO THE SPACE OF 43 DEG C. WHEN ZONE TEMPERATURE RISES ABOVE THE HEATING HIGH LIMIT SET POINT, THE HOT WATER REHEAT 3-WAY VALVE SHALL MODULATE TO 100% BYPASS.

LETTER DATED 6 JAN 99

RECORD DRAWING

IF SMOKE DETECTOR SENSES SMOKE IN THE SUPPLY AIR STREAM, ALARM SHALL BE SENT TO THE DDC AND FIRE ALARM SYSTEMS AND UNIT SHALL GO INTO "OFF" MODE.

EXHAUST FANS (EF-1, EF-2, AND EF-3)

OFF:

EXHAUST FAN SHALL BE OFF AND OUTSIDE AIR DAMPER SHALL BE CLOSED.

HAND:

OUTSIDE AIR DAMPER SHALL OPEN AND EXHAUST FAN SHALL ENERGIZE ON.

AUTO:

WHEN SPACE TEMPERATURE RISES ABOVE SET POINT OF 29 DEG C (ADJ.), OUTSIDE AIR DAMPER SHALL OPEN AND EXHAUST FAN SHALL ENERGIZE ON. WHEN SPACE TEMPERATURE FALLS BELOW SETPOINT, EXHAUST FAN SHALL DE-ENERGIZE AND OUTSIDE AIR DAMPER SHALL CLOSE.

CHILLER (CH-1)

CHILLER SHALL BE STARTED MANUALLY AT THE CHILLER CONTROL PANEL OR REMOTELY THROUGH THE DDC SYSTEM. LEAD CHILLED WATER PUMP SHALL BE ON. AFTER PROOF OF WATER FLOW FROM FLOW SWITCH AT THE CHILLER, CHILLER MANUFACTURER'S START SEQUENCE SHALL BE INITIATED. CHILLER SHALL MAINTAIN A CONSTANT 7.2 DEG C CHILLED WATER SUPPLY TEMPERATURE. IF AT ANY TIME THE FLOW SWITCH IN THE CHILLED WATER SUPPLY LINE INDICATES NO FLOW, THE CHILLER SHALL BE DE-ENERGIZED. PROVIDE INDICATION OF WATER FLOW AT THE CHILLED WATER CONTROL PANEL. ALL ALARMS AND SAFETIES FROM THE CHILLER CONTROL PANEL SHALL BE SENT BACK TO THE DDC SYSTEM.

CHILLED WATER PUMPS (P-3 AND P-4)

OFF:

PUMPS SHALL BE OFF. DDC CONTROLLER SHALL NOT BE CAPABLE OF STARTING PUMPS.

HAND:

LEAD PUMP SHALL BE MANUALLY SELECTED. PUMPS P-3 AND P-4 SHALL NOT RUN SIMULTANEOUSLY. LEAD PUMP SHALL BE STARTED WITH PANEL MOUNTED PUSH BUTTON. PUMP SHALL RUN CONTINUOUSLY. LEAD PUMP FLOW SWITCH SHALL SIGNAL AN AUDIBLE NO FLOW ALARM AT THE PUMP STARTER PANEL IF FLOW IS NOT DETECTED WITHIN 20 SECONDS (ADJ.).

AUTO:

DDC SYSTEM SHALL AUTOMATICALLY START CHILLED WATER PUMP. PUMP SHALL RUN CONTINUOUSLY TO SUPPLY CHILLED WATER TO THE AHU'S AND THE AIR COMPRESSORS. PUMPS SHALL BE ALTERNATED FOR EQUAL RUN TIME, ALTERNATING EVERY 200 HOURS (ADJ.). PUMP P-3 OR P-4 SHALL RUN CONTINUOUSLY. P-3 AND P-4 SHALL NOT RUN SIMULTANEOUSLY. IF LEAD PUMP FLOW SWITCH DETECTS NO FLOW AFTER 20 SECONDS (ADJ.) THEN PUMP WILL BE TURNED OFF AND AN ALARM SHALL BE SENT TO THE PUMP STARTER PANEL AND TO THE DDC CONTROLLER. DDC CONTROLLER SHALL THEN START THE LAG PUMP. IF LAG PUMP FLOW SWITCH DETECTS NO FLOW AFTER 20 SECONDS (ADJ.) THEN PUMP WILL BE TURNED OFF AND AN ALARM SHALL BE SENT TO THE PUMP STARTER PANEL AND TO THE DDC CONTROLLER.

HEAT EXCHANGER (HE-1)

STEAM VALVE SHALL MODULATE FROM CLOSED TO OPEN TO MAINTAIN HOT WATER SUPPLY TEMPERATURE OF 71 DEG C (ADJ.). IF STEAM FLOW SWITCH DETECTS NO FLOW 30 SECONDS (ADJ.) AFTER STEAM CONTROL VALVE OPENS, THEN AN ALARM SHALL BE SENT TO THE DDC SYSTEM. IF HOT WATER PUMPS P-1 AND P-2 ARE OFF, STEAM VALVE SHALL MODULATE CLOSED.

HOT WATER PUMPS (P-1 AND P-2)

OFF:

PUMPS SHALL BE OFF. DDC CONTROLLER SHALL NOT BE CAPABLE OF STARTING PUMP.

HAND:

LEAD PUMP SHALL BE MANUALLY SELECTED. PUMPS P-1 AND P-2 SHALL NOT RUN SIMULTANEOUSLY. LEAD PUMP SHALL BE STARTED WITH PANEL MOUNTED PUSH BUTTON. PUMP SHALL RUN CONTINUOUSLY. LEAD PUMP FLOW SWITCH SHALL SIGNAL AN AUDIBLE NO FLOW ALARM AT THE PUMP STARTER PANEL IF FLOW IS NOT DETECTED WITHIN 20 SECONDS (ADJ.).

AUTO:

HOT WATER PUMPS SHALL BE STARTED REMOTELY THROUGH THE DDC SYSTEM. PUMPS SHALL BE ALTERNATED FOR EQUAL RUN TIME, ALTERNATING EVERY 200 HOURS (ADJ.). PUMP P-1 OR P-2 SHALL RUN CONTINUOUSLY UNTIL SIGNALLED TO TURN OFF FROM THE DDC SYSTEM OR BY MANUAL OVERRIDE. P-1 AND P-2 SHALL NOT RUN SIMULTANEOUSLY. IF LEAD PUMP FLOW SWITCH DETECTS NO FLOW AFTER 20 SECONDS (ADJ.) THEN PUMP WILL BE TURNED OFF AND AN ALARM SHALL BE SENT TO THE PUMP STARTER PANEL AND TO THE DDC CONTROLLER. DDC CONTROLLER SHALL THEN START THE LAG PUMP. IF LAG PUMP FLOW SWITCH DETECTS NO FLOW AFTER 20 SECONDS (ADJ.) THEN PUMP WILL BE TURNED OFF AND AN ALARM SHALL BE SENT TO THE PUMP STARTER PANEL AND TO THE DDC CONTROLLER.

POINT DESCRIPTION	INPUT / OUTPUT SCHEDULE											
	INPUT			OUTPUT			ALARMS		FUNCTIONS			
	DIGITAL (D)	ANALOG (A)		DIGITAL (X)	ANALOG (AO)		DIGITAL	ANALOG				
	ON/OFF STATUS	TEMPERATURE		ON/OFF/AUTO	POSITION ADJ.		HIGH					
	PREHEAT / DIFF. PREHEAT	PRESSURE		ON/OFF	SET POINT ADJ.		LOW					
	AUX. CONTACT	FLOW (CFM, #/HR)		OPEN/CLOSE			FAILURE					
AHU-1												
SUPPLY FAN	•	•	•	•								
OUTSIDE AIR FAN (SF-1)	•	•	•	•								
O.A. DAMPER				•								
O.A. FILTER												
OUTSIDE AIR		•	•									
MIXED AIR		•	•									
SUPPLY AIR		•	•									
FILTER												
PREHEAT COIL VALVE					•							
CHILLED WATER COIL VALVE					•							
SMOKE (SA)		•										
ZONE 1 REHEAT COIL VALVE					•							
ZONE 1 SA												
ZONE 1 SPACE												
ZONE 2 REHEAT COIL VALVE					•							
ZONE 2 SA												
ZONE 2 SPACE												
AUTO POSITION STATUS	•											
AHU-2												
SUPPLY FAN	•	•	•	•								
OUTSIDE AIR FAN (SF-2)	•	•	•	•								
O.A. DAMPER				•								
O.A. FILTER												
OUTSIDE AIR		•	•									
MIXED AIR		•	•									
SUPPLY AIR		•	•									
FILTER												
PREHEAT COIL VALVE					•							
CHILLED WATER COIL VALVE					•							
SMOKE (SA)		•										
ZONE 1 REHEAT COIL VALVE					•							
ZONE 1 SA												
ZONE 1 SPACE												
ZONE 2 REHEAT COIL VALVE					•							
ZONE 2 SA												
ZONE 2 SPACE												
ZONE 3 REHEAT COIL VALVE					•							
ZONE 3 SA												
ZONE 3 SPACE												
ZONE 4 REHEAT COIL VALVE					•							
ZONE 4 SA												
ZONE 4 SPACE												
ZONE 5 REHEAT COIL VALVE					•							
ZONE 5 SA												
ZONE 5 SPACE												
ZONE 6 REHEAT COIL VALVE					•							
ZONE 6 SA												
ZONE 6 SPACE												
AUTO POSITION STATUS	•											
EF-1, 2, 3, 4, 5, AND 6												
FAN	•			•								
STEAM SYSTEM												
MAIN STEAM		•	•									
CONTROL VALVE					•							
HOT WATER SYSTEM												
P-1, P-2	•	•		•								
HWS		•										
HWR		•										
CHILLED WATER SYSTEM												
P-3, P-4	•	•										
CHS		•										
CHR		•										
CHILLER	•											

CONFORMING TO EXIST. RECORDS

JTI

LID

REVISED

ATLANTIC DIVISION

NORFOLK, VIRGINIA

CONTROLLED INDUSTRIAL FACILITY (CIF)

NONE 434704 P-318 05-94-4190 N62470-94-B-4190 4334704 93 140

M-10

REVISIONS

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CONTROLLED INDUSTRIAL FACILITY (CIF)

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M-10

CONTROLLED AREA - HVAC SEQUENCE OF OPERATION

THE CONTROLLED AREA HEATING, VENTILATING AND AIR CONDITIONING (HVAC) SYSTEM SHALL BE CONTROLLED AUTOMATICALLY FROM THE DIRECT DIGITAL CONTROL (DDC) SYSTEM. ALL SET POINTS SHALL BE ADJUSTABLE. THE HVAC SYSTEM CONTROLS FOR THE CONTROLLED AREA SHALL BE FROM A SINGLE CONTROLLER INTERACTING WITH THE MAIN BUILDING DDC. NOTE: THE DDC WILL CONTROL THE CONTROLLED AREA TEMPERATURE AND WILL START/STOP THE RECIRC SYSTEM AND OPEN AND SHUT FRESH AIR DAMPERS ONLY.

THE CONTROLLED AREA HVAC SYSTEM CONSISTING OF A RECIRCULATION SYSTEM, AN A/C SYSTEM AND AN EXHAUST SYSTEM SHALL BE INTERACTIVELY CONTROLLED AND HAVE THE FOLLOWING FOUR MODES OF OPERATION: "OFF", "HAND", "HIGH CONDENSATE COOLING OFF" AND "OCCUPIED". THESE MODES OF OPERATION SHALL BE INITIATED BY THE DDC SYSTEM OR MANUAL OVERRIDE. ADDITIONALLY THE HVAC SYSTEM CAN BE SWITCHED TO THE "OFF" MODE IN AN EMERGENCY BY A MANUAL SWITCH IN THE CONTROL ROOM. AFTER AN EMERGENCY SHUTDOWN, A PASSWORD WILL BE REQUIRED TO RESTART THE SYSTEM. THE SYSTEM SHALL ALSO HAVE THE CAPABILITY TO BE ROUTINELY STOPPED AND RESTARTED BY A MANUAL SWITCH IN THE CONTROL ROOM. A ROUTINE "SHUTDOWN" WILL SWITCH THE SYSTEM TO THE "OFF" MODE. RETURNING THIS SWITCH TO THE "NORMAL" POSITION WILL ALLOW THE SYSTEM TO OPERATE IN THE LAST DDC COMMANDS MODE. THIS WILL NOT OVERRIDE ANY ALARM OR PREVIOUS PASSWORD OPERATOR SPECIFIED MODES.

ALL ALARMS WHICH WILL CAUSE THE CONTROLLED AREA HVAC SYSTEMS TO SECURE WILL RESULT IN ONE DIGITAL OUTPUT TO AN INDICATING PANEL RELAY IN THE VENTILATION CONTROL PANEL IN THE CONTROL ROOM. THE ALARM CAUSING THE SHUTDOWN SHALL BE DETECTED BY THE DDC TO THE SYSTEM OPERATOR.

"OFF"

THE RECIRCULATION SYSTEM FAN, THE A/C SYSTEM FAN AND THE EXHAUST SYSTEM FAN SHALL BE OFF. THE RECIRCULATION SYSTEM & A/C SYSTEM COOLING COIL CHILLED WATER 3-WAY VALVES SHALL BE 100% BYPASS. THE HOT WATER PREHEAT COIL 3-WAY VALVES SHALL BE 100% OPEN TO THE COIL WHEN OUTSIDE TEMPERATURE IS LESS THAN 12°C. THE HOT WATER REHEAT COIL 3-WAY VALVE SHALL BE 100% BYPASS. THE FRESH AIR SUPPLY DAMPERS SERVING THE RECIRCULATION SYSTEM AND THE A/C SYSTEM SHALL BE CLOSED. THE ELECTRIC AIR HEATERS SHALL BE OFF.

"HAND"

THE RECIRCULATION SYSTEM, A/C SYSTEM OR EITHER EXHAUST FAN WILL OPERATE WHILE THE SPRING LOADED SWITCH IS HELD IN THE "HAND" POSITION. THE FAN WILL SWITCH OFF WHEN THE SWITCH IS RELEASED. THE WATER VALVE POSITIONS SHALL BE AS INDICATED IN THE "OFF" MODE.

"HIGH CONDENSATE COOLING OFF"

WHEN THE SYSTEM IS OPERATING IN THE "OCCUPIED" MODE, THE "HIGH CONDENSATE COOLING OFF" MODE SHALL BE INITIATED BY THE DDC UPON THE 90% FULL ALARM FROM THE CONDENSATE COLLECTION TANK (CCT). THE A/C AND EXHAUST SYSTEMS SHALL CONTINUE TO OPERATE IN THE "OCCUPIED" MODE AND THE RECIRCULATION SYSTEM FAN SHALL REMAIN ON. THE HOT WATER PREHEAT AND REHEAT COIL 3-WAY VALVES AND ELECTRIC AIR HEATERS WILL CONTINUE TO OPERATE IN THE "OCCUPIED" MODE. THE A/C SYSTEM COOLING COIL CHILLED WATER 3-WAY VALVE SHALL CONTINUE TO OPERATE IN THE "OCCUPIED" MODE. THE RECIRCULATION SYSTEM COOLING COIL CHILLED WATER VALVE SHALL BE 100% BYPASS. THIS MODE OF OPERATION REQUIRES THE CONDENSATE COLLECTION TANK TO BE DRAINED (BELOW 90% FULL LEVEL WHICH WILL RESET THE ALARM) PRIOR TO THE RECIRCULATION SYSTEM RETURNING TO THE "OCCUPIED" MODE.

IF ANY OF THE CONTROLLED AREA HVAC SMOKE DETECTORS (RECIRCULATION SYSTEM RETURN, RECIRCULATION SYSTEM SUPPLY, A/C SYSTEM SUPPLY OR EXHAUST SYSTEM DISCHARGE) SENSES SMOKE, AN ALARM SHALL BE SENT TO THE DDC AND FIRE ALARM SYSTEMS AND THE RECIRCULATION SYSTEM, A/C SYSTEM AND EXHAUST SYSTEMS SHALL GO INTO "OFF" MODE.

"OCCUPIED" - THE "OCCUPIED" MODE WILL BE INITIATED BY THE DDC OR MANUAL OVERRIDE. WHEN INITIATED, THE ON-LINE EXHAUST FAN SHALL BE ENERGIZED AND BOTH FRESH AIR SUPPLY DAMPERS SHALL OPEN. WHEN THE EXHAUST SYSTEM DIFFERENTIAL PRESSURE SENSOR DETECTS FAN OPERATION, THE DDC SHALL ENERGIZE THE A/C SYSTEM AND RECIRCULATION SYSTEMS. SHOULD THE DIFFERENTIAL PRESSURE SENSOR FAIL TO DETECT FAN OPERATION WITHIN 15 SECONDS OF START UP, AN ALARM SHALL BE SENT TO THE DDC AND THE EXHAUST FAN SWITCHED TO THE "OFF" MODE.

THE RECIRCULATION SYSTEM AND A/C SYSTEM PREHEAT HOT WATER 3-WAY VALVES SHALL MODULATE TO MAINTAIN THE FRESH AIR SUPPLY TEMPERATURE AT 13°C WHEN THE OUTSIDE AIR TEMPERATURE FALLS BELOW 12°C. AN ALARM SHALL BE SENT TO THE DDC WHEN THE FRESH AIR TEMPERATURE DOWNSTREAM OF THE PREHEATER FALLS BELOW 2°C.

WHEN THE HIGH BAY AREA SPACE TEMPERATURE RISES ABOVE THE COOLING HIGH LIMIT SET POINT, THE RECIRCULATION SYSTEM COOLING COIL CHILLED WATER 3-WAY VALVE SHALL INCREMENTALLY INCREASE FLOW THROUGH THE CHILLED WATER COIL TO SATISFY THE SPACE COOLING SET POINT. THE SUPPLY AIR TEMPERATURE SHALL RESET IN 5 MINUTE INTERVALS WITH THE MINIMUM SUPPLY AIR TEMPERATURE TO THE SPACE OF 13°C. WHEN THE HIGH BAY AREA SPACE TEMPERATURE IS BELOW THE SPACE COOLING SET POINT, THE RECIRCULATION SYSTEM COOLING COIL CHILLED WATER 3-WAY VALVE SHALL MODULATE TO 100% BYPASS.

WHEN THE HIGH BAY SPACE TEMPERATURE FALLS BELOW THE HEATING LOW LIMIT SET POINT, THE RECIRCULATION SYSTEM REHEATER COIL HOT WATER 3-WAY VALVE SHALL INCREMENTALLY INCREASE FLOW THROUGH THE RECIRCULATION SYSTEM REHEATER TO SATISFY THE SPACE HEATING SET POINT. THE SUPPLY AIR TEMPERATURE SHALL BE RESET IN 5 MINUTE INTERVALS WITH THE MAXIMUM SUPPLY AIR TEMPERATURE TO THE SPACE OF 27°C. WHEN THE HIGH BAY AREA SPACE TEMPERATURE IS ABOVE THE SPACE HEATING SET POINT, THE RECIRCULATION SYSTEM REHEATER COIL HOT WATER 3-WAY VALVE SHALL MODULATE TO 100% BYPASS.

THE A/C SYSTEM SUPPLY AIR TEMPERATURE WILL BE MAINTAINED AT 13°C. WHEN THE FRESH AIR SUPPLY EXCEEDS 13°C, THE A/C SYSTEM COOLING COIL SHALL BE SUPPLIED WITH CHILLED WATER. THE A/C SYSTEM COOLING COIL CHILLED WATER 3-WAY VALVE SHALL MODULATE OPEN TO SATISFY THE LEAVING AIR TEMPERATURE OF 13°C.

WHEN ANY A/C SYSTEM SPACE TEMPERATURE FALLS BELOW THE HEATING LOW LIMIT SET POINT, THE ELECTRIC HEATER FOR THAT ZONE SHALL BE SWITCHED ON. WHEN THE ZONE TEMPERATURE RISES ABOVE THE HEATING HIGH LIMIT, THE ELECTRIC HEATER FOR THAT ZONE SHALL BE SECURED.

THE TWO EXHAUST FANS SHALL NOT RUN SIMULTANEOUSLY. THE FANS SHALL BE ALTERNATED FOR EQUAL RUN TIME, ALTERNATING ON THE OPERATOR'S SPECIFIED INTERVAL WITH WEEKLY AS A MINIMUM.

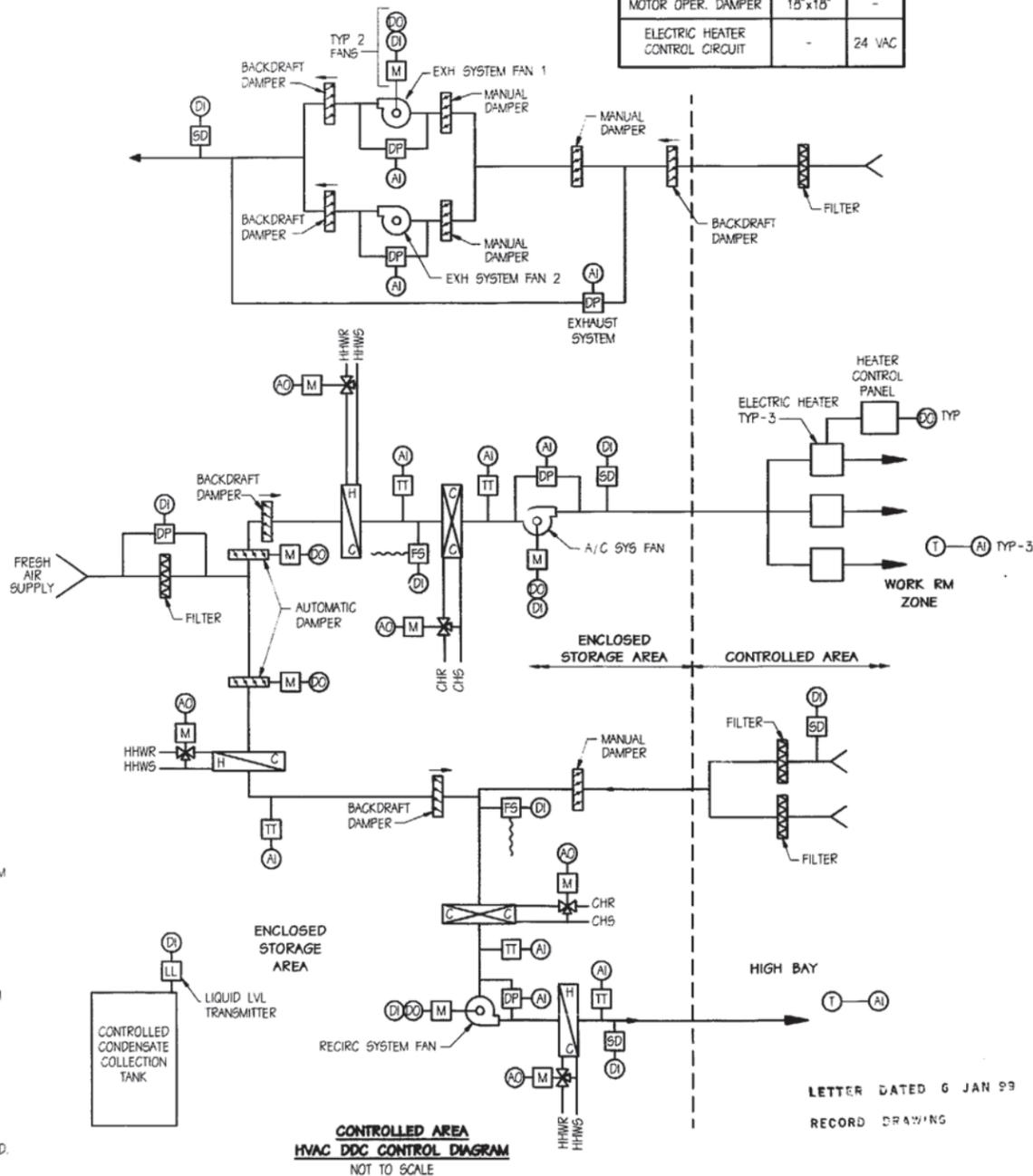
IF ANY OF THE CONTROLLED AREA HVAC SMOKE DETECTORS (RECIRCULATION SYSTEM RETURN, RECIRCULATION SYSTEM SUPPLY, A/C SYSTEM SUPPLY OR EXHAUST SYSTEM DISCHARGE) SENSES SMOKE, AN ALARM SHALL BE SENT TO THE DDC AND FIRE ALARM SYSTEMS, AND THE RECIRCULATION SYSTEM, THE A/C SYSTEM AND EXHAUST SYSTEMS SHALL GO INTO THE "OFF" MODE.

WHEN THE RECIRCULATION SYSTEM, A/C SYSTEM AND THE EXHAUST SYSTEM FANS ARE OPERATING AND THE EXHAUST SYSTEM DIFFERENTIAL PRESSURE DETECTS AN EXHAUST SYSTEM FAN FAILURE, AN ALARM SHALL BE SENT TO THE DDC AND THE RECIRCULATION SYSTEM, A/C SYSTEM AND EXHAUST SYSTEMS SHALL GO INTO THE "OFF" MODE.

THE DDC SYSTEM SHALL ALSO HAVE THE CAPABILITY TO SECURE ALL THREE CONTROLLED AREA SYSTEMS SHOULD THE DDC RECEIVE A FAILURE ALARM FROM EITHER THE A/C SYSTEM OR RECIRCULATION SYSTEM FAN. THIS CAPABILITY WILL BE OPERATOR SELECTED.

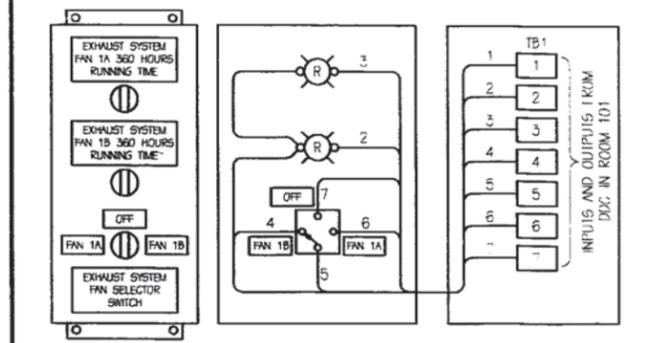
COOLING/HEATING COIL DATA FOR DDC COMPONENTS

DESCRIPTION	FLOWRATE	NPT
RECIRC COOLING COIL CHILLED WATER	120 GPM	3"
A/C SYSTEM COOLING COIL CHILLED WATER	34 GPM	2"
RECIRC PREHEATER COIL HOT WATER	20 GPM	1 1/2"
A/C SYSTEM PREHEATER COIL HOT WATER	20 GPM	1 1/2"
RECIRC REHEATER COIL HOT WATER	25 GPM	1 1/2"
MISCELLANEOUS INFORMATION		
DESCRIPTION	SIZE	VOLTAGE
MOTOR OPER. DAMPER	18"x18"	-
ELECTRIC HEATER CONTROL CIRCUIT	-	24 VAC



REVISIONS

REVZONE	DESCRIPTION	BY	DATE	APPD



THERE ARE 10 SPARE LEADS IN CONTROL CONDUIT CC19. SIX OF THESE LEADS ARE CONTAINED IN ONE CABLE AND ONE EACH SPARE IS CONTAINED IN FOUR DIFFERENT, FOUR CONDUCTOR CABLES. THESE CABLES TERMINATE IN THE HVAC ALARM PANEL, IN ROOM 108 AND IN THE ENCLOSED STORAGE AREA PULL BOX (GOVT. BOX) LOCATED ON THE SOUTH WALL OF ROOM 101. THE ABOVE CIRCUIT IS RECOMMENDED FOR THE FAN TIME IN SERVICE LIGHTS AND THE FAN SELECTOR SWITCH. NSFFY ALSO RECOMMENDS THAT THE ENCLOSURE FOR THE ABOVE LIGHTS AND SWITCH BE ATTACHED TO THE HVAC ALARM ENCLOSURE IN A MANNER SIMILAR TO THE WAY THE REMOTE ALARM INDICATOR WAS ATTACHED TO THE TLI ENCLOSURE.

FOR THE CONTROLLED CONDENSATE TANK HIGH LEVEL ALARM ALL NSFFY NEEDS FOR THIS ALARM IS A SET OF DRY CONTACTS TO BE CONNECTED TO TERMINALS TB1-18 AND TB2-18 IN THE HVAC ALARM PANEL.

EXHAUST FAN SELECTOR SWITCH DETAIL
FROM SK-4190-045 13-AUG-96
NOT TO SCALE

MATERIAL SOURCE LEGEND

E - EMERGENCY (NOT RELOC)	CP - CENTRALLY PROCURED MATERIAL (NOT ULM)
R - RELOCATED	LLM (CP) - LONG LEAD TIME MATERIAL (CP)
M - MODIFIED (NOT RELOCATED)	LLM (NF) - LONG LEAD TIME MATERIAL (NF)
NR - MODIFIED & RELOCATED	
CFM - CONSTRUCTION FURNISHED MATERIAL	
MF - MANUFACTURING ACTIVITY FURNISHED	

AUTHORITY:
COMSUBSTANT LTR
SER N4074/06977
DTD 23 NOV 1993
TF: 670 CAT:

WEIGHT CONTROL DATA

LEVERS IN FEET TO THE NEAREST TENTH OF A FOOT
USE SEPARATE LINES FOR EACH WT GRP, S/A, REV, WT INSTL, WT RMV

REV	ADDED OR REMOVED	WT GRP	WT (LBS)	VOL ADJ (GAL)	VERTICAL MOM (FT-LBS)	LCS AFT B (FT)	LONG. MOM (FT-LBS)	PWD AFT (FT)	TCC AFT (FT)	TRANS MOM (FT-LBS)	PORT STYD (S)	VAL BY

NSF PLANNING YARD
NORFOLK
NAVAL SHIPYARD
NORFOLK, VA 23708-5000
FORM NO. 80884 CODE 2380

DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
ARLINGTON, VA 22242-5160

NORFOLK CONTROLLED INDUSTRIAL FACILITY
CONTROLLED AREA
HVAC DDC CONTROL DIAGRAM

APPROVED FOR NAVSEA
D 53711830 7032412
SCALE: NONE SHEET 1 OF 2

CONTROLLING TO CONST. RECORDS

THIS DRAWING, BY REFERENCE, APPLICABLE TO: NSFFY 4190-045 (REV. 13-AUG-96)

ATLANTIC DIVISION

NORFOLK NAVAL STATION
NORFOLK, VIRGINIA

CONTROLLED INDUSTRIAL FACILITY (CIF)

CONTROLLED AREA
HVAC DDC CONTROL DIAGRAM

DATE: 05-94-4190
REV: 4399155
REV: 05-94-4190
REV: 4399155

M - 11

CONTROLLED AREA - INPUT / OUTPUT SCHEDULE									
POINT DESCRIPTION	INPUT			OUTPUT		ALARMS		FUNCTIONS	
	DIGITAL (DI)	ANALOG (AI)		DIGITAL (DO)	ANALOG (AO)	DIGITAL	ANALOG		
	ON/OFF STATUS PRESS. / DIFF. PRESS. STATUS AUX. CONTACT	TEMPERATURE PRESSURE FLOW (GPM, #/HP)		ON/OFF/AUTO ON/OFF OPEN/CLOSE	POSITION ADJ. SET POINT ADJ.	HIGH LOW FAILURE TO VENT CONTROL PANEL	HIGH LOW FLOW FAILURE		
EXHAUST FAN 1									
EXHAUST FAN 2									
EXHAUST FAN 1A POSIT STATUS	•								
EXHAUST FAN 2A POSIT STATUS	•								
EXHAUST SYSTEM OPERATION		•							•
EXHAUST SYSTEM SMOKE DET		•				•			
RECIRC PREHEAT AIR		•				•			
RECIRC FAN		•		•			•		•
RECIRC COOLING COIL V					•				•
RECIRC PREHEAT COIL V					•				•
RECIRC REHEAT COIL V					•				•
RECIRC RETURN SMOKE DETECTOR	•					•			
RECIRC SUPPLY SMOKE DETECTOR	•					•			
HIGH BAY SPACE TEMP		•							•
RECIRC COOL COIL AIR TEMP		•							•
RECIRC SUPPLY AIR TEMP		•							•
RECIRC MIXED AIR F5 LOW LIMIT	•					•			
RECIRC AUTO POSITION STATUS	•								
A/C SYSTEM FAN		•		•			•		•
A/C COOLING COIL V					•				•
A/C PREHEAT COIL V					•				•
A/C SUPPLY SMOKE DET	•					•			
ZONE 1 SPACE TEMP		•							•
ZONE 2 SPACE TEMP		•							•
ZONE 3 SPACE TEMP		•							•
ZONE 1 ELEC HTR CONT				•					•
ZONE 2 ELEC HTR CONT				•					•
ZONE 3 ELEC HTR CONT				•					•
A/C AUTO POSITION STATUS	•								
A/C MIXED AIR F5 LOW LIMIT	•					•			
A/C SUPPLY AIR		•							•
A/C PREHEAT AIR		•							•
FRESH AIR SPLY DAMPER REC				•					
FRESH AIR SPLY DAMPER A/C				•					
FRESH AIR SPLY FILTER	•						•		
CONDENSATE COLLECT TANK		•				•			
OUTSIDE AIR		•							
LOCAL NORMAL SYSTEM ON/OFF	•								
EMERGENCY SHUTDOWN	•								
CONTROLLED AREA HVAC STATUS						•			

LETTER DATED 6 JAN 99
RECORD DRAWING

SIZE	FSCM NO.	WT GRP	NAVSEA DRAWING NO.
D	53711	830	7032412
SCALE: NONE			SHEET 2 OF 2

NONE
434706
P-3'E
05-94-4190
N02470-95-5-4190
4334706
95 140
M-12

ATLANTIC DIVISION
NORFOLK NAVAL STATION
CONTROLLED INDUSTRIAL FACILITY (CIF)
BY 97 MCON PROJECT P-318
CONTROLLED AREA - I/O SCHEDULE

JTE
MFI
RQZ

Submittal and Design Review Schedule
Capt. P. J. Adams 11/14

FAN SCHEDULE								
FAN NUMBER	EF-1	EF-2	EF-3	EF-4	EF-5	EF-6	EF-1	EF-2
LOCATION SHEET NUMBER	M-1	M-4	M-4	M-3	M-3	M-3	M-4	M-4
LOCATION	NORTH WALL	P-5	ROOF	ROOF	ROOF	ROOF	DUCT	DUCT
AREA SERVED	ENCLOSED STORAGE	112	201	115,119,120	209,210	208	AHU-1	AHU-2
L/S @ STANDARD CONDITIONS	8494	140	310	880	426	504	995	1030
STATIC PRESSURE (Pa)	11	50	45	135	86	105	102	105
APPROX WHEEL DIA (mm)	1238	203	229	356	254	305	432	432
APPROX WHEEL RPM	574	1300	1090	1235	1300	1135	1720	1720
APPROX MOTOR KW	3.16	0.022	0.05	0.3	0.1	0.1	0.45	0.45
ELECTRICAL DATA (VOLTS/PHASE/HERTZ)	460/3/60	115/1/60	115/1/60	460/3/60	115/1/60	115/1/60	460/3/60	460/3/60
DRIVE TYPE	BELT	DIRECT	BELT	BELT	BELT	BELT	BELT	BELT
FAN TYPE	PROPELLER	EXHAUSTER	EXHAUSTER	EXHAUSTER	EXHAUSTER	EXHAUSTER	CENTRIFUGAL	CENTRIFUGAL
FAN MOUNTING	WALL	ROOF	ROOF	ROOF	ROOF	ROOF	DUCT	DUCT
FAN MATERIAL	CARBON STEEL	ALUMINUM	ALUMINUM	ALUMINUM	ALUMINUM	ALUMINUM	STEEL	STEEL
STARTER SIZE	NEMA 1	NEMA 0	NEMA 0	NEMA 1	NEMA 0	NEMA 0	NEMA 1	NEMA 1

DIFFUSER, REGISTER AND GRILLE SCHEDULE											
TYPE	SA-A	SA-B	SA-C	RA-A	RA-B	EA-A	EA-B	EA-C	EA-D	EA-E	EA-F
FACE TYPE	SQ, PF	SQ, PF	SQ, PF	SQ, PF	SQ, PF	SQ, PF	SQ, PF	SQ, PF	SQ, PF	SQ, PF	SQ, PF
MOUNTING	L-1	FL	DUCT	L-1	FL	DUCT	FL	L-1	DUCT	FL	DUCT
PATTERN	2W, 4W	2W, 4W	2W, 4W	--	--	--	--	--	--	--	--
DAMPER	OB	OB	OB	OB	OB	OB	--	--	--	--	--
ACCESSORIES	E-D	E-D, P-R	E-D	--	P-R	--	P-R	--	--	P-R	--
MATERIAL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL	AL
FINISH	W-E	W-E	W-E	W-E	W-E	W-E	W-E	W-E	W-E	W-E	W-E

LEGEND
 FACE TYPE: SQ = SQUARE, PF = PERFORATED, HS = HORIZONTAL STRAIGHT BLADES
 MOUNTING: FL = FLUSH, L-1 = LAY-IN, 4W = 4-WAY
 PATTERNS: FX = FIXED, 2W = 2-WAY
 DAMPERS: O-B = OPPOSED BLADE
 ACCESSORIES: E-D = EQUALIZING DEFLECTORS, P-R = PLASTER RING
 MATERIAL: AL = ALUMINUM, A-E = A-TE ENAMEL

AIR COOLED WATER CHILLER (CH) SCHEDULE																							
UNIT NO	LOCATION	LOCATION SHT. NO.	UNIT ELEVATION (MASL)	TYPE OF UNIT	CAPACITY (KW)	CHILLED WATER SYSTEM				SUMMER AMBIENT (°C)	WINTER AMBIENT (°C)	INPUT KW	CHILLER EFF	MIN CIRCUIT AMPACITY	NO OF COMPRESSORS	PERCENT MINIMUM LOAD	FAN DATA			ELECTRICAL DATA			REMARKS
						TEMPERATURE		FLOW (LITER/SEC)	MAX PRESS DROP (KPa)								FAN KW (EA.)	NO OF FANS	FAN FLA	VOLT	PHASE	HERTZ	
						ENT °C	EXIT °C																
CH-1	SOUTH EXTERIOR	M2	0	AIR-COOLED ROTARY	431	12.8	7.2	18.41	42	33	-8	133	10.4	253	2	15%	1.0	10	2.5	460	3	60	

HEAT EXCHANGER (HE) SCHEDULE													
UNIT NO	LOCATION DWG. NO.	TYPE OF UNIT	NUMBER OF PAGES	KW TRANSFER	COLD SIDE				HOT SIDE				NOTES
					TYPE OF FLUID	FLOW (LITER/SEC)	ENT TEMP (°C)	LWT TEMP (°C)	PRESS. DROP (KPa)	TYPE OF FLUID	STEAM PRESSURE (KPa)	FLOW (Kg/SEC)	
HE-1	M-4	SHELL/TUBE	2	254	WATER	5.47	60	71	2.99	STEAM	103	0.12	

PURE WATER SYSTEM (PWS) SCHEDULE						
SYSTEM NO.	DESIGN CAPACITY (LITERS/DAY)	DESIGN PRESSURE (KPa)	INLET WATER TDS (PPM)	OUTLET WATER RESISTIVITY (MEG OHMS-CM)	ELECTRICAL DATA	
					VOLTS	HERTZ
PWS-1	57	57	165	17	115	60

DUCT HEATING COIL (HC) SCHEDULE									
COIL NUMBER	HC-1	HC-2	HC-3	HC-4	HC-5	HC-6	HC-7	HC-8	
LOCATION	112	201	213	202	207	208	207	207	
LOCATION SHEET NUMBER	M-4	M-2	M-3	M-3	M-3	M-3	M-3	M-3	
TOTAL AIR FLOW (LITERS/SEC)	1225	734	978	505	1175	702	249	360	
ENTERING AIR TEMP (°C)	13.9	13.9	12.5	12.5	12.5	12.5	12.5	12.5	
LEAVING AIR TEMP (°C)	24.2	23.6	23.7	22	22.6	21.2	21.4	21.4	
MAX AIR PRESS DROP (KPa)	60	60	60	60	60	60	60	60	
COIL TOTAL LOAD (KW)	15.1	8.8	13.2	5.8	14.6	7.3	2.6	3.8	
WATER FLOW RATE (LITERS/SEC)	0.33	0.19	0.26	0.13	0.32	0.16	0.06	0.08	
ENTERING WATER TEMP (°C)	71	71	71	71	71	71	71	71	
LEAVING WATER TEMP (°C)	60	60	60	60	60	60	60	60	
MAX WATER PRESS DROP (KPa)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
TEMPERATURE CONTROL	3-WAY VALVE								
REMARKS									
NOTES									

AIR HANDLING UNIT (AHU) SCHEDULE			
UNIT NUMBER	AHU-1	AHU-2	
LOCATION SHEET NUMBER	M4	M4	
LOCATION	112	201	
LITERS/SEC @ STANDARD CONDITIONS	1959	3969	
OUTSIDE AIR LITER/SEC @ STANDARD CONDITIONS	995	1030	
EXTERNAL STATIC PRESSURE (Pa)	266	378	
APPROX MOTOR H. P.	2.38	5.54	
ELECTRICAL DATA (VOLTS/PHASE/HERTZ)	460/3/60	460/3/60	
STARTER SIZE	NEMA 1	NEMA 1	
COOLING COIL TYPE	WATER	WATER	
GRAND TOTAL COOLING (KW)	61.5	104.8	
TOTAL SENSIBLE COOLING (KW)	33.5	65.3	
ENTERING AIR TEMP DB/WB (°C)	28.1/22.2	26.4/20.1	
LEAVING AIR TEMP DB/WB (°C)	14.0/13.7	12.6/12.1	
WATER FLOW (LITERS/SEC)	2.65	4.54	
WATER PRESSURE DROP (KPa)	19.6	32.9	
AIR PRESSURE DROP (Pa)	214	179	
ENTERING WATER TEMP (°C)	7.2	7.2	
LEAVING WATER TEMP (°C)	12.8	12.8	
HEATING COIL TYPE	WATER	--	
TOTAL HEATING (KW)	16.5	--	
ENTERING AIR TEMP (°C)	7.1	--	
LEAVING AIR TEMP (°C)	14.0	--	
WATER FLOW (LITERS/SEC)	0.35	--	
WATER PRESSURE DROP (KPa)	0.12	--	
AIR PRESSURE DROP (Pa)	27	--	
ENTERING WATER TEMP (°C)	71	--	
LEAVING WATER TEMP (°C)	60	--	
NOTES			

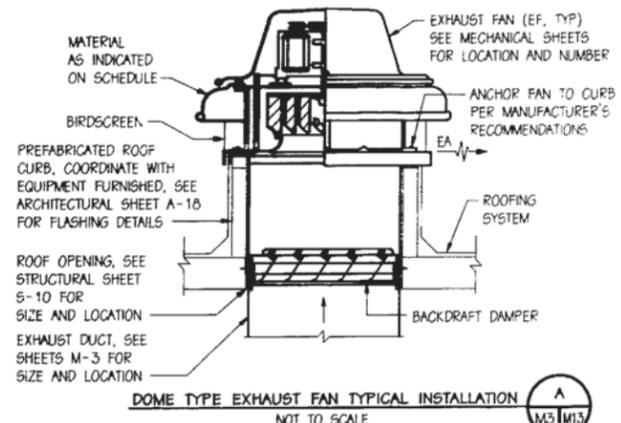
UNIT HEATER SCHEDULE					
UNIT NUMBER	UH-1	UH-2	UH-3	UH-4	UH-5
LOCATION SHEET NUMBER	M-1	M-1	M-3	M-4	M-4
TYPE	VERTICAL	VERTICAL	VERTICAL	HORIZONTAL	HORIZONTAL
STEAM PRESSURE (KPa)	103	103	103	--	--
STEAM FLOW (KG/SEC)	0.04	0.04	0.014	--	--
HOT WATER:					
ENTERING WATER TEMP (°C)	--	--	--	71	71
TEMP. DROP (°C)	--	--	--	60	60
FLOW (LITERS/SEC)	--	--	--	0.06	0.06
PRESSURE DROP (KPa)	--	--	--	0.06	0.06
AIRFLOW (LITERS/SEC)	1015	1015	490	165	165
FAN SPEED (RPM)	1550	1550	835	1550	1550
FAN KW	0.37	0.37	0.04	0.02	0.02
HEATING KW	81	81	30	3.4	3.4
ENTERING AIR TEMP (°C)	21	21	21	21	21
LEAVING AIR TEMP (°C)	53	53	44	32	32
ELECTRICAL DATA (VOLTS/PHASE/HERTZ)	115/1/60	115/1/60	115/1/60	115/1/60	115/1/60
THROW (METERS)	--	--	--	9	9
SPREAD (METERS)	22	22	22	--	--
MOUNTING HEIGHT (METERS)	12.4	12.4	12.4	3.0	3.0
STARTER SIZE	NEMA 0	NEMA 0	NEMA 0	NEMA 0	NEMA 0
THERMOSTAT SET POINT (°C)	10	10	10	10	10

EXPANSION TANK (ET) SCHEDULE			
UNIT NUMBER	ET-1	ET-2	ET-3
LOCATION SHEET NUMBER	M-22	M-22	P-5
FLUID TYPE	WATER	WATER	WATER
TYPE	DIAPHRAGM	DIAPHRAGM	DIAPHRAGM
SYSTEM WATER VOLUME (LITERS)	440	2063	445
TANK DIAMETER (mm)	610	610	305
TANK VOLUME (LITERS)	284	284	20
ACCEPTANCE VOLUME (LITERS)	200	200	10
MAX FLUID TEMPERATURE (°C)	76.7	15.6	60
MIN FLUID TEMPERATURE (°C)	54.4	4.4	4.4
INITIAL FILL PRESSURE (KPa)	82.74	82.74	276.0
MAXIMUM FILL PRESSURE (KPa)	207	207	207
NOTES			

DUCT CONSTRUCTION AND LEAK TEST SCHEDULE									
UNIT NO.	DUCT PRESSURE CLASS (Pa)				DUCT SEAL CLASS	DUCT LEAK CLASS	DUCT TEST PRESSURE	DUCT TEST TYPE	REMARKS
	SUPPLY DUCT	RETURN DUCT	EXHAUST DUCT	OUTSIDE AIR DUCT					
AHU-1	500	250	--	250	C	12	400	(1)	SUPPLY DUCT ONLY
AHU-2	500	250	--	250	C	12	400	(1)	SUPPLY DUCT ONLY
EF-1	--	--	500	--	C	12	--	NONE	--
EF-2	--	--	500	--	C	12	--	NONE	--
EF-3	--	--	500	--	C	12	--	NONE	--
EF-4	--	--	500	--	C	12	--	NONE	--
EF-5	--	--	500	--	C	12	--	NONE	--
EF-6	--	--	500	--	C	12	--	NONE	--
SF-1	--	--	--	250	C	12	250	NONE	Δ
SF-2	--	--	--	250	C	12	250	NONE	Δ

① TEST PER SMACNA HVACADLT.M. 2ND EDITION

ROOM DESCRIPTION	INDOOR				OUTDOOR			
	SUMMER		WINTER		SUMMER		WINTER	
	°C DB	% RH	°C DB	% RH	°C DB	% RH	°C DB	% RH
ALL ROOMS	24.4	50	20	50	33.9	49	-6.7	N/A



LETTER DATED 6 JAN 99

CONTINUING TO DWG. RECORDS

REV. PER AS-BUILT CONDITIONS

ATLANTIC DIVISION

NORFOLK NAVAL STATION NORFOLK, VIRGINIA

CONTROLLED INDUSTRIAL FACILITY (CIF)

BY 87-MCON-PROJECT P-318

EQUIPMENT SCHEDULES

DATE: 1/26/96

NORFOLK NAVAL STATION NORFOLK, VIRGINIA

NONE

434707

P-318

05-94-4190

N62470-94-B-4190

4334707

96 140

M-13

CEP-209 Record Drawings

MECHANICAL ABBREVIATIONS

<p>⊙ AND ABV ABOVE ADJ ADJUSTABLE AHU AIR HANDLING UNIT ATC AUTOMATIC TEMPERATURE CONTROL AP ACCESS PANEL AV AUTOMATIC AIR VENT BA BREATHABLE AIR CA COMPRESSED AIR CAP CAPACITY CD CONDENSATE DRAIN CH CABINET HEATER CHWP CHILLED WATER PUMP CLG CEILING CO CLEANOUT CW COLD WATER, POTABLE DB DRY BULB DEG C, C° DEGREE CELSIUS DIA DIAMETER DN DOWN DWG DRAWING DX DIRECT EXPANSION EXH EXHAUST EAT, LAT ENTERING/LEAVING AIR TEMPERATURE</p>	<p>EF EXHAUST FAN EL ELEVATION (DATUM) ELEV ELEVATION (VIEW) EQ EQUIPMENT ER EXHAUST REGISTER ESP, TSP EXTERNAL/TOTAL STATIC PRESSURE EWC ELECTRIC WATER COOLER EWT, LWT ENTERING/LEAVING WATER TEMPERATURE EX, EXIST EXISTING F&T FLOAT & THERMOSTATIC TRAP FD FLOOR DRAIN FL FLANGED FLA FULL LOAD AMPERES FLR FLOOR FOB FLAT ON BOTTOM FOT FLAT ON TOP GA GAUGE, GAGE GALV GALVANIZED HT HEIGHT HB HOSE BIBB HC HEATING COIL HPS, HPR HIGH PRESSURE STEAM SUPPLY/RETURN HWS, HWR HEATING WATER SUPPLY/RETURN HW HOT WATER, POTABLE</p>	<p>HWP HEATING WATER PUMP HZ HERTZ IL INTERLOCK J JOULE Kg KILOGRAM KW KILOWATT KPa KILOPASCAL L LENGTH L LITRE L/S LITRES PER SECOND LPS, LPR LOW PRESSURE STEAM SUPPLY/RETURN M METER MAX MAXIMUM MM MILLIMETER MIN MINIMUM MOD MOTOR OPERATED DAMPER MTD MOUNTED MU MAKE UP AIR FAN MV MANUAL AIR VENT NRS NON RISING STEM N NORTH NC NORMALLY CLOSED NF NON FREEZE NIC NOT IN CONTRACT NTS NOT TO SCALE</p>	<p>NO NORMALLY OPEN No NUMBER OC ON CENTERS OSD OPEN SITE DRAIN OA OUTSIDE AIR OED OPEN END DUCT OS&Y OUTSIDE SCREW & YOKE Pa PASCAL PA PLANT AIR PD PRESSURE DROP PH PHASE PRV PRESSURE REDUCING VALVE PTAC PACKAGED TERMINAL AIR CONDITIONING UNIT RA RETURN AIR RG RETURN GRILLE RM ROOM RPM REVOLUTIONS PER MINUTE RR RETURN REGISTER RS RISING STEM SA SUPPLY AIR SAN, W SANITARY, WASTE SENS SENSIBLE COOLING SD SPLITTER DAMPER SP STATIC PRESSURE SPS STATIC PRESSURE SENSOR</p>	<p>SQ SQUARE SR SUPPLY REGISTER SW STORM WATER SWC STEAM WATER CONVERTER TD THERMODYNAMIC TRAP TDH TOTAL DYNAMIC HEAD TEMP TEMPERATURE THICK THICKNESS TW THERMOMETER WELL TYP TYPICAL UH UNIT HEATER V VENT VAV VARIABLE AIR VOLUME VB VACUUM BREAKER VEL VELOCITY VTR VENT THROUGH ROOF W WIDTH W/ WITH WB WET BULB WH WALL HYDRANT</p>
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MECHANICAL LEGEND

<p>—○— PIPING TURNED DOWN —○— PIPING TURNED UP — — — COLD WATER, POTABLE — · · · · · HOT WATER, POTABLE — · · · · · HOT WATER RETURN, POTABLE — VENT — SW STORM WATER — SANITARY, WASTE (GRAVITY) — PS SANITARY, WASTE (PUMPED) — BA BREATHABLE AIR — CA COMPRESSED AIR — F FIRE PROTECTION — CHWS CHILLED WATER SUPPLY — CHWR CHILLED WATER RETURN — HPS HIGH PRESSURE STEAM — HPR HIGH PRESSURE RETURN — LPS LOW PRESSURE STEAM — LPR LOW PRESSURE RETURN — PC PUMPED CONDENSATE — CD AIR CONDITIONING CONDENSATE DRAIN — HWS HEATING WATER SUPPLY</p>	<p>—HWR— HEATING WATER RETURN — GATE VALVE — OS & Y GATE VALVE — GLOBE VALVE — BALL VALVE — 2-WAY VALVE — 3-WAY VALVE — BUTTERFLY VALVE — CHECK VALVE — PRESSURE REDUCING VALVE — PRESSURE RELIEF VALVE — BALANCING VALVE WITH FLOW TAPS — MULTI-PURPOSE VALVE — DIRECTION OF FLOW ARROW — CONCENTRIC REDUCER — ECCENTRIC REDUCER — STRAINER W/ BLOW DOWN VALVE — FLEXIBLE PIPE CONNECTION — HOSE BIBB W/ VACUUM BREAKER — WALL HYDRANT W/ VACUUM BREAKER — PIPE GUIDE — PIPE ANCHOR</p>	<p>— UNION — FDC FIRE DEPARTMENT CONNECTION — FD-1 FLOOR DRAIN, TYPE () — FCO FLOOR CLEANOUT — CO HORIZONTAL CLEANOUT — T N NIGHT THERMOSTAT — S DUCT MOUNTED SMOKE DETECTOR — T XX THERMOSTAT SERVING VAV-XX — T THERMOSTAT — THERMOMETER — TW THERMOMETER WELL — P/V PRESSURE GAUGE WITH SHUT-OFF COCK — P/V COMPOUND GAUGE WITH SHUT-OFF COCK — CAPPED PIPING — MW MANUAL AIR VENT — AV AUTOMATIC AIR VENT — FIRE DAMPER WITH ACCESS DOOR — FLEXIBLE CONNECTION — VD VOLUME DAMPER (HANDLE SHOWS DIRECTION OF AIR FLOW) — MOD MOTOR OPERATED DAMPER — ACOUSTICAL LINING INSULATION</p>	<p>— DUCT UNDER POSITIVE PRESSURE TURNED UP — DUCT UNDER POSITIVE PRESSURE TURNED DOWN — DUCT UNDER NEGATIVE PRESSURE TURNED UP — DUCT UNDER NEGATIVE PRESSURE TURNED DOWN — TRANSITION — TRANSITION, SQUARE (RECTANGULAR) TO ROUND — CEILING DIFFUSER, ROUND ARROWS INDICATE THROW DIRECTIONS — CEILING DIFFUSER, RECTANGULAR ARROWS INDICATE THROW DIRECTIONS — RETURN REGISTER OR GRILLE — DIRECTION OF FLOW ARROW (FIRST DIMENSION SHOWN IS SIDE SHOWING) — SQUARE ELBOW WITH TURNING VANES — DOOR LOUVER — CONNECT NEW TO EXISTING</p>
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NOTE:
ALL DIMENSIONS ARE MILLIMETERS (MM) UNLESS OTHERWISE NOTED

<p style="text-align: center;">WHITMAN, REQUADT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND</p> <p style="text-align: center;">A/E CONTRACT NO. 88820-93-01-004 DATE</p> <p style="text-align: center;">APPROVED FOR ACTIVITY - SATISFACTORY TO FOR ETD FOR COMMANDER NAVFAC</p>	<p style="text-align: center;">ATLANTIC DIVISION NAVAL STATION, NORFOLK VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING</p> <p style="text-align: center;">NO. 024020</p>
<p>CODE ID. NO. X SCALE: N18 ETD NO. 451715 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONSTR. CONTR. NO. N62470-94-B-4191 NAVFAC DRAWING NO. 4351715 SHEET 100 OF 196</p>	<p style="text-align: center;">M-1</p>

MECHANICAL ABBREVIATIONS

<p>Ø AND ABV ABOVE ADJ ADJUSTABLE AHU AIR HANDLING UNIT ATC AUTOMATIC TEMPERATURE CONTROL AP ACCESS PANEL AV AUTOMATIC AIR VENT BA BREATHABLE AIR CA COMPRESSED AIR CAP CAPACITY CD CONDENSATE DRAIN CH CABINET HEATER CHWP CHILLED WATER PUMP CLG CEILING CO CLEANOUT CW COLD WATER, POTABLE DB DRY BULB DEG C, C° DEGREE CELCIUS DIA DIAMETER DN DOWN DWG DRAWING DX DIRECT EXPANSION EXH EXHAUST EAT, LAT ENTERING/LEAVING AIR TEMPERATURE</p>	<p>AT AND ABV ABOVE ADJ ADJUSTABLE AHU AIR HANDLING UNIT ATC AUTOMATIC TEMPERATURE CONTROL AP ACCESS PANEL AV AUTOMATIC AIR VENT BA BREATHABLE AIR CA COMPRESSED AIR CAP CAPACITY CD CONDENSATE DRAIN CH CABINET HEATER CHWP CHILLED WATER PUMP CLG CEILING CO CLEANOUT CW COLD WATER, POTABLE DB DRY BULB DEG C, C° DEGREE CELCIUS DIA DIAMETER DN DOWN DWG DRAWING DX DIRECT EXPANSION EXH EXHAUST EAT, LAT ENTERING/LEAVING AIR TEMPERATURE</p>	<p>EF EXHAUST FAN EL ELEVATION (DATUM) ELEV ELEVATION (VIEW) EQ ELEVATOR ER EXHAUST REGISTER ESP, TSP EXTERNAL/TOTAL STATIC PRESSURE EWC ELECTRIC WATER COOLER EWT, LWT ENTERING/LEAVING WATER TEMPERATURE EX, EXIST EXISTING F&T FLOAT & THERMOSTATIC TRAP FD FLOOR DRAIN FL FLANGED FLA FULL LOAD AMPERES FLR FLOOR FOB FLAT ON BOTTOM FOT FLAT ON TOP GA GAUGE, GAGE GALV GALVANIZED HT HEIGHT HB HOSE BIBB HC HEATING COIL HPS, HPR HIGH PRESSURE STEAM SUPPLY/RETURN HWS, HWR HEATING WATER SUPPLY/RETURN HW HOT WATER, POTABLE</p>	<p>HWP HEATING WATER PUMP HZ HERTZ IL INTERLOCK J JOULE Kg KILOGRAM KW KILOWATT KPa KILOPASCAL L LENGTH L LITRE L/S LITRES PER SECOND LPS, LPR LOW PRESSURE STEAM SUPPLY/RETURN M METER MAX MAXIMUM MM MILLIMETER MIN MINIMUM MOD MOTOR OPERATED DAMPER MOUNT MOUNTED MU MAKE UP AIR FAN MW MANUAL AIR VENT NRS NON RISING STEM N NORTH NC NORMALLY CLOSED NF NON FREEZE NIC NOT IN CONTRACT NTS NOT TO SCALE</p>	<p>NO NORMALLY OPEN No NUMBER OC ON CENTERS OSD OPEN SITE DRAIN OA OUTSIDE AIR OED OPEN END DUCT OS&Y OUTSIDE SCREW & YOKE Pa PASCAL PA PLANT AIR PD PRESSURE DROP PH PHASE PRV PRESSURE REDUCING VALVE PTAC PACKAGED TERMINAL AIR CONDITIONING UNIT RA RETURN AIR RG RETURN GRILLE RM ROOM RPM REVOLUTIONS PER MINUTE RR RETURN REGISTER RS RISING STEM SA SUPPLY AIR SAN, W SANITARY, WASTE SENS SENSIBLE COOLING SD SPLITTER DAMPER SP STATIC PRESSURE SPS STATIC PRESSURE SENSOR</p>	<p>SQ SQUARE SR SUPPLY REGISTER SW STORM WATER SWC STEAM WATER CONVERTER TD THERMODYNAMIC TRAP TDH TOTAL DYNAMIC HEAD TEMP TEMPERATURE THICK THICKNESS TW THERMOMETER WELL TYP TYPICAL UH UNIT HEATER V VENT VAV VARIABLE AIR VOLUME VB VACUUM BREAKER VEL VELOCITY VTR VENT THROUGH ROOF W WIDTH W/ WITH WB WET BULB WH WALL HYDRANT</p>
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MECHANICAL LEGEND

<p>—○— PIPING TURNED DOWN —○— PIPING TURNED UP — — — COLD WATER, POTABLE — — — HOT WATER, POTABLE — — — HOT WATER RETURN, POTABLE — — — VENT — SW — STORM WATER— — — — SANITARY, WASTE (GRAVITY) — PS — SANITARY, WASTE (PUMPED) — BA — BREATHABLE AIR — CA — COMPRESSED AIR — F — FIRE PROTECTION — CHWS — CHILLED WATER SUPPLY — CHWR — CHILLED WATER RETURN — HPS — HIGH PRESSURE STEAM — HPR — HIGH PRESSURE RETURN — LPS — LOW PRESSURE STEAM — LPR — LOW PRESSURE RETURN — PC — PUMPED CONDENSATE — CD — AIR CONDITIONING CONDENSATE DRAIN — HWS — HEATING WATER SUPPLY</p>	<p>—HWR— HEATING WATER RETURN — GATE VALVE — OS & Y GATE VALVE — GLOBE VALVE — BALL VALVE — 2-WAY VALVE — 3-WAY VALVE — BUTTERFLY VALVE — CHECK VALVE — PRESSURE REDUCING VALVE — PRESSURE RELIEF VALVE — BALANCING VALVE WITH FLOW TAPS — MULTI-PURPOSE VALVE — DIRECTION OF FLOW ARROW — CONCENTRIC REDUCER — ECCENTRIC REDUCER — STRAINER W/ BLOW DOWN VALVE — FLEXIBLE PIPE CONNECTION — HOSE BIBB W/ VACUUM BREAKER — WALL HYDRANT W/ VACUUM BREAKER — PIPE GUIDE — PIPE ANCHOR</p>	<p>— UNION — FDC FIRE DEPARTMENT CONNECTION — FD-1 FLOOR DRAIN, TYPE () — FCO FLOOR CLEANOUT — CO HORIZONTAL CLEANOUT ① N NIGHT THERMOSTAT ② DUCT MOUNTED SMOKE DETECTOR ① XX THERMOSTAT SERVING VAV-XX ① THERMOSTAT — THERMOMETER — TW THERMOMETER WELL — PRESSURE GAUGE WITH SHUT-OFF COCK — COMPOUND GAUGE WITH SHUT-OFF COCK — CAPPED PIPING — MW MANUAL AIR VENT — AV AUTOMATIC AIR VENT — FD FIRE DAMPER WITH ACCESS DOOR — FLEXIBLE CONNECTION — VD VOLUME DAMPER (HANDLE SHOWS DIRECTION OF AIR FLOW) — MOD MOTOR OPERATED DAMPER — ACCOUSTICAL LINING INSULATION</p>	<p>— DUCT UNDER POSITIVE PRESSURE TURNED UP — DUCT UNDER POSITIVE PRESSURE TURNED DOWN — DUCT UNDER NEGATIVE PRESSURE TURNED UP — DUCT UNDER NEGATIVE PRESSURE TURNED DOWN — TRANSITION — TRANSITION, SQUARE (RECTANGULAR) TO ROUND — CEILING DIFFUSER, ROUND — ARROWS INDICATE THROW DIRECTIONS — CEILING DIFFUSER, RECTANGULAR — ARROWS INDICATE THROW DIRECTIONS — RETURN REGISTER OR GRILLE — 610x330 — DIRECTION OF FLOW ARROW (FIRST DIMENSION SHOWN IS SIDE SHOWING) — SQUARE ELBOW WITH TURNING VANES — DOOR LOUVER — CONNECT NEW TO EXISTING</p>
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NOTE:
ALL DIMENSIONS ARE MILLIMETERS (MM) UNLESS OTHERWISE NOTED

DATE							
APPROVED							
DESCRIPTION							
REVISIONS							
SYMBOL							
DATE							
DESCRIPTION							

WHITMAN, REQUARDT AND ASSOCIATES
ENGINEERS
BALTIMORE, MARYLAND

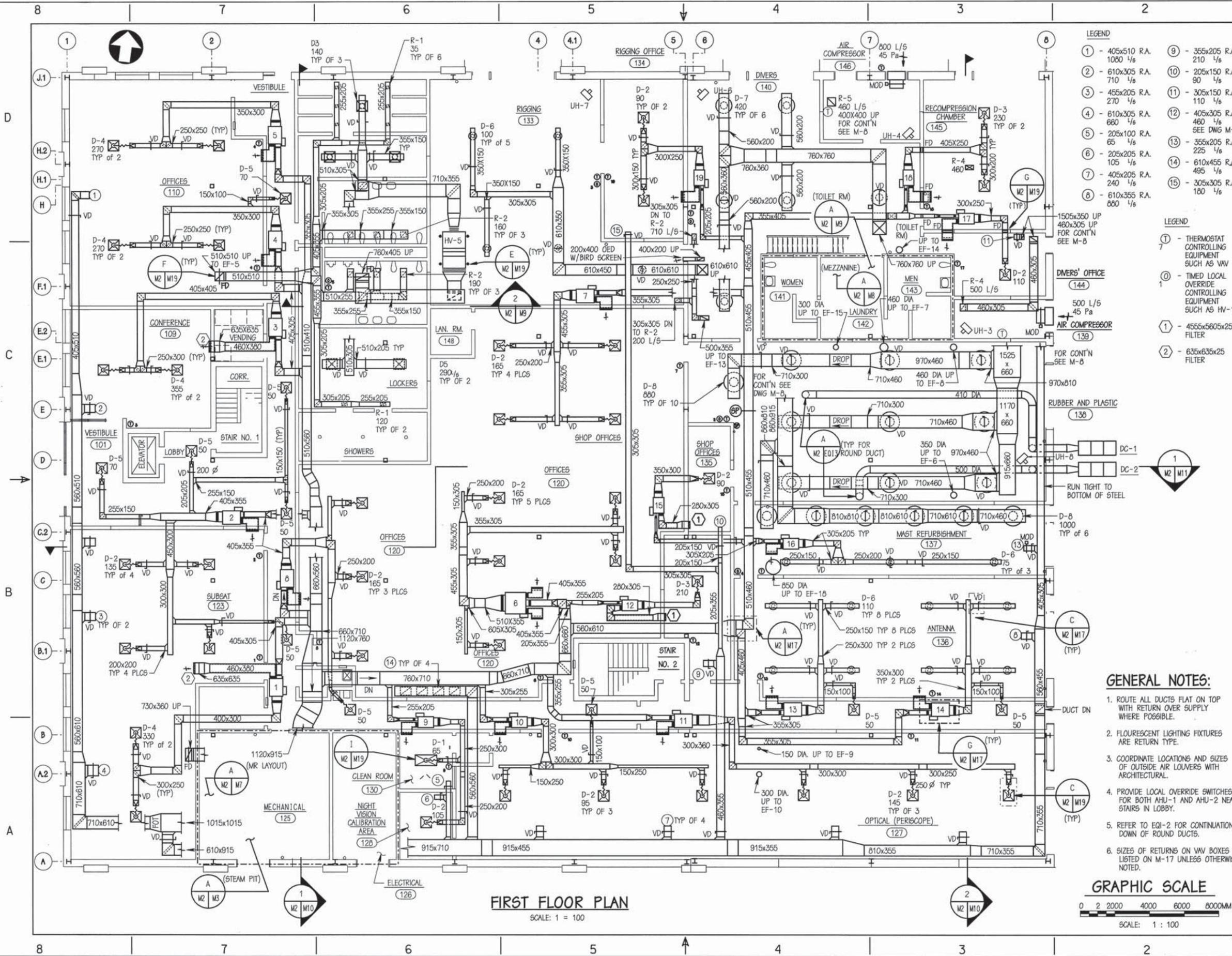
ACTIVITY - SATISFACTORY TO
DATE 3/19/97

FOR EIT FOR COMMANDER NAVFAC

NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL STATION
NORFOLK, VIRGINIA

NAVAL STATION, NORFOLK, VIRGINIA
SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)
UTILITY UPGRADE AND EXPANSION
WATERFRONT SUPPORT BUILDING
ABBREVIATIONS AND LEGEND

CODE LB. NO. X	SIZE A1
SCALE =	NTB
EFD NO.	451715
STA. PROJ. NO.	P-320
SPEC. NO.	05-94-4191
CONSTR. CONTR. NO.	NE2470-94-B-4191
NAVFAC DRAWING NO.	451715
SHEET	100 OF 196
M-1	



- LEGEND**
- ① - 405x510 R.A. 1080 1/8
 - ② - 610x305 R.A. 710 1/8
 - ③ - 455x205 R.A. 270 1/8
 - ④ - 610x305 R.A. 660 1/8
 - ⑤ - 205x100 R.A. 65 1/8
 - ⑥ - 205x205 R.A. 105 1/8
 - ⑦ - 405x205 R.A. 240 1/8
 - ⑧ - 610x355 R.A. 880 1/8
 - ⑨ - 355x205 R.A. 210 1/8
 - ⑩ - 205x150 R.A. 90 1/8
 - ⑪ - 305x150 R.A. 110 1/8
 - ⑫ - 405x305 R.A. 460 1/8
 - ⑬ - 355x205 R.A. 225 1/8
 - ⑭ - 610x455 R.A. 495 1/8
 - ⑮ - 305x305 R.A. 180 1/8

- LEGEND**
- ① - THERMOSTAT CONTROLLING EQUIPMENT SUCH AS VAV 7
 - ② - TIMED LOCAL OVERRIDE CONTROLLING EQUIPMENT SUCH AS HV-1
 - ③ - 455x560x25 FILTER
 - ④ - 635x635x25 FILTER

GENERAL NOTES:

1. ROUTE ALL DUCTS FLAT ON TOP WITH RETURN OVER SUPPLY WHERE POSSIBLE.
2. FLOURESCENT LIGHTING FIXTURES ARE RETURN TYPE.
3. COORDINATE LOCATIONS AND SIZES OF OUTSIDE AIR LOUVERS WITH ARCHITECTURAL.
4. PROVIDE LOCAL OVERRIDE SWITCHES FOR BOTH AHU-1 AND AHU-2 NEAR STAIRS IN LOBBY.
5. REFER TO EQI-2 FOR CONTINUATION DOWN OF ROUND DUCTS.
6. SIZES OF RETURNS ON VAV BOXES ARE LISTED ON M-17 UNLESS OTHERWISE NOTED.



FIRST FLOOR PLAN
SCALE: 1 = 100

NO.	DATE	REVISIONS

DESIGN	DATE
DRAWN	
CHECKED	
PROJECT MANAGER	
FIRE PROTECTION	
QUALITY CONTROL	
BRANCH MANAGER	
DESIGN DIRECTOR	

WHITMAN, REQUARDT AND ASSOCIATES
ENGINEERS
BALTIMORE, MARYLAND

DATE: 2/19/77

ACTIVITY - SATISFACTORY TO

FOR EFD FOR COMMANDER NAVFAC

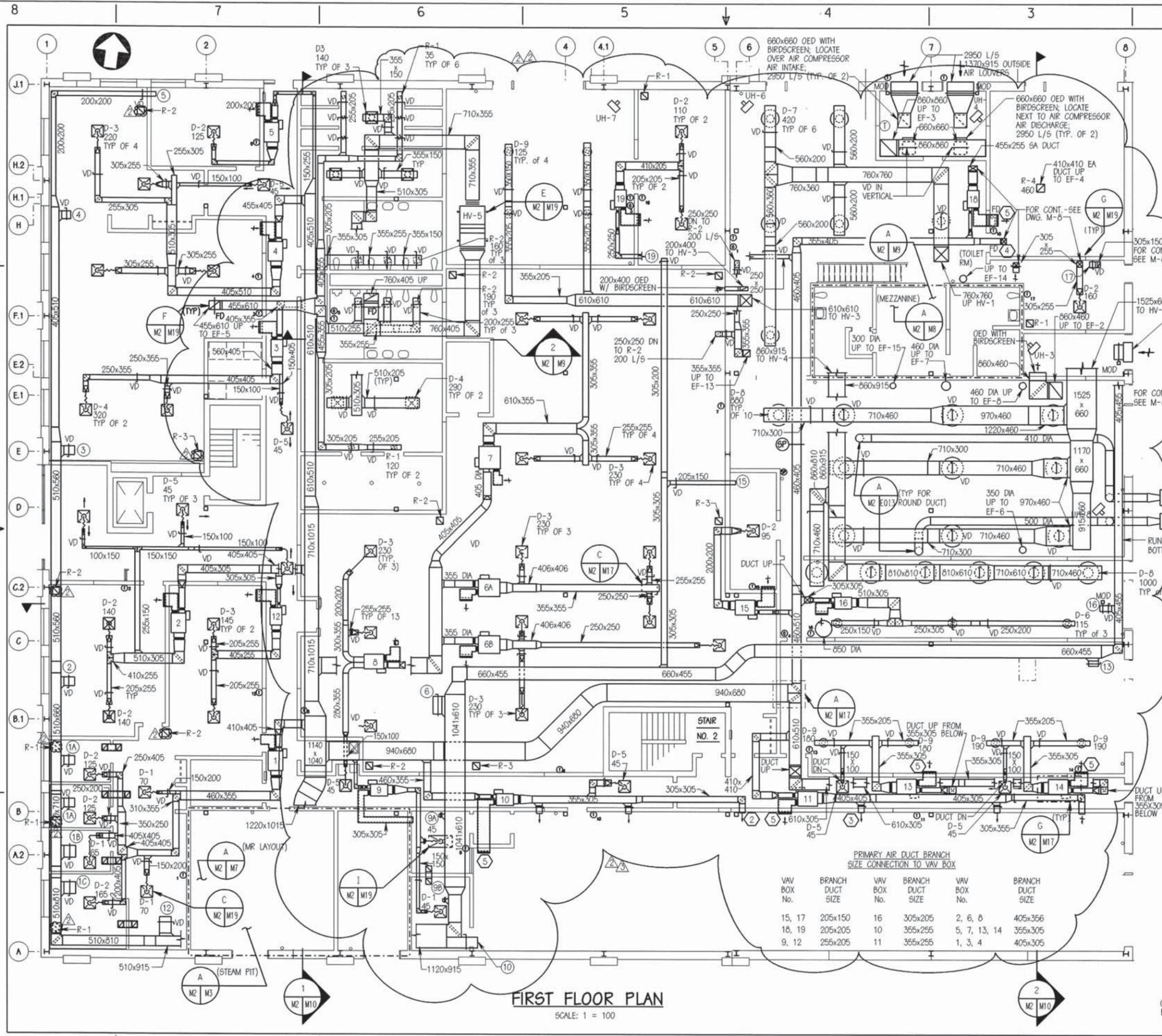
NAVY FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION

NAVAL STATION, NORFOLK, VIRGINIA

SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)
UTILITY UPGRADE AND EXPANSION

WATERFRONT SUPPORT BUILDING
FIRST FLOOR PLAN

CODE ID. NO. X SIZE: A1
SCALE: 1 : 100
EFD NO. 461716
STA. PROJ. NO. P-320
SPEC. NO. 05-94-4191
CONTRACTING CODE NO. NS2470-94-B-4191
NAVFAC DRAWING NO. 4351716
SHEET 101 OF 196
M-2



LEGEND

(1A)	115 L/S RA 200x200	(9A)	40 L/S RA 150x150
(1B)	60 L/S RA 150x150	(9B)	40 L/S RA 150x150
(1C)	150 L/S RA 200x200	(10)	2560 L/S RA SIDEWALL RETUF GRILLE IN OCCU SPACE 560x915
(2)	250 L/S RA 350x200	(12)	385 L/S RA 305x305
(3)	575 L/S RA 405x350	(13)	665 L/S RA 510x405
(4)	790 L/S RA 405x405	(15)	65 L/S RA 205x150
(5)	115 L/S RA 200x200	(16)	310 L/S RA 250x200 SEE DWG M-8
(6)	2690 L/S RA 915x510	(17)	145 L/S RA 200x200 SEE DWG M-8
		(18)	415 L/S RA 405x305
		(19)	200 L/S RA 305x305

- LEGEND**
- (1) - THERMOSTAT CONTROLLING EQUIPMENT SUCH AS VAV 7
 - (2) - TIMED LOCAL OVERRIDE CONTROLLING EQUIPMENT SUCH AS HV-1
 - (3) TRANSFER DUCT
 - (4) FOR DETAIL - SEE SHEET M-19

- GENERAL NOTES:**
1. ROUTE ALL DUCTS FLAT ON TOP WITH RETURN OVER SUPPLY WHERE POSSIBLE.
 2. FLOURESCENT LIGHTING FIXTURES ARE RETURN TYPE.
 3. COORDINATE LOCATIONS AND SIZES OF OUTSIDE AIR LOUVERS WITH ARCHITECTURAL.
 4. PROVIDE LOCAL OVERRIDE SWITCHES FOR BOTH AHU-1 AND AHU-2 NEAR STAIRS IN LOBBY.
 5. REFER TO EQI-2 FOR CONTINUATION DOWN OF ROUND DUCTS.
 6. SIZES OF RETURNS ON VAV BOXES ARE LISTED ON M-17 UNLESS OTHERWISE NOTED.
 7. MAXIMUM LENGTH OF FLEXIBLE DUCT
 8. MOUNT UNIT HEATERS AT 2.7 M

GRAPHIC SCALE

0 2 2000 4000 6000 8000MM

SCALE: 1 : 100

PRIMARY AIR DUCT BRANCH SIZE CONNECTION TO VAV BOX

VAV BOX No.	BRANCH DUCT SIZE	VAV BOX No.	BRANCH DUCT SIZE	VAV BOX No.	BRANCH DUCT SIZE
15, 17	205x150	16	305x205	2, 6, 8	405x356
18, 19	205x205	10	355x255	5, 7, 13, 14	355x305
9, 12	255x205	11	355x255	1, 3, 4	405x305

FIRST FLOOR PLAN
SCALE: 1 = 100

DESIGN	DATE	APPROVED	DATE
DRAWN	7/2/98	PROJECT MANAGER	7/2/98
CHECKED	5/15/98	QUALITY CONTROL	5/15/98
DESIGNED	4/17/98	BRANCH MANAGER	4/17/98
APPROVED		DESIGN DIRECTOR	

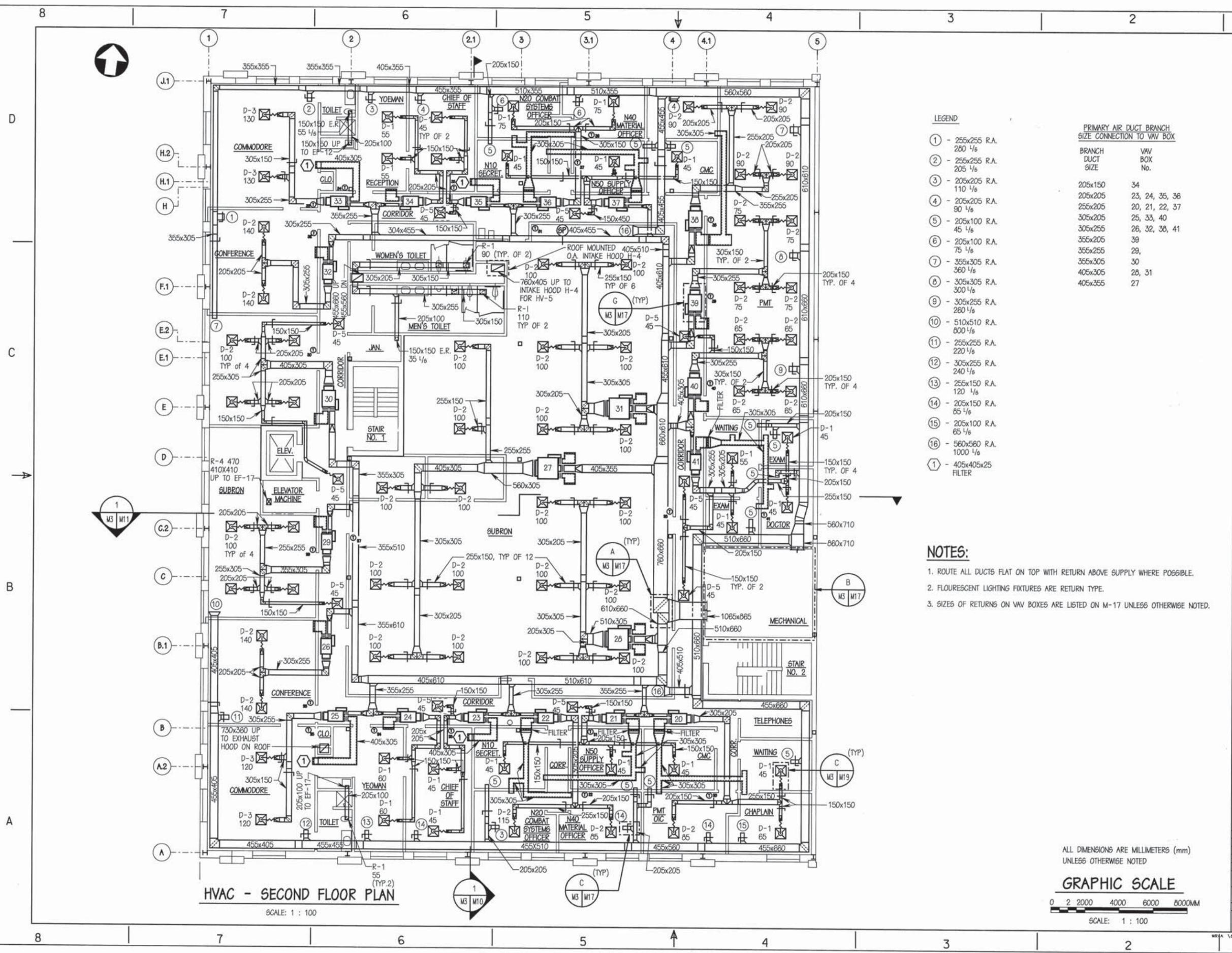
WHITMAN, REQUARDT AND ASSOCIATES
ENGINEERS
BALTIMORE, MARYLAND

NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL STATION
NAVAL STATION, NORFOLK VIRGINIA
SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)
UTILITY UPGRADE AND EXPANSION
WATERFRONT SUPPORT BUILDING
FIRST FLOOR PLAN

REVISIONS

NO.	DESCRIPTION	DATE
1	FURNITURE CHANGES/COMMENTS REVISIONS	
2	FURNITURE CHANGES	
3	USER CHANGES - ENTIRE SHEET MODIFIED	

CODE NO. 100
SCALE: 1 : 100
EFD NO. 451716
STA. PROJ. NO. P-320
SPEC. NO. 05-94-4191
CONSTR. CONTR. NO. M62470-94-B-4191
NAVFAC DRAWING NO. 4351716
SHEET 101 OF 196
M-2



HVAC - SECOND FLOOR PLAN

SCALE: 1 : 100

LEGEND

- ① - 255x255 R.A. 280 1/8
- ② - 255x255 R.A. 205 1/8
- ③ - 205x205 R.A. 110 1/8
- ④ - 205x205 R.A. 90 1/8
- ⑤ - 205x100 R.A. 45 1/8
- ⑥ - 205x100 R.A. 75 1/8
- ⑦ - 355x305 R.A. 360 1/8
- ⑧ - 305x305 R.A. 300 1/8
- ⑨ - 305x255 R.A. 260 1/8
- ⑩ - 510x510 R.A. 600 1/8
- ⑪ - 255x255 R.A. 220 1/8
- ⑫ - 305x255 R.A. 240 1/8
- ⑬ - 255x150 R.A. 120 1/8
- ⑭ - 205x150 R.A. 85 1/8
- ⑮ - 205x100 R.A. 65 1/8
- ⑯ - 560x560 R.A. 1000 1/8
- ⑰ - 405x405x25 FILTER

PRIMARY AIR DUCT BRANCH SIZE CONNECTION TO VAV BOX

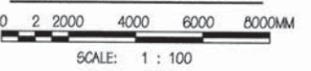
BRANCH DUCT SIZE	VAV BOX No.
205x150	34
205x205	23, 24, 35, 36
255x205	20, 21, 22, 37
305x205	25, 33, 40
305x255	26, 32, 38, 41
355x205	39
355x255	29
355x305	30
405x305	28, 31
405x355	27

NOTES:

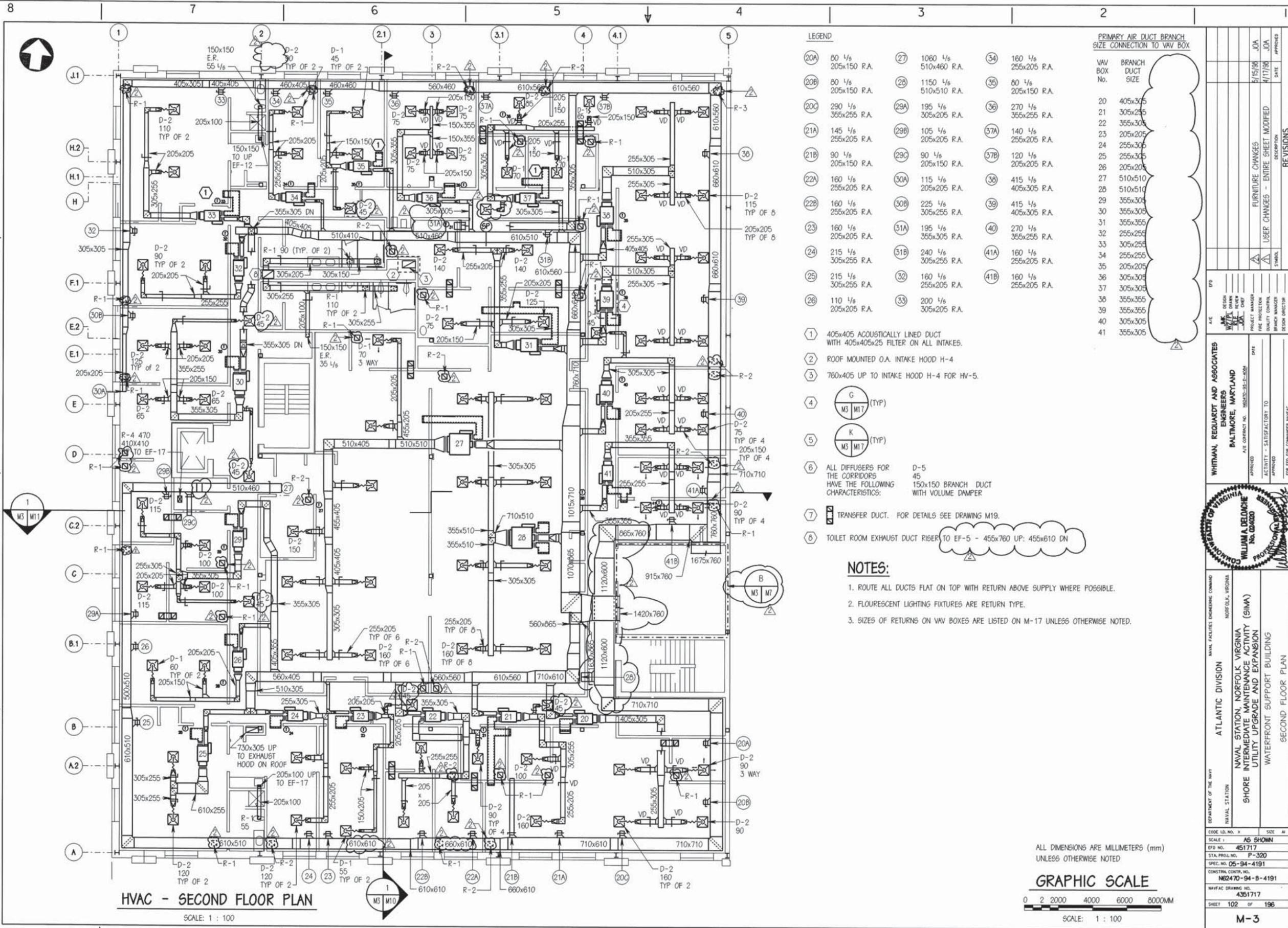
1. ROUTE ALL DUCTS FLAT ON TOP WITH RETURN ABOVE SUPPLY WHERE POSSIBLE.
2. FLOURESCENT LIGHTING FIXTURES ARE RETURN TYPE.
3. SIZES OF RETURNS ON VAV BOXES ARE LISTED ON M-17 UNLESS OTHERWISE NOTED.

ALL DIMENSIONS ARE MILLIMETERS (mm)
UNLESS OTHERWISE NOTED

GRAPHIC SCALE



DESIGNER	CHECKER	PROJECT MANAGER	QUALITY CONTROL	BRANCH MANAGER	DESIGN DIRECTOR	SYMBOL	REVISIONS
DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE
APPROVED	APPROVED	APPROVED	APPROVED	APPROVED	APPROVED	APPROVED	APPROVED
<p>WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND</p> <p>DATE: 2/19/97</p> <p>PROJECT NO. W-93-2-008</p> <p>ACTIVITY - SATISFACTORY TO</p> <p>FOR ETD FOR COMMANDER NAVFAC</p>							
<p>NAVAL DIVISION</p> <p>NAVAL STATION, NORFOLK, VIRGINIA</p> <p>SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)</p> <p>UTILITY UPGRADE AND EXPANSION</p> <p>WATERFRONT SUPPORT BUILDING</p> <p>SECOND FLOOR PLAN</p>							<p>SEE A1</p> <p>SCALE: AS SHOWN</p> <p>ETD NO. 451717</p> <p>STA. PROJ. NO. P-320</p> <p>SPEC. NO. 05-94-4191</p> <p>CONSTR. CONTR. NO. N62470-94-B-4191</p> <p>NAVFAC DRAWING NO. 4351717</p> <p>SHEET 102 OF 198</p> <p>M-3</p>



HVAC - SECOND FLOOR PLAN
SCALE: 1 : 100

LEGEND

- ① 405x405 ACOUSTICALLY LINED DUCT WITH 405x405x25 FILTER ON ALL INTAKES.
- ② ROOF MOUNTED O.A. INTAKE HOOD H-4
- ③ 760x405 UP TO INTAKE HOOD H-4 FOR HV-5.
- ④ (TYP)
- ⑤ (TYP)
- ⑥ ALL DIFFUSERS FOR THE CORRIDORS HAVE THE FOLLOWING CHARACTERISTICS:
D-5
45
150x150 BRANCH DUCT WITH VOLUME DAMPER
- ⑦ TRANSFER DUCT. FOR DETAILS SEE DRAWING M19.
- ⑧ TOILET ROOM EXHAUST DUCT RISER TO EF-5 - 455x760 UP; 455x610 DN

NOTES:

1. ROUTE ALL DUCTS FLAT ON TOP WITH RETURN ABOVE SUPPLY WHERE POSSIBLE.
2. FLOURESCENT LIGHTING FIXTURES ARE RETURN TYPE.
3. SIZES OF RETURNS ON VAV BOXES ARE LISTED ON M-17 UNLESS OTHERWISE NOTED.

PRIMARY AIR DUCT BRANCH SIZE CONNECTION TO VAV BOX

VAV BOX No.	BRANCH DUCT SIZE
20	405x305
21	305x255
22	355x305
23	205x205
24	255x305
25	255x305
26	205x205
27	510x510
28	510x510
29	355x305
30	355x305
31	355x355
32	255x255
33	305x255
34	255x255
35	205x205
36	305x305
37	305x305
38	355x355
39	355x355
40	305x305
41	355x305

ALL DIMENSIONS ARE MILLIMETERS (mm)
UNLESS OTHERWISE NOTED

GRAPHIC SCALE

SCALE: 1 : 100

DATE	APPROVED	REVISIONS
5/15/98	JOA	FURNITURE CHANGES
4/17/98	JOA	USER CHANGES - ENTIRE SHEET MODIFIED

DATE	APPROVED	REVISIONS
5/15/98	JOA	FURNITURE CHANGES
4/17/98	JOA	USER CHANGES - ENTIRE SHEET MODIFIED

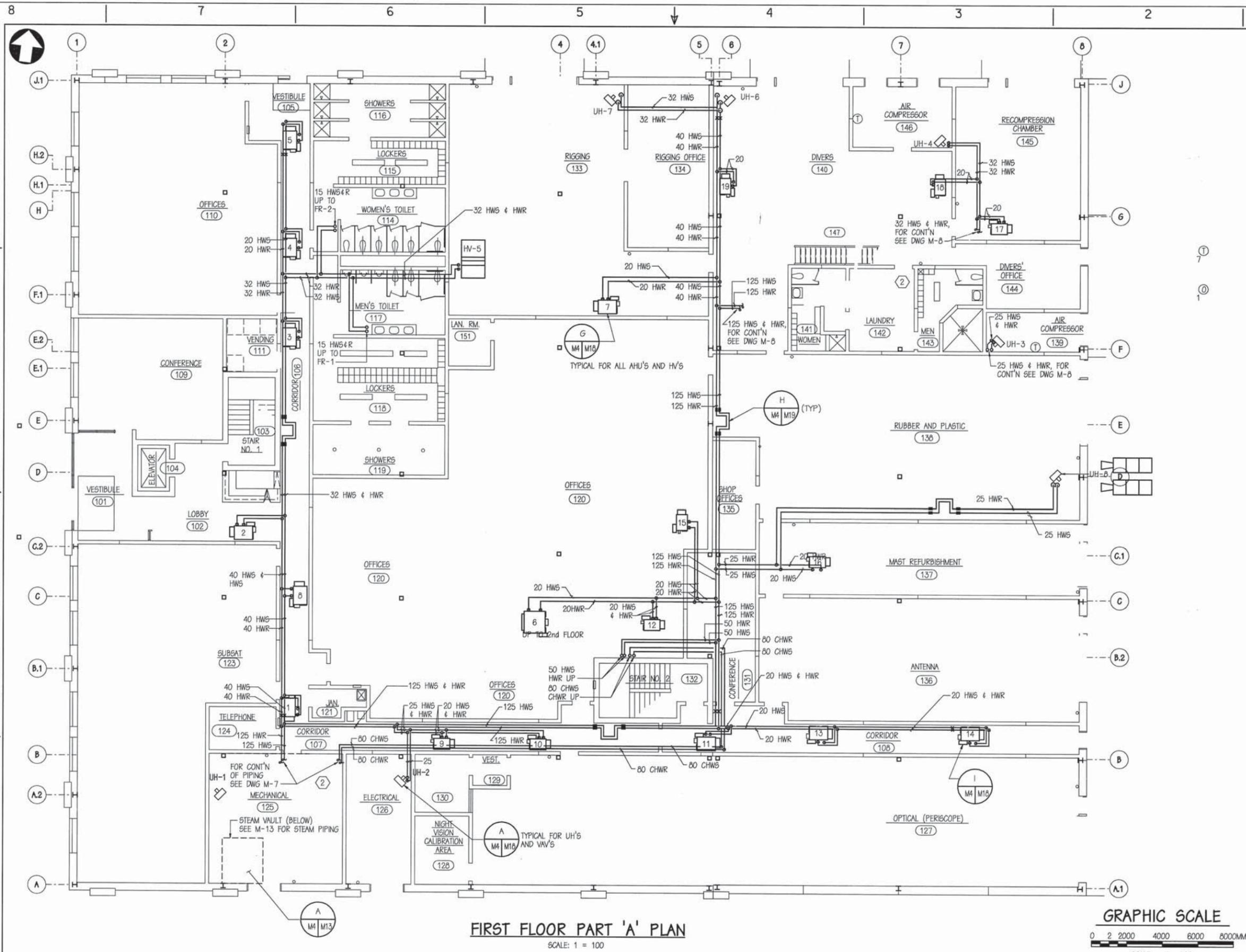
WHITMAN, REQUARDT AND ASSOCIATES
ENGINEERS
BALTIMORE, MARYLAND

PROJECT MANAGER: [Signature]
DATE: [Date]
ACTIVITY - SATISFACTORY TO [Signature]
APPROVED FOR COMMANDER NAVFAC: [Signature]

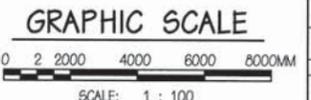
DEPARTMENT OF THE NAVY
NAVAL STATION
ATLANTIC DIVISION
NAVAL STATION, NORFOLK, VIRGINIA
SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)
UTILITY UPGRADE AND EXPANSION
WATERFRONT SUPPORT BUILDING
SECOND FLOOR PLAN

CODE LD. NO. X
SCALE: AS SHOWN
EFD NO. 451717
STA. PROJ. NO. P-320
SPEC. NO. 05-94-4191
CONSTR. CONTR. NO. NS2470-94-B-4191
NAVFAC DRAWING NO. 4351717
SHEET 102 OF 196

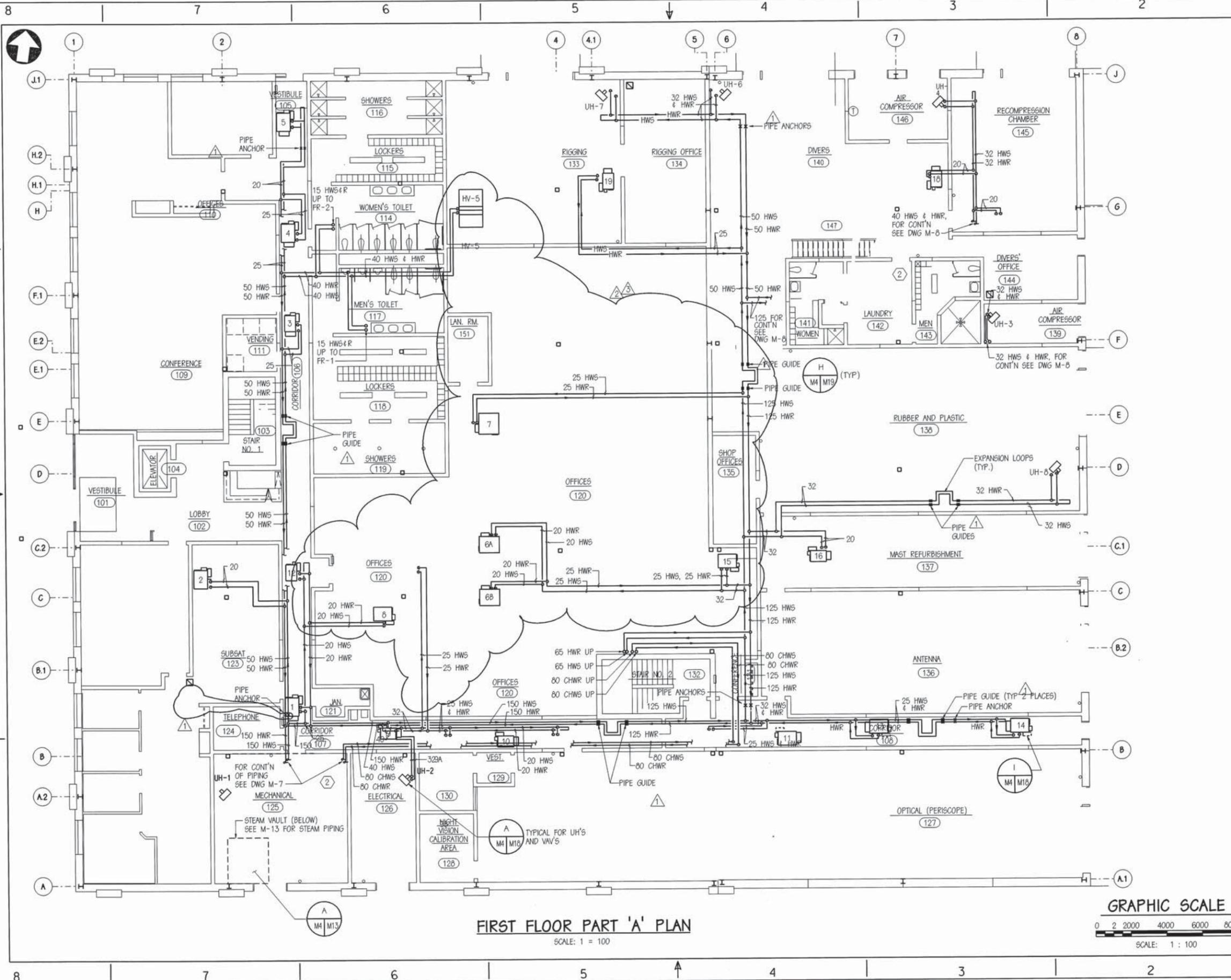
M-3



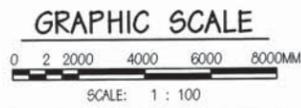
FIRST FLOOR PART 'A' PLAN
SCALE: 1 = 100



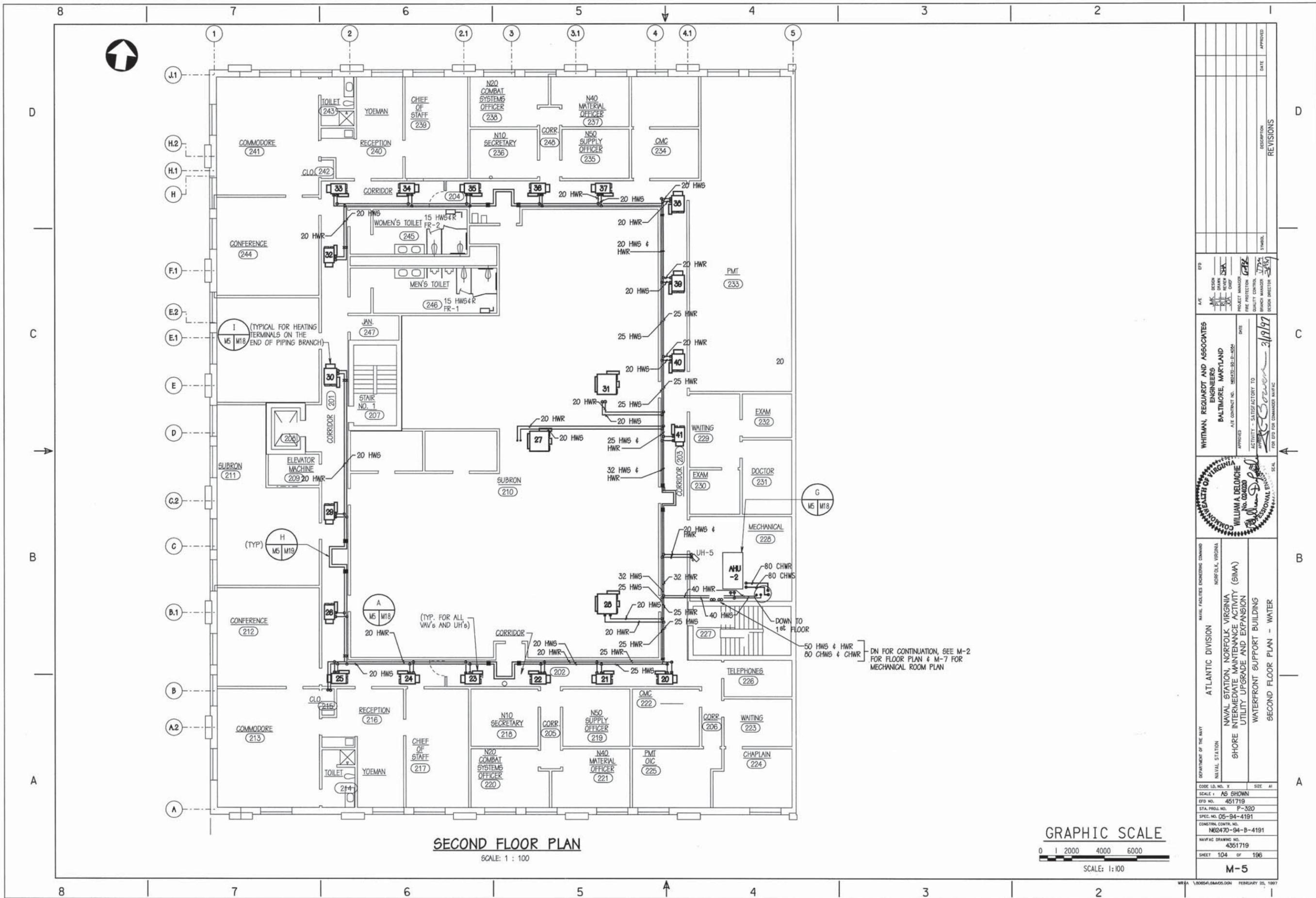
DESIGN	DATE	APPROVED
BY		
CHECK		
BY		
PROJECT MANAGER	DATE	APPROVED
BY		
QUALITY CONTROL	DATE	APPROVED
BY		
BRANCH MANAGER	DATE	APPROVED
BY		
DESIGN DIRECTOR	DATE	APPROVED
BY		
REVISIONS		
NO.	DESCRIPTION	DATE
WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. HB20-85-D-654 APPROVED: <i>[Signature]</i> DATE: 3/19/97 ACTIVITY - SATISFACTORY TO: <i>[Signature]</i> APPROVED: <i>[Signature]</i> DATE: 3/19/97 FOR EFD FOR COMMANDER NAVFAC		
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA NAVAL STATION NORFOLK VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING FIRST FLOOR PLAN - WATER		
CODE ID. NO. X	SIZE A1	
SCALE: AS SHOWN		
EFD NO. 451718		
STA. PROJ. NO. P-320		
SPEC. NO. 05-94-4191		
CONSTR. CONTR. NO. N82470-94-B-4191		
NAVFAC DRAWING NO. 4351718		
SHEET 103 OF 198		
M-4		



FIRST FLOOR PART 'A' PLAN
SCALE: 1 = 100



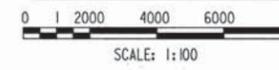
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DRAWN	JOA	DATE	APPROVED												
CHECKED	JOA	DATE	APPROVED												
PROJECT MANAGER	JOA	DATE	APPROVED												
FIRE PROTECTION	JOA	DATE	APPROVED												
QUALITY CONTROL	JOA	DATE	APPROVED												
REVISIONS	<table border="1"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>ADDENDUM NO. 1</td> <td>4/18/97</td> </tr> <tr> <td>2</td> <td>FURNITURE CHANGES</td> <td>5/15/98</td> </tr> <tr> <td>3</td> <td>FURNITURE CHANGES</td> <td>7/7/98</td> </tr> </tbody> </table>			NO.	DESCRIPTION	DATE	1	ADDENDUM NO. 1	4/18/97	2	FURNITURE CHANGES	5/15/98	3	FURNITURE CHANGES	7/7/98
NO.	DESCRIPTION	DATE													
1	ADDENDUM NO. 1	4/18/97													
2	FURNITURE CHANGES	5/15/98													
3	FURNITURE CHANGES	7/7/98													
<p>WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. 182470-94-B-4191 DATE: 05-19-94</p>															
<p>ATLANTIC DIVISION NAVAL STATION NORFOLK, VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING FIRST FLOOR PLAN - WATER</p>															
CODE NO.	451718	SIZE	A1												
SCALE	AS SHOWN														
EFD NO.	P-320														
STA. PROJ. NO.	05-94-4191														
SPEC. NO.	182470-94-B-4191														
CONSTR. CONTR. NO.	4351718														
NAVFAC DRAWING NO.	103 OF 196														
M-4															



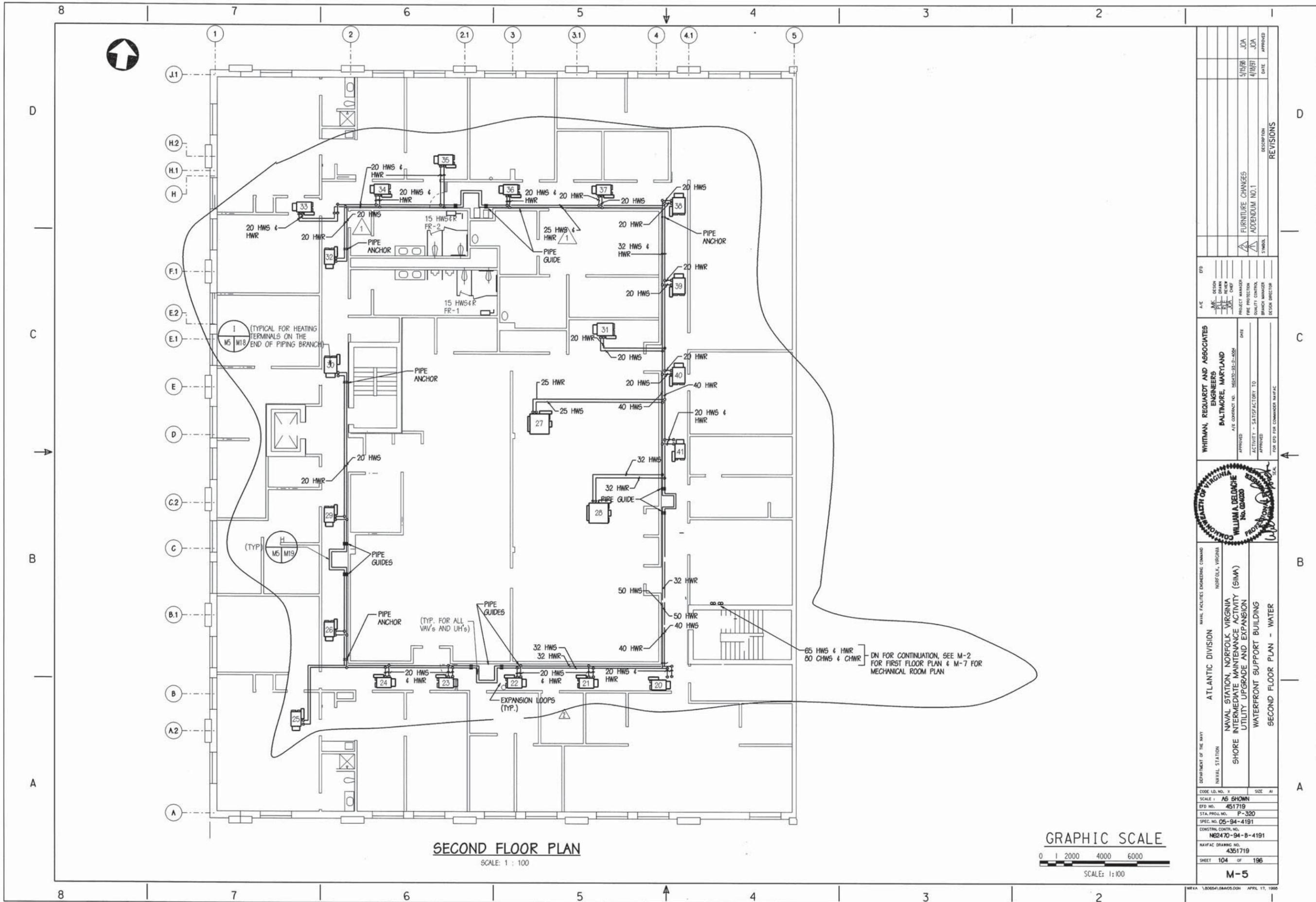
SECOND FLOOR PLAN

SCALE: 1 : 100

GRAPHIC SCALE



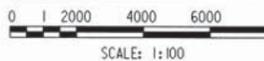
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SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION		WATERFRONT SUPPORT BUILDING SECOND FLOOR PLAN - WATER		APPROVED BY: [Signature] WILLIAM A. DELONGHE No. 024020 PROFESSIONAL ENGINEER COMMONWEALTH OF VIRGINIA		PROJECT MANAGER: [Signature] QUALITY CONTROL: [Signature] BRANCH MANAGER: [Signature] DESIGN DIRECTOR: [Signature]		REVISIONS NO. DATE DESCRIPTION	
CODE ID. NO. X SCALE: AS SHOWN EFD NO. 451719 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONST. CONTR. NO. NS2470-94-B-4191 NAVPAC DRAWING NO. 4351719 SHEET 104 OF 196	SIZE: A1	M-5		FEBRUARY 23, 1997		APPROVED: [Signature] DATE:		APPROVED:	



SECOND FLOOR PLAN

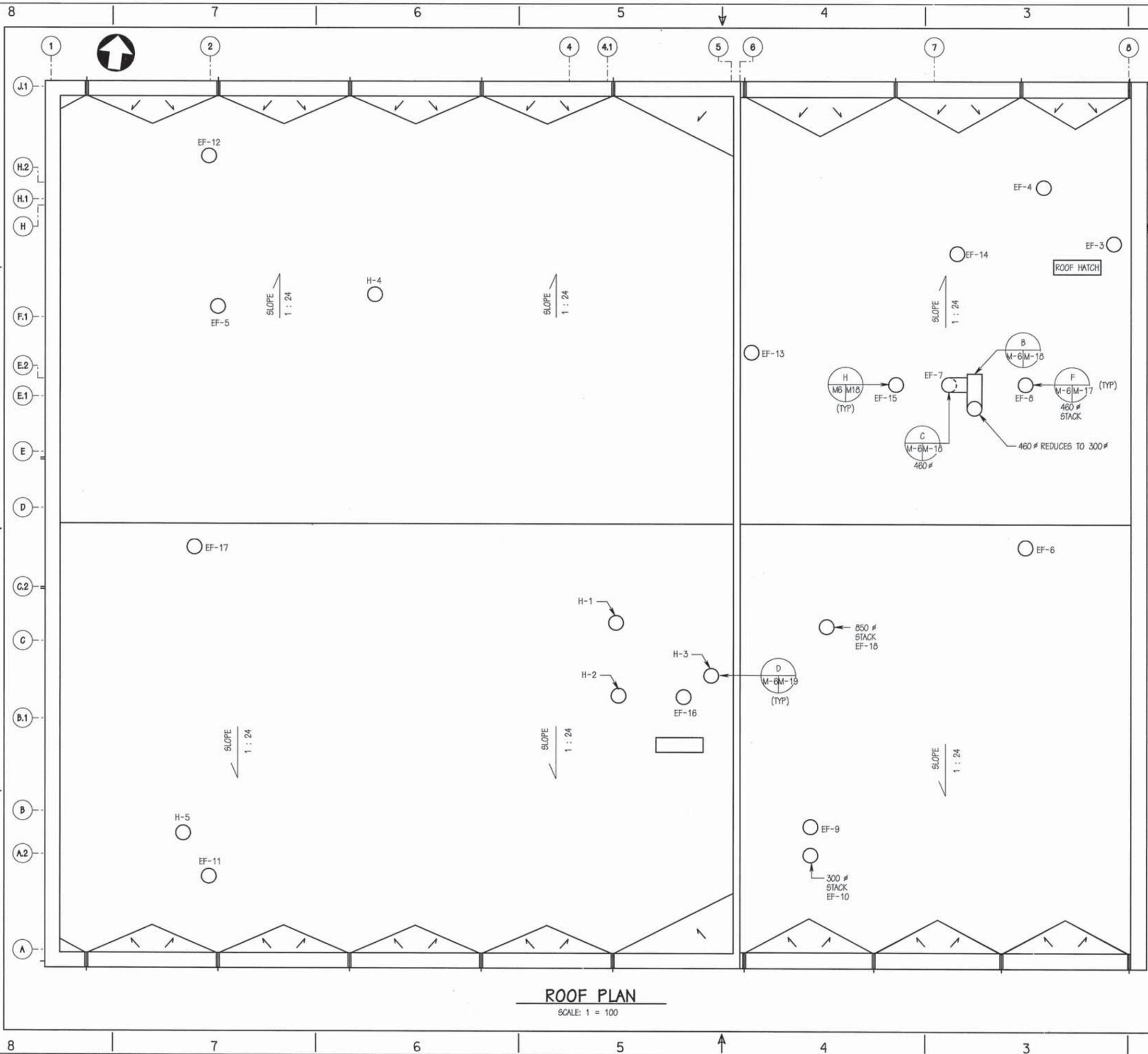
SCALE: 1 : 100

GRAPHIC SCALE



DEPARTMENT OF THE NAVY NAVAL STATION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA		ATLANTIC DIVISION NAVAL STATION, NORFOLK VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING SECOND FLOOR PLAN - WATER	
CODE ID. NO. 1 SCALE 1: 100 EFD NO. 451719 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONSTR. CONTR. NO. N62470-94-B-4191 NAVFAC DRAWING NO. 4361719	NO. SHOWN 451719 P-320 05-94-4191 N62470-94-B-4191 4361719	WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. 198520-93-E-258 APPROVED: [Signature] ACTIVITY - SATISFACTORY TO [Signature] APPROVED FOR COMMANDER NAVFAC [Signature]	PROJECT MANAGER: [Signature] FIRE PROTECTION: [Signature] BRANCH MANAGER: [Signature] DESIGN DIRECTOR: [Signature]
REVISIONS NO. 1 DATE: 5/15/98 APPROVED: JOA NO. 2 DATE: 4/18/97 APPROVED: JOA		REVISIONS NO. 1 DATE: 5/15/98 APPROVED: JOA NO. 2 DATE: 4/18/97 APPROVED: JOA	





ROOF PLAN
SCALE: 1 = 100

GRAPHIC SCALE

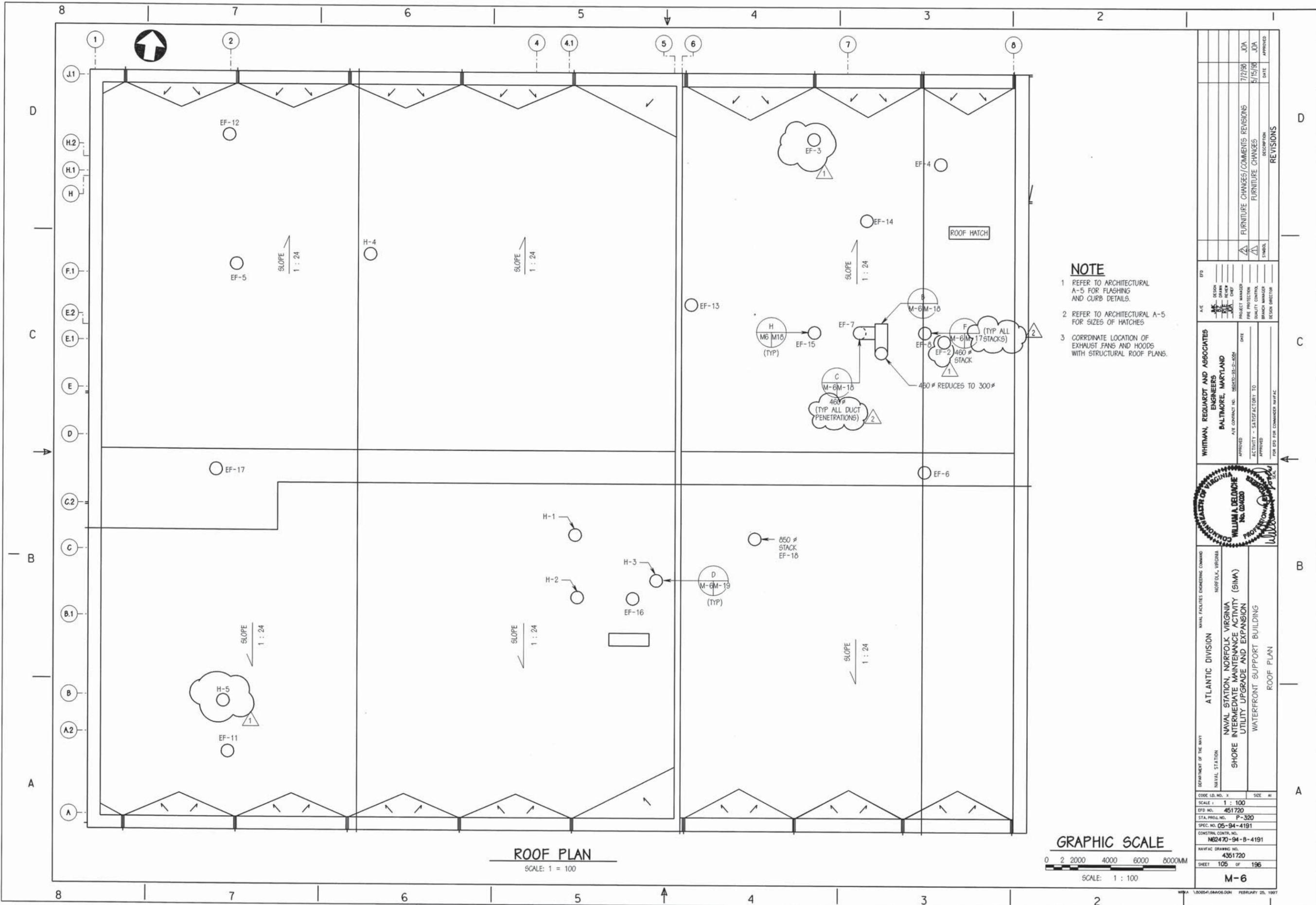


NOTE

- 1 REFER TO ARCHITECTURAL A-5 FOR FLASHING AND CURB DETAILS.
- 2 REFER TO ARCHITECTURAL A-5 FOR SIZES OF HATCHES
- 3 CORRDINATE LOCATION OF EXHAUST FANS AND HOODS WITH STRUCTURAL ROOF PLANS.

DEPARTMENT OF THE NAVY NAVAL STATION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA		ATLANTIC DIVISION NAVAL STATION, NORFOLK VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING ROOF PLAN	
CODE LD. NO. X SCALE: 1 : 100 EFD NO. 451720 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONSTR. CONTR. NO. N62470-94-B-4191 NAVFAC DRAWING NO. 4351720 SHEET 105 OF 196		SIZE: A1 M-6	
WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. W852-82-P-054 PROJECT NUMBER: 100 PROJECT LOCATION: 100 PROJECT OWNER: 100 PROJECT MANAGER: 100 DESIGN DIRECTOR: 100		APPROVED: [Signature] DATE: 2/19/97 FOR EFD FOR COMMANDER NAVFAC	
REVISIONS NO. DESCRIPTION DATE APPROVED			





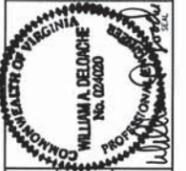
ROOF PLAN
SCALE: 1 = 100

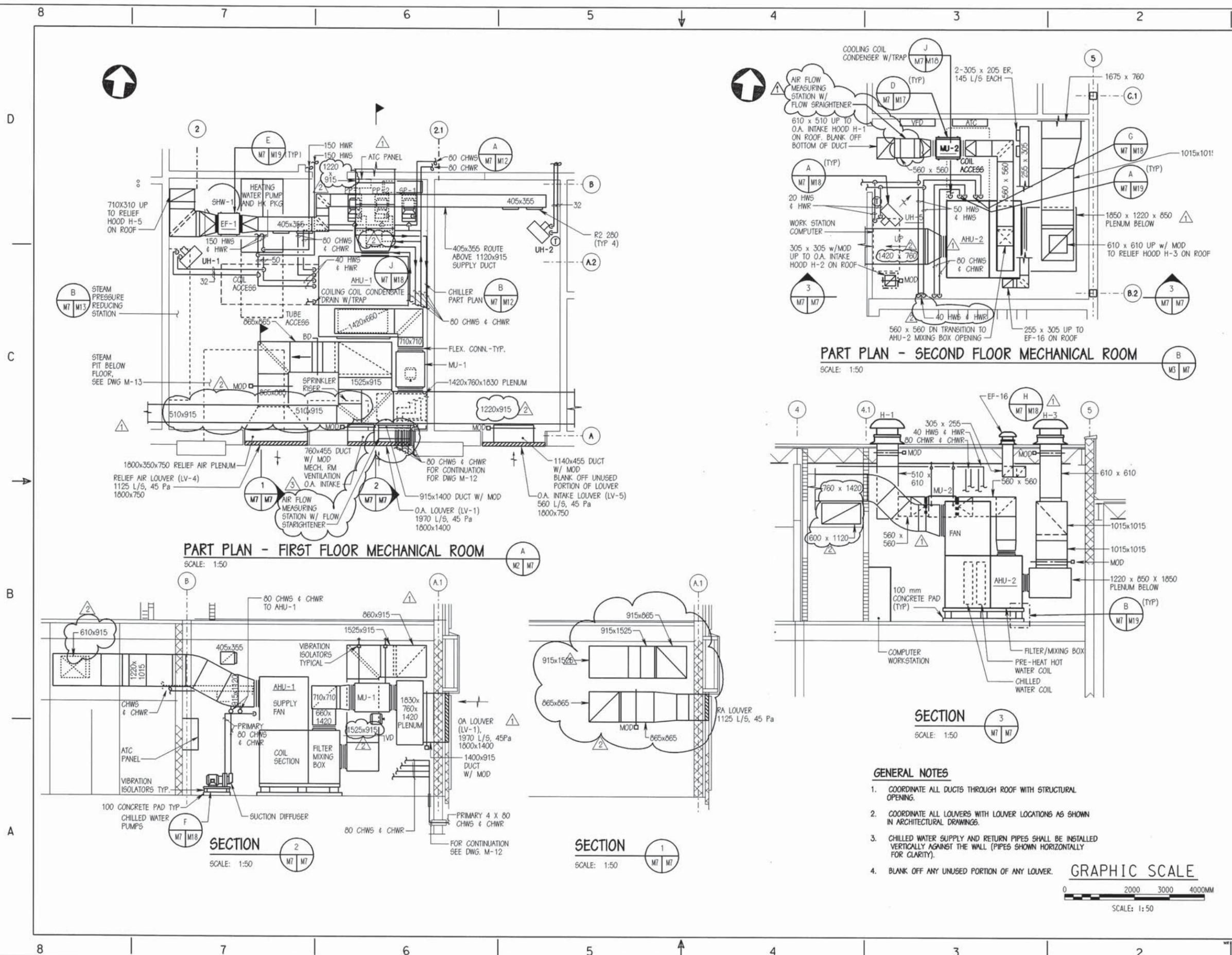
NOTE

- 1 REFER TO ARCHITECTURAL A-5 FOR FLASHING AND CURB DETAILS.
- 2 REFER TO ARCHITECTURAL A-5 FOR SIZES OF HATCHES
- 3 CORRDINATE LOCATION OF EXHAUST FANS AND HOODS WITH STRUCTURAL ROOF PLANS.

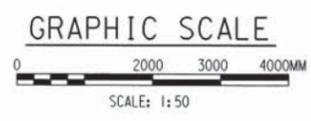


DEPARTMENT OF THE NAVY NAVAL STATION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA		ATLANTIC DIVISION NAVAL STATION, NORFOLK, VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING ROOF PLAN	
CODE I.D. NO. X SCALE 1 : 100 EFD NO. 451720 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONSTR. CONTR. NO. N62470-94-B-4191 NAVFAC DRAWING NO. 4361720 SHEET 105 OF 196	PROJECT MANAGER FIRE PROTECTION QUALITY CONTROL DESIGN CHECK RECORD PREP	PROJECT NO. N62470-94-B-4191 DATE 7/2/90 APPROVED 5/15/98 FOR EFD FOR COMMANDER NAVFAC.	WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. N62470-94-B-4191 APPROVED ACTIVITY - SATISFACTORY TO APPROVED FOR EFD FOR COMMANDER NAVFAC.
REVISIONS SYMBOL DESCRIPTION DATE APPROVED		FURNITURE CHANGES/COMMENTS REVISIONS FURNITURE CHANGES DATE APPROVED	

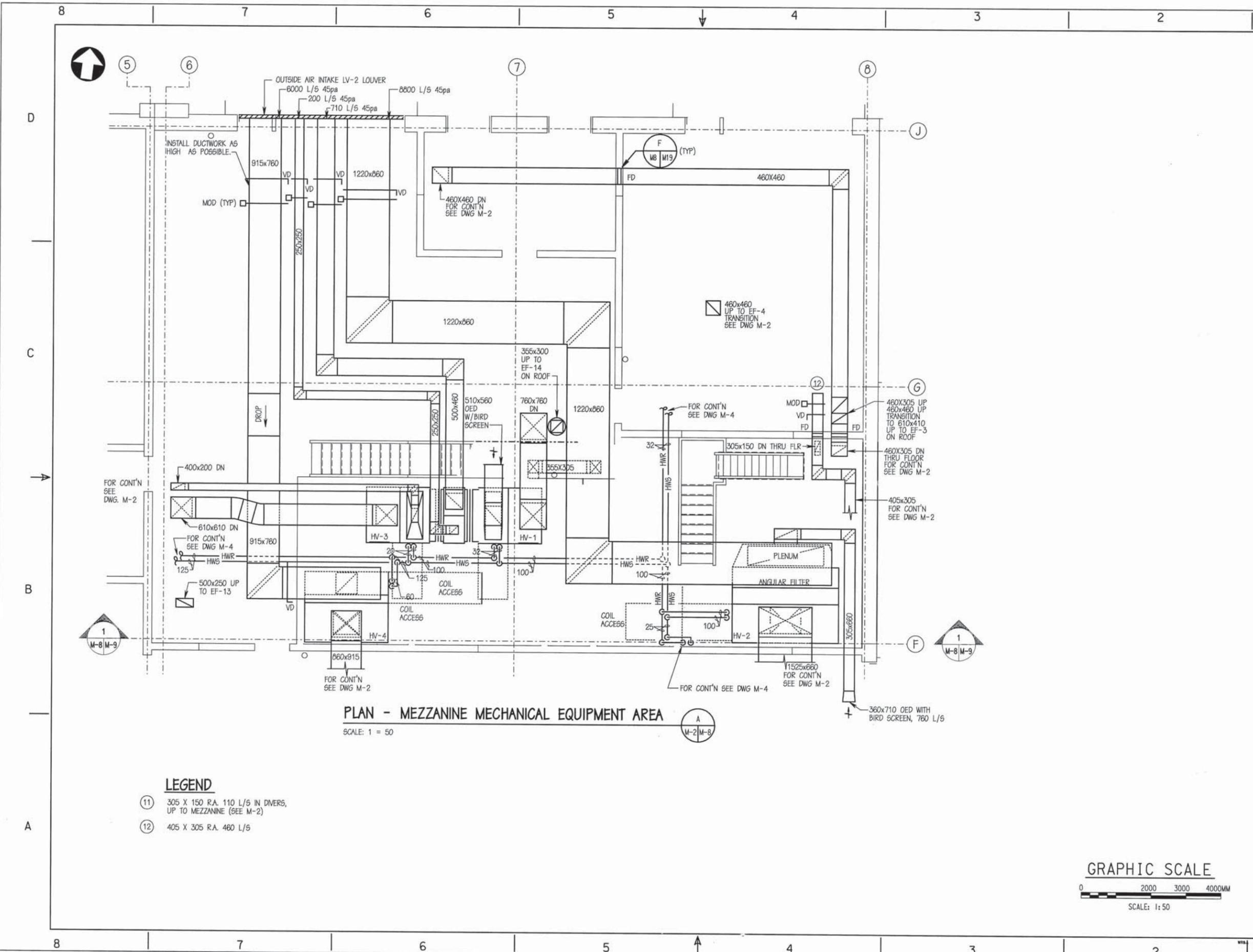




- GENERAL NOTES**
- COORDINATE ALL DUCTS THROUGH ROOF WITH STRUCTURAL OPENING.
 - COORDINATE ALL LOUVERS WITH LOUVER LOCATIONS AS SHOWN IN ARCHITECTURAL DRAWINGS.
 - CHILLED WATER SUPPLY AND RETURN PIPES SHALL BE INSTALLED VERTICALLY AGAINST THE WALL (PIPES SHOWN HORIZONTALLY FOR CLARITY).
 - BLANK OFF ANY UNUSED PORTION OF ANY LOUVER.



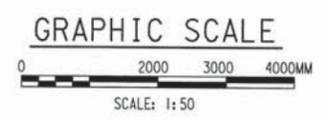
DEPARTMENT OF THE NAVY NAVAL STATION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA		ATLANTIC DIVISION NAVAL STATION, NORFOLK VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING MECHANICAL ROOM PART PLANS AND SECTIONS													
CODE ID. NO. 7 SCALE: AS SHOWN EFD NO. 451721 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONSTN. CONTR. NO. N62470-94-B-4191 NAVFAC DRAWING NO. 4351721 SHEET 106 OF 196	WHITMAN, REGUARD AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. 18670-93-E-258 DATE APPROVED ACTIVITY - SATISFACTORY TO APPROVED FOR EFD FOR COMMANDER IN/AFAC	COMMONWEALTH OF VIRGINIA WILLIAM A. DELOACHE No. 00-0000 PROFESSIONAL SEAL	REVISIONS <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> <tr> <td>1</td> <td>4/17/94</td> <td>USER CHANGES</td> </tr> <tr> <td>2</td> <td>5/15/94</td> <td>FURNITURE CHANGES</td> </tr> <tr> <td>3</td> <td>7/2/94</td> <td>FURNITURE CHANGES/ COMMENTS</td> </tr> </table>	NO.	DATE	DESCRIPTION	1	4/17/94	USER CHANGES	2	5/15/94	FURNITURE CHANGES	3	7/2/94	FURNITURE CHANGES/ COMMENTS
NO.	DATE	DESCRIPTION													
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2	5/15/94	FURNITURE CHANGES													
3	7/2/94	FURNITURE CHANGES/ COMMENTS													

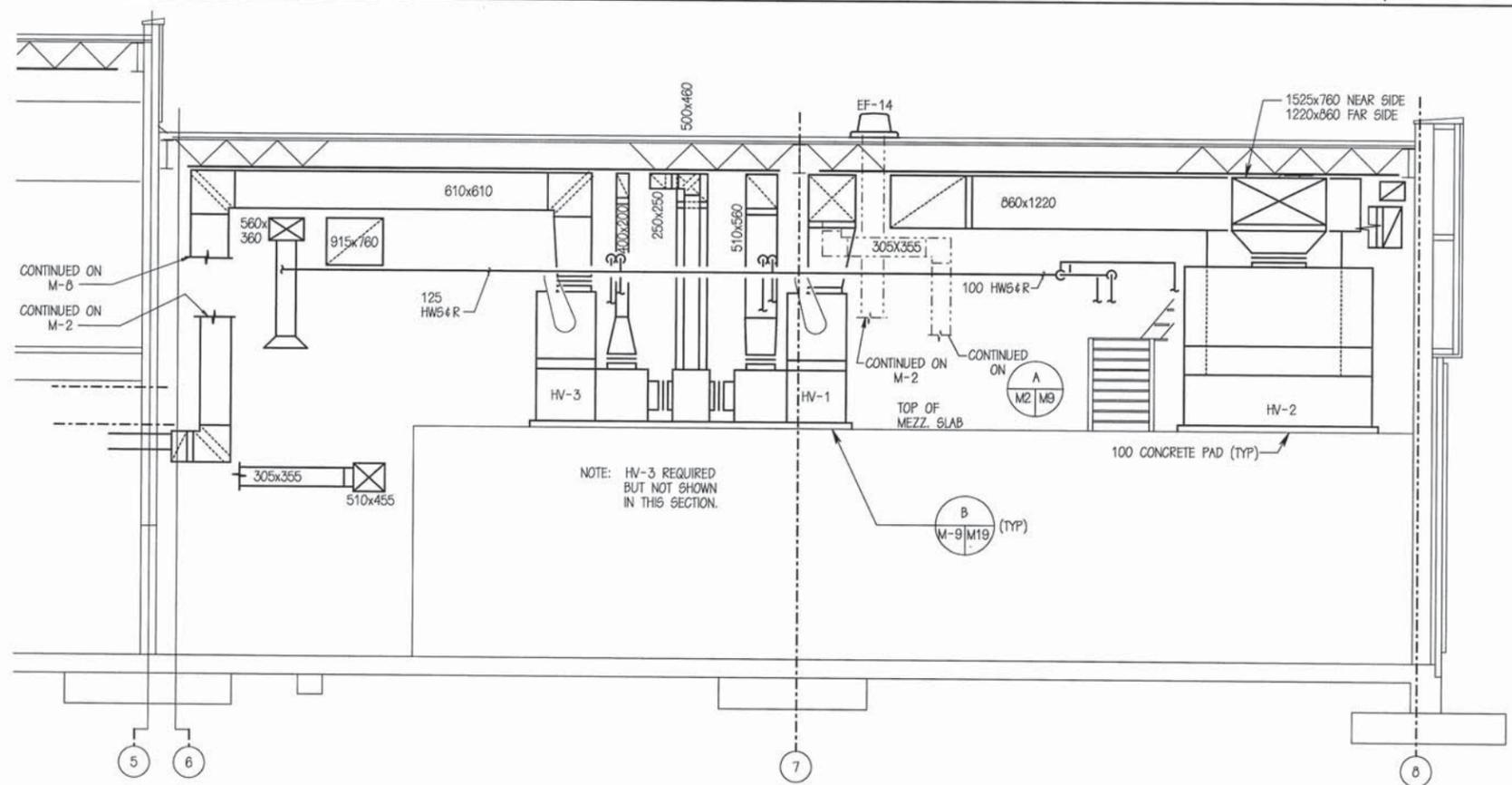


LEGEND

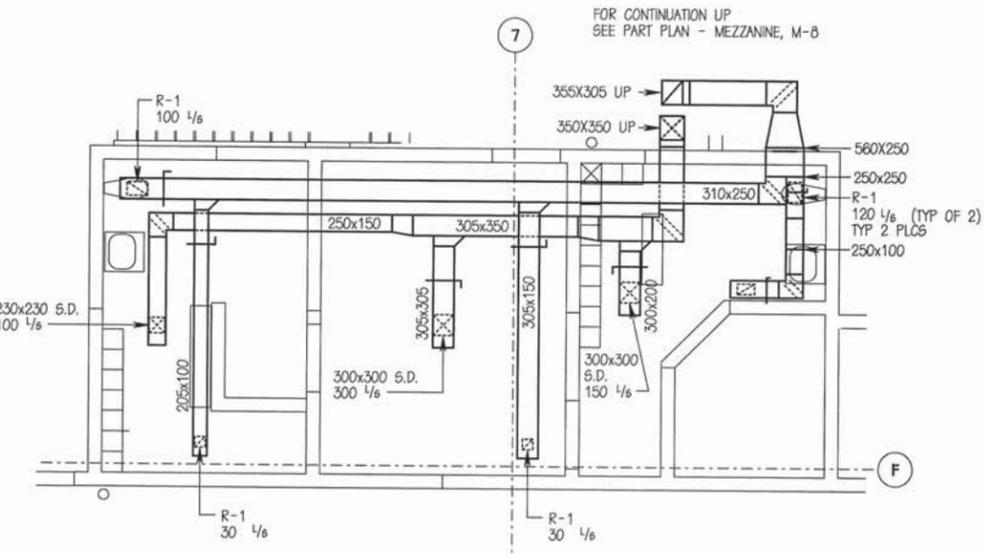
- (11) 305 X 150 RA, 110 L/S IN DIVERS, UP TO MEZZANINE (SEE M-2)
- (12) 405 X 305 RA, 480 L/S

DEPARTMENT OF THE NAVY NAVAL STATION ATLANTIC DIVISION NAVAL STATION, NORFOLK VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) WATERFRONT SUPPORT BUILDING MEZZANINE PART PLAN		WHITMAN, REGUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. N62470-94-B-4191 DATE 2/19/97 APPROVED: [Signature] PROJECT MANAGER: [Signature] QUALITY CONTROL: [Signature] BRANCH MANAGER: [Signature] DESIGN DIRECTOR: [Signature]	
CODE NO. M-8 SCALE 1:50 EPD NO. 451722 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONSTRUCTION NO. N62470-94-B-4191 NAVFAC DRAWING NO. 4361722 SHEET 107 OF 196		REVISIONS NO. DATE DESCRIPTION 1 2/19/97	

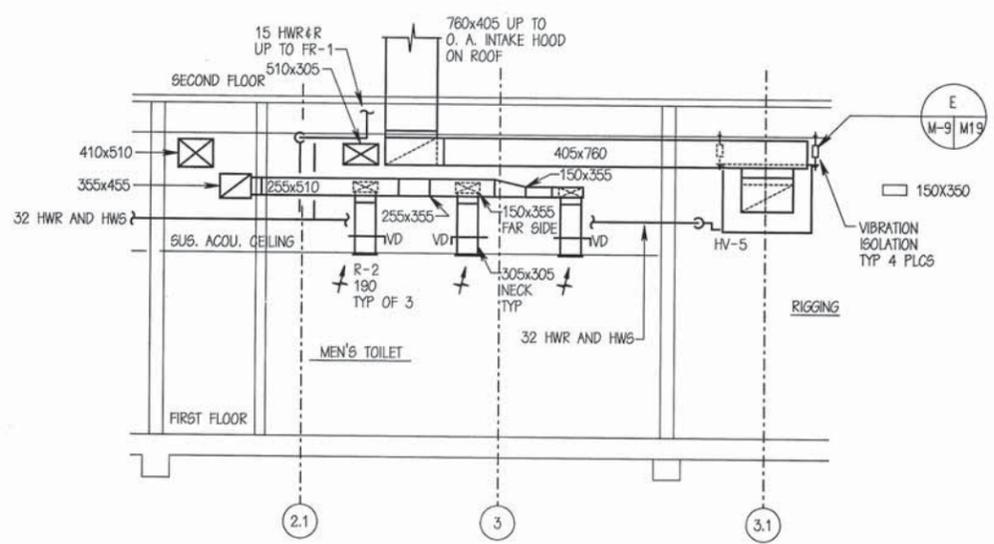




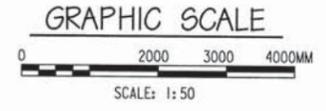
SECTION 1
SCALE: 1 = 50



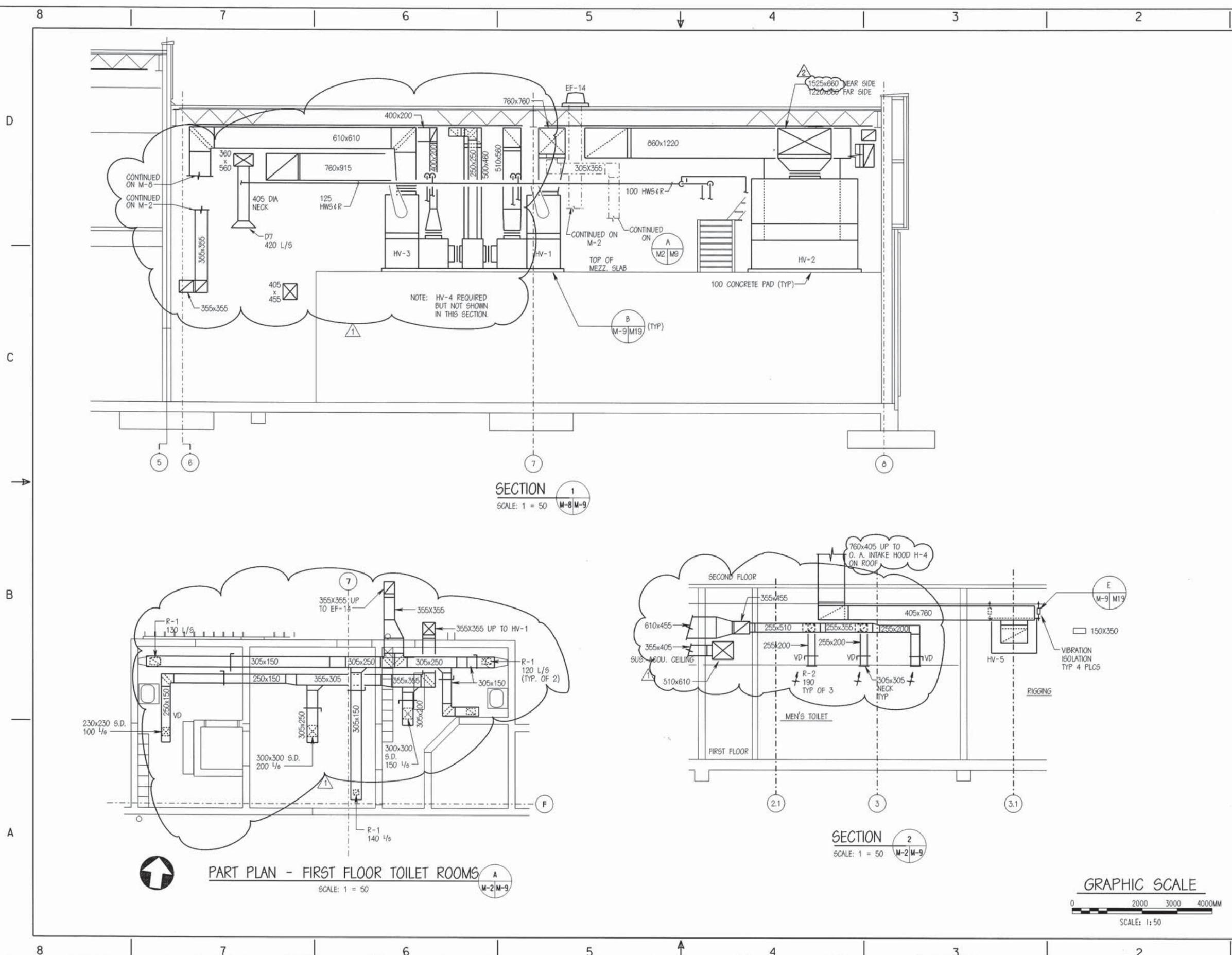
PART PLAN - FIRST FLOOR TOILET ROOMS
SCALE: 1 = 50



SECTION 2
SCALE: 1 = 50



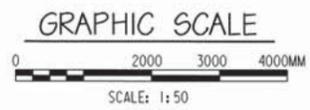
DEPARTMENT OF THE NAVY NAVAL STATION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA		ATLANTIC DIVISION NAVAL STATION, NORFOLK, VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING PART PLAN AND SECTIONS		WHITMAN, REGUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. N62470-94-B-4191 DATE 9/19/97 APPROVED FOR EFD FOR COMMANDER NAVFAC	
CODE LD. NO. X SCALE: 1:50 EFD NO. 451723 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONSTR. CONTR. NO. N62470-94-B-4191 NAVFAC DRAWING NO. 4351723 SHEET 106 OF 196 M-9		REVISIONS NO. DESCRIPTION DATE APPROVED		ETD A/E DESIGNED DRAWN CHECKED PROJECT MANAGER FIRE PROTECTION QUALITY CONTROL BRANCH MANAGER SENIOR DIRECTOR	



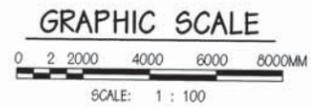
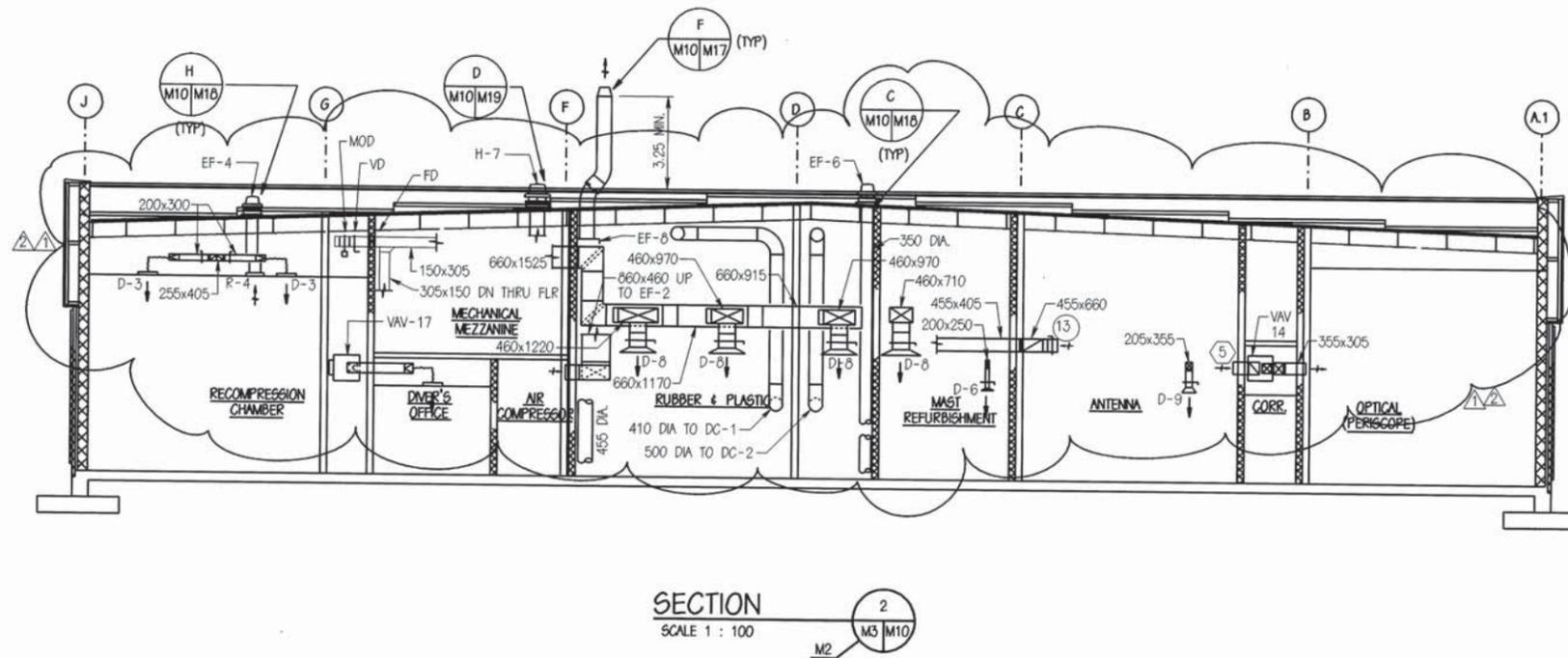
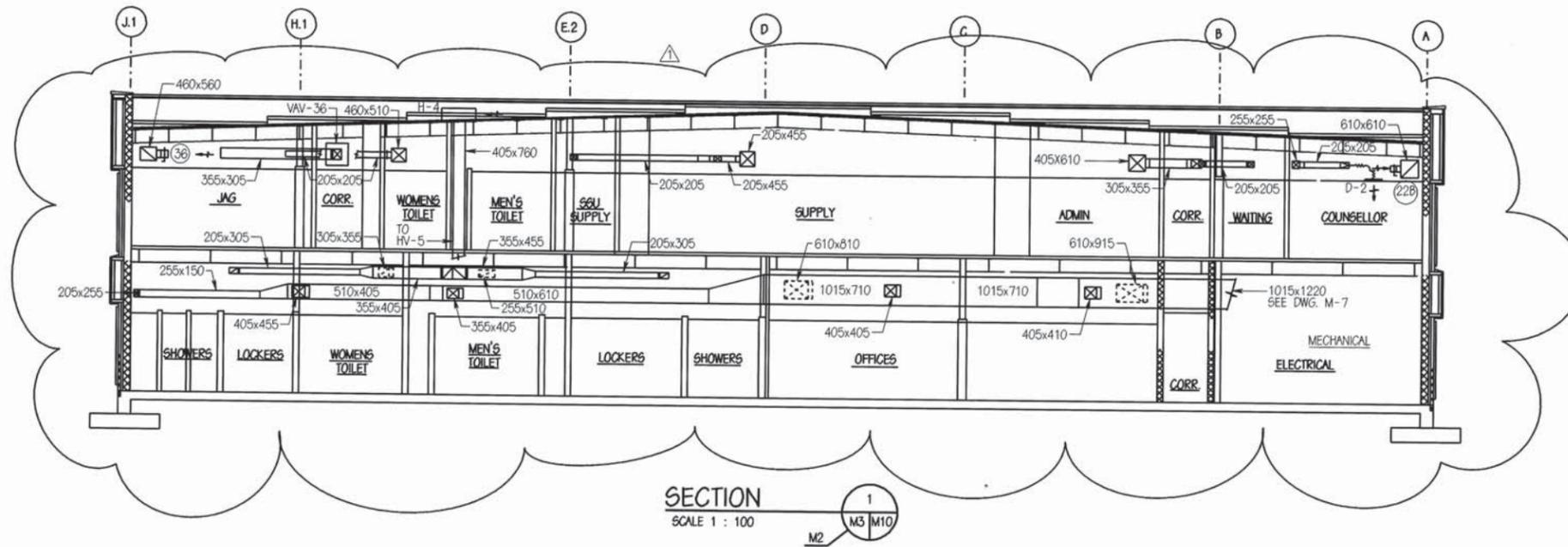
SECTION 1
SCALE: 1 = 50
M-8 | M-9

SECTION 2
SCALE: 1 = 50
M-2 | M-9

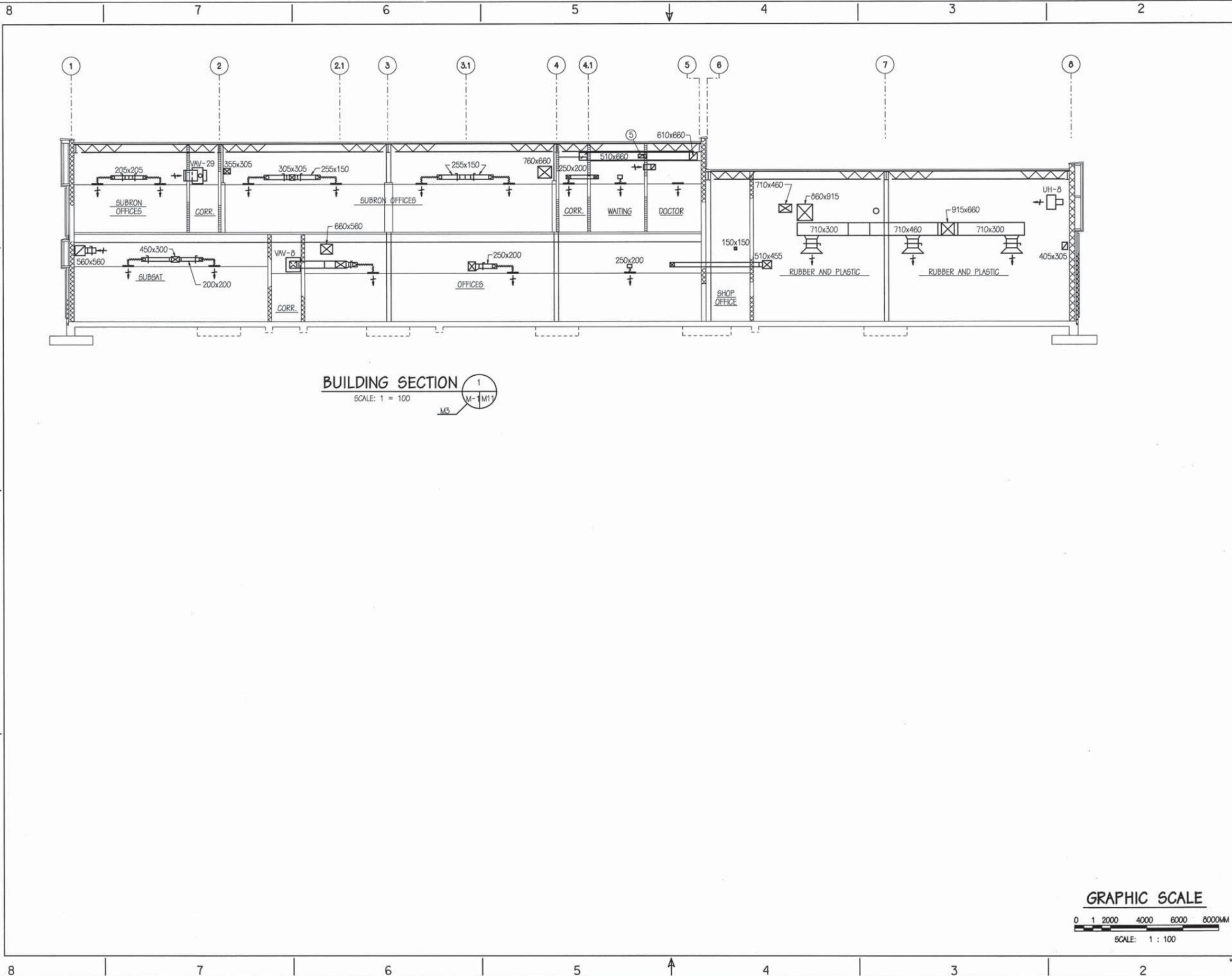
PART PLAN - FIRST FLOOR TOILET ROOMS
SCALE: 1 = 50
M-2 | M-9



DEPARTMENT OF THE NAVY NAVAL STATION		ATLANTIC DIVISION NORFOLK, VIRGINIA		NAVAL FACILITIES ENGINEERING COMMAND	
NAVAL STATION, NORFOLK VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING PART PLAN AND SECTIONS		WILLIAM A. DELONGHE No. 024020 PROFESSIONAL ENGINEER STATE OF VIRGINIA		WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. W8020-94-0-208 DATE 05/15/94 APPROVED ACTIVITY - SATISFACTORY TO APPROVED FOR EFD FOR COMMANDER NAVFAC	
CODE ID. NO. X SCALE 1 EFD NO. 451723 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONST. CONTR. NO. N62470-94-B-4191 NAVFAC DRAWING NO. 4351723 SHEET 106 OF 196	SIZE A1 1:50 451723 P-320 05-94-4191 N62470-94-B-4191 4351723	REVISIONS 7/2/96 JOA 5/15/96 JOA DATE DATE DESCRIPTION DESCRIPTION FURNITURE CHANGES / COMM FURNITURE CHANGES		APPROVED APPROVED APPROVED	

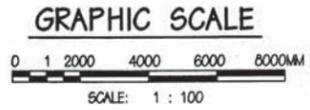


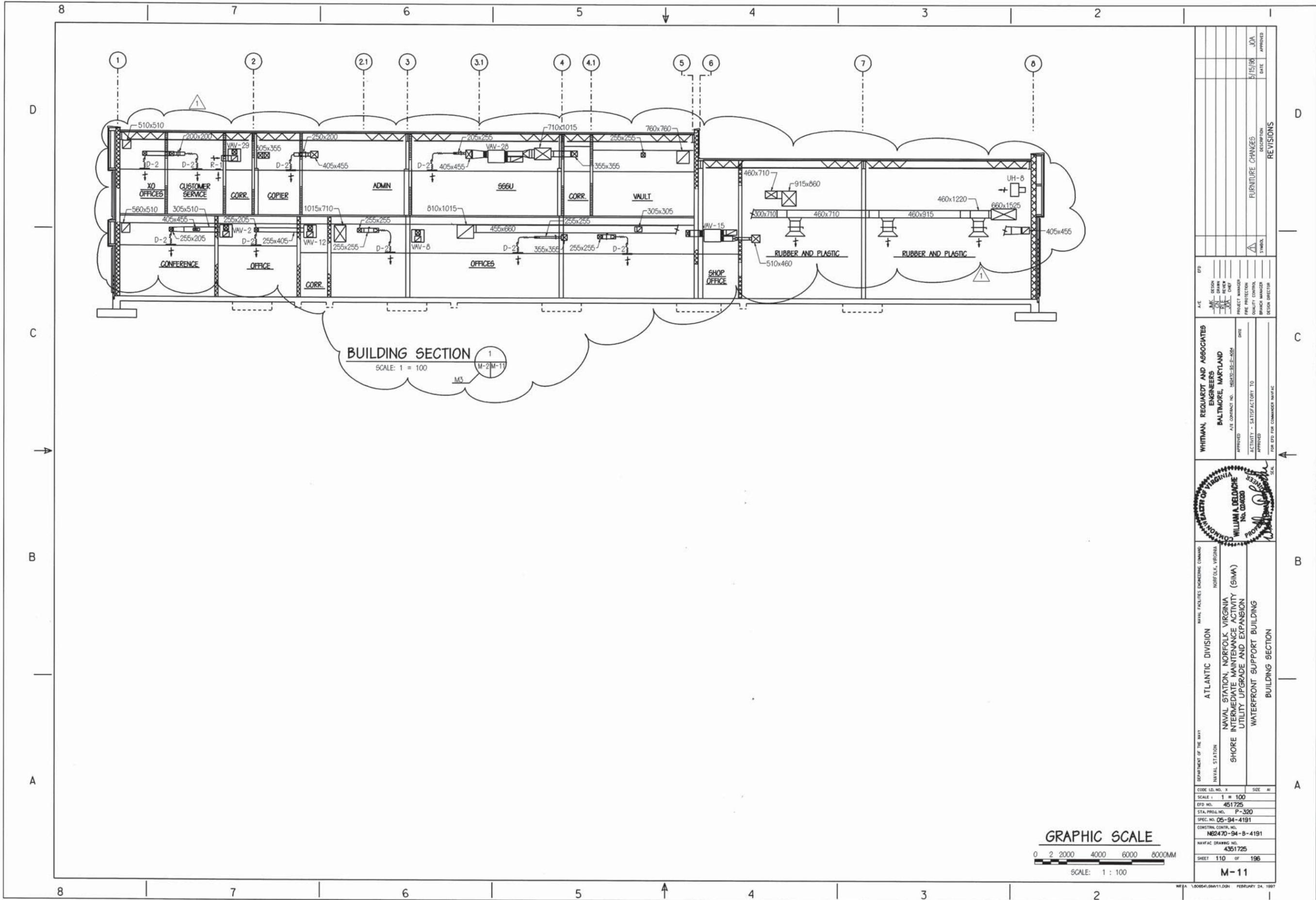
DEPARTMENT OF THE NAVY NAVAL STATION		NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA	
ATLANTIC DIVISION		SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION	
WATERFRONT SUPPORT BUILDING BUILDING SECTIONS		WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND	
CODE LD. NO. X SCALE: 1:100 EFD NO. 451724 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONSTR. CONTR. NO. N62470-94-B-4191 NAVFAC DRAWING NO. 4351724 SHEET 109 OF 196		PROJECT MANAGER: JDA DATE: 7/2/98 REVISIONS:	
APPROVED: [Signature] ACTIVITY - SATISFACTORY TO: [Signature]		REVISIONS:	



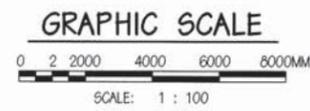
BUILDING SECTION
 SCALE: 1 = 100
 M-11

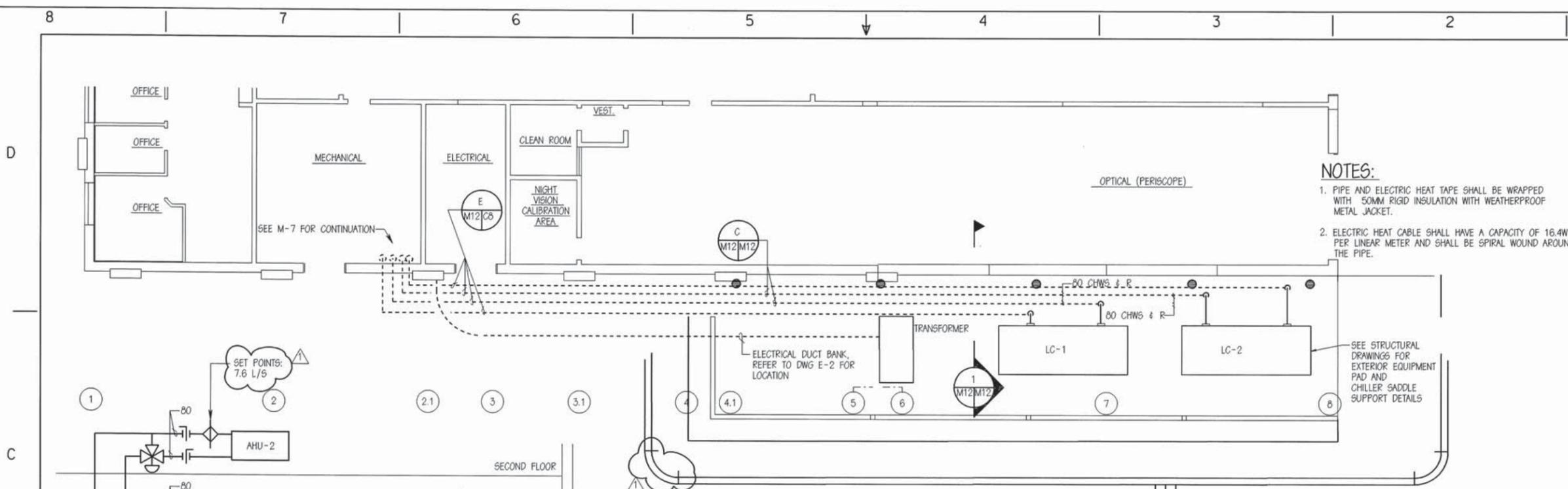
WHITMAN, REGUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. N82470-94-B-4191		DATE 3/19/97
APPROVED <i>[Signature]</i> PROJECT MANAGER FIRE PROTECTION QUALITY CONTROL BRANCH MANAGER DESIGN DIRECTOR		REVISIONS DATE APPROVED
APPROVED ACTIVITY - SATISFACTORY TO FIRE EFD FOR COMMANDER WATFAC		
NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA ATLANTIC DIVISION NAVAL STATION, NORFOLK, VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING BUILDING SECTION		
DEPARTMENT OF THE NAVY NAVAL STATION	CODE LD. NO. X SCALE: 1 = 100 EFD NO. 451725 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONSTR. CONTR. NO. N82470-94-B-4191 NAVFAC DRAWING NO. 4351725 SHEET 110 OF 196	SIZE A1
M-11		





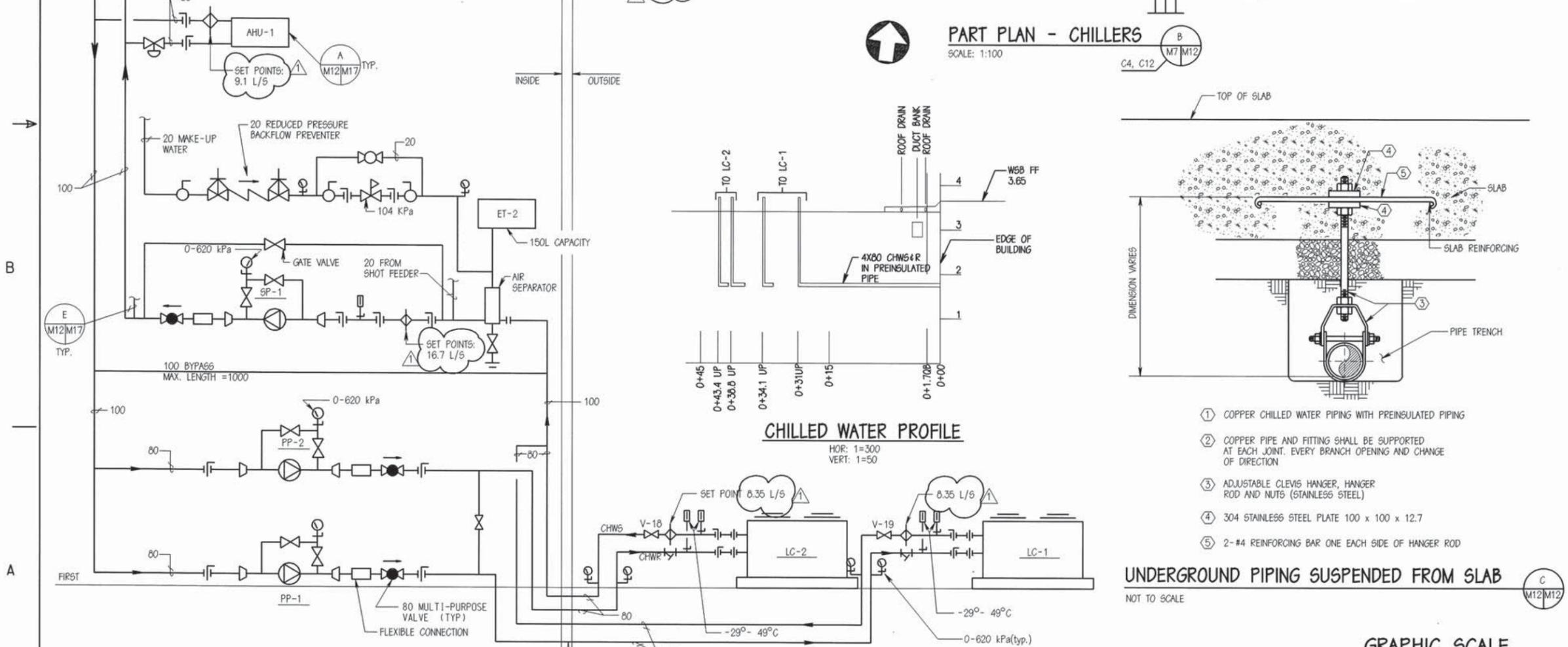
DEPARTMENT OF THE NAVY NAVAL STATION SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING BUILDING SECTION		ATLANTIC DIVISION NORFOLK, VIRGINIA NAVAL STATION, NORFOLK VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING BUILDING SECTION	WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. 88SD-95-E-308 DWE APPROVED: [Signature] ACTIVITY - SATISFACTORY TO [Signature] APPROVED FOR EFD FOR COMMANDER NAVFAC	A/E A/E DESIGN A/E DRAW A/E REVIEW A/E CHECK A/E FIELD A/E PROJECT MANAGER A/E FIRE PROTECTION A/E QUALITY CONTROL A/E BRANCH MANAGER A/E DESIGN DIRECTOR	EFD DESIGN DRAW REVIEW CHECK FIELD PROJECT MANAGER FIRE PROTECTION QUALITY CONTROL BRANCH MANAGER DESIGN DIRECTOR	REVISIONS NO. DATE DESCRIPTION 1 5/15/98 JCA 2 3 4 5 6 7 8 9 10
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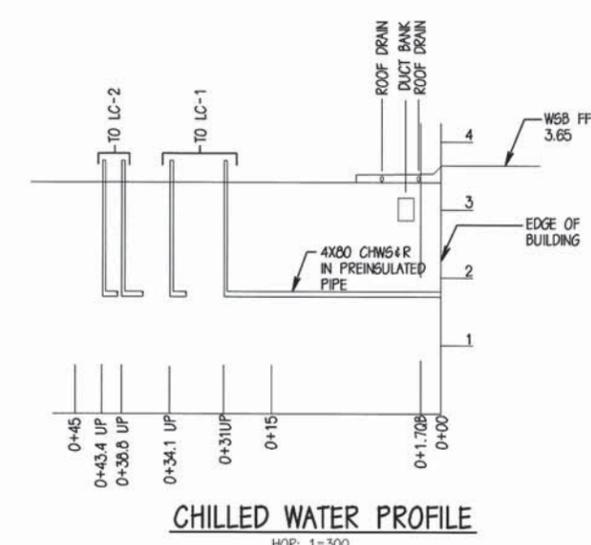


NOTES:

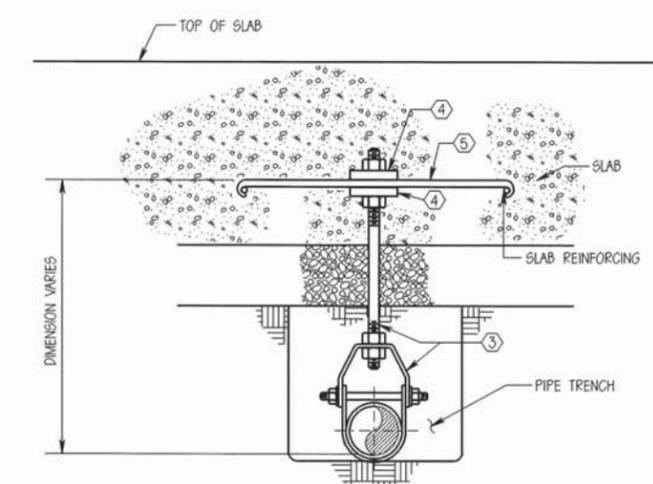
- PIPE AND ELECTRIC HEAT TAPE SHALL BE WRAPPED WITH 50MM RIGID INSULATION WITH WEATHERPROOF METAL JACKET.
- ELECTRIC HEAT CABLE SHALL HAVE A CAPACITY OF 16.4W PER LINEAR METER AND SHALL BE SPIRAL WOUND AROUND THE PIPE.



PART PLAN - CHILLERS
SCALE: 1:100

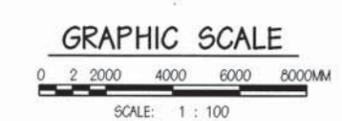


CHILLED WATER PROFILE
HOR: 1=300
VERT: 1=50



- COPPER CHILLED WATER PIPING WITH PREINSULATED PIPING
- COPPER PIPE AND FITTING SHALL BE SUPPORTED AT EACH JOINT, EVERY BRANCH OPENING AND CHANGE OF DIRECTION
- ADJUSTABLE CLEVIS HANGER, HANGER ROD AND NUTS (STAINLESS STEEL)
- 304 STAINLESS STEEL PLATE 100 x 100 x 12.7
- 2-#4 REINFORCING BAR ONE EACH SIDE OF HANGER ROD

UNDERGROUND PIPING SUSPENDED FROM SLAB
NOT TO SCALE



REVISIONS NO. DATE DESCRIPTION 1 7/2/95 JJA APPROVED	
FUTURE CHANGES/COMMENTS NO. DATE DESCRIPTION 1 7/2/95 JJA APPROVED	
PROJECT MANAGER: [Name] PROJECT ENGINEER: [Name] PROJECT ARCHITECT: [Name] PROJECT MECHANICAL: [Name] PROJECT ELECTRICAL: [Name] PROJECT PLUMBING: [Name] PROJECT CIVIL: [Name] PROJECT STRUCTURAL: [Name] PROJECT SPECIALTIES: [Name]	
WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. 18620-35-E-206 DATE: [Date] ACTIVITY - SATISFACTORY TO [Name] APPROVED FOR ETO FOR COMMANDER NAVFAC	
COMMONWEALTH OF VIRGINIA PROFESSIONAL SEAL WILLIAM A. DELOACHE No. 024020 PROFESSIONAL ENGINEER	
NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA ATLANTIC DIVISION NAVAL STATION, NORFOLK VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING CHILLED WATER PART PLAN AND SECTIONS	
CODE ID. NO. X SCALE: AS SHOWN ETO NO. 451726 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONTROL CONTR. NO. NS2470-94-B-4191 NAVFAC DRAWING NO. 4351726 SHEET 111 OF 196	M-12

8 7 6 5 4 3 2 1

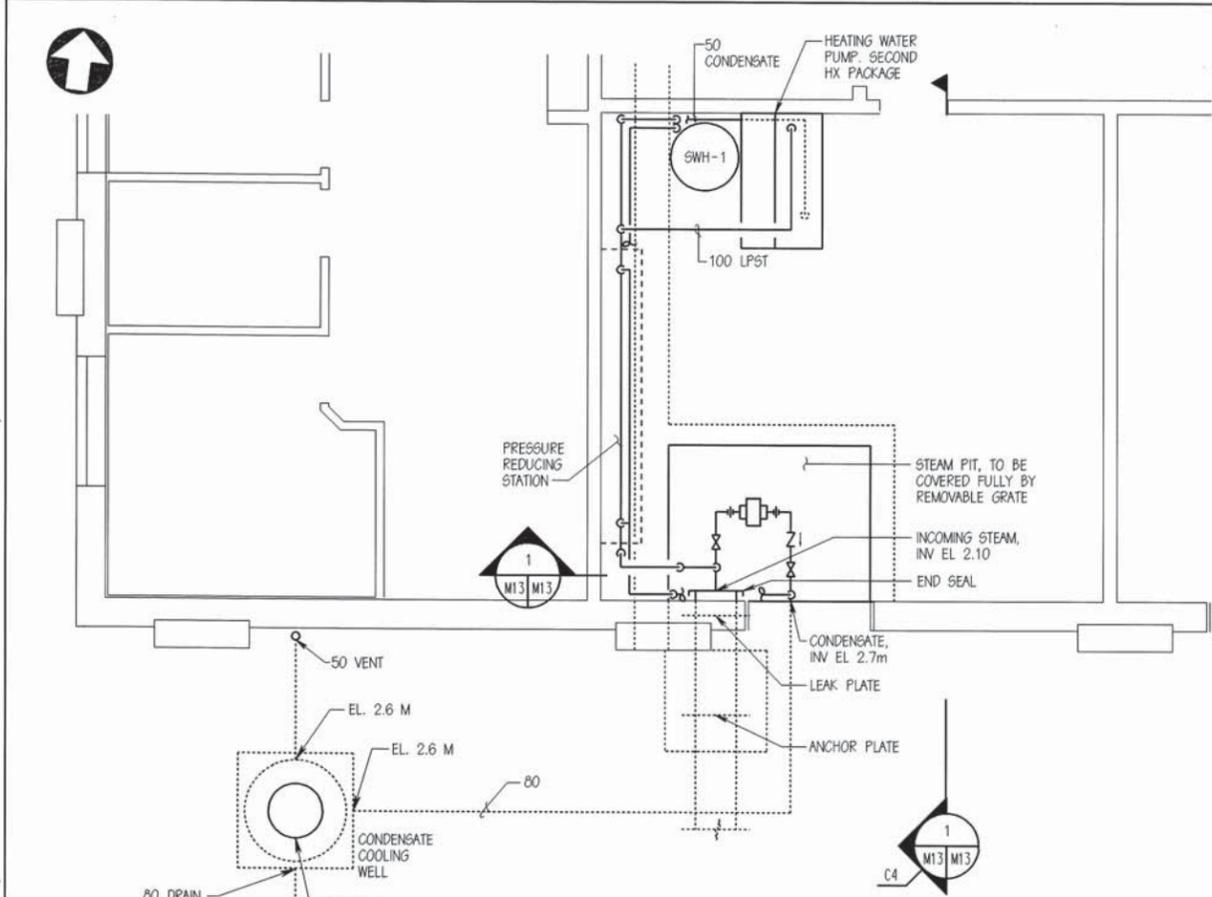


D

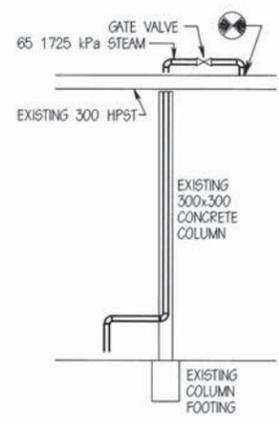
C

B

A



PART PLAN - STEAM PIPING
SCALE: 1=50

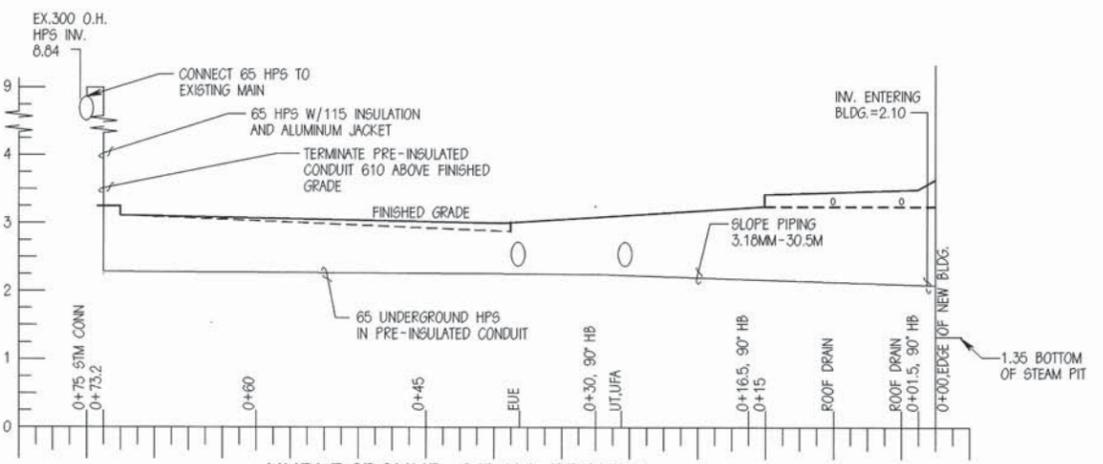
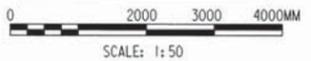


STEAM CONNECTION TO EXISTING DETAIL
NOT TO SCALE

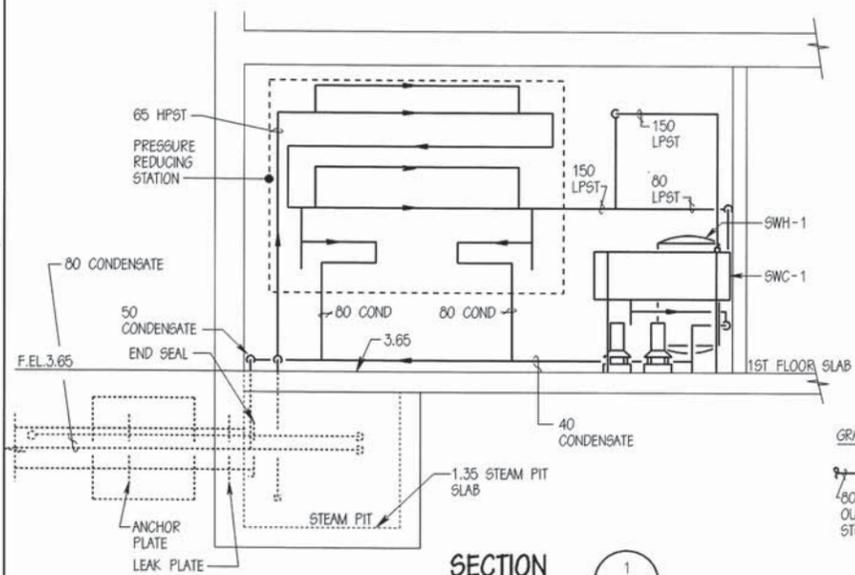
NOTES:

1. FOR CONT'N OF DOMESTIC HOT WATER, SEE DWG P-1 AND P-2.
2. FOR CONT'N OF HEATING WATER, SEE DWG M-7 AND M-14.
3. FOR LOCATIONS OF EXTERIOR STEAM AND CONDENSATE PIPING AND CONDENSATE COOLING WELL, SEE DWG C-4.
4. FOR STRUCTURAL DETAILS OF STEAM PIT, SEE DWG S-5 AND S-16.
5. FOR FLASHING DETAILS, SEE A-5.
6. ADD ANCHORS AND EXPANSION LOOPS TO UNDERGROUND STEAM LINE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

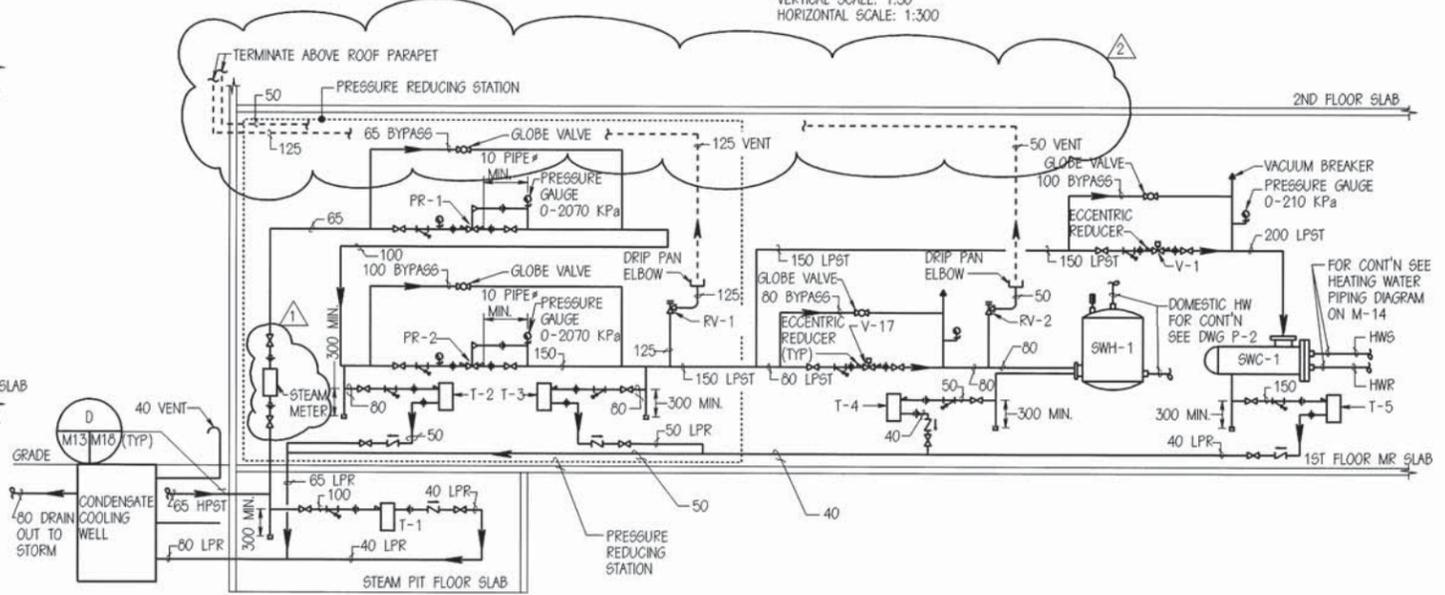
GRAPHIC SCALE



UNDERGROUND STEAM PROFILE
VERTICAL SCALE: 1:50
HORIZONTAL SCALE: 1:300



SECTION 1
SCALE: 1=50



DETAIL - STEAM PRESSURE REDUCING STATION AND CONVERTER PIPING
NOT TO SCALE

8 7 6 5 4 3 2 1

NO.	DATE	DESCRIPTION
1	5/15/98	FURNITURE CHANGES
2	7/2/98	FURNITURE CHANGES/COMMENTS REVISIONS

WHITMAN, REQUAEDT AND ASSOCIATES ENGINEERS
BALTIMORE, MARYLAND

WILLIAM DELAUNE
No. 04020

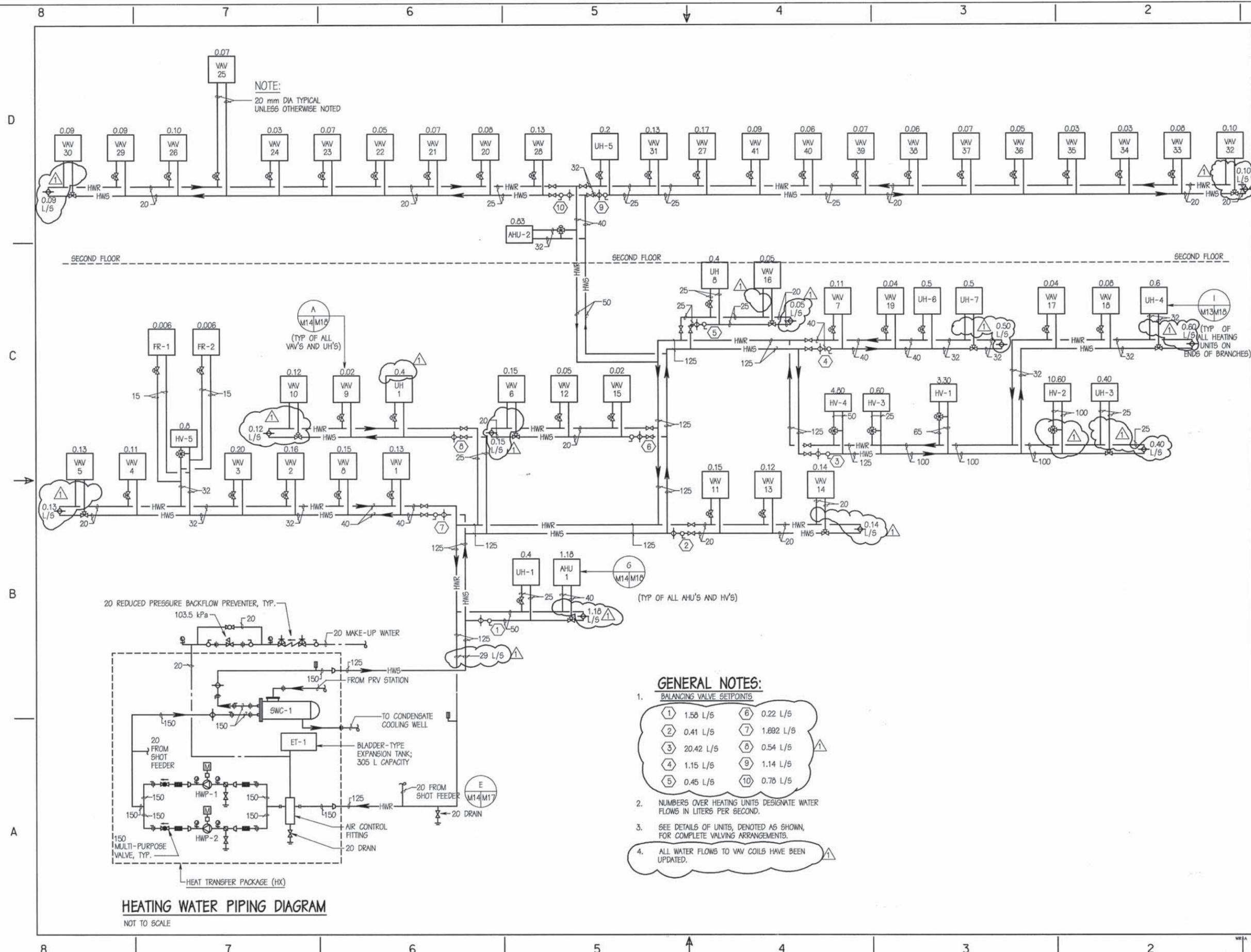
APPROVED: [Signature]

ATLANTIC DIVISION
NAVAL STATION
NAVAL FACILITIES ENGINEERING COMMAND
NOF/DLX, VIRGINIA

SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIM)
UTILITY UPGRADE AND EXPANSION
WATERFRONT SUPPORT BUILDING
STEAM PART PLAN, SECTIONS AND DIAGRAM

CODE 10, NO. 3	SIZE A1
SCALE: AS SHOWN	
EFD NO. 451727	
STA. PROJ. NO. P-320	
SPEC. NO. 06-94-4191	
CONSTR. CONTR. NO. N62470-94-B-4191	
NAVFAC DRAWING NO. 4351727	
SHEET 112 OF 196	

M-13



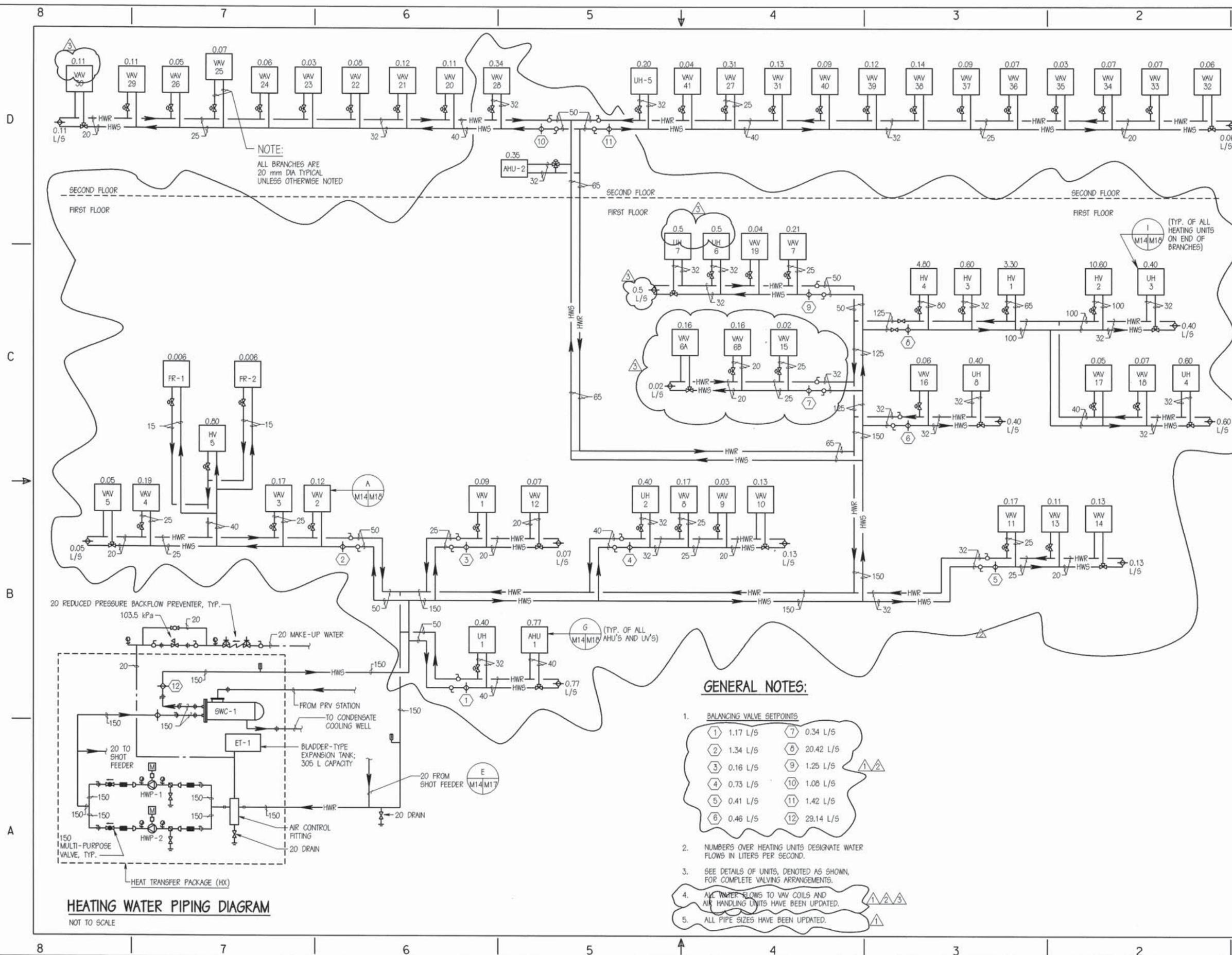
NOTE:
20 mm DIA TYPICAL
UNLESS OTHERWISE NOTED

- GENERAL NOTES:**
- BALANCING VALVE SETPOINTS

1	1.58 L/S	6	0.22 L/S
2	0.41 L/S	7	1.892 L/S
3	20.42 L/S	8	0.54 L/S
4	1.15 L/S	9	1.14 L/S
5	0.45 L/S	10	0.78 L/S
 - NUMBERS OVER HEATING UNITS DESIGNATE WATER FLOWS IN LITERS PER SECOND.
 - SEE DETAILS OF UNITS, DENOTED AS SHOWN, FOR COMPLETE VALVING ARRANGEMENTS.
 - ALL WATER FLOWS TO VAV COILS HAVE BEEN UPDATED.

HEATING WATER PIPING DIAGRAM
NOT TO SCALE

REVISIONS DATE: 1/24/97 APPROVED: DHA	
AMENDMENT NO. 1 SYMBOL:	
EDITION: 1 DRAWN BY: DHA DATE: 1/24/97	PROJECT MANAGER: JAP FIRE PROTECTION: JAP QUALITY CONTROL: JAP BRANCH MANAGER: JAP DESIGN DIRECTOR: JAP
WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. M8628-28-2-208 DATE: 3/19/97	
APPROVED: [Signature] ACTIVITY - SATISFACTORY TO: [Signature] APPROVED FOR EFD FOR COMMANDER NAVFAC: [Signature]	
COMMONWEALTH OF VIRGINIA REGISTERED PROFESSIONAL ENGINEER WILLIAM A. DELONGHE NO. 02400	
DEPARTMENT OF THE NAVY NAVAL STATION ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA	NAVAL STATION, NORFOLK, VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING HEATING WATER DISTRIBUTION DIAGRAM
EDDIE ID. NO. X SCALE: AS SHOWN EFD NO. 451728 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONSTING CONTR. NO. N62470-94-B-4191 NAVFAC DRAWING NO. 4351728	SHEET 113 OF 198 M-14



HEATING WATER PIPING DIAGRAM
NOT TO SCALE

DESIGN	DATE	BY	REVISIONS
PROJECT MANAGER	7/2/98	JOA	FURNITURE CHANGES/COMMENTS
QUALITY CONTROL	5/15/98	JOA	FURNITURE CHANGES
BRANCH MANAGER	4/16/97	JOA	ADDENDUM NO.1
DESIGN DIRECTOR			DATE
			APPROVED

DESIGN	DATE	BY	REVISIONS
PROJECT MANAGER	7/2/98	JOA	FURNITURE CHANGES/COMMENTS
QUALITY CONTROL	5/15/98	JOA	FURNITURE CHANGES
BRANCH MANAGER	4/16/97	JOA	ADDENDUM NO.1
DESIGN DIRECTOR			DATE
			APPROVED

WHITMAN, ROBERT AND ASSOCIATES
ENGINEERS
BALTIMORE, MARYLAND

A/E CONTRACT NO. 8820-35-E-208
DATE 05/15/98

ACTIVITY - SATISFACTORY TO
APPROVED FOR EFD FOR COMMANDER NAVFAC

ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NOFOLK, VIRGINIA

NAVAL STATION
NAVAL STATION, NORFOLK VIRGINIA
SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)
UTILITY UPGRADE AND EXPANSION
WATERFRONT SUPPORT BUILDING
HEATING WATER DISTRIBUTION DIAGRAM

WILLIAM A. DELONGHE
No. 024000
Professional Engineer
State of Virginia

CODE ID. NO.	SIZE	AS
SCALE	AS SHOWN	
EFD NO.	451728	
STA. PROJ. NO.	P-320	
SPEC. NO.	05-94-4191	
CONSTR. CONTR. NO.	N62470-94-B-4191	
NAVFAC DRAWING NO.	4351728	
SHEET	113	OF 196
M-14		

MRFA 1.00054/DWM14.DWG APRIL 9, 1999

SERIES FLOW FAN POWERED VAV BOX SCHEDULE

VAV #	PRIMARY AIR L/S @ 13°C		LOW PRESS. SUPPLY AIR FAN (L/S)	PRIMARY AIR INLET DUCT (Ø mm.)	REHEAT COIL (LOAD) WATER FLOW (L/S)		COIL EAT/LAT (°C)	COIL P.D. AIR (Pa.) WATER (KPa.)		FAN POWER (KW)	MAX. E.S.P. (Pa.)	AREA SERVED	REMARKS
	MAX.	MIN.			(KW)	(L/S)		(Pa.)	(KPa.)				
AHU-1 FIRST FLOOR													
1	620	250	620	255	4.5	0.09	18/24	32	0.8	0.25	147	ADMIN.	
2	415	415	415	205	5.0	0.12	13/23	32	1.4	0.19	80	CONFERENCE	
3	685	625	685	305	6.6	0.17	14/22	40	0.8	0.25	87	#16-C135.3	
4	925	540	925	305	7.2	0.19	17/24	62	0.8	0.37	87	SURGE	
5	125	125	125	150	2.0	0.06	13/26	4	0.5	0.07	67	CONFERENCE	
6A	690	690	690	177.5	6.6	0.156	8.5/10.5	17.5	1.45	0.37	54.5	OFFICES	4
6B	690	690	690	177.5	6.6	0.156	8.5/10.5	17.5	1.45	0.37	54.5	OFFICES	4
7	920	920	920	305	8.0	0.21	13/21	55	1.0	0.56	82	OFFICES	
8	735	735	735	305	7.1	0.17	13/21	45	0.8	0.37	95	OFFICES	
9	90	90	90	150	1.1	0.03	13/23	2	0.5	0.07	67	CLEAN/NIGHT VISION	
10	735	450	735	305	6.2	0.15	16/23	45	0.8	0.25	102	OPTICAL	
11	735	450	735	305	7.1	0.17	16/24	45	0.8	0.25	95	OPTICAL	
12	290	290	290	205	2.6	0.07	13/21	17	0.5	0.19	75	BUSINESS ADMIN.	
13	405	405	405	205	4.4	0.11	13/22	30	0.6	0.19	75	ANTENNA	
14	425	425	425	255	5.6	0.15	13/24	32	0.6	0.19	75	ANTENNA	
15	95	90	95	150	1.0	0.02	13/22	2	0.5	0.07	67	SHOP OFFICE	
16	390	155	390	205	2.8	0.06	18/24	27	0.5	0.19	95	MAST REFURBISHMENT	
17	160	160	160	150	1.9	0.05	13/23	5	0.5	0.07	52	DIVERS OFFICE	
18	460	185	460	255	3.3	0.07	18/24	37	0.5	0.19	75	RECOMPRESSION	IL W/P412
19	220	135	220	150	2.1	0.04	16/24	10	0.5	0.07	75	RIGGING OFFICE	
AHU-2 SECOND FLOOR													
20	500	360	500	255	4.2	0.11	16/23	25	0.6	0.19	87	SSGU	
21	305	305	305	205	4.4	0.12	13/25	37	0.5	0.19	95	COMBAT	
22	360	240	360	205	3.5	0.09	16/24	25	0.6	0.19	87	DUTY,DECOMP	
23	155	60	155	150	1.1	0.03	19/25	5	0.5	0.07	72	OFFICE	
24	240	180	240	205	2.6	0.06	15/24	12	0.5	0.07	72	#19 N10	
25	240	95	240	205	2.9	0.07	18/28	12	0.5	0.07	95	COMMODORE	
26	120	120	120	150	2.0	0.05	13/27	4	0.6	0.07	72	CONFERENCE	
27	1180	1180	1180	355	12.7	0.31	13/22	82	3.6	0.56	102	INT OFFICES	
28	1280	1280	1280	355	13.8	0.14	15/22	30	3.2	(2) 0.37	80	INT OFFICES	
29	475	300	475	255	4.6	0.11	16/24	40	0.5	0.19	95	RECP CAMERA	
30	470	300	470	255	4.5	0.11	16/24	40	0.5	0.19	102	CHAPLAIN	
31	480	480	480	255	5.2	0.13	13/22	40	0.5	0.19	72	MEDICAL	
32	180	180	180	150	2.6	0.06	13/25	7	0.6	0.07	72	CONFERENCE	
33	220	90	220	150	2.9	0.07	18/29	10	0.5	0.07	87	COMMODORE	
34	180	180	180	150	2.6	0.07	13/25	10	0.5	0.07	72	#18 N10	
35	135	60	135	150	1.3	0.05	18/26	4	0.5	0.07	72	OFFICE	
36	300	180	300	205	2.5	0.07	17/24	20	0.5	0.19	72	LEGAL	
37	290	240	290	205	3.5	0.09	15/25	17	0.5	0.19	95	#16	
38	460	460	460	255	6.1	0.14	13/24	37	0.6	0.19	87	#16	
39	460	460	460	255	5.0	0.12	13/22	37	0.6	0.19	87	#16	
40	345	345	345	205	3.7	0.09	13/22	25	0.6	0.19	95	COM PERS	
41	450	180	450	255	2.2	0.14	18/22	37	0.5	0.19	102	VAULT,LAN	

NOTES: ALL VAV BOXES HAVE 80°C EWT
 ALL VAV BOXES HAVE 70°C LWT
 ALL VAV BOXES ARE 277 VOLTS, 1 PHASE, 60 HERTZ
 ALL VAV BOXES HAVE 1 ROW OF HEATING COILS
 ALL VAV BOXES SHALL BE EQUIPPED W/FAN SPEED CONTROL REGULATORS(SCR)

△ SCHEDULE REVISED

AIR DEVICE SCHEDULE

UNIT I.D.	NECK	FACE	MOUNTING	PATTERN	L/S RANGE	ΔP (Pa)	NC	REMARKS
SUPPLY AIR DEVICES								
D1	150 DIA	610x610	LAY-IN	4 WAY	45-75	24.9	9-23	-
D2	200 DIA	610x610	LAY-IN	4 WAY	80-165	24.9	10-28	-
D3	250 DIA	610x610	LAY-IN	4 WAY	170-255	24.9	16-31	-
D4	300 DIA	610x610	LAY-IN	4 WAY	260-370	24.9	25-34	-
D5	150 DIA	610x610	LAY-IN	2 WAY	45-75	24.9	9-23	CORRIDORS
D6	200 DIA	445 DIA	EXPOSED	-	59-115	24.9	23-31	-
D7	405 DIA	910 DIA	EXPOSED	-	406-530	24.9	30-33	-
D8	510 DIA	1120 DIA	EXPOSED	-	670-1030	24.9	30-34	-
D9	305 DIA	1120 DIA	EXPOSED	-	125-333	24.9	23-29	-
RETURN AIR DEVICES								
R1	250x200	300x250	SURFACE	-	34-160	24.9	9-28	-
R2	306x305	350x350	LAY-IN	-	161-361	24.9	9-31	-
R3	360x360	400x400	LAY-IN	-	362-444	24.9	9-28	-
R4	410x410	450x450	LAY-IN	-	445-602	24.9	9-31	-
R5	460x460	500x500	LAY-IN	-	603-1060	24.9	9-33	-

DUCT CONSTRUCTION AND LEAK TEST SCHEDULE

UNIT I.D.	DUCT PRESSURE CLASS (Pa)	DUCT SEAL CLASS	DUCT LEAK CLASS L/S M ²	DUCT TEST PRESS	DUCT TEST TYPE	REMARKS
AHU-1	750	B	60	NOTE 2	NOTE 1	
AHU-2	750	B	60	NOTE 2	NOTE 1	
1ST RETURN	500	C	120	NOTE 2	NOTE 1	
2ND RETURN	500	C	120	NOTE 2	NOTE 1	
HV-1	500	C	120	NOTE 2	NOTE 1	
HV-2	500	C	120	NOTE 2	NOTE 1	
HV-3	500	C	120	NOTE 2	NOTE 1	
HV-4	500	C	120	NOTE 2	NOTE 1	
HV-5	500	C	120	NOTE 2	NOTE 1	
EF-1 TO 5	500	C	120	NOTE 2	NOTE 1	
EF-6,9	500	C	60	NOTE 2	NOTE 1	
EF-7	500	C	60	NOTE 2	NOTE 1	
EF-8,10,16	500	C	60	NOTE 2	NOTE 1	
EF-11 TO 17	500	C	120	NOTE 2	NOTE 1	
DC-1	1500	A	15	NOTE 2	NOTE 1	
DC-2	750	B	30	NOTE 2	NOTE 1	

NOTE 1: TEST PER SMACNA DCTM.

NOTE 2: DUCT TEST PRESSURE SHALL BE 90% OF DUCT PRESSURE.

DATE	APPROVED
4/18/97	JOA
4/19/97	JOA
5/15/98	JOA
7/2/98	JOA
REVISIONS	
SYMBOL	DESCRIPTION
△	APPENDIX NO.1
△	USER CHANGES
△	FURNITURE CHANGES
△	FURNITURE CHANGES/COMMENTS REVISIONS
WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. 18820-93-008 PROJECT MANAGER: [Signature] PROJECT CONTROL: [Signature] QUALITY CONTROL: [Signature] BRANCH MANAGER: [Signature] DESIGN DIRECTOR: [Signature]	
DEPARTMENT OF THE NAVY NAVAL STATION ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA NAVAL STATION, NORFOLK VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION GATERFRONT SUPPORT BUILDING SCHEDULES	
CODE LD. NO. 9	SIZE A1
SCALE 1" = 16'	
EFD NO. 451730	
STA. PROJ. NO. P-320	
SPEC. NO. 06-94-4191	
CONTROL CONTR. NO. N62470-94-B-4191	
NAVFAC DRAWING NO. 4361730	
SHEET 115 OF 196	
M-16	

SERIES FLOW FAN POWERED VAV BOX SCHEDULE

VAV #	PRIMARY AIR L/S @ 13°C		LOW PRESS. SUPPLY AIR FAN (L/S)	PRIMARY AIR INLET DUCT (Ø mm.)	REHEAT COIL		COIL EAT/IAT (°C)	COIL P.D.		FAN POWER (KW)	MAX. E.S.P. (Pa.)	RADIATED SOUND POWER - 100% PRIMARY AIRFLOW CAP. DISCHARGE SOUND POWER dB re: 10-12 WATTS							AREA SERVED	REMARKS
	MAX.	MIN.			(LOAD)	WATER FLOW (L/S)		AIR (Pa.)	WATER (KPa.)			2	3	4	5	6	7			
AHU-1 FIRST FLOOR																				
1	660	264	660	305	5.6	0.13	18/25	42.3	1.2	.56	280	71/75	69/72	61/68	55/68	50/65	46/60	SUBSAT.		
2	610	304	610	305	6.4	0.16	18/25	47.3	1.2	.56	320	72/76	70/73	62/69	56/69	51/66	47/61	SUBSAT. LOBBY VESTIBULE		
3	710	710	710	305	6.5	0.20	13/23	24.9	3.9	.56	190	71/75	69/72	61/68	55/68	50/65	46/60	BREAK/CONFERENCE		
4	610	266	610	305	4.6	0.11	18/24	32.4	3.9	.56	220	68/72	66/69	58/66	52/66	47/62	44/58	OFFICES		
5	540	216	540	305	5.4	0.13	18/27	27.4	3.9	.56	190	64/68	62/66	55/63	48/63	44/59	41/55	OFFICES		
6	825	607	825	355	6.3	0.15	15/22	14.9	1.8	(2) .38	210	69/71	65/68	56/66	50/65	48/62	46/60	OFFICES		
7	660	479	660	305	4.4	0.11	15/21	27.4	1.2	.56	210	65/69	63/67	56/64	49/64	45/60	42/56	OFFICES		
8	595	595	595	305	6.2	0.15	13/22	47.3	1.2	.56	290	72/69	70/67	62/64	56/64	51/60	47/56	OFFICES		
9	170	68	170	150	0.7	0.02	18/22	5.0	.93	.13	180	58/60	57/49	51/49	44/46	41/50	39/49	CLEAN/NIGHT VISION		
10	335	319	335	205	5.0	0.12	13/26	17.4	.93	.19	260	61/62	59/54	54/53	46/54	43/55	41/53	OPTICAL		
11	435	319	435	255	6.3	0.15	15/27	19.9	2.7	.38	250	58/65	58/59	52/55	47/55	43/54	39/52	OPTICAL		
12	210	210	210	150	2.2	0.05	13/22	5.0	.93	.13	120	63/65	62/55	56/54	48/52	44/55	40/55	CONFERENCE		
13	490	415	490	255	5.0	0.12	14/23	22.4	1.2	.38	240	64/70	64/64	57/60	50/60	46/60	41/58	ANTENNA		
14	490	415	490	255	5.8	0.14	14/24	22.4	1.2	.38	230	64/70	64/64	57/60	50/60	46/60	41/58	ANTENNA		
15	90	64	90	100	0.8	0.02	18/23	2.5	.93	.10	120	-	-	-	-	-	-	SHOP OFFICE		
16	225	96	225	205	2.1	0.05	18/26	10.0	.93	.19	200	58/59	51/49	51/49	44/50	42/51	40/49	MAST REFURBISHMENT	IL W/P412	
17	110	110	110	100	1.6	0.04	13/25	2.5	.93	.10	150	-	-	-	-	-	-	RECOMPRESSION CHAMBER		
18	460	184	460	305	3.2	0.08	18/24	27.4	3.9	.56	150	58/60	57/49	51/49	44/46	41/50	39/49	DIVER'S OFFICE		
19	160	96	160	150	1.6	0.04	17/25	5.0	.93	.13	150	58/60	57/49	51/49	44/46	41/50	39/49	OFFICE		
AHU-2 SECOND FLOOR																				
20	195	164	195	150	3.5	0.08	15/30	7.5	.93	.13	200	61/63	60/52	54/52	46/49	43/53	40/52	CHAPLAIN, PMT, WAITING		
21	180	98	180	150	3.1	0.07	17/32	7.5	.93	.13	220	60/62	59/51	53/51	45/46	42/52	39/51	OMC, SUPPLY OFFICE, SECRETARY		
22	200	60	200	150	2.0	0.05	18/27	7.5	.93	.13	150	61/63	60/52	54/52	46/49	43/53	40/52	MAT. OFFICER, COMBAT OFFICER		
23	135	54	135	125	3.0	0.07	18/37	2.5	.93	.10	230	-	-	-	-	-	-	CHIEF OF STAFF		
24	120	66	120	125	1.3	0.03	17/26	2.5	.93	.10	260	-	-	-	-	-	-	YEOMAN		
25	240	96	240	150	2.9	0.07	18/29	10.0	.93	.13	150	65/67	65/59	59/58	51/57	45/58	39/59	COMMODORE		
26	280	275	280	205	4.0	0.10	13/25	10.0	3.2	.19	140	63/65	62/55	56/54	48/52	44/55	40/55	CONFERENCE		
27	600	590	600	355	7.1	0.17	16/23	17.4	6.0	(2) .38	310	72/74	68/71	59/69	53/68	50/65	48/62	SUBRON		
28	600	459	600	355	5.7	0.13	15/23	10.0	6.0	(2) .38	210	67/70	64/67	55/65	49/64	47/61	44/60	SUBRON		
29	445	178	445	255	3.6	0.09	18/25	24.9	.93	.38	250	58/65	58/59	52/55	47/55	43/54	39/52	SUBRON		
30	490	196	490	255	3.9	0.09	18/25	22.4	1.2	.38	320	64/70	64/64	57/60	50/60	46/60	41/58	SUBRON		
31	600	459	600	355	5.6	0.13	15/23	10.0	1.8	(2) .38	210	67/70	64/67	55/65	49/64	47/61	44/60	SUBRON		
32	280	275	280	205	4.0	0.10	13/25	7.5	3.2	.19	220	61/62	59/54	54/52	46/54	43/55	41/53	CONFERENCE		
33	260	104	260	205	3.3	0.08	18/29	12.5	.93	.19	190	58/59	56/50	51/49	44/50	42/51	40/49	COMMODORE		
34	110	66	110	125	1.3	0.03	17/26	2.5	.93	.10	260	-	-	-	-	-	-	YEOMAN, RECEPTION		
35	135	54	135	125	1.4	0.03	18/27	2.5	.93	.10	290	-	-	-	-	-	-	CHIEF OF STAFF		
36	150	66	150	150	2.0	0.05	18/29	5.0	.93	.13	200	58/60	57/49	51/49	44/46	41/50	39/49	COMBAT OFFICER, MAT. OFFICER		
37	180	98	180	150	3.1	0.07	17/32	7.5	.93	.13	220	61/63	60/52	54/52	46/52	43/49	40/52	SECRETARY, SUPPLY OFFICER, OMC		
38	360	197	360	205	2.5	0.06	17/23	19.9	.93	.19	210	63/64	61/56	56/55	47/56	43/57	40/56	PMT		
39	300	230	300	205	2.8	0.07	15/23	17.4	.93	.19	160	59/60	57/51	52/50	45/51	43/52	41/50	PMT		
40	305	197	305	205	2.6	0.06	16/24	12.5	.93	.19	230	57/58	55/49	50/48	43/49	41/50	39/48	PMT		
41	280	280	280	205	4.0	0.09	13/25	14.9	3.2	.19	260	52/59	51/54	47/50	44/49	40/47	36/45	WAITING, EXAM., DOCTOR, EXAM.		

NOTES: ALL VAV BOXES HAVE 80°C EWT
 ALL VAV BOXES HAVE 70°C LWT
 ALL VAV BOXES ARE 277 VOLTS, 1 PHASE, 60 HERTZ
 ALL VAV BOXES HAVE 1 ROW OF HEATING COILS.
 ALL VAV BOXES SHALL BE EQUIPPED W/FAN SPEED CONTROL REGULATORS(SCR)

AIR DEVICE SCHEDULE

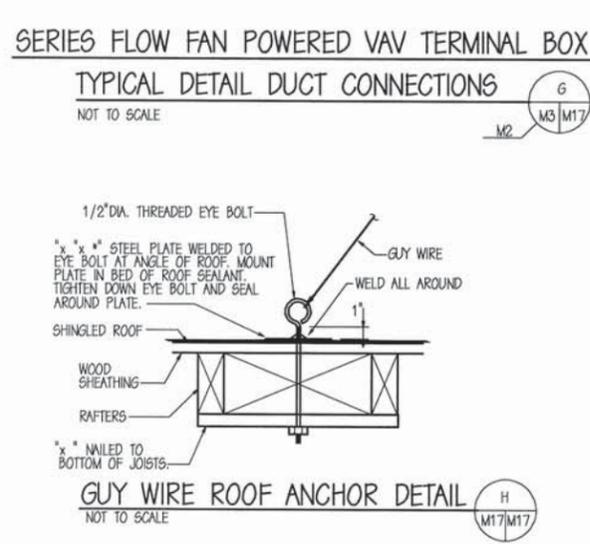
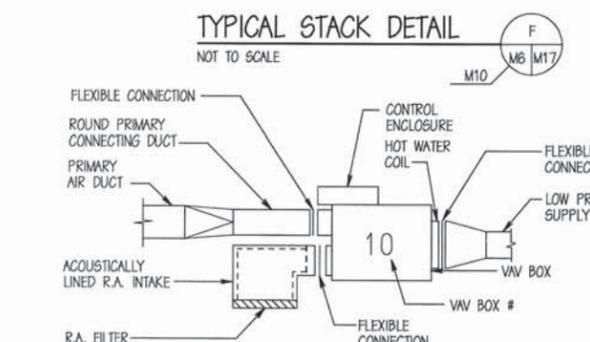
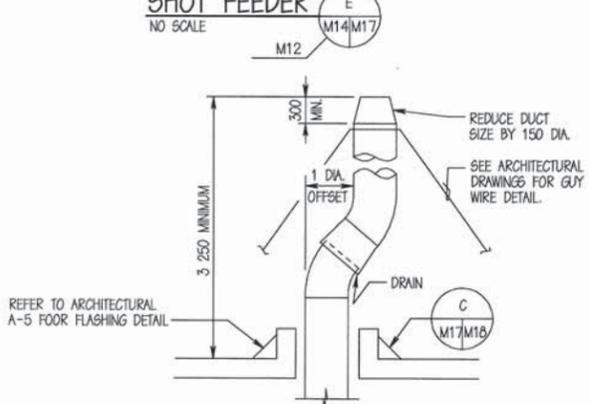
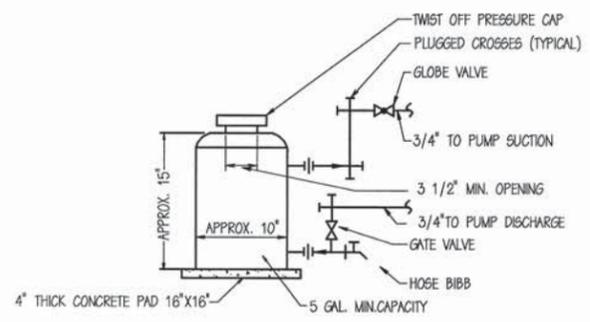
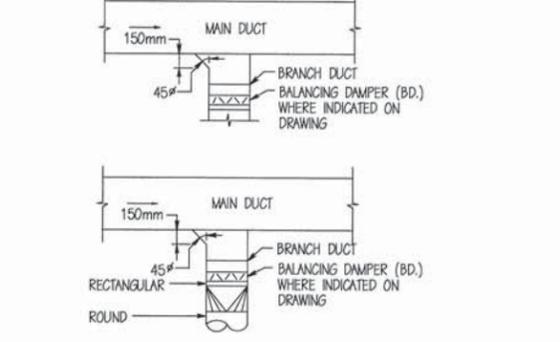
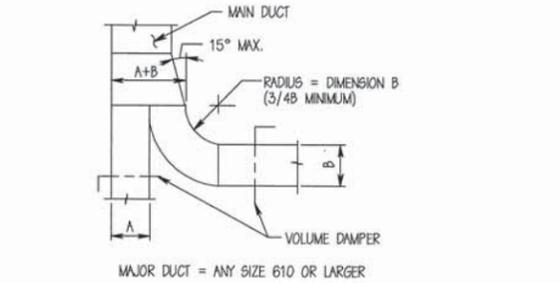
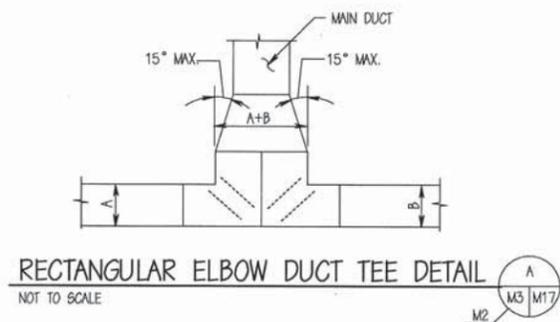
UNIT I.D.	NECK	FACE	MOUNTING	PATTERN	L/S RANGE	ΔP (Pa)	NC	REMARKS
SUPPLY AIR DEVICES								
D1	150 DIA	610x610	LAY-IN	4 WAY	45-75	24.9	9-23	-
D2	200 DIA	610x610	LAY-IN	4 WAY	80-185	24.9	10-28	-
D3	250 DIA	610x610	LAY-IN	4 WAY	170-255	24.9	18-31	-
D4	300 DIA	610x610	LAY-IN	4 WAY	260-370	24.9	25-34	-
D5	150 DIA	610x610	LAY-IN	2 WAY	45-75	24.9	9-23	CORRIDORS
D6	200 DIA	445 DIA	EXPOSED	-	59-115	24.9	23-31	-
D7	405 DIA	910 DIA	EXPOSED	-	406-530	24.9	30-33	-
D8	510 DIA	1120 DIA	EXPOSED	-	670-1030	24.9	30-34	-
RETURN AIR DEVICES								
R1	150x150	200x200	LAY-IN	-	34-160	24.9	9-26	-
R2	305x305	350x350	LAY-IN	-	161-361	24.9	9-31	-
R3	360x360	400x400	LAY-IN	-	362-444	24.9	9-28	-
R4	410x410	450x450	LAY-IN	-	445-602	24.9	9-31	-
R5	460x460	500x500	LAY-IN	-	603-1060	24.9	9-33	-

DUCT CONSTRUCTION AND LEAK TEST SCHEDULE

UNIT I.D.	DUCT PRESSURE CLASS (Pa)	DUCT SEAL CLASS	DUCT LEAK CLASS L/S M ²	DUCT TEST PRESS	DUCT TEST TYPE	REMARKS
AHU-1	750	B	60	NOTE 2	NOTE 1	
AHU-2	750	B	60	NOTE 2	NOTE 1	
1ST RETURN	500	C	120	NOTE 2	NOTE 1	
2ND RETURN	500	C	120	NOTE 2	NOTE 1	
HV-1	500	C	120	NOTE 2	NOTE 1	
HV-2	500	C	120	NOTE 2	NOTE 1	
HV-3	500	C	120	NOTE 2	NOTE 1	
HV-4	500	C	120	NOTE 2	NOTE 1	
HV-5	500	C	120	NOTE 2	NOTE 1	
EF-1 TO 5	500	C	120	NOTE 2	NOTE 1	
EF-6,9	500	C	60	NOTE 2	NOTE 1	
EF-7	500	C	60	NOTE 2	NOTE 1	
EF-8,10,11	500	C	60	NOTE 2	NOTE 1	
EF-11 TO 17	500	C	120	NOTE 2	NOTE 1	
DC-1	1500	A	15	NOTE 2	NOTE 1	
DC-2	750	B	30	NOTE 2	NOTE 1	

NOTE 1: TEST PER SMACNA DCTM.
 NOTE 2: DUCT TEST PRESSURE SHALL BE 90% OF DUCT PRESSURE.

DATE	APPROVED	DATE	APPROVED
1/19/97	[Signature]	1/19/97	[Signature]
DESCRIPTION		REVISIONS	
AMENDMENT NO. 1			
DATE	DESCRIPTION	DATE	DESCRIPTION
WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. N62470-94-B-4191			
APPROVED: [Signature] DATE: 1/19/97 ACTIVITY - SATISFACTORY TO [Signature] FOR EFD FOR COMMANDER NAVFAC			
NAVAL FACILITIES ENGINEERING DIVISION NORFOLK, VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION GATERFRONT SUPPORT BUILDING SCHEDULES			
SCALE	NTS	DATE	1/19/97
EFD NO.	451730	DATE	1/19/97
STA. PROJ. NO.	F-320	DATE	1/19/97
SPEC. NO.	05-84-4191	DATE	1/19/97
CONTRACTING CONTRACT NO.	N62470-94-B-4191	DATE	1/19/97
NAVFAC DRAWING NO.	4351730	DATE	1/19/97
SHEET	115	OF	196
M-16			



UNIT SIZE	RETURN AIR ELBOW INLET SIZES IN mm WITH 25mm ACOUSTICAL LINING	FILTER SIZE mm	FILTER VELOCITY MAX. M/S	REMARKS
6		610x305x25	1.52	TYPICAL OF ALL VAV BOXES OF THIS SIZE UNLESS OTHERWISE NOTED ON M-2 & M-3
8		635x405x25	1.52	TYPICAL OF ALL VAV BOXES OF THIS SIZE UNLESS OTHERWISE NOTED ON M-2 & M-3
10 12		685x485x25	2.05	TYPICAL OF ALL VAV BOXES OF THIS SIZE UNLESS OTHERWISE NOTED ON M-2 & M-3
14		685x485x25	1.52	TYPICAL OF ALL VAV BOXES OF THIS SIZE UNLESS OTHERWISE NOTED ON M-2 & M-3

NOTE : SEVERAL ROOMS HAVE ACOUSTICALLY LINED RETURN AIR DUCTS WITH FILTERS INSTEAD OF ELBOWS. REFER TO FLOOR PLANS ON M-2 AND M-3

UNIT I.D.	FAN			HEATING COIL								LOCATION		
	ELECTRICAL			MOTOR (KW)	AIR FLOW (L/S)	EAT (DEG. C)	LAT (DEG. C)	LOAD (KW)	EWT (DEG. C)	LWT (DEG. C)	WATER FLOW (L/S)		MIN. # OF ROWS	MAX ESP (Pa)
	V	PH	HZ											
UH - 1	120	3	60	0.37	560	10	35	16.8	80	70	0.4	1	53.6	1ST MR
UH - 2	120	3	60	0.37	560	10	35	16.8	80	70	0.4	1	53.6	1ST ER
UH - 3	120	3	60	0.37	500	10	35	15.0	80	70	0.4	1	53.6	AIR COMP.
UH - 4	120	3	60	0.37	800	10	35	24.0	80	70	0.6	1	53.6	AIR COMP.
UH - 5	120	3	60	0.37	240	10	35	7.2	80	70	0.2	1	53.6	2ND MR
UH - 6	120	3	60	0.37	890	10	35	20.7	80	70	0.5	1	53.6	DIVERS
UH - 7	120	3	60	0.37	727	10	35	21.8	80	70	0.5	1	53.6	RIGGING
UH - 8	120	3	60	0.37	497	10	35	14.9	80	70	0.4	1	53.6	RUB. & PLAS.

UNIT I.D.	AREA SERVED	MAX (L/S)	EXTERNAL SP (KPa)	SHAKER (KW)	MOTOR (KW)	ELECTRICAL			CONTROL METHOD	LOCATION	REMARKS
						V	PH	HZ			
DC - 1	R&P SANDERS	2230	1.29	0.56	11.19	480	3	60	IL W/5600,5121 5106,5604	MEZZANINE	W/EXPLOSION RELIEF VENTS
DC - 2	R&P DOWNDRAFT TABLE	2265	0.56	0.56	11.19	480	3	60	IL W/K108	MEZZANINE	W/EXPLOSION RELIEF VENTS

UNIT I.D.	AREA SERVED	ELEMENT				ENCLOSURE			L/S	MAX. PD Pa
		W	LENGTH MM.	ROWS	TUBE DIA. MM.	LENGTH mm.	WIDTH mm.	HEIGHT mm.		
FR-1	2ND FLOOR WOMEN'S TOILET	273	610	1	32	915	89	203	0.006	248
FR-2	2ND FLOOR MEN'S TOILET	302	610	1	32	915	89	203	0.006	248

REVISIONS

NO.	DESCRIPTION	DATE	APPROVED

PROJECT MANAGER: [Signature]

DATE: 2/19/99

ACTIVITY - SATISFACTORY TO [Signature]

FOR EIT FOR COMMANDER NAVFAC

WHITMAN, REGUARDI AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND

NAVAL FACILITIES ENGINEERING COMMAND

ATLANTIC DIVISION

NAVAL STATION, NORFOLK VIRGINIA

SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION

WATERFRONT SUPPORT BUILDING SCHEDULES AND DETAILS

CODE ID. NO. X: NFB

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

EFD NO. 451731

STA. PROJ. NO. P-320

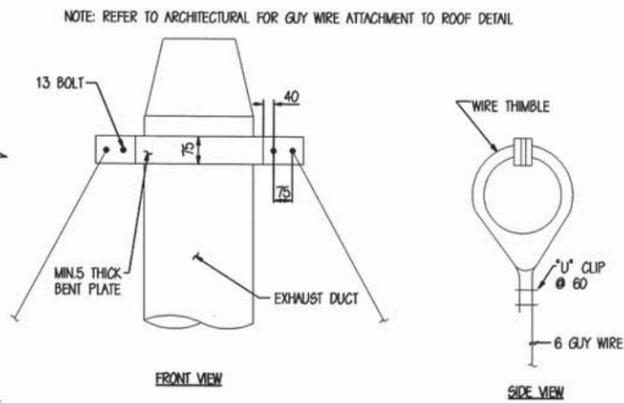
SPEC. NO. 05-94-4191

CONSTN. CONTR. NO. N62470-94-B-4191

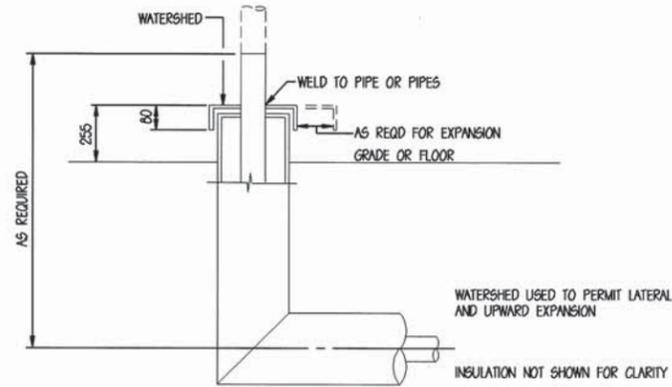
NAVFAC DRAWING NO. 4351731

SHEET 116 OF 196

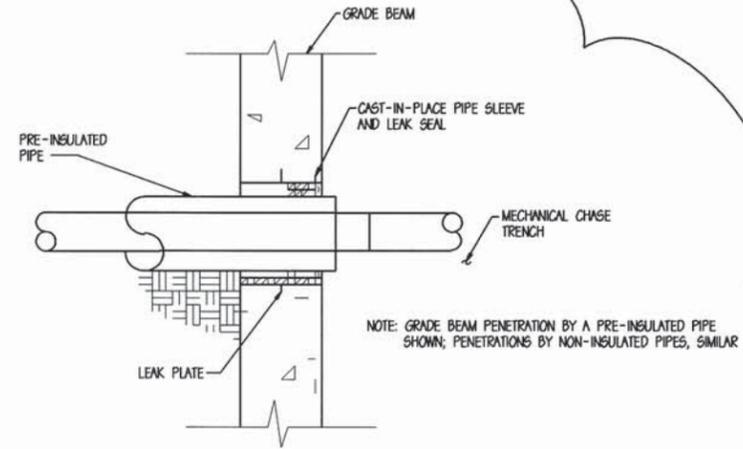
M-17



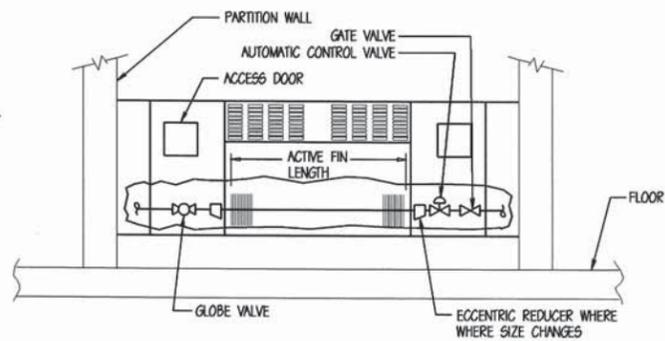
GUY WIRE ATTACHMENT TO DUCT DETAIL
NO SCALE



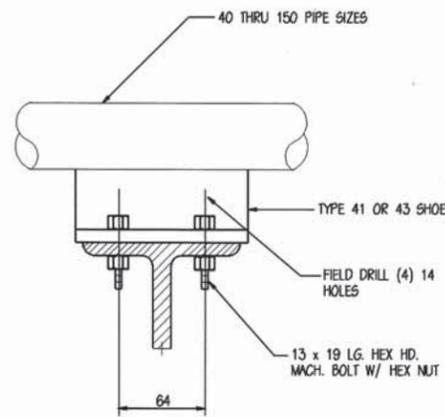
DETAIL OF WATERSHED
NO SCALE



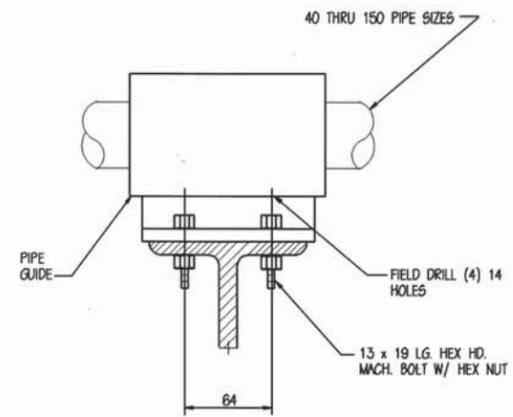
GRADE BEAM PENETRATION DETAIL
NO SCALE



FINNED TUBE RADIATION DETAIL
NOT TO SCALE



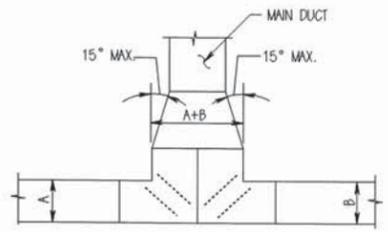
3.2 U ANCHOR FOR 40-150 LINES ON SHOES
NO SCALE



PIPE GUIDE DETAIL
NO SCALE

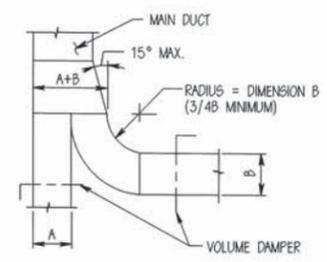
NOTE
SPACE PIPE GUIDES AS SHOWN ON DRAWINGS M-4 AND M-5 AND AS RECOMMENDED BY MANUFACTURER

DEPARTMENT OF THE NAVY NAVAL STATION NAVAL FACILITIES ENGINEERING COMMAND NOF/OLC, VIRGINIA		ATLANTIC DIVISION NAVAL STATION, NORFOLK VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING DETAILS		WHITMAN, REGUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. 186520-05-E-2008 DATE 05/01/08 APPROVED FOR SATISFACTORY TO APPROVED FOR COMMANDER NAVFAC	
U.S. E.P.S. JUNIOR DESIGN JUNIOR DRAWN JUNIOR CHECKED JUNIOR IN CHARGE PROJECT MANAGER FIRE PROTECTION BRANCH MANAGER REGION DIRECTOR	REVISIONS NO. DATE DESCRIPTION 1 7/2/99 JDA APPROVED	FURNITURE CHANGES/COMMENTS REVISIONS 1 7/2/99 JDA APPROVED			
CODE ID. NO. X SCALE NTB		EFD NO. P-320		STA. PROJ. NO. 05-94-4191	
SPEC. NO. 05-94-4191		CONSTN. CONTR. NO. NS2470-94-B-4191		NAVFAC DRAWING NO.	
SHEET 116-5 OF 196		M-17A		FEBRUARY 25, 1997	



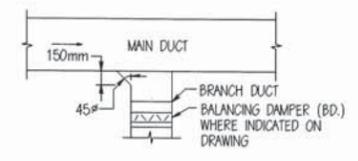
RECTANGULAR ELBOW DUCT TEE DETAIL
NOT TO SCALE

M2 M3 M17



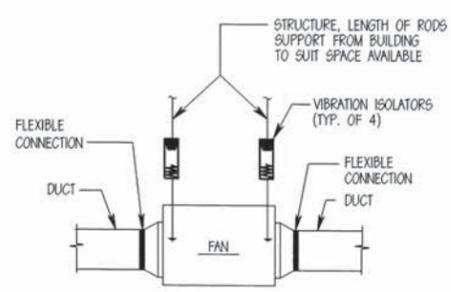
MAJOR DUCT BRANCH DETAIL
NOT TO SCALE

M2 M3 M17



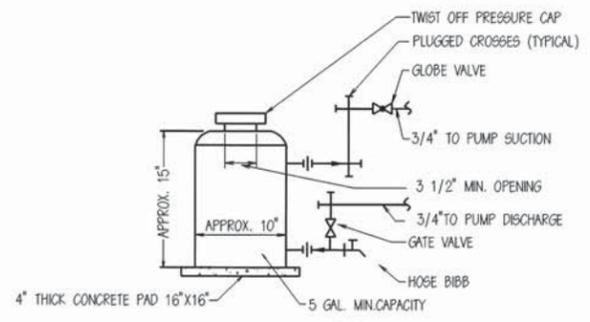
TYPICAL BRANCH CONNECTION
NOT TO SCALE

M2, M3 M3 M17



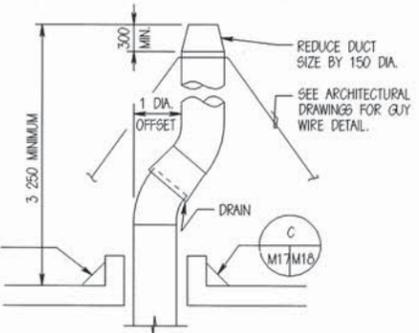
CENTRIFUGAL IN-LINE FAN DETAIL
NOT TO SCALE

M7 M17



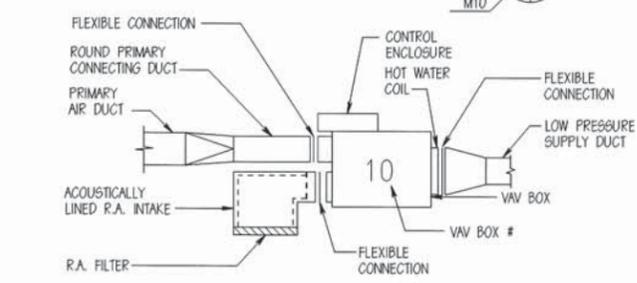
SHOT FEEDER
NO SCALE

M12 M14 M17



TYPICAL STACK DETAIL
NOT TO SCALE

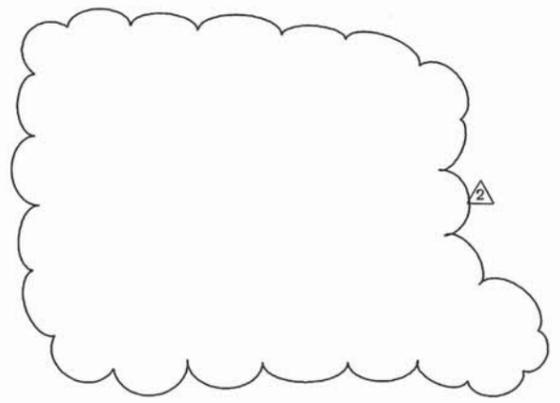
M6 M17



SERIES FLOW FAN POWERED VAV TERMINAL BOX
TYPICAL DETAIL DUCT CONNECTIONS

NOT TO SCALE

M2 M3 M17



VAV ACOUSTICAL ELBOW AIR INLET SIZES

UNIT SIZE	RETURN AIR ELBOW INLET SIZES IN mm WITH 25mm ACOUSTICAL LINING	FILTER SIZE mm	FILTER VELOCITY MAX. M/S	REMARKS
6		610x305x25	1.52	TYPICAL OF ALL VAV BOXES OF THIS SIZE UNLESS OTHERWISE NOTED ON M-2 & M-3
8		635x405x25	1.52	TYPICAL OF ALL VAV BOXES OF THIS SIZE UNLESS OTHERWISE NOTED ON M-2 & M-3
10 12		665x485x25	2.05	TYPICAL OF ALL VAV BOXES OF THIS SIZE UNLESS OTHERWISE NOTED ON M-2 & M-3
14		665x485x25	1.52	TYPICAL OF ALL VAV BOXES OF THIS SIZE UNLESS OTHERWISE NOTED ON M-2 & M-3

NOTE : SEVERAL ROOMS HAVE ACOUSTICALLY LINED RETURN AIR DUCTS WITH FILTERS INSTEAD OF ELBOWS. REFER TO FLOOR PLANS ON M-2 AND M-3

UNIT HEATER SCHEDULE

UNIT I.D.	FAN			HEATING COIL								LOCATION		
	V	PH	HZ	MOTOR (KW)	AIR FLOW (L/S)	EAT (DEG. C)	LAT (DEG. C)	LOAD (KW)	EWT (DEG. C)	LWT (DEG. C)	WATER FLOW (L/S)		MIN. # OF ROWS	MAX ESP (Pa)
UH - 1	120	1	60	0.37	560	10	35	16.8	80	70	0.4	1	53.8	1ST MR
UH - 2	120	1	60	0.37	560	10	35	16.8	80	70	0.4	1	53.8	1ST ER
UH - 3	120	1	60	0.37	500	10	35	15.0	80	70	0.4	1	53.8	AIR COMP.
UH - 4	120	1	60	0.37	800	10	35	24.0	80	70	0.6	1	53.8	AIR COMP.
UH - 5	120	1	60	0.37	240	10	35	7.2	80	70	0.2	1	53.8	2ND MR
UH - 6	120	1	60	0.37	690	10	35	20.7	80	70	0.5	1	53.8	DIVERS
UH - 7	120	1	60	0.37	727	10	35	21.8	80	70	0.5	1	53.8	RIGGING
UH - 8	120	1	60	0.37	497	10	35	14.9	80	70	0.4	1	53.8	RUB. & PLAS.

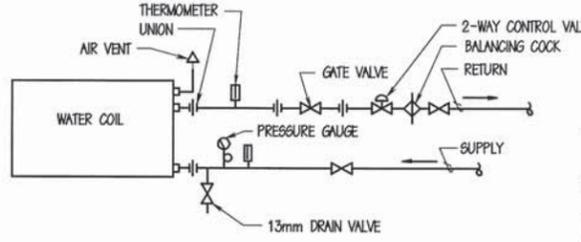
DUST COLLECTOR SCHEDULE

UNIT I.D.	AREA SERVED	MAX (L/S)	EXTERNAL SP (KPa)	SHAKER (KW)	MOTOR (KW)	ELECTRICAL			CONTROL METHOD	LOCATION	REMARKS
						V	PH	HZ			
DC - 1	R4P SANDERS	2230	1.29	0.56	11.19	480	3	60	IL W/5600,5121 5106,5604	MEZZANINE	W/EXPLOSION RELIEF VENTS
DC - 2	R4P DOWNDRAFT TABLE	2265	0.56	0.56	11.19	480	3	60	IL W/K106	MEZZANINE	W/EXPLOSION RELIEF VENTS

FINNED TUBE RADIATION (FTR) SCHEDULE

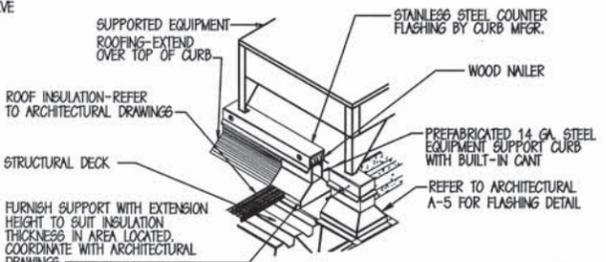
UNIT I.D.	AREA SERVED	ELEMENT			ENCLOSURE			L/S	MAX. PD Pa	
		W	LENGTH MM.	ROWS	TUBE DIA. MM.	LENGTH mm.	WIDTH mm.			HEIGHT mm.
FR-1	2ND FLOOR WOMEN'S TOILET	273	610	1	32	915	89	203	0.006	248
FR-2	2ND FLOOR MEN'S TOILET	302	610	1	32	915	89	203	0.006	248

DEPARTMENT OF THE NAVY
 NAVAL STATION
 ATLANTIC DIVISION
 NAVAL FACILITIES ENGINEERING COMMAND
 NORFOLK, VIRGINIA
 NAVAL STATION, NORFOLK VIRGINIA
 SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)
 UTILITY UPGRADE AND EXPANSION
 WATERFRONT SUPPORT BUILDING
 SCHEDULES AND DETAILS
 WHITMAN, REGUARD AND ASSOCIATES
 ENGINEERS
 BALTIMORE, MARYLAND
 PROJECT MANAGER: [Name]
 DATE: [Date]
 APPROVED: [Signature]
 ACTIVITY - SATISFACTORY TO: [Name]
 APPROVED: [Signature]
 FOR PFD FOR COMMANDER NAVFAC
 REVISIONS
 NO. DESCRIPTION DATE APPROVED
 1 FURNITURE CHANGES/COMMENTS REVISIONS 7/2/99 JOA
 2 FURNITURE CHANGES 5/15/99 JOA
 3 [Blank] [Blank] [Blank] [Blank]



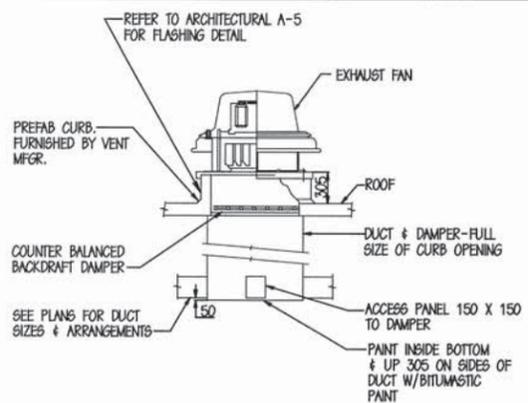
HOT WATER COIL CONNECTION FOR UH'S AND VAV'S

NOT TO SCALE
M4, M5, M7 M12/M16



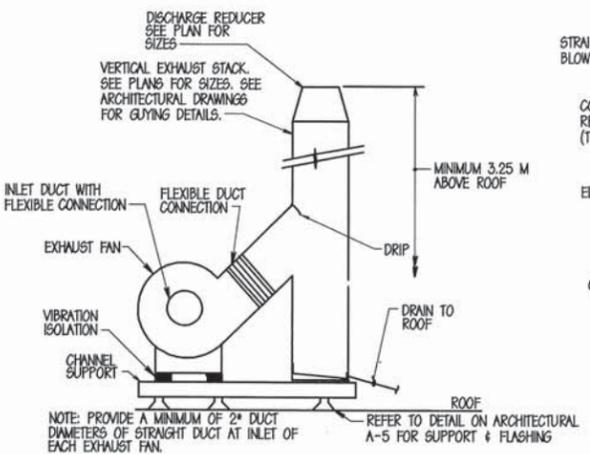
ROOF EQUIPMENT SUPPORT DETAIL

NO SCALE
M10/M16



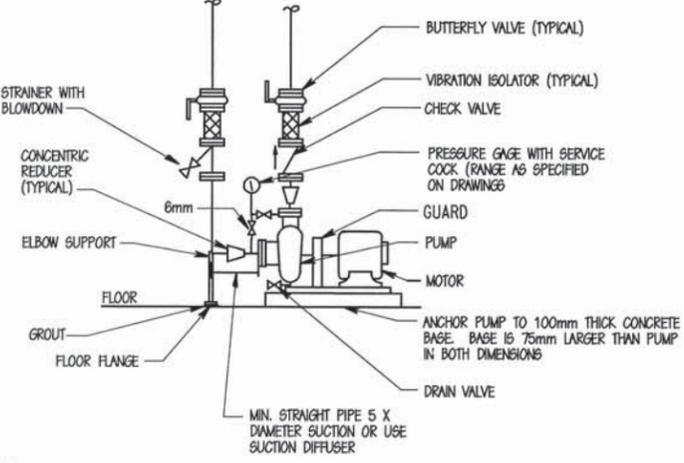
ROOF EXHAUST FAN DETAIL

NOT TO SCALE
M6 M10/M16



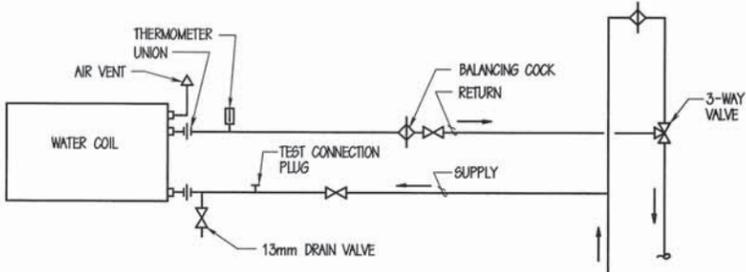
TYPICAL EXHAUST FAN W/ VERTICAL STACK

NOT TO SCALE
M6 M10/M16



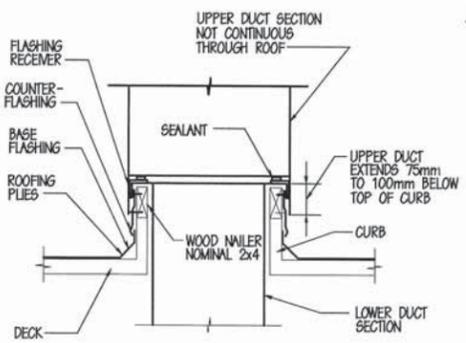
CENTRIFUGAL PUMP

NOT TO SCALE
M7 M16



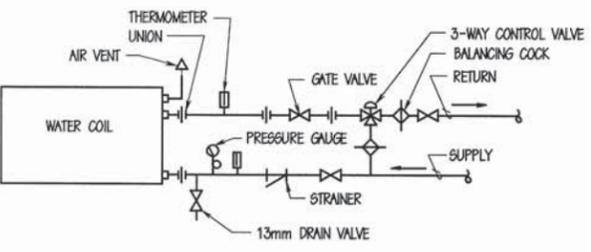
HOT WATER COIL CONNECTION FOR UNIT ON END OF BRANCH

NOT TO SCALE
M4, M5, M7, M9 M12/M16



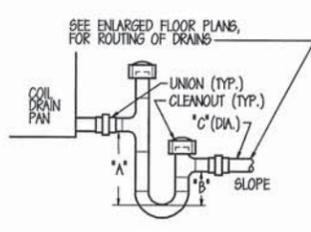
DUCT PENETRATION OF ROOF

NOT TO SCALE
M6, M10/M16



HOT WATER COIL CONNECTION FOR AHU'S AND HV'S

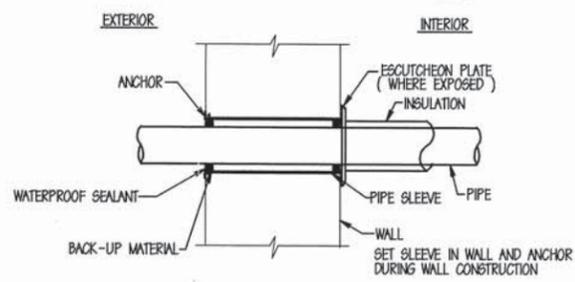
NOT TO SCALE
M4, M5, M7, M9 M12/M16



COIL CONDENSATE TRAP DETAIL

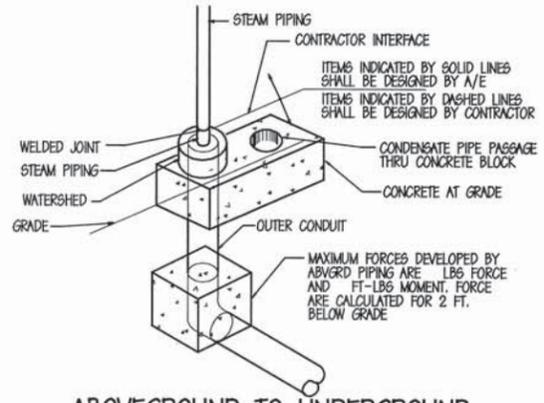
NO SCALE
M12, M13

TRAP SIZING SCHEDULE			
UNIT SERVED	A	B	C
AHU-1	450	300	40
AHU-2	450	300	40



PIPE SLEEVE THRU UNDERGROUND EXTERIOR WALL

NO SCALE
M12 M13/M16



ABOVEGROUND TO UNDERGROUND STEAM DETAIL

NO SCALE
M12 M13/M16

NO.	DATE	DESCRIPTION	APPROVED

WHITMAN, REGARDI AND ASSOCIATES
ENGINEERS
BALTIMORE, MARYLAND
A/E CONTRACT NO. 18832-82-058
DATE 2/19/87
ACTIVITY - SATISFACTORY TO
FOR ETD FOR COMMANDER NAVFAC

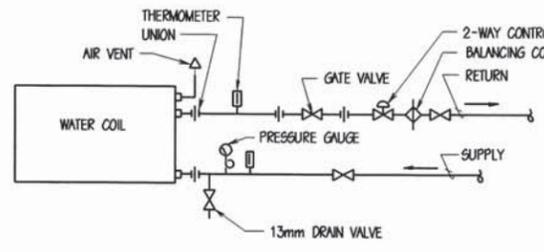


NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA
ATLANTIC DIVISION
NAVAL STATION, NORFOLK VIRGINIA
SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)
UTILITY UPGRADE AND EXPANSION
WATERFRONT SUPPORT BUILDING
DETAILS

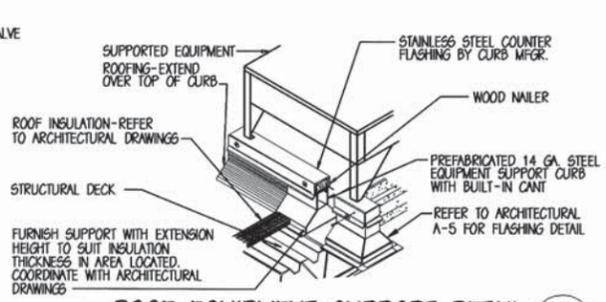
CODE I.D. NO. X	SCALE	AI
SCALE - NOT TO SCALE	451732	
EPD NO.	P-320	
STA. PROJ. NO.	05-94-4191	
SPEC. NO.	CONSTR. CONTR. NO.	
	N62470-94-B-4191	
NAVFAC DRAWING NO.	4351732	
SHEET 117 OF 196		

M-16

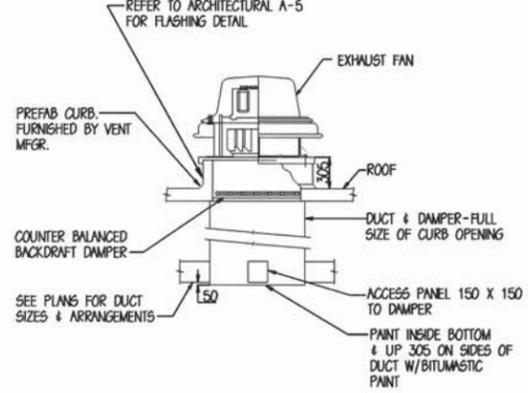
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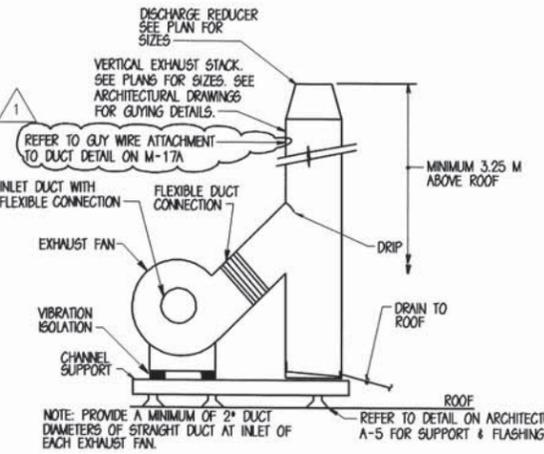
HOT WATER COIL CONNECTION FOR UH'S AND VAV'S
NOT TO SCALE



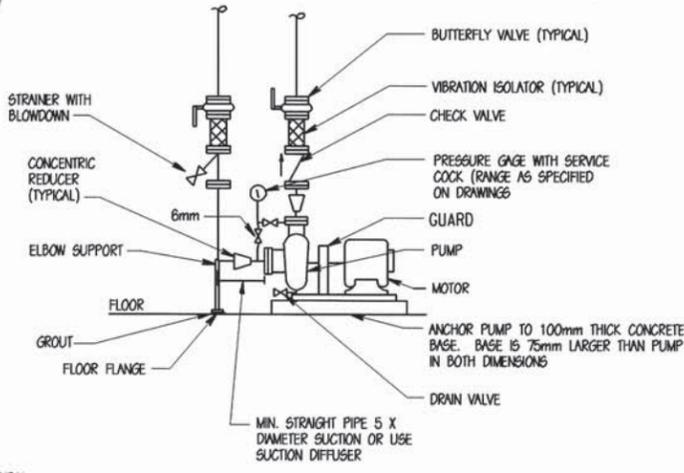
ROOF EQUIPMENT SUPPORT DETAIL
NO SCALE



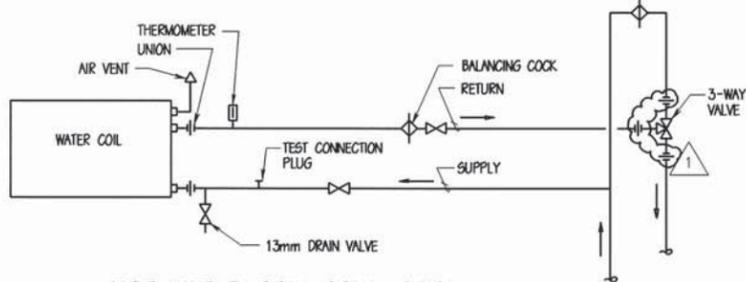
ROOF EXHAUST FAN DETAIL
NOT TO SCALE



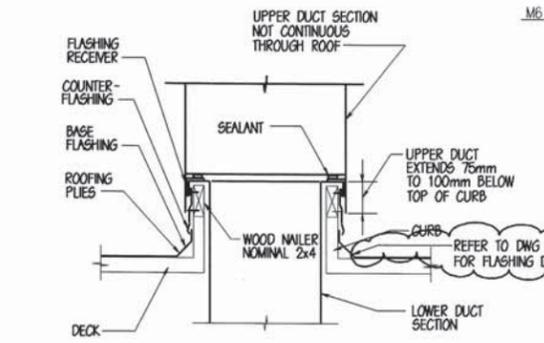
TYPICAL EXHAUST FAN W/ VERTICAL STACK
NOT TO SCALE



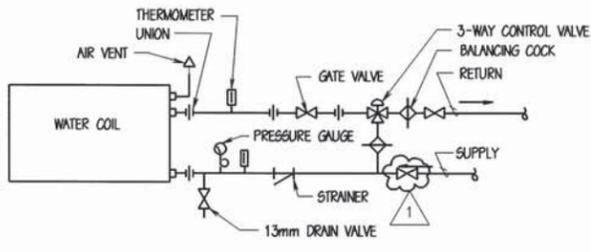
CENTRIFUGAL PUMP
NOT TO SCALE



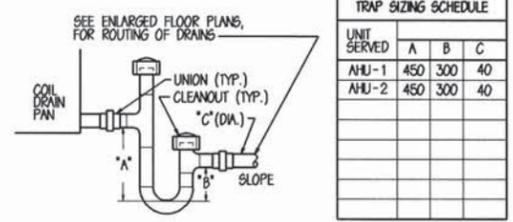
HOT WATER COIL CONNECTION FOR UNIT ON END OF BRANCH
NOT TO SCALE



DUCT PENETRATION OF ROOF
NOT TO SCALE

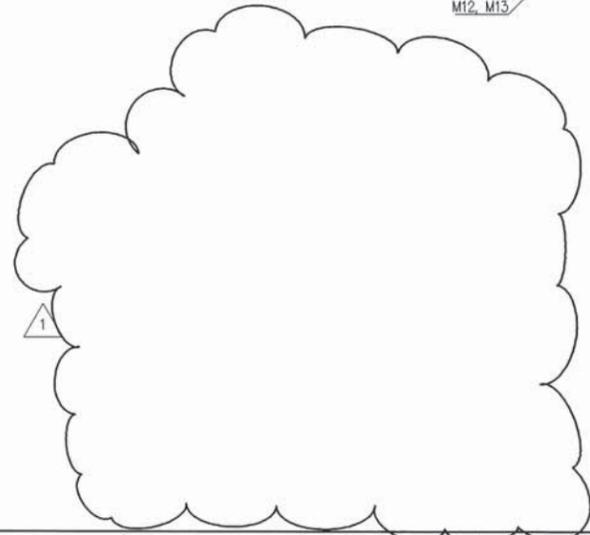
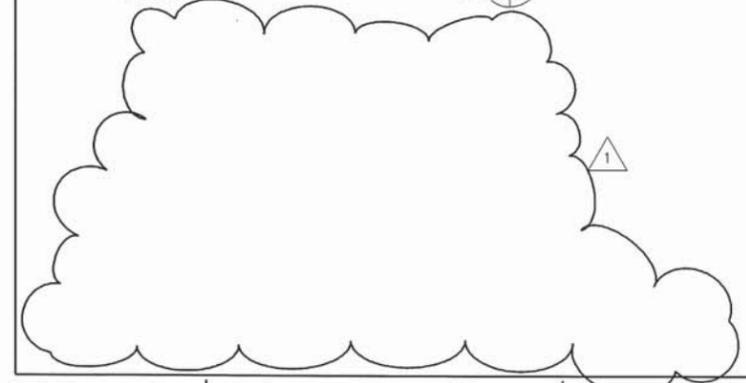


HOT WATER COIL CONNECTION FOR AHU'S AND HV'S
NOT TO SCALE



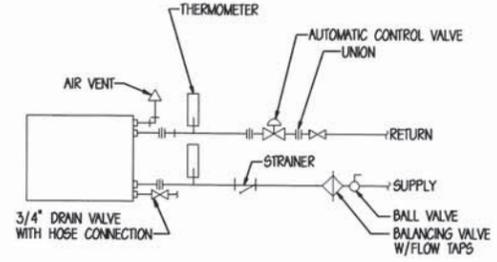
COIL CONDENSATE TRAP DETAIL
NO SCALE

UNIT SERVED	A	B	C
AHU-1	450	300	40
AHU-2	450	300	40

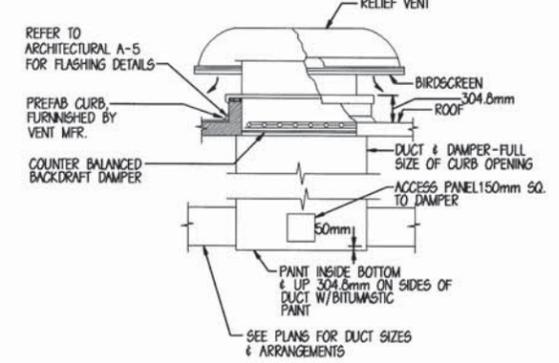


<p>REVISIONS</p> <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> <tr> <td>1</td> <td>7/2/98</td> <td>FURNITURE CHANGES (COMMENTS, REVISIONS)</td> </tr> </table>		NO.	DATE	DESCRIPTION	1	7/2/98	FURNITURE CHANGES (COMMENTS, REVISIONS)	<p>APPROVED</p> <p>DATE</p> <p>JOA</p>
NO.	DATE	DESCRIPTION						
1	7/2/98	FURNITURE CHANGES (COMMENTS, REVISIONS)						
<p>DESIGNER</p> <p>CHECKER</p> <p>PROJECT MANAGER</p> <p>QUALITY CONTROL</p> <p>BRANCH MANAGER</p> <p>DESIGN DIRECTOR</p>		<p>SYMBOL</p>						
<p>WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND</p> <p>A/E CONTRACT NO. 18820-25-D-2558</p> <p>ACTIVITY - SATISFACTORY TO APPROVED</p> <p>FOR ETO FOR COMMANDER NAVFAC</p>								
<p>ATLANTIC DIVISION</p> <p>NAVAL STATION, NORFOLK VIRGINIA</p> <p>SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION</p> <p>WATERFRONT SUPPORT BUILDING</p> <p>DETAILS</p>								
<p>CODE ID. NO. X</p> <p>SCALE - NOT TO SCALE</p> <p>EFD NO. 451732</p> <p>STA. PROJ. NO. P-320</p> <p>SPEC. NO. 05-94-4191</p> <p>CONSTR. CONTR. NO. N62470-94-B-4191</p> <p>NAVFAC DRAWING NO. 4351732</p> <p>SHEET 117 OF 196</p> <p>M-1B</p>								

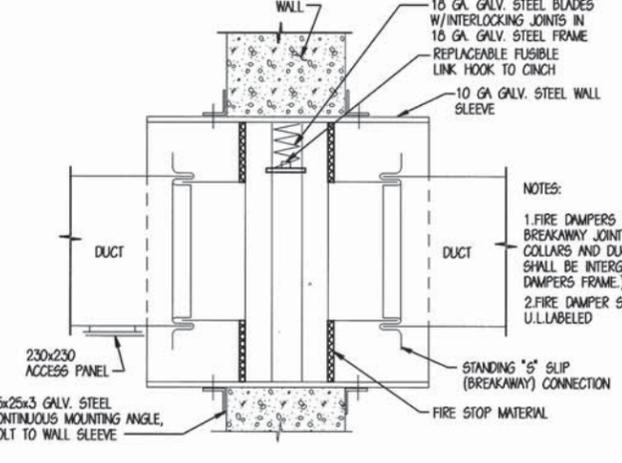
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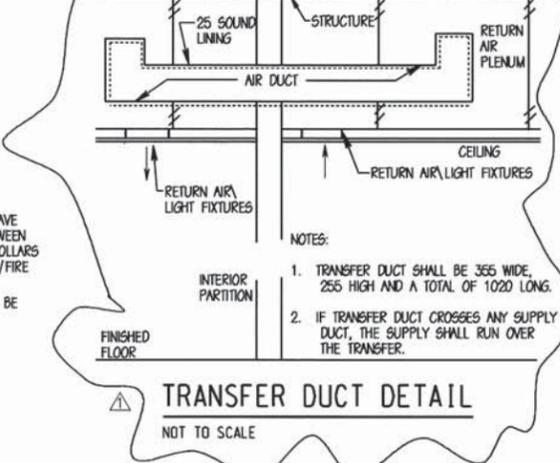
COOLING COIL PIPING DETAIL
NOT TO SCALE
M7 M12 M19



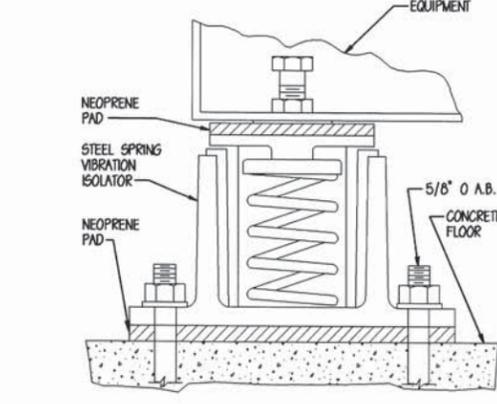
TYPICAL RELIEF VENT DETAIL
NOT TO SCALE
M6 M10 M19



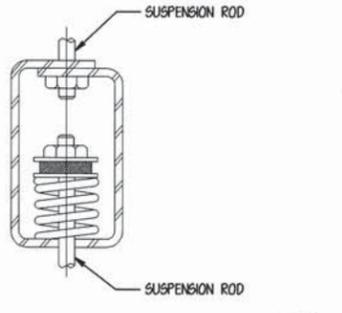
HORIZONTAL DUCT FIRE DAMPER
NOT TO SCALE
SEE NOTES THIS SHEET
M2 M19



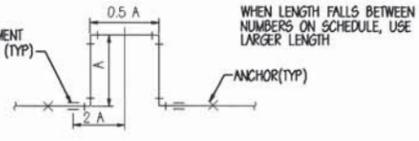
TRANSFER DUCT DETAIL
NOT TO SCALE



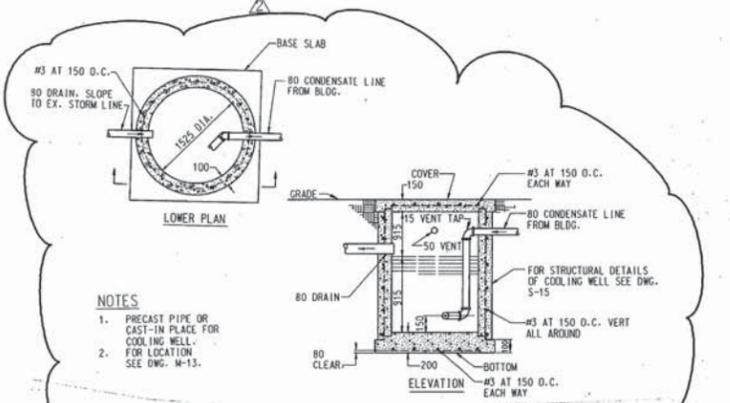
VIBRATION ISOLATOR DETAIL
NOT TO SCALE
M7 M9 M19



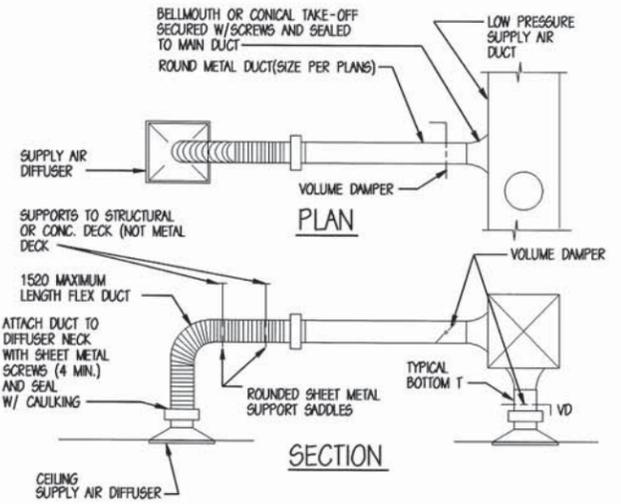
LENGTH BETWEEN ANCHORS (M)	PIPE SIZES (MM)							
	20	25	30	40	50	65	80	100
15	914	1219	1219	1524	1524	1524	1524	1829
30	1219	1524	1524	1829	1829	1676	1829	2134
45	1524	1829	1981	2134	2286	2134	2286	2591
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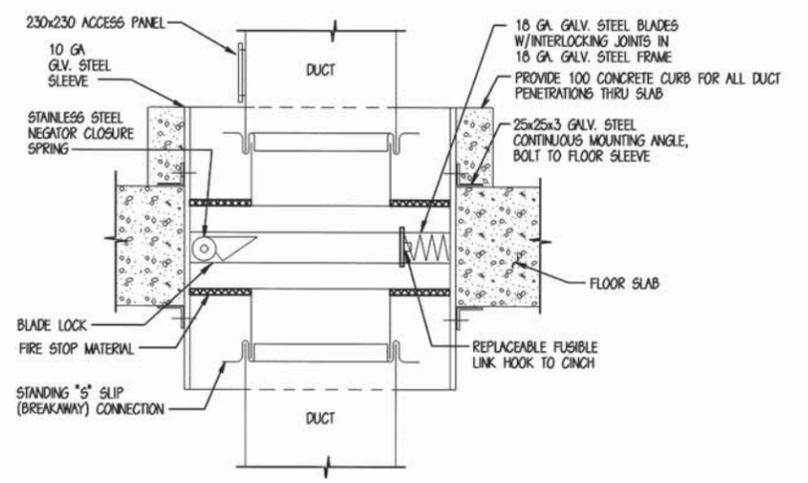
EXPANSION LOOP DETAIL
NOT TO SCALE
M4 M5 M19



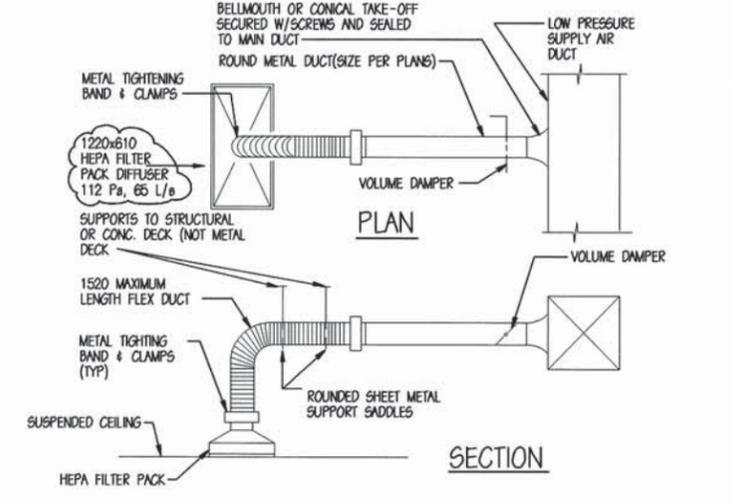
SECTION COOLING WELL DETAIL
NOT TO SCALE
M3 M19



ROUND NECK DIFFUSER DETAIL
NOT TO SCALE
M2 M3 M19



VERTICAL DUCT FIRE DAMPER
NOT TO SCALE
M2 M19



ROUND NECK HEPA FILTER PACK DIFFUSER DETAIL
NOT TO SCALE
M2 M19

DESIGN	DATE	BY	REVISED	DATE	BY
PROJECT MANAGER	7/2/86	JOA	FURNITURE CHANGES/COMMENTS REVISIONS	5/15/86	JOA
FIRE PROTECTION			FURNITURE CHANGES		
QUALITY CONTROL					
BRANDY MANAGER					
DESIGN DIRECTOR					

WHITMAN, REQUARDT AND ASSOCIATES
ENGINEERS
BALTIMORE, MARYLAND

APPROVED: WILLIAM A. DELOACH
REGISTERED PROFESSIONAL ENGINEER
STATE OF VIRGINIA
No. 00000

ATLANTIC DIVISION
NAVAL STATION, NORFOLK, VIRGINIA
SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)
UTILITY UPGRADE AND EXPANSION
WATERFRONT SUPPORT BUILDING
DETAILS

CODE NO. 1
SCALE: 1/8" = 1'-0"
EFD NO. 451733
STA. PROJ. NO. P-320
SPEC. NO. 06-94-4191
CONSTR. CONTR. NO. N62470-94-B-4191
NAVFAC DRAWING NO. 4361733
SHEET 118 OF 196

M-19

8 7 6 5 4 3 2 1

A. GENERAL

CONTROL SYSTEM SHALL BE DIGITAL/ELECTRIC. THE PRIMARY BUILDING AUTOMATION SYSTEM TERMINAL (BAST) IS LOCATED IN THE SECOND FLOOR MECHANICAL ROOM. THERE ARE THREE DIFFERENT TYPES OF CONTROL SYSTEMS FOR HVAC EQUIPMENT.

TYPE 1: BUILDING SYSTEM OPERATED ON AN OCCUPIED/UNOCCUPIED CYCLE DETERMINED BY A SCHEDULE (TO BE DETERMINED BY USER) IN THE DDC CONTROLLER SCHEDULE FOR OPERATION DURING OCCUPIED PERIODS. MANUAL OVERRIDE CONTROL SHALL BE PROVIDED LOCALLY.

AHU-1 MU-1 EF-5 HV-1 HV-3
AHU-2 MU-2 HV-2 HV-5

TYPE 2: MANUALLY OPERATED SYSTEM, LOCALLY OPERATED FROM POINT OF USE.

EF-6 EF-8 EF-10 EF-12 EF-18 DC-1 HV-4
EF-7 EF-9 EF-11 EF-15 EF-4 DC-2

TYPE 3: TEMPERATURE OPERATED EXHAUST SYSTEM WHICH SHALL OPERATE ON A RISE IN SPACE TEMPERATURE ABOVE SETPOINT.

EF-1 EF-3 EF-16 EF-17

B. BUILDING PRESSURIZATION
RUBBER AND PLASTIC (136) NEGATIVE
MAST REFRUBISHMENT (137) NEGATIVE
ANTENNA (136) POSITIVE
OPTICAL (127) NEUTRAL
OFFICE AREAS NEUTRAL

C. AHU-1 AND AHU-2 - VARIABLE AIR VOLUME (TYPE 1 SEQUENCE)

UNITS SHALL RUN UNDER CONTROL TYPE 1 OF THE DDC CONTROL SCHEDULE. AT THE BEGINNING OF THE OCCUPIED PERIOD, OUTSIDE AIR DAMPERS SHALL BE FULLY CLOSED, MAKE UP AIR FAN SHALL BE DE-ENERGIZED, AND SUPPLY FAN SHALL BE ENERGIZED. THE INITIAL RETURN AIR TEMPERATURE SHALL DETERMINE IF THE UNIT SHALL OPERATE UNDER MORNING COOL DOWN, MORNING WARM UP, OR OCCUPIED MODES AS DESCRIBED BELOW.

MORNING COOL DOWN: IF THE INITIAL RETURN AIR TEMPERATURE IS ABOVE 24 C (ADJUSTABLE), LC-1 SHALL OPERATE UNDER ITS OWN CONTROLS TO MAINTAIN 11.3 C SUPPLY AIR TEMPERATURE. WHEN RETURN AIR TEMPERATURE REACHES 24 C, CONTROLS SHALL REVERT TO OCCUPIED MODE.

MORNING WARM UP: IF THE INITIAL RETURN AIR TEMPERATURE IS BELOW 20 C (ADJUSTABLE), THE 3-WAY VALVE ON THE PREHEATING COIL SHALL BE FULLY OPEN. WHEN THE RETURN AIR TEMPERATURE REACHES 20 C, CONTROLS SHALL REVERT TO OCCUPIED MODE.

OCCUPIED MODE: IF THE INITIAL RETURN AIR TEMPERATURE IS BETWEEN 20 AND 24 C, THE UNIT SHALL RUN UNDER THE OCCUPIED MODE. ONCE THE UNIT IS IN OCCUPIED MODE, THE MAKE-UP AIR FAN SHALL BE ENERGIZED AND OUTSIDE AIR DAMPERS AND RELIEF DAMPERS SHALL OPEN TO CONSTANT POSITION.

AHU-1: 1970 L/S OUTSIDE AIR
AHU-2: 1330 L/S OUTSIDE AIR

THE AIR FLOW MONITORING STATIONS SHALL MONITOR THE INCOMING OUTSIDE AIR FLOW AND, ON SENSING LOW AIR FLOW, SHALL SIGNAL AN ALARM ON THE BAST.

SUPPLY AIR TEMPERATURE SENSOR, THROUGH DISCHARGE AIR CONTROLLER, SHALL MODULATE VALVE ON COOLING COIL TO MAINTAIN DISCHARGE TEMPERATURE (11.3 C ADJUSTABLE). (AHU-1; 3-WAY: AHU-2; 2-WAY)

DISCHARGE AIR STATIC PRESSURE SENSOR, LOCATED AS SHOWN ON DRAWINGS M-2 AND M-3, MODULATE SUPPLY AIR FAN VFD TO MAINTAIN SET POINT. HIGH LIMIT STATIC PRESSURE SWITCH LOCATED IN SUPPLY DUCT SHALL SHUT DOWN UNIT ON HIGH PRESSURE.

WHEN OUTSIDE AIR TEMPERATURE FALLS BELOW A PREDETERMINED (ADJUSTABLE) SETTING, THE SUPPLY AIR TEMPERATURE SENSOR, THROUGH DISCHARGE AIR CONTROLLER, SHALL MODULATE 3-WAY VALVE ON PREHEATING COIL TO MAINTAIN SETPOINT (11.3 C ADJUSTABLE).

NIGHT SETBACK: WHEN UNIT IS INDEXED TO UNOCCUPIED MODE, OUTSIDE AIR AND RELIEF DAMPERS SHALL CLOSE, AND SUPPLY AND MAKE-UP AIR FANS SHALL BE DE-ENERGIZED. IF TEMPERATURE IN A ZONE RISES ABOVE 30 C (ADJUSTABLE), SUPPLY FANS SHALL START AND LC-1 SHALL PROVIDE COOLING UNTIL ZONE TEMPERATURE FALLS BELOW 30 C. FANS SHALL RUN FOR 15 MINUTES MINIMUM. WHEN ZONE TEMPERATURE FALLS BELOW 30 C, SUPPLY FANS SHALL BE DE-ENERGIZED. IF TEMPERATURE IN A ZONE FALLS BELOW 16 C (ADJUSTABLE), SUPPLY FANS SHALL BE ENERGIZED. 3-WAY VALVE ON PREHEATING COIL SHALL BE FULLY OPEN, AND SWC-1 SHALL PROVIDE HEATING UNTIL ZONE TEMPERATURE RISES ABOVE 16 C. WHEN ZONE TEMPERATURE RISES ABOVE 16 C, SUPPLY FANS SHALL BE DE-ENERGIZED.

PROVIDE TIMED LOCAL OVERRIDE SWITCH FOR UNIT ON EACH FLOOR NEAR MAIN STAIRS AS SHOWN ON DRAWINGS M-2 AND M-3.

THE DUCT SMOKE DETECTOR, LOCATED IN SUPPLY AND RETURN AIR DUCTS, SHALL DE-ENERGIZE UNIT ON SENSING PRODUCTS OF COMBUSTION.

CONSTANT VOLUME SERIES FAN-POWERED MIXING BOXES

THE FAN SHALL BE ENERGIZED BEFORE ANY PRIMARY AIR IS SUPPLIED TO A SERIES FLOW FAN TERMINAL. THE COLD PRIMARY AIR FROM THE AHU IS PROVIDED TO THE TERMINAL THROUGH A VAV DAMPER ASSEMBLY AND MIXED WITH RECIRCULATED RETURN AIR FROM THE CONDITIONED SPACE. ALL AIR PASSES THROUGH THE FAN TO THE DISCHARGE DUCT. THIS IS A CONSTANT VOLUME UNIT, ALWAYS PROVIDING THE SPACE WITH A STEADY CIRCULATION ACCORDING TO THE FAN SETTING AND THE DISCHARGE RESISTANCE. ALL UNITS SHALL BE EQUIPPED WITH FAN SPEED CONTROL REGULATOR.

A ROOM WALL-MOUNTED THERMOSTAT, LOCATED AS SHOWN ON M-2 AND M-3, ACTING THROUGH A MICROPROCESSOR-BASED VAV BOX CONTROLLER, SHALL MODULATE THE SUPPLY AIR CONTROL DAMPER TO MAINTAIN THE COOLING SETPOINT (24 C ADJUSTABLE) UNTIL THE SUPPLY AIR DAMPER CLOSURES TO MINIMUM SUPPLY AIR FLOW.

SEQUENCE OF OPERATION

WHEN THE SPACE TEMPERATURE CALLS FOR HEAT AFTER THE SUPPLY AIR DAMPER IS CLOSED TO MINIMUM FLOW (WINTER MODE), THE VAV HEATING WATER COIL SHALL BE CONTROLLED BY A 2-WAY VALVE TO MAINTAIN THE HEATING SETPOINT (20 C ADJUSTABLE).

WHEN PAINT SPRAY BOOTH P412 IS ENERGIZED LOCALLY, VAV-16 SHALL DE-ENERGIZE AND HV-4 SHALL ENERGIZE.

WHEN THE RECOMP. EQUIPMENT IS ENERGIZED, EF-4 SHALL BE ENERGIZED AND THE MOD ON THE RETURN DUCT SHALL CLOSE. WHEN THE EQUIP. IS DE-ENERGIZED, THE OPPOSITE SHALL OCCUR.

D. HV-1 - CONSTANT VOLUME (TYPE 1 SEQUENCE)

UNIT SHALL RUN UNDER CONTROL TYPE 1 OF THE DDC CONTROL SCHEDULE. WHEN THE SUPPLY FAN STARTS, EF-13 AND 14 SHALL START AND THE OUTSIDE AIR DAMPER SHALL OPEN. THE OUTSIDE AIR DAMPER SHALL BE OPEN TO ITS MINIMUM POSITION WHEN D934 IS TURNED "OFF" AND SHALL BE FULLY OPENED WHEN D934 IS TURNED "ON." WHEN THE UNIT IS DE-ENERGIZED, THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED.

WHEN THE ROOM AIR TEMPERATURE FALLS BELOW A PREDETERMINED (ADJUSTABLE) SETTING, THE WALL MOUNTED ROOM TEMPERATURE SENSOR SHALL MODULATE THE THREE-WAY VALVE ON THE HEATING COIL TO MAINTAIN ROOM TEMPERATURE (20 C ADJUSTABLE). WHEN THE ROOM AIR TEMPERATURE RISES ABOVE THE ROOM TEMPERATURE SETPOINT, THE 3-WAY VALVE SHALL BE FULLY CLOSED.

DUCT SMOKE DETECTORS, LOCATED IN THE SUPPLY AIR AND RETURN AIR DUCTS, SHALL SHUT DOWN UNIT ON SENSING PRODUCTS OF COMBUSTION AND SIGNAL AN ALARM ON THE BAST.

PROVIDE TIMED LOCAL OVERRIDE SWITCH NEAR ROOM WALL-MOUNTED THERMOSTAT.

E. HV-2 - CONSTANT VOLUME (TYPE 1 SEQUENCE)

UNIT SHALL RUN UNDER CONTROL TYPE 1 OF THE DDC CONTROL SCHEDULE. WHEN THE UNIT IS DE-ENERGIZED, THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED. WHEN THE SUPPLY FAN STARTS, EF-6 SHALL START, THE OUTSIDE AIR DAMPER SHALL OPEN TO ITS MINIMUM POSITION, THE RETURN AIR DAMPER SHALL OPEN, AND THE FAN SHALL RUN ON ITS MINIMUM POSITION. IF ANY EQUIPMENT (EXCEPT 0103 OR 0115) IS TURNED "ON," ITS INTERLOCKED DUST COLLECTOR OR EXHAUST FAN SHALL TURN "ON." IF THIS OCCURS, THE RETURN AIR DAMPER SHALL CLOSE, THE OUTSIDE AIR DAMPER SHALL OPEN TO ITS MAXIMUM POSITION, AND THE WALL MOUNTED ROOM PRESSURE SENSOR SHALL, THROUGH THE STATIC PRESSURE CONTROLLER, MODULATE THE SUPPLY AIR FAN VFD TO MAINTAIN SETPOINT. AN EXHAUST FAN OR DUST COLLECTOR SHALL TURN "ON" IF ANY OF THE EQUIPMENT THAT IT SERVES IS TURNED "ON." AN EXHAUST FAN OR DUST COLLECTOR SHALL TURN "OFF" IF ALL OF THE EQUIPMENT THAT IT SERVES IS TURNED "OFF." THE EQUIPMENT WITH ITS INTERLOCKED DUST COLLECTOR OR EXHAUST FAN ARE LISTED BELOW.

T511 EF-7 P405 EF-8 S121 DC-1 S604 DC-1 0103 EF-6
T531 EF-7 S600 DC-1 S108 DC-1 K108 DC-2 0115 EF-6

WHEN THE ROOM AIR TEMPERATURE FALLS BELOW A PREDETERMINED (ADJUSTABLE) SETTING, THE WALL MOUNTED ROOM TEMPERATURE SENSOR SHALL MODULATE THE THREE-WAY VALVE ON THE HEATING COIL TO MAINTAIN ROOM TEMPERATURE (20 C ADJUSTABLE). WHEN THE ROOM AIR TEMPERATURE RISES ABOVE THE ROOM TEMPERATURE SETPOINT, THE 3-WAY VALVE SHALL BE FULLY CLOSED.

DUCT SMOKE DETECTORS, LOCATED IN THE SUPPLY AIR AND RETURN AIR DUCTS, SHALL SHUT DOWN UNIT ON SENSING PRODUCTS OF COMBUSTION AND SIGNAL AN ALARM ON THE BAST.

PROVIDE TIMED LOCAL OVERRIDE SWITCH NEAR ROOM WALL-MOUNTED THERMOSTAT.

F. HV-3 - CONSTANT VOLUME (TYPE 1 SEQUENCE)

UNIT SHALL RUN UNDER CONTROL TYPE 1 OF THE DDC CONTROL SCHEDULE. WHEN THE SUPPLY FAN STARTS, EF-13 SHALL START AND THE OUTSIDE AIR DAMPER SHALL OPEN. WHEN THE UNIT IS DE-ENERGIZED, THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED.

WHEN THE ROOM AIR TEMPERATURE FALLS BELOW A PREDETERMINED (ADJUSTABLE) SETTING, THE WALL MOUNTED ROOM TEMPERATURE SENSOR SHALL MODULATE THE THREE-WAY VALVE ON THE HEATING COIL TO MAINTAIN ROOM TEMPERATURE (20 C ADJUSTABLE). WHEN THE ROOM AIR TEMPERATURE RISES ABOVE THE ROOM TEMPERATURE SETPOINT, THE 3-WAY VALVE SHALL BE FULLY CLOSED.

PROVIDE TIMED LOCAL OVERRIDE SWITCH NEAR ROOM WALL-MOUNTED THERMOSTAT.

G. HV-4 - CONSTANT VOLUME (TYPE 2 SEQUENCE)

UNIT SHALL RUN UNDER CONTROL TYPE 2 OF THE DDC CONTROL SCHEDULE. WHEN P412 STARTS, THE SUPPLY FAN SHALL START, THE OUTSIDE AIR DAMPER SHALL OPEN, EF-18 SHALL START, THE MOD ON THE RETURN DUCT SHALL CLOSE, AND VAV-16 SHALL BE DE-ENERGIZED. WHEN THE UNIT IS DE-ENERGIZED, THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED. WHEN P412 STOPS, THE OPPOSITE SHALL OCCUR.

WHEN THE ROOM AIR TEMPERATURE FALLS BELOW A PREDETERMINED (ADJUSTABLE) SETTING AND P412 IS TURNED "ON," THE WALL MOUNTED ROOM TEMPERATURE SENSOR SHALL MODULATE THE THREE-WAY VALVE ON THE HEATING COIL TO MAINTAIN ROOM TEMPERATURE (20 C ADJUSTABLE). WHEN THE ROOM AIR TEMPERATURE RISES ABOVE THE ROOM TEMPERATURE SETPOINT, THE 3-WAY VALVE SHALL BE FULLY CLOSED.

DUCT SMOKE DETECTORS, LOCATED IN THE SUPPLY AIR DUCT, SHALL SHUT DOWN UNIT ON SENSING PRODUCTS OF COMBUSTION AND SIGNAL AN ALARM ON THE BAST.

PROVIDE TIMED LOCAL OVERRIDE SWITCH NEAR ROOM WALL-MOUNTED THERMOSTAT.

H. HV-5 - CONSTANT VOLUME (TYPE 1 SEQUENCE)

UNIT SHALL RUN UNDER CONTROL TYPE 1 OF THE DDC CONTROL SCHEDULE. WHEN THE SUPPLY FAN STARTS, THE OUTSIDE AIR DAMPER SHALL OPEN AND EF-5 SHALL START. WHEN THE UNIT IS DE-ENERGIZED, THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED.

WHEN THE ROOM AIR TEMPERATURE FALLS BELOW A PREDETERMINED (ADJUSTABLE) SETTING, THE WALL MOUNTED ROOM TEMPERATURE SENSOR SHALL MODULATE THE THREE-WAY VALVE ON THE HEATING COIL TO MAINTAIN ROOM TEMPERATURE (20 C ADJUSTABLE). WHEN THE ROOM AIR TEMPERATURE RISES ABOVE THE ROOM TEMPERATURE SETPOINT, THE 3-WAY VALVE SHALL BE FULLY CLOSED.

DUCT SMOKE DETECTORS, LOCATED IN THE SUPPLY AIR DUCT, SHALL SHUT DOWN UNIT ON SENSING PRODUCTS OF COMBUSTION AND SIGNAL AN ALARM ON THE BAST.

PROVIDE TIMED LOCAL OVERRIDE SWITCH NEAR ROOM WALL-MOUNTED THERMOSTAT.

I. TEMPERATURE OPERATED EXHAUST SYSTEMS (TYPE 3 SEQUENCE)

VENTILATION

ON RISE IN SPACE TEMPERATURE ABOVE SETPOINT (27 C), THERMOSTAT SHALL ENERGIZE EXHAUST FAN EF-1 AND OUTSIDE AIR MOD SHALL OPEN TO MAINTAIN COOLING SETPOINT.

HEATING

DURING WINTER SEASON, THERMOSTAT SHALL ENERGIZE UNIT HEATER UH-2 TO MAINTAIN HEATING SETPOINT (16 C ADJUSTABLE). COOLING SYSTEM SHALL BE LOCKED OUT IN HEATING CYCLE ABOVE SETPOINT (27 C).

SAME SEQUENCE OF OPERATION AS ABOVE WITH EXHAUST FANS AND/OR UNIT HEATERS AS FOLLOWS:

MECHANICAL ROOM (125): EF-1, UH-1
ELECTRICAL ROOM (126): EF-1, UH-2
AIR COMPRESSOR ROOM (139): EF-3, UH-3
AIR COMPRESSOR ROOM (146): EF-3, UH-4
MECHANICAL ROOM (228): EF-16, UH-5
DNERS (140): UH-6
RIGGING (133): UH-7
RUBBER AND PLASTIC (138): UH-8

J. HEATING WATER SYSTEM

HEATING WATER SYSTEM SHALL BE ENERGIZED BY AUTOMATIC CONTROL. THE HEATING WATER SUPPLY (HWS) TEMPERATURE SHALL BE MAINTAINED BY CONVERTER CONTROL VALVE V-1. V-1 SHALL BE CONTROLLED BY TEMPERATURE SENSOR IN HWS AND OUTSIDE AIR. V-1 SHALL BE CLOSED WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 16 C, OTHERWISE THE SET POINT SHALL BE PER THE "HWS RESET SCHEDULE" (SEE M-23). ON A FALL IN HWS TEMPERATURE, V-1 SHALL MODULATE OPEN TO MAINTAIN ITS SET POINT. ON A RISE IN HWS TEMPERATURE, THE REVERSE SHALL OCCUR.

HEATING WATER PUMPS

WHEN SYSTEM IS INDEXED ON, THE LEAD HEATING WATER PUMP, HWP-1, WILL RUN BASED ON TIME DELAY. IF LEAD PUMP FAILS, LAG PUMP, HWP-2, WILL AUTOMATICALLY START. BOTH PUMPS SHALL BE INTERLOCKED TO THE HEATING WATER SYSTEM.

K. CHILLED WATER SYSTEM

PROVIDE PUSH BUTTONS FOR AN OPERATOR TO MANUALLY START-STOP THE PRIMARY AND SECONDARY PUMPS. INTERLOCK CHILLERS SUCH THAT UPON PROOF OF FLOW FROM A FLOW SWITCH FOR EACH MACHINE, CHILLERS WILL BE ENABLED TO RUN. PROVIDE LOGIC CONTROLLER TO MODULATE CHILLED WATER DISCHARGE TEMPERATURE TO A SETPOINT OF 6.7 C AND CONTROL CHILLER LEAD/LAG OPERATION. ALSO PROVIDE FOR MANUAL SELECTION OF LEAD CHILLER. PROVIDE TEMPERATURE SENSORS IN THE DISCHARGE PIPING OF EACH CHILLER AND THE COMMON CHILLED WATER RETURN HEADER. THESE WATER TEMPERATURE SENSORS SHALL OPERATE THROUGH LOGIC CONTROLLER TO CONTROL COOLING CAPACITY SUCH THAT THE LEAD CHILLER SHALL OPERATE WHEN THE SYSTEM CALL FOR COOLING. WHEN THE RETURN WATER TEMPERATURE RISES ABOVE 12.8 C THE SECOND CHILLER (LAG) SHALL ENERGIZE AND MODULATE AS REQUIRED. WHEN THE RETURN WATER TEMPERATURE DROPS BELOW 6.7 C, THE SECOND CHILLER SHALL DE-ENERGIZE. THE LOGIC CONTROL PROVIDED SHALL BE CAPABLE OF BEING FIELD PROGRAMMED FROM LEAD/LAG SEQUENCING TO PARALLEL CAPACITY CONTROL. IF EITHER OF THE CHILLERS ARE ENERGIZED, ITS CONTROL VALVE SHALL BE FULLY OPEN. IF EITHER CHILLER IS DE-ENERGIZED, THE OPPOSITE SHALL OCCUR.

CHILLED WATER PUMPS

WHEN THE SYSTEM IS INDEXED ON, THE LEAD PRIMARY PUMP SHALL RUN. WHEN THE RETURN CHILLED WATER RISES ABOVE 12.8 C, THE LAG PRIMARY PUMP SHALL RUN. WHEN THE RETURN WATER TEMPERATURE FALLS BELOW 6.7 C, THE OPPOSITE SHALL OCCUR. THE SECONDARY PUMP (CIRCULATING PUMP) VFD MOTOR SHALL MODULATE DEPENDING ON THE DIFFERENTIAL PRESSURE.

L. PREHEATING COIL (AHU-1 AND AHU-2) AND HEATING COIL (HV-1 THROUGH HV-5) FREEZE PROTECTION

ON A FALL IN SUPPLY AIR TEMPERATURE BELOW 4 C, OUTSIDE AIR DAMPER SHALL CLOSE, SUPPLY FAN SHALL BE DE-ENERGIZED, HEATING VALVE SHALL BE FULLY OPEN, AND AN ALARM SHALL BE SIGNALLED.

CONTROL LEGEND

- AS ACTUATOR SENSOR
CHS CHILLED AND HEATING WATER SYSTEM
T HEATING THERMOSTAT
T V VENTILATION THERMOSTAT
TS TEMPERATURE SENSOR
PT PRESSURE TRANSMITTER
STR MOTOR STARTER
VFD VARIABLE FREQUENCY DRIVE
DPT DIFF. PRESSURE TRANSMITTER
DPS DIFF. PRESSURE SWITCH
FS FREEZE/STAT
SD SMOKE DETECTOR
EDM ELECTRIC DAMPER MOTOR
RFT RETURN AIR FLOW TRANSMITTER
SPT STATIC PRESSURE TRANSMITTER
3-WAY CONTROL VALVE (ELEC. ACTUATOR)
2-WAY CONTROL VALVE (ELEC. ACTUATOR)
SENSOR WELL
M MOTOR
R RELAY
N.O. NORMALLY OPEN
N.C. NORMALLY CLOSED
O.A. OUTSIDE AIR
LPS LOW PRESSURE STEAM
HPS HIGH PRESSURE STEAM
-CHWR- CHILLED WATER RETURN
-CHWS- CHILLED WATER SUPPLY
-HWR- HOT WATER RETURN
-HWS- HOT WATER SUPPLY
OL OVERLOAD
HOA HAND-OFF-AUTOMATIC
PRV PRESSURE REDUCING VALVE
2 POS 2 POSITION
MOD MODULATING
CLG COOLING
HTG HEATING
+I+ N.O. CONTACT
+I- N.C. CONTACT
PILOT LIGHT
* PANEL MOUNTED
DIRECTION OF FLOW
PRESSURE GAGE
XX-1 DDC POINT IDENTIFIER
DI DIGITAL INPUT
DO DIGITAL OUTPUT
AI ANALOG INPUT
AO ANALOG OUTPUT

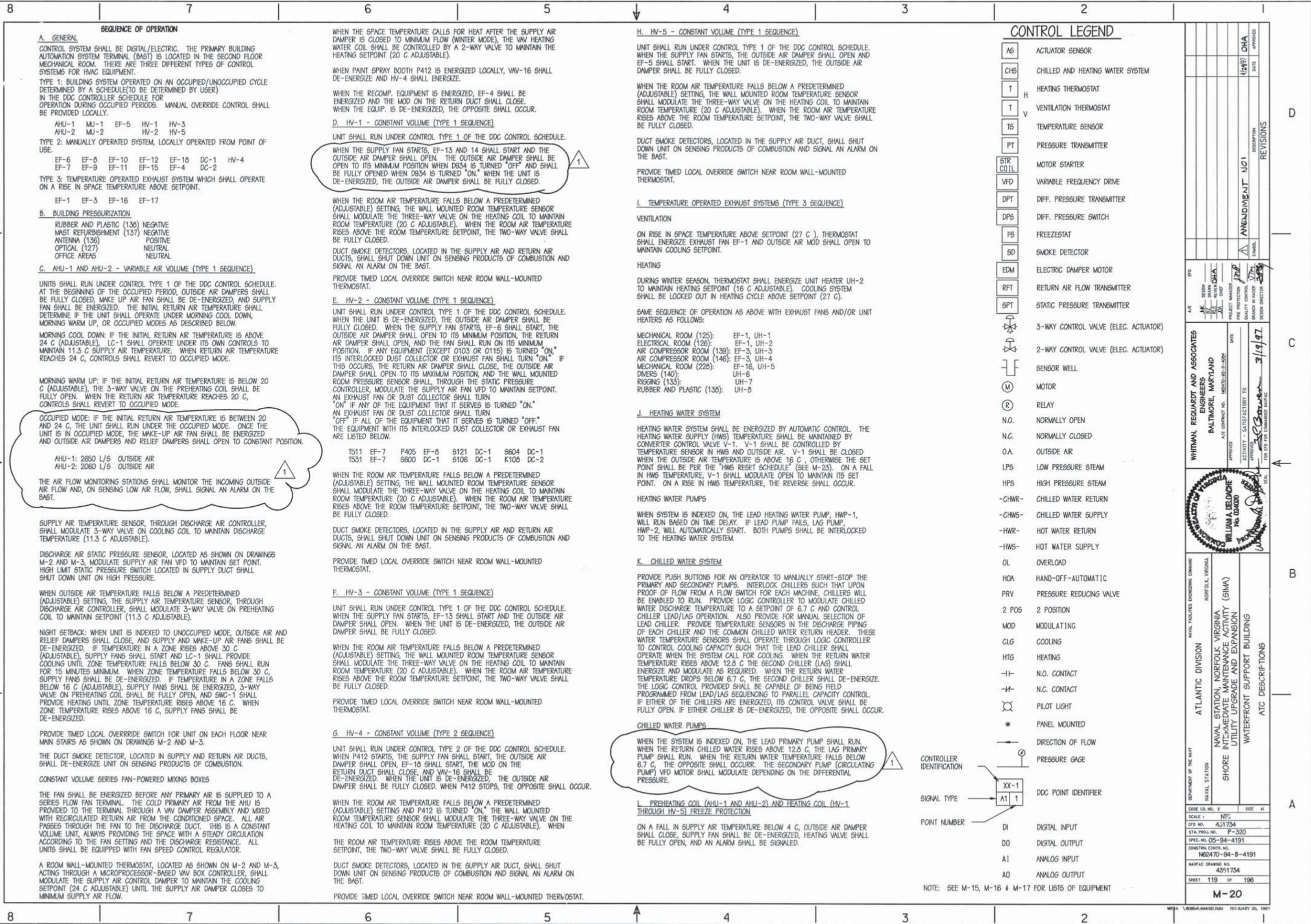
CONTROLLER IDENTIFICATION

SIGNAL TYPE

POINT NUMBER

NOTE: SEE M-15, M-16 & M-17 FOR LISTS OF EQUIPMENT

REVISIONS table with columns for NO., DATE, DESCRIPTION, and APPROVED. Includes project information for WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS, BALTIMORE, MARYLAND. Also includes a circular seal for WILLIAM DELORCHE, PROFESSIONAL ENGINEER, No. 024020.



SEQUENCE OF OPERATION

A. GENERAL
 CONTROL SYSTEM SHALL BE DIGITAL/ELECTRIC. THE PRIMARY BUILDING AUTOMATION SYSTEM TERMINAL (BAST) IS LOCATED IN THE SECOND FLOOR MECHANICAL ROOM. THERE ARE THREE DIFFERENT TYPES OF CONTROL SYSTEMS FOR HVAC EQUIPMENT.
 TYPE 1: BUILDING SYSTEM OPERATED ON AN OCCUPIED/UNOCCUPIED CYCLE DETERMINED BY A SCHEDULE (TO BE DETERMINED BY USER) IN THE DDC CONTROLLER SCHEDULE FOR OPERATION DURING OCCUPIED PERIODS. MANUAL OVERRIDE CONTROL SHALL BE PROVIDED LOCALLY.
 AHU-1 MU-1 EF-5 HV-1 HV-3
 AHU-2 MU-2 HV-2 HV-5
 TYPE 2: MANUALLY OPERATED SYSTEM, LOCALLY OPERATED FROM POINT OF USE.
 EF-6 EF-8 EF-10 EF-12 EF-18 DC-1 HV-4
 EF-7 EF-9 EF-11 EF-15 EF-4 DC-2
 TYPE 3: TEMPERATURE OPERATED EXHAUST SYSTEM WHICH SHALL OPERATE ON A RISE IN SPACE TEMPERATURE ABOVE SETPOINT.
 EF-1 EF-3 EF-16 EF-17

B. BUILDING PRESSURIZATION
 RUBBER AND PLASTIC (138) NEGATIVE
 MAST REFURBISHMENT (137) NEGATIVE
 ANTENNA (136) POSITIVE
 OPTICAL (127) NEUTRAL
 OFFICE AREAS NEUTRAL

C. AHU-1 AND AHU-2 - VARIABLE AIR VOLUME (TYPE 1 SEQUENCE)
 UNITS SHALL RUN UNDER CONTROL TYPE 1 OF THE DDC CONTROL SCHEDULE. AT THE BEGINNING OF THE OCCUPIED PERIOD, OUTSIDE AIR DAMPERS SHALL BE FULLY CLOSED, MAKE UP AIR FAN SHALL BE DE-ENERGIZED, AND SUPPLY FAN SHALL BE ENERGIZED. THE INITIAL RETURN AIR TEMPERATURE SHALL DETERMINE IF THE UNIT SHALL OPERATE UNDER MORNING COOL DOWN, MORNING WARM UP, OR OCCUPIED MODES AS DESCRIBED BELOW.
 MORNING COOL DOWN: IF THE INITIAL RETURN AIR TEMPERATURE IS ABOVE 24 C (ADJUSTABLE), LC-1 SHALL OPERATE UNDER ITS OWN CONTROLS TO MAINTAIN 11.3 C SUPPLY AIR TEMPERATURE. WHEN RETURN AIR TEMPERATURE REACHES 24 C, CONTROLS SHALL REVERT TO OCCUPIED MODE.
 MORNING WARM UP: IF THE INITIAL RETURN AIR TEMPERATURE IS BELOW 20 C (ADJUSTABLE), THE 3-WAY VALVE ON THE PREHEATING COIL SHALL BE FULLY OPEN. WHEN THE RETURN AIR TEMPERATURE REACHES 20 C, CONTROLS SHALL REVERT TO OCCUPIED MODE.
 OCCUPIED MODE: IF THE INITIAL RETURN AIR TEMPERATURE IS BETWEEN 20 AND 24 C, THE UNIT SHALL RUN UNDER THE OCCUPIED MODE. ONCE THE UNIT IS IN OCCUPIED MODE, THE MAKE-UP AIR FAN SHALL BE ENERGIZED AND OUTSIDE AIR DAMPERS AND RELIEF DAMPERS SHALL OPEN TO CONSTANT POSITION.
 AHU-1: 2650 L/S OUTSIDE AIR
 AHU-2: 2060 L/S OUTSIDE AIR

THE AIR FLOW MONITORING STATIONS SHALL MONITOR THE INCOMING OUTSIDE AIR FLOW AND, ON SENSING LOW AIR FLOW, SHALL SIGNAL AN ALARM ON THE BAST.

SUPPLY AIR TEMPERATURE SENSOR, THROUGH DISCHARGE AIR CONTROLLER, SHALL MODULATE 3-WAY VALVE ON COOLING COIL TO MAINTAIN DISCHARGE TEMPERATURE (11.3 C ADJUSTABLE).
 DISCHARGE AIR STATIC PRESSURE SENSOR, LOCATED AS SHOWN ON DRAWINGS M-2 AND M-3, MODULATE SUPPLY AIR FAN VFD TO MAINTAIN SET POINT. HIGH LIMIT STATIC PRESSURE SWITCH LOCATED IN SUPPLY DUCT SHALL SHUT DOWN UNIT ON HIGH PRESSURE.

WHEN OUTSIDE AIR TEMPERATURE FALLS BELOW A PREDETERMINED (ADJUSTABLE) SETTING, THE SUPPLY AIR TEMPERATURE SENSOR, THROUGH DISCHARGE AIR CONTROLLER, SHALL MODULATE 3-WAY VALVE ON PREHEATING COIL TO MAINTAIN SETPOINT (11.3 C ADJUSTABLE).
 NIGHT SETBACK: WHEN UNIT IS INDEXED TO UNOCCUPIED MODE, OUTSIDE AIR AND RELIEF DAMPERS SHALL CLOSE, AND SUPPLY AND MAKE-UP AIR FANS SHALL BE DE-ENERGIZED. IF TEMPERATURE IN A ZONE RISES ABOVE 30 C (ADJUSTABLE), SUPPLY FANS SHALL START AND LC-1 SHALL PROVIDE COOLING UNTIL ZONE TEMPERATURE FALLS BELOW 30 C. FANS SHALL RUN FOR 15 MINUTES MINIMUM. WHEN ZONE TEMPERATURE FALLS BELOW 30 C, SUPPLY FANS SHALL BE DE-ENERGIZED. IF TEMPERATURE IN A ZONE FALLS BELOW 16 C (ADJUSTABLE), SUPPLY FANS SHALL BE ENERGIZED, 3-WAY VALVE ON PREHEATING COIL SHALL BE FULLY OPEN, AND SWC-1 SHALL PROVIDE HEATING UNTIL ZONE TEMPERATURE RISES ABOVE 16 C. WHEN ZONE TEMPERATURE RISES ABOVE 16 C, SUPPLY FANS SHALL BE DE-ENERGIZED.

PROVIDE TIMED LOCAL OVERRIDE SWITCH FOR UNIT ON EACH FLOOR NEAR MAIN STAIRS AS SHOWN ON DRAWINGS M-2 AND M-3.
 THE DUCT SMOKE DETECTOR, LOCATED IN SUPPLY AND RETURN AIR DUCTS, SHALL DE-ENERGIZE UNIT ON SENSING PRODUCTS OF COMBUSTION.
 CONSTANT VOLUME SERIES FAN-POWERED MIXING BOXES

THE FAN SHALL BE ENERGIZED BEFORE ANY PRIMARY AIR IS SUPPLIED TO A SERIES FLOW FAN TERMINAL. THE COLD PRIMARY AIR FROM THE AHU IS PROVIDED TO THE TERMINAL THROUGH A VAV DAMPER ASSEMBLY AND MIXED WITH RECIRCULATED RETURN AIR FROM THE CONDITIONED SPACE. ALL AIR PASSES THROUGH THE FAN TO THE DISCHARGE DUCT. THIS IS A CONSTANT VOLUME UNIT, ALWAYS PROVIDING THE SPACE WITH A STEADY CIRCULATION ACCORDING TO THE FAN SETTING AND THE DISCHARGE RESISTANCE. ALL UNITS SHALL BE EQUIPPED WITH FAN SPEED CONTROL REGULATOR.

A ROOM WALL-MOUNTED THERMOSTAT, LOCATED AS SHOWN ON M-2 AND M-3, ACTING THROUGH A MICROPROCESSOR-BASED VAV BOX CONTROLLER, SHALL MODULATE THE SUPPLY AIR CONTROL DAMPER TO MAINTAIN THE COOLING SETPOINT (24 C ADJUSTABLE) UNTIL THE SUPPLY AIR DAMPER CLOSES TO MINIMUM SUPPLY AIR FLOW.

WHEN THE SPACE TEMPERATURE CALLS FOR HEAT AFTER THE SUPPLY AIR DAMPER IS CLOSED TO MINIMUM FLOW (WINTER MODE), THE VAV HEATING WATER COIL SHALL BE CONTROLLED BY A 2-WAY VALVE TO MAINTAIN THE HEATING SETPOINT (20 C ADJUSTABLE).
 WHEN PAINT SPRAY BOOTH P412 IS ENERGIZED LOCALLY, VAV-16 SHALL DE-ENERGIZE AND HV-4 SHALL ENERGIZE.

WHEN THE RECOMP. EQUIPMENT IS ENERGIZED, EF-4 SHALL BE ENERGIZED AND THE MOD ON THE RETURN DUCT SHALL CLOSE. WHEN THE EQUIP. IS DE-ENERGIZED, THE OPPOSITE SHALL OCCUR.
D. HV-1 - CONSTANT VOLUME (TYPE 1 SEQUENCE)
 UNIT SHALL RUN UNDER CONTROL TYPE 1 OF THE DDC CONTROL SCHEDULE.
 WHEN THE SUPPLY FAN STARTS, EF-13 AND 14 SHALL START AND THE OUTSIDE AIR DAMPER SHALL OPEN. THE OUTSIDE AIR DAMPER SHALL BE OPEN TO ITS MINIMUM POSITION WHEN D834 IS TURNED "OFF" AND SHALL BE FULLY OPENED WHEN D834 IS TURNED "ON." WHEN THE UNIT IS DE-ENERGIZED, THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED.

WHEN THE ROOM AIR TEMPERATURE FALLS BELOW A PREDETERMINED (ADJUSTABLE) SETTING, THE WALL MOUNTED ROOM TEMPERATURE SENSOR SHALL MODULATE THE THREE-WAY VALVE ON THE HEATING COIL TO MAINTAIN ROOM TEMPERATURE (20 C ADJUSTABLE). WHEN THE ROOM AIR TEMPERATURE RISES ABOVE THE ROOM TEMPERATURE SETPOINT, THE TWO-WAY VALVE SHALL BE FULLY CLOSED.
 DUCT SMOKE DETECTORS, LOCATED IN THE SUPPLY AIR AND RETURN AIR DUCTS, SHALL SHUT DOWN UNIT ON SENSING PRODUCTS OF COMBUSTION AND SIGNAL AN ALARM ON THE BAST.
 PROVIDE TIMED LOCAL OVERRIDE SWITCH NEAR ROOM WALL-MOUNTED THERMOSTAT.

E. HV-2 - CONSTANT VOLUME (TYPE 1 SEQUENCE)
 UNIT SHALL RUN UNDER CONTROL TYPE 1 OF THE DDC CONTROL SCHEDULE. WHEN THE UNIT IS DE-ENERGIZED, THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED. WHEN THE SUPPLY FAN STARTS, EF-6 SHALL START, THE OUTSIDE AIR DAMPER SHALL OPEN TO ITS MINIMUM POSITION, THE RETURN AIR DAMPER SHALL OPEN, AND THE FAN SHALL RUN ON ITS MINIMUM POSITION. IF ANY EQUIPMENT (EXCEPT 0103 OR 0119) IS TURNED "ON," ITS INTERLOCKED DUST COLLECTOR OR EXHAUST FAN SHALL TURN "ON." IF THIS OCCURS, THE RETURN AIR DAMPER SHALL CLOSE, THE OUTSIDE AIR DAMPER SHALL OPEN TO ITS MAXIMUM POSITION, AND THE WALL MOUNTED ROOM PRESSURE SENSOR SHALL, THROUGH THE STATIC PRESSURE CONTROLLER, MODULATE THE SUPPLY AIR FAN VFD TO MAINTAIN SETPOINT. AN EXHAUST FAN OR DUST COLLECTOR SHALL TURN "ON" IF ANY OF THE EQUIPMENT THAT IT SERVES IS TURNED "ON." AN EXHAUST FAN OR DUST COLLECTOR SHALL TURN "OFF" IF ALL OF THE EQUIPMENT THAT IT SERVES IS TURNED "OFF." THE EQUIPMENT WITH ITS INTERLOCKED DUST COLLECTOR OR EXHAUST FAN ARE LISTED BELOW.

1511	EF-7	P405	EF-6	6121	DC-1	6604	DC-1
1531	EF-7	6600	DC-1	6106	DC-1	K108	DC-2

WHEN THE ROOM AIR TEMPERATURE FALLS BELOW A PREDETERMINED (ADJUSTABLE) SETTING, THE WALL MOUNTED ROOM TEMPERATURE SENSOR SHALL MODULATE THE THREE-WAY VALVE ON THE HEATING COIL TO MAINTAIN ROOM TEMPERATURE (20 C ADJUSTABLE). WHEN THE ROOM AIR TEMPERATURE RISES ABOVE THE ROOM TEMPERATURE SETPOINT, THE TWO-WAY VALVE SHALL BE FULLY CLOSED.
 DUCT SMOKE DETECTORS, LOCATED IN THE SUPPLY AIR AND RETURN AIR DUCTS, SHALL SHUT DOWN UNIT ON SENSING PRODUCTS OF COMBUSTION AND SIGNAL AN ALARM ON THE BAST.
 PROVIDE TIMED LOCAL OVERRIDE SWITCH NEAR ROOM WALL-MOUNTED THERMOSTAT.

F. HV-3 - CONSTANT VOLUME (TYPE 1 SEQUENCE)
 UNIT SHALL RUN UNDER CONTROL TYPE 1 OF THE DDC CONTROL SCHEDULE. WHEN THE SUPPLY FAN STARTS, EF-13 SHALL START AND THE OUTSIDE AIR DAMPER SHALL OPEN. WHEN THE UNIT IS DE-ENERGIZED, THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED.
 WHEN THE ROOM AIR TEMPERATURE FALLS BELOW A PREDETERMINED (ADJUSTABLE) SETTING, THE WALL MOUNTED ROOM TEMPERATURE SENSOR SHALL MODULATE THE THREE-WAY VALVE ON THE HEATING COIL TO MAINTAIN ROOM TEMPERATURE (20 C ADJUSTABLE). WHEN THE ROOM AIR TEMPERATURE RISES ABOVE THE ROOM TEMPERATURE SETPOINT, THE TWO-WAY VALVE SHALL BE FULLY CLOSED.
 PROVIDE TIMED LOCAL OVERRIDE SWITCH NEAR ROOM WALL-MOUNTED THERMOSTAT.

G. HV-4 - CONSTANT VOLUME (TYPE 2 SEQUENCE)
 UNIT SHALL RUN UNDER CONTROL TYPE 2 OF THE DDC CONTROL SCHEDULE. WHEN P412 STARTS, THE SUPPLY FAN SHALL START, THE OUTSIDE AIR DAMPER SHALL OPEN, EF-16 SHALL START, THE MOD ON THE RETURN DUCT SHALL CLOSE, AND VAV-16 SHALL BE DE-ENERGIZED. WHEN THE UNIT IS DE-ENERGIZED, THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED. WHEN P412 STOPS, THE OPPOSITE SHALL OCCUR.
 WHEN THE ROOM AIR TEMPERATURE FALLS BELOW A PREDETERMINED (ADJUSTABLE) SETTING AND P412 IS TURNED "ON," THE WALL MOUNTED ROOM TEMPERATURE SENSOR SHALL MODULATE THE THREE-WAY VALVE ON THE HEATING COIL TO MAINTAIN ROOM TEMPERATURE (20 C ADJUSTABLE). WHEN THE ROOM AIR TEMPERATURE RISES ABOVE THE ROOM TEMPERATURE SETPOINT, THE TWO-WAY VALVE SHALL BE FULLY CLOSED.

THE ROOM AIR TEMPERATURE RISES ABOVE THE ROOM TEMPERATURE SETPOINT, THE TWO-WAY VALVE SHALL BE FULLY CLOSED.
 DUCT SMOKE DETECTORS, LOCATED IN THE SUPPLY AIR DUCT, SHALL SHUT DOWN UNIT ON SENSING PRODUCTS OF COMBUSTION AND SIGNAL AN ALARM ON THE BAST.
 PROVIDE TIMED LOCAL OVERRIDE SWITCH NEAR ROOM WALL-MOUNTED THERMOSTAT.

L. PREHEATING COIL (AHU-1 AND AHU-2) AND HEATING COIL (HV-1 THROUGH HV-5) FREEZE PROTECTION
 ON A FALL IN SUPPLY AIR TEMPERATURE BELOW 4 C, OUTSIDE AIR DAMPER SHALL CLOSE, SUPPLY FAN SHALL BE DE-ENERGIZED, HEATING VALVE SHALL BE FULLY OPEN, AND AN ALARM SHALL BE SIGNALLED.

H. HV-5 - CONSTANT VOLUME (TYPE 1 SEQUENCE)
 UNIT SHALL RUN UNDER CONTROL TYPE 1 OF THE DDC CONTROL SCHEDULE. WHEN THE SUPPLY FAN STARTS, THE OUTSIDE AIR DAMPER SHALL OPEN AND EF-5 SHALL START. WHEN THE UNIT IS DE-ENERGIZED, THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED.
 WHEN THE ROOM AIR TEMPERATURE FALLS BELOW A PREDETERMINED (ADJUSTABLE) SETTING, THE WALL MOUNTED ROOM TEMPERATURE SENSOR SHALL MODULATE THE THREE-WAY VALVE ON THE HEATING COIL TO MAINTAIN ROOM TEMPERATURE (20 C ADJUSTABLE). WHEN THE ROOM AIR TEMPERATURE RISES ABOVE THE ROOM TEMPERATURE SETPOINT, THE TWO-WAY VALVE SHALL BE FULLY CLOSED.
 DUCT SMOKE DETECTORS, LOCATED IN THE SUPPLY AIR DUCT, SHALL SHUT DOWN UNIT ON SENSING PRODUCTS OF COMBUSTION AND SIGNAL AN ALARM ON THE BAST.
 PROVIDE TIMED LOCAL OVERRIDE SWITCH NEAR ROOM WALL-MOUNTED THERMOSTAT.

I. TEMPERATURE OPERATED EXHAUST SYSTEMS (TYPE 3 SEQUENCE)
 VENTILATION
 ON RISE IN SPACE TEMPERATURE ABOVE SETPOINT (27 C), THERMOSTAT SHALL ENERGIZE EXHAUST FAN EF-1 AND OUTSIDE AIR MOD SHALL OPEN TO MAINTAIN COOLING SETPOINT.
 HEATING
 DURING WINTER SEASON, THERMOSTAT SHALL ENERGIZE UNIT HEATER UH-2 TO MAINTAIN HEATING SETPOINT (16 C ADJUSTABLE). COOLING SYSTEM SHALL BE LOCKED OUT IN HEATING CYCLE ABOVE SETPOINT (27 C).
 SAME SEQUENCE OF OPERATION AS ABOVE WITH EXHAUST FANS AND/OR UNIT HEATERS AS FOLLOWS:

MECHANICAL ROOM (125):	EF-1, UH-1
ELECTRICAL ROOM (126):	EF-1, UH-2
AIR COMPRESSOR ROOM (139):	EF-3, UH-3
AIR COMPRESSOR ROOM (146):	EF-3, UH-4
MECHANICAL ROOM (228):	EF-16, UH-5
DIVERS (140):	UH-6
RIGGING (133):	UH-7
RUBBER AND PLASTIC (136):	UH-8

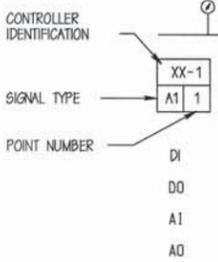
J. HEATING WATER SYSTEM
 HEATING WATER SYSTEM SHALL BE ENERGIZED BY AUTOMATIC CONTROL. THE HEATING WATER SUPPLY (HWS) TEMPERATURE SHALL BE MAINTAINED BY CONVERTER CONTROL VALVE V-1. V-1 SHALL BE CONTROLLED BY TEMPERATURE SENSOR IN HWS AND OUTSIDE AIR. V-1 SHALL BE CLOSED WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 16 C, OTHERWISE THE SET POINT SHALL BE PER THE "HWS RESET SCHEDULE" (SEE M-23). ON A FALL IN HWS TEMPERATURE, V-1 SHALL MODULATE OPEN TO MAINTAIN ITS SET POINT. ON A RISE IN HWS TEMPERATURE, THE REVERSE SHALL OCCUR.
 HEATING WATER PUMPS
 WHEN SYSTEM IS INDEXED ON, THE LEAD HEATING WATER PUMP, HWP-1, WILL RUN BASED ON TIME DELAY. IF LEAD PUMP FAILS, LAG PUMP, HWP-2, WILL AUTOMATICALLY START. BOTH PUMPS SHALL BE INTERLOCKED TO THE HEATING WATER SYSTEM.

K. CHILLED WATER SYSTEM
 PROVIDE PUSH BUTTONS FOR AN OPERATOR TO MANUALLY START-STOP THE PRIMARY AND SECONDARY PUMPS. INTERLOCK CHILLERS SUCH THAT UPON PROOF OF FLOW FROM A FLOW SWITCH FOR EACH MACHINE, CHILLERS WILL BE ENABLED TO RUN. PROVIDE LOGIC CONTROLLER TO MODULATE CHILLED WATER DISCHARGE TEMPERATURE TO A SETPOINT OF 6.7 C AND CONTROL CHILLER LEAD/LAG OPERATION. ALSO PROVIDE FOR MANUAL SELECTION OF LEAD CHILLER. PROVIDE TEMPERATURE SENSORS IN THE DISCHARGE PIPING OF EACH CHILLER AND THE COMMON CHILLED WATER RETURN HEADER. THESE WATER TEMPERATURE SENSORS SHALL OPERATE THROUGH LOGIC CONTROLLER TO CONTROL COOLING CAPACITY SUCH THAT THE LEAD CHILLER SHALL OPERATE WHEN THE SYSTEM CALL FOR COOLING. WHEN THE RETURN WATER TEMPERATURE RISES ABOVE 12.8 C THE SECOND CHILLER (LAG) SHALL ENERGIZE AND MODULATE AS REQUIRED. WHEN THE RETURN WATER TEMPERATURE DROPS BELOW 6.7 C, THE SECOND CHILLER SHALL DE-ENERGIZE. THE LOGIC CONTROL PROVIDED SHALL BE CAPABLE OF BEING FIELD PROGRAMMED FROM LEAD/LAG SEQUENCING TO PARALLEL CAPACITY CONTROL. IF EITHER OF THE CHILLERS ARE ENERGIZED, ITS CONTROL VALVE SHALL BE FULLY OPEN. IF EITHER CHILLER IS DE-ENERGIZED, THE OPPOSITE SHALL OCCUR.
 CHILLED WATER PUMPS
 WHEN THE SYSTEM IS INDEXED ON, THE LEAD PRIMARY PUMP SHALL RUN. WHEN THE RETURN CHILLED WATER RISES ABOVE 12.8 C, THE LAG PRIMARY PUMP SHALL RUN. WHEN THE RETURN WATER TEMPERATURE FALLS BELOW 6.7 C, THE OPPOSITE SHALL OCCUR. THE SECONDARY PUMP (CIRCULATING PUMP) VFD MOTOR SHALL MODULATE DEPENDING ON THE DIFFERENTIAL PRESSURE.

L. PREHEATING COIL (AHU-1 AND AHU-2) AND HEATING COIL (HV-1 THROUGH HV-5) FREEZE PROTECTION
 ON A FALL IN SUPPLY AIR TEMPERATURE BELOW 4 C, OUTSIDE AIR DAMPER SHALL CLOSE, SUPPLY FAN SHALL BE DE-ENERGIZED, HEATING VALVE SHALL BE FULLY OPEN, AND AN ALARM SHALL BE SIGNALLED.

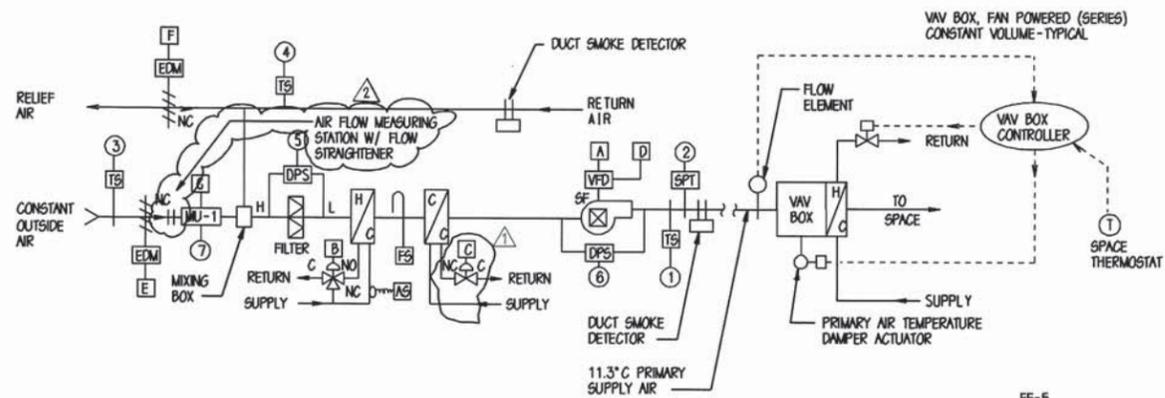
CONTROL LEGEND

- AS ACTUATOR SENSOR
- CHS CHILLED AND HEATING WATER SYSTEM
- T H HEATING THERMOSTAT
- T V VENTILATION THERMOSTAT
- TS TEMPERATURE SENSOR
- PT PRESSURE TRANSMITTER
- STR COIL MOTOR STARTER
- VFD VARIABLE FREQUENCY DRIVE
- DPT DIFF. PRESSURE TRANSMITTER
- DPS DIFF. PRESSURE SWITCH
- FS FREEZE STAT
- SD SMOKE DETECTOR
- EDM ELECTRIC DAMPER MOTOR
- RFT RETURN AIR FLOW TRANSMITTER
- SPT STATIC PRESSURE TRANSMITTER
- 3-WAY CONTROL VALVE (ELEC. ACTUATOR)
- 2-WAY CONTROL VALVE (ELEC. ACTUATOR)
- SENSOR WELL
- (M) MOTOR
- (R) RELAY
- N.O. NORMALLY OPEN
- N.C. NORMALLY CLOSED
- O.A. OUTSIDE AIR
- LPS LOW PRESSURE STEAM
- HPS HIGH PRESSURE STEAM
- CHWR- CHILLED WATER RETURN
- CHWS- CHILLED WATER SUPPLY
- HWR- HOT WATER RETURN
- HWS- HOT WATER SUPPLY
- OL OVERLOAD
- HOA HAND-OFF-AUTOMATIC
- PRV PRESSURE REDUCING VALVE
- 2 POS 2 POSITION
- MOD MODULATING
- CLG COOLING
- HTG HEATING
- I- N.O. CONTACT
- #- N.C. CONTACT
- PILOT LIGHT
- * PANEL MOUNTED
- DIRECTION OF FLOW
- ⊕ PRESSURE GAGE
- XX-1 DDC POINT IDENTIFIER
- A1 1
- DI DIGITAL INPUT
- DO DIGITAL OUTPUT
- A1 ANALOG INPUT
- AO ANALOG OUTPUT



NOTE: SEE M-15, M-16 & M-17 FOR LISTS OF EQUIPMENT

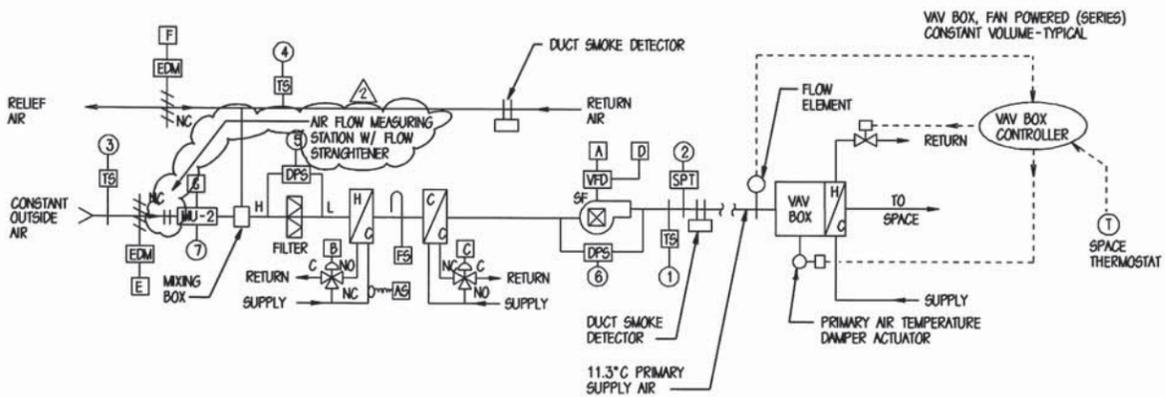
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REVISIONS		DESCRIPTION	
AMENDMENT NO. 1			
SYMBOL			
DESIGN	AK	DATE	
DRAWN	AK	REVIEW	AK
CHECKED	AK	DATE	
PROJECT MANAGER	JTP	DATE	
QUALITY CONTROL	JTP	DATE	
DESIGN DIRECTOR	JTP	DATE	
APPROVED	JTP	DATE	3/19/97
ACTIVITY - SATISFACTORY TO			
FOR EFD FOR COMMANDER NAVFAC			
WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND			
A/E CONTRACT NO. N62470-94-B-4191			
APPROVED			
SEAL			
NAVY FACILITIES ENGINEERING DIVISION			
ATLANTIC DIVISION			
NAVAL STATION, NORFOLK, VIRGINIA			
INTERMEDIATE MAINTENANCE ACTIVITY (I/M/A)			
UTILITY UPGRADE AND EXPANSION			
WATERFRONT SUPPORT BUILDING			
ATC DESCRIPTIONS			
DEPARTMENT OF THE NAVY			
NAVAL STATION			
CODE ID. NO. X		SIZE	A1
SCALE	NTC		
EFD NO.	431734		
STA. PROJ. NO.	P-320		
SPEC. NO.	05-94-4191		
CONSTR. CONTR. NO.	N62470-94-B-4191		
NAVFAC DRAWING NO.	4351734		
SHEET	119	OF	196
M-20			



AHU-1 CONTROL - VARIABLE AIR VOLUME

AHU-1	
LOCAL DDC CONTROLLER	
INPUTS	
ANALOG	① SUPPLY AIR TEMP.
ANALOG	② SUPPLY AIR S.P.
ANALOG	③ O.A. TEMP.
ANALOG	④ RETURN AIR TEMP.
DIGITAL	⑤ FILTER DIRTY
DIGITAL	⑥ SUPPLY FAN STATUS
DIGITAL	⑦ O.A. MAKE-UP FAN
DIGITAL	⑧ EF-5
OUTPUTS	
ANALOG	A SUPPLY FAN SPEED
ANALOG	B HMR CONTROL VALVE
ANALOG	C CHMR CONTROL VALVE
DIGITAL	D SUPPLY FAN START
DIGITAL	E O.A. DAMPER
DIGITAL	F RELIEF DAMPER
DIGITAL	G O.A. MAKE UP FAN

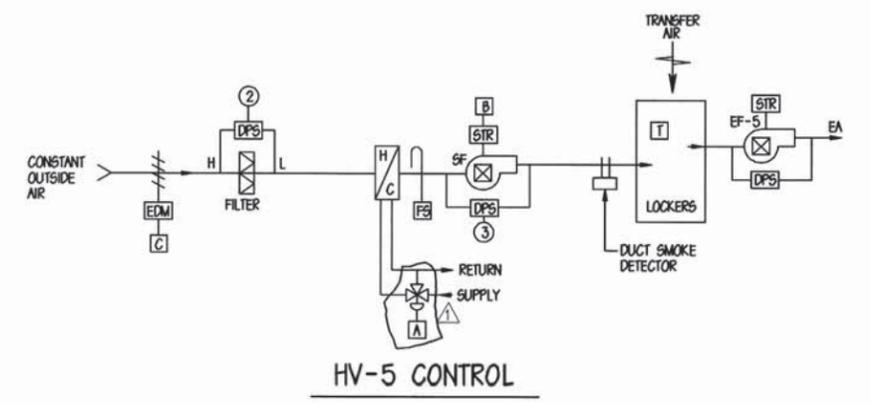
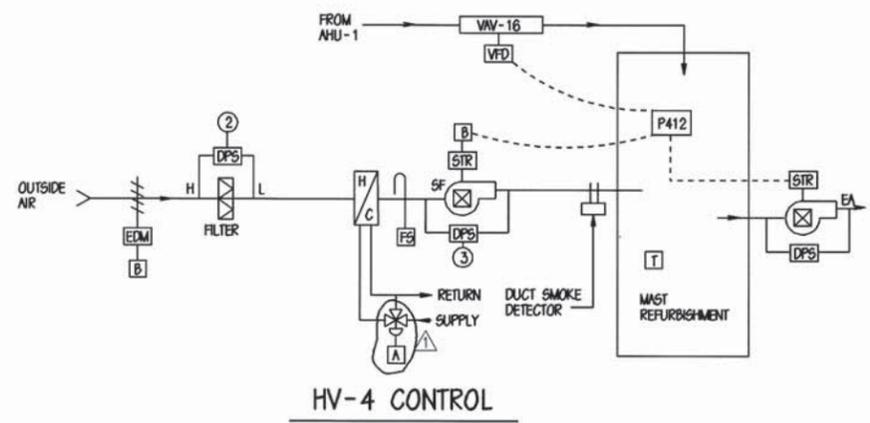
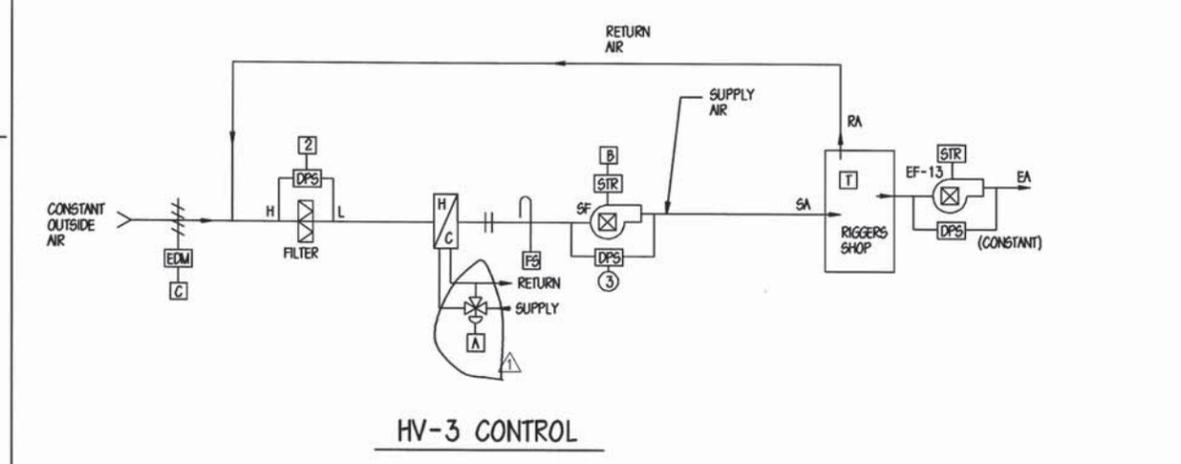
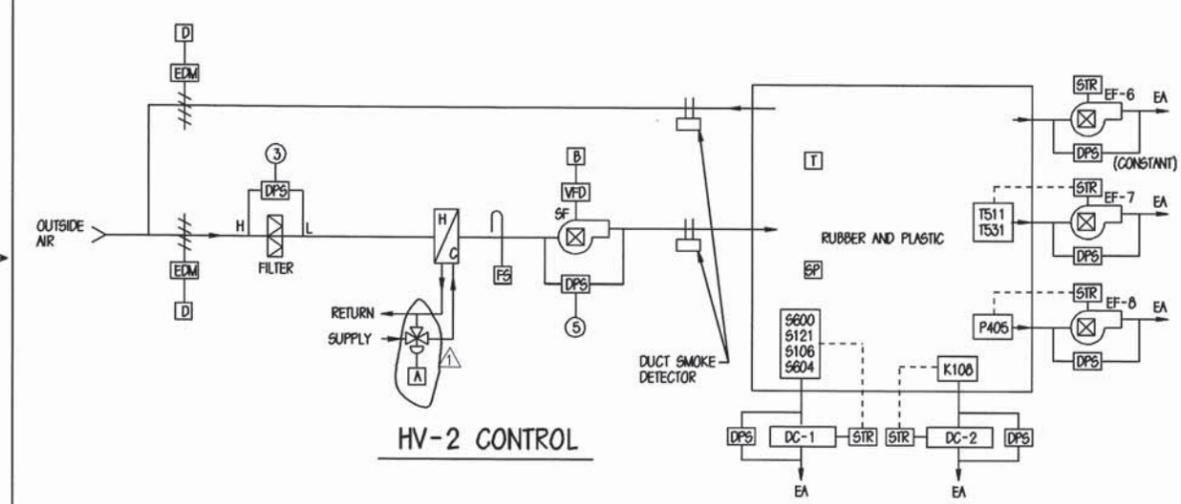
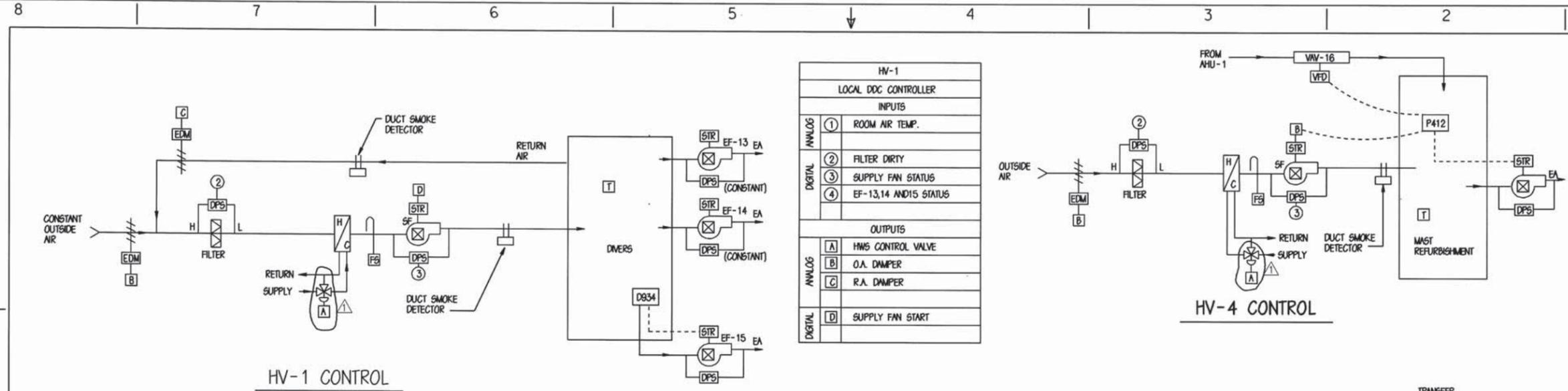
FOR AHU-1 #2



AHU-2 CONTROL - VARIABLE AIR VOLUME

AHU-2	
LOCAL DDC CONTROLLER	
INPUTS	
ANALOG	① SUPPLY AIR TEMP.
ANALOG	② SUPPLY AIR S.P.
ANALOG	③ O.A. TEMP.
ANALOG	④ RETURN AIR TEMP.
DIGITAL	⑤ FILTER DIRTY
DIGITAL	⑥ SUPPLY FAN STATUS
DIGITAL	⑦ O.A. MAKE-UP FAN
OUTPUTS	
ANALOG	A SUPPLY FAN SPEED
ANALOG	B HMR CONTROL VALVE
ANALOG	C CHMR CONTROL VALVE
DIGITAL	D SUPPLY FAN START
DIGITAL	E O.A. DAMPER
DIGITAL	F RELIEF DAMPER
DIGITAL	G O.A. MAKE UP FAN

DEPARTMENT OF THE NAVY NAVAL STATION ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA) UTILITY UPGRADE AND EXPANSION WATERFRONT SUPPORT BUILDING ATC DIAGRAMS - AIR HANDLING UNITS		WHITMAN, REQUARDT AND ASSOCIATES ENGINEERS BALTIMORE, MARYLAND A/E CONTRACT NO. W8620-93-2-3004 DATE APPROVED ACTIVITY - SATISFACTORY TO APPROVED FOR ETO FOR COMMANDER NAVFAC	
CODE ID. NO. 4 SCALE 1/8" = 1'-0" EFD NO. 451735 STA. PROJ. NO. P-320 SPEC. NO. 05-94-4191 CONTROL. CONTR. NO. N62470-94-B-4191 NAVFAC DRAWING NO. 4361735 SHEET 120 OF 196		REVISIONS DESCRIPTION DATE APPROVED SYMBOL 7/2/96 JOA 5/15/98 JOA APPROVED	



HV-4 LOCAL DDC CONTROLLER	
INPUTS	
ANALOG	① ROOM AIR TEMPERATURE
DIGITAL	② FILTER DIRTY
DIGITAL	③ SUPPLY FAN STATUS
DIGITAL	④ EF-18 STATUS
OUTPUTS	
ANALOG	A HNS CONTROL VALVE
DIGITAL	B SUPPLY FAN START
DIGITAL	C O.A. DAMPER
DIGITAL	D VW-16 STOP

HV-5 LOCAL DDC CONTROLLER	
INPUTS	
ANALOG	① ROOM AIR TEMPERATURE
DIGITAL	② FILTER DIRTY
DIGITAL	③ SUPPLY FAN STATUS
DIGITAL	④ EF-5 STATUS
OUTPUTS	
ANALOG	A HNS CONTROL VALVE
DIGITAL	B FAN START
DIGITAL	C O.A. DAMPER

GENERAL NOTES

1. PROVIDE CONTROL RELAYS IN LINE TO GOVERNMENT FURNISHED EQUIPMENT TO INTERLOCK WITH CONTRACTOR FURNISHED EQUIPMENT.

DESIGN	DATE	APPROVED
DRAWN	DATE	APPROVED
CHECKED	DATE	APPROVED
PROJECT MANAGER	DATE	APPROVED
FIRE PROTECTION	DATE	APPROVED
QUALITY CONTROL	DATE	APPROVED
BRANCH MANAGER	DATE	APPROVED
DESIGN DIRECTOR	DATE	APPROVED

REVISIONS

NO.	DESCRIPTION	DATE	BY
1	FURNITURE CHANGES	5/15/98	JJA

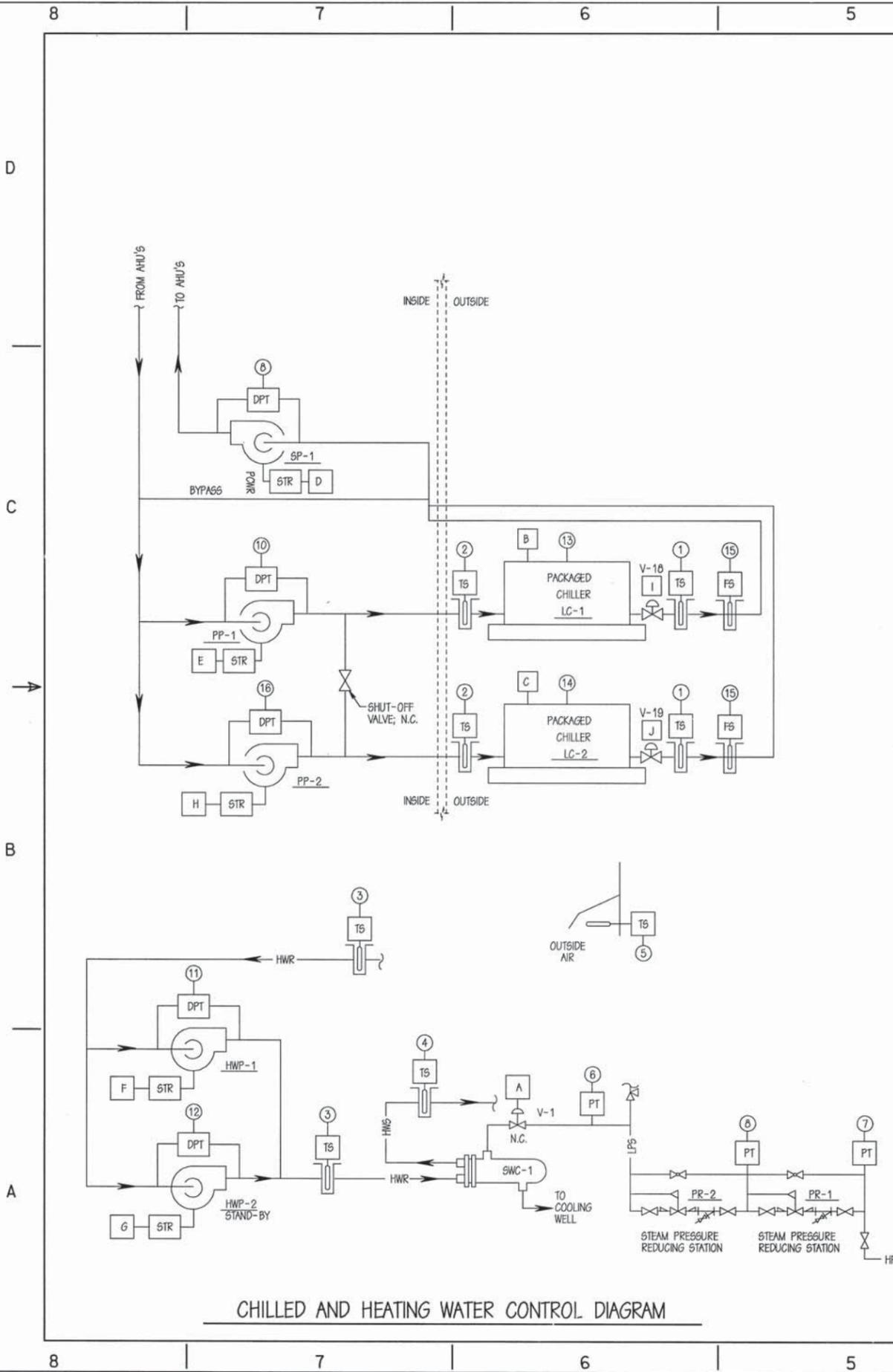
WHITMAN, REQUARDT AND ASSOCIATES
ENGINEERS
BALTIMORE, MARYLAND

NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL STATION, NORFOLK VIRGINIA
SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)
UTILITY UPGRADE AND EXPANSION
WATERFRONT SUPPORT BUILDING
ATC DIAGRAMS - HEATING VENTILATING UNITS

CONTRACT NO. N62470-94-B-4191
ACTIVITY - SATISFACTORY TO APPROVED FOR COMMANDER NAVFAC

CODE LD. NO. X
SCALE: 1:100
EFD NO. 451736
STA. PROJ. NO. P-320
SPEC. NO. 05-94-4191
CONSTR. CONTR. NO. N62470-94-B-4191
NAVFAC DRAWING NO. 4351736
SHEET 121 OF 196

M-22



CHILLED AND HEATING WATER CONTROL DIAGRAM

CONTROL VALVE SCHEDULE													
MARK	UNIT SERVED	SERVICE	TYPE	ACTION	CAPACITY		STEAM PRESS. (KPA)		MIN. CV	WATER PD KPa	NOM SIZE (mm)	LOCATION	REMARKS
					KW	L/S	INITIAL	FINAL					
V-1	SWC-1	STEAM	2-WAY	MOD	12.80	-	105	34	-	-	50	MECH RM 125	N.C.
V-2	AHU-1	CHWR	2-WAY	MOD	249	9.2	-	-	41	30	80	MECH RM 125	MIXING VALVE
V-3	AHU-1	HWR	3-WAY	MOD	43.9	.7	-	-	7	30	32	MECH RM 125	MIXING VALVE
V-4	AHU-2	CHWR	2-WAY	MOD	196	7.2	-	-	32	30	80	MECH RM 228	MIXING VALVE
V-5	AHU-2	HWR	3-WAY	MOD	20.0	.43	-	-	3.3	30	25	MECH RM 228	MIXING VALVE
V-6	HV-1	HWS	3-WAY	MOD	83	2	-	-	2.6	30	25	MEZZANINE	
V-7	HV-2	HWS	3-WAY	MOD	440	10.5	-	-	54	30	64	MEZZANINE	
V-8	HV-3	HWS	3-WAY	MOD	15	.4	-	-	4.2	30	25	MEZZANINE	
V-9	HV-4	HWS	3-WAY	MOD	199	4.7	-	-	39	30	64	MEZZANINE	
V-10	HV-5	HWS	3-WAY	MOD	47	1.1	-	-	9	30	38	MEZZANINE	
V-11	UH-1,2,3,4,5	HWR	2-WAY	2-POS	-	.03	-	-	11	15	13	UH-1 MECH. RM. (125) UH-2 ELECT. RM. (126) UH-3 AIR COMP. RM. (135) UH-4 AIR COMP. RM. (146) UH-5 MECH. RM. (228)	
V-12	UH-6,7,8	HWR	2-WAY	2-POS	-	0.5	-	-	0.3	15	13	UH-6 DIVERS (140) UH-7 RIGGING (133) UH-8 RUBBER & PLASTIC (138)	
V-13	VAV-9,15,24,34	HWR	2-WAY	2-POS	-	0.2	-	-	0.1	15	13	VARIOUS	
V-14	VAV-1,2,4,5,6,7,8,10,12,13,14,16,17,18,19,20,21,22,23,25,26,29,30,31,33,35,36,37,38,39,40	HWR	2-WAY	2-POS	-	0.6	-	-	0.4	15	13	VARIOUS	
V-15	VAV-11	HWR	2-WAY	2-POS	-	0.9	-	-	0.6	15	13	VARIOUS	
V-16	VAV-3,26,27,32,41	HWR	2-WAY	2-POS	-	1.2	-	-	0.8	15	13	VARIOUS	
V-17	SWH-1	STM	2-WAY	MOD	12.0	-	105	34	-	-	50	MECH RM 125	NC
V-18	LC-1	CHWR	2-WAY	2-POS	-	8.2	-	-	32	30	80	OUTSIDE	NC
V-19	LC-2	CHWR	2-WAY	2-POS	-	8.2	-	-	32	30	80	OUTSIDE	NC

1. ALL VALVES MUST BE CAPABLE OF TIGHT CLOSURE AGAINST RESPECTIVE PUMP SHUT-OFF HEAD.
2. SOLENOID VALVE (120 V)

CHW/HW SYSTEM (CHS)	
LOCAL DDC CONTROLLER	
ANALOG	
A	V-1 HWS TEMP
DIGITAL	
B	CHILLER LC-1 START
C	CHILLER LC-2 START
D	PUMP PP-1 START
E	PUMP PP-2 START
F	PUMP HWP-1 START
G	PUMP HWP-2 START
H	PUMP SP-1 START
I	V-18 OPEN
J	V-19 OPEN

HWS RESET SCHEDULE	
O.A. TEMP. (CDB)	HWS TEMP. (C)
-0.31	80
4.4	70
15.6	VALVE CLOSED

DESIGNED BY: [Signature]
 DRAWN BY: [Signature]
 CHECKED BY: [Signature]
 PROJECT MANAGER: [Signature]
 QUALITY CONTROL: [Signature]
 APPROVED FOR THE COMMANDER: [Signature]

DATE: 3/19/97
 SHEET: 122 OF 196

WHITMAN, REGUARD AND ASSOCIATES
 ENGINEERS
 BALTIMORE, MARYLAND

APPROVED FOR THE COMMANDER: [Signature]
 DATE: 3/19/97

WILLIAM A. DELONGHE
 No. 02420
 PROFESSIONAL ENGINEER

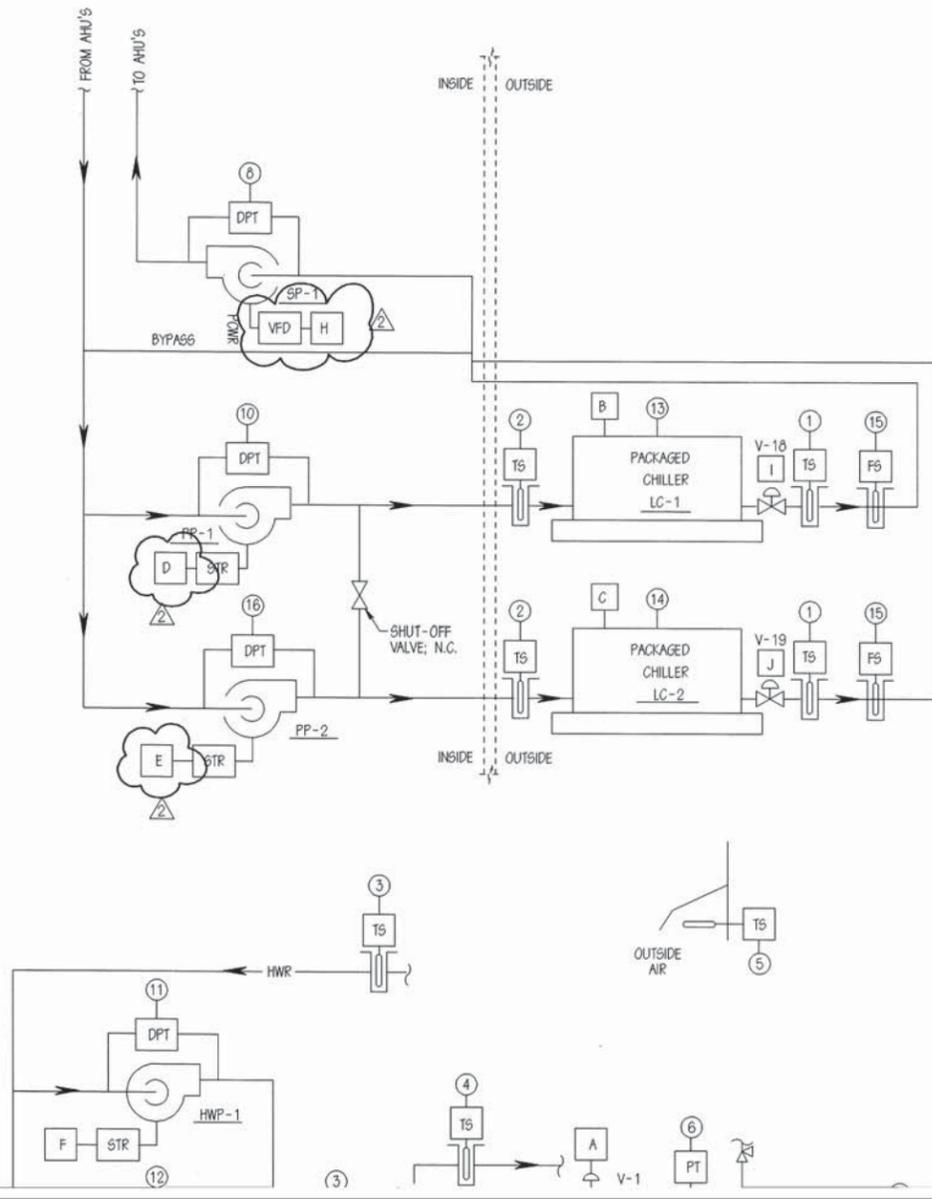
NAVAL FACILITIES ENGINEERING COMMAND
 NORFOLK, VIRGINIA
 ATLANTIC DIVISION
 NAVAL STATION, NORFOLK, VIRGINIA
 SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)
 UTILITY UPGRADE AND EXPANSION
 WATERFRONT SUPPORT BUILDING
 HEATING AND COOLING STATIONS DIAGRAM

CODE ID. NO. X
 SCALE: NTS
 EFD NO. 451737
 STA. PROJ. NO. P-320
 SPEC. NO. 05-94-4191
 CONSTR. CONTR. NO. N62470-94-B-4191
 MANFAC. DRAWING NO. 4351737
 SHEET 122 OF 196

M-23

8 7 6 5 4 3 2 1

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CONTROL VALVE SCHEDULE

MARK	UNIT SERVED	SERVICE	TYPE	ACTION	CAPACITY		STEAM PRESS. (KPA)		MIN. CV	WATER PD KPa	NOM SIZE (mm)	LOCATION	REMARKS
					KW	L/S	INITIAL	FINAL					
V-1	SWC-1	STEAM	2-WAY	MOD	120	-	105	34	-	-	50	MECH RM 125	N.C.
V-2	AHU-1	CHWR	2-WAY	MOD	249	9.2	-	-	41	30	80	MECH RM 125	MIXING VALVE
V-3	AHU-1	HWR	3-WAY	MOD	43.9	.7	-	-	7	30	32	MECH RM 125	MIXING VALVE
V-4	AHU-2	CHWR	3-WAY	MOD	196	7.2	-	-	32	30	80	MECH RM 228	MIXING VALVE
V-5	AHU-2	HWR	3-WAY	MOD	20.0	.43	-	-	3.3	30	25	MECH RM 228	MIXING VALVE
V-6	HV-1	HWS	3-WAY	MOD	83	2	-	-	2.6	30	25	MEZZANINE	
V-7	HV-2	HWS	3-WAY	MOD	440	10.5	-	-	54	30	64	MEZZANINE	
V-8	HV-3	HWS	3-WAY	MOD	15	.4	-	-	4.2	30	25	MEZZANINE	
V-9	HV-4	HWS	3-WAY	MOD	199	4.7	-	-	39	30	64	MEZZANINE	
V-10	HV-5	HWS	3-WAY	MOD	47	1.1	-	-	9	30	38	MEZZANINE	
V-11	UH-1,2,3,4,5	HWR	2-WAY	2-POS	-	.03	-	-	11	15	13	UH-1 MECH. RM.(125) UH-2 ELECT. RM.(126) UH-3 AIR COMP. RM.(135) UH-4 AIR COMP. RM.(146) UH-5 MECH. RM. (228)	
V-12	UH-6,7,8	HWR	2-WAY	2-POS	-	0.5	-	-	0.3	15	13	UH-6 DIVERS (140) UH-7 RIGGING (133) UH-8 RUBBER & PLASTIC (138)	
V-13	VAV-9,15,24,34	HWR	2-WAY	2-POS	-	0.2	-	-	0.1	15	13	VARIOUS	
V-14	VAV-1,2,4,5,6,7,8,10,12,13,14,16,17,18,19,20,21,22,23,25,26,29,30,31,33,36,36,37,38,39,40	HWR	2-WAY	2-POS	-	0.6	-	-	0.4	15	13	VARIOUS	
V-15	VAV-11	HWR	2-WAY	2-POS	-	0.9	-	-	0.6	15	13	VARIOUS	
V-16	VAV-3,26,27,32,41	HWR	2-WAY	2-POS	-	1.2	-	-	0.8	15	13	VARIOUS	
V-17	SWH-1	STM	2-WAY	MOD	1280		105	34	-	-	50	MECH RM 125	NC
V-18	LC-1	CHWR	2-WAY	2-POS		8.2	-	-	32	30	80	OUTSIDE	NC
V-19	LC-2	CHWR	2-WAY	2-POS		8.2	-	-	32	30	80	OUTSIDE	NC

1. ALL VALVES MUST BE CAPABLE OF TIGHT CLOSURE AGAINST RESPECTIVE PUMP SHUT-OFF HEAD.
2. SOLENOID VALVE (120 V)

CHW/HW SYSTEM (CHS)	
LOCAL DDC CONTROLLER	
	ANALOG
ANALOG	A V-1 HWS TEMP
DIGITAL	B CHILLER LC-1 START
DIGITAL	C CHILLER LC-2 START
DIGITAL	D PUMP PP-1 START
DIGITAL	E PUMP PP-2 START
DIGITAL	F PUMP HWP-1 START
DIGITAL	G PUMP HWP-2 START
DIGITAL	H PUMP SP-1 START
	ANALOG
ANALOG	1 CHWS TEMP.
ANALOG	2 CHWR TEMP.
ANALOG	3 HWS TEMP.
ANALOG	4 HWR TEMP.
ANALOG	5 O.A. TEMP.
ANALOG	6 LPS PRESSURE-KPA
ANALOG	7 HPS PRESSURE-KPA
ANALOG	8 HPS PRESSURE-KPA

DESIGN: []
 CHECK: []
 DATE: []
 PROJECT MANAGER: []
 QUALITY CONTROL: []
 BRANCH MANAGER: []
 DESIGN DIRECTOR: []

APPROVED: []
 ACTIVITY - SATISFACTORY TO: []
 APPROVED: []
 FOR STD FOR COMMANDER NAVFAC

WHITMAN, REQUARDT AND ASSOCIATES
 ENGINEERS
 BALTIMORE, MARYLAND

A/E CONTRACT NO. []
 PROJECT NO. []
 DATE []

WILLIAM A. DELORE
 NO. 020020
 REGISTERED PROFESSIONAL ENGINEER

ATLANTIC DIVISION
 NAVAL FACILITIES ENGINEERING COMMAND
 NORFOLK, VIRGINIA
 NAVAL STATION, NORFOLK, VIRGINIA
 INTERMEDIATE MAINTENANCE ACTIVITY (SIMA)
 UTILITY UPGRADE AND EXPANSION
 WATERFRONT SUPPORT BUILDING
 HEATING AND COOLING STATIONS DIAGRAMS

REVISIONS
 NO. DESCRIPTION DATE APPROVED
 1 FURNITURE CHANGES 7/2/98 JOA
 2 FURNITURE CHANGES/COMMENTS REVISIONS 5/15/98 JOA

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