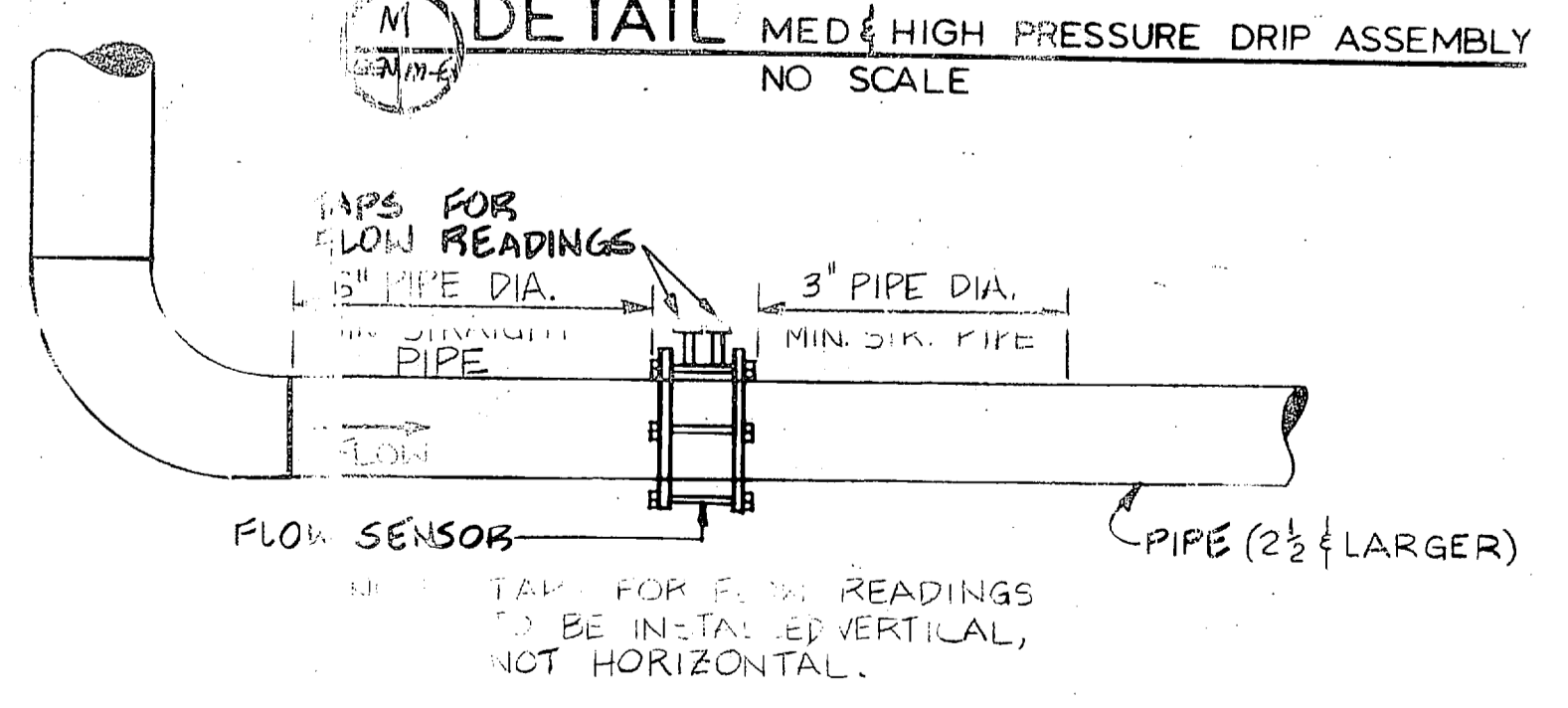
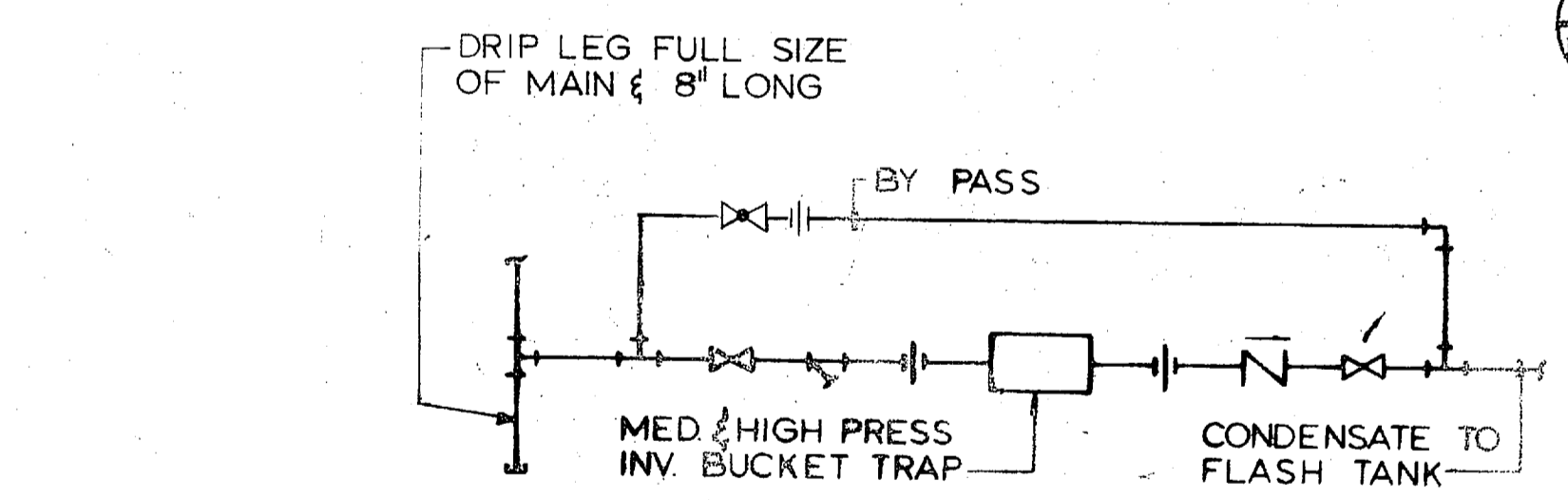
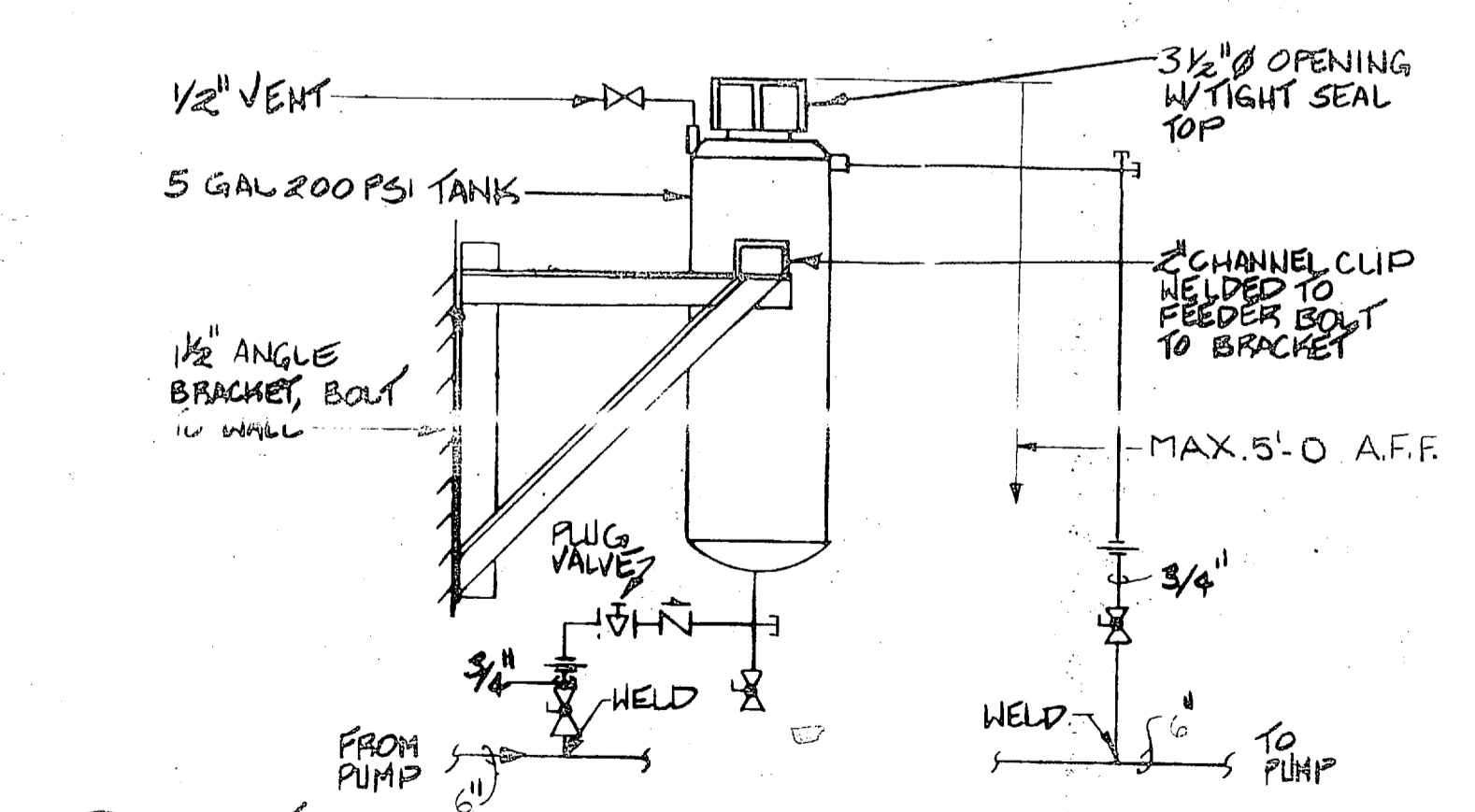
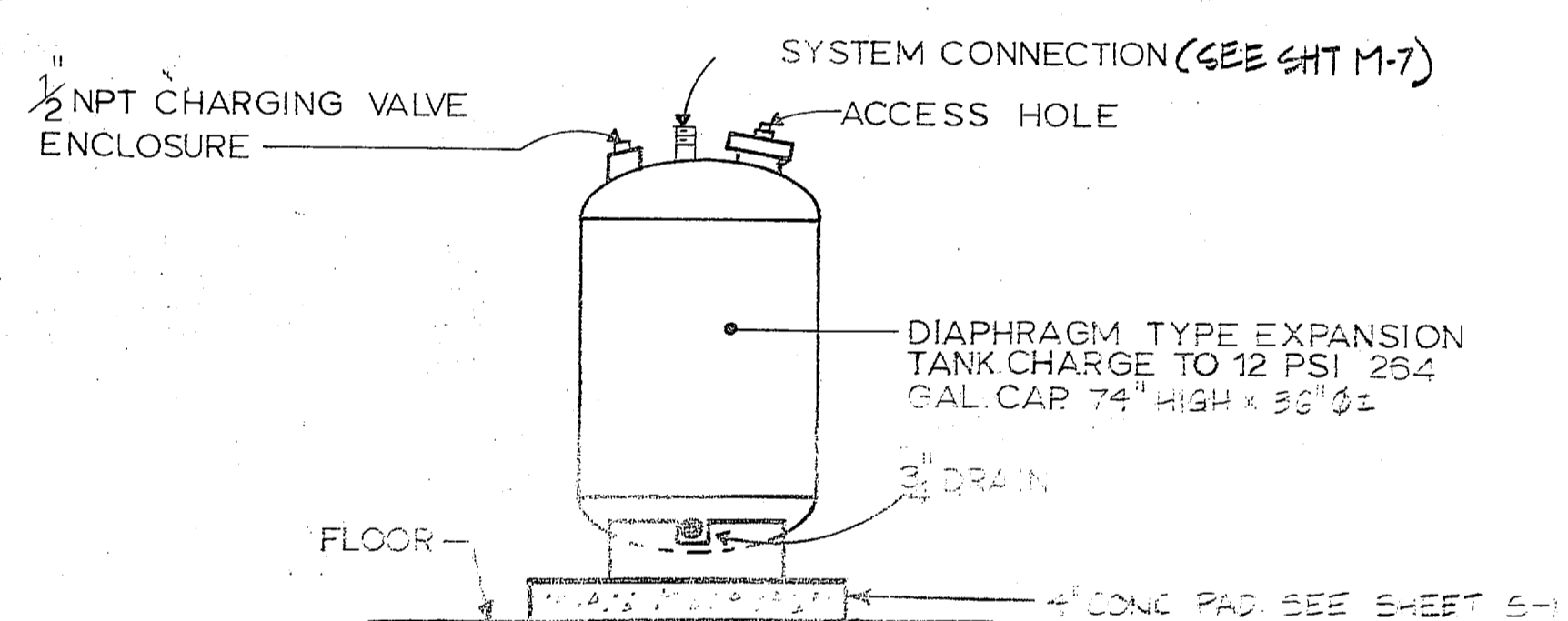
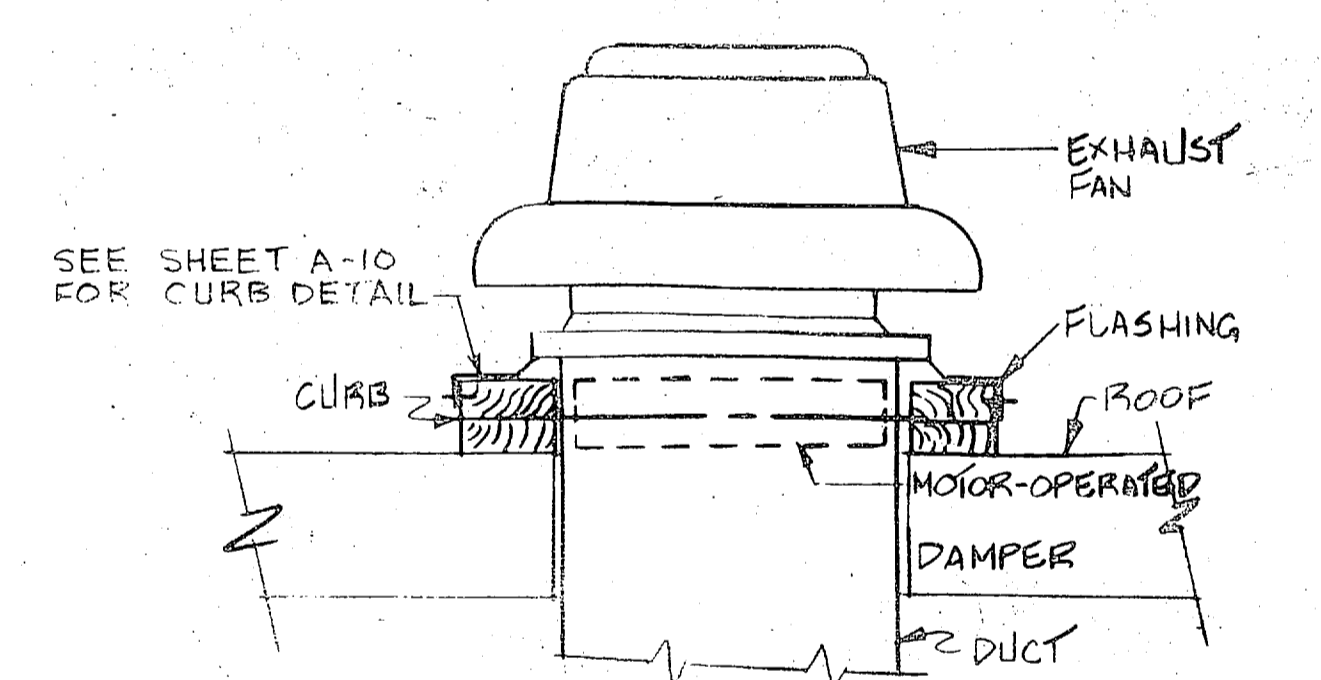
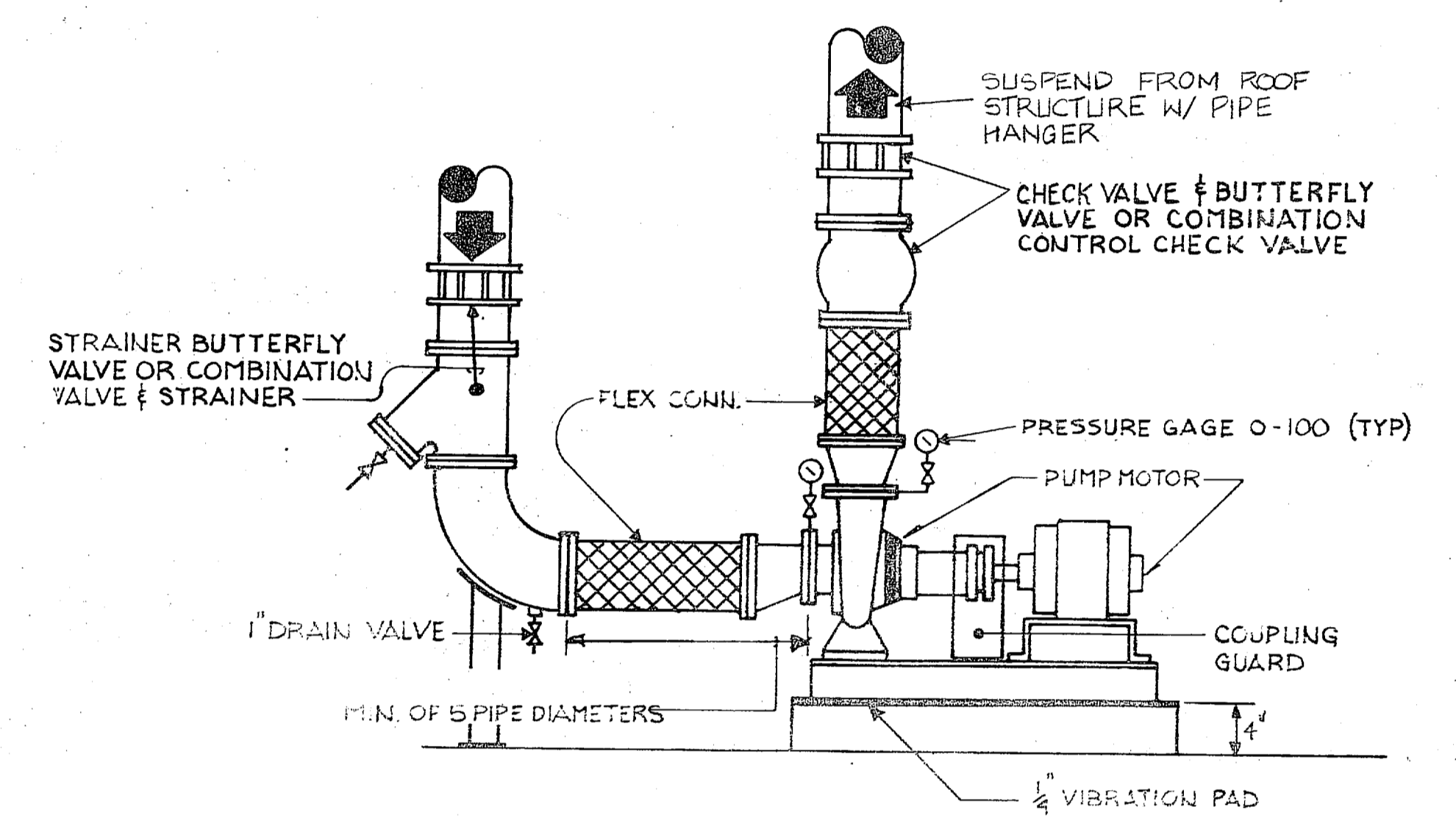
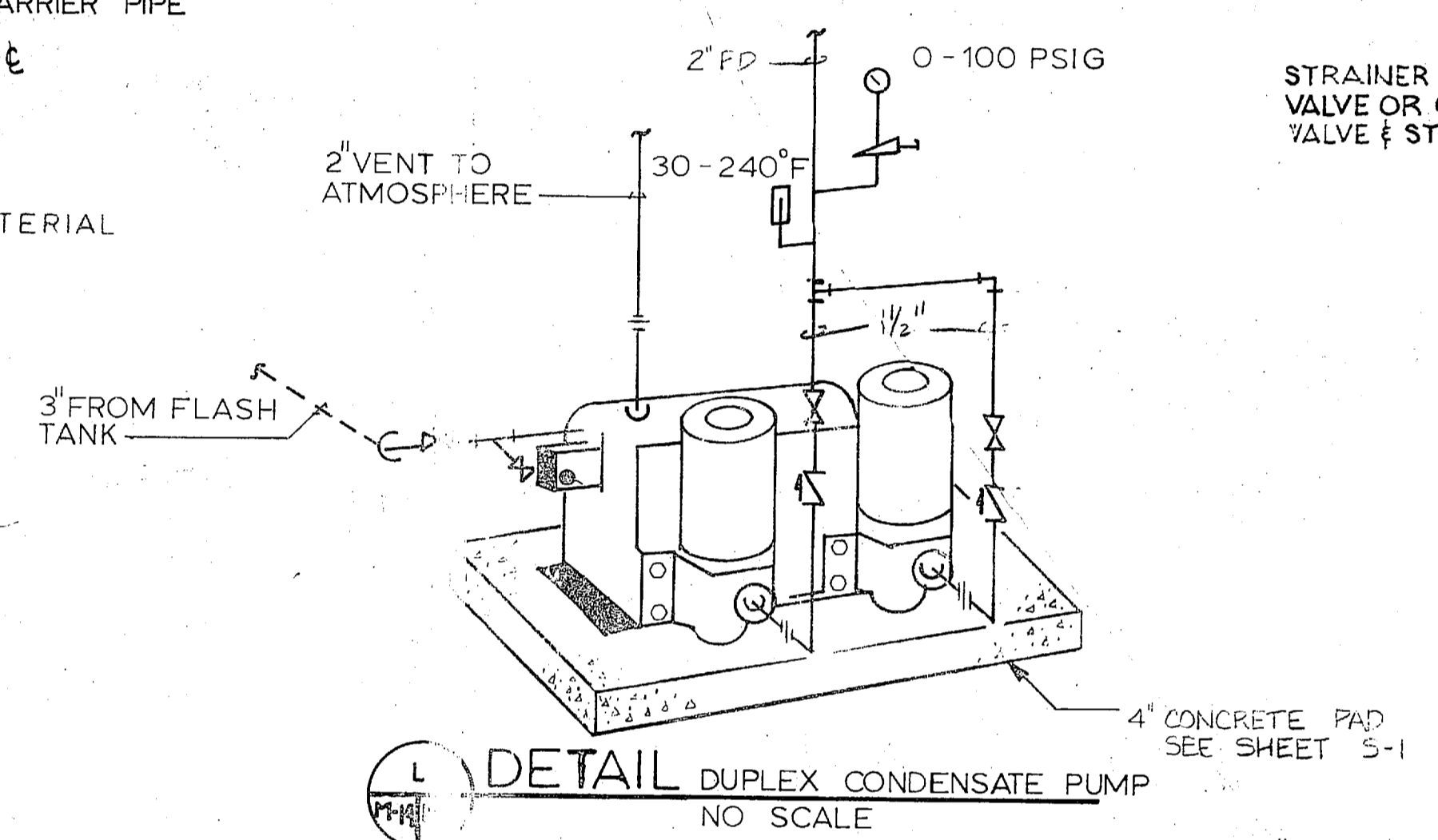
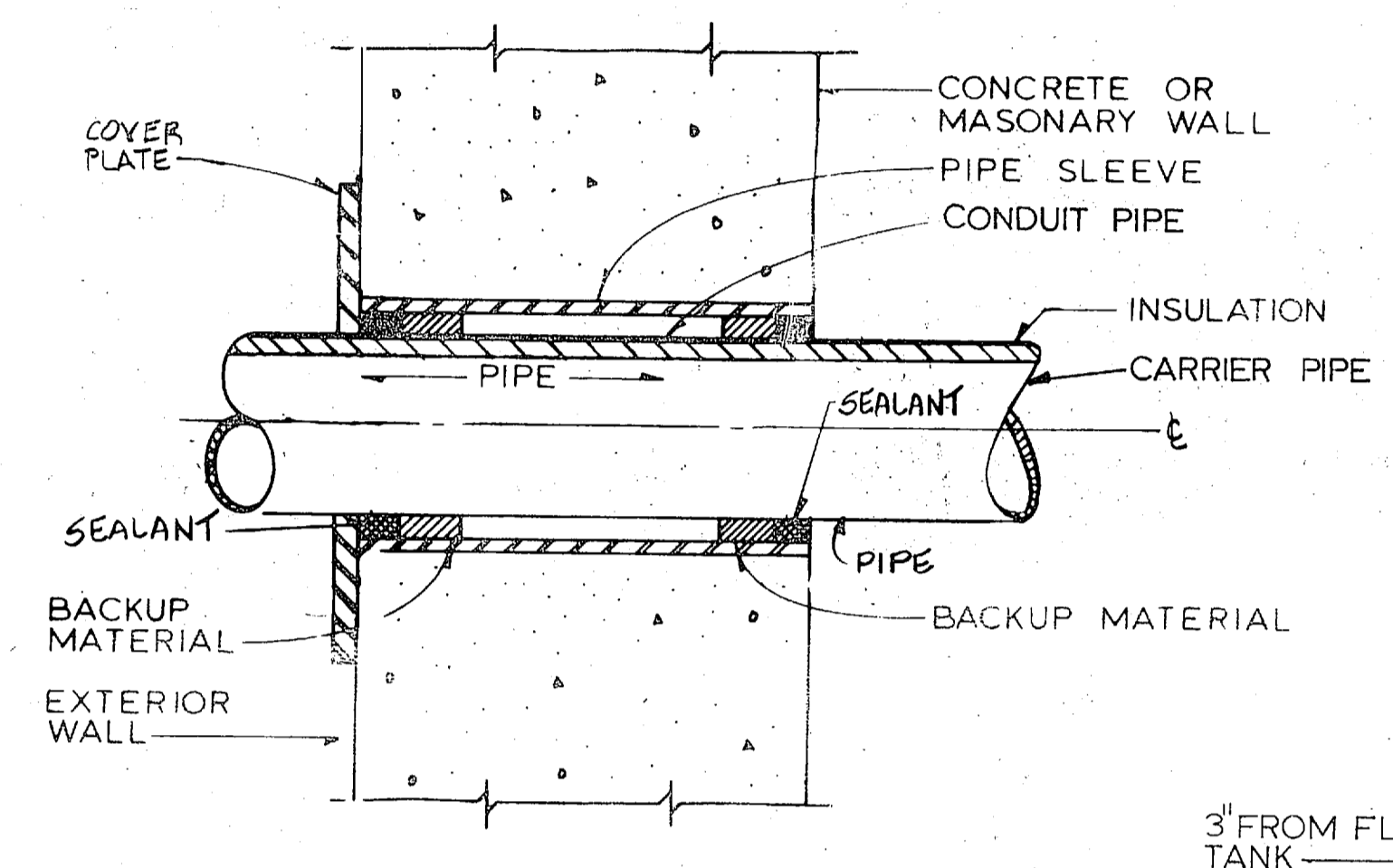
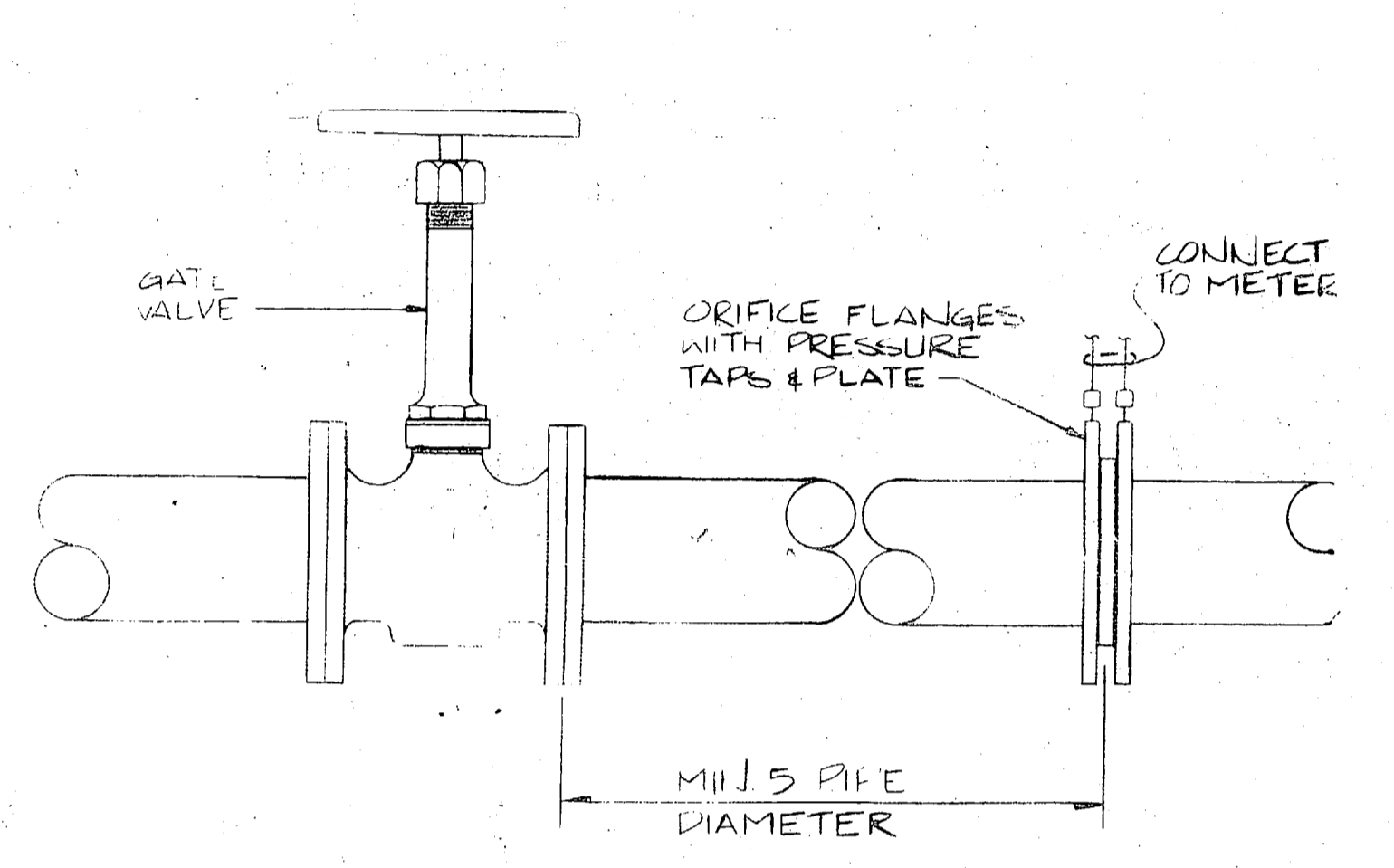
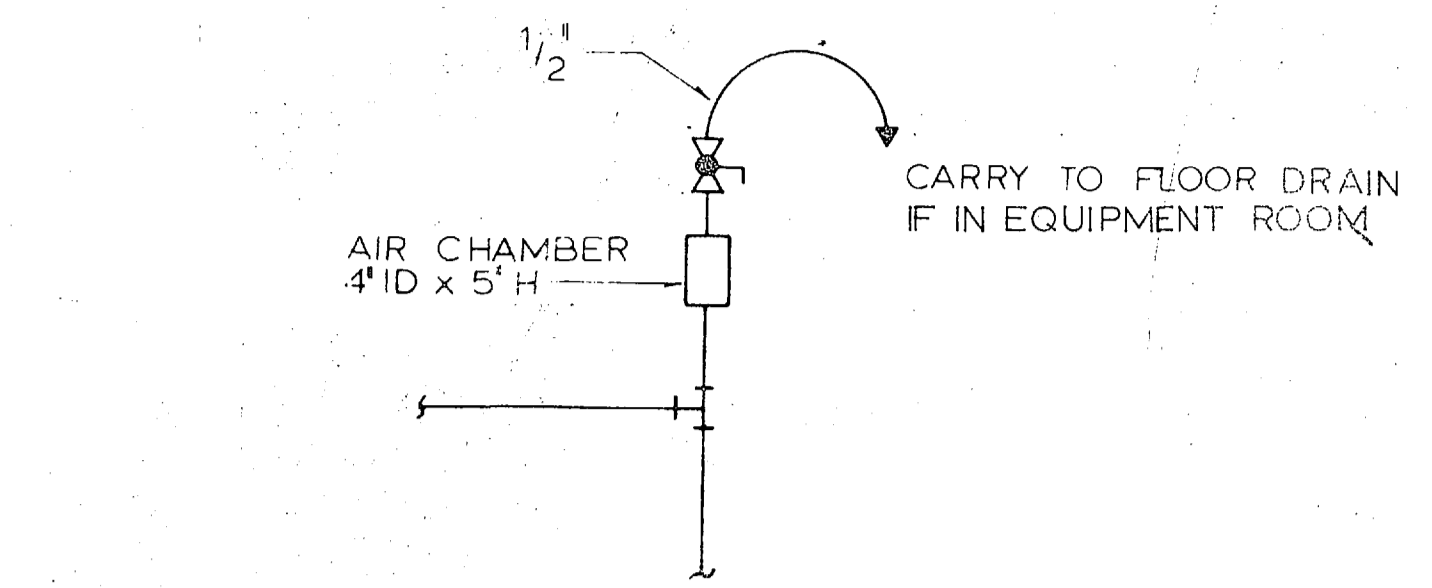
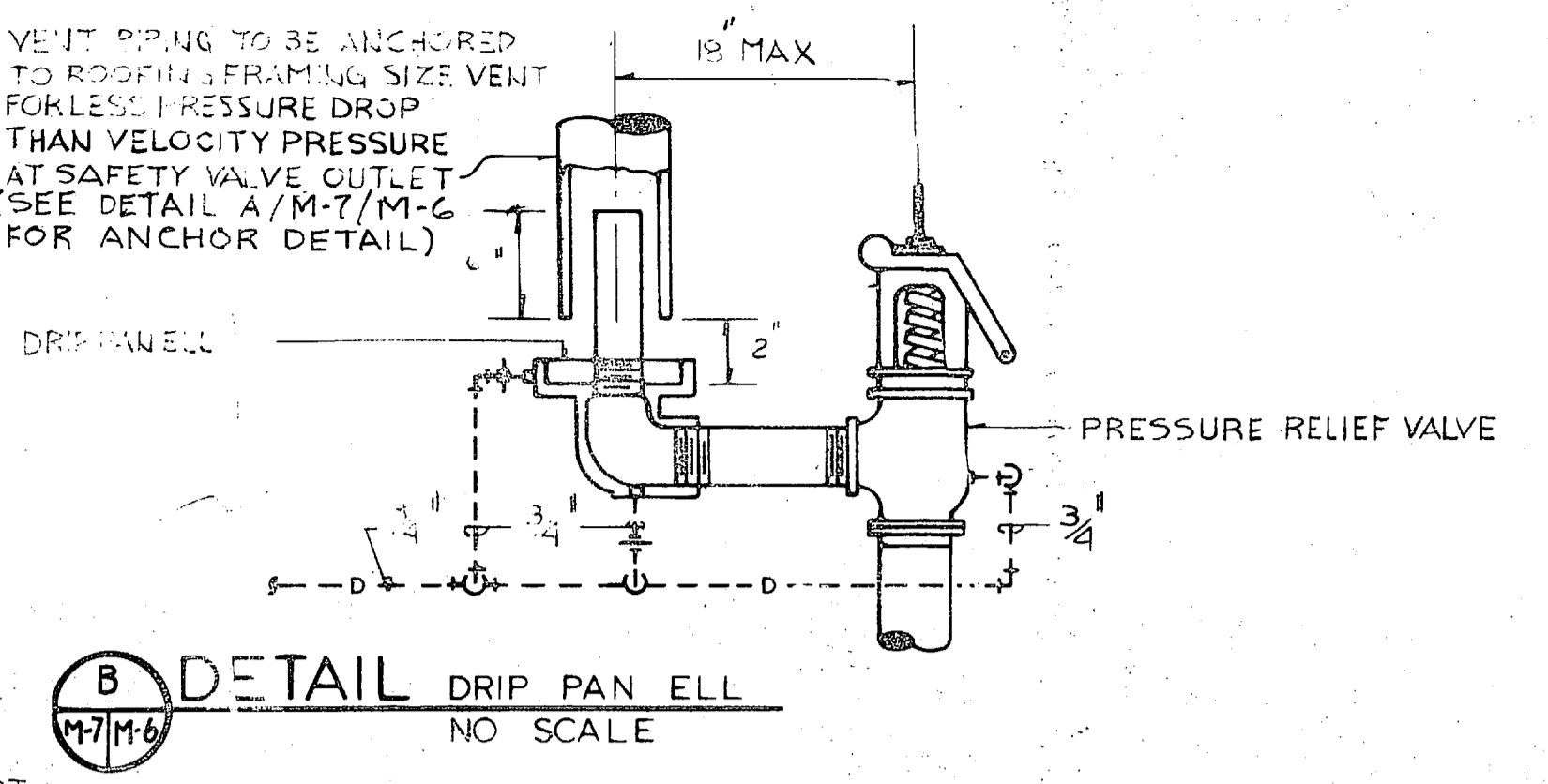
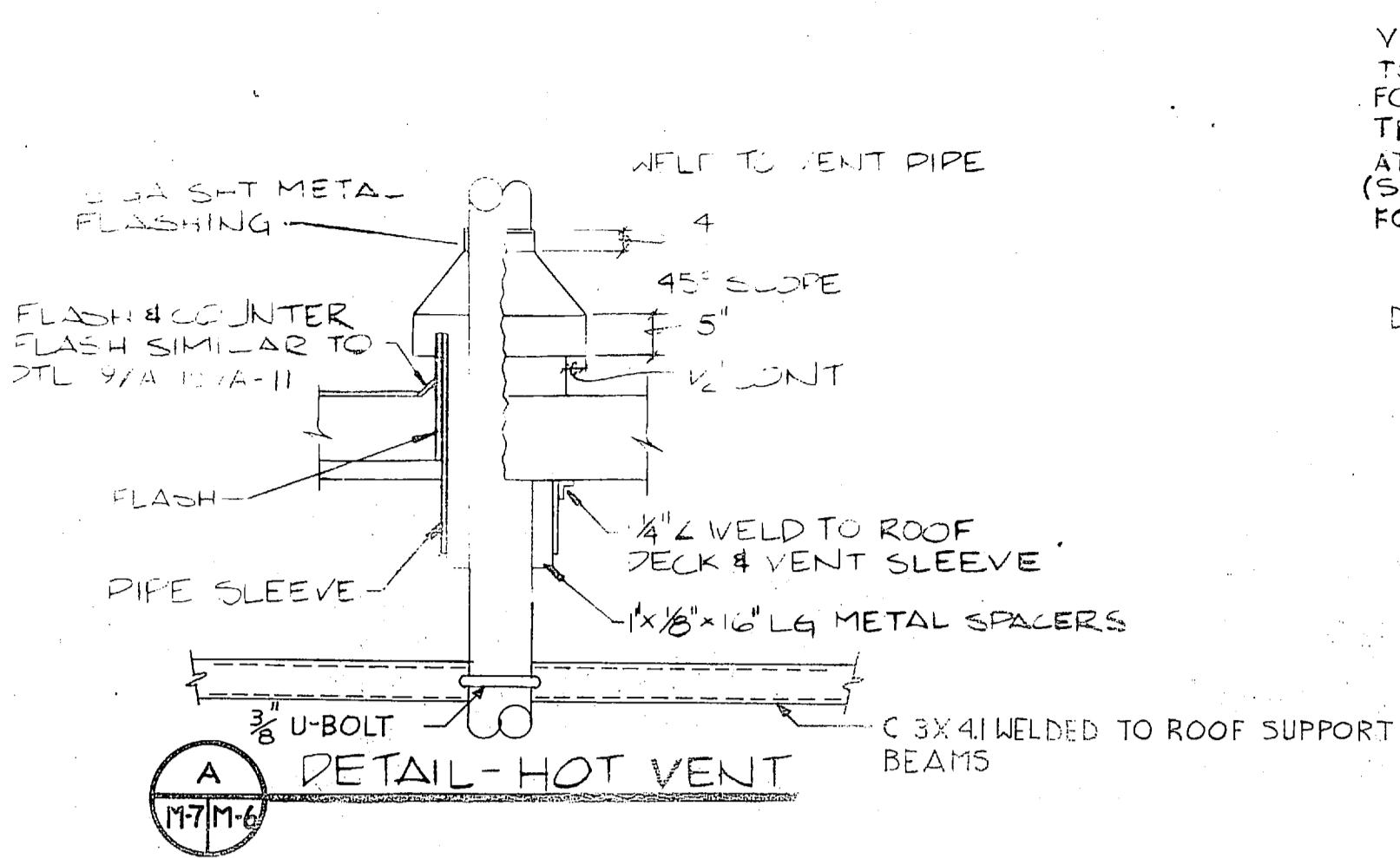


REV	DESCRIPTION	PREP BY	DATE	APPROV



**SYMBOL LEGEND**

⊖	THERMOSTAT (VENTILATION)	CHWS	CHILLED HOT WATER SUPPLY
⊖	THERMOSTAT (HEATING & COOLING)	CHWR	CHILLED HOT WATER RETURN
⊖	THERMOSTAT (HEATING)	CWS	CHILLED WATER SUPPLY
⊖	FAN COIL UNIT DESIGNATION	CWR	CHILLED WATER RETURN
⊖	CONNECT NEW TO EXISTING	— —	GATE VALVE
— —	PIPE REDUCER ECCENTRIC	— —	HOSE END GATE VALVE
— —	GAGE COCK	— —	BUTTERFLY VALVE
C.I.	CAST IRON	— —	GLOBE VALVE
A.F.F.	ABOVE FINISHED FLOOR	— —	STRAINER
E.S.P.	EXTERNAL STATIC PRESSURE	— —	2-WAY CONTROL VALVE
— —		— —	3-WAY CONTROL VALVE
— —		— —	UNION
— —		— —	PIPE REDUCION CONCENTRIC
— —		— —	PRESS. GAGE W/ GAUGE COCK
— —		— —	THERMOMETER
— —		— —	CHECK VALVE
— —		— —	MANUAL AIR VENT
— —		— —	MANUAL VOLUME DRAIN
— —		— —	PRESS. RED. VALVE
— —		— —	FAN COIL UNIT
— —		— —	UNIT HEATER
— —		— —	TERMINAL AIR BLENDER
— —		— —	RECLAIM LIQUID CHILLER
— —		— —	FLOOR DRAIN
— —		— —	OPPOSED BLADE DAMPER
— —		— —	ENERGY MONITORING CONTROL SYSTEM
— —		— —	MOTOR OPERATED DAMPER
— —		— —	ACCESS DOOR
— —		— —	FIRE DAMPER
— —		— —	BELOW FINISHED FLOOR
⊖		⊖	THERMOSTAT
⊖		⊖	HUMIDITY SENSOR
— —		— —	HWS HOT WATER SUPPLY
— —		— —	HWR HOT WATER RETURN
— —		— —	MPS MEDIUM PRESSURE STEAM
— —		— —	FLOW DIRECTION
— —		— —	HPS HIGH PRESSURE STEAM
— —		— —	DOOR GRILLE
— —		— —	PIPE ANCHOR
— —		— —	PRIMARY CHILLED HOT WATER SUPPLY
— —		— —	PRIMARY CHILLED HOT WATER RETURN
— —		— —	DOMESTIC HWS
— —		— —	DOMESTIC HWR
— —		— —	RECLAIM HOT WATER
— —		— —	PUMP DISCHARGE
— —		— —	VENT TO ROOF
— —		— —	MED. P. PRESS. DRIP ASSEMBLY
— —		— —	HIGH PRESS. DRIP ASSEMBLY
— —		— —	HOT GAS LINE
— —		— —	LIQUID LINE
— —		— —	CONTROL VALVE ASSEMBLY
— —		— —	AIR COOLED CONDENSER
— —		— —	EXPANSION LINE

**HP503 HP504 HP505**

**M-6**

J. N. PEASE ASSOCIATES ARCHITECTS - ENGINEERS - PLANNERS CHARLOTTE NORTH CAROLINA

DEPARTMENT OF THE NAVY NAVAL STATION ATLANTIC DIVISION

NAVY FACILITIES ENGINEERING COMMAND

MARINE CORPS BASE CAMP LEJEUNE, N.C.

UNACCOMPANIED ENLISTED PERSONNEL HOUSING

**HVAC DETAILS**

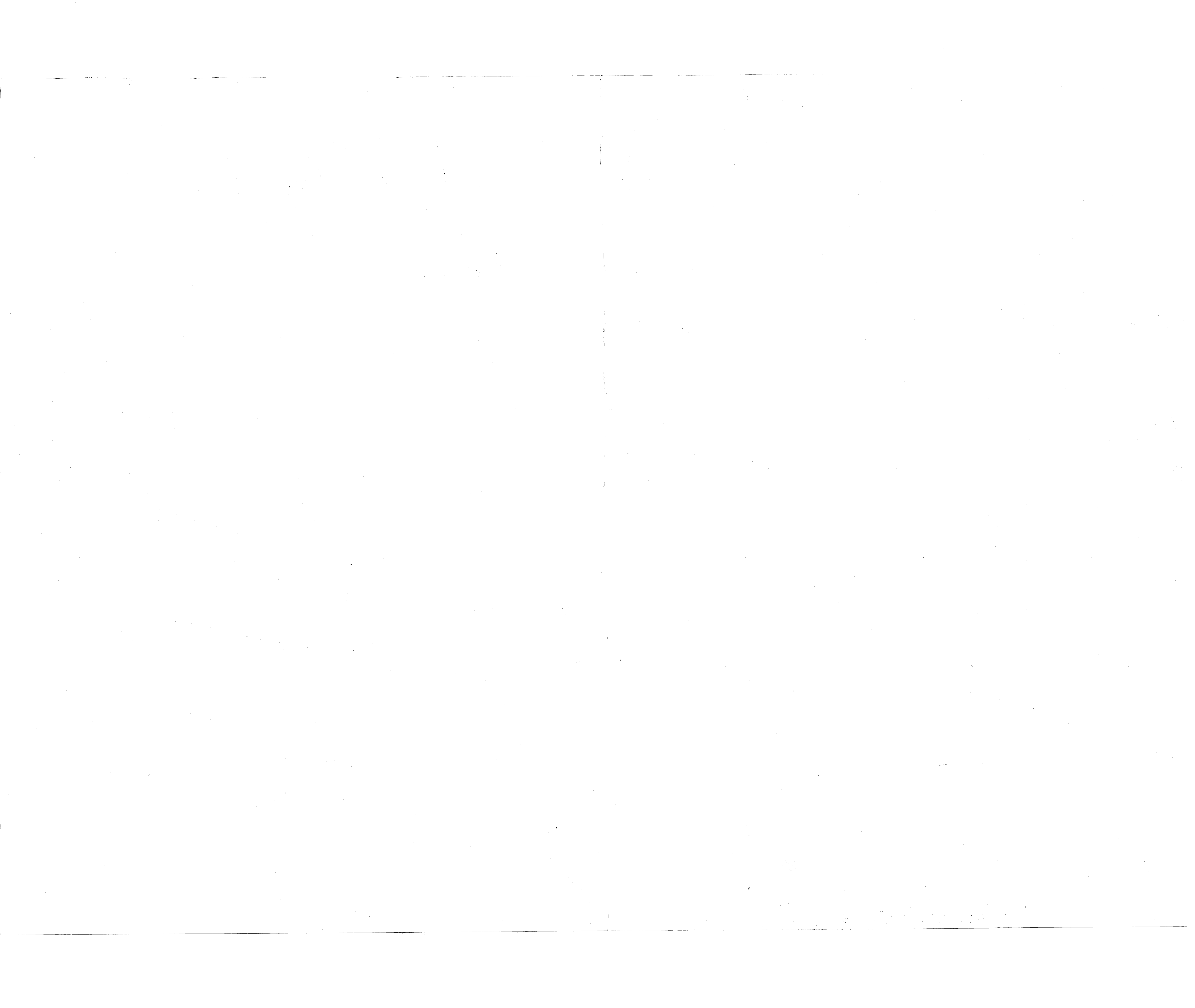
DATE: 10/23/85

NO. 80091

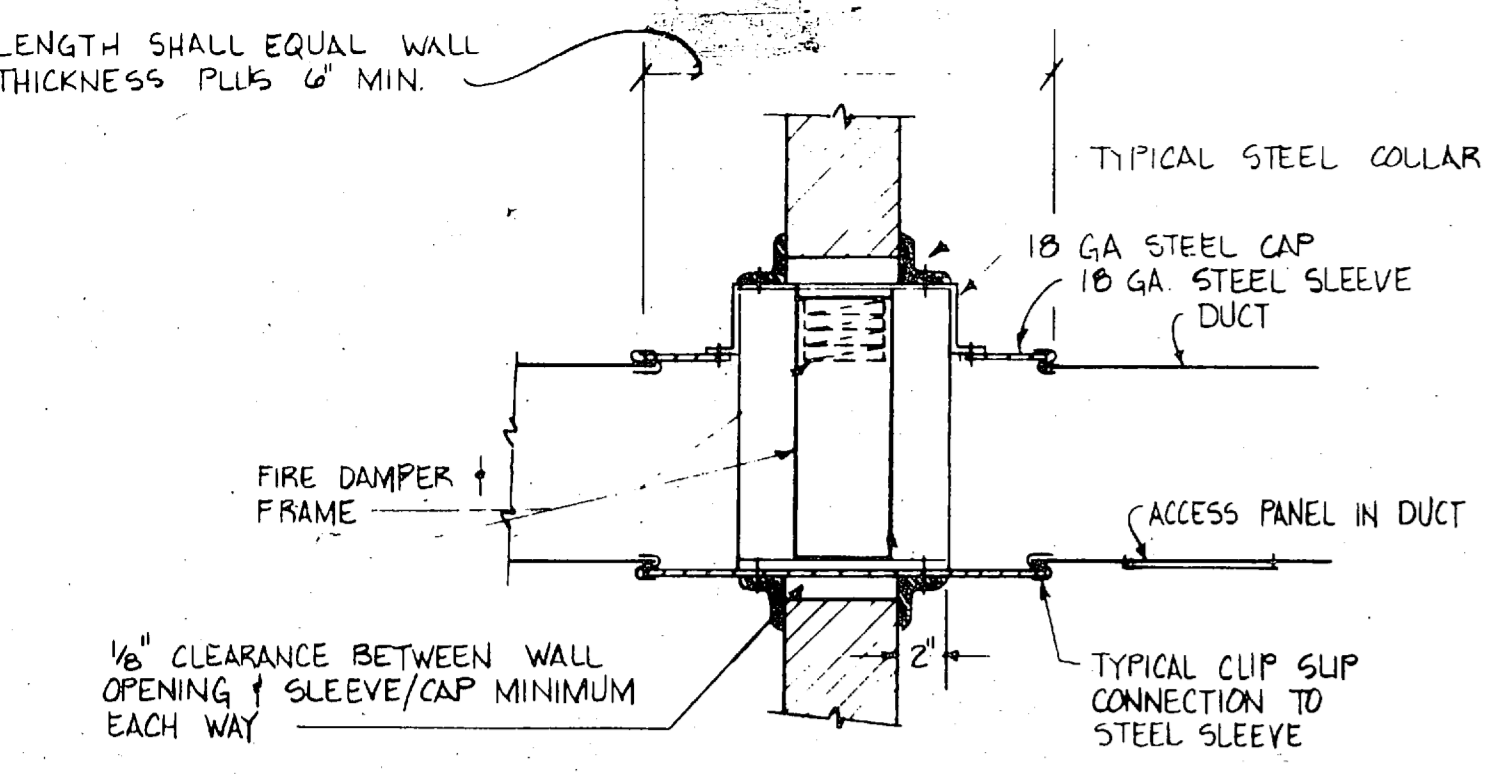
NO. N62470-84-B-4140

NO. 05-84-4140

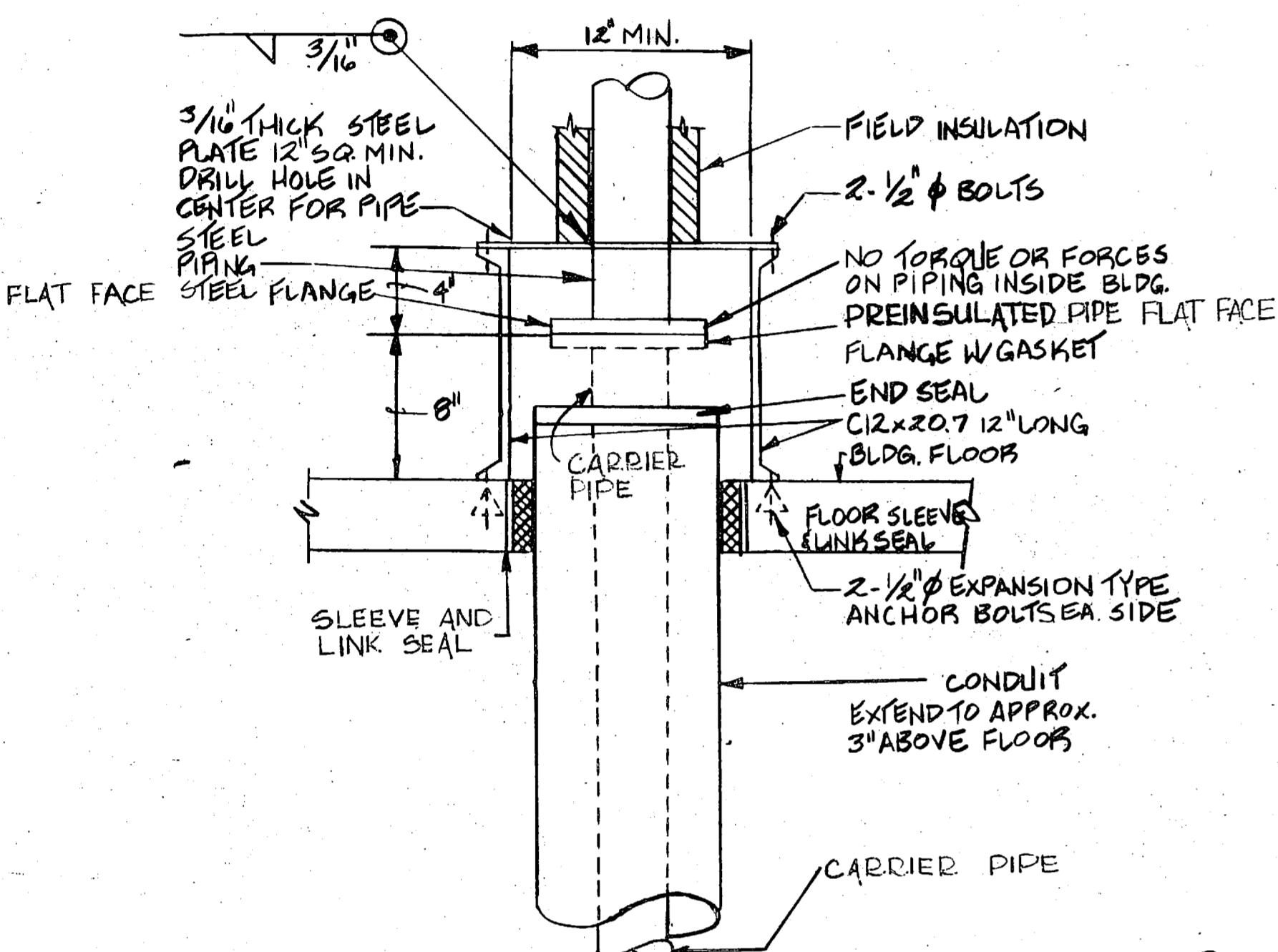
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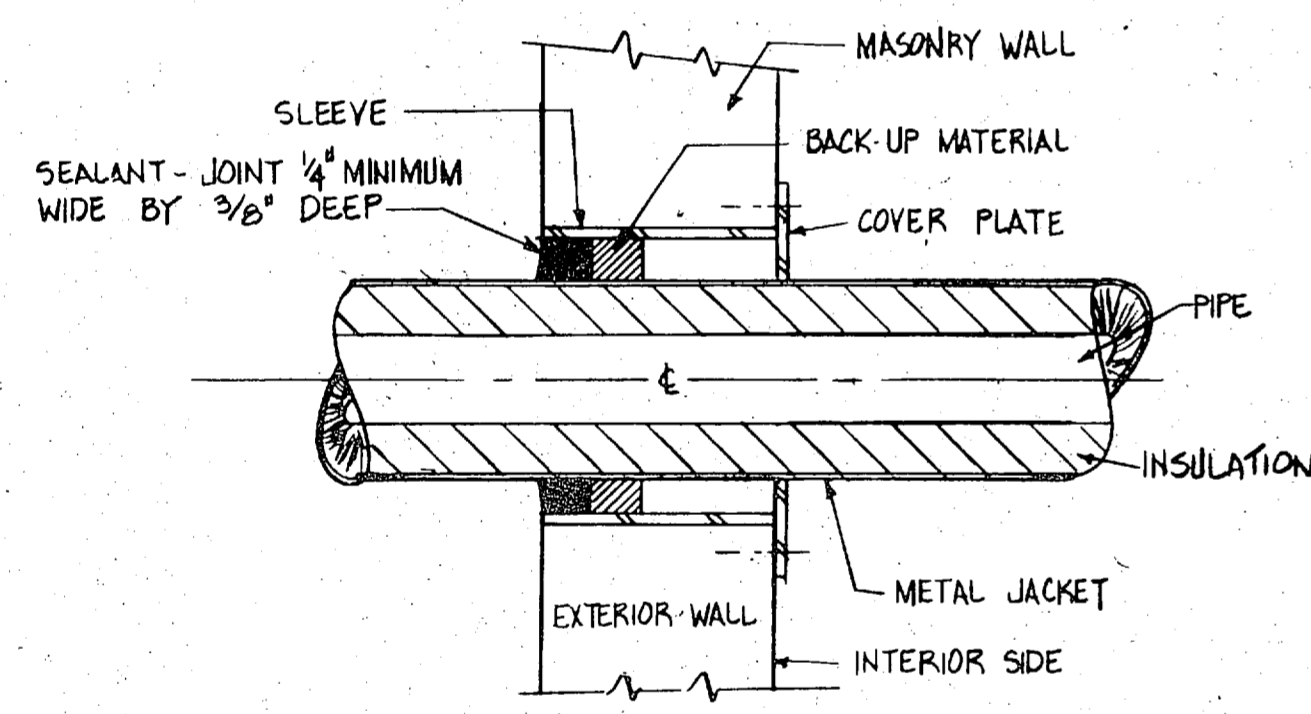
REVISIONS			
SYM	DESCRIPTION	PREP BY	DATE



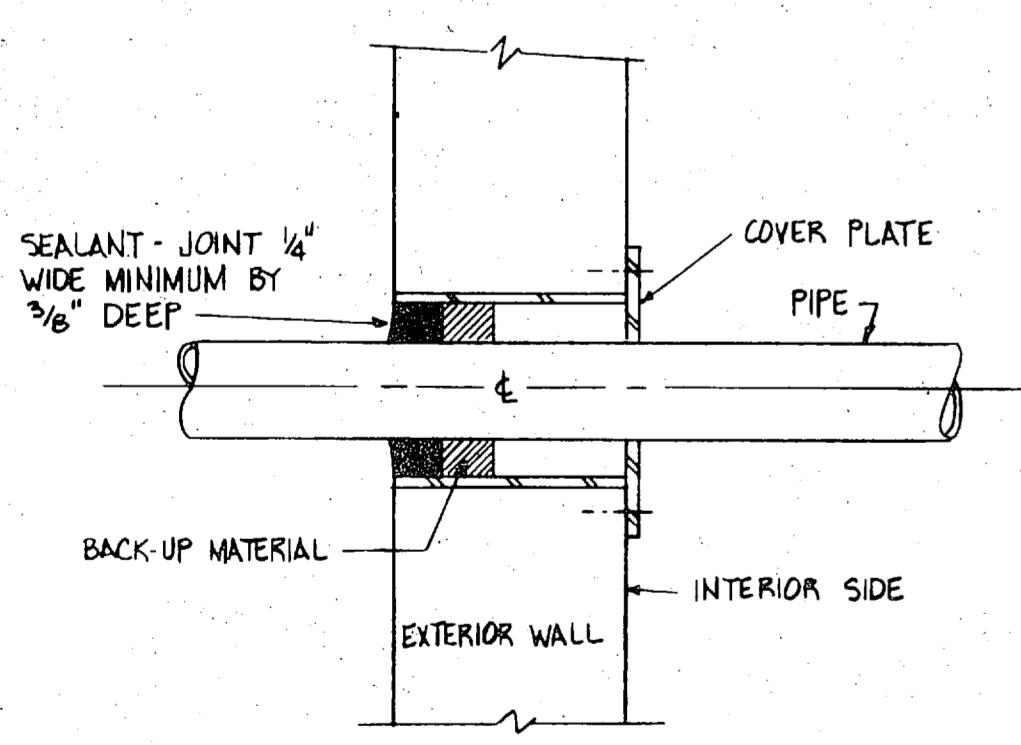
**M** DUCT THRU 1 HR PARTITION  
NO SCALE



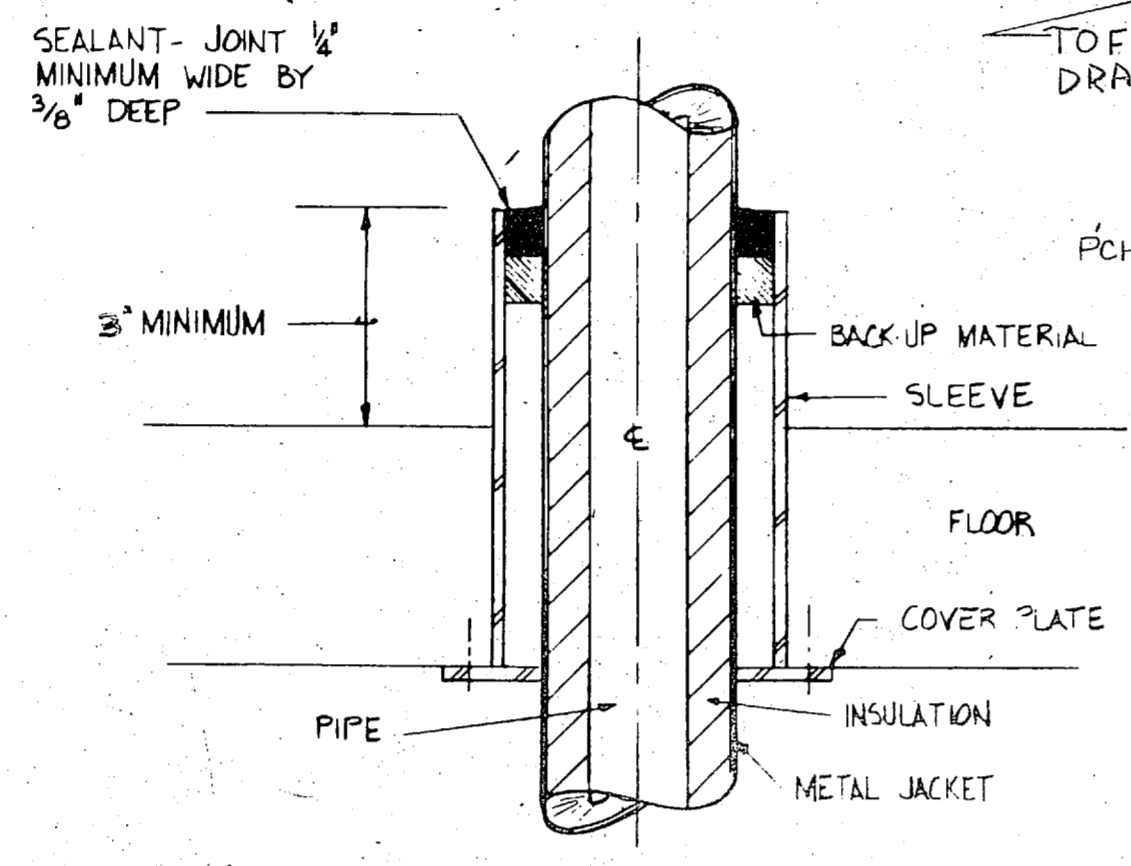
**N** PREINSULATED PIPE TO STEEL PIPE CONN. @ BLDG. ENTRANCE  
NO SCALE



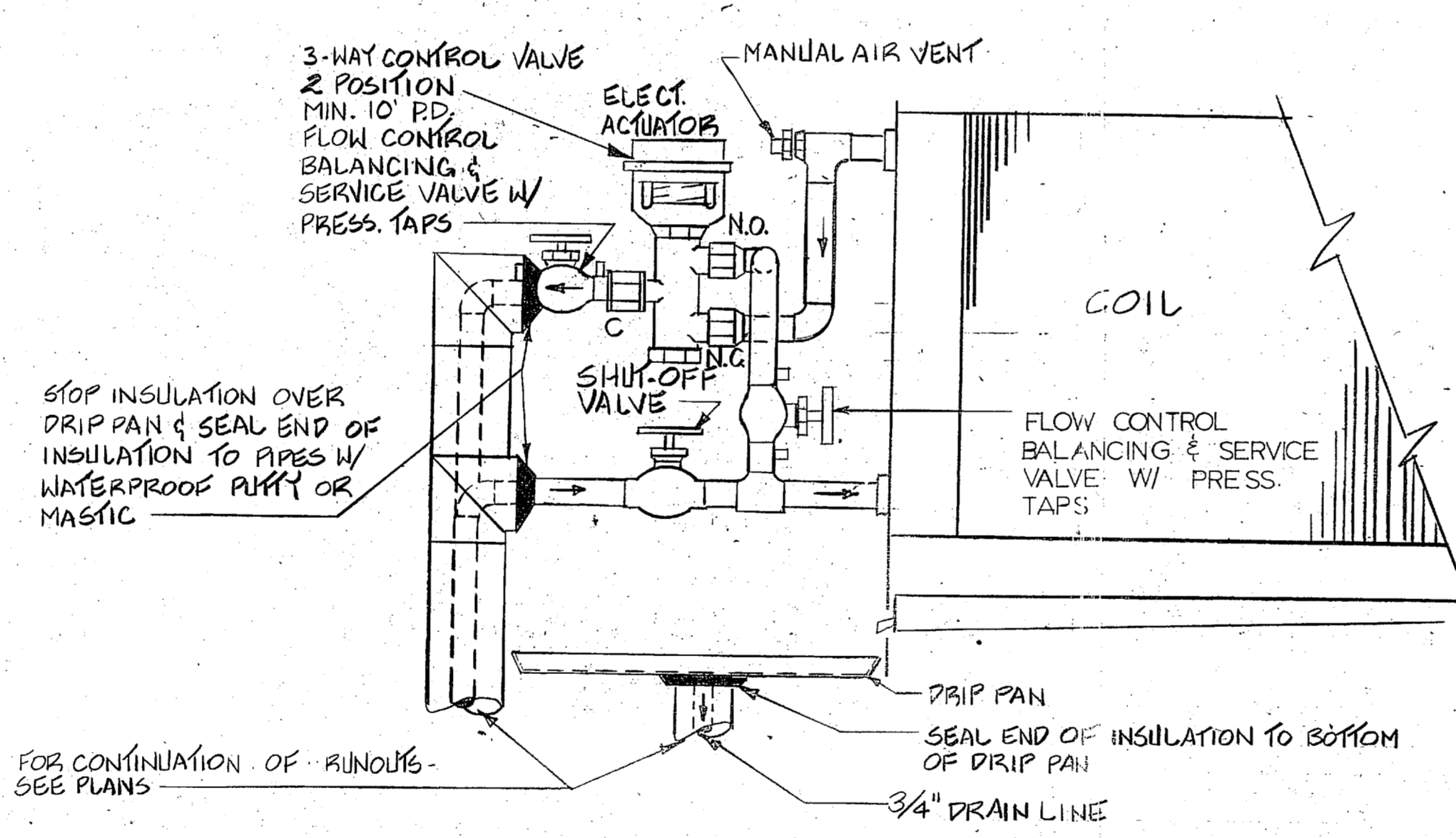
**P** PIPE SLEEVE FOR INSULATED PIPE THRU WALL - ABOVE GRADE  
NO SCALE



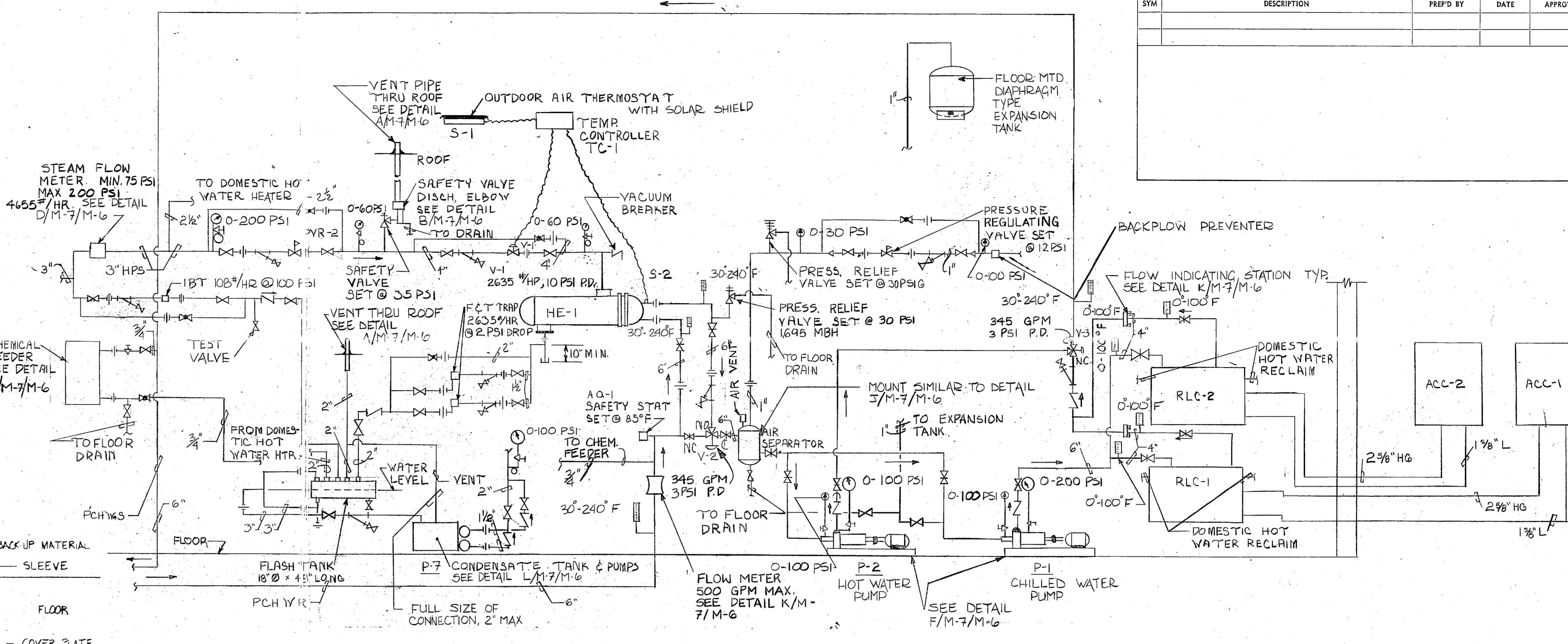
**Q** PIPE SLEEVE FOR BARE PIPE THRU WALL - ABOVE GRADE  
NO SCALE



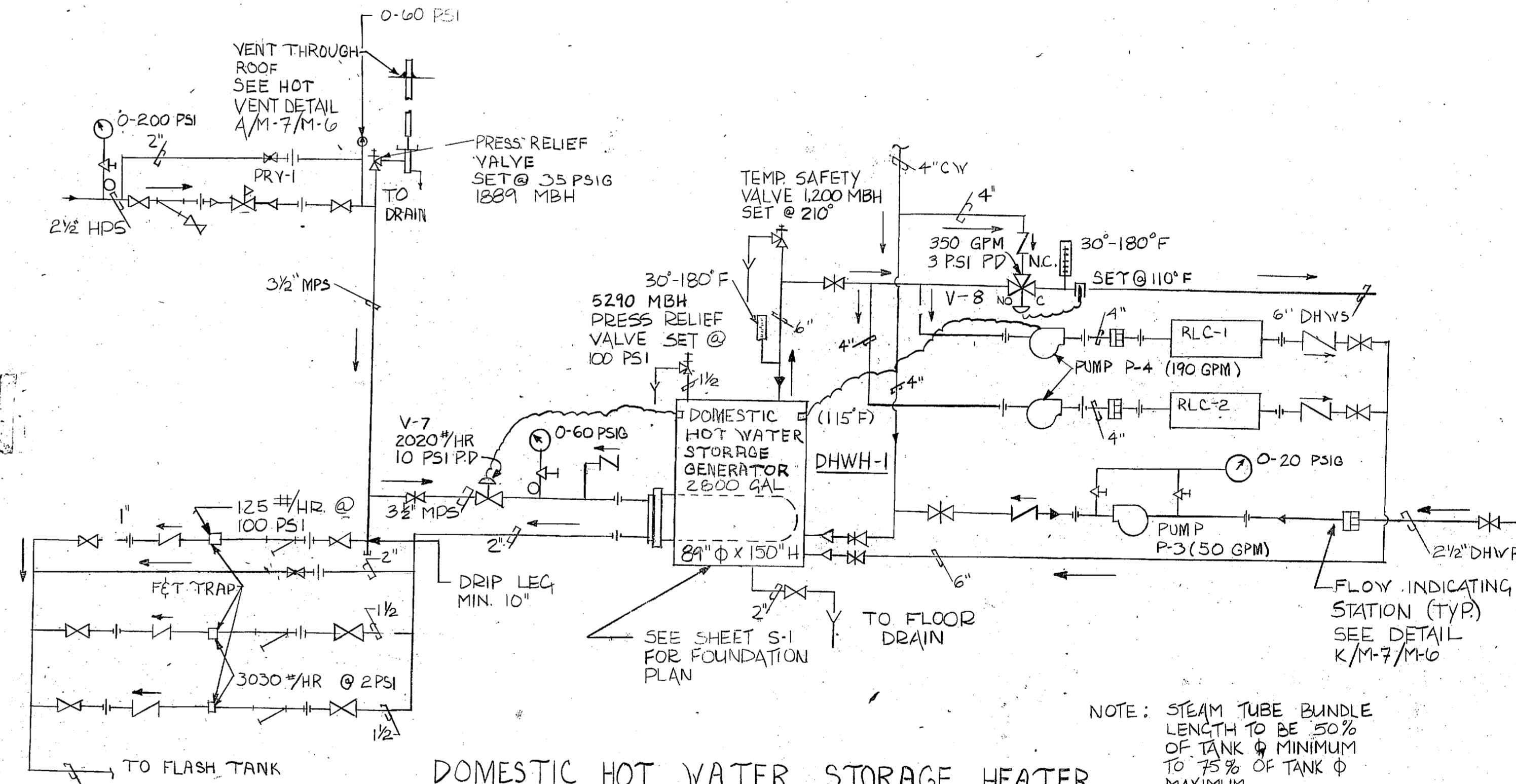
**R** PIPE PENETRATION THRU CONCRETE FLOOR  
NO SCALE



**S** FAN COIL UNIT PIPING DETAIL  
NOT TO SCALE



MECHANICAL EQUIPMENT BUILDING, HP-502 PIPING SCHEMATIC  
NO SCALE

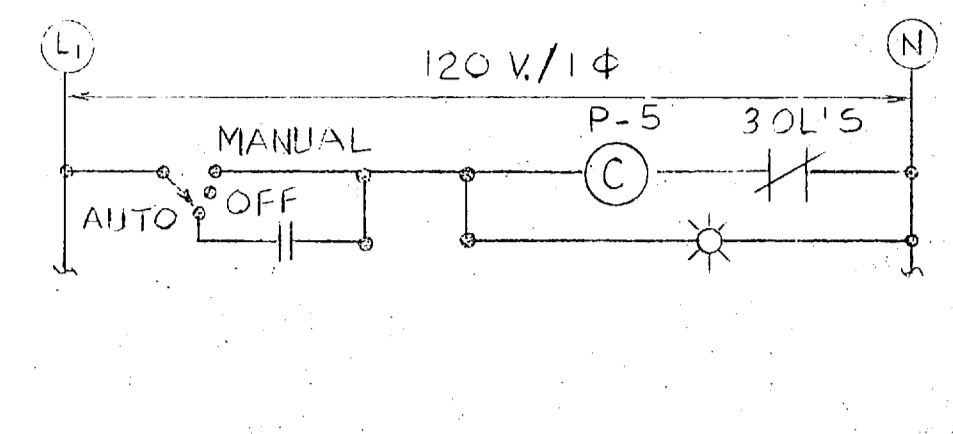


DOMESTIC HOT WATER STORAGE HEATER SCHEMATIC PIPING  
NO SCALE

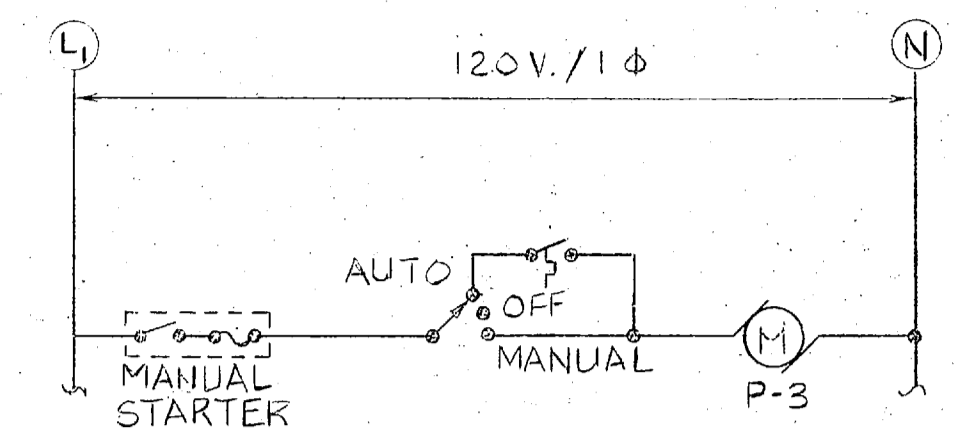
<b>HP 503 HP 504 HP 505</b>		<b>M-7</b>	
J. N. PEASE ASSOCIATES ARCHITECTS - ENGINEERS - PLANNERS CHARLOTTE NORTH CAROLINA		DEPARTMENT OF THE NAVY NAVAL STATION ATLANTIC DIVISION NORFOLK, VIRGINIA	
DESIGNED BY: W. B. KIRK PROJECT MANAGER: C. H. INGRAM DRAWN BY: J. N. PEASE CHECKED BY: J. N. PEASE DATE: 12/18/85		MARINE CORP BASE CAMP LEJEUNE, N.C. UNACCOMPANIED ENLISTED PERSONNEL HOUSING <b>DETAILS &amp; PIPING SCHEMATICS</b>	
APPROVED: J. N. Pease OFFICER IN CHARGE		SIZE: CODE IDENT NO: <b>F 80091</b>	
APPROVED: J. N. Pease DATE: 12/18/85		NAVFAC DRAWING NO: 4133666 CONSTR CONTR NO: N62470-84-B-4140	
SCALE: NO SCALE SPEC: 05-84-4140		SHEET: 67 OF 94 EFD DWG. NO.: 233666	



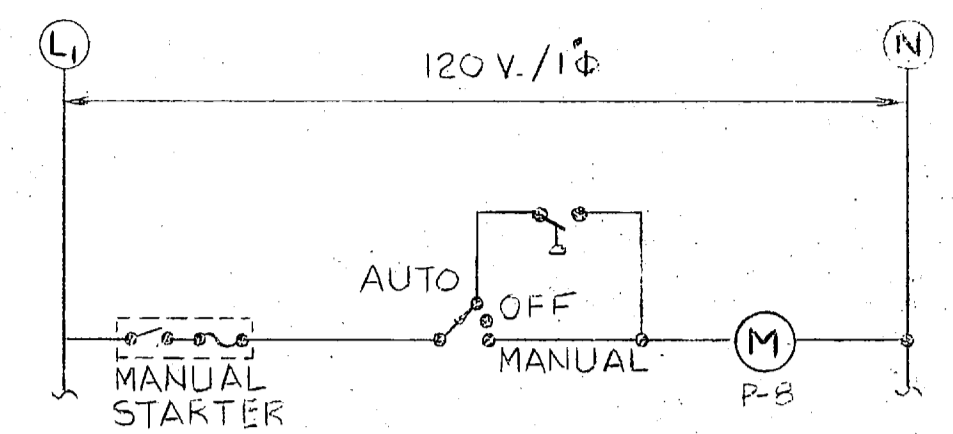
REV	DESCRIPTION	DATE	BY	CHKD



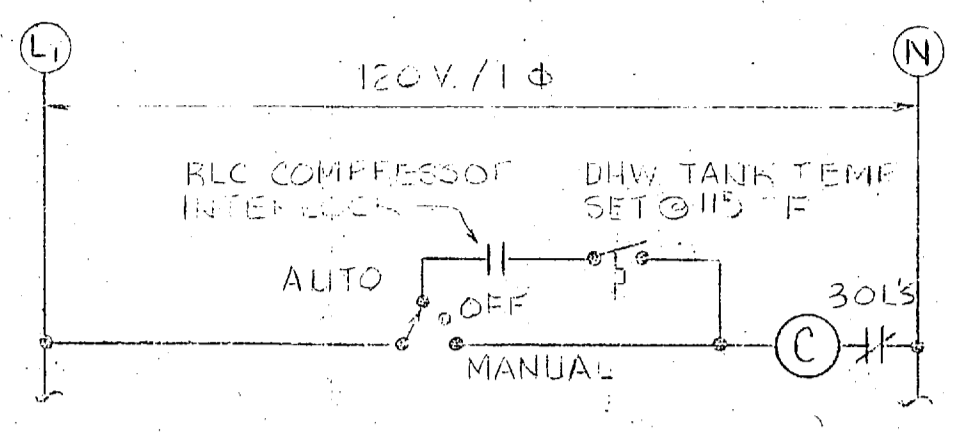
**PUMP CONTROLS**  
NO SCALE  
TYPICAL FOR PUMPS P-2



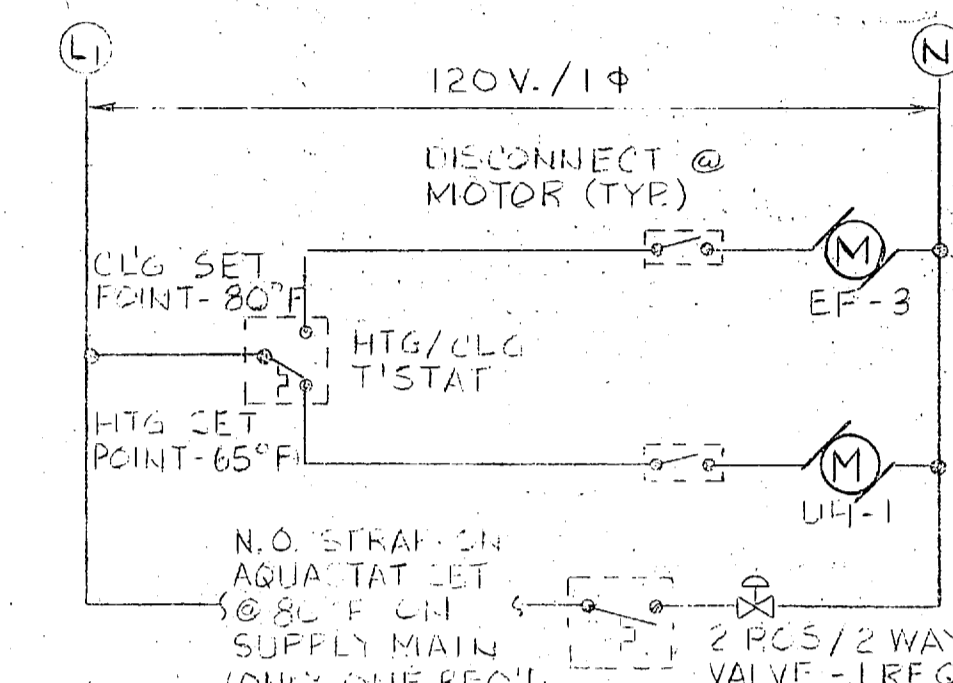
**DOM. HOT WATER PUMP CONTROLS**  
NO SCALE



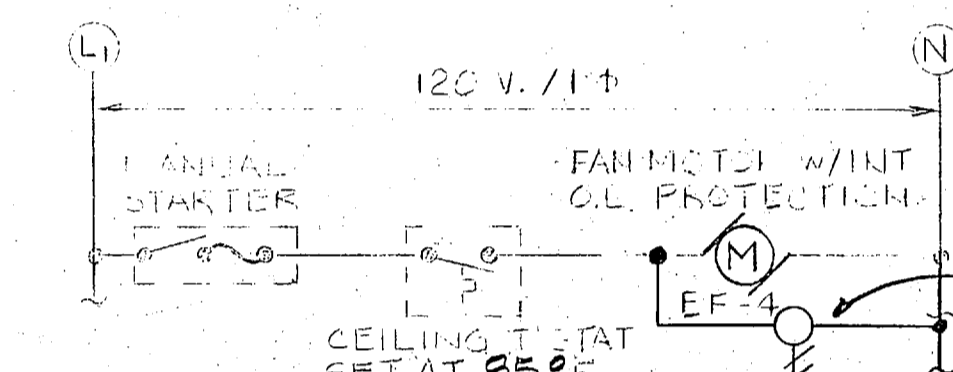
**SUMP PUMP CONTROLS**  
NO SCALE



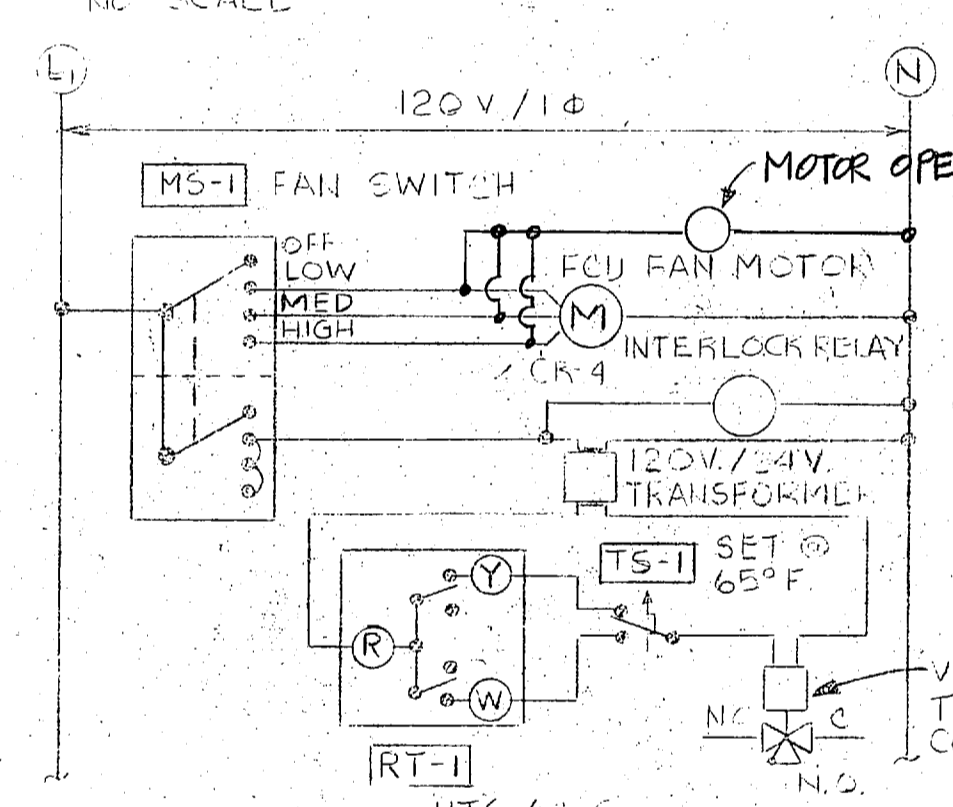
**PUMP P-4 CONTROL**  
NO SCALE (TYP FOR 2 PUMPS)



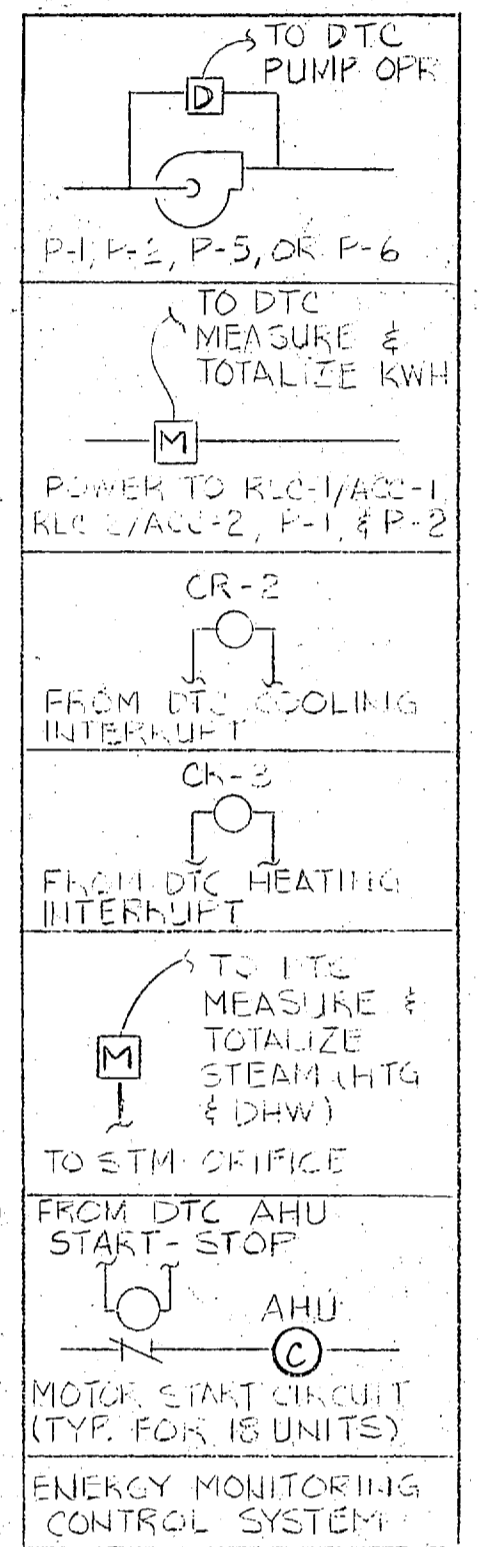
**LAUNDRY ROOM CONTROL**  
NO SCALE



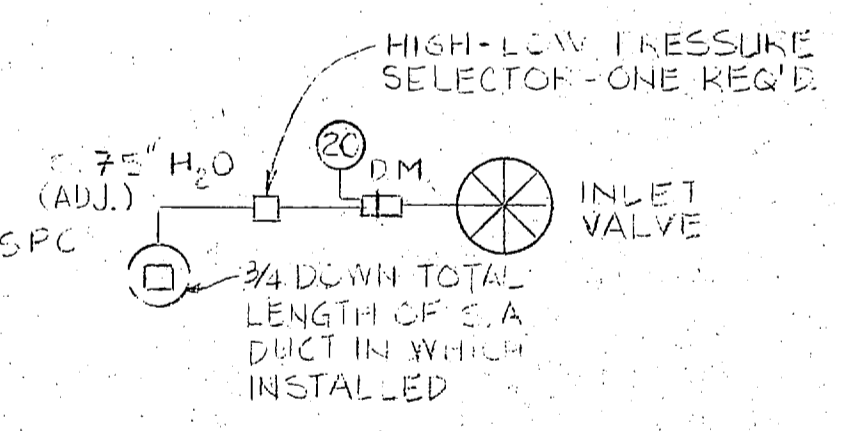
**MECHANICAL BUILDING EXHAUST FAN CONTROL**  
NO SCALE



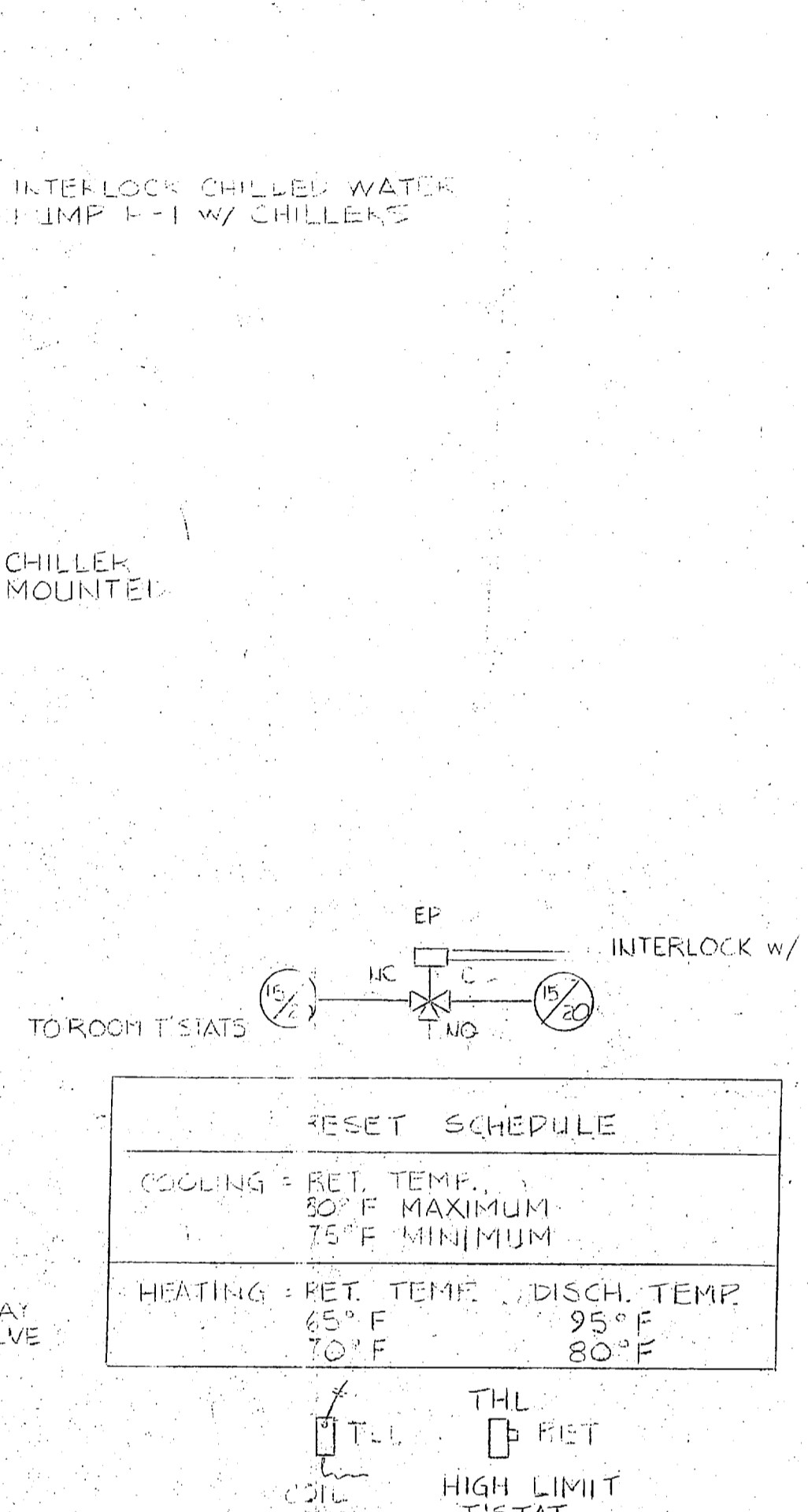
**FAN COIL UNIT CONTROL**  
NO SCALE



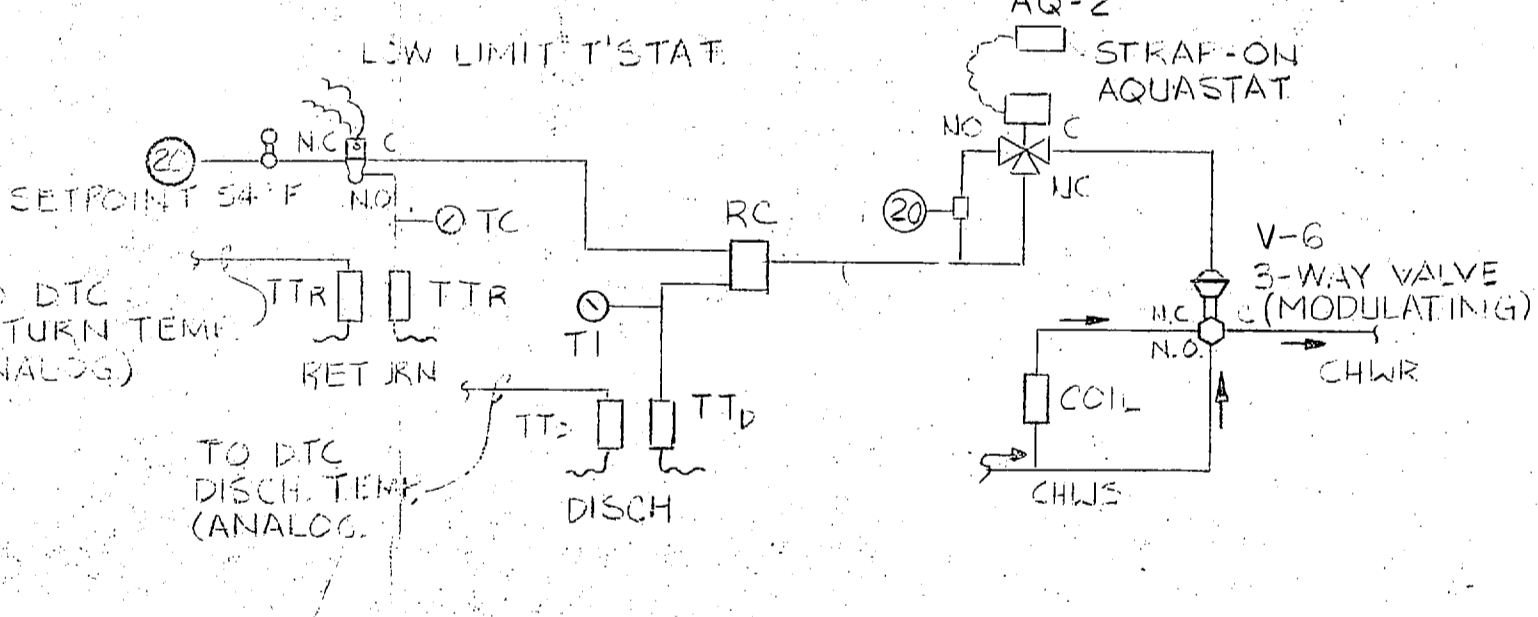
**HEATING / COOLING CONTROL**  
NO SCALE



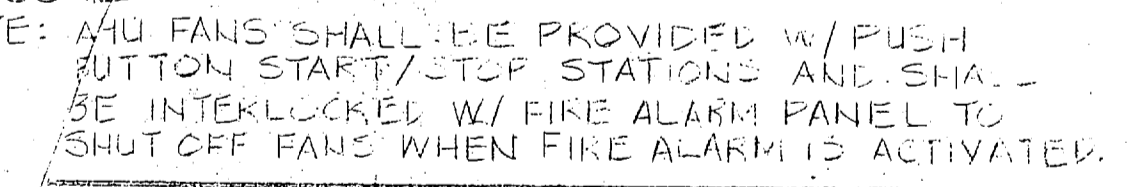
**PLENUM STATIC PRESSURE CONTROLS**  
NO SCALE (1 EACH PER V. AIR HANDLING UNIT)



**ROOM CONTROL**  
NO SCALE



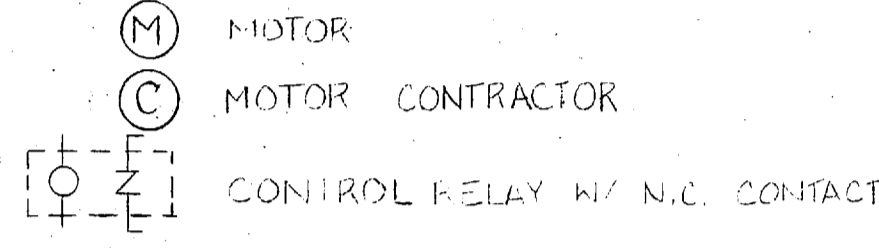
**AIR HANDLING UNIT CONTROL**  
NO SCALE



**EXHAUST FAN SCHEDULE**

UNIT DESIGNATION	EF-1	EF-2	EF-3	EF-4	EF-5	EF-6
NOTES	1	1	2	1	1	1
AIR FLOW, CFM	120	440	500	120	104	240
TOTAL STATIC PRESSURE IN LG	.125	.125	.125	.125	.125	.125
LOCATION	ROOM	ROOF	JAIL	ROOF	CEILING	LOUNGE STR
AREA SERVED	JAIL	ELECT. ROOM	LAUNDRY	HR-502	TOILETS	LOUNGE
MAX MOTOR HP	1/2	1/2	1/2	1/2	1/2	1/2
VOLTS/PHASE/HERTZ	120/1/60	120/1/60	120/1/60	120/1/60	120/1/60	120/1/60
FAN TYPE	CENTRIFUGAL	CENTRIFUGAL	PROP.	CENTRIFUGAL	CENTRIFUGAL	IN-LINE

- AQ AQUASTAT
- CR CONTROL RELAY
- TS TEMPERATURE SENSOR
- ME MANUAL SWITCH
- DTC DATA TERMINAL CABINET
- S SENSOR
- NC NORMALLY CLOSED
- NO NORMALLY OPEN
- C COMMON
- SPC STATIC PRESSURE CONTROLLER
- FS FLOW SWITCH
- TL LOW LIMIT THERMOSTAT
- TH HIGH LIMIT THERMOSTAT
- TR RETURN AIR TEMP TRANSMITTER
- TT DISCHARGE AIR TEMP TRANSMITTER
- TI TEMP INDICATOR
- FC RESET CONTROLLER
- OLS THERMAL OVERLOAD
- DM DAMPER MOTOR
- EP ELECTRIC-PNEUMATIC SWITCH
- NO NORMALLY OPEN CONTACT
- NC NORMALLY CLOSED CONTACT
- PL PILOT LIGHT
- F FUSE
- SW SWITCH
- TS TEMPERATURE SENSING SWITCH
- FS FLOAT SWITCH



**DESIGN CONDITIONS**

MODE	OUTSIDE	INSIDE
Summer	85°F DB	75°F DB
Winter	23°F DB	68°F DB

**STEAM/HOT WATER HEAT EXCHANGER**

UNIT DESIGNATION	HE-1
TYPE SERVICE	HEATING
BLDG SERVED	HP-503-504-505
TEMP IN °F	160
TEMP OUT °F	180
STEAM PRESS, PSIG	15
STEAM FLOW, LBS/HR	2835
WATER FLOW, GPM	250
EXCHANGE TYPE	SHELL/TUBE
NOTES	1, 2, 3

1. MAX TUBE VEL. = 7 F.P.S.  
2. MAX PRESS DROP = 5 FT W.G.  
3. SCALE FACTOR = 0.0005

**UNIT HEATER SCHEDULE**

UNIT DESIGNATION	UH-1
AREA SERVED	LAUNDRY
MIN OR. BTUH	8295
ENT AIR TEMP °F	60
WATER TEMP °F	180
WATER TEMP DROP °F	20
MAX MOTOR HP	1/2
VOLTS/PHASE/HERTZ	120/1/60
HEATER TYPE	HORIZONTAL
G.P.M.	1

1. DIRECTIONAL DISCHARGE LOWER

**PRV SCHEDULE**

DESIGNATION	PRV-1	PRV-2	PRV-3
ENT PRESSURE PSIG	150	150	150
LG. PRESSURE PSIG	25	25	7.5
MAX. LBS/HR	2020	2635	800

**FAN COIL UNIT SCHEDULE**

UNIT DESIGNATION	FCU-1	FCU-2
NOTES	1	2
NOMINAL CFM	600	200
COIL SELECTION, CFM	600	200
MAXIMUM CHILLER WATER FLOW GPM	6	1
MINIMUM COIL CAPACITY SENSIBLE BTUH	17,302	3740
MINIMUM COIL CAPACITY TOTAL BTUH	34,220	5130
ENTERING AIR TEMP °F	73.0	73
ENTERING AIR TEMP, WB °F	72.3	66
ENTERING WATER TEMP °F	42.2	42
MINIMUM COIL CAPACITY TOTAL BTUH	17,302	3740
ENTERING AIR TEMP, DB °F	49.2	68
ENTERING WATER TEMP °F	180	180
CFM OUTSIDE AIR	250	0
PIPING BONDOUT SIZE, SUPPLY & RETURN	1"	1/2"
MAXIMUM MOTOR WATTAGE	155	15
MAXIMUM HOT WATER FLOW, GPM	6	1

**RECIPROCATING LIQUID CHILLER (W/AIR COOL. COND.)**

UNIT DESIGNATION	RLC-1	RLC-2
BUILDING SERVED	HP-503-504-505	HP-503-504-505
MINIMUM TOTAL CAPACITY TONS	25.5	23.5
ENTERING WATER TEMP °F	54	54
LEAVING WATER TEMP °F	42	42
WATER FLOW, GPM	173	173
APPROX. AIR TEMP, DB °F	95	75
MAXIMUM WATER PRESSURE DROP FT W.G.	10'	10'
MAXIMUM UNIT KW	105	105
VOLTS/PHASE/HERTZ	480/3/60	480/3/60

CHILLER SHALL HAVE MINIMUM OF 4 STAGES OF CAPACITY REDUCTION  
LOADING FACTOR = 0.0005

**PUMP SCHEDULE**

UNIT DESIGNATION	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8
TYPE SERVICE	CHILLER WATER	HOT WATER	DOWN WTR	SEC. WATER	SEC. WATER	SEC. WATER	SEC. WATER	SEC. WATER
BLDG SERVED	HP-503-504-505	HP-503-504-505	HP-503-504-505	HP-503-504-505	HP-504	HP-504	HP-502	HP-502
WATER FLOW, GPM	345	250	30	190	180	135	30	30
TOTAL HEAD, FT W.G.	80'	32'	15'	26'	55'	20'	23'	23'
F.P. IN/AREA STR	1750/2	1750/1	1750/00	1750/00	1750/0	1750/0	1750/000	1750/000
MAX MOTOR HP	1/5	1/2	1/2	2	5	5	5	5
VOLTS/PHASE/HERTZ	208/3/60	120/1/60	120/1/60	208/3/60	208/3/60	208/3/60	208/3/60	120/1/60
PUMP TYPE	BASE MTR	BASE MTR	IN-LINE	IN-LINE	IN-LINE	IN-LINE	IN-LINE	VERT. IMP. CTR

- EXHAUST FAN SCHEDULE NOTES:**
- PROVIDE MOTOR OPERATED DAMPER, DISCONNECT SWITCH & BIRD SCREEN
  - PROVIDE ALUMINUM WALL GRILLE, FAN GUARD, GRAVITY BACKDRAFT
  - DAMPER & DISCONNECT SWITCH
  - PROVIDE ALUMINUM SELF-FLUSHING, CURB. SEE DETAIL 2/A-14
  - MAX. SOUND LEVEL TO BE 4 SONES
  - INTERLOCK LIGHT SWITCH
  - BIRD SCREEN NOT REQUIRED ON EF-5
- PUMP SCHEDULE NOTES:**
- REDR=1,129 SQUARE FEET
  - 245 GAL RECEIVER CAPACITY
  - DUPLICATE HYDRAST IRON RECEIVER
  - MECH. ALTERNATE
- \*\*TYP REPAIR

**J. N. PEASE ASSOCIATES**  
ARCHITECTS - ENGINEERS - PLANNERS  
CHARLOTTE NORTH CAROLINA

**DEPARTMENT OF THE NAVY**  
NAVAL STATION  
MARINE CORPS BASE CAMP LEJEUNE, N.C.

**UNACCOMPANIED ENLISTED PERSONNEL HOUSING CONTROLS & SCHEDULES**

DATE: 10/27/85  
APPROVED: [Signature]  
OFFICE IN CHARGE

SCALE: NO SCALE, SPEC 05-84-1140

CONSTR CONTR NO: 4133667  
SHEET 65 OF 74



SYM	DESCRIPTION	PREP'D BY	DATE	APPROVED

AIR HANDLING UNIT SCHEDULE		*NEMA STARTER SIZE 1, 208/3/60																										
UNIT NO.	LOCATION	FAN DATA						COOLING PERFORMANCE DATA										HEATING PERFORMANCE			REMARKS							
		TOTAL CFM	MIN. O.A. CFM	MIN. O.V. CFM	TESP	APPROX. T.S.P.	MIN. HP*	COIL C.F.M.	TOTAL LOAD B.T.U.H.	TOTAL SENS. B.T.U.H.	MAX. FACE VEL.	ENT. AIR D.B.	LEAV. AIR D.B.	COIL G.P.M.	E.W.T. °F	WAT. P.P. MAX	AIR P.P. MAX	MIN. ROW	COIL C.F.M.	TOTAL LOAD B.T.U.H.		MAX. FACE VEL.	E.A.T. °F D.B.	L.A.T. °F D.B.	COIL G.P.M.	E.W.T. °F		
AHU-1	HP-503 HP-505	4850	200	1700	1.08	2.5"	5	4850	134680	109998	500	78.5	65.5	57.5	56.3	23.3	45	8"	0.7"	4	4850	130479	500	66.2	91.1	13.0	180	1ST FLOOR, UNIT H
AHU-2																											1ST FLOOR, UNIT H	
AHU-3																											2ND FLOOR, UNIT H	
AHU-4		4850		1700	1.08			4850	134680	109998				57.5	56.3	23.3					4850	130479		66.2	91.1			2ND FLOOR, UNIT H
AHU-5		5200		1880	1.13			5200	142740	116813				57.7	56.6	23.8					5200	130067		66.3	89.4			3RD FLOOR, UNIT H
AHU-6	HP-503 HP-505	5200	200	1880	1.10			5200	142740	116813				65.5		23.8					5200	130067		66.3	89.4	13.0		3RD FLOOR, UNIT H
AHU-7	HP-504	5750	240	2050	1.08			5750	160425	129168				65.6		26.7					5750	153573		66.1	90.9	15.6		1ST FLOOR, UNIT H
AHU-8																											2ND FLOOR, UNIT H	
AHU-9																											2ND FLOOR, UNIT H	
AHU-10		5750		2050	1.13			5750	160425	129168				78.5	65.6	26.7					5750	153573		66.1	90.9	15.6		2ND FLOOR, UNIT H
AHU-11		6100		2170	1.13			6100	167445	136372				78.4	65.5	27.9					6100	152907		66.2	89.4	15.3		3RD FLOOR, UNIT H
AHU-12	HP-504	6100	240	2170	1.11	2.5"	5	6100	167445	136372	500	78.4	65.5	57.7	56.4	27.9	45	8"	0.7"	4	6100	152907	500	66.2	89.4	15.3	180	3RD FLOOR, UNIT H

HOT WATER STORAGE GENERATOR										
UNIT NO.	SERVICE	LOCATION	STEAM PRESS	HR	RECOV. GPH	ENT. WATER	LEAVE WATER	GAL	TANK SIZE	REMARKS
DHWH-1	HP505-504-503	HP-502	15	2020	1732	40	120	2800	89/150	

SEQUENCE OF OPERATION:

1. HEATING/COOLING CONTROL: SYSTEM SHALL BE ENERGIZED WHENEVER MANUAL "ON-OFF" SWITCH IS IN "ON" POSITION, AND SYSTEM MODE SHALL BE CONTROLLED BY "COOL-AUTO-HEAT" SELECTOR SWITCH. WITH THE SELECTOR SWITCH IN THE AUTO POSITION, A NORMALLY OPEN THERMOSTAT (T-1), LOCATED IN THE OUTSIDE AIR, SHALL CONTROL THE SYSTEM CHANGEOVER. ABOVE 65 DEGREES F OUTSIDE TEMPERATURE THE SYSTEM SHALL BE IN THE COOLING MODE, AND BELOW 65 DEGREES F THE SYSTEM SHALL BE IN THE HEATING MODE. WHEN SYSTEM IS IN THE HEATING MODE THE HEATING HOT WATER PUMP SHALL BE ENERGIZED AND THE SWITCHOVER 3-WAY VALVES (V-2 AND V-3) SHALL BE IN THE HEATING (NORMALLY OPEN) POSITIONS. WHEN SYSTEM IS IN THE COOLING MODE A REMOTE BULB THERMOSTAT (AQ-1), ACTING AS HIGH LIMIT SAFETY, WITH ELEMENT LOCATED IN THE RETURN WATER LINE SHALL PREVENT SYSTEM CHANGEOVER UNTIL WATER TEMPERATURE IS BELOW A PREDETERMINED SETTING (85 DEGREES F ADJ.). UNTIL CHANGEOVER TEMPERATURE IS MAINTAINED, HOT WATER PUMP SHALL CONTINUE TO OPERATE WITHOUT SHORT CYCLING, CIRCULATING WATER FOR COOL DOWN, AND THE CONVERTER STEAM VALVE V-1 SHALL BE MAINTAINED IN THE CLOSED POSITION DURING COOLING MODE. RELAY (CR1) SHALL BE ENERGIZED WHEN (AQ-1) CLOSURES, TO START CHILLED WATER PUMP, STOP HOT WATER PUMP, AND POSITION 3-WAY VALVES (V-2 AND V-3), TO COOLING MODE.

2. CHILLER CONTROL: THE AIR COOLED WATER CHILLER SHALL HAVE SELF-CONTAINED CONTROLS WHICH WILL START ON A DEMAND FOR COOLING, AND FLOW SWITCHES (FS-1 AND FS-2) SHALL BE INTERLOCKED TO PREVENT CHILLERS FROM STARTING UNLESS THERE IS PROOF OF FLOW IN THE CHILLED WATER LINE. AN ELECTRICAL INTERLOCK BETWEEN CHILLED WATER PUMP AND CHILLER SHALL PREVENT CHILLER FROM STARTING UNLESS PUMP IS ENERGIZED. THE TEMPERATURE CONTROLLER SHALL ARRANGE THE UNLOADING STAGES TO PREVENT SHORT CYCLING OF EITHER MACHINE AND MAINTAIN SYSTEM CHILLED WATER TEMPERATURE WITHIN PLUS OR MINUS 1 DEGREE F OF THE SYSTEM DESIGN. CHILLER CONTROL SEQUENCER SHALL ALLOW LEAD MACHINE TO OPERATE UP TO GREATER THAN 50 PERCENT (ADJUSTABLE) OF THE SYSTEM LOAD BEFORE ENERGIZING THE SECOND MACHINE. AS THE TOTAL LOAD DECREASES, THE LEAD MACHINE SHALL REMAIN IN OPERATION UNTIL LESS THAN 50 PERCENT (ADJUSTABLE) OF THE SYSTEM LOAD IS REACHED. MACHINE SHALL HAVE A LEAD-LAG SELECTOR SWITCH. THE LEAVING WATER TEMPERATURE FROM EITHER MACHINE SHALL NOT FALL BELOW 59 DEGREES F OR MANUFACTURER'S RECOMMENDATIONS, WHICHEVER IS HIGHER.

2.1 COOLING-ONLY MODE OF OPERATION: THE UNIT SHALL START IN THE NORMAL SEQUENCE THROUGH THE CHILLED WATER TEMPERATURE CONTROLLER AND THE SAFETY CIRCUITS. SINCE THERE IS NO REQUIREMENT FOR HEAT IN THE HEAT RECOVERY WATER CIRCUIT, THE HEAT RECOVERY TEMPERATURE CONTROLLER (HRTC) SHALL BE SATISFIED. CONDENSER FAN CONTROL: IN THE COOLING-ONLY MODE SHALL OPERATE WITH NORMAL AMBIENT CONDENSER FAN CONTROL: A LIQUID LINE REGULATOR (CLR) (OPERATED BY A SOLENOID) THAT CONTROLS THE CONDENSING PRESSURE IN THE SYSTEM BY REGULATING LIQUID FLOW LEAVING THE AIR-COOLED CONDENSER (ACC-1 AND/OR ACC-2) SHALL BE OPEN (ENERGIZED) TO ALLOW FULL REFRIGERANT FLOW; A HOT GAS REGULATOR (HGR) (ALSO OPERATED BY SOLENOID) THAT MAINTAINS PRESSURE IN THE RECEIVER DURING LOW-AMBIENT START AND OPERATION AND NORMAL START SHALL BE CLOSED (DE-ENERGIZED). THE SYSTEM SHALL THEN OPERATE AS A STANDARD AIR-COOLED RECIPROCATING CHILLER; AND A SOLENOID VALVE (SV) BETWEEN THE WATER COOLED CONDENSER AND THE LIQUID RECEIVER SHALL BE CLOSED ALLOWING NO REFRIGERANT FLOW THROUGH THE WATER COOLED CONDENSER. A FLOAT VALVE (FV) IN THE WATER COOLED CONDENSER SHALL CONTROL THE SV AND MAINTAIN AN ADEQUATE LEVEL OF LIQUID IN THE WATER COOLED CONDENSER TO PREVENT SHORT CIRCUITING OF HOT GAS DURING THE COOLING-ONLY MODE.

2.2 HEAT RECOVERY MODE: WHEN THE WATER TEMPERATURE IN THE WATER COOLED CONDENSER CIRCUIT FALLS BELOW THE SETTING OF THE HRTC, CONTROL SHALL BE SWITCHED TO THE HEAT RECOVERY MODE. VALVES LLR AND HGR SHALL BE DE-ENERGIZED AND ENERGIZED, RESPECTIVELY, ALLOWING EACH VALVE TO OPERATE AS PRESSURE REGULATORS, AND THE CONDENSER FANS SHALL BE CYCLED TO CONTROL IN RESPONSE TO THE ENTERING WATER TEMPERATURE OF THE WATER COOLED CONDENSER. ON AN INCREASE IN THE ENTERING WATER TEMPERATURE OF THE WATER COOLED CONDENSER, THE CONDENSER FANS SHALL BE TURNED ON AS REQUIRED TO INCREASE THE HEAT REJECTION CAPACITY OF THE AIR-COOLED CONDENSER. AS THE WATER TEMPERATURE IN THE WATER COOLED CONDENSER CIRCUIT VARIES IN RESPONSE TO HEAT RECLAIM DEMAND, LLR, HGR, HRTC, FV AND CONDENSER FANS SHALL AUTOMATICALLY RESPOND TO MAINTAIN THE SET DESIGN HOT WATER TEMPERATURE IN THE WATER COOLED CONDENSER WATER CIRCUIT. ANY EXCESS HEAT SHALL BE REJECTED THROUGH THE AIR COOLED CONDENSER.

2.3 PUMP P-4 CONTROL (TYPICAL FOR TWO PUMPS): PUMP P-4 SHALL BE ENERGIZED WHEN THE TEMPERATURE OF THE WATER IN THE DOMESTIC HOT WATER STORAGE GENERATOR FALLS BELOW 115 DEGREES F. HOWEVER, THE PUMP SHALL BE INTERLOCKED WITH THE RECIPROCATING LIQUID CHILLER SO THAT THE PUMP WILL NOT OPERATE UNLESS THE CHILLER IS IN OPERATION. ALSO, A SENSOR IN THE CHILLER'S LEAVING CHILLED WATER LINE SHALL DE-ENERGIZE THE PUMP IF THE LEAVING CHILLED WATER TEMPERATURE EXCEEDS 46 DEGREES F.

3. HOT WATER CONTROL: AN ADJUSTABLE OUTDOOR RESET THERMOSTAT (T-1) MODULATES, THROUGH A TEMPERATURE CONTROLLER, STEAM REGULATING VALVE (V-1) ON A PREDETERMINED RESET SCHEDULE TO MAINTAIN LEAVING WATER TEMPERATURE.

4. FAN COIL UNITS: A LOW VOLTAGE CHANGEOVER THERMOSTAT (TS-1) FOR USE WITH COMBINATION HEATING-COOLING THERMOSTAT (RT-1) SHALL CONTROL THE WATER FLOW THROUGH EACH FAN COIL UNIT BY CONTROLLING THE POSITION OF A TWO-POSITION THREE-WAY VALVE (V-5). THE MODE OF THE CHANGEOVER THERMOSTAT SHALL BE CONTROLLED BY A STRAP-ON THERMOSTAT ELEMENT ON THE WATER SUPPLY TO THE TWO-POSITION THREE-WAY VALVE (V-5). WHEN WATER SUPPLY IS ABOVE 65 DEGREES F, THE CHANGEOVER THERMOSTAT (TS-1) SHALL BE POSITIONED TO THE HEATING MODE. WHEN WATER SUPPLY IS BELOW 65 DEGREES F, THE CHANGEOVER THERMOSTAT (TS-1) SHALL BE POSITIONED TO THE COOLING MODE. FAN OPERATION SHALL BE CONTROLLED BY OFF-HIGH-MEDIUM-LOW FAN SPEED SWITCH (MS-1). THERMOSTAT AND SWITCH SHALL BE MOUNTED FIVE FEET ABOVE THE FLOOR.

5. LAUNDRY ROOM CONTROL: A TWO-STAGE HEATING/COOLING THERMOSTAT SHALL ENERGIZE THE EXHAUST FAN ANY TIME SPACE TEMPERATURE EXCEEDS 80 DEGREES F AND ENERGIZE THE UNIT HEATER FAN WHENEVER THE SPACE TEMPERATURE FALLS BELOW 65 DEGREES F. WHEN THE ROOM TEMPERATURE FALLS BELOW 80 DEGREES F THE EXHAUST FAN SHALL BE DE-ENERGIZED. A STRAP-ON AQUASTAT SHALL PREVENT THE UNIT HEATER FROM OPERATING IF THE WATER TEMPERATURE IS BELOW 80 DEGREES F AND CLOSE TWO-POSITION VALVE.

6. MECHANICAL EQUIPMENT BUILDING EXHAUST FAN EF-4: FAN SHALL BE CONTROLLED BY A THERMOSTAT. ON A RISE IN ROOM TEMPERATURE, THERMOSTAT SET FOR 85 DEGREES F, THE FAN SHALL ENERGIZE AND OPEN EXHAUST AIR DAMPER, AND ON A DROP IN TEMPERATURE THE REVERSE SHALL OCCUR.

7. AIR HANDLER UNIT CONTROL (FOR EACH A.H. UNIT): UNITS SHALL BE STARTED AND STOPPED MANUALLY.

7.1 THE AH UNIT AND ROOM CONTROLS SHALL BE INDEXED FOR HEATING OR COOLING FROM A SENSOR (AQ-2) IN THE CW/HW SUPPLY PIPING FROM CENTRAL SYSTEM. WHEN 75 DEGREES F OR ABOVE WATER TEMPERATURE IS SENSED, THE SYSTEM SHALL BE INDEXED FOR HEATING. WHEN 65 DEGREES F OR BELOW WATER IS SENSED, THE SYSTEM SHALL BE INDEXED FOR COOLING.

7.2 WITH AH UNITS OPERATING AND SYSTEM INDEXED FOR HEATING, THE RETURN AIR SENSOR SHALL RESET THE DISCHARGE AIR TEMPERATURE OVER A PREDETERMINED SCHEDULE. ON A FALL IN DISCHARGE TEMPERATURE, CONTROLLER (RC) SHALL REPOSITION THREE-WAY VALVE (V-6) SUPPLYING HOT WATER TO THE UNIT COIL.

7.3 WITH THE AH UNIT OPERATING AND SYSTEM INDEXED FOR COOLING, THE DISCHARGE AIR CONTROLLER (TID) SHALL BE AUTOMATICALLY SET TO MAINTAIN 59 DEGREE F CONSTANT DISCHARGE AIR TEMPERATURE. THE RETURN AIR SENSOR SHALL BE LOCKED OUT.

7.4 PROVIDE A TEMPERATURE LOW LIMIT THERMOSTAT (TLL) TO SHUT THE AH UNIT DOWN AT 38 DEGREES F.

7.5 PROVIDE A TEMPERATURE HIGH LIMIT THERMOSTAT (THL) TO SHUT THE AH UNIT DOWN AT 135 DEGREES F.

8. ROOM CONTROL: WITH THE ROOM THERMOSTAT INDEXED FOR HEATING, THE ROOM THERMOSTAT SHALL ON A FALL IN TEMPERATURE MODULATE THE TAB SUPPLY AIR DAMPER OPEN SIMULTANEOUSLY CLOSING THE ROOM RETURN AIR DAMPER. WITH THE THERMOSTAT INDEXED FOR COOLING THE THERMOSTAT SHALL ON A RISE IN TEMPERATURE MODULATE TO OPEN THE TAB SUPPLY AIR SIMULTANEOUSLY CLOSING THE ROOM RETURN. INDEXING FOR HEATING AND COOLING SHALL BE AUTOMATIC BY CENTRAL SOURCE.

9. AH UNIT STATIC PRESSURE CONTROL: A STATIC PRESSURE CONTROL (SPC) SHALL BE PROVIDED FOR EACH SUPPLY PLENUM (FOUR PER AH UNIT) WITH THE SENSING TIPS LOCATED IN THE SUPPLY PLENUM 3/4 DOWN TOTAL LENGTH OF SUPPLY AIR DUCT IN WHICH INSTALLED AND IN THE AH EQUIPMENT ROOM. ON A RISE IN STATIC ABOVE THE CONTROLLER SETPOINT (.75 INCH ADJ.) THE CONTROLLER SHALL MODULATE THE INLET VALVE ON THE AH UNIT FAN. THROUGH A HIGH-LOW PRESSURE SELECTOR (ONE PER AH UNIT), THE CONTROLLER SETPOINT IS ADJUSTABLE.

10. HOT WATER STORAGE HEATERS: A SELF-CONTAINED CONTROL VALVE V-7 WITH A CAPILLARY BULB IN THE DOMESTIC HOT WATER TANK SHALL MODULATE THE NORMALLY CLOSED STEAM VALVE TO CONTROL THE WATER TEMPERATURE SET AT 110 DEGREES F. DOMESTIC WATER CIRCULATION PUMP P-3 SHALL BE CONTROLLED AUTOMATICALLY BY AQUASTAT LOCATED IN DOMESTIC HOT WATER RETURN SET AT 110 DEGREES F AND WHEN TEMPERATURE DROPS BELOW 110 DEGREES F WILL START PUMP P-3. A SELF-CONTAINED TEMPERING VALVE V-8 SET AT 110 DEGREES F WITH THE BULB LOCATION IN THE DOMESTIC HOT WATER SUPPLY LINE SHALL MAINTAIN THE DESIRED DOMESTIC HOT WATER TEMPERATURE TO THE BUILDINGS.

11. EF-1 AND EF-2 EXHAUST FAN CONTROL: WITH HIGH LIMIT THERMOSTAT AND DISCONNECT SWITCH CLOSED, EXHAUST FAN RUNS CONTINUOUSLY WITH MOTOR OPERATED DAMPER OPEN.

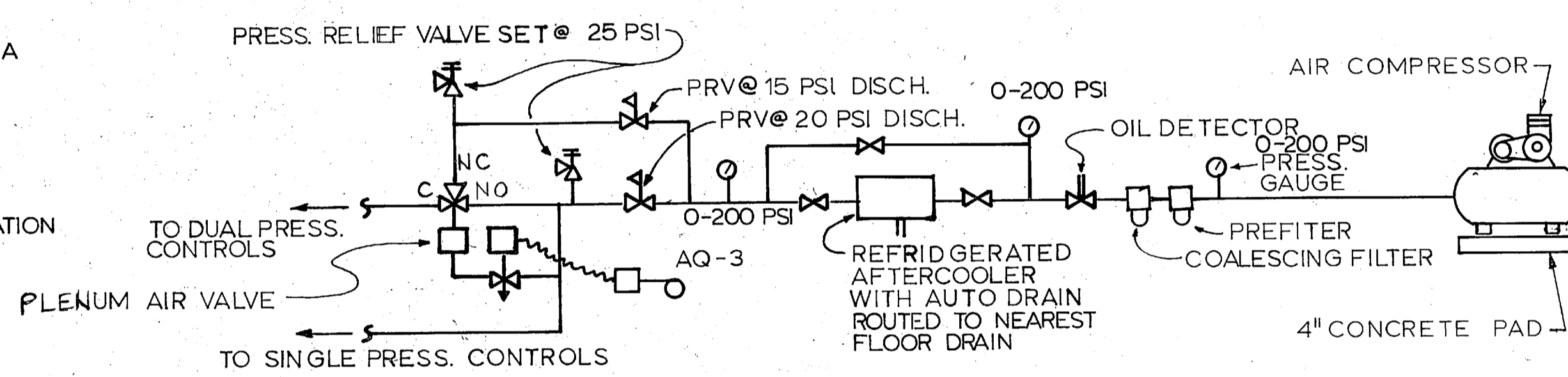
12. ENERGY MONITORING CONTROL SYSTEM (EMCS): A CENTRAL ENERGY MANAGEMENT AND CONTROL SYSTEM WILL BE INSTALLED IN THE FUTURE WHICH WILL CONNECT BUILDINGS HP-503, HP-504, AND HP-505 AND THE MECHANICAL BUILDING HP-502. DATA TERMINAL CABINETS (DTC) SHALL BE FURNISHED THAT WILL INCORPORATE THE FOLLOWING POINTS INTO THE EMCS. ALL EQUIPMENT SHALL BE COMPATIBLE FOR CONNECTING TO THE FUTURE FIELD INTERFACE DEVICES AND TO THE CENTRAL SYSTEM.

12.1 MECHANICAL BUILDING:

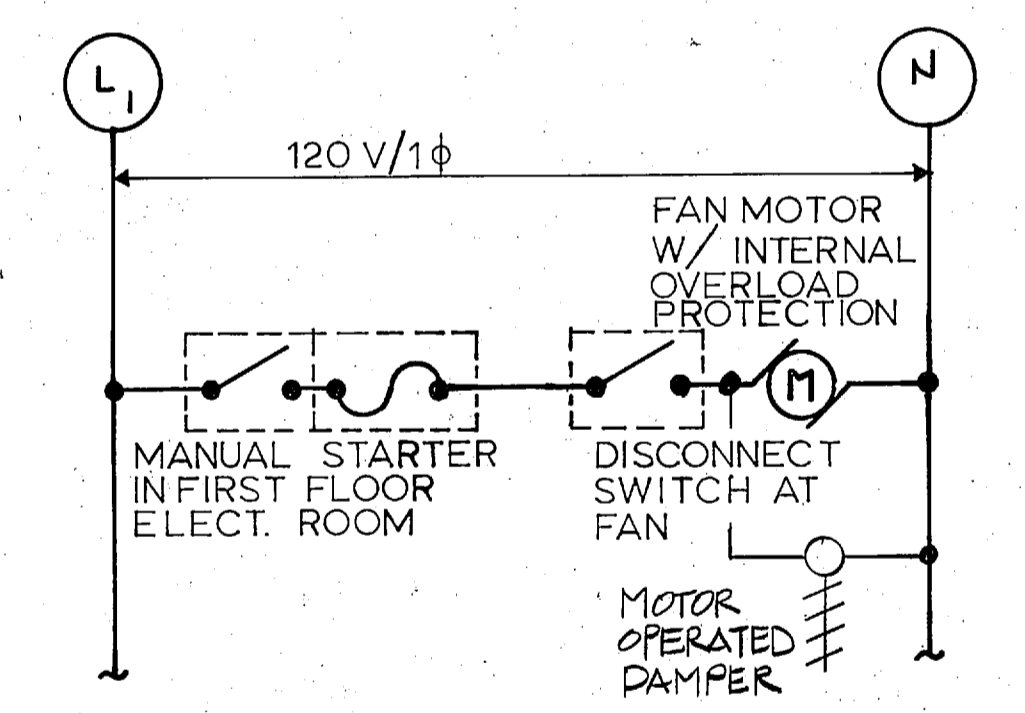
- CHILLED/HOT WATER SUPPLY AND RETURN -- TEMPERATURE SENSOR (DEGREE F) AND FLOW (GPM)
- CHILLER RLC/ACC-1 -- START-STOP, ALARMS STATUS, CHILLED WATER RESET AND CHILLER PROFILE AND SELECT
- CHILLER RLC/ACC-2 -- START-STOP, ALARMS STATUS, CHILLED WATER RESET AND CHILLER PROFILE AND SELECT
- STEAM LINE -- MEASURE STEAM FLOW LBS./HOUR (ORIFICE)
- STEAM LINE -- TOTALIZE STEAM FLOW
- ELECTRICAL ENERGY -- MEASURE AND TOTALIZE KWH, KWD, CHILLER RLC/ACC1 AND 2, P1 AND 2
- MONITOR HEAT OR COOL CONTROL POSITION
- PUMPS NO. 1 AND 2 -- MONITOR OPERATION, START-STOP (FOR DEMAND LIMITING)

12.2 UEPH BUILDINGS:

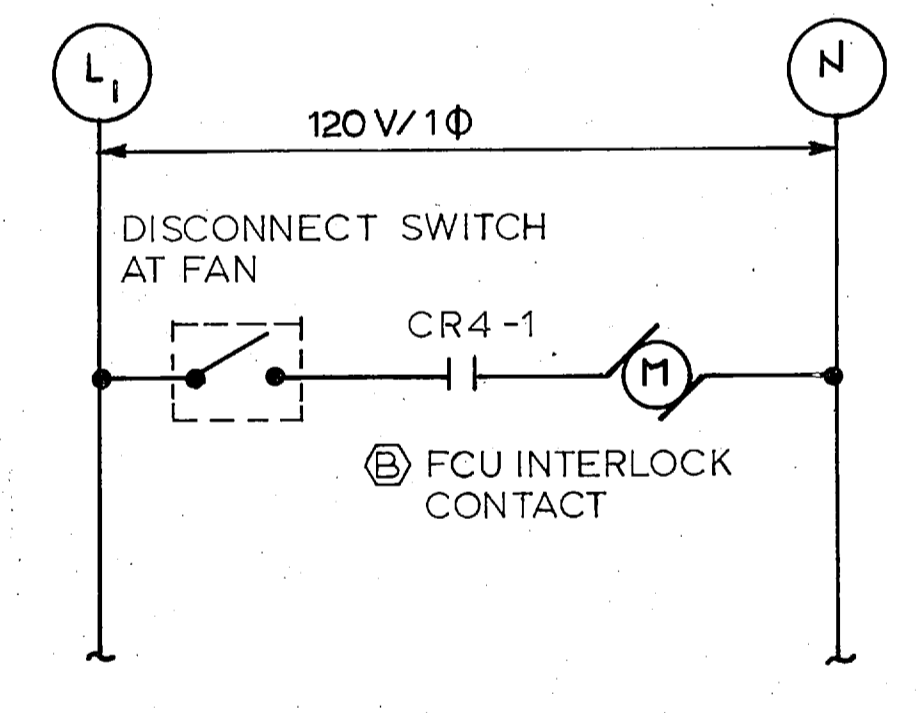
- POINTS LISTED ARE REQUIRED IN EACH BUILDING:
- MEASURE TEMPERATURE OF SUPPLY AND RETURN AIR TEMPERATURE OF EACH AIR HANDLER (6 PER BUILDING)
- BUILDING AIR HANDLERS (6 PER BUILDING) START-STOP-FOR DEMAND LIMITING AND DUTY CYCLING, FAN STATUS
- HUMIDITY MONITORING, EACH BUILDING AIR HANDLERS, (6 PER BUILDING)
- TERMINAL AIR BLENDER CONTROL (ONE PER AIR HANDLING UNIT) -- HIGH AND LOW TEMPERATURE



8 DETAIL CONTROL AIR COMPRESSOR  
NO SCALE



FAN EF-1 CONTROL (TYP FOR EF-2)  
NO SCALE



FAN EF-6 CONTROL  
NO SCALE

**HP 503 HP 504 HP 505**

	J. N. PEASE ASSOCIATES ARCHITECTS - ENGINEERS - PLANNERS CHARLOTTE NORTH CAROLINA	DEPARTMENT OF THE NAVY NAVAL STATION <b>ATLANTIC DIVISION</b> NORFOLK, VIRGINIA
	DR. WAS or WRB CH. ENGR. WAS SUBMITTED BY DATE 14/01/85 APPROVED BY DATE 10/29/85 OFFICE IN CHARGE DATE 11/16/86	MARINE CORPS BASE CAMP LEJEUNE, N.C.
NAVFAC DRAWING NO. 4133668	CONST. CONTR. NO. N62470-84-B-4140	SHEET 69 OF 94 233668

