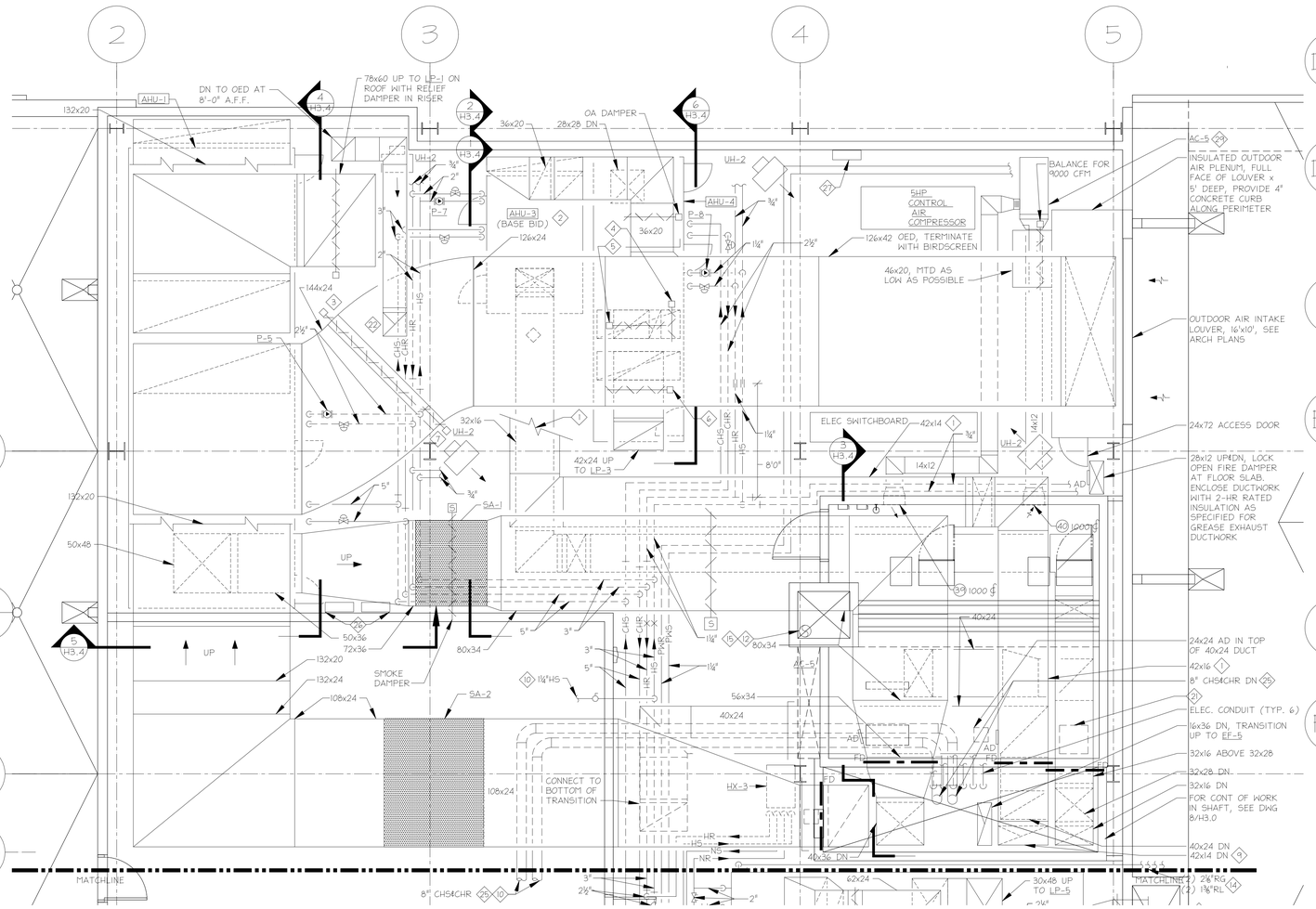
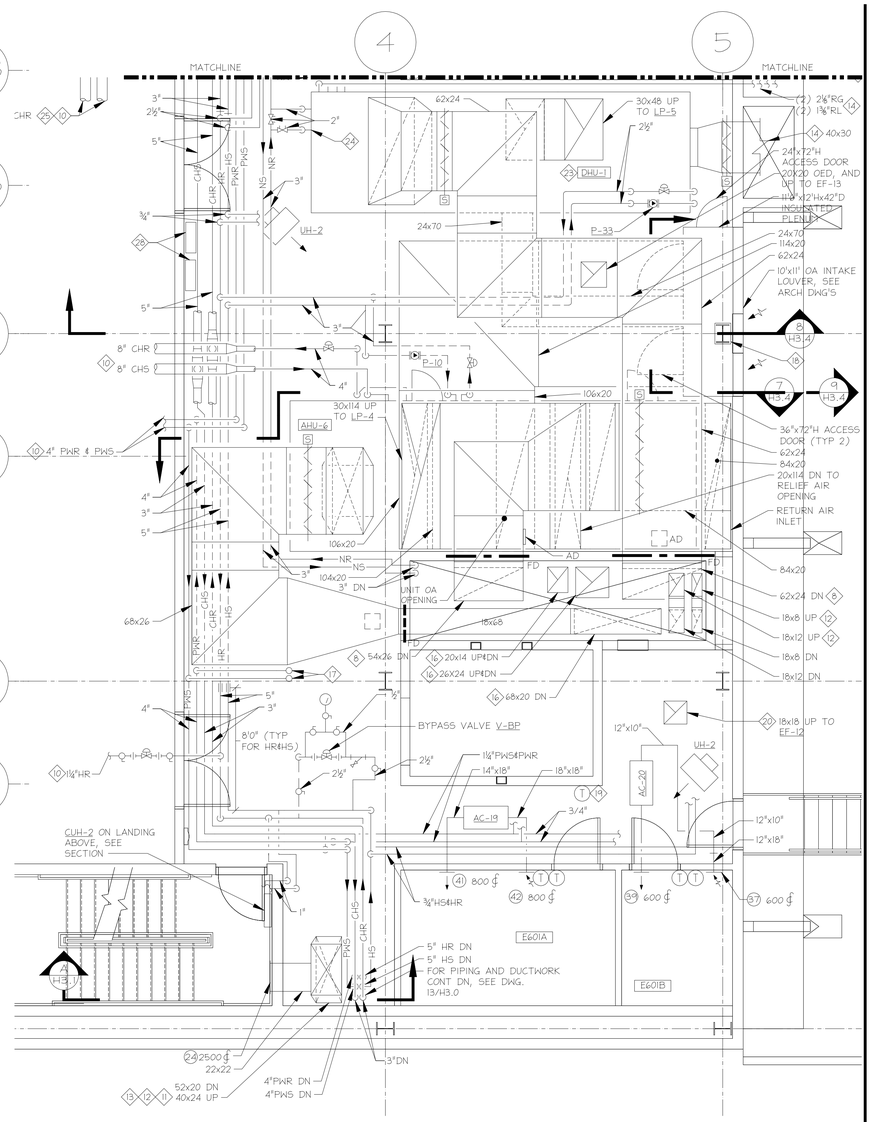


1 MECHANICAL ROOM - PART PLAN - PENTHOUSE
1/4"=1'-0"

0 2' 4' 8'

N



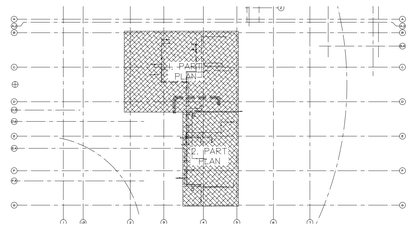
2 MECHANICAL ROOM - PART PLAN - PENTHOUSE
1/4"=1'-0"

0 2' 4' 8'

N

◇ SPECIAL NOTES:

1. PROVIDE UNDER ALTERNATE #9.
2. PLAN AND SECTION A/H3.4 SHOW AHU-3 FOR BASE BID. SEE SECTION A2it/H3.4 FOR CONFIGURATION UNDER ALTERNATE #9.
3. 104x24 MAXIMUM OA DAMPER.
4. 8x24 MIN OA DAMPER.
5. 34x24 MAX OA DAMPER.
6. 42x24 RELIEF DAMPER.
7. 18x24 MINIMUM OA DAMPER.
8. FOR CONT. DN SEE DRAWING 7/H3.0
9. UNDER BASE BID, TRANSITION UP TO FAN EF-8 ON ROOF.
10. FOR CONT. SEE DRAWING H3.6.
11. FOR CONT. DN SEE DWG. 13/H3.0.
12. FOR CONT. UP SEE DWG. H2.7.
13. PROVIDE FD AT FLOOR SLAB.
14. FOR CONT. SEE DWG. H2.6.
15. 10"Φ TYPE 2 FLUE VENT.
16. NOT USED.
17. 1½" PWS4PWR UP TO AC-6 IN ELEVATOR MACHINE ROOM ABOVE. PROVIDE MANUAL AIR VENT AT HIGHEST POINT OF PIPING.
18. WITHIN PLENUM, COLUMN SHALL BE WRAPPED IN GALV SHEET METAL, WHICH SHALL BE INSULATED ON THE COLUMN SIDE WITH 1" RIGID INSULATION, AND SEALED AT ALL SEAMS AND JOINTS.
19. THERMOSTAT FOR MER VENTILATION SYSTEM.
20. TERMINATE WITH BIRDSCREEN AT OED, APPROX 18" BELOW ROOF.
21. (3) 24x24 AD. IN BOTTOM AND TOP OF 32x28, AND IN BOTTOM OF 32x16.
22. 20x20 UP TO EF-14.
23. COORDINATED DUCTWORK AND PIPING DRAWINGS AT ¾" SCALE SHALL BE PROVIDED FOR DHU-1 AND ALL ASSOCIATED PIPING & DUCTWORK WITHIN 8'-0" OF UNIT.
24. SEE PIPING DETAIL FOR FLOOR MOUNTED AC UNITS, DWG. H5.2.
25. PROVIDE UNDER ALT. #2.
26. ATC PANELS FOR AHU-1 AND AHU-3.
27. ATC PANEL FOR AHU-4.
28. ATC PANELS FOR DHU-1 AND AHU-6.
29. CONVERT UNIT TO DUCTED TYPE. MOUNT UNIT AND DRAIN PAN AS HIGH AS POSSIBLE.



3 KEY PLAN
NO SCALE

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Mech. Room Penthouse

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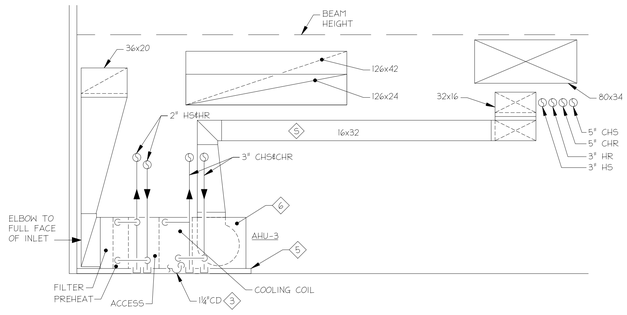
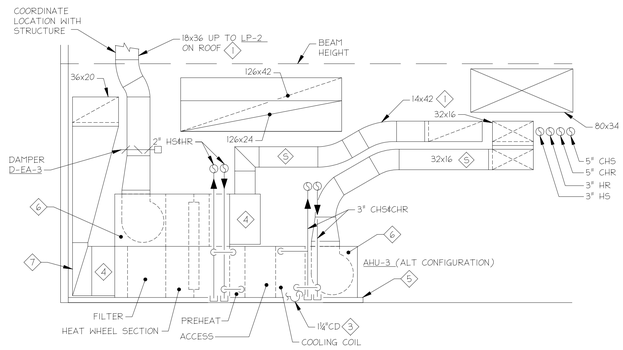
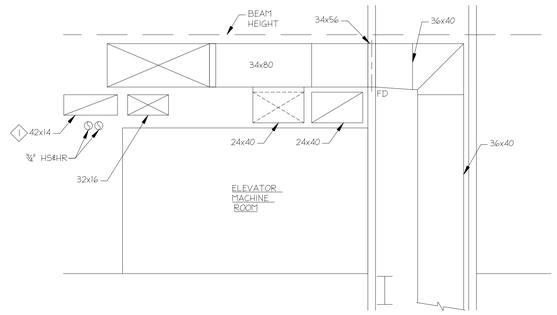
H3.3



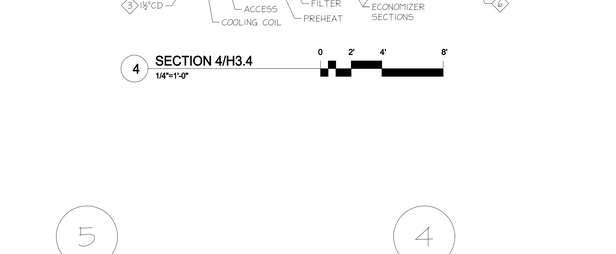
1 SECTION 1/H3.4 - BASE BID
1/4"=1'-0"



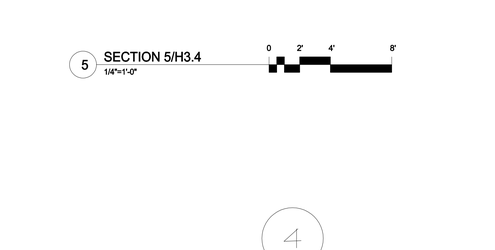
2 SECTION 2/H3.4 - ALTERNATE #9
1/4"=1'-0"



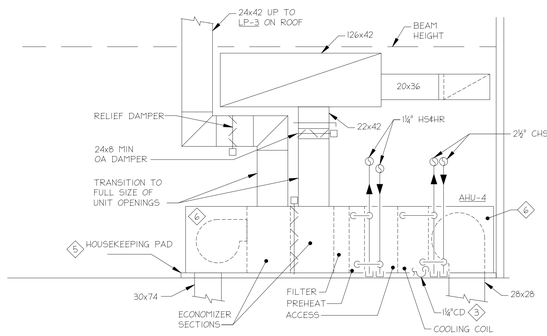
3 SECTION 3/H3.4
1/4"=1'-0"



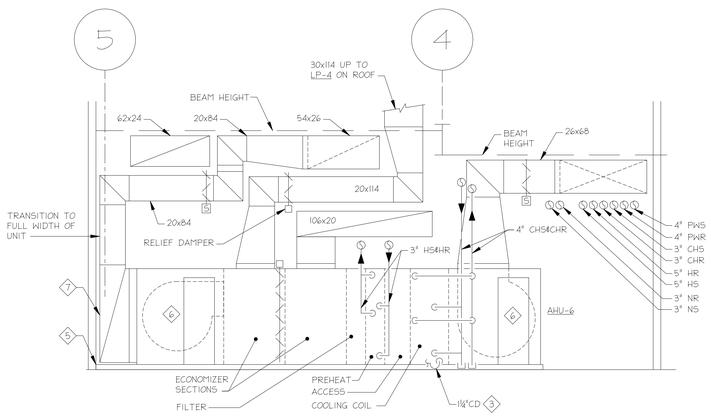
4 SECTION 4/H3.4
1/4"=1'-0"



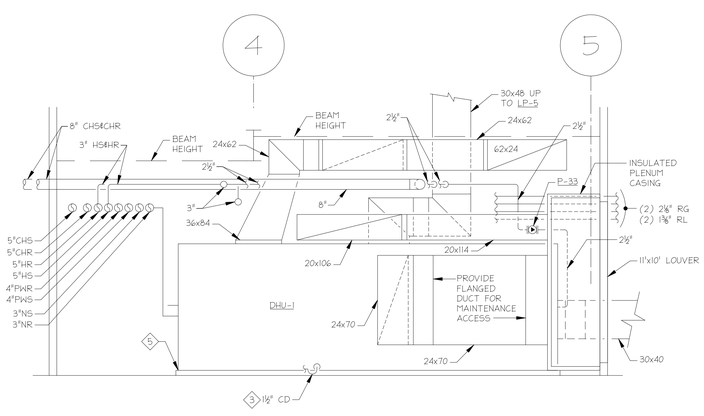
5 SECTION 5/H3.4
1/4"=1'-0"



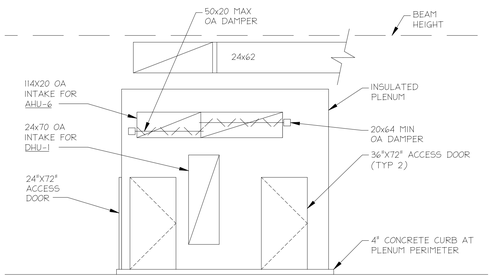
6 SECTION 6/H3.4
1/4"=1'-0"



7 SECTION 7/H3.4
1/4"=1'-0"



8 SECTION 8/H3.4
1/4"=1'-0"



9 SECTION 9/H3.4
1/4"=1'-0"

NOTE: DHU-1 SHALL BE MOUNTED ON MINIMUM SIX (6) SPRINGS WITH HEIGHT SAVING BRACKETS, MIN. STATIC DEFLECTION 0.75 INCH. INERTIA BASE IS NOT REQUIRED.

◇ SPECIAL NOTES:

1 PROVIDE UNDER ALTERNATE #9.

2 N/A

3 PIPE TO NEAREST FLOOR DRAIN.

4 INSULATED PLENUM, FULL FACE OF OPENING.

5 HOUSEKEEPING PAD, MINIMUM HEIGHT 4", EXTEND 2" BEYOND EDGE OF EQUIPMENT. SEE STRUCTURAL DRAWINGS FOR DETAILS. HEIGHT OF PAD SHALL MEET REQUIREMENTS FOR CONDENSATE TRAP AT COOLING COIL, SEE DETAIL ON DWG. H5.0.

6 FAN SECTION WITH ACCESS DOOR.

7 ELBOW TO FULL FACE OF OPENING.

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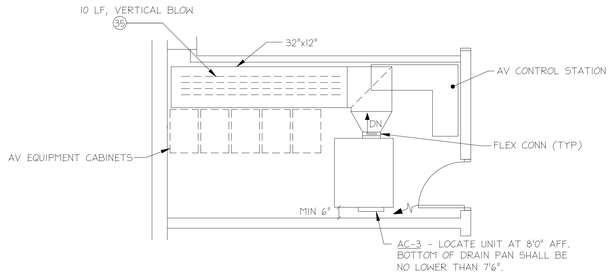
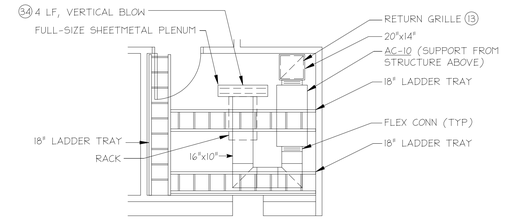
HVAC Sections

H3.4



1 PART PLAN - AV CONTROL ROOM
1/4"=1'-0"

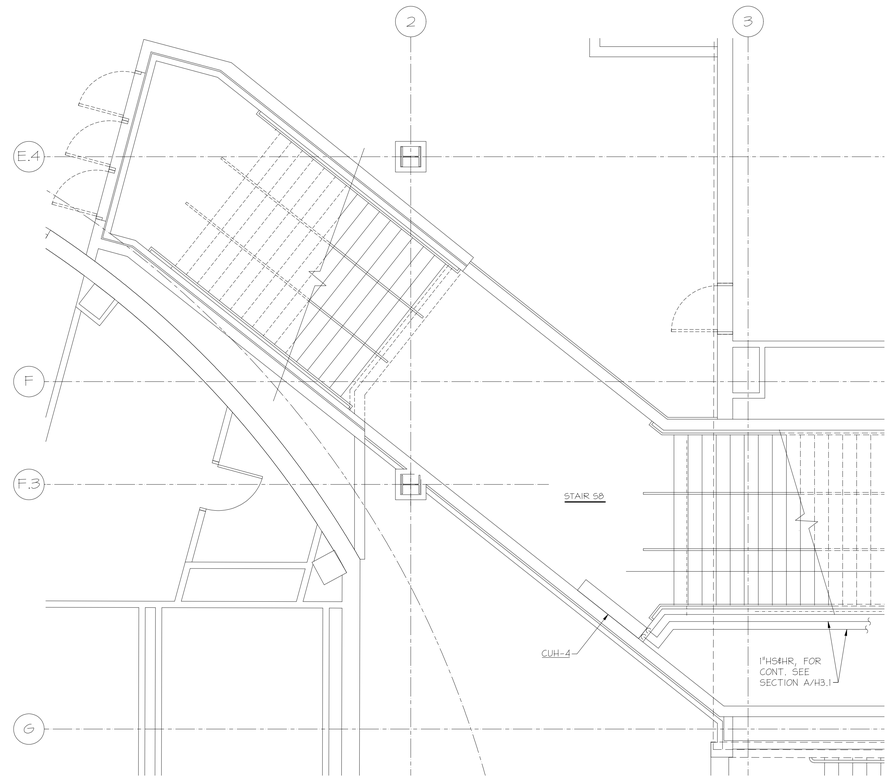
0 2' 4' 8'



NOTES:
1. SIMILAR LAYOUT FOR ALL TELECOM ROOMS EXCEPT THOSE MODIFIED UNDER BULLETIN 99, SEE FLOOR PLANS FOR FURTHER INFORMATION.
2. PROVIDE DRAIN PAN UNDER A/C UNIT AND PROCESS WATER PIPING.

2 PART PLAN - FIRST FLOOR TELEPHONE RM T123
1/4"=1'-0"

0 2' 4' 8'



3 H3-5 STAIR S8 - LOADING DOCK ENTRANCE INTERMEDIATE FLOOR PLAN
1/4"=1'-0"

0 2' 4' 8'

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Part Plans

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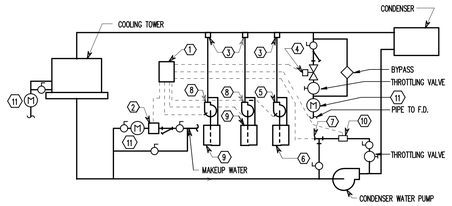
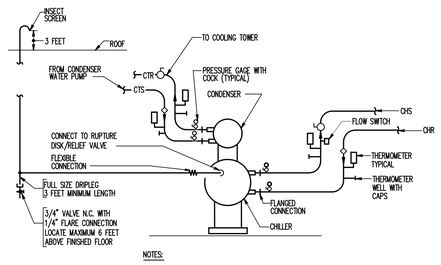
H3.5



1. CONTROLLER
2. WATER METER
3. STOP & INJECTION ASSEMBLY
4. BLEEDOFF SOLENOID VALVE
5. CHEMICAL FEED PUMP
6. CHEMICAL DRUM
7. CONDUCTIVITY PROBE
8. BIOCIDE FEED PUMP
9. BIOCIDE DRUM
10. pH PROBE
11. BALTIMORE CITY APPROVED PULSE FLOW METER, WITH CONTACTS FOR CONNECTION TO ATC. READOUT SHALL BE IN CU. FEET FOR MEASUREMENT BY THE UTILITY COMPANY

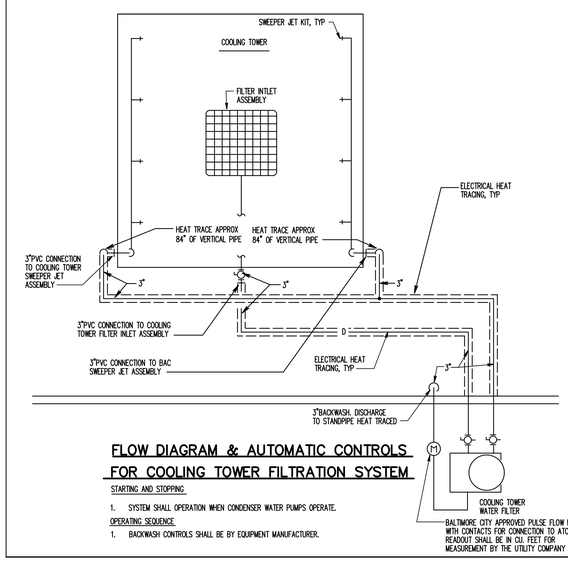
CONDENSER WATER TREATMENT AND UTILITY METERING



NOTES:

1. INSTALL PIPE CONNECTIONS TO CHILLER TO PERMIT REMOVAL OF TUBES.

WATER CHILLER CONNECTIONS WATER COOLED



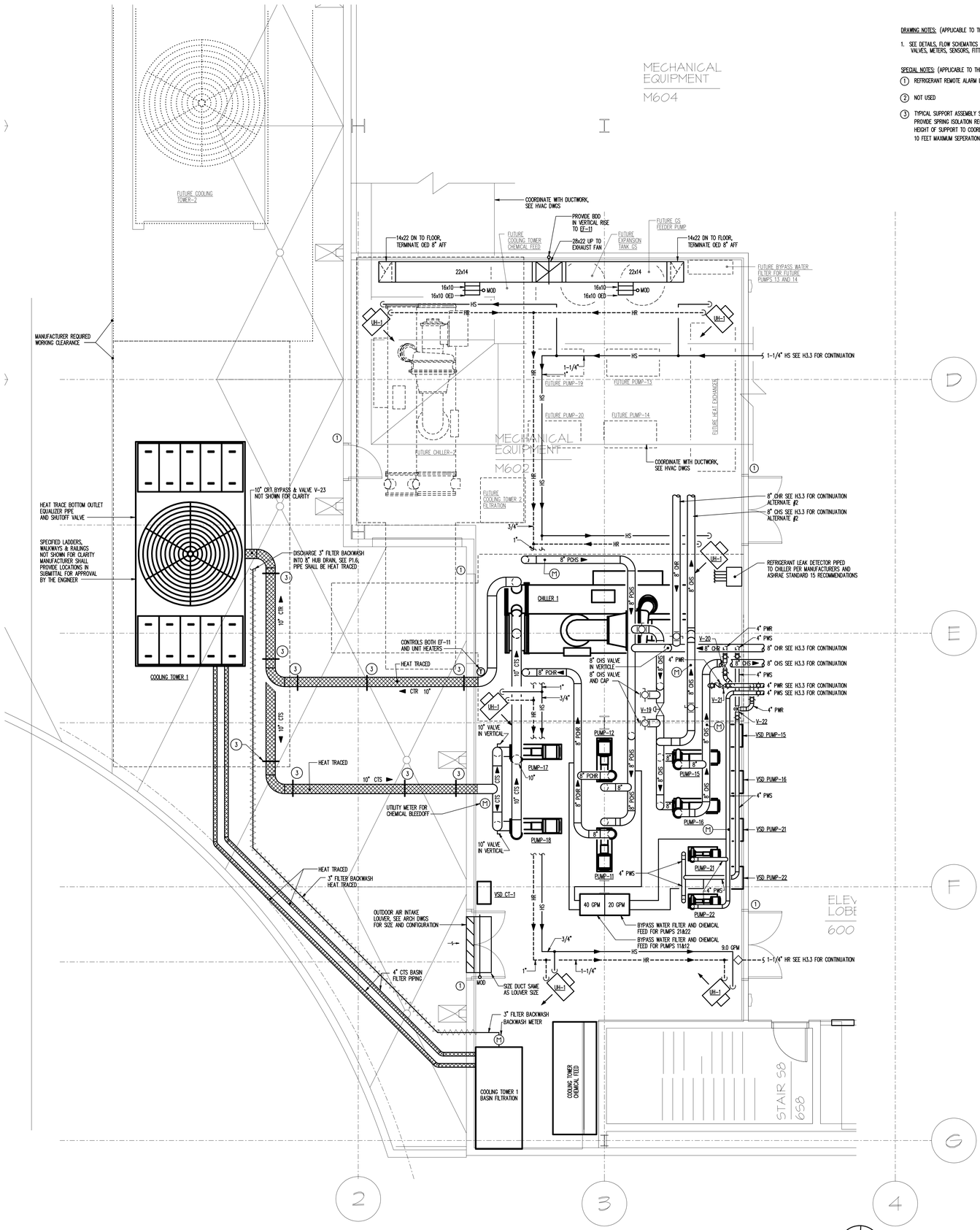
FLOW DIAGRAM & AUTOMATIC CONTROLS FOR COOLING TOWER FILTRATION SYSTEM

STARTING AND STOPPING

1. SYSTEM SHALL OPERATION WHEN CONDENSER WATER PUMPS OPERATE.

OPERATING SEQUENCE

1. BACKWASH CONTROLS SHALL BE BY EQUIPMENT MANUFACTURER.



1 MECHANICAL ROOM - PENTHOUSE - CHILLER PLANT
1/4" = 1'-0"

0 2' 4' 8'

N

DRAWING NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. SEE DETAILS, FLOW SCHEMATICS AND CONTROL DIAGRAMS FOR ALL ASSOCIATED VALVES, METERS, SENSORS, FITTINGS AND ETC. NOT SHOWN ON THE FLOOR PLAN.

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. REFRIGERANT REMOTE ALARM LOCATION
2. NOT USED
3. TYPICAL SUPPORT ASSEMBLY SEE STRUCTURAL ENGINEERING DETAIL. PROVIDE SPRING ISOLATION REQUIREMENTS OF SPEC WITH SUPPORT/HANGER ASSEMBLY. HEIGHT OF SUPPORT TO COORDINATE WITH PIPING ELEVATION REQUIREMENTS. 10 FEET MAXIMUM SEPERATION.

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Mechanical Room - Penthouse - Chiller Plant

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H3.6

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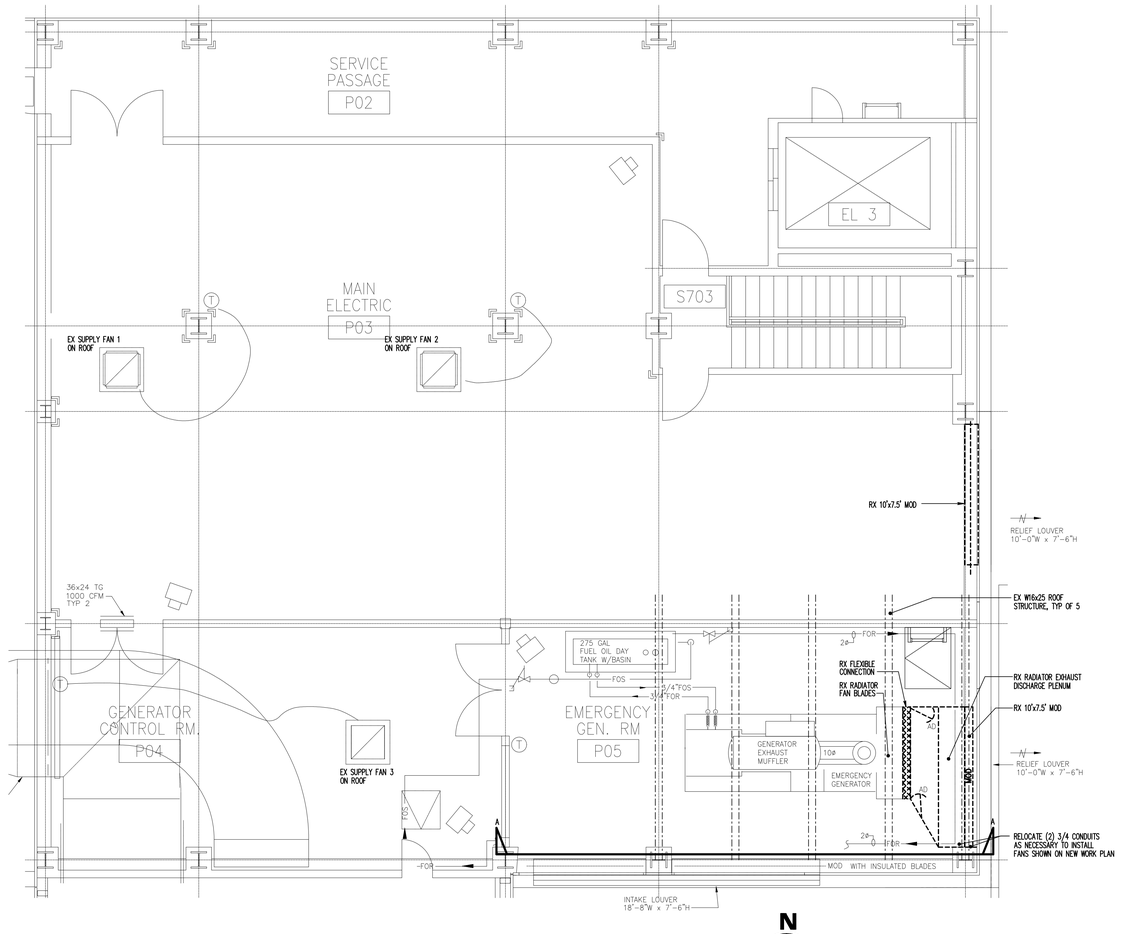
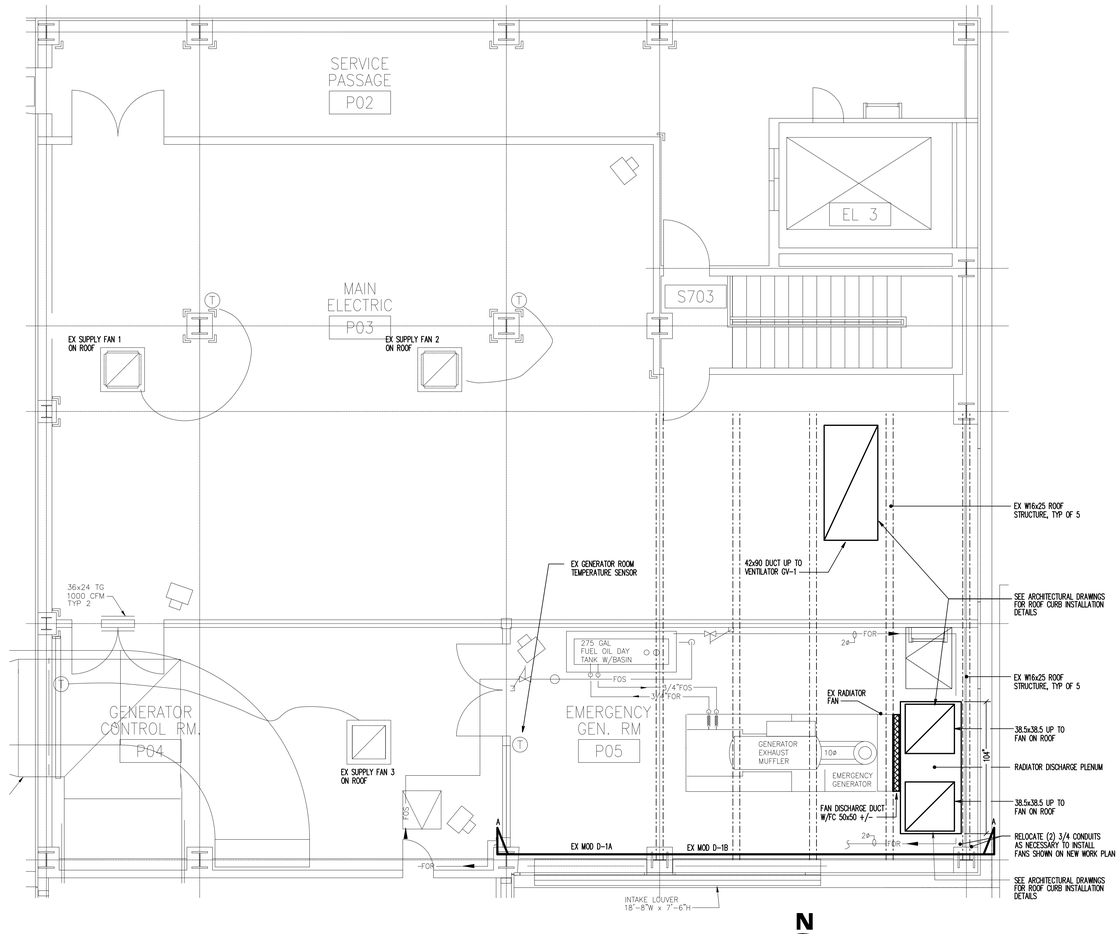
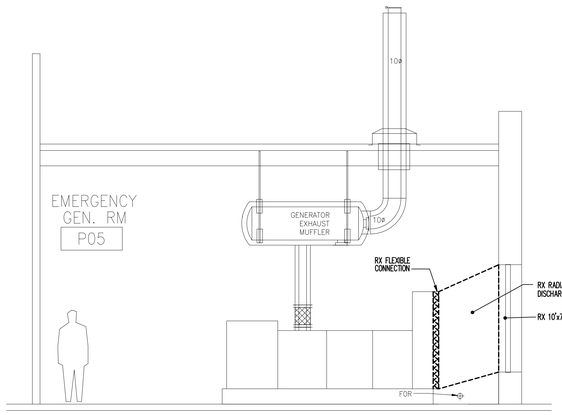


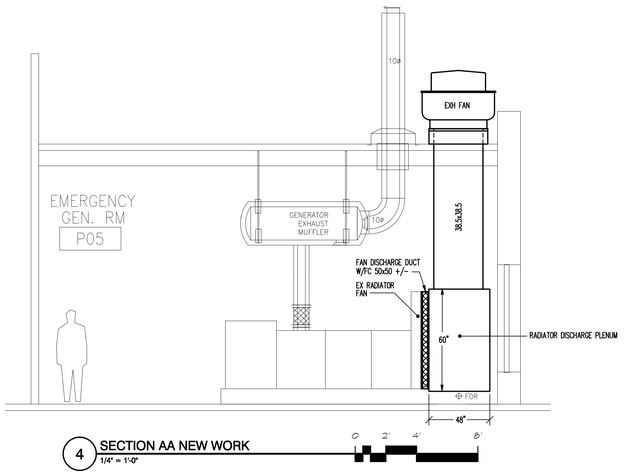
1 SON PENTHOUSE DEMOLITION
1/4" = 1'-0"



2 SON PENTHOUSE NEW WORK
1/4" = 1'-0"



3 SECTION AA DEMOLITION
1/4" = 1'-0"



4 SECTION AA NEW WORK
1/4" = 1'-0"

FANS (1) (2) (3)

UNIT NO.	TYPE	LOCATION	SERVICE	CFM	CLASS	WHEEL DIA.	SP	MOTOR HP	NOTES
FAN-1	UPBLAST	SON ROOF	EMER GENERATOR	12,500	I	36	1.5	7-1/2	GREENHECK MD. CUBE-360HP
FAN-2	UPBLAST	SON ROOF	EMER GENERATOR	12,500	I	36	1.5	7-1/2	GREENHECK MD. CUBE-360HP

NOTES FOR FANS:

(1) PROVIDE WITH GRAVITY BACKDRAFT DAMPER

(2) POWERED BY GENERATOR OUTPUT CIRCUIT BREAKER.

(3) PROVIDE ON 12-INCH HIGH CURB OF THE SAME MANUFACTURER.

GRAVITY VENTILATOR (1) (2)

UNIT NO.	TYPE	LOCATION	SERVICE	CFM	THROAT WxH	MAX HEIGHT	SP	VELOCITY FPM	NOTES
GV-1	GREENHECK MD FGR	SON ROOF	ELEC RM VENT	20,000	42x90	23	0.15	780	

NOTES FOR GRAVITY VENTILATOR:

(1) PROVIDE WITH MOTOR OPERATED DAMPER INTERLOCKED BY CONTROL CONTRACTOR TO OPEN WHEN ANY OF THE THREE VENTILATION SUPPLY FANS OPERATE.

(2) PROVIDE ON 12-INCH HIGH CURB OF THE SAME MANUFACTURER.

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Campus Center

621 West Lombard Street
University of Maryland, Baltimore
Baltimore, MD

Key Plan

SON Penthouse

UMB PROJECT NO. 99-311
WTW PROJECT NO. 70-4091
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H3.7

HALLC JOB NO.: U04720

AIR HANDLING UNIT SCHEDULE

DESIG.	SERVICE	LOCATION	SUPPLY AIR FLOW						PREHEAT COILS							COOLING COILS										FILTERS					REMARKS
			FAN DESIG.	CFM MIN	CFM MAX	MIN OA (CFM)	ESP (IN. WG)	TSP (IN. WG)	EAT (°F)	LAT (°F)	MBH	MAX AIR PD (IN. WG)	NO. OF ROWS	GPM	MAX WATER PD (FT. WG)	EAT DB/WB	LAT DB/WB	TOTAL MBH	SENS. MBH	MIN. ROWS	MAX FACE VELOCITY (FPM)	MAX APD (IN. WG)	MAX FINS PER IN.	GPM	MAX WPD (FT. WG)	SERVICE	EFFIC. (%)	INIT. APD (IN. WG)	FINAL APD (IN. WG)	TYPE	
AHU-1	MULTIPURPOSE, OFFICES	PENTHOUSE	SF-1	11,450	37,690	11,450	3.0	5.25	0.0	55.0	680	.20"	1	68	10	81.1/68.0	54.0/53.0	1781	1102	10	500	0.85	10	297	15	RETURN	30%	0.22	0.50	2" TA	NOTE 4
AHU-2																															NOT USED
AHU-3	LOCKER RMS	PENTHOUSE	SF-3	6,300	6,300	6,300	2.0	3.75	0.0	55.0	397	.20"	1	40	10	95.0/78.0	54.0/53.0	590	296	12	500	1.30	11	98	15	RETURN	30%	0.22	0.50	2" TA	BASE BID.
AHU-3	LOCKER RMS	PENTHOUSE	SF-3	6,300	6,300	6,300	2.0	4.80	0.0	55.0	397	.20"	1	40	10	95.0/78.0	54.0/53.0	590	296	12	500	-	-	98	15	SUPPLY, EXHAUST	30%	0.22	0.50	2" TA	ALT #9 (NOTE 3)
AHU-4	FITNESS CTR	PENTHOUSE	SF-4	3,100	10,340	2,020	2.5	3.9	25.1	55.0	100	.20"	1	10	10	78.9/66.0	54.0/53.0	414	278	8	500	0.70	8	69	15	RETURN	30%	0.22	0.50	2" TA	NOTE 4
AHU-5	GENERAL	GARDEN LEVEL	SF-5	4,000	8,850	4,000	2.5	4.1	0.0	55.0	238	.20	1	24	10	84.0/70.4	54.0/53.0	498	287	8	500	0.75	9	83	15	RETURN	30%	0.22	0.50	2" TA	FORMER BOOKSTORE UNIT NOTE 4
AHU-6	FOOD SERVICES	PENTHOUSE	SF-6	16,860	23,690	13,800	2.0	3.80	13.1	55.0	764	.20	1	76	10	86.7/77.0	54.0/53.0	1492	835	10	500	-	-	249	15	RETURN	30%	0.22	0.50	2" TA	NOTE 5

NOTES:
1. COOLING COIL EWT/LWT = 45F/57F
2. PREHEAT COIL EWT/LWT = 180F/160F, SCHEDULED CONDITIONS AT MIN AIRFLOW
3. FOR ALT#9 IN ADDITION PROVIDE UNIT WITH EXHAUST FAN AND HEAT WHEEL FOR THE FOLLOWING ADDITIONAL CONDITIONS: RETURN AIR 4,045 CFM, SUMMER RA 75F/50%RH, WINTER RA 70F/30%RH, MAX WHEEL PD = 1.0 IN.W.G.
4. BALANCE UNIT FOR 10% OUTDOOR AIR.
5. BALANCE UNIT FOR CURRENT DUTY OF 18,875 CFM MAX SA, 9,440 CFM MIN SA, 5,000 CFM MIN OA.
6. BALANCE UNIT FOR CURRENT DUTY OF 7,650 CFM MAX SA, 4,000 CFM MIN SA.

NATATORIUM UNIT SCHEDULE

GENERAL		SUPPLY FAN			RETURN FAN				OUTDOOR AIR				COOLING SECTION (DX)			POOL WATER HEATING SECTION				AUXILIARY HEATING (HEATING WATER) SECTION				UNIT POWER				MISCELLANEOUS
		CFM			CFM				SUMMER																			
DESIG.	LOCATION	MAX	MIN	ESP (in w.g.)	MIN. HP	MAX	MIN	ESP (IN W.G.)	MIN. HP	MIN. CFM	DB (°F)	WB (°F)	WINTER DB (°F)	MOISTURE REMOVAL (lb/hr)	TOTAL/ SENS. CAPACITY (MBH)	REFRIG	CAPACITY (MBH)	PROCESS WATER (GPM)	EWT (°F)	COIL P DROP MAX. (ft. w.g.)	MIN OUTPUT (MBH)	HOT WATER FLOW (GPM)	COIL P DROP MAX (ft. w.g.)	EWT (°F)	EAT (°F)	LAT (°F)	VOLTS/PH/Hz	MIN. CIRCUIT AMPACITY	MOCP	FILTERS	BASIS OF DESIGN
DHU-1	PENTHOUSE	19,000	19,000	2.0	20	19,700	19,700	1.25	20	3,650	95	78	0	233	604/	R-22	700	80	85	20	1231	62	15	180	66	82	460/3/60	139	150	30%	POOLPAK SWHP220

NOTE: 1.

FAN SCHEDULE

DESIG.	LOCATION	SERVICE	TYPE	CFM MIN	CFM MAX	SP (IN WG)	WHEEL DIA (IN)	CLASS	SPEED (RPM)	BHP/HP	V/PH/HZ	REMARKS
SF-1	AHU-1	SUPPLY	DWDI	11,450	37,690	5.25	36	1	1122	43.2/50	480/3/60	VFD
SF-2	ROOF	SHAFT PRESS.	UTILITY	3,000	3,000	1.5	16	1	1548	1.3/1.5	480/3/60	
SF-3	AHU-3	SUPPLY	DWDI	6,300	6,300	3.75	18	1	2001	6.7/7.5	480/3/60	VFD; BASE BID
SF-3	AHU-3	SUPPLY	AIRFOIL DWDI	6,300	6,300	4.80	18	1	2177	8.5/10	480/3/60	VFD; ALT #9
SF-4	AHU-4	SUPPLY	DWDI	3,100	10,340	3.90	22	1	1445	9.7/15	480/3/60	VFD
SF-5	AHU-5	SUPPLY	DWDI	4,000	8,850	4.1	20	1	1693	7.9/10	480/3/60	VFD
SF-6	AHU-6	SUPPLY	DWDI	16,860	23,690	2.0	28	1	1361	23.5/30	480/3/60	VFD
SF-7	DHU-1	SUPPLY	DWDI	19,000	19,000	-	-	-	-	-/15	480/3/60	SEE NATATORIUM UNIT SCHEDULE
SF-8	ROOF	STAIR PRESS.	UTILITY	15,000	15,000	1.5	29	1	1086	8.0/10	480/3/60	-
SF-9	ROOF	STAIR PRESS.	UTILITY	15,000	15,000	1.5	29	1	1086	8.0/10	480/3/60	-
SF-10	ROOF	STAIR PRESS.	AXIAL	15,000	15,00	1.5	30	1	2053	8.0/10	480/3/60	-
SF-11	AHU-5	OA	IN-LINE	885	8,850	2.0	24	II	1170	5.6/7.5	480/3/60	VFD, NOTE 3
RF-1	AHU-1	RETURN	DWDI	8,375	37,690	2.5	40	1	760	22.8/25	480/3/60	VFD; BALANCE MAX FOR 34,615 CFM
RF-2	-	-	-	-	-	-	-	-	-	-	-	NOT USED
RF-3	AHU-3	RETURN	DWDI	4,045	4,045	3.65	18	1	2030	7.1/10	480/3/60	VFD; ALT #9
RF-4	AHU-4	RETURN	DWDI	2,380	10,340	2.5	22	1	1269	6.0/7.5	480/3/60	VFD; BALANCE MAX FOR 9,620 CFM
RF-5	AHU-5	RETURN	DWDI	3,235	8,850	2.4	22	1	1179	4.7/7.5	480/3/60	VFD; BALANCE MAX FOR 8,085 CFM
RF-6	AHU-6	RETURN	DWDI	3,060	23,690	2.0	32	1	933	13.7/15	480/3/60	VFD; NOTE 1, 2
RF-7	DHU-1	RETURN	DWDI	19,700	19,700	-	-	-	-	-/20	480/3/60	SEE NATATORIUM UNIT SCHEDULE
EF-1	ROOF	FOOD SVC #1	GREASE EXHAUST	2,400	2,400	-	-	-	-	2.6/3	480/3/60	FUTURE
EF-2	ROOF	FOOD SVC #2	GREASE EXHAUST	1,500	1,500	-	-	-	-	1.75/2	480/3/60	FUTURE
EF-3	ROOF	FOOD SVC #3	GREASE EXHAUST	3,000	3,000	-	-	-	-	2.9/5	480/3/60	FUTURE
EF-4	ROOF	FOOD SVC #4	GREASE EXHAUST	6,900	6,900	-	-	-	-	6.2/7.5	480/3/60	FUTURE
EF-5	ROOF	TLT EXH	DOME	5,265	5,265	1.5	24	1	1110	2.2/3	480/3/60	
EF-6	AC ROOF	TLT EXH	DOME	1,210	1,210	0.4	14	1	930	0.16/0.25	120/1/60	
EF-7	ROOF	POOL EQUIP	DOME	1,385	1,385	1.0	14	1	2035	0.6/0.75	480/3/60	
EF-8	AHU-3	LOCKER EXHAUST	DOME	4,045	4,045	1.75	24	1	1050	2.1/3.0	480/3/60	BASE BID
EF-9												NOT USED
EF-10	ROOF	FIREPLACE FLUE	FLUE	600	600	0.30	--	--	1600	-/-	120/1/60	1.4 AMPS
EF-11	ROOF	MER	DOME	4,000	4,000	0.5	20	1	890	.82/1	480/3/60	
EF-12	ROOF	MER	DOME	2,000	2,000	0.25	16	1	805	.23/.33	120/1/60	
EF-13	ROOF	MER	DOME	3,500	3,500	0.25	18	1	960	.55/.75	480/3/60	
EF-14	ROOF	MER	DOME	3,500	3,500	0.25	18	1	960	.55/.75	480/3/60	

NOTE: 1. MAX CFM SHALL OCCUR ONLY WHEN FANS EF-1 THRU EF-4 ARE OFF. WHEN EF-1 THRU EF-4 ARE ON, MAX CFM = 9,890 CFM. BALANCING CONTRACTOR SHALL ESTABLISH FAN SPEED FOR BOTH CONDITIONS.
2. BALANCE FAN FOR CURRENT DUTY OF 18,875 MAX CFM, 9440 MIN CFM.
3. BALANCE FAN FOR CURRENT DUTY OF 7,650 MAX CFM.

WATER COOLED AIR CONDITIONING UNIT SCHEDULE

GENERAL			SUPPLY FAN				COOLING SECTION			CONDENSING SECTION			UNIT POWER			MISCELLANEOUS	
			CFM														
DESIG.	LOCATION	TYPE	TOTAL	MIN OA	ESP (IN W.G.)	HP	TOT/SENS CAPACITY (MBH)	EAT DB/RH	LAT DB/RH	PROCESS WATER (GPM)	EWT (°F)	LWT (°F)	MAX WPD (FT)	FULL LOAD AMP	MOCP	VOLTS/PH/Hz	BASIS OF DESIGN	REMARKS
AC-1	RM 009	FLR MTD	5650	0	0.25	(2)3.0	130/114	72/50	55	23.3	85	110	20	37.9	50	480/3/60	LIEBERT VHI38W	ELECTRICAL ROOM
AC-15	RM 009	FLR MTD	5650	0	0.25	(2)3.0	130/114	72/50	55	23.3	85	110	20	37.9	50	480/3/60	LIEBERT VHI38W	ELECTRICAL ROOM
AC-2	RM 021	DUCTED	480	0	0.3	0.2	12.4/9.9	72/50	58	1.6	85	105	2.0	6.6	15	208/1/60	LIEBERT MMD14W	ELECTRIC CLOSET
AC-3	RM 019	DUCTED	2800	0	0	1.5	62.4/52.9	72/50	58	10.1	85	110	5.9	32.3	40	480/3/60	LIEBERT MMD60E/MCD89W	PROVIDE ELEC REHEAT
AC-4	FCC-102	CABINET	480	0	0.3	0.2	12.4/9.9	72/50	58	1.6	85	105	6.7	6.6	15	208/1/60	LIEBERT MMD14W	ELECTRIC CLOSET
AC-5	ELEV 1/2 RM 6E3	CABINET	1175	0	0.0	0.27	32.9/25.6	72/50	58	7.4	85	105	7.5	23.0	30	480/3/60	LIEBERT DME037E/DMC40WG	PROVIDE ELECTRIC REHEAT DATAMATE
AC-6	ELEV 3 PH	CABINET	1175	0	0.0	0.27	32.9/25.6	72/50	58	7.4	85	105	7.5	23.0	30	480/3/60	LIEBERT DME037E/DMC40WG	PROVIDE ELECTRIC REHEAT DATAMATE
AC-7	FUTURE ELEV.	CABINET	--	--	--	--	32.9/25.6	--	--	7.4	85	105	7.5	--	--	480/3/60	--	FUTURE
AC-8	RM 023	DUCTED	800	0	0.3	0.5	23.0/18.9	72/50	58	7.9	85	105	17.3	14.2	25	208/1/60	MMD24E/MCD26W	TELECOM ROOM
AC-9	RM 121	DUCTED	480	0	0.0	0.2	12.4/9.9	72/50	58	1.6	85	105	2.0	6.6	15	208/1/60	LIEBERT MMD14W	ELECTRIC CLOSET
AC-10	RM 123	DUCTED	600	0	0.3	0.2	18.4/13.7	72/50	58	3.2	85	105	6.7	10.7	20	208/1/60	LIEBERT MMD20W	TELECOM ROOM
AC-11	RM 217	DUCTED	480	0	0.0	0.2	12.4/9.9	72/50	58	1.6	85	105	2.0	6.6	15	208/1/60	LIEBERT MMD14W	ELECTRIC CLOSET
AC-12	RM 219	DUCTED	600	0	0.3	0.2	18.4/13.7	72/50	58	3.2	85	105	6.7	10.7	20	208/1/60	LIEBERT MMD20W	TELECOM ROOM
AC-13	RM 357	DUCTED	800	0	0.0	0.5	23.0/18.9	72/50	58	7.9	85	105	17.3	14.2	25	208/1/60	LIEBERT MMD24E/MCD26W	ELECTRIC CLOSET
AC-14	RM 359	DUCTED	600	0	0.3	0.2	18.4/13.7	72/50	58	3.2	85	105	6.7	10.7	20	208/1/60	LIEBERT MMD20W	TELECOM ROOM
AC-15	RM 421	CABINET	480	0	0.0	0.2	12.4/9.9	72/50	58	1.6	85	105	2.0	6.6	15	208/1/60	LIEBERT MMD14W	ELECTRIC CLOSET
AC-16	RM 423	DUCTED	480	0	0.3	0.2	12.4/9.9	72/50	58	1.6	85	105	2.0	6.6	15	208/1/60	LIEBERT MMD14W	TELECOM ROOM
AC-17	RM 517	DUCTED	480	0	0.0	0.2	12.4/9.9	72/50	58	1.6	85	105	2.0	6.6	15	208/1/60	LIEBERT MMD14W	ELECTRIC CLOSET
AC-18	RM 519	DUCTED	480	0	0.3	0.2	12.4/9.9	72/50	58	1.6	85	105	2.0	6.6	15	208/1/60	LIEBERT MMD14W	TELECOM ROOM
AC-19	E601A	DUCTED	800	0	0.2	0.5	23.0/18.9	72/50	58	15.3	85	105	8.2	26.3	50	480/3/60	LIEBERT MMD60E/MCD89W	ELECTRICAL ROOM
AC-20	E601B	DUCTED	600	0	0.2	0.2	18.4/13.7	72/50	58	3.2	85	105	6.7	10.7	20	208/1/60	LIEBERT MMD20W	ELECTRICAL ROOM

ROOFTOP AC UNIT (4) (5)

UNIT #	FAN CFM	FAN hp	FAN ESP	OA CFM	COOLING CAPACITY (1) TOTAL MBH	COOLING CAPACITY (1) SENS. MBH	COOLING CAPACITY (1) EAT DB	COOLING CAPACITY (1) EAT WB	HEATING CAPACITY (2) REVERSE CYCLE MBH (3)	HEATING CAPACITY (2) REVERSE CYCLE LAT	HEATING CAPACITY (2) SUPPLEMENTAL KW	NOTES
AC-1	12000	-	-	1680	-	-	-	-	-	-	-	EXISTING
AC-2	8000	7 1/2	1.3	1400	290	205	80	66	-	-	72	
AC-3	1740	1	1.0	400	61	47	82	67	31	73	12	
AC-4	1500	1	1.0	160	47	36	78	65	25	80	6	

NOTES FOR AIR SOURCE HEAT PUMPS:
(1) COOLING CAPACITY BASED ON 105 DEG F DB AND 78 DEG F WET BULB OUTDOOR AIR TEMPERATURE. COOLING CAPACITY INCLUDES FAN HEAT GAIN.
(2) HEATING CAPACITY BASED ON 11 DEG F OUTDOOR AIR TEMPERATURE AND 70 DEG F ROOM AIR TEMPERATURE ENTERING COIL. HEATING CAPACITY INCLUDES FAN HEAT GAIN.
(3) HEATING CAPACITY DOES NOT INCLUDE SUPPLEMENTAL KW.
(4) SEE ELECTRICAL DWGS FOR ELECTRICAL REQUIREMENTS.
(5) SEE SPECIFICATION SECTION 15782 "ROOFTOP HEATING AND COOLING UNITS" FOR CONTROL SEQUENCES.

CONDENSING UNIT SCHEDULE

GENERAL		FANS		CAPACITY		ELECTRIC			MISCELLANEOUS	
DESIG.	SERVES	QUANTITY	HP	(MBH)	AMBIENT T (°F)	FLA	V/PH/HZ	MOCP	MANUFACTURER	REMARKS
CU-1	DHU-1	6	1.5	704	105	21.0	480/3/60	30	BY DHU-1 MFR	

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17	4/30/09	BULLETIN #108R
16	3/30/09	BULLETIN #105
15	4/15/09	BULLETIN #99R
14	3/2/09	BULLETIN #94
13	12/16/08	BULLETIN #82
12	12/7/08	BULLETIN #80
11	11/20/08	BULLETIN #78
10	11/19/08	BULLETIN #72 (rev)
9	11/20/08	BULLETIN #69
8	9/4/08	BULLETIN #63
7	7/28/08	BULLETIN #55
6	6/23/08	BULLETIN #51
5	05/23/08	COORD. DWGS RFI 163
4	05/09/08	BULLETIN #31
3	04/14/08	CB-39
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HVAC Schedules

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WTW PROJECT NO. 70-4091
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H4.0

STEAM TO HOT WATER HEAT EXCHANGERS

DESIG. HX-	TYPE	SERVICE	HEATING CAPACITY				STEAM (PSIG)		CONTROL VALVE (LBS/HR.)	TRAP LBS/HR)	REMARKS
			GPM	EWT (F°)	LWT (F°)	MAX PD (FT W.G.)	CONTROL VALVE	ENT SHELL			
1	U-TUBE	HTG HW	640	160	180	15'	60	40	6,511	19,500	2-PASS, 22°ϕ, 48"L
2	U-TUBE	HTG HW	640	160	180	15'	60	40	6,511	19,500	2-PASS, 22°ϕ, 48"L

UNIT HEATER SCHEDULE

DESIG. UH-	SERVICE	AIR FLOW (CFM)	CAPACITY (MBH)	EAT (F°)	LAT (F°)	GPM (1)	HP	V/PH/HZ	REMARKS
UH-1	VARIOUS	340	12.6	60	94.3	1.3	1/40	120/1/60	-
UH-2	VARIOUS	630	21.7	60	91.9	2.2	1/25	120/1/60	-

NOTE: 1. EWT 180, 20° ΔT, MAXIMUM WPD 5FT.

CABINET UNIT HEATER SCHEDULE

DESIG. UH-	TYPE	AIR FLOW (CFM)	CAPACITY (MBH)	EAT (F°)	ROWS	GPM (1)	WATTS	V/PH/HZ	REMARKS
CUH-1	VERT. CAB	210	14.5	70	2	1.0	60	120/1/60	-
CUH-2	VERT. CAB	277	23.3	70	3	1.6	85	120/1/60	-
CUH-3	HORZ. CAB	277	23.3	70	3	1.6	85	120/1/60	-
CUH-4	VERT. CAB.	780	59.0	70	3	4.0	320	120/1/60	DWG. H3.5
CUH-5	HORZ. RECESSED	250	15.4	70	-	-	4500	208/3/60	ELECTRIC COIL (2)

NOTE: 1. EWT 180, 20° ΔT, MAXIMUM WPD 5FT.

2. **TRANE FORCE FLO MODEL E OR APPROVED EQUAL. PROVIDE DISCONNECT, DUAL-STAGE HEATING, WALL-MTD FAN SPEED SWITCH WITH SETPOINT DIAL, AND STAMPED INLET & OUTLET LOUVERS ON BOTTOM PANEL.**

EXPANSION TANK SCHEDULE

DESIG.	LOCATION	SERVICE	HORIZ/ VERT CONFIG	TANK VOLUME (GAL.)	ACCEPTANCE VOLUME (GAL.)	CW PRESSURE REGULATOR			RELIEF VALVE SETTING (PSIG)	REMARKS
						INLET (PSIG)	OUTLET (PSIG)	CAPACITY (GPM)		
ET-1	GARDEN LEVEL	HTG HW	VERT.	264	264	87	56	20	70	TACO CA-1000, 36"ϕ x 80" H
GS	PENTHOUSE	GLYCOL WATER	-	-	-	-	-	-	-	FUTURE

SC-008.dwg

FINNED TUBE RADIATION SCHEDULE

DESIG. ☐	TYPE (SEE SPEC)	ROWS	PIPE SIZE (IN)	FIN SIZE (IN)	FINS PER FOOT	ENCLOSURE HEIGHT (IN)	ENCLOSURE DEPTH (IN)			BASIS OF DESIGN
1	CABINET	1	¾"	3¼"x23/4"	34	8	4			TRANE MODEL E3
2	PEDESTAL	1	¾"	2¾"x4¼"	34	10	5			TRANE MODEL S
3	PEDESTAL	1	¾"	4¼"x4¼"	34	5	5			TRANE MODEL S

NOTE: 1. UNITS SHALL BE SELECTED @ 170° AWT, 65° EAT.

SC-020.dwg

AIR CURTAIN SCHEDULE

DESIG.	NOZZLE WIDTH (INCHES)	CAPACITY (MBH) (1)	CFM	GPM @ °F EWT	MAX H2O PD (FT)	MOTORS		REMARKS
						HP	VOLTS/PH/HZ	
C-1	96	--	2762	--	--	(2)1/5	120/1/60	BERNER MAX209A

NOTE: 1. NO HEAT.
2. PROVIDE MANUAL SWITCH.

SC-006.dwg

PLATE HEAT EXCHANGER SCHEDULE

DESIG.	SERVICE	PRIMARY WATER				SECONDARY WATER				MINIMUM SURFACE AREA (SQ. FT.)	REMARKS
		GPM	EWT (°F)	LWT (°F)	PD (PSIG)	GPM	EWT (°F)	LWT (°F)	PD (PSIG)		
HX-3	POOL WTR HEATING	65	180	150	7.5	80	80	104	9.4	10.1	316SS

SC-021.dwg

SOUND ATTENUATORS SCHEDULE

DESIG.	SERVICE	SIZE LxWxH (INCHES)	AIR FLOW (CFM)	MAX PD (INCHES W.G.)	MIN. dBA REDUCTION BY OCTAVE BAND CENTER FREQUENCY (Hz)								REMARKS
					63	125	250	500	1000	2000	4000	8000	
SA-1	AHU-1 (SA)	60x72x36	37,690	0.48	4	6	12	21	24	21	16	11	IAC TYPE MS
SA-2	AHU-1 (RA)	84x108x24	34,615	0.60	7	14	25	42	50	40	24	13	IAC TYPE MS
SA-3	AHU-4 (SA)	60x36x24	10,340	0.48	4	9	17	34	42	33	22	14	IAC TYPE MS
SA-4	AHU-4 (RA)	60x48x24	9,620	0.48	5	10	19	36	43	31	19	10	IAC TYPE MS
SA-5	AHU-5 (SA)	60x72x12	8,850	0.48	4	9	17	34	42	33	22	14	IAC TYPE MS
SA-6	AHU-5 (RA)	36x72x12	8,085	0.40	6	7	13	24	26	19	13	9	IAC TYPE MS

LOUVERED PENTHOUSES

DESIG.	DUTY	CFM	MAXIMUM S.P. (IN)	THROAT SIZE (IN x IN)	LOUVERED FREE AREA (SF)	LOUVERED HEIGHT (INCHES)	REMARKS
LP-1	AHU-1 RELIEF	37,685	0.12	78"x60"	50	59	-
LP-2	AHU-3 RELIEF	6,690	0.12	18"x36"	10	31	ALT #9
LP-3	AHU-4 RELIEF	10,340	0.12	24"x42"	14	36	-
LP-4	AHU-6 RELIEF	23,690	0.12	30"x114"	30	31	-
LP-5	DHU-1 RELIEF	19,500	0.12	30"x48"	25	36	-

SC-014.dwg

PUMP SCHEDULE

DESIG.	LOCATION	SERVICE	TYPE (SEE SPEC)	CAPACITY (GPM)	HEAD (FT W.G.)	APPROX. IMP. DIA. (INCHES)	SUCT. X DISCHARGE (INCHES)	MINIMUM PUMP EFF (%)	PUMP SPEED (RPM)	BHP/MTR HP	VOLTS/ PHASE/ HZ	REMARKS
P-1	GARDEN LEVEL MER	HTG HW DISTRIB.	END SUCTION	640	114	5.8	5x4	76	3550	24/30	480/3/60	-
P-2	GARDEN LEVEL MER	HTG HW DISTRIB	END SUCTION	640	114	5.8	5x4	76	3550	24/30	480/3/60	STANDBY
P-3	GARDEN LEVEL MER	FTR SOUTH	IN-LINE	21	37	6.0	1½x1½	34	1750	.65/.75	120/1/60	-
P-4	GARDEN LEVEL MER	FTR NORTH	IN-LINE	50	37	6.0	2x2	55	1750	.8/1.5	480/3/60	-
P-5	PENTHOUSE	AHU-1	IN-LINE	68	25	5.4	2x2	58	1750	.7/1.0	480/3/60	-
P-6	POOL FILTER ROOM	POOL WATER HEATING LOOP	IN-LINE	80	60	7.6	2½x2½	54	1750	2.4/3.0	480/3/60	-
P-7	PENTHOUSE	AHU-3	IN-LINE	40	25	5.9	1½x1½	40	1750	.6/.75	480/3/60	-
P-8	PENTHOUSE	AHU-4	CARTRIDGE	10	25	-	1¼x1¼	-	3250	-/.125	120/1/60	-
P-9	GARDEN LEVEL MER	AHU-5	IN-LINE	24	25	5.3	1½x1½	36	1750	.4/.75	480/3/60	-
P-10	PENTHOUSE	AHU-6	IN-LINE	76	25	5.5	2x2	59	1750	.8/1.0	480/3/60	-
P-11	M 602 CHILLER PLANT	PRIMARY CHILLED WATER	END SUCTION	840	30	9.1	8x6	76	1150	8.4/10	480/3/60	-
P-12	M 602 CHILLER PLANT	PRIMARY CHILLED WATER	END SUCTION	840	30	9.1	8x6	76	1150	8.4/10	480/3/60	STANDBY
P-13		FUTURE										
P-14		FUTURE										
P-15	M 602 CHILLER PLANT	SECONDARY CHILLED WATER	END SUCTION	800	65	8.8	6X5	80	1750	15/20	16.4/20	VSD
P-16	M 602 CHILLER PLANT	SECONDARY CHILLED WATER	END SUCTION	800	65	8.8	6X5	80	1750	15/20	16.4/20	VSD, STANDBY
P-17	M 602 CHILLER PLANT	CONDENSER WATER	END SUCTION	1,200	46	11.7	8X6	83	1150	17/20	480/3/60	
P-18	M 602 CHILLER PLANT	CONDENSER WATER	END SUCTION	1,200	46	11.7	8X6	83	1150	17/20	480/3/60	STANDBY
P-19		FUTURE										
P-20		FUTURE										
P-21	M 602 CHILLER PLANT	PROCESS COOLING LOOP	END SUCTION	200	80	9.1	2.5X2	70	1750	5.4/7.5	480/3/60	VSD
P-22	M 602 CHILLER PLANT	PROCESS COOLING LOOP	END SUCTION	200	80	9.1	2.5X2	70	1750	5.4/7.5	480/3/60	VSD, STANDBY
P-32	GARDEN LEVEL MER	CHILLED WATER EXPORT PUMP	END SUCTION	800	110	11.9	5X4	77	1750	29.1/40	480/3/60	VSD, ALT #2
P-33	PENTHOUSE	DHU-1	IN-LINE	62	25	5.5	2X2	58	1750	.7/1.0	480/3/60	

WATER-COOLED CHILLERS

UNIT NO.	LOCATION	MAX. KW	EVAPORATOR FLUID					CONDENSER WATER				NOTES
			FLUID	GPM	EFT	LFT	FPD	GPM	EWT	LWT	WPD	
1	PENTHOUSE	209	WATER	800	57	45	13	1,200	85	95	21	BASE BID
1	PENTHOUSE	228	WATER	800	57	45	13	1,200	85	95	21	ALTERN. #18

COOLING TOWERS

UNIT NO.	LOCATION	NO. CELLS	GPM EACH CELL	MAX. WPD	EAT WB	EWT	LWT	CELL FAN MOTOR HP	BASIN HEATER (1) MBH	NOTES
1	ROOF	1	1,200	5	80	95	85	30	(2) 10 kW	-

NOTES FOR COOLING TOWERS:

(1) PROVIDE ELECTRIC BASIN HEATER.

FUTURE FLUID-TO-FLUID HEAT EXCHANGERS

UNIT NO.	LOCATION	TYPE	SERVICE	PRIMARY FLUID					SECONDARY FLUID					NOTES
				FLUID	GPM	EFT	LFT	FPD	FLUID	GPM	EFT	LFT	FPD	
1	PENTHOUSE	-	ICE STORAGE	GLYCOL	1,500	-	-	-	WATER	670	-	-	-	

AIR DEVICE SCHEDULE

DESIG. ○	TYPE	INLET/NECK SIZE (IN.)	FACE / SLOT	BASIS OF DESIGN
1	CD-1	6	24x24	TITUS TDC
2	CD-1	8	24x24	TITUS TDC
3	CD-1	10	24x24	TITUS TDC
4	CD-1	12	24x24	TITUS TDC
5	CD-1	14	24x24	TITUS TDC
6	CD-1	16	24x24	TITUS TDC
7	CD-2	6	24x24	TITUS PAS
8	CD-2	8	24x24	TITUS PAS
9	CD-2	10	24x24	TITUS PAS
10	CD-2	12	24x24	TITUS PAS
11	CD-2	14	24x24	TITUS PAS
12	CD-2	16	24x24	TITUS PAS
13	RI	22x22	24x24 PERFORATED	TITUS PAR
14	BAR	36x6	38x8, 15° DEFLECTION	TITUS CT-481
15	BAR	24x6	38x8, 15° DEFLECTION	TITUS CT-481
16	BAR	12x6	38x8, 15° DEFLECTION	TITUS CT-481
17	EG	6x6	24x24 PERFORATED	TITUS PAR
18	EG	8x8	24x24 PERFORATED	TITUS PAR
19	EG	10x10	24x24 PERFORATED	TITUS PAR
20	EG	12x12	24x24 PERFORATED	TITUS PAR
21	EG	6x6	12x12 PERFORATED	TITUS PAR
22	EG	10x10	12x12 PERFORATED	TITUS PAR
23	EG	15x15	24x24 PERFORATED	TITUS PAR
24	SD-1	22x22	22x22	TITUS 30IRS-HD
25	SD-1	36x20	36x20	TITUS 30IRS-HD
26	SLOT	SEE PLANS FOR LENGTH	(2) 1/2" SLOTS	TITUS ML, 3/4" BORDER
27	SLOT	SEE PLANS FOR LENGTH	(3) 1/2" SLOTS	TITUS ML, 3/4" BORDER
28	SLOT	SEE PLANS FOR LENGTH	(3) 1" SLOTS	TITUS ML, 3/4" BORDER
29	EG-SW	6x6	6x6, 3/4" BLADES, 35°	TITUS 350FL, ALUMINUM
30	SD-SW	8x6	8x6, 3/4" SINGLE BLADES	TITUS 301FL, ALUMINUM
31	CD-3	6x6	6x6	TITUS TDC ALUMINUM
32	CD-3	9x9	9x9	TITUS TDC ALUMINUM
33	SLOT	SEE PLANS FOR LENGTH	(4) 3/4" SLOTS	TITUS ML, BORDER 16 (RADIUS TYPE)
34	SLOT	SEE PLANS FOR LENGTH	(6) 1" SLOTS	TITUS ML, 3/4" BORDER
35	SLOT	SEE PLANS FOR LENGTH	(8) 1" SLOTS	TITUS ML, 3/4" BORDER
36	R2	4x48	1/2" x 1/2" x 1" D	EGGCRATE
37				NOT USED
38				NOT USED
39	SD-SW	16x12	3/4" BLADES, DBL. DEFL.	TITUS 300 FL
40	R3	18x12	3/4" BLADES, 35°	TITUS 350 FL
41	SD-SW	14x18	3/4" BLADES, DBL. DEFL.	TITUS 300 FL
42	R3	18x18	3/4" BLADES, 35°	TITUS 350 FL
43	SLOT	SEE PLANS FOR LENGTH	(3) 3/4" SLOTS	-
44	EG-SW	SIZE TO MATCH DUCT CONNECTION	3/4" BLADES, 35°	TITUS 350 FL

NOTES: 1. ALL DEVICES SHALL BE SELECTED FOR MAX NC LEVEL OF 30 UNLESS OTHERWISE NOTED.
2. ALL SUPPLY AIR DEVICES SHALL BE FOUR-WAY THROW UNLESS INDICATED OTHERWISE ON THE PLANS.

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20	1/29/10	RECORD DRAWING
19	8/4/09	BULLETIN #120
18	4/29/09	BULLETIN #109
17	4/30/09	BULLETIN #108R
16	3/30/09	BULLETIN #105
15	4/15/09	BULLETIN #99R
14	3/2/09	BULLETIN #94
13	12/16/08	BULLETIN #82
12	12/7/08	BULLETIN #80
11	11/20/08	BULLETIN #78
10	11/19/08	BULLETIN #72 (rev)
9	10/20/08	BULLETIN #69
8	9/4/08	BULLETIN #63
7	7/28/08	BULLETIN #55
6	6/23/08	BULLETIN #51
5	05/23/08	COORD. DWGS RFI 163
4	05/09/08	BULLETIN #31
3	04/14/08	CB-39
2	03/10/08	CBM-2
1	02/18/08	CBM-1
0	05/02/07	For Construction
Rev:	Date:	Comment:

Issued: May 2, 2007

Campus Center

621 West Lombard Street
University of Maryland, Baltimore
Baltimore, MD

100% CONSTRUCTION DOCUMENTS

UMB PROJECT NO. 99-311
WTW PROJECT NO. 70-4091
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HVAC Schedules

H4.1

VARIABLE AIR VOLUME TERMINAL UNIT SCHEDULE

DESIG.	CFM		MIN INLET ⌀ SIZE (INCHES)	HEAT COIL DUTY (4)				REMARKS
	MAX	MIN		CAPACITY (MBH) (1)	ROWS	GPM (2)	MAX AIR PD (IN W.G.) (1)	
G5A	810	380	9	17.2	1	1.7	0.10	
G5B	560	280	8	12.1	1	1.2	0.19	
G5C	430	215	7	9.8	1	1.0	0.09	
G5D	390	195	6	8.8	1	0.9	0.12	
G5E	595	300	8	13.6	1	1.4	0.15	
G5F	350	350	6	7.6	1	0.8	0.10	
G5G	300	150	6	6.5	1	0.6	0.08	
G5H	350	175	6	7.6	1	0.8	0.10	
G5J	750	375	9	16.2	1	1.6	0.12	
G5K	450	225	7	9.5	1	1.0	0.12	
G5L	750	750	9	16.2	1	1.6	0.12	
G5M								NOT USED
G5N								NOT USED
G5P								NOT USED
G5Q								NOT USED
G5R	500	0	7	-	-	--	--	
G5S	200	200	5	8.8	2	0.9	0.09	
G5T	120	60	5	2.6	1	0.5	0.10	
11A	2,120	1,060	16	59.4	2	5.9	0.34	
11B	1,610	805	14	36.5	1	3.7	0.13	
11C	1,330	1,000	12	34.6	2	3.5	0.36	
11D	1,690	845	16	45.6	1	4.6	0.20	
11E	270	135	5	8.7	1	0.9	0.06	
15A	1,935	970	14	41.8	1	4.2	0.20	
16A	1,450	1,450	14	31.3	1	3.1	0.16	
16B	2,330	2,330	16	50.3	2	5.0	0.34	
16C	1,410	700	12	30.5	1	3.0	0.17	
16D	400	200	7	10.8	1	1.1	0.15	
21A	850	425	10	19.3	1	1.9	0.14	
21B	1,030	515	10	23.4	1	2.3	0.21	
21C	2,500	1,250	16	56.7	1	5.7	0.20	
21D	2,520	1,260	16	57.2	1	5.7	0.20	
21E	1,550	775	14	35.2	1	3.5	0.12	
21F	1140	1140	12	24.7	1	2.5	0.22	
21G	705	353	8	16.0	2	1.6	0.41	
21H	460	230	7	12.8	1	1.3	0.07	
26A	500	250	7	11.3	1.0	1.1	0.11	
26B	2,910	1,455	24x16	66.0	1.0	6.6	0.12	
26C	3,360	1,680	24x16	76.2	1.0	7.6	0.15	
26D	1,110	555	12	24.0	1.0	2.4	0.16	
26E	3,360	1,680	24x16	76.2	1.0	7.6	0.15	
26F	1,480	740	14	32.0	1.0	3.2	0.17	
26G	1,600	800	14	36.3	1.0	3.6	0.13	
26H	2,850	1,425	24x16	64.6	1.0	6.5	0.11	
26J	980	490	10	21.2	1.0	2.1	0.15	
31A	1,160	580	12	26.3	2.0	2.6	0.10	
31B	500	500	7	11.3	1.0	1.1	0.11	
31C	490	245	7	11.1	1.0	1.1	0.11	
31D	900	450	10	20.4	1.0	2.0	0.15	
31E	1,200	600	12	27.2	1.0	2.7	0.15	
31F	2,590	1,295	16	58.7	1.0	5.9	0.21	
31G	700	350	8	15.9	1.0	1.6	0.19	
31H	200	100	5	4.5	1.0	0.5	0.04	
31J	275	138	5	6.2	1.0	0.6	0.06	

VARIABLE AIR VOLUME TERMINAL UNIT SCHEDULE

DESIG.	CFM		MIN INLET ⌀ SIZE (INCHES)	HEAT COIL DUTY (4)				REMARKS
	MAX	MIN		CAPACITY (MBH) (1)	ROWS	GPM (2)	MAX AIR PD (IN W.G.) (1)	
31K	420	210	7	9.5	1.0	1.0	0.11	
31L	225	113	5	5.1	1.0	0.5	0.04	
31M	260	130	5	5.9	1.0	0.6	0.05	
31N	1,325	663	12	30.1	1.0	3.0	0.18	
31O	300	150	6	6.8	1	0.7	0.07	
31P	150	75	4	3.4	1	0.3	0.02	
31Q	620	310	8	14.1	1	1.4	0.15	
31R	270	135	5	6.1	1	0.6	0.06	
31S	720	360	9	13.0	1	1.3	0.20	
31T	260	130	5	5.9	1	0.6	0.06	
31U	300	150	6	6.8	1	0.7	0.07	
31V	1,125	563	12	25.5	1	2.6	0.13	
31W	725	363	9	16.4	1	1.6	0.11	
31X	575	288	8	13.0	1	1.3	0.14	
31Y	400	200	6	9.1	1	0.9	0.12	
31Z	140	70	4	3.2	1	0.3	0.04	
31AA	270	135	5	6.1	1	0.6	0.06	
31BB	1,000	500	10	22.7	1	2.3	0.19	
31CC	2,640	1,320	16	59.9	1	6.0	0.21	
31DD	75	40	4	3.4	1	0.3	0.02	
31EE	225	115	5	5.1	1	0.5	0.05	
31FF	350	175	6	8.8	1	0.9	0.12	
41A	220	110	5	5.0	1	0.5	0.09	
41B	510	255	7	11.6	1	1.2	0.11	
41C	2,565	1,283	16	58.2	1	5.8	0.21	
41D	330	165	6	7.5	1	0.7	0.09	
41E	880	440	10	23.0	1	2.3	0.20	
41F	320	160	6	9.0	1	0.9	0.20	
43A	675	675	8	15.3	1	1.5	0.16	
43B	1,120	1,120	12	25.4	1	2.5	0.12	
43C	240	240	5	2.7	1	0.3	0.04	
43D	1,665	1,665	14	20.2	1	2.0	0.14	
43E	1,690	1,690	14	38.3	1	3.8	0.14	
43F	170	85	4	3.9	1	0.4	0.03	
43G	1,320	660	12	29.9	1	3.0	0.17	
54A	540	270	7	12.2	1	1.2	0.12	
54B	2,140	1,070	16	48.5	1	4.9	0.15	
54C	2,610	1,305	16	59.2	1	5.9	0.21	
54D	1,925	963	14	43.7	1	4.4	0.17	
54E	1,400	700	14	39.1	1	3.9	0.10	
54F	1,215	608	12	27.6	1	2.8	0.15	
54G	860	430	10	19.5	1	2.0	0.14	
54H	555	555	8	12.6	1	1.3	0.12	

NOTES:

1. AT MAXIMUM AIR FLOW.
2. CALCULATED AT A DELTA T OF 20°F (180°F-160°F).
3. ALL UNITS SHALL BE SELECTED FOR MAXIMUM NC LEVEL OF 30 (RADIATED & DISCHARGE) AT 1.5" INLET STATIC PRESSURE.
4. ENTERING AIR TEMP = 55° F

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MEC PROJECT NO. 0512300

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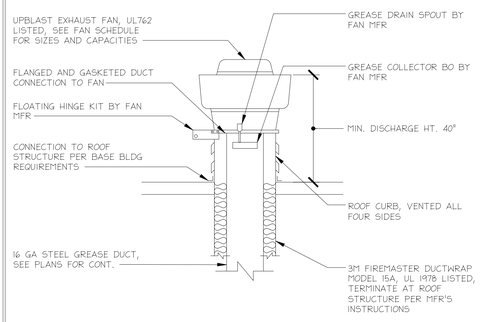
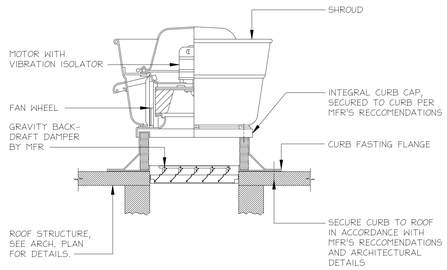
H4.2

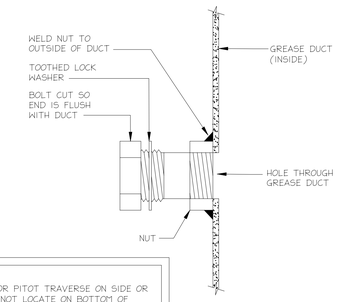


GREASE EXHAUST FAN DETAIL
NO SCALE
MExh-002



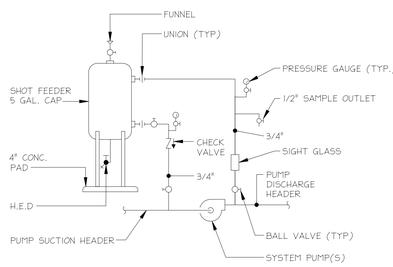
UPBLAST TYPE ROOF EXHAUST FAN DETAIL
NO SCALE
MExh-005

NOTE: CURBS AND FANS SHALL BE FROM SAME MANUFACTURER. PROVIDE WEATHERPROOF DISCONNECT BY MFR.



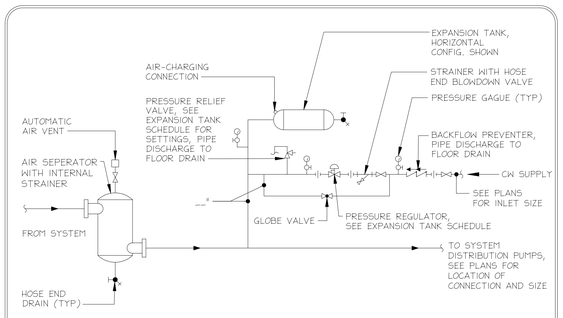
NOTE:
LOCATE OPENING FOR PITOT TRAVERSE ON SIDE OR TOP OF DUCT (DO NOT LOCATE ON BOTTOM OF DUCT.)

PITOT TUBE ACCESS PORT FOR KITCHEN EXHAUST DUCTS DETAIL
NO SCALE
MExh-001



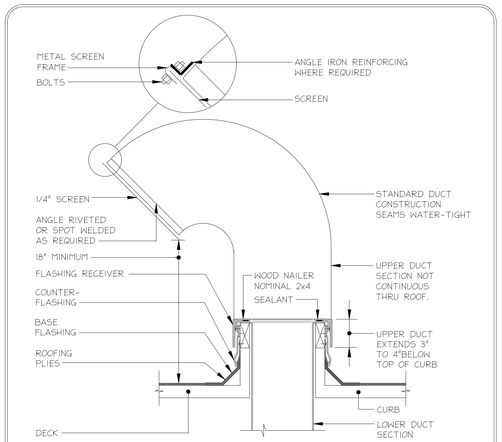
NOTE: FOR USE IN HEATING HOT WATER SYSTEM ONLY.

CHEMICAL SHOT FEEDER DETAIL
NO SCALE
MPlmb-002

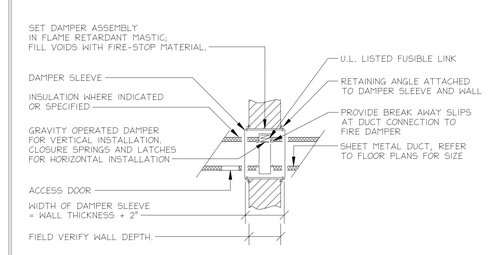


NOTE: FOR USE IN HEATING HOT WATER SYSTEM ONLY.

EXPANSION TANK, AIR SEPARATOR, MAKE-UP WATER CONNECTION PIPING DETAIL
NO SCALE
MExpan-002



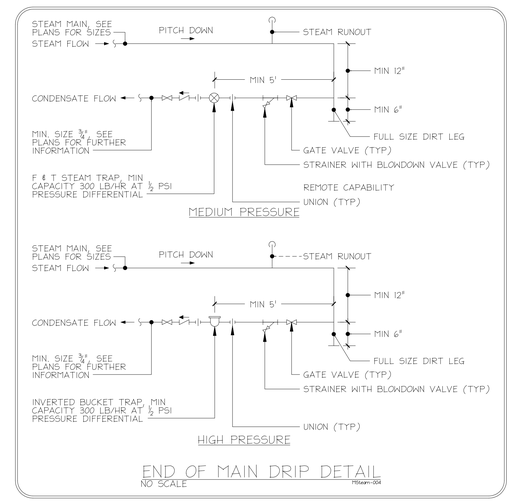
GOOSENECK DUCT DETAIL
NO SCALE
MDuct-006



HORIZONTAL AIR FLOW

FIRE DAMPER INSTALLATION DETAIL
NO SCALE
MDuct-005

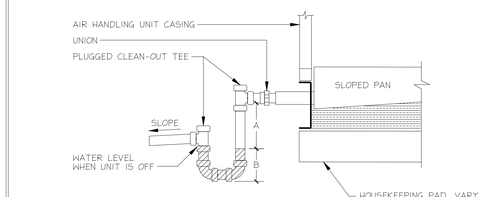
NOTE: SEE ARCH. DWGS FOR WALL FIRE RATING.



MEDIUM PRESSURE

HIGH PRESSURE

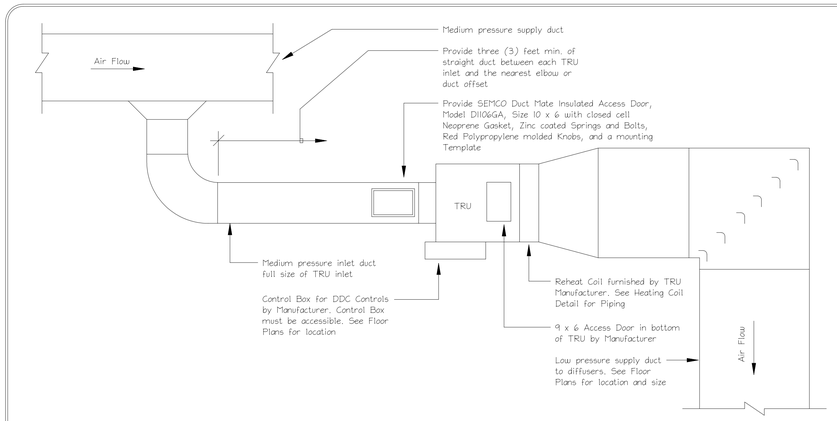
END OF MAIN DRIP DETAIL
NO SCALE
MSteam-004



SCHEDULE OF DIMENSIONS		
AHU	A	B
1	3.25"	-
2	-	-
3	4"	2"
4	2.5"	1.25"
5	2.6"	1.30"
6	2.8"	1.4"
DHU-1	4"	2"

NOTES:
1. ALL DIMENSIONS ARE MINIMUM.
2. SEE PLANS FOR PIPE DIAMETERS.

A/C CONDENSATE DRAIN TRAP DETAIL
NO SCALE
MMisc-005



TERMINAL REHEAT UNIT - DUCTWORK
NO SCALE
MSteam-004

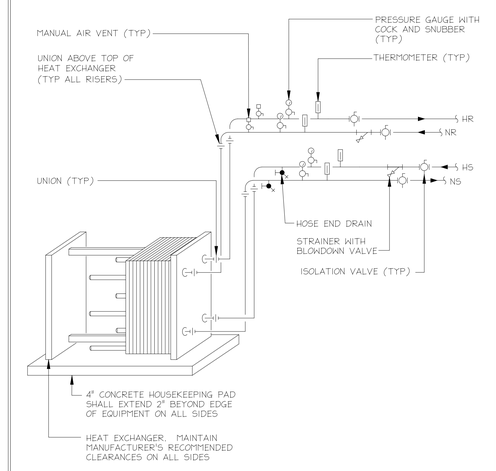


PLATE AND FRAME WATER-TO-WATER HEAT EXCHANGER DETAIL
NO SCALE
HVAC-020

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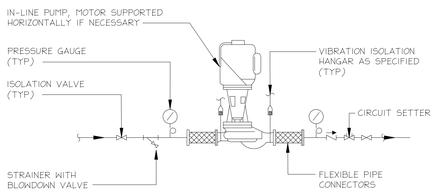
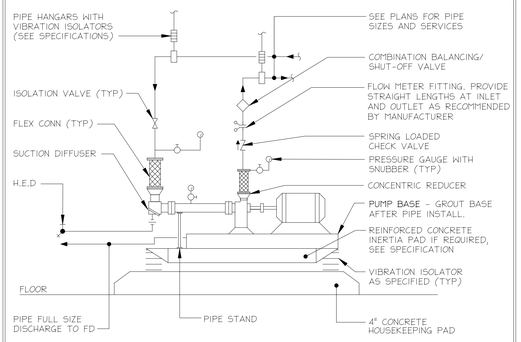
H5.0

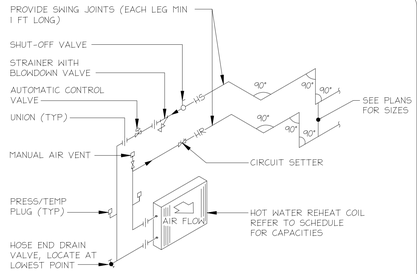


IN-LINE PUMP DETAIL
NO SCALE
PIPump-001

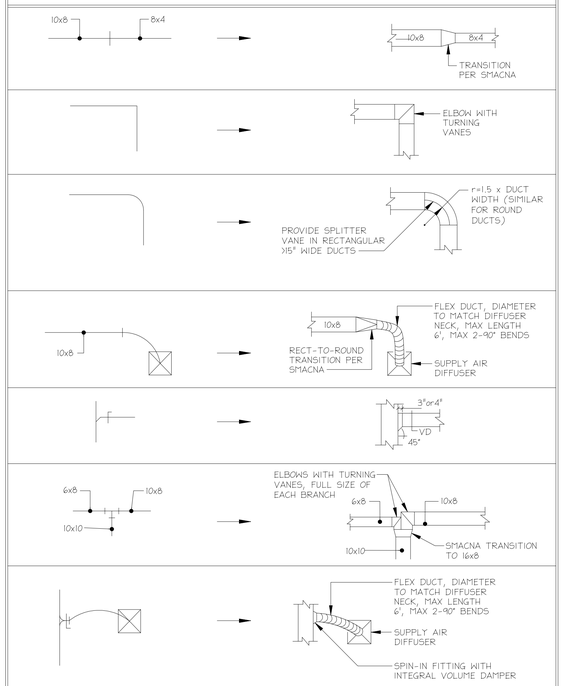


BASE MOUNTED END SUCTION PUMP SUPPORT & PIPING DETAIL
NO SCALE
PIPump-002

NOTE: A SIGN SHALL BE PLACED PROMINENTLY AT EACH PUMP SAYING "DANGER: AUTOMATICALLY STARTED EQUIPMENT. TAKE OFF LINE BEFORE CLOSING ISOLATION VALVES"

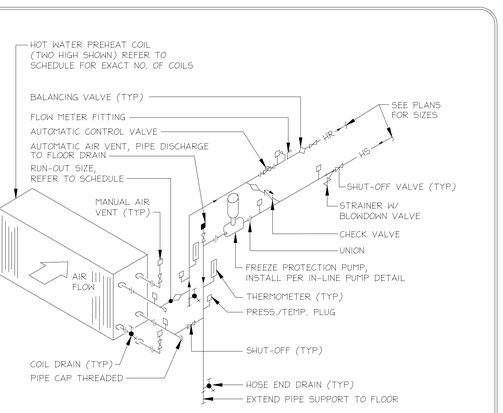


PIPING DETAIL: HW REHEAT COIL AT VAV BOX WITH 2-WAY VALVE
NO SCALE
PHCoil-006



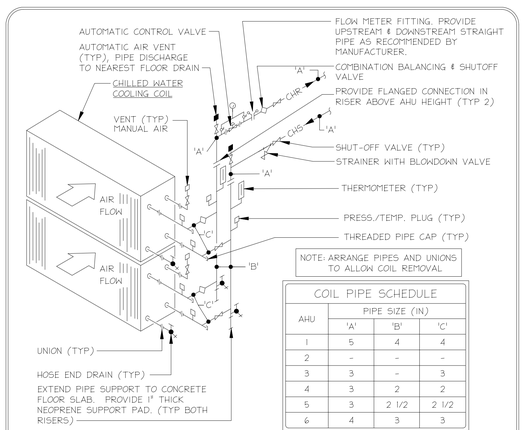
NOTE: AIR DEVICE TAKE-OFFS FROM TOP OF DUCT ARE NOT ACCEPTABLE

SINGLE-LINE DUCTWORK SYMBOLS DETAIL
NO SCALE
PDuct-005



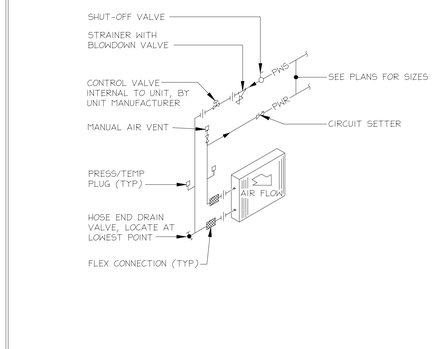
PIPING DETAIL: HW PREHEAT COILS WITH FREEZE PROTECTION PUMP
NO SCALE
PCoil-002

NOTE: ARRANGE PIPES & UNIONS TO ALLOW COIL REMOVAL.

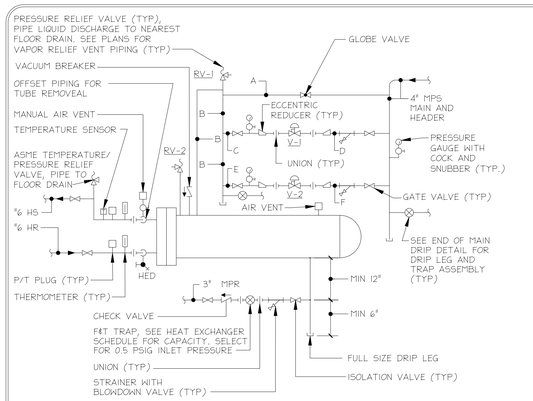


COIL PIPE SCHEDULE			
AHU	PIPE SIZE (IN.)		
	'A'	'B'	'C'
1	5	4	4
2	-	-	-
3	3	-	3
4	3	2	2
5	3	2 1/2	2 1/2
6	4	3	3

PIPING DETAIL: MULTIPLE CHW COOLING COILS
NO SCALE
PCoil-001



PIPING DETAIL: WATER COOLED AIR-CONDITIONER AND HEAT PUMP UNITS
NO SCALE
PCoil-004



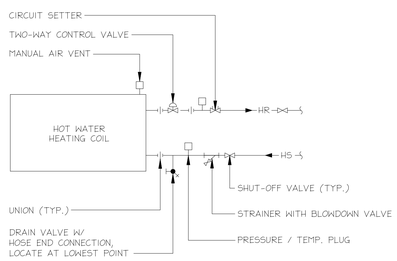
CONTROL VALVES (2)				
DESIG (1)	PRESSURES		SIZE (IN.)	CAPACITY (LB/HR.)
	INLET (PSIG.)	OUTLET (PSIG.)		
V-1	60	40	2	2100
V-2	60	40	2 1/2"	4400

PIPE SIZES	
DESIG	DIAM
A	3
B	4
C	2 1/2
D	2
E	4
F	4

RELIEF VALVES			
DESIG (1)	SIZE (INXIN)	MIN CAP.	PRESSURE SETTING
RV-1	2x3	6500	70 PSIG
RV-2	2x3	6500	70 PSIG

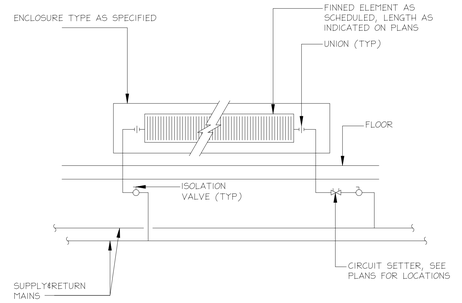
NOTES:
1. TYPICAL FOR CORRESPONDING VALVES ON HX-1 & HX-2
2. CONTROL VALVES SHALL BE PNEUMATICALLY OPERATED TEMPERATURE REGULATORS.
3. THIS DETAIL APPLICABLE ONLY TO HX-1 AND HX-2

STEAM-TO-HOT WATER HEAT EXCHANGER DETAIL
NO SCALE
PSteam-007

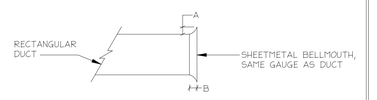


NOTE: PIPING SPECIALTIES SHALL BE FACTORY PROVIDED

PIPING DETAIL: UNIT HEATERS WITH 2-WAY VALVE
NO SCALE
PCoil-008



PIPING DETAIL: FINNED TUBE RADIATION
NO SCALE



- FOR DUCTS ≤ 24x12, A=B=2"
- FOR DUCTS ≥ 24x12 IN EITHER DIMENSION, A=B=3"

DUCT BELLMOUTH DETAIL
NO SCALE

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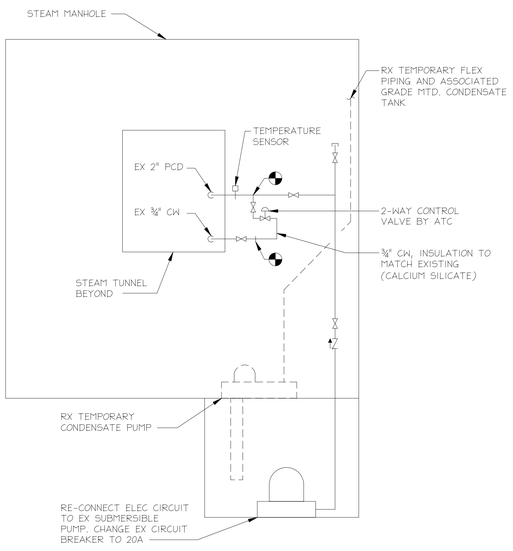
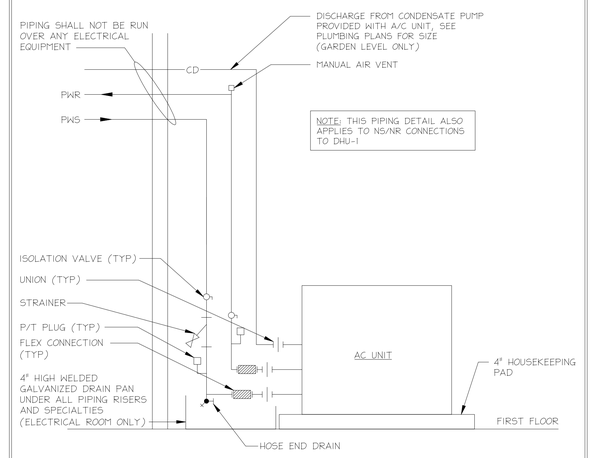


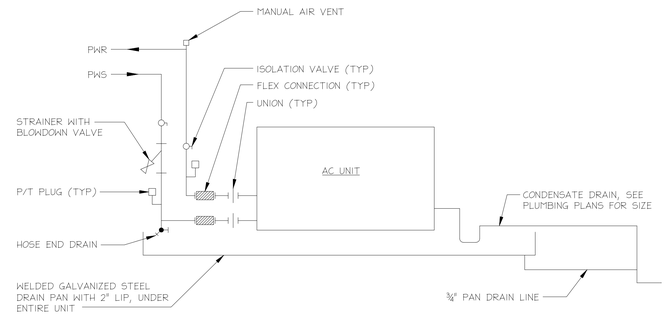
PIPING DETAIL - CONDENSATE COOLER AND PUMP IN STEAM TUNNEL

NOT TO SCALE



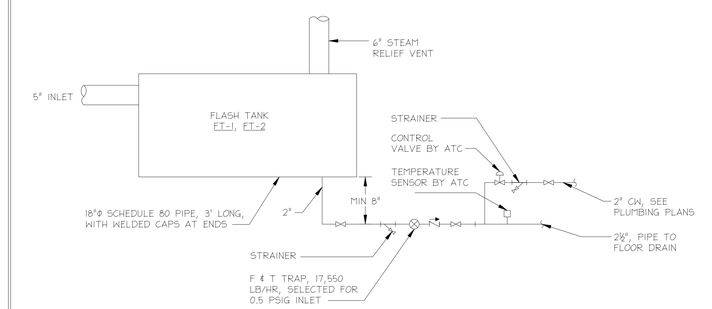
PIPING DETAIL: FLOOR MOUNTED A/C UNITS

NOT TO SCALE



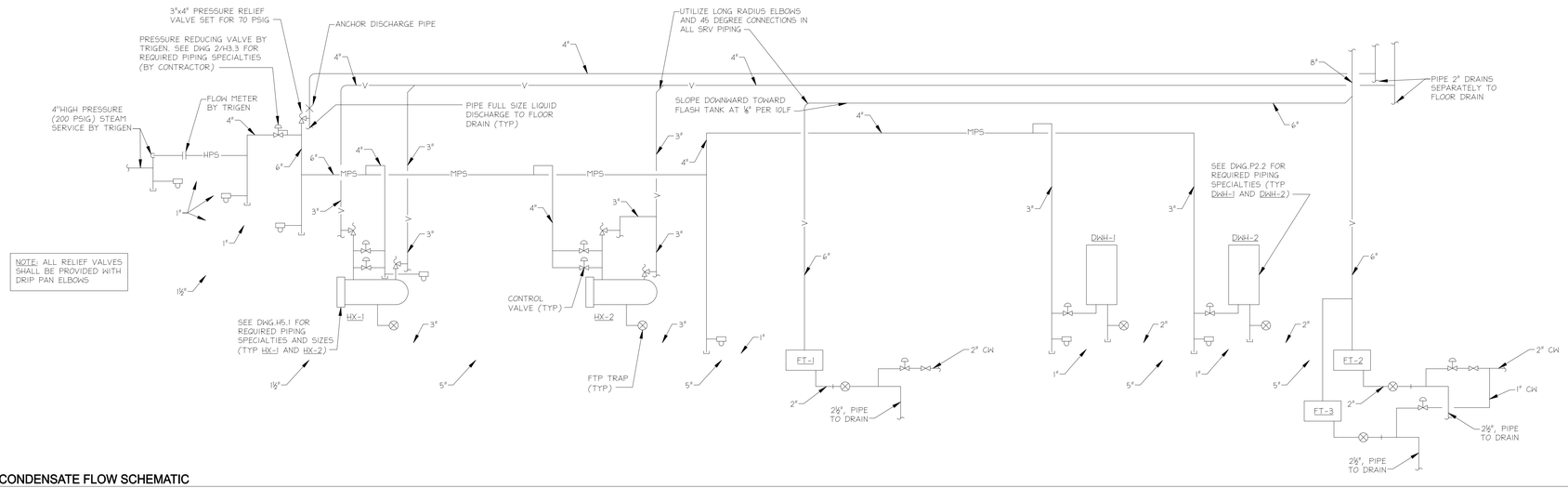
PIPING DETAIL - CEILING MOUNTED A/C UNITS

NOT TO SCALE



FLASH TANK PIPING DETAIL

NOT TO SCALE



2 STEAM/CONDENSATE FLOW SCHEMATIC

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17	4/30/09	BULLETIN #108R
16	3/30/09	BULLETIN #105
15	4/15/09	BULLETIN #99R
14	3/2/09	BULLETIN #94
13	12/16/08	BULLETIN #82
12	12/7/08	BULLETIN #80
11	11/20/08	BULLETIN #78
10	11/19/08	BULLETIN #72 (rev)
9	10/20/08	BULLETIN #69
8	9/4/08	BULLETIN #63
7	7/28/08	BULLETIN #55
6	6/23/08	BULLETIN #51
5	05/23/08	COORD. DWGS RFI 163
4	05/09/08	BULLETIN #31
3	04/14/08	CB-39
2	03/10/08	CBM-2
1	02/18/08	CBM-1
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Details, Flow Schematics

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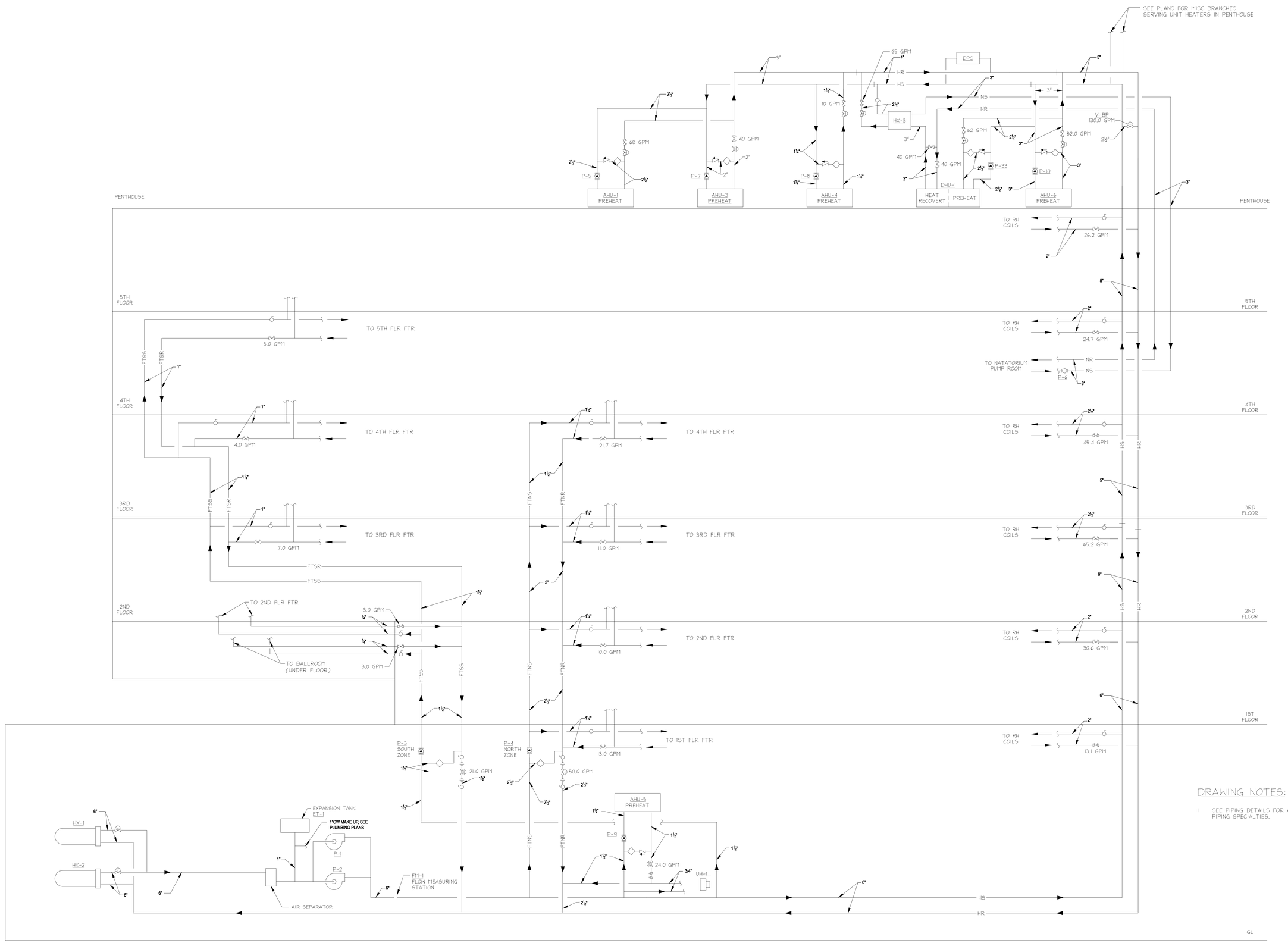
H5.2



DRAWING NOTES:

1. SEE PIPING DETAILS FOR ALL REQUIRED PIPING SPECIALTIES.

1 **HEATING HOT WATER**
NO SCALE

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MEC PROJECT NO. 0512300

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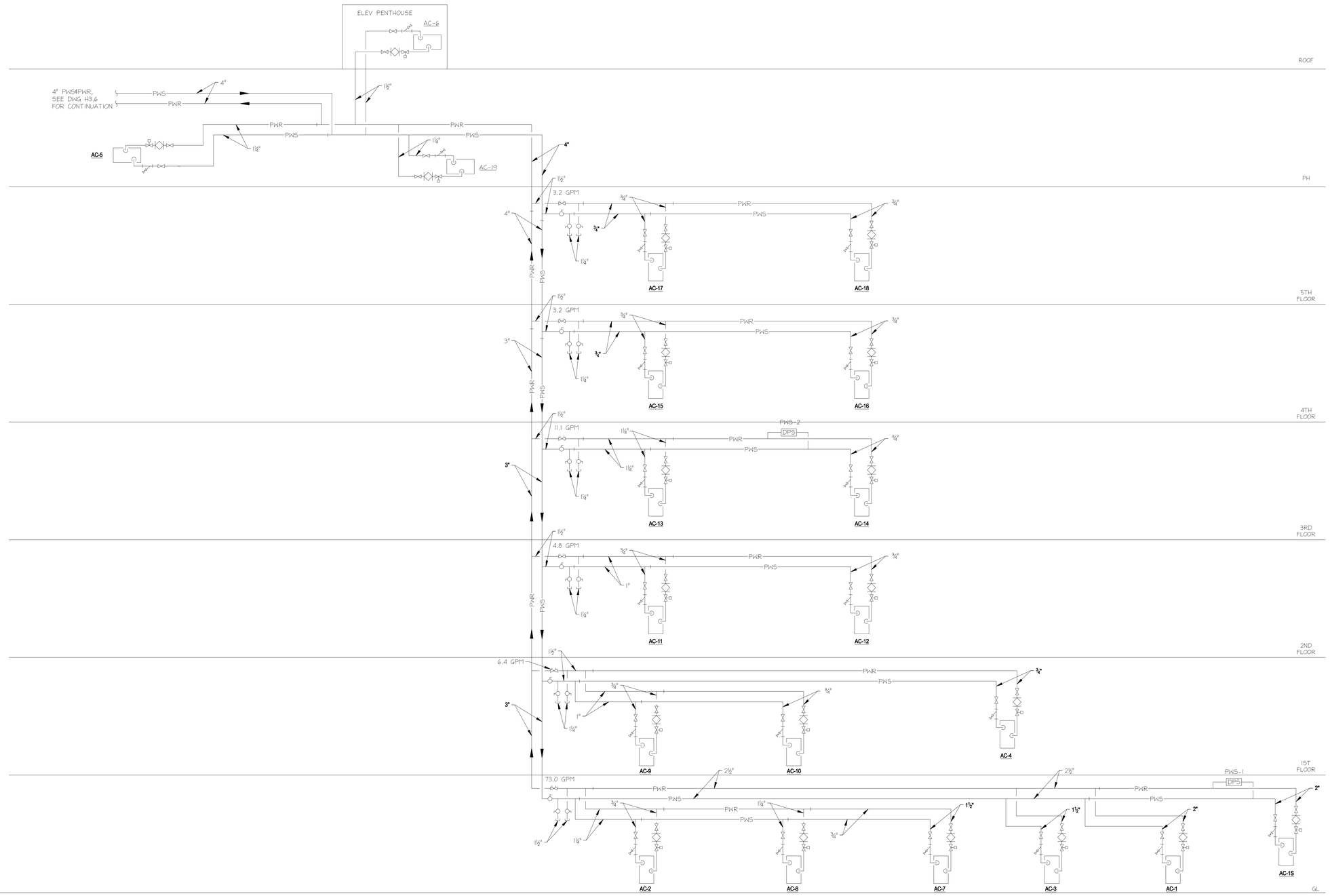

1 PROCESS WATER RISER DIAGRAM
NOT TO SCALE

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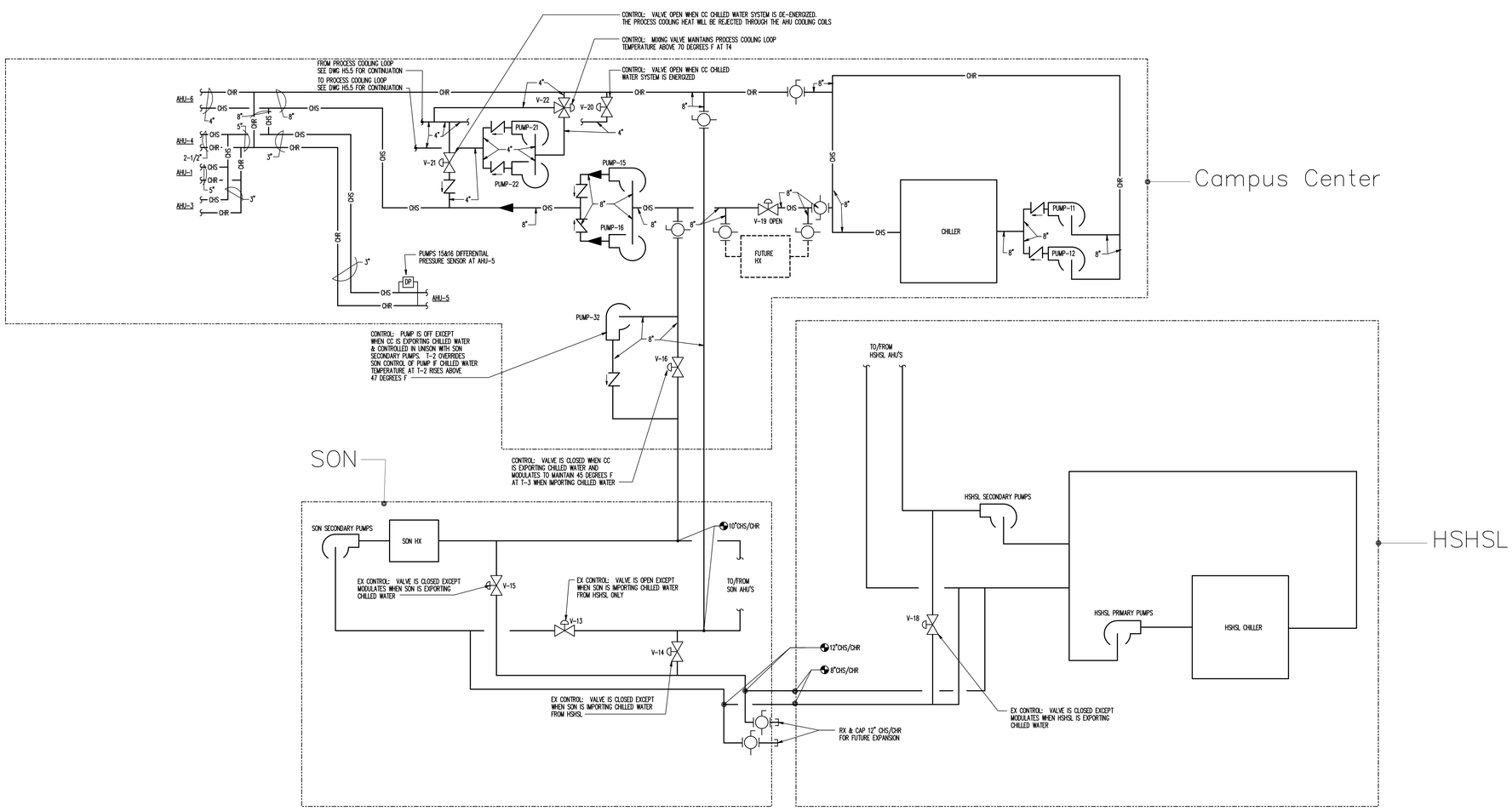
H5.4

DRAWING NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. SEE DETAILS, FLOW SCHEMATICS AND CONTROL DIAGRAMS FOR ALL ASSOCIATED VALVES, METERS, SENSORS, FITTINGS AND ETC. NOT SHOWN ON THE RISER DIAGRAM.



1 **CHILLER PLANT RISER DIAGRAM**
NONE

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Riser Diagram - Chiller Plant

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H5.5

HALLC JOB NO.: U04720

SEQUENCE OF OPERATIONS - AHU-1

1. GENERAL:

A. SEE @GENERAL REQUIREMENTS - AUTOMATIC TEMPERATURE CONTROLS" ON DWG. H6.3 FOR INFORMATION APPLICABLE TO THIS SYSTEM.

B. THE SYSTEM SHALL BE ENERGIZED AND DE-ENERGIZED THROUGH THE CCMS BY CALENDAR SCHEDULING OR MANUAL OVERRIDE.

C. HEATING AND COOLING MODES SHALL BE GOVERNED BY STATUS OF OUTDOOR AIR TEMPERATURE AS DETERMINED BY THE CCMS. AT TEMPERATURES ABOVE 50F, THE SYSTEM SHALL BE IN COOLING MODE. FOR TEMPERATURES BELOW 50F, THE SYSTEM SHALL BE IN HEATING MODE.

D. OCCUPIED/UNOCCUPIED MODES SHALL BE DETERMINED BY THE CCMS THROUGH CALENDAR SCHEDULING.

1) INITIAL CALENDAR SHALL PLACE SYSTEM IN OCCUPIED MODE FROM 7AM THROUGH MIDNIGHT ON WEEKDAYS AND SATURDAYS. ALL OTHER HOURS, INCLUDING HOLIDAYS, SHALL BE SCHEDULED AS UNOCCUPIED.

E. SEE @NAMING CONVENTION" ON THIS SHEET FOR KEY TO CONTROL COMPONENT NAMES. THESE NAMES SHALL BE UTILIZED BY THE ATC CONTRACTOR IN GRAPHIC REPRESENTATIONS OF THE SYSTEM, AND AS POINT NAMES UTILIZED IN TREND AND OTHER CCMS REPORTS.

2. OCCUPIED MODE:

A. UPON A COMMAND FROM THE CCMS THROUGH THE LOCAL DIGITAL CONTROL PANEL (DCP), THE SYSTEM SHALL BE ENERGIZED:

1) SMOKE DAMPERS SDR-SA-1 AND SDR-RA-1 SHALL OPEN.
2) DAMPER D-MIN-1 AND D-MA-1 SHALL OPEN.
3) DAMPER D-REL-1 AND D-MAX-1 SHALL BE CLOSED.
4) EF-5 SHALL BE ENERGIZED.
5) FANS SF-1 AND RF-1 SHALL RAMP UP FROM MINIMUM SPEED TO MEET THEIR SETPOINTS AS DESCRIBED BELOW.
6) PREHEAT AND COOLING COIL VALVES SHALL OPERATE AS DESCRIBED BELOW.

B. SYSTEM SHALL OPERATE UNDER HEATING OR COOLING MODE AS APPROPRIATE, AS DESCRIBED BELOW.

3. UNOCCUPIED MODE:

A. UPON A COMMAND FROM THE CCMS, THE SYSTEM SHALL BE DE-ENERGIZED:

1) FANS SHALL BE DE-ENERGIZED.
2) AFTER TWO MINUTES, ALL DAMPERS EXCEPT D-MA-1 SHALL CLOSE.
3) VALVES V-PH-1 AND V-CC-1 SHALL BE DRIVEN OPEN.

B. IN HEATING MODE, THE SYSTEM SHALL BE ENERGIZED AS DESCRIBED ABOVE UPON SENSING A SPACE TEMPERATURE OF 60F (ADJUSTABLE) OR BELOW ANYWHERE IN THE AREA SERVED BY THE SYSTEM, AS SENSED BY LOCAL ROOM TEMPERATURE SENSORS.

C. IN COOLING MODE, THE SYSTEM SHALL BE ENERGIZED AS DESCRIBED ABOVE UPON SENSING A SPACE TEMPERATURE OF 80F (ADJUSTABLE) OR ABOVE ANYWHERE IN THE AREA SERVED BY THE SYSTEM, AS SENSED BY LOCAL ROOM TEMPERATURE SENSORS.

D. UPON BEING ENERGIZED, THE SYSTEM SHALL OPERATE AS DESCRIBED UNDER HEATING OR COOLING MODE, AS APPROPRIATE, UNTIL THE NIGHT SETBACK TEMPERATURE IS REACHED IN ALL ZONES SERVED.

4. MORNING WARMUP/COOLDOWN:

A. AN OPTIMAL START PROGRAM SHALL ENERGIZE THE SYSTEM AT THE TIME NECESSARY TO BRING ALL SERVED ZONES TO OCCUPIED TEMPERATURE SETPOINTS.

B. UPON STARTUP, THE FOLLOWING SHALL OCCUR:

1) SMOKE DAMPERS SDR-SA-1 AND SDR-RA-1 SHALL OPEN.
2) DAMPER D-MA-1 SHALL OPEN.
3) DAMPER D-REL-1, D-MIN-1 AND D-MAX-1 SHALL BE CLOSED.
4) FAN EF-5 SHALL REMAIN OFF.
5) FANS SF-1 AND RF-1 SHALL RAMP UP FROM MINIMUM SPEED:
   (1) SF-1 SHALL MEET ITS STATIC PRESSURE SETPOINT AS DESCRIBED BELOW.
   (2) RF-1 AIRFLOW SHALL MATCH SF-1 AIRFLOW.
6) PREHEAT AND COOLING COIL VALVES SHALL OPERATE AS DESCRIBED UNDER HEATING/COOLING MODES.
7) RETURN AIR CONTROL DAMPERS SHALL OPERATE AS DESCRIBED BELOW.

C. UPON REACHING OCCUPIED SETPOINT IN ALL ZONES SERVED, THE SYSTEM SHALL REVERT TO OCCUPIED MODE OF OPERATION.

5. COOLING MODE:

A. VFD SHALL MODULATE THE SPEED OF SUPPLY FAN TO MEET THE SETPOINT OF SPS-SA-1-1 (1.0 IN.W.G., ADJUSTABLE). SETPOINT TO BE VERIFIED BY TESTING & BALANCING CONTRACTOR.

B. AIRFLOW AT SUPPLY AND RETURN FANS SHALL BE MONITORED BY INDICATED AIRFLOW MONITORING STATIONS AT FAN INLETS.

C. VFD SHALL MODULATE THE SPEED OF RETURN FAN SUCH THAT RETURN CFM = (SUPPLY CFM - 3,075).

D. PREHEAT COIL CONTROL VALVE SHALL BE CLOSED.

E. COOLING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN UNIT DISCHARGE TEMPERATURE OF 55F (ADJUSTABLE) AS SENSED BY T-SA-1.

F. ECONOMIZER: AT OUTDOOR AIR TEMPERATURES LESS THAN 65F, D-MAX-1 AND D-REL-1 SHALL MODULATE TOGETHER WITH COOLING COIL CONTROL VALVE TO MAINTAIN UNIT DISCHARGE AIR TEMPERATURE SETPOINT.

G. VENTILATION AIR: UPON SENSING CO2 LEVELS HIGHER THAN SETPOINT AT ANY OF THE INDICATED SPACE SENSORS FOR 15 MINUTES, D-MAX-1 AND D-REL-1 SHALL MODULATE OPEN. AFTER CO2 SETPOINT HAS BEEN MAINTAINED FOR ONE HOUR, DAMPERS SHALL REVERT TO NORMAL CONTROL.

6. HEATING MODE:

A. COOLING COIL IS UTILIZED BY THE PROCESS WATER LOOP TO REJECT HEAT FROM WATER-COOLED UNITS IN THE BUILDING. THEREFORE, V-CC-1 SHALL BE OVERRIDDEN OPEN AT ALL TIMES.

B. VALVE V-PH-1 SHALL MODULATE TO MAINTAIN UNIT DISCHARGE TEMPERATURE OF 55F (ADJUSTABLE) AS SENSED BY T-SA-1.

C. WHEN OUTDOOR AIR TEMPERATURE IS LESS THAN 40F, PUMP P-5 SHALL BE ENERGIZED.

D. IF SUPPLY AIR TEMPERATURE RISES ABOVE 60F, D-MAX-1 AND D-REL-1 SHALL MODULATE TO MAINTAIN SETPOINT.

7. SAFETIES:

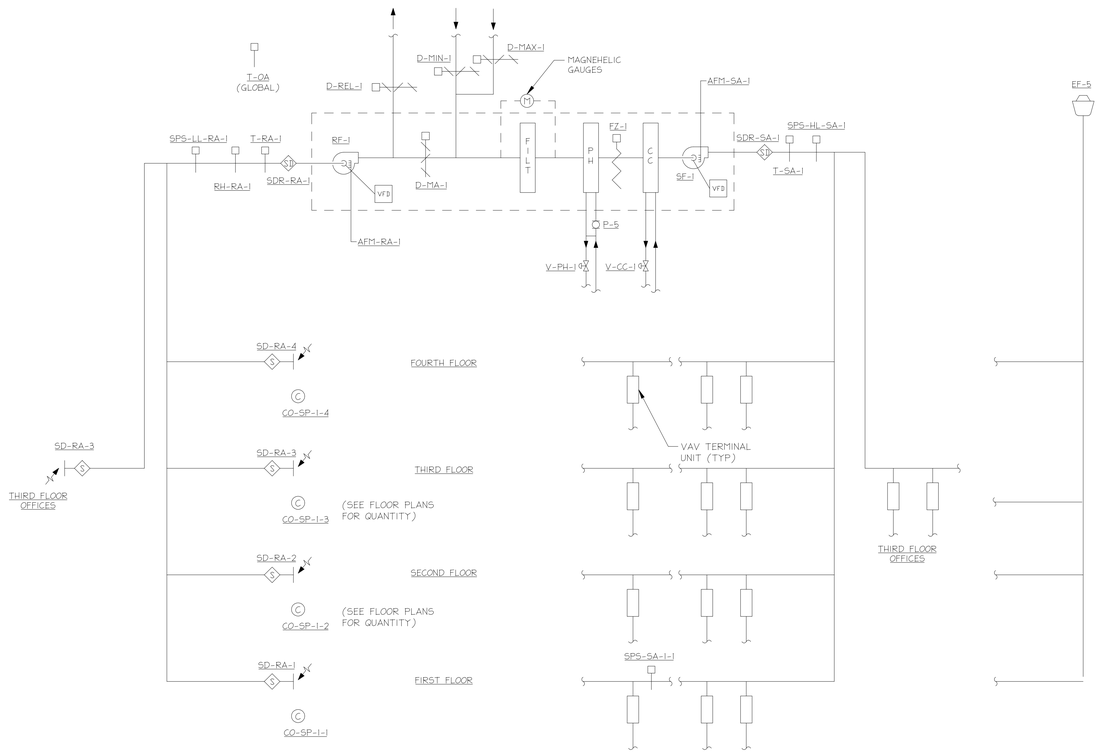
A. IF THE PRODUCTS OF COMBUSTION ARE DETECTED BY ANY SMOKE DETECTOR IN THE SYSTEM, A TROUBLE SIGNAL SHALL BE SENT TO THE FIRE ALARM SYSTEM, AN ALARM SHALL BE SENT TO THE CCMS, AND AHU-1 SHALL BE DE-ENERGIZED AS DESCRIBED ABOVE UNDER UNOCCUPIED MODE.

B. IF TEMPERATURE LESS THAN 35F IS SENSED BY FREEZESTAT, A CRITICAL ALARM SHALL BE SENT TO THE CCMS, PREHEAT VALVE SHALL BE DRIVEN OPEN, AND AHU-1 SHALL BE DE-ENERGIZED. PREHEAT PUMP SHALL CONTINUE TO OPERATE.

C. ALL FANS AND THE PREHEAT PUMP SHALL BE MONITORED FOR STATUS. UPON FAILURE, A CRITICAL ALARM SHALL BE SENT TO THE CCMS.

D. IF UNIT DISCHARGE STATIC PRESSURE RISES ABOVE SETPOINT OF SPS-HL-SA-1, SYSTEM SHALL BE DE-ENERGIZED AND A CRITICAL ALARM SHALL BE SENT TO THE CCMS.

E. IF UNIT INLET STATIC PRESSURE FALLS BELOW SETPOINT OF SPS-LL-RA-1, SYSTEM SHALL BE DE-ENERGIZED AND A CRITICAL ALARM SHALL BE SENT TO THE CCMS.

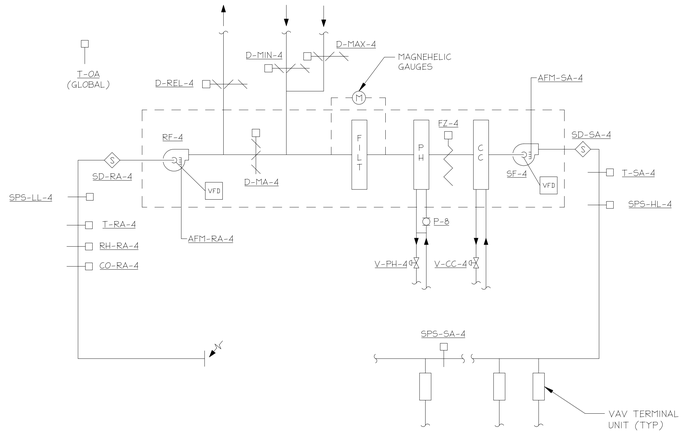


1 AUTOMATIC TEMPERATURE CONTROLS DIAGRAM - AHU-1 (MULTIPURPOSE)
NO SCALE

ATC COMPONENT NAMING CONVENTION
(APPLICABLE TO AHU'S)

X-X-X-X

- FLOOR (IF APPLICABLE)
- AHU
- SERVICE:
  - SA =SUPPLY
  - RA =RETURN
  - EA =EXHAUST
  - MA =MIXED AIR
  - REL =RELIEF
  - MIN =MINIMUM OUTDOOR AIR
  - MAX =MAXIMUM OUTDOOR AIR
  - OA =OUTDOOR AIR
  - PH =PREHEAT
  - CC =COOLING
  - SP =SPACE
  - HL =HIGH LIMIT
  - LL =LOW LIMIT
- COMPONENTS:
  - T =TEMPERATURE SENSOR
  - RH =RELATIVE HUMIDITY SENSOR
  - D =DAMPER
  - V =VALVE
  - FZ =FREEZESTAT
  - CO2 =CARBON DIOXIDE SENSOR
  - SDR =SMOKE DAMPER
  - SD =SMOKE DETECTOR
  - CO2 =CARBON DIOXIDE SENSOR
  - SPS =STATIC PRESSURE SENSOR
  - AFM =AIR FLOW MONITORING STATION



2 AUTOMATIC TEMPERATURE CONTROLS DIAGRAM - AHU-4 (FITNESS CTR)
NO SCALE

SEQUENCE OF OPERATIONS - AHU-4

1. GENERAL:

A. SEE @GENERAL REQUIREMENTS - AUTOMATIC TEMPERATURE CONTROLS" ON DWG. H6.3 FOR INFORMATION APPLICABLE TO THIS SYSTEM.

B. THE SYSTEM SHALL BE ENERGIZED AND DE-ENERGIZED THROUGH THE CCMS BY CALENDAR SCHEDULING OR MANUAL OVERRIDE.

C. HEATING AND COOLING MODES SHALL BE GOVERNED BY STATUS OF OUTDOOR AIR TEMPERATURE AS DETERMINED BY THE CCMS. AT TEMPERATURES ABOVE 50F, THE SYSTEM SHALL BE IN COOLING MODE. FOR TEMPERATURES BELOW 50F, THE SYSTEM SHALL BE IN HEATING MODE.

D. OCCUPIED/UNOCCUPIED MODES SHALL BE DETERMINED BY THE CCMS THROUGH CALENDAR SCHEDULING.

1) INITIAL CALENDAR SHALL PLACE SYSTEM IN OCCUPIED MODE FROM 7AM THROUGH MIDNIGHT, SEVEN DAYS PER WEEK. ALL OTHER HOURS, INCLUDING HOLIDAYS, SHALL BE SCHEDULED AS UNOCCUPIED.

E. SEE @NAMING CONVENTION" ON DWG. THIS SHEET FOR KEY TO CONTROL COMPONENT NAMES. THESE NAMES SHALL BE UTILIZED BY THE ATC CONTRACTOR IN GRAPHIC REPRESENTATIONS OF THE SYSTEM, AND AS POINT NAMES UTILIZED IN TREND AND OTHER CCMS REPORTS.

2. OCCUPIED MODE:

A. UPON A COMMAND FROM THE CCMS THROUGH THE LOCAL DIGITAL CONTROL PANEL (DCP), THE SYSTEM SHALL BE ENERGIZED:

1) DAMPER D-MIN-4 AND D-MA-4 SHALL OPEN.
2) DAMPER D-REL-4 AND D-MAX-4 SHALL BE CLOSED.
3) FANS SF-4 AND RF-4 SHALL RAMP UP FROM MINIMUM SPEED TO MEET THEIR SETPOINTS AS DESCRIBED BELOW.
4) PREHEAT AND COOLING COIL VALVES SHALL OPERATE AS DESCRIBED BELOW.

B. SYSTEM SHALL OPERATE UNDER HEATING OR COOLING MODE AS APPROPRIATE, AS DESCRIBED BELOW.

3. UNOCCUPIED MODE:

A. UPON A COMMAND FROM THE CCMS, THE SYSTEM SHALL BE DE-ENERGIZED:

1) FANS SHALL BE DE-ENERGIZED.
2) AFTER TWO MINUTES, ALL DAMPERS EXCEPT D-MA-4 SHALL CLOSE.
3) VALVES V-PH-4 AND V-CC-4 SHALL BE DRIVEN OPEN.

B. IN HEATING MODE, THE SYSTEM SHALL BE ENERGIZED AS DESCRIBED ABOVE UPON SENSING A SPACE TEMPERATURE OF 60F (ADJUSTABLE) OR BELOW ANYWHERE IN THE AREA SERVED BY THE SYSTEM, AS SENSED BY LOCAL ROOM TEMPERATURE SENSORS.

C. IN COOLING MODE, THE SYSTEM SHALL BE ENERGIZED AS DESCRIBED ABOVE UPON SENSING A SPACE TEMPERATURE OF 80F (ADJUSTABLE) OR ABOVE ANYWHERE IN THE AREA SERVED BY THE SYSTEM, AS SENSED BY LOCAL ROOM TEMPERATURE SENSORS.

D. UPON BEING ENERGIZED, THE SYSTEM SHALL OPERATE AS DESCRIBED UNDER HEATING OR COOLING MODE, AS APPROPRIATE, UNTIL THE NIGHT SETBACK TEMPERATURE IS REACHED IN ALL ZONES SERVED.

4. MORNING WARMUP/COOLDOWN:

A. AN OPTIMAL START PROGRAM SHALL ENERGIZE THE SYSTEM AT THE TIME NECESSARY TO BRING ALL SERVED ZONES TO OCCUPIED TEMPERATURE SETPOINTS.

B. UPON STARTUP, THE FOLLOWING SHALL OCCUR:

1) DAMPER D-MA-4 SHALL OPEN.
2) DAMPER D-REL-4, D-MIN-4 AND D-MAX-4 SHALL BE CLOSED.
3) FANS SF-4 AND RF-4 SHALL RAMP UP FROM MINIMUM SPEED:
   (1) SF-4 SHALL MEET ITS STATIC PRESSURE SETPOINT AS DESCRIBED BELOW.
   (2) RF-4 AIRFLOW SHALL MATCH SF-4 AIRFLOW.
4) PREHEAT AND COOLING COIL VALVES SHALL OPERATE AS DESCRIBED UNDER HEATING/COOLING MODES.

C. UPON REACHING OCCUPIED SETPOINT IN ALL ZONES SERVED, THE SYSTEM SHALL REVERT TO OCCUPIED MODE OF OPERATION.

5. COOLING MODE:

A. VFD SHALL MODULATE THE SPEED OF SUPPLY FAN TO MEET THE SETPOINT OF SPS-SA-4 (1.0 IN.W.G., ADJUSTABLE). SETPOINT TO BE VERIFIED BY TESTING & BALANCING CONTRACTOR.

B. AIRFLOW AT SUPPLY AND RETURN FANS SHALL BE MONITORED BY INDICATED AIRFLOW MONITORING STATIONS AT FAN INLETS.

C. VFD SHALL MODULATE THE SPEED OF RETURN FAN SUCH THAT RETURN CFM = (SUPPLY CFM - 720).

D. PREHEAT COIL CONTROL VALVE SHALL BE CLOSED.

E. COOLING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN UNIT DISCHARGE TEMPERATURE OF 55F (ADJUSTABLE) AS SENSED BY T-SA-4.

F. ECONOMIZER: AT OUTDOOR AIR TEMPERATURES LESS THAN 65F, D-MAX-4 AND D-REL-4 SHALL MODULATE TOGETHER WITH COOLING COIL CONTROL VALVE TO MAINTAIN UNIT DISCHARGE AIR TEMPERATURE SETPOINT.

G. VENTILATION AIR: UPON SENSING CO2 LEVELS HIGHER THAN SETPOINT AT RETURN AIR SENSOR FOR 15 MINUTES, D-MAX-4 AND D-REL-4 SHALL MODULATE OPEN. AFTER CO2 SETPOINT HAS BEEN MAINTAINED FOR ONE HOUR, DAMPERS SHALL REVERT TO NORMAL CONTROL.

6. HEATING MODE:

A. COOLING COIL IS UTILIZED BY THE PROCESS WATER LOOP TO REJECT HEAT FROM WATER-COOLED UNITS IN THE BUILDING. THEREFORE, V-CC-4 SHALL BE OVERRIDDEN OPEN AT ALL TIMES.

B. VALVE V-PH-4 SHALL MODULATE TO MAINTAIN UNIT DISCHARGE TEMPERATURE OF 55F (ADJUSTABLE) AS SENSED BY T-SA-4.

C. WHEN OUTDOOR AIR TEMPERATURE IS LESS THAN 40F, PUMP P-8 SHALL BE ENERGIZED.

D. IF SUPPLY AIR TEMPERATURE RISES ABOVE 60F, D-MAX-4 AND D-REL-4 SHALL MODULATE TO MAINTAIN SETPOINT.

7. SAFETIES:

A. IF THE PRODUCTS OF COMBUSTION ARE DETECTED BY ANY SMOKE DETECTOR IN THE SYSTEM, A TROUBLE SIGNAL SHALL BE SENT TO THE FIRE ALARM SYSTEM, AN ALARM SHALL BE SENT TO THE CCMS, AND AHU-4 SHALL BE DE-ENERGIZED AS DESCRIBED ABOVE UNDER UNOCCUPIED MODE.

B. IF TEMPERATURE LESS THAN 35F IS SENSED BY FREEZESTAT, A CRITICAL ALARM SHALL BE SENT TO THE CCMS, PREHEAT VALVE SHALL BE DRIVEN OPEN, AND AHU-4 SHALL BE DE-ENERGIZED. PREHEAT PUMP SHALL CONTINUE TO OPERATE.

C. ALL FANS AND THE PREHEAT PUMP SHALL BE MONITORED FOR STATUS. UPON FAILURE, A CRITICAL ALARM SHALL BE SENT TO THE CCMS.

D. IF UNIT DISCHARGE STATIC PRESSURE RISES ABOVE SETPOINT OF SPS-HL-SA-4, SYSTEM SHALL BE DE-ENERGIZED AND A CRITICAL ALARM SHALL BE SENT TO THE CCMS.

E. IF UNIT INLET STATIC PRESSURE FALLS BELOW SETPOINT OF SPS-LL-RA-4, SYSTEM SHALL BE DE-ENERGIZED AND A CRITICAL ALARM SHALL BE SENT TO THE CCMS.

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MEC PROJECT NO. 0512300

Rev.	Date:	Comment:
20	1/29/10	RECORD DRAWING
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4	05/09/08	BULLETIN #31
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2	03/10/08	CBM-2
1	02/18/08	CBM-1
0	05/02/07	For Construction

Issued: May 2, 2007

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Automatic Temp. Controls

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UMB PROJECT NO. 99-311
WTW PROJECT NO. 70-4091
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H6.0

SEQUENCE OF OPERATIONS – AHU-3 (BASE BID)

1. GENERAL:

A. SEE ◎GENERAL REQUIREMENTS – AUTOMATIC TEMPERATURE CONTROLS• ON DWG. H6.3 FOR INFORMATION APPLICABLE TO THIS SYSTEM.

B. THE SYSTEM SHALL BE ENERGIZED AND DE-ENERGIZED THROUGH THE CCMS BY CALENDAR SCHEDULING OR MANUAL OVERRIDE.

C. HEATING AND COOLING MODES SHALL BE GOVERNED BY STATUS OF OUTDOOR AIR TEMPERATURE AS DETERMINED BY THE CCMS. AT TEMPERATURES ABOVE 50F, THE SYSTEM SHALL BE IN COOLING MODE. FOR TEMPERATURES BELOW 50F, THE SYSTEM SHALL BE IN HEATING MODE.

D. OCCUPIED/UNOCCUPIED MODES SHALL BE DETERMINED BY THE CCMS THROUGH CALENDAR SCHEDULING.

1) INITIAL CALENDAR SHALL PLACE SYSTEM IN OCCUPIED MODE FROM 7AM THROUGH MIDNIGHT SEVEN DAYS PER WEEK. ALL OTHER HOURS, INCLUDING HOLIDAYS, SHALL BE SCHEDULED AS UNOCCUPIED.

E. SEE ◎NAMING CONVENTION• ON DWG. H6.0 FOR KEY TO CONTROL COMPONENT NAMES. THESE NAMES SHALL BE UTILIZED BY THE ATC CONTRACTOR IN GRAPHIC REPRESENTATIONS OF THE SYSTEM, AND AS POINT NAMES UTILIZED IN TREND AND OTHER CCMS REPORTS.

2. OCCUPIED MODE:

A. UPON A COMMAND FROM THE CCMS THROUGH THE LOCAL DIGITAL CONTROL PANEL (DCP), THE SYSTEM SHALL BE ENERGIZED:

1) DAMPER D-OA-3 SHALL OPEN.
2) EF-8 SHALL BE ENERGIZED.
3) FAN SF-3 SHALL RAMP UP FROM MINIMUM SPEED TO MEET ITS SETPOINT AS DESCRIBED BELOW.
4) PREHEAT AND COOLING COIL VALVES SHALL OPERATE AS DESCRIBED BELOW.

B. SYSTEM SHALL OPERATE UNDER HEATING OR COOLING MODE AS APPROPRIATE, AS DESCRIBED BELOW.

3. UNOCCUPIED MODE:

A. UPON A COMMAND FROM THE CCMS, THE SYSTEM SHALL BE DE-ENERGIZED:

1) FANS SHALL BE DE-ENERGIZED.
2) AFTER TWO MINUTES, ALL DAMPERS SHALL CLOSE.
3) VALVES V-PH-3 AND V-CC-3 SHALL BE DRIVEN OPEN.

B. IN HEATING MODE, THE SYSTEM SHALL BE ENERGIZED AS DESCRIBED ABOVE UPON SENSING A SPACE TEMPERATURE OF 60F (ADJUSTABLE) OR BELOW ANYWHERE IN THE AREA SERVED BY THE SYSTEM, AS SENSED BY LOCAL ROOM TEMPERATURE SENSORS.

C. IN COOLING MODE, THE SYSTEM SHALL BE ENERGIZED AS DESCRIBED ABOVE UPON SENSING A SPACE TEMPERATURE OF 80F (ADJUSTABLE) OR ABOVE ANYWHERE IN THE AREA SERVED BY THE SYSTEM, AS SENSED BY LOCAL ROOM TEMPERATURE SENSORS.

D. UPON BEING ENERGIZED, THE SYSTEM SHALL OPERATE AS DESCRIBED UNDER HEATING OR COOLING MODE, AS APPROPRIATE, UNTIL THE NIGHT SETBACK TEMPERATURE IS REACHED IN ALL ZONES SERVED.

4. MORNING WARMUP/COOLDOWN:

A. AN OPTIMAL START PROGRAM SHALL ENERGIZE THE SYSTEM AT THE TIME NECESSARY TO BRING ALL SERVED ZONES TO OCCUPIED TEMPERATURE SETPOINTS.

B. UPON STARTUP, THE FOLLOWING SHALL OCCUR:

1) DAMPER D-OA-3 SHALL OPEN.
2) FAN EF-8 SHALL BE ENERGIZED.
3) FAN SF-3 SHALL RAMP UP FROM MINIMUM SPEED:
   (1) SF-1 SHALL MEET ITS STATIC PRESSURE SETPOINT AS DESCRIBED BELOW.
4) PREHEAT AND COOLING COIL VALVES SHALL OPERATE AS DESCRIBED UNDER HEATING/COOLING MODES.

C. UPON REACHING OCCUPIED SETPOINT IN ALL ZONES SERVED, THE SYSTEM SHALL REVERT TO OCCUPIED MODE OF OPERATION.

5. COOLING MODE:

A. VFD SHALL MODULATE THE SPEED OF SUPPLY FAN TO MEET THE SETPOINT OF SPS-SA-3-3 (1.0 IN.W.G., ADJUSTABLE). SETPOINT TO BE VERIFIED BY TESTING ¢ BALANCING CONTRACTOR.

B. AIRFLOW AT SUPPLY FAN SHALL BE MONITORED BY INDICATED AIRFLOW MONITORING STATIONS AT FAN INLET.

C. PREHEAT COIL CONTROL VALVE SHALL BE CLOSED.

D. COOLING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN UNIT DISCHARGE TEMPERATURE OF 55F (ADJUSTABLE) AS SENSED BY T-SA-3.

6. HEATING MODE:

A. COOLING COIL IS UTILIZED BY THE PROCESS WATER LOOP TO REJECT HEAT FROM WATER-COOLED UNITS IN THE BUILDING. THEREFORE, V-CC-1 SHALL BE OVERRIDDEN OPEN AT ALL TIMES.

B. VALVE V-PH-3 SHALL MODULATE TO MAINTAIN UNIT DISCHARGE TEMPERATURE OF 55F (ADJUSTABLE) AS SENSED BY T-SA-3.

C. WHEN OUTDOOR AIR TEMPERATURE IS LESS THAN 40F, PUMP P-7 SHALL BE ENERGIZED.

7. SAFETIES:

A. IF THE PRODUCTS OF COMBUSTION ARE DETECTED BY ANY SMOKE DETECTOR IN THE SYSTEM, A TROUBLE SIGNAL SHALL BE SENT TO THE FIRE ALARM SYSTEM, AN ALARM SHALL BE SENT TO THE CCMS, AND AHU-3 SHALL BE DE-ENERGIZED AS DESCRIBED ABOVE UNDER UNOCCUPIED MODE.

B. IF TEMPERATURE LESS THAN 35F IS SENSED BY FREEZESTAT, A CRITICAL ALARM SHALL BE SENT TO THE CCMS, PREHEAT VALVE SHALL BE DRIVEN OPEN, AND AHU-3 SHALL BE DE-ENERGIZED. PREHEAT PUMP SHALL CONTINUE TO OPERATE.

C. ALL FANS AND THE PREHEAT PUMP SHALL BE MONITORED FOR STATUS. UPON FAILURE, A CRITICAL ALARM SHALL BE SENT TO THE CCMS.

D. IF UNIT DISCHARGE STATIC PRESSURE RISES ABOVE SETPOINT OF SPS-HL-SA-3, SYSTEM SHALL BE DE-ENERGIZED AND A CRITICAL ALARM SHALL BE SENT TO THE CCMS.

SEQUENCE OF OPERATIONS – AHU-3 (ALT #9)

1. GENERAL:

A. SEE ◎GENERAL REQUIREMENTS – AUTOMATIC TEMPERATURE CONTROLS• ON DWG. H6.3 FOR INFORMATION APPLICABLE TO THIS SYSTEM.

B. THE SYSTEM SHALL BE ENERGIZED AND DE-ENERGIZED THROUGH THE CCMS BY CALENDAR SCHEDULING OR MANUAL OVERRIDE.

C. HEATING AND COOLING MODES SHALL BE GOVERNED BY STATUS OF OUTDOOR AIR TEMPERATURE AS DETERMINED BY THE CCMS. AT TEMPERATURES ABOVE 50F, THE SYSTEM SHALL BE IN COOLING MODE. FOR TEMPERATURES BELOW 50F, THE SYSTEM SHALL BE IN HEATING MODE.

D. OCCUPIED/UNOCCUPIED MODES SHALL BE DETERMINED BY THE CCMS THROUGH CALENDAR SCHEDULING.

1) INITIAL CALENDAR SHALL PLACE SYSTEM IN OCCUPIED MODE FROM 7AM THROUGH MIDNIGHT SEVEN DAYS PER WEEK. ALL OTHER HOURS, INCLUDING HOLIDAYS, SHALL BE SCHEDULED AS UNOCCUPIED.

E. SEE ◎NAMING CONVENTION• ON DWG. H6.0 FOR KEY TO CONTROL COMPONENT NAMES. THESE NAMES SHALL BE UTILIZED BY THE ATC CONTRACTOR IN GRAPHIC REPRESENTATIONS OF THE SYSTEM, AND AS POINT NAMES UTILIZED IN TREND AND OTHER CCMS REPORTS.

2. OCCUPIED MODE:

A. UPON A COMMAND FROM THE CCMS THROUGH THE LOCAL DIGITAL CONTROL PANEL (DCP), THE SYSTEM SHALL BE ENERGIZED:

1) DAMPER D-OA-3 AND D-EA-3 SHALL OPEN.
2) FANS SF-3 AND RF-3 SHALL RAMP UP FROM MINIMUM SPEED TO MEET THEIR SETPOINTS AS DESCRIBED BELOW.
3) PREHEAT AND COOLING COIL VALVES SHALL OPERATE AS DESCRIBED BELOW.
4) HEATWHEEL SHALL BE OPERATED BY FACTORY ON-BOARD CONTROLS.

B. SYSTEM SHALL OPERATE UNDER HEATING OR COOLING MODE AS APPROPRIATE, AS DESCRIBED BELOW.

3. UNOCCUPIED MODE:

A. UPON A COMMAND FROM THE CCMS, THE SYSTEM SHALL BE DE-ENERGIZED:

1) FANS SHALL BE DE-ENERGIZED.
2) AFTER TWO MINUTES, ALL DAMPERS SHALL CLOSE.
3) VALVES V-PH-3 AND V-CC-3 SHALL BE DRIVEN OPEN.
4) HEATWHEEL SHALL BE DE-ENERGIZED.

B. IN HEATING MODE, THE SYSTEM SHALL BE ENERGIZED AS DESCRIBED ABOVE UPON SENSING A SPACE TEMPERATURE OF 60F (ADJUSTABLE) OR BELOW ANYWHERE IN THE AREA SERVED BY THE SYSTEM, AS SENSED BY LOCAL ROOM TEMPERATURE SENSORS.

C. IN COOLING MODE, THE SYSTEM SHALL BE ENERGIZED AS DESCRIBED ABOVE UPON SENSING A SPACE TEMPERATURE OF 80F (ADJUSTABLE) OR ABOVE ANYWHERE IN THE AREA SERVED BY THE SYSTEM, AS SENSED BY LOCAL ROOM TEMPERATURE SENSORS.

D. UPON BEING ENERGIZED, THE SYSTEM SHALL OPERATE AS DESCRIBED UNDER HEATING OR COOLING MODE, AS APPROPRIATE, UNTIL THE NIGHT SETBACK TEMPERATURE IS REACHED IN ALL ZONES SERVED.

4. MORNING WARMUP/COOLDOWN:

A. AN OPTIMAL START PROGRAM SHALL ENERGIZE THE SYSTEM AT THE TIME NECESSARY TO BRING ALL SERVED ZONES TO OCCUPIED TEMPERATURE SETPOINTS.

B. UPON STARTUP, THE FOLLOWING SHALL OCCUR:

1) DAMPERS D-OA-3 AND D-EA-3 SHALL OPEN.
2) FAN SF-3 SHALL RAMP UP FROM MINIMUM SPEED:
   (1) SF-3 SHALL MEET ITS STATIC PRESSURE SETPOINT AS DESCRIBED BELOW.
   (2) RF-3 SHALL OPERATE AS DESCRIBED BELOW.
3) PREHEAT AND COOLING COIL VALVES, AND HEATWHEEL, SHALL OPERATE AS DESCRIBED UNDER HEATING/COOLING MODES.

C. UPON REACHING OCCUPIED SETPOINT IN ALL ZONES SERVED, THE SYSTEM SHALL REVERT TO OCCUPIED MODE OF OPERATION.

5. COOLING MODE:

A. VFD SHALL MODULATE THE SPEED OF SUPPLY FAN TO MEET THE SETPOINT OF SPS-SA-3-3 (1.0 IN.W.G., ADJUSTABLE). SETPOINT TO BE VERIFIED BY TESTING ¢ BALANCING CONTRACTOR.

B. AIRFLOW AT FANS SHALL BE MONITORED BY INDICATED AIRFLOW MONITORING STATIONS AT FAN INLETS.

C. VFD SHALL MODULATE THE SPEED OF FAN RF-3 SUCH THAT EXHAUST CFM = 1.03 X SUPPLY CFM.

D. HEATWHEEL SHALL PRECOOL AIR ACCORDING TO ITS FACTORY ON-BOARD CONTROLS.

E. PREHEAT COIL CONTROL VALVE SHALL BE CLOSED.

F. COOLING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN UNIT DISCHARGE TEMPERATURE OF 55F (ADJUSTABLE) AS SENSED BY T-SA-3.

6. HEATING MODE:

A. COOLING COIL IS UTILIZED BY THE PROCESS WATER LOOP TO REJECT HEAT FROM WATER-COOLED UNITS IN THE BUILDING. THEREFORE, V-CC-3 SHALL BE OVERRIDDEN OPEN AT ALL TIMES.

B. VALVE V-PH-3 SHALL MODULATE TO MAINTAIN UNIT DISCHARGE TEMPERATURE OF 55F (ADJUSTABLE) AS SENSED BY T-SA-3.

C. HEATWHEEL SHALL PREHEAT AIR ACCORDING TO ITS FACTORY ON-BOARD CONTROLS.

D. WHEN OUTDOOR AIR TEMPERATURE IS LESS THAN 40F, PUMP P-7 SHALL BE ENERGIZED.

7. SAFETIES:

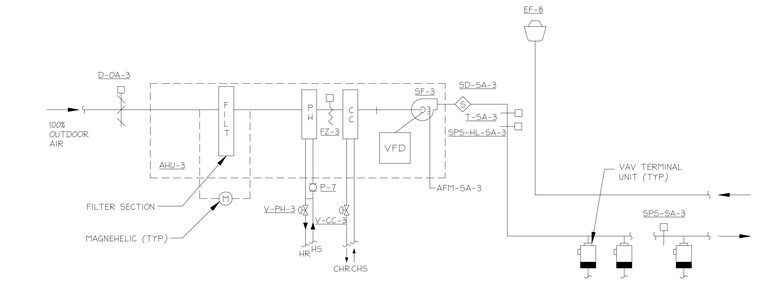
A. IF THE PRODUCTS OF COMBUSTION ARE DETECTED BY ANY SMOKE DETECTOR IN THE SYSTEM, A TROUBLE SIGNAL SHALL BE SENT TO THE FIRE ALARM SYSTEM, AN ALARM SHALL BE SENT TO THE CCMS, AND AHU-3 SHALL BE DE-ENERGIZED AS DESCRIBED ABOVE UNDER UNOCCUPIED MODE.

B. IF TEMPERATURE LESS THAN 35F IS SENSED BY FREEZESTAT, A CRITICAL ALARM SHALL BE SENT TO THE CCMS, PREHEAT VALVE SHALL BE DRIVEN OPEN, AND AHU-3 SHALL BE DE-ENERGIZED. PREHEAT PUMP SHALL CONTINUE TO OPERATE.

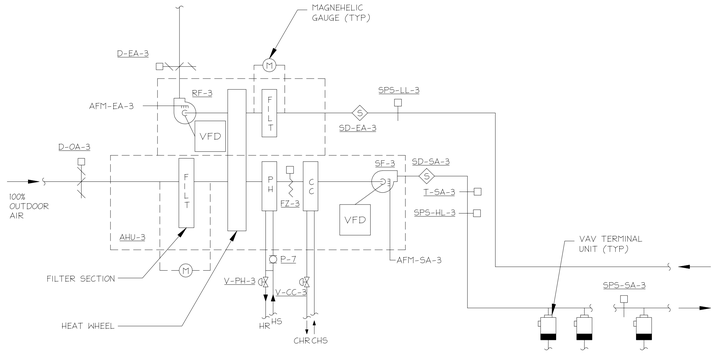
C. ALL FANS AND THE PREHEAT PUMP SHALL BE MONITORED FOR STATUS. UPON FAILURE, A CRITICAL ALARM SHALL BE SENT TO THE CCMS.

D. IF UNIT DISCHARGE STATIC PRESSURE RISES ABOVE SETPOINT OF SPS-HL-3, SYSTEM SHALL BE DE-ENERGIZED AND A CRITICAL ALARM SHALL BE SENT TO THE CCMS.

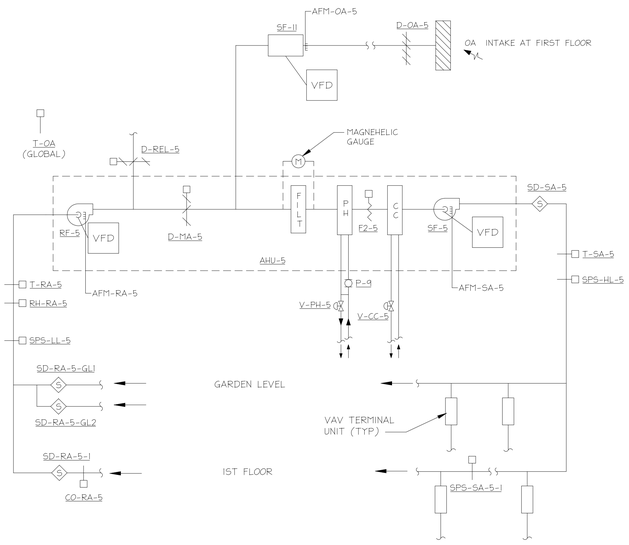
E. IF UNIT INLET STATIC PRESSURE FALLS BELOW SETPOINT OF SPS-LL-3, SYSTEM SHALL BE DE-ENERGIZED AND A CRITICAL ALARM SHALL BE SENT TO THE CCMS.



1 AUTOMATIC TEMPERATURE CONTROLS DIAGRAM - AHU-3 (LOCKER ROOMS) - BASE BID
NO SCALE



2 AUTOMATIC TEMPERATURE CONTROLS DIAGRAM - AHU-3 (LOCKER ROOMS) - ALT#9
NO SCALE



3 AUTOMATIC TEMPERATURE CONTROLS DIAGRAM - AHU-5 (BOOKSTORE)
NO SCALE

SEQUENCE OF OPERATIONS – AHU-5

1. GENERAL:

A. SEE ◎GENERAL REQUIREMENTS – AUTOMATIC TEMPERATURE CONTROLS• ON DWG. H6.3 FOR INFORMATION APPLICABLE TO THIS SYSTEM.

B. THE SYSTEM SHALL BE ENERGIZED AND DE-ENERGIZED THROUGH THE CCMS BY CALENDAR SCHEDULING OR MANUAL OVERRIDE.

C. HEATING AND COOLING MODES SHALL BE GOVERNED BY STATUS OF OUTDOOR AIR TEMPERATURE AS DETERMINED BY THE CCMS. AT TEMPERATURES ABOVE 50F, THE SYSTEM SHALL BE IN COOLING MODE. FOR TEMPERATURES BELOW 50F, THE SYSTEM SHALL BE IN HEATING MODE.

D. OCCUPIED/UNOCCUPIED MODES SHALL BE DETERMINED BY THE CCMS THROUGH CALENDAR SCHEDULING.

1) INITIAL CALENDAR SHALL PLACE SYSTEM IN OCCUPIED MODE FROM 7AM THROUGH MIDNIGHT ON WEEKDAYS AND SATURDAYS. ALL OTHER HOURS, INCLUDING HOLIDAYS, SHALL BE SCHEDULED AS UNOCCUPIED.

E. SEE ◎NAMING CONVENTION• ON DWG. H6.0 FOR KEY TO CONTROL COMPONENT NAMES. THESE NAMES SHALL BE UTILIZED BY THE ATC CONTRACTOR IN GRAPHIC REPRESENTATIONS OF THE SYSTEM, AND AS POINT NAMES UTILIZED IN TREND AND OTHER CCMS REPORTS.

2. OCCUPIED MODE:

A. UPON A COMMAND FROM THE CCMS THROUGH THE LOCAL DIGITAL CONTROL PANEL (DCP), THE SYSTEM SHALL BE ENERGIZED:

1) DAMPER D-OA-5 AND D-MA-5 SHALL OPEN.
2) DAMPER D-REL-5 SHALL BE CLOSED.
3) FANS SF-5, RF-5, AND SF-11 SHALL RAMP UP FROM MINIMUM SPEED TO MEET THEIR SETPOINTS AS DESCRIBED BELOW.
4) PREHEAT AND COOLING COIL VALVES SHALL OPERATE AS DESCRIBED BELOW.

B. SYSTEM SHALL OPERATE UNDER HEATING OR COOLING MODE AS APPROPRIATE, AS DESCRIBED BELOW.

3. UNOCCUPIED MODE:

A. UPON A COMMAND FROM THE CCMS, THE SYSTEM SHALL BE DE-ENERGIZED:

1) FANS SHALL BE DE-ENERGIZED.
2) AFTER TWO MINUTES, ALL DAMPERS EXCEPT D-MA-5 SHALL CLOSE.
3) VALVES V-PH-5 AND V-CC-5 SHALL BE DRIVEN OPEN.

B. IN HEATING MODE, THE SYSTEM SHALL BE ENERGIZED AS DESCRIBED ABOVE UPON SENSING A SPACE TEMPERATURE OF 60F (ADJUSTABLE) OR BELOW ANYWHERE IN THE AREA SERVED BY THE SYSTEM, AS SENSED BY LOCAL ROOM TEMPERATURE SENSORS.

C. IN COOLING MODE, THE SYSTEM SHALL BE ENERGIZED AS DESCRIBED ABOVE UPON SENSING A SPACE TEMPERATURE OF 80F (ADJUSTABLE) OR ABOVE ANYWHERE IN THE AREA SERVED BY THE SYSTEM, AS SENSED BY LOCAL ROOM TEMPERATURE SENSORS.

D. UPON BEING ENERGIZED, THE SYSTEM SHALL OPERATE AS DESCRIBED UNDER HEATING OR COOLING MODE, AS APPROPRIATE, UNTIL THE NIGHT SETBACK TEMPERATURE IS REACHED IN ALL ZONES SERVED.

4. MORNING WARMUP/COOLDOWN:

A. AN OPTIMAL START PROGRAM SHALL ENERGIZE THE SYSTEM AT THE TIME NECESSARY TO BRING ALL SERVED ZONES TO OCCUPIED TEMPERATURE SETPOINTS.

B. UPON STARTUP, THE FOLLOWING SHALL OCCUR:

1) DAMPER D-MA-5 SHALL OPEN.
2) DAMPERS D-REL-5, D-OA-5 SHALL BE CLOSED.
3) FAN SF-11 SHALL BE OFF.
4) FANS SF-5 AND RF-5 SHALL RAMP UP FROM MINIMUM SPEED:
   (1) SF-5 SHALL MEET ITS STATIC PRESSURE SETPOINT AS DESCRIBED BELOW.
   (2) RF-5 AIRFLOW SHALL MATCH SF-5 AIRFLOW.
5) PREHEAT AND COOLING COIL VALVES SHALL OPERATE AS DESCRIBED UNDER HEATING/COOLING MODES.
6) RETURN AIR CONTROL DAMPERS SHALL OPERATE AS DESCRIBED BELOW.

C. UPON REACHING OCCUPIED SETPOINT IN ALL ZONES SERVED, THE SYSTEM SHALL REVERT TO OCCUPIED MODE OF OPERATION.

5. COOLING MODE:

A. VFD SHALL MODULATE THE SPEED OF SUPPLY FAN TO MEET THE SETPOINT OF SPS-SA-5-1 (1.0 IN.W.G., ADJUSTABLE). SETPOINT TO BE VERIFIED BY TESTING ¢ BALANCING CONTRACTOR.

B. AIRFLOW AT SUPPLY, RETURN, AND OUTDOOR AIR FANS SHALL BE MONITORED BY INDICATED AIRFLOW MONITORING STATIONS AT FAN INLETS.

C. VFD SHALL MODULATE THE SPEED OF RETURN FAN SUCH THAT RETURN CFM = (SUPPLY CFM – 765).

D. VFD SHALL MODULATE THE SPEED OF FAN SF-11 SUCH THAT OUTDOOR AIR CFM = SUPPLY CFM – RETURN CFM.

E. PREHEAT COIL CONTROL VALVE SHALL BE CLOSED.

F. COOLING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN UNIT DISCHARGE TEMPERATURE OF 55F (ADJUSTABLE) AS SENSED BY T-SA-1.

G. ECONOMIZER: AT OUTDOOR AIR TEMPERATURES LESS THAN 65F, SF-11 AND D-REL-1 SHALL MODULATE TOGETHER WITH COOLING COIL CONTROL VALVE TO MAINTAIN UNIT DISCHARGE AIR TEMPERATURE SETPOINT.

H. VENTILATION AIR: UPON SENSING CO2 LEVELS HIGHER THAN SETPOINT AT RETURN AIR SENSOR FOR 15 MINUTES, D-REL-1 SHALL MODULATE OPEN AND SF-11 SHALL INCREASE SPEED. AFTER CO2 SETPOINT HAS BEEN MAINTAINED FOR ONE HOUR, DAMPERS AND FAN SHALL REVERT TO NORMAL CONTROL.

6. HEATING MODE:

A. COOLING COIL IS UTILIZED BY THE PROCESS WATER LOOP TO REJECT HEAT FROM WATER-COOLED UNITS IN THE BUILDING, THEREFORE, V-CC-5 SHALL BE OVERRIDDEN OPEN AT ALL TIMES.

B. VALVE V-PH-5 SHALL MODULATE TO MAINTAIN UNIT DISCHARGE TEMPERATURE OF 55F (ADJUSTABLE) AS SENSED BY T-SA-5.

C. WHEN OUTDOOR AIR TEMPERATURE IS LESS THAN 40F, PUMP P-9 SHALL BE ENERGIZED.

D. IF SUPPLY AIR TEMPERATURE RISES ABOVE 60F, SF-11 AND D-REL-5 SHALL MODULATE TO MAINTAIN SETPOINT.

7. SAFETIES:

A. IF THE PRODUCTS OF COMBUSTION ARE DETECTED BY ANY SMOKE DETECTOR IN THE SYSTEM, A TROUBLE SIGNAL SHALL BE SENT TO THE FIRE ALARM SYSTEM, AN ALARM SHALL BE SENT TO THE CCMS, AND AHU-5 SHALL BE DE-ENERGIZED AS DESCRIBED ABOVE UNDER UNOCCUPIED MODE.

B. IF TEMPERATURE LESS THAN 35F IS SENSED BY FREEZESTAT, A CRITICAL ALARM SHALL BE SENT TO THE CCMS, PREHEAT VALVE SHALL BE DRIVEN OPEN, AND AHU-5 SHALL BE DE-ENERGIZED. PREHEAT PUMP SHALL CONTINUE TO OPERATE.

C. ALL FANS AND THE PREHEAT PUMP SHALL BE MONITORED FOR STATUS. UPON FAILURE, A CRITICAL ALARM SHALL BE SENT TO THE CCMS.

D. IF UNIT DISCHARGE STATIC PRESSURE RISES ABOVE SETPOINT OF SPS-HL-SA-5, SYSTEM SHALL BE DE-ENERGIZED AND A CRITICAL ALARM SHALL BE SENT TO THE CCMS.

E. IF UNIT INLET STATIC PRESSURE FALLS BELOW SETPOINT OF SPS-LL-RA-5, SYSTEM SHALL BE DE-ENERGIZED AND A CRITICAL ALARM SHALL BE SENT TO THE CCMS.

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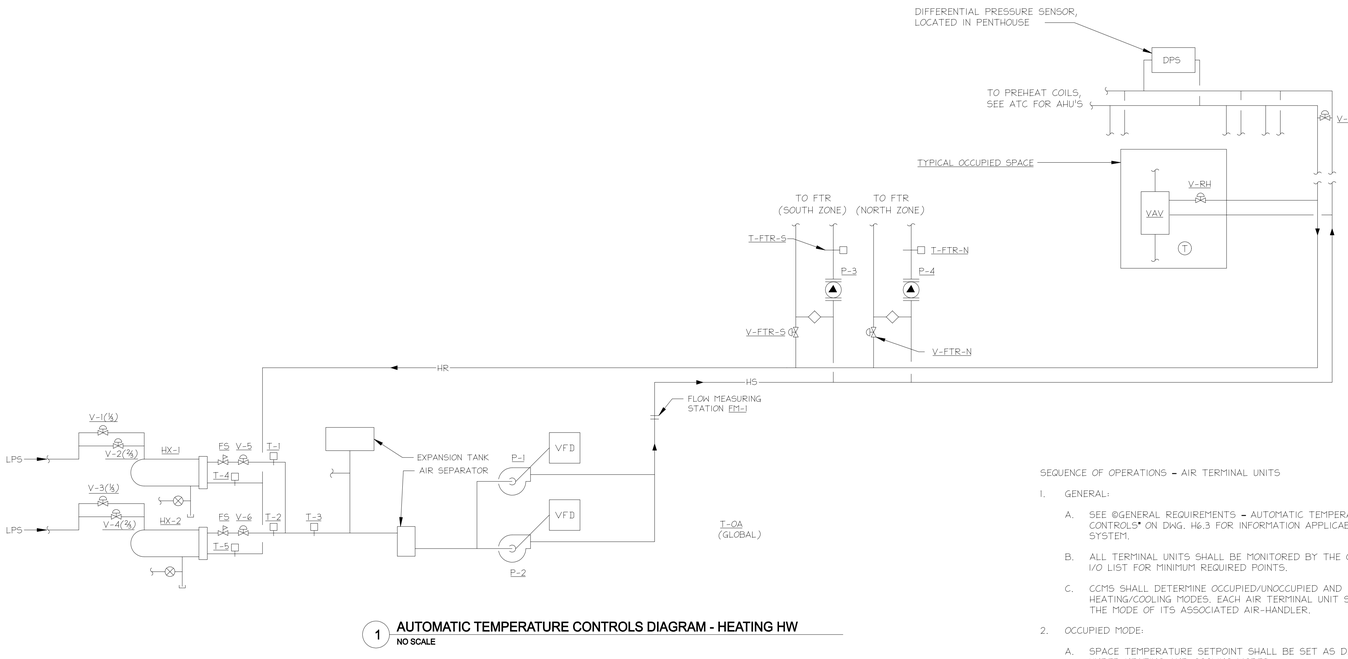
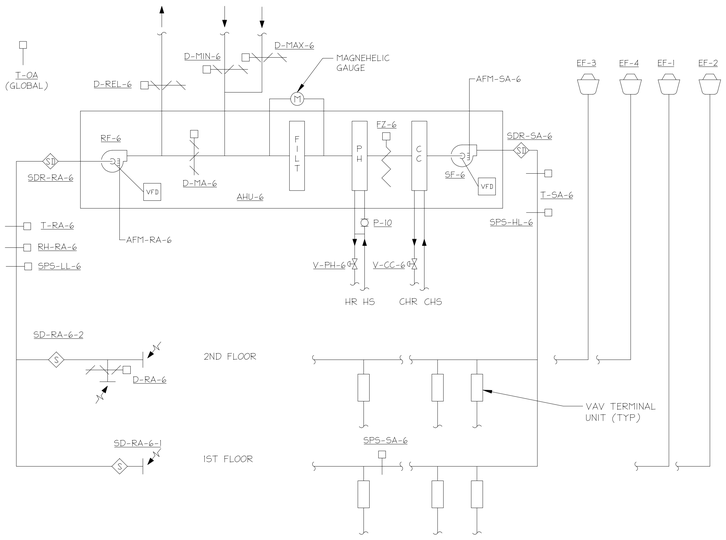
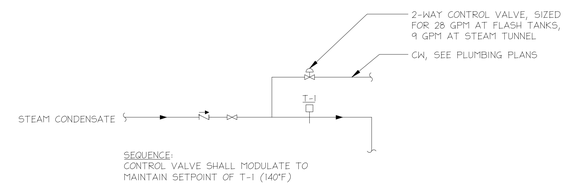
H6.1



1 AUTOMATIC TEMPERATURE CONTROLS DIAGRAM - HEATING HW
NO SCALE



2 AUTOMATIC TEMPERATURE CONTROLS DIAGRAM - AHU-6 (FOOD SERVICES)
NO SCALE



3 AUTOMATIC TEMPERATURE CONTROLS DIAGRAM - CONDENSATE COOLER
NO SCALE

SEQUENCE OF OPERATIONS – AIR TERMINAL UNITS

1. GENERAL:
   - A. SEE @GENERAL REQUIREMENTS – AUTOMATIC TEMPERATURE CONTROLS" ON DWG. H6.3 FOR INFORMATION APPLICABLE TO THIS SYSTEM.
   - B. ALL TERMINAL UNITS SHALL BE MONITORED BY THE CCMS, SEE I/O LIST FOR MINIMUM REQUIRED POINTS.
   - C. CCMS SHALL DETERMINE OCCUPIED/UNOCCUPIED AND HEATING/COOLING MODES. EACH AIR TERMINAL UNIT SHALL MATCH THE MODE OF ITS ASSOCIATED AIR-HANDLER.
2. OCCUPIED MODE:
   - A. SPACE TEMPERATURE SETPOINT SHALL BE SET AS DESCRIBED UNDER HEATING AND COOLING MODES.
3. UNOCCUPIED MODE:
   - A. SPACE TEMPERATURE SETPOINT SHALL BE 60F (ADJUSTABLE) UNDER HEATING MODE, OR 80F (ADJUSTABLE) UNDER COOLING MODE.
4. HEATING MODE:
   - A. SPACE TEMPERATURE SETPOINT SHALL BE 70F (ADJUSTABLE).
   - B. AIR TERMINAL UNIT SHALL OPERATE AT MINIMUM SCHEDULED AIRFLOW.
   - C. WHEN SPACE TEMPERATURE FALLS BELOW 70F, REHEAT VALVE SHALL MODULATE OPEN. UPON THE REVERSE THE OPPOSITE SHALL OCCUR.
5. COOLING MODE:
   - A. SPACE TEMPERATURE SETPOINT SHALL BE 76F (ADJUSTABLE).
   - B. AS SPACE TEMPERATURE RISES ABOVE 76F, TERMINAL UNIT DAMPER SHALL MODULATE OPEN. UPON THE REVERSE THE OPPOSITE SHALL OCCUR, UNTIL THE MINIMUM SCHEDULED AIRFLOW IS REACHED.
   - C. AS SPACE TEMPERATURE DROPS BELOW COOLING SETPOINT, REHEAT VALVE SHALL MODULATE OPEN. UPON THE REVERSE THE OPPOSITE SHALL OCCUR.
6. MORNING WARMUP:
   - A. AIR TERMINAL UNIT SHALL OPERATE AT MINIMUM SCHEDULED AIRFLOW.
   - B. REHEAT VALVE SHALL BE OVERRIDDEN OPEN.
   - C. ONCE THE OCCUPIED MODE SPACE TEMPERATURE SETPOINT IS REACHED, REHEAT VALVE SHALL REVERT TO OCCUPIED MODE OPERATION.
7. MORNING COOLDOWN:
   - A. AIR TERMINAL UNIT SHALL BE OVERRIDDEN OPEN TO FULL SCHEDULED AIRFLOW.
   - B. REHEAT VALVE SHALL BE OVERRIDDEN CLOSED.
   - C. ONCE THE OCCUPIED MODE SPACE TEMPERATURE SETPOINT IS REACHED, REHEAT VALVE AND AIRFLOW CONTROL DAMPER SHALL REVERT TO OCCUPIED MODE OPERATION.

SEQUENCE OF OPERATIONS – HEATING HOT WATER SYSTEM

1. GENERAL:
   - A. SEE "GENERAL REQUIREMENTS – AUTOMATIC TEMPERATURE CONTROLS" ON DWG. H6.3 FOR INFORMATION APPLICABLE TO THIS SYSTEM.
   - B. THE SYSTEM SHALL BE ENERGIZED AND DE-ENERGIZED THROUGH THE CCMS BY CALENDAR SCHEDULING OR MANUAL OVERRIDE.
   - C. THE HEATING SYSTEM LEAD PUMP SHALL OPERATE AS DESCRIBED HEREIN 24 HOURS/DAY, SEVEN DAYS/WEEK.
   - D. HEATING AND COOLING MODES SHALL BE GOVERNED BY STATUS OF OUTDOOR AIR TEMPERATURE AS DETERMINED BY THE CCMS. AT TEMPERATURES ABOVE 60F, THE SYSTEM SHALL BE IN COOLING MODE. FOR TEMPERATURES BELOW 60F, THE SYSTEM SHALL BE IN HEATING MODE. (NOTE: THIS IS DIFFERENT THAN THE SWITCHOVER POINT FOR OTHER SYSTEMS). THE OUTDOOR AIR CHANGEOVER CONDITION SHALL BE CONSISTENT FOR 1 HOUR BEFORE SYSTEM CHANGEOVER OCCURS.
   - E. SEE "NAMING CONVENTION" ON DWG. H6.0 FOR KEY TO CONTROL COMPONENT NAMES. THESE NAMES SHALL BE UTILIZED BY THE ATC CONTRACTOR IN GRAPHIC REPRESENTATIONS OF THE SYSTEM, AND AS POINT NAMES UTILIZED IN TREND AND OTHER CCMS REPORTS.
   - F. FOR CONTROLS ASSOCIATED WITH PREHEAT COILS, SEE AIR HANDLING UNIT SEQUENCES.
   - G. FOR CONTROLS ASSOCIATED WITH AIR TERMINAL UNITS, SEE SEPARATE SEQUENCE.
2. DISTRIBUTION PUMPS:
   - A. UPON A COMMAND FROM THE CCMS THROUGH THE LOCAL DIGITAL CONTROL PANEL (DCP), THE SYSTEM SHALL BE ENERGIZED:
     1) AUTOMATIC ISOLATION VALVE AT LEAD HEAT EXCHANGER SHALL OPEN.
     2) LEAD PUMP SHALL BE ENERGIZED.
     3) REMAINING SUBSYSTEMS SHALL OPERATE AS DESCRIBED BELOW.
   - B. SYSTEM SHALL OPERATE UNDER HEATING OR COOLING MODE AS APPROPRIATE, AS DESCRIBED BELOW.
   - C. PUMPS P-1 AND P-2 AND HEAT EXCHANGERS HX-1 AND HX-2 SHALL ALTERNATE OPERATION AS LEAD EQUIPMENT ON A MONTHLY BASIS.
   - D. UPON FAILURE OF THE LEAD PUMP, THE LAG PUMP SHALL AUTOMATICALLY BE ENERGIZED. HEAT EXCHANGERS SHALL FOLLOW SUIT.
   - E. SPEED OF LEAD PUMP SHALL MODULATE THROUGH ASSOCIATED VFD, TO MAINTAIN SETPOINT OF DIFFERENTIAL PRESSURE SENSOR.
   - F. BYPASS VALVE V-BP SHALL NORMALLY BE CLOSED. AS FLOW RATE FALLS BELOW 100 GPM (ADJUSTABLE) AS SENSED BY FLOW METER FM-1 FOR 5 MINUTES, V-BP SHALL MODULATE OPEN TO MAINTAIN MINIMUM FLOW RATE. AS FLOWRATE INCREASES ABOVE 100 GPM, V-BP SHALL MODULATE CLOSED.
3. COOLING MODE:
   - A. PUMPS P-3 AND P-4 SHALL BE DE-ENERGIZED.
   - B. CONTROL VALVES AT ALL UNIT HEATERS AND CABINET UNIT HEATERS SHALL BE CLOSED.
   - C. HEAT EXCHANGER CONTROLS SHALL BE AS DESCRIBED BELOW.
   - D. IF ALL AIR-HANDLING UNITS ARE IN UNOCCUPIED MODE, DISTRIBUTION PUMP (P-1 OR P-2) SHALL BE DE-ENERGIZED.
   - E. FINNED TUBE LOOP VALVES V-FTR-S AND V-FTR-N SHALL BE CLOSED.
4. HEATING MODE:
   - A. PUMPS P-3 AND P-4 SHALL BE ENERGIZED.
   - B. CONTROL VALVES AT ALL UNIT HEATERS AND CABINET UNIT HEATERS SHALL BE ENABLED.
   - C. HEAT EXCHANGER CONTROLS SHALL BE AS DESCRIBED BELOW.
5. HEAT EXCHANGERS:
   - A. AT LEAD HEAT EXCHANGER HX-1, VALVE V-5 SHALL OPEN. UPON PROOF OF FLOW AT ASSOCIATED FLOW SWITCH, STEAM VALVE V-1 SHALL MODULATE OPEN TO MAINTAIN 180F (ADJUSTABLE) AT TEMPERATURE SENSOR T-1.
   - B. IF T-1 SETPOINT CANNOT BE MAINTAINED FOR 15 MINUTES (ADJUSTABLE), V-2 SHALL MODULATE OPEN.
   - C. IF V-1 AND V-2 ARE FULL OPEN AND T-1 SETPOINT CANNOT BE MAINTAINED FOR 15 MINUTES, ISOLATION VALVE V-6 SHALL OPEN AND V-2 SHALL CLOSE. UPON PROOF OF FLOW AT HX-2, VALVE V-3 SHALL MODULATE OPEN TO MAINTAIN SETPOINT OF T-2.
   - D. IF V-1 AND V-3 ARE FULL OPEN AND SETPOINTS OF T-1 AND T-2 CANNOT BE MAINTAINED FOR 15 MINUTES, V-2 AND V-4 SHALL MODULATE OPEN IN PARALLEL.
   - E. UPON THE OPPOSITE THE REVERSE SHALL OCCUR.
6. FINNED TUBE LOOPS (P-3 AND P-4):
   - A. 3-WAY CONTROL VALVES SHALL MODULATE TO MAINTAIN A RESET SCHEDULE AT ASSOCIATED SUPPLY WATER TEMPERATURE SENSORS T-FTR-X.
   - B. SEPARATE RESET SCHEDULES SHALL BE PROVIDED FOR EACH LOOP. ALL PARAMETERS SHALL BE ADJUSTABLE.
   - C. RESET SCHEDULE FOR NORTH LOOP SHALL BE AS FOLLOWS: OUTDOOR AIR = 40F, SUPPLY WATER = 180F; OUTDOOR AIR = 60F, SUPPLY WATER = 140F.
   - D. RESET SCHEDULE FOR SOUTH LOOP SHALL BE AS FOLLOWS: OUTDOOR AIR = 30F, SUPPLY WATER = 180F; OUTDOOR AIR = 60F, SUPPLY WATER = 120F.
   - E. PUMPS SHALL BE MONITORED FOR STATUS, WITH A CRITICAL ALARM SENT TO THE CCMS UPON FAILURE.

SEQUENCE OF OPERATIONS – AHU-6

1. GENERAL:
   - A. SEE "GENERAL REQUIREMENTS – AUTOMATIC TEMPERATURE CONTROLS" ON DWG. H6.3 FOR INFORMATION APPLICABLE TO THIS SYSTEM.
   - B. THE SYSTEM SHALL BE ENERGIZED AND DE-ENERGIZED THROUGH THE CCMS BY CALENDAR SCHEDULING OR MANUAL OVERRIDE.
   - C. HEATING AND COOLING MODES SHALL BE GOVERNED BY STATUS OF OUTDOOR AIR TEMPERATURE AS DETERMINED BY THE CCMS. AT TEMPERATURES ABOVE 50F, THE SYSTEM SHALL BE IN COOLING MODE. FOR TEMPERATURES BELOW 50F, THE SYSTEM SHALL BE IN HEATING MODE.
   - D. OCCUPIED/UNOCCUPIED MODES SHALL BE DETERMINED BY THE CCMS THROUGH CALENDAR SCHEDULING.
     1) INITIAL CALENDAR SHALL PLACE SYSTEM IN OCCUPIED MODE FROM 5 AM THROUGH MIDNIGHT SEVEN DAYS PER WEEK. ALL OTHER HOURS, INCLUDING HOLIDAYS, SHALL BE SCHEDULED AS UNOCCUPIED.
   - E. SEE @NAMING CONVENTION" ON DWG. H6.0 FOR KEY TO CONTROL COMPONENT NAMES. THESE NAMES SHALL BE UTILIZED BY THE ATC CONTRACTOR IN GRAPHIC REPRESENTATIONS OF THE SYSTEM, AND AS POINT NAMES UTILIZED IN TREND AND OTHER CCMS REPORTS.
2. OCCUPIED MODE:
   - A. UPON A COMMAND FROM THE CCMS THROUGH THE LOCAL DIGITAL CONTROL PANEL (DCP), THE SYSTEM SHALL BE ENERGIZED:
     1) SMOKE DAMPERS SDR-SA-6 AND SDR-RA-6 SHALL OPEN.
     2) DAMPER D-MIN-6 AND D-MA-6 SHALL OPEN.
     3) DAMPER D-REL-6 AND D-MAX-6 SHALL BE CLOSED.
     4) EF-1, EF-2, EF-3, EF-4 SHALL BE ENERGIZED.
     5) FANS SF-6 AND RF-6 SHALL RAMP UP FROM MINIMUM SPEED TO MEET THEIR SETPOINTS AS DESCRIBED BELOW.
     6) PREHEAT AND COOLING COIL VALVES SHALL OPERATE AS DESCRIBED BELOW.
     7) DAMPER D-RA-6 SHALL REMAIN CLOSED.
   - B. SYSTEM SHALL OPERATE UNDER HEATING OR COOLING MODE AS APPROPRIATE, AS DESCRIBED BELOW.
3. UNOCCUPIED MODE:
   - A. UPON A COMMAND FROM THE CCMS, THE SYSTEM SHALL BE DE-ENERGIZED:
     1) FANS SHALL BE DE-ENERGIZED.
     2) AFTER TWO MINUTES, ALL DAMPERS EXCEPT D-MA-6 SHALL CLOSE.
     3) VALVES V-PH-6 AND V-CC-6 SHALL BE DRIVEN OPEN.
   - B. IN HEATING MODE, THE SYSTEM SHALL BE ENERGIZED AS DESCRIBED ABOVE UPON SENSING A SPACE TEMPERATURE OF 60F (ADJUSTABLE) OR BELOW ANYWHERE IN THE AREA SERVED BY THE SYSTEM, AS SENSED BY LOCAL ROOM TEMPERATURE SENSORS.
   - C. IN COOLING MODE, THE SYSTEM SHALL BE ENERGIZED AS DESCRIBED ABOVE UPON SENSING A SPACE TEMPERATURE OF 80F (ADJUSTABLE) OR ABOVE ANYWHERE IN THE AREA SERVED BY THE SYSTEM, AS SENSED BY LOCAL ROOM TEMPERATURE SENSORS.
   - D. UPON BEING ENERGIZED, THE SYSTEM SHALL OPERATE AS DESCRIBED UNDER HEATING OR COOLING MODE, AS APPROPRIATE, UNTIL THE NIGHT SETBACK TEMPERATURE IS REACHED IN ALL ZONES SERVED.
4. MORNING WARMUP/COOLDOWN:
   - A. AN OPTIMAL START PROGRAM SHALL ENERGIZE THE SYSTEM AT THE TIME NECESSARY TO BRING ALL SERVED ZONES TO OCCUPIED TEMPERATURE SETPOINTS.
   - B. UPON STARTUP, THE FOLLOWING SHALL OCCUR:
     1) SMOKE DAMPERS SDR-SA-6 AND SDR-RA-6 SHALL OPEN.
     2) DAMPER D-MA-6 SHALL OPEN.
     3) DAMPER D-REL-6, D-MIN-6 AND D-MAX-6 SHALL BE CLOSED.
     4) FANS EF-1 THRU 4 SHALL REMAIN OFF.
     5) FANS SF-6 AND RF-6 SHALL RAMP UP FROM MINIMUM SPEED:
        (1) SF-6 SHALL MEET ITS STATIC PRESSURE SETPOINT AS DESCRIBED BELOW.
        (2) RF-6 AIRFLOW SHALL MATCH SF-6 AIRFLOW.
     6) PREHEAT AND COOLING COIL VALVES SHALL OPERATE AS DESCRIBED UNDER HEATING/COOLING MODES.
     7) DAMPER D-RA-6 SHALL OPEN.
   - C. UPON REACHING OCCUPIED SETPOINT IN ALL ZONES SERVED, THE SYSTEM SHALL REVERT TO OCCUPIED MODE OF OPERATION.
5. COOLING MODE:
   - A. VFD SHALL MODULATE THE SPEED OF SUPPLY FAN TO MEET THE SETPOINT OF SPS-SA-6 (1.0 IN.W.G., ADJUSTABLE). SETPOINT TO BE VERIFIED BY TESTING & BALANCING CONTRACTOR.
   - B. AIRFLOW AT SUPPLY AND RETURN FANS SHALL BE MONITORED BY INDICATED AIRFLOW MONITORING STATIONS AT FAN INLETS.
   - C. VFD SHALL MODULATE THE SPEED OF RETURN FAN SUCH THAT RETURN CFM = (SUPPLY CFM – 9,000).
   - D. PREHEAT COIL CONTROL VALVE SHALL BE CLOSED.
   - E. COOLING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN UNIT DISCHARGE TEMPERATURE OF 55F (ADJUSTABLE) AS SENSED BY T-SA-6.
   - F. ECONOMIZER: AT OUTDOOR AIR TEMPERATURES LESS THAN 65F, D-MAX-6 AND D-REL-6 SHALL MODULATE TOGETHER WITH COOLING COIL CONTROL VALVE TO MAINTAIN UNIT DISCHARGE AIR TEMPERATURE SETPOINT.
6. HEATING MODE:
   - A. COOLING COIL IS UTILIZED BY THE PROCESS WATER LOOP TO REJECT HEAT FROM WATER-COOLED UNITS IN THE BUILDING. THEREFORE, V-CC-6 SHALL BE OVERRIDDEN OPEN AT ALL TIMES.
   - B. VALVE V-PH-6 SHALL MODULATE TO MAINTAIN UNIT DISCHARGE TEMPERATURE OF 55F (ADJUSTABLE) AS SENSED BY T-SA-6.
   - C. WHEN OUTDOOR AIR TEMPERATURE IS LESS THAN 40F, PUMP P-10 SHALL BE ENERGIZED.
   - D. IF SUPPLY AIR TEMPERATURE RISES ABOVE 60F, D-MAX-6 AND D-REL-6 SHALL MODULATE TO MAINTAIN SETPOINT.
7. SAFETIES:
   - A. IF THE PRODUCTS OF COMBUSTION ARE DETECTED BY ANY SMOKE DETECTOR IN THE SYSTEM, A TROUBLE SIGNAL SHALL BE SENT TO THE FIRE ALARM SYSTEM, AN ALARM SHALL BE SENT TO THE CCMS, AND AHU-6 SHALL BE DE-ENERGIZED AS DESCRIBED ABOVE UNDER UNOCCUPIED MODE.
   - B. IF TEMPERATURE LESS THAN 35F IS SENSED BY FREEZESTAT, A CRITICAL ALARM SHALL BE SENT TO THE CCMS, PREHEAT VALVE SHALL BE DRIVEN OPEN, AND AHU-6 SHALL BE DE-ENERGIZED. PREHEAT PUMP SHALL CONTINUE TO OPERATE.
   - C. ALL FANS AND THE PREHEAT PUMP SHALL BE MONITORED FOR STATUS. UPON FAILURE, A CRITICAL ALARM SHALL BE SENT TO THE CCMS.
   - D. IF UNIT DISCHARGE STATIC PRESSURE RISES ABOVE SETPOINT OF SPS-HL-6, SYSTEM SHALL BE DE-ENERGIZED AND A CRITICAL ALARM SHALL BE SENT TO THE CCMS.
   - E. IF UNIT INLET STATIC PRESSURE FALLS BELOW SETPOINT OF SPS-LL-6, SYSTEM SHALL BE DE-ENERGIZED AND A CRITICAL ALARM SHALL BE SENT TO THE CCMS.
8. TEMPORARY OPERATION PRIOR TO FOOD SERVICE TENANT FIT-OUTS:
   - A. SUPPLY AND RETURN FANS WILL BE BALANCED FOR CURRENT OPERATION AS SCHEDULED.
   - B. SYSTEM SHALL OPERATE AS DESCRIBED ABOVE, EXCEPT FOR THE FOLLOWING:
     1) IN OCCUPIED MODE, EXHAUST FANS WILL NOT YET EXIST. DAMPER D-RA-6 SHALL OPEN.
     2) IN OCCUPIED MODE, RF-6 AIRFLOW SHALL EQUAL 97% OF SF-6 AIRFLOW.

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Campus Center

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Automatic Temp. Controls

100% CONSTRUCTION DOCUMENTS

UMB PROJECT NO. 99-311
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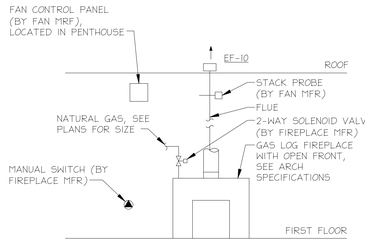
H6.2

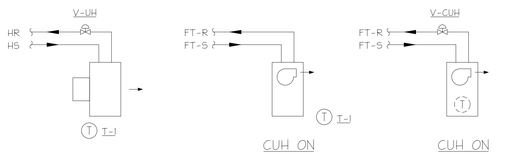


AUTOMATIC TEMPERATURE CONTROLS - EF-10, FIREPLACE

NOT TO SCALE

SEQUENCE OF OPERATIONS - EF-10, FIREPLACE

1. CONTROL COMPONENTS SHALL GENERALLY BE PROVIDED BY EQUIPMENT MANUFACTURERS. ALL CONNECTING WIRING, TUBING, ETC. SHALL BE PROVIDED BY ATC CONTRACTOR, IN ACCORDANCE WITH MFR'S DIRECTIONS. ATC CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING CONTROLS TO ENSURE ALL COMPONENTS OPERATE TOGETHER PROPERLY.
2. UPON ACTUATION OF MANUAL SWITCH, FAN EF-10 SHALL BE ENERGIZED.
3. EF-10 SPEED SHALL BE MODULATED BY FAN CONTROL PANEL, IN RESPONSE TO STACK PROBE READINGS, TO ATTAIN PROPER DRAFT IN FLUE.
4. ONCE PROPER DRAFT IS ACHIEVED, NATURAL GAS VALVE SHALL OPEN.
5. IF DRAFT LEVEL FALLS, FAN SPEED SHALL INCREASE TO MAINTAIN PROPER LEVEL. IF PROPER DRAFT LEVEL CANNOT BE MAINTAINED, THE GAS VALVE SHALL BE AUTOMATICALLY CLOSED. THIS CONDITION SHALL BE AUTOMATICALLY RESET AFTER A PERIOD OF TIME.
6. WHEN MANUAL SWITCH IS TURNED TO "OFF" POSITION, GAS VALVE SHALL BE CLOSED. FAN SHALL CONTINUE TO OPERATE FOR A MINIMUM OF 10 MINUTES.

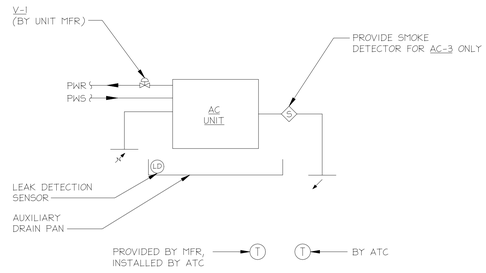


AUTOMATIC TEMPERATURE CONTROLS - UNIT HEATERS & CABINET UNIT HEATERS

NOT TO SCALE

SEQUENCE OF OPERATIONS - UNIT HEATERS, CABINET UNIT HEATERS

1. SEE "GENERAL REQUIREMENTS - AUTOMATIC TEMPERATURE CONTROLS" ON DWG. H6.3 FOR INFORMATION APPLICABLE TO THIS SYSTEM.
2. UNIT HEATERS:
   A. WHEN SPACE TEMPERATURE FALLS BELOW SETPOINT OF T-1 (65F, ADJUSTABLE), UNIT FAN SHALL BE ENERGIZED AND VALVE V-UH SHALL OPEN. UPON THE OPPOSITE THE REVERSE SHALL OCCUR. T-1 SHALL BE WALL-MOUNTED, PROVIDED BY UH MANUFACTURER.
3. CABINET UNIT HEATERS:
   A. WHERE CUH'S ARE CONNECTED TO FINNED TUBE LOOP, THE FOLLOWING SEQUENCE SHALL APPLY: CUH FAN SHALL BE ENERGIZED TO MAINTAIN SETPOINT OF WALL-MTD THERMOSTAT T-1. CUH SHALL NOT BE PROVIDED WITH HW CONTROL VALVE.
   B. WHERE CUH'S ARE CONNECTED TO HEATING HOT WATER SYSTEM (HS/HR), THE FOLLOWING SEQUENCE SHALL APPLY: WHEN OVERALL SYSTEM IS IN HEATING MODE AS DEFINED BY THE CCMS, CUH FAN SHALL BE ENERGIZED. VALVE V-CUH SHALL MODULATE TO MAINTAIN SETPOINT OF RETURN AIR THERMOSTAT (PROVIDED BY UNIT MANUFACTURER). WHEN OVERALL SYSTEM IS IN COOLING MODE, CUH FAN SHALL BE DE-ENERGIZED AND V-CUH SHALL BE CLOSED.

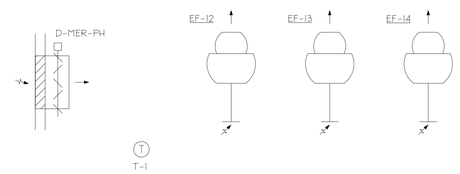


TYPICAL AUTOMATIC TEMPERATURE CONTROLS, WATER-COOLED A/C UNITS

NOT TO SCALE

QUENCE OF OPERATIONS - WATER-COOLED AC UNITS

1. GENERAL:
   A. SEE "GENERAL REQUIREMENTS - AUTOMATIC TEMPERATURE CONTROLS" ON DWG. H6.3 FOR INFORMATION APPLICABLE TO THIS SYSTEM.
2. AC UNIT CONTROLS:
   A. EACH AC UNIT SHALL BE OPERATED BY ITS OWN FACTORY ON-BOARD CONTROLS TO MAINTAIN SPACE TEMPERATURE.
   B. UNITS SHALL BE PROVIDED WITH CONTACTS ETC. TO ENABLE CCMS TO ACCOMPLISH MONITORING ETC. AS DESCRIBED BELOW.
   C. UNITS SHALL BE PROVIDED WITH CONDENSATE OVERFLOW SWITCH WHICH SHALL SHUTDOWN UNIT AND INDICATE ALARM.
   D. WHERE A SMOKE DETECTOR IS PROVIDED, THAT DETECTOR SHALL SHUT DOWN UNIT AND SEND ALARM TO CCMS.
3. CCMS SHALL PERFORM THE FOLLOWING:
   A. MONITOR STATUS AND ALARM CONDITION OF UNIT.
   B. MONITOR SPACE TEMPERATURE VIA WALL-MOUNTED TEMPERATURE SENSOR PROVIDED BY ATC. IF SPACE TEMPERATURE RISES ABOVE 80F (TEL/DATA ROOMS) OR 90F (ELECTRICAL CLOSETS), AN ALARM SHALL BE INDICATED AT THE CCMS.
   C. MONITOR LEAK DETECTION SENSOR (PROVIDED BY ATC) IN AUXILIARY DRAIN PAN. DETECTION OF MOISTURE SHALL SOUND A CRITICAL ALARM AT CCMS.
   D. UNITS SHALL ALWAYS BE IN OCCUPIED MODE.

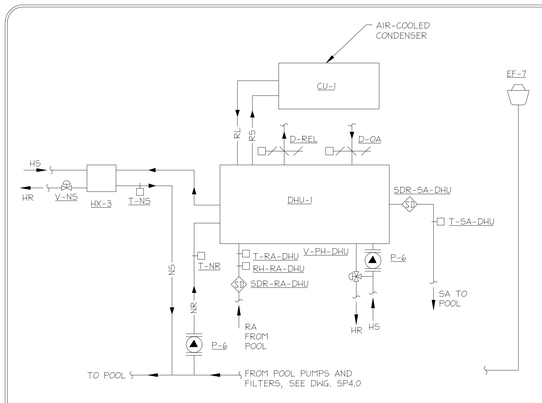


AUTOMATIC TEMPERATURE CONTROLS - VENTILATION OF M605 / M604

NOT TO SCALE

SEQUENCE OF OPERATIONS - VENTILATION OF PENTHOUSE MER M605/M604

1. SEE "GENERAL REQUIREMENTS - AUTOMATIC TEMPERATURE CONTROLS" ON DWG. H6.3 FOR INFORMATION APPLICABLE TO THIS SYSTEM.
2. WHEN SPACE TEMPERATURE RISES ABOVE SETPOINT OF T-1 (85F, ADJUSTABLE), DAMPER D-MER-PH SHALL OPEN AND FANS EF-12, EF-13, EF-14 SHALL BE ENERGIZED. UPON THE OPPOSITE THE REVERSE SHALL OCCUR.

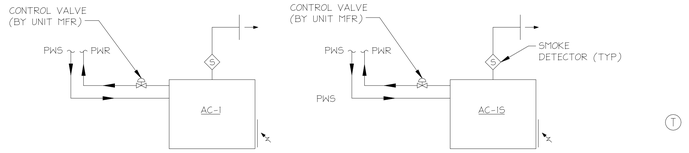


ATC SCHEMATIC - NATATORIUM HVAC & POOL WATER HEATING SYSTEM

NOT TO SCALE

SEQUENCE OF OPERATIONS - NATATORIUM EQUIPMENT

1. GENERAL:
   A. NATATORIUM DEHUMIDIFICATION UNIT DHU-1 AND ASSOCIATED CONDENSING UNIT CU-1 SHALL BE CONTROLLED BY FACTORY ON-BOARD CONTROLS, AS DESCRIBED IN SPECIFICATION SECTION 15781.
   B. DHU-1 SHALL NOT BE AFFECTED BY OPERATIONAL MODES DEFINED BY CENTRAL DDC SYSTEM (OCCUPIED/UNOCCUPIED, HEATING/COOLING). DHU-1 AND ASSOCIATED EQUIPMENT IS INTENDED TO RUN 24 HOURS PER DAY, YEAR-ROUND.
   C. DHU-1 SHALL BE OPERABLE FROM THE CENTRAL DDC SYSTEM TO THE FOLLOWING MINIMUM EXTENT: START/STOP; SPACE TEMPERATURE AND RH SETPOINT ADJUSTMENT; NORMAL AND PURGE MODE.
   D. DHU-1 AND CU-1 SHALL BE MONITORED BY THE DDC SYSTEM FOR STATUS AND ALARM.
   E. DAMPERS D-REL AND D-OA, AND VALVE V-PH-DHU SHALL BE FACTORY-PROVIDED WITH DHU-1.
   F. ATC CONTRACTOR SHALL INSTALL ANY FIELD-MOUNTED SENSORS REQUIRED BY THE DHU-1 MANUFACTURER, AT MINIMUM TO INCLUDE OUTDOOR TEMPERATURE AND RH, AND INTERIOR WALL TEMPERATURE SENSORS.
   G. TEMPERATURE AND HUMIDITY SENSORS INDICATED ON THE ATC SCHEMATIC SHALL BE PROVIDED AND INSTALLED BY ATC. AIR TEMPERATURE SENSORS SHALL BE ACCURATE TO +/- 1F. RH SENSOR SHALL BE ACCURATE TO +/- 2% RH.
   H. FAN EF-7 SHALL OPERATE AT ALL TIMES.
2. NORMAL OPERATION:
   A. UPON A COMMAND FROM THE DDC SYSTEM, SMOKE DAMPERS SDR-SA-DHU AND SDR-RA-DHU SHALL OPEN, AND DHU-1 SHALL BE ENERGIZED.
   B. DHU-1 SHALL MAINTAIN RETURN AIR CONDITIONS OF 84F AND 55% RH (BOTH ADJUSTABLE).
   C. WHEN DHU-1 IS COMMANDED OFF BY THE DDC SYSTEM, SDR DAMPERS SHALL CLOSE.
3. PURGE OPERATION:
   A. WHILE ENERGIZED, UPON A COMMAND FROM THE DDC SYSTEM, DHU-1 SHALL FULLY OPEN RELIEF AND OUTDOOR AIR DAMPERS, AND VALVE V-PH-DHU. SYSTEM SHALL REMAIN IN PURGE MODE FOR TIME PERIOD CHOSEN BY DDC SYSTEM OPERATOR.
   B. UPON A COMMAND FROM THE DDC SYSTEM, DHU-1 SHALL REVERT TO NORMAL MODE.
4. PUMP P-6 AND HX-3:
   A. PUMP P-6 SHALL BE INTERLOCKED WITH POOL PUMPS (SEE SP DRAWINGS).
   B. VALVE V-NS SHALL MODULATE TO MAINTAIN POOL WATER RETURN TEMPERATURE OF 82F (ADJUSTABLE), AS SENSED BY SENSOR T-NR.
5. SAFETIES:
   A. UPON SENSING A TEMPERATURE OF 200F OR ABOVE AT T-NS, VALVE V-NS SHALL CLOSE AND AN ALARM SHALL BE INDICATED AT THE CENTRAL DDC SYSTEM.
   B. IF RH AT RH-RA-DHU RISES ABOVE 60% FOR ONE HOUR, AN ALARM SHALL BE INDICATED.
   C. IF THE PRODUCTS OF COMBUSTION ARE SENSED IN SUPPLY OR RETURN DUCTWORK, DHU-1 AND CU-1 SHALL BE DE-ENERGIZED AND AN ALARM SHALL BE INDICATED AT THE DDC SYSTEM.
   D. PUMP P-6 SHALL BE MONITORED FOR STATUS AND FAILURE.
   E. FAN EF-7 SHALL BE MONITORED FOR STATUS AND A CRITICAL ALARM SHALL BE INDICATED AT THE CCMS UPON FAILURE.
   F. WHENEVER OUTDOOR AIR TEMPERATURE IS 45° OR LESS, PUMP P-33 SHALL BE ENERGIZED.



AUTOMATIC TEMPERATURE CONTROLS, AC-1 & AC-1S

NOT TO SCALE

SEQUENCE OF OPERATIONS - AC-1, AC-1S

1. SEE "GENERAL REQUIREMENTS - AUTOMATIC TEMPERATURE CONTROLS" ON DWG. H6.3 FOR INFORMATION APPLICABLE TO THIS SYSTEM.
2. UNITS SHALL BE PROVIDED WITH LEAD/LAG AND AUTOMATIC STANDBY CONTROLS BY CCMS.
3. CCMS SHALL HAVE START/STOP CONTROL OVER EACH UNIT. UNITS SHALL NOT BE SUBJECT TO OCCUPIED/UNOCCUPIED MODE. UNITS SHALL ALWAYS BE CONSIDERED IN COOLING MODE.
4. EACH UNIT SHALL OPERATE ACCORDING TO ITS FACTORY ON-BOARD CONTROLS TO MAINTAIN RETURN AIR SETPOINT OF 80F.
5. CCMS SHALL MONITOR SPACE TEMPERATURE BY MEANS OF WALL-MOUNTED TEMPERATURE SENSOR, SEE PLANS FOR LOCATION.
6. CCMS SHALL MONITOR EACH UNIT FOR STATUS AND ALARM.
7. UPON SENSING PRODUCTS OF COMBUSTION, SMOKE DETECTOR AT EACH UNIT SHALL DE-ENERGIZE UNIT, SEND ALARM TO CCMS, AND SEND TROUBLE INDICATOR TO FIRE ALARM SYSTEM.

AUTOMATIC TEMPERATURE CONTROLS - GENERAL REQUIREMENTS

A. ALL CONTROLS SHALL BE CONNECTED TO AND INTEGRATED WITH AN EXISTING CENTRAL DDC SYSTEM ON THE UMB CAMPUS, EITHER SIEMENS OR JOHNSON CONTROLS AS SPECIFIED.

B. A MINIMUM OF ONE DDC CONTROL PANEL SHALL BE PROVIDED IN EACH OF THE MAJOR MECHANICAL ROOMS (PENTHOUSE MER, AND GARDEN LEVEL MER), AND ON EACH FLOOR.

C. A MINIMUM OF ONE LOCAL CONTROL PANEL SHALL BE PROVIDED FOR EACH AIR-HANDLER, THE HEATING HOT WATER SYSTEM, CHILLER PLANT, AND DHU-1.

D. THE SEQUENCES INDICATED ON THE DRAWINGS DESCRIBE THE DESIGN INTENT OF THE AUTOMATIC TEMPERATURE CONTROL SYSTEMS. PROVIDE ALL DEVICES, EQUIPMENT, AND WIRING AS REQUIRED TO PERFORM THE INDICATED SEQUENCES.

E. SEE OTHER DRAWINGS FOR ATC REQUIREMENTS RELATED TO OTHER SYSTEMS, INCLUDING PLUMBING, LIGHTING, AND FIRE PROTECTION.

F. UNLESS OTHERWISE NOTED, SIZE ALL AUTOMATIC CONTROL VALVES FOR A MAXIMUM OF TEN (10) FOOT WATER PRESSURE DROP AT THE MAXIMUM DESIGN FLOW RATE.

G. SEE PLANS FOR LOCATION OF ALL ROOM THERMOSTATS, CONTROL PANELS, DAMPERS, VALVES, AND EQUIPMENT. WHERE SUCH DEVICES ARE NOT INDICATED, HOWEVER REQUIRED BY THE SEQUENCES, THEY SHALL BE PROVIDED AND LOCATED IN THE FIELD AS DIRECTED BY THE ARCHITECT AND OWNER.

H. ALL PUMPS AND FANS SHALL BE PROVIDED WITH CURRENT TRANSDUCERS FOR STATUS PROOF.

I. ALL TEMPERATURE, PRESSURE, HUMIDITY, AIR FLOW, WATER FLOW AND TIME SET POINTS SHALL BE FULLY ADJUSTABLE FROM THE CENTRAL CONTROL AND MONITORING SYSTEM (CCMS).

J. PROVIDE ALL HARDWARE, SOFTWARE, DEVICES, EQUIPMENT AND WIRING AS REQUIRED TO INTERFACE WITH THE CCMS.

K. ALL TWO (2) POSITION DAMPERS SHALL BE PROVIDED WITH END SWITCHES.

L. REFER TO INPUT/OUTPUT SUMMARY SCHEDULE FOR ADDITIONAL CONTROL ITEMS NOT DESCRIBED IN THE SEQUENCES. THE INPUT/OUTPUT SUMMARY SCHEDULE LISTS THE MINIMUM REQUIREMENTS. PROVIDE ALL REQUIRED POINTS FOR COMPLETE OPERATION OF THE SYSTEM.

M. VARIABLE FREQUENCY DRIVES SHALL BE SOFT STARTED AT MINIMUM SPEED AND INCREASED TO OPERATING SPEED BY THE CCMS.

N. THE CONTROL MANUFACTURER SHALL PREPARE AND SUBMIT FOR APPROVAL A COMPOSITE CONTROL AND INTERLOCK WIRING DIAGRAM DEPICTING THE CONTROL SYSTEM THAT WILL BE PROVIDED. THE MANUFACTURER SHALL BE RESPONSIBLE FOR AND SHALL PROVIDE ALL CONTROL AND INTERLOCK WIRING FOR THE ENTIRE SYSTEM INCLUDING THE CHILLER CONTROL SYSTEM AND COMMUNICATION MODULE PROVIDED BY THE CHILLER MANUFACTURER. DIAGRAMS SHALL CLEARLY SHOW HOW THE MANUFACTURER'S CONTROLS AND OTHER DEVICES WILL BE INTERFACED WITH ALL OF THE EQUIPMENT INSTALLED UNDER THIS CONTRACT REQUIRING CONNECTIONS TO THE CONTROL SYSTEM.

O. START/STOP CONTROL OF ALL CHILLERS, CHILLED WATER PUMPS, CONDENSER WATER PUMPS, SYSTEM VALVES, COOLING TOWER CELLS AND FANS SHALL BE THROUGH THE CCMS AS PROVIDED BY THE CONTROL MANUFACTURER. CHILLER MANUFACTURER PANELS (CMP) SHALL CONTROL THE CHILLER AND ITS INTEGRAL START/STOP SAFETY FUNCTIONS. THE CMP AND CCMS SHALL PROVIDE ALL STATUS AND ALARM MONITORING FOR EACH SYSTEM COMPONENT AND ALSO INDICATED CHILLER DIAGNOSTIC. THE START/STOP SETTING FOR VARIOUS SYSTEM COMPONENTS SHALL BE PERFORMED MANUALLY THROUGH A HAND-OFF- AUTO SWITCH (HOA) OR BY THE CCMS AS OUTLINED IN THE CONTRACT DOCUMENTS.

P. THE CCMS SHALL BE RESPONSIBLE FOR INITIATING THE CHILLERS, CONDENSER WATER PUMPS, CHILLED WATER PUMPS, SYSTEM VALVES, COOLING TOWER LEVEL STATUS, COOLING TOWER FAN OPERATION. ALL CHILLER SAFETY CONDITIONS MUST BE SATISFIED IN ORDER FOR THE CCMS TO INITIATE THE SYSTEM. IF ANY OF THE SYSTEM CONDITIONS ARE NOT NORMAL OR CHILLER DIAGNOSTICS ARE INDICATED ON THE CMP A MESSAGE SHALL BE DISPLAYED INDICATING THE SPECIFIC PROBLEM AT THE CMP AND THE CCMS. A DISPLAY ON THE CMP AND THE CCMS WILL SHOW WHEN SYSTEM START WAS INITIATED.

Q. THE CCMS SHALL PROVIDE FOR CHILLER AND COOLING TOWER OPTIMIZATION.

R. SMOKE DAMPERS SHALL BE PROVIDED AS SHOWN ON THE DRAWINGS AND REQUIRED BY CODE.

S. ALL TWO POSITION VALVES SHALL BE FITTED WITH AN END SWITCH TO INDICATE PROOF OF OPENING AND CLOSURE. THE END SWITCH SHALL BE INTERNAL OR EXTERNAL TO THE VALVE ACTUATOR.

T. THE CCMS SHALL INTEGRATE THE TOWER TREATMENT SYSTEM, TOWER FILTRATION SYSTEM, TOWER MAKE UP WATER AND DRAIN SYSTEM FOR PROPER OPERATION.

U. AFTER EACH ROOM AIR TERMINAL UNIT (RATU) HAS BEEN FIELD SET AT ITS DESIGN OPERATING POSITION, THE ATC CONTRACTOR SHALL SET THE PROGRAM LOGIC OF EACH RATU SO THAT AUTOMATIC RATU CALIBRATION IS SCHEDULED DURING THE UNOCCUPIED MODE.

V. THE ATC CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT THE ROOM NUMBERS ASSIGNED TO ALL CONTROL COMPONENTS SUCH AS RATU'S, THERMOSTATS ETC IN THE PROGRAM LOGIC ARE THE ACTUAL ROOM NUMBERS USED IN THE BUILDING PRIOR TO THE SYSTEM BEING TURNED OVER TO OWNER.

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Campus Center

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Automatic Temp. Controls

100% CONSTRUCTION DOCUMENTS

UMB PROJECT NO. 99-311
WTW PROJECT NO. 70-4091
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H6.3

DDC - INPUT / OUTPUT POINT SCHEDULE

| SYSTEM, APPARATUS OR AREA POINT DESCRIPTION | INPUT TO DDC: ANALOG: TEMPERATURE | HUMIDITY | PRESSURE | GPM | KW | GPM | LB/HR | VELOCITY (FPM) | DIFF. PRESSURE | VALVE POSITION % | DAMPER POSITION % | TONS | ENTHALPY | RUN TIME | EFFICIENCY | DIFF. FLOW | COT | FPM | INPUT TO DDC: BINARY: PRESSURE SWITCH | CURRENT RELAY | SMOKE DETECTOR | LOW LIMIT | CONTACT | HIGH LIMIT | END SWITCH | STATUS | HI-LO-FAIL | FREEZE | AIR FLOW | METER | FLOW SWITCH | UNDERFLOOR WATER | OUTPUT FROM DDC: ANALOG: PNEUMATIC | VALVE CONTROL | CURRENT | DAMPER CONTROL | VFD | DIGITAL: OFF - ON | OPEN - CLOSE | SET POINT ADJUST | SYSTEM FEATURES: ALARMS: HI ANALOG | LOW ANALOG | MAINTENANCE | CRITICAL | HI BINARY | LO BINARY | PROGRAMS: TIME SCHEDULING | DEMAND LIMITING | NIGHT SETBACK | OCCUPIED/UNOCCUPIED | TEMPERATURE CYCLE | OPTIMAL START/STOP | TREND | ALARM INSTRUCTION | DDC CONTROL | LEAD LAG | GENERAL: AUTOMATIC STAND BY | COLOR GRAPHICS | UTILITY MGMT | PRESSURE ALARM | DRYER ALARM | NOTES |
|---|---|---

CHILLER PLANT CONTROL SEQUENCE

GENERAL

1. LEAD/LAG STATUS OF THE PUMPS SHALL ALTERNATE ON A MONTHLY BASIS.
2. IF AFTER 30 SECONDS, THE LEAD PUMP FAILS TO START, THE LAG PUMP SHALL START AND AN ALARM SHOULD BE SENT BACK TO THE BUILDING AUTOMATION SYSTEM, BAS.
3. PUMP STATUS SHALL BE AS DETERMINED BY A CURRENT TRANSDUCER ON THE PUMP MOTOR.
4. THIS PLANT WILL PROVIDE OR RECEIVE CHILLED WATER TO/FROM THE SON/HSHSL LOOP SYSTEM. THEREFORE, THE BAS SHALL COMMAND CHILLER AND PUMP POINTS THROUGH THE BAS. THE BAS SHALL ALSO MONITOR AND PROFILE THE FLOW RATES AND TEMPERATURES OF THE SON/HSHSL LOOP.
5. VALVE V-19 SHALL BE LOCKED OPEN.

CHILLER MODE

1. THE CHILLER SYSTEM TO BE ACTIVATED MANUALLY OR AUTOMATICALLY THROUGH THE BAS. WHEN THE CHILLER SYSTEM IS ACTIVATED, LEAD PRIMARY CHILLED WATER PUMP AND LEAD CONDENSER WATER PUMP START AND RUN FOR A PREDETERMINED RUN TIME AND WHEN FULL PROOF OF FLOW IS SENSED, THEN THE CHILLER AND COOLING TOWER ARE ACTIVATED.
2. THE PUMPS, CHILLER AND COOLING TOWER SHALL BE ENERGIZED WHEN COOLING TOWER IS PROVEN FULL OF WATER.
3. ANY FAILURE TO COMPLETE A SUCCESSFUL START SHALL CAUSE THE CHILLER TO ENTER A SHUTDOWN MODE AND SEND AN ALARM SIGNAL TO THE BAS. THIS SHALL ACTIVATE THE IMPORTING OF CHILLED WATER AS STATED BELOW.
4. THE DEMAND FOR CHILLED WATER SHALL BE DETERMINED BY THE CHILLER MANUFACTURER'S PANEL (CMP) SENSING THE TEMPERATURE DIFFERENCE BETWEEN THE EVAPORATOR FLUID SETPOINT AT T-6 AND THE SUPPLY FLUID TEMPERATURE AT T-1 WHEN CHILLED WATER FLOW IS ESTABLISHED BY THE CHILLER MANUFACTURER SUPPLIED FLOW SWITCH AND BY A REMOTE START SEQUENCE FROM THE BAS.
5. THE CHILLED WATER SET POINT AT T-1 SHALL BE 45 DEGREES F (ADJUSTABLE). THE BAS SHALL TRANSMIT A "UNIT IS RUNNING" MESSAGE TO THE BAS.
6. THE COOLING TOWER SHALL MAINTAIN A CONDENSER WATER SUPPLY TEMPERATURE OF 65 DEGREES F (ADJUSTABLE) AT T-7 TO THE CHILLER'S CONDENSER. A TEMPERATURE TRANSMITTER T-7 LOCATED IN THE MAIN CONDENSER WATER SUPPLY PIPE SHALL SENSE THE CONDENSER WATER SUPPLY TEMPERATURE TO THE CHILLER AND CYCLE THE COOLING TOWER FAN SPEED THROUGH THE BAS. THE COOLING TOWER FAN SHALL CYCLE FROM LOW TO HIGH SPEED THROUGH THE VSD TO MAINTAIN THE CONDENSER WATER SUPPLY TEMPERATURE SETPOINT AT T-7.
7. THE COOLING TOWER CELLS UTILIZE A CENTRAL BYPASS SYSTEM THAT IS CONTROLLED BY A MODULATING TWO WAY MOTORIZED AUTOMATIC CONTROL VALVE V-23. THE COOLING TOWER BYPASS VALVE V-23 SHALL MODULATE DURING LOW OUTSIDE AIR TEMPERATURE CONDITIONS IN ORDER TO MAINTAIN A MINIMUM 70 DEGREES F (ADJUSTABLE) SETPOINT TEMPERATURE AS SENSED BY A TEMPERATURE TRANSMITTER T-7. AS THE CONDENSER WATER SUPPLY TEMPERATURE INCREASES, THE BY PASS CONTROL VALVE V-23 SHALL MODULATE TO A CLOSED POSITION AND INCREASE THE CONDENSER WATER FLOW TO THE COOLING TOWER. THIS PROCESS SHALL CONTINUE WITH FULL FLOW OVER THE TOWER UNTIL MAXIMUM SETPOINT TEMPERATURE IS REACHED AT T-7. THE COOLING TOWER CELL BY PASS SYSTEM IS CONTROLLED BY THE BAS IN ORDER TO MAINTAIN A MINIMUM SETPOINT TEMPERATURE OF 70 DEGREES F (ADJUSTABLE) AT T-7.
8. THE BAS WILL ACTIVATE THE TOWER WATER MAKE UP SYSTEM WHEN THERE IS A CALL FOR COOLING. THE BAS SHALL GIVE A FULL SIGNAL WHEN THE TOWER WATER LEVEL IS AT AN ACCEPTABLE LEVEL BEFORE THE CHILLER, PRIMARY CHILLED WATER PUMP AND THE CONDENSER WATER SYSTEM IS ENERGIZED. THE BAS WILL ALLOW ACTIVATION OF THE TOWER FILTRATION SYSTEM WHEN THE CONDENSER SYSTEM IS FULL. LEVEL SENSOR SHALL MAINTAIN THE PROPER LEVEL IN THE COOLING TOWER BASIN SECTION BY ADDITION OF MAKE-UP WATER. A ELECTRONIC LIQUID LEVEL MONITOR SHALL HAVE HIGH AND LOW BASIN ALARMS FOR TOWER CELL TO THE BAS. THE LIQUID LEVEL MONITOR SHALL ACTIVATE COOLING TOWER MAKE-UP WATER VALVE TO MAINTAIN ITS SETPOINT. THE BAS WILL DEACTIVATE THE TOWER WATER MAKE UP SYSTEM, FILTRATION SYSTEMS, AND THE CHEMICAL TREATMENT SYSTEMS WHEN THE COOLING SYSTEM IS DEACTIVATED (ADJUSTABLE). THE WATER MAKE-UP VALVE SHALL BE PROVIDED BY SIEMENS. THE VALVE SHALL ACCEPT SIGNAL TO OPEN FROM THE COOLING TOWER LEVEL CONTROLLER AND PROVE THE MAKE-UP VALVE IS OPEN THROUGH THE ATC SYSTEM.
9. AFTER THE TOWER WATER LEVEL PROBE SYSTEM SHOWS PROOF OF THE TOWER BEING FULL OF WATER, AND AFTER CHILLED WATER FLOW IS ESTABLISHED, THE CONDENSER WATER PUMP SHALL START AFTER A PREDETERMINED TIME DELAY AS SUGGESTED BY THE CHILLER MANUFACTURER.
10. THE BAS WILL DEACTIVATE THE COOLING TOWER FANS WHEN THE CHILLER SYSTEM IS IN THE DEACTIVATED MODE.
11. THE TOWER FILL SYSTEM MUST MAINTAIN A FULL STATUS, THE CONDENSER WATER PUMP PROOF MUST REMAIN MADE AND THE CONDENSER WATER FLOW SHALL BE VERIFIED FOR A MINIMUM OF FIVE (5) MINUTES BEFORE CHILLER IS ENERGIZED.
12. NOT USED.
13. WHEN OUTDOOR AIR TEMPERATURE FALLS TO 35 DEGREES F, BASIN HEATERS ARE PLACED UNDER CONTROL OF BASIN THERMOSTAT PROVIDED BY COOLING TOWER MANUFACTURER, AND PIPE TRACING CABLE IS PLACED UNDER CONTROL OF THERMOSTAT PROVIDED WITH THE HEAT TRACE SYSTEM.

SECONDARY CHILLED WATER SYSTEM

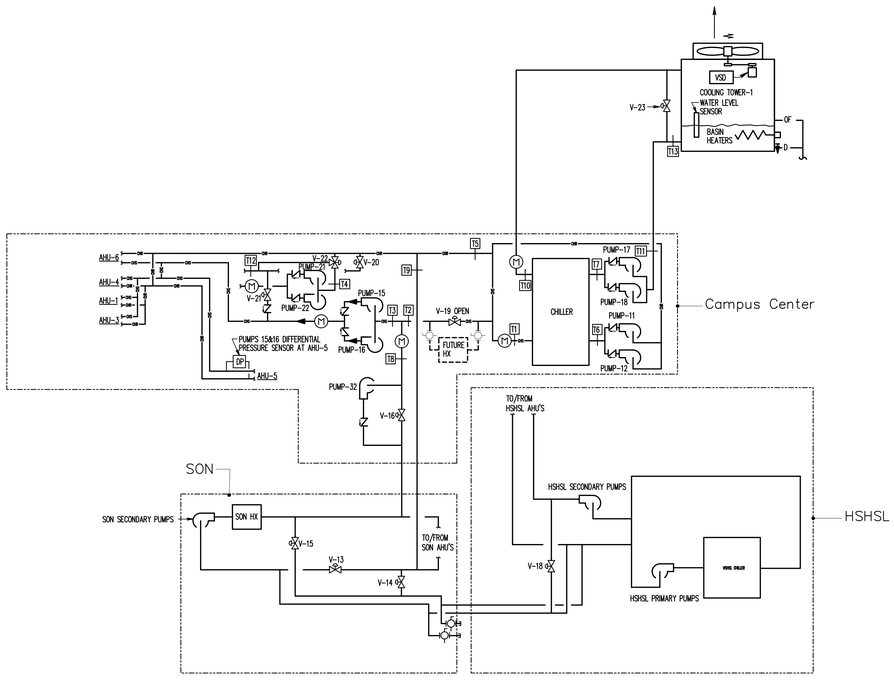
1. THE LEAD SECONDARY CHILLED WATER PUMP SHALL BE STARTED AT REDUCED SPEED THROUGH ITS VSD WHEN SYSTEM START IS INITIATED. REDUCED SPEED STARTING SHALL BE THE MINIMUM SETTING OF THE VARIABLE FREQUENCY PUMP DRIVE AND SHALL BE FULLY ADJUSTABLE THROUGHOUT THE RANGE OF THE DRIVE.
2. DIFFERENTIAL PRESSURE TRANSMITTER (DPT'S) WITH ADJUSTABLE SETPOINT, THROUGH A LOGIC CONTROLLER, SHALL MODULATE THE VARIABLE FREQUENCY PUMP DRIVE TO MAINTAIN A SETPOINT OF 10 PSI (ADJUSTABLE). IF THERE ARE MULTIPLE TRANSMITTERS, THE TRANSMITTER CALLING FOR AN INCREASE IN DIFFERENTIAL PRESSURE ABOVE ITS MINIMUM SETPOINT SHALL TAKE CONTROL OF THE PUMP DRIVE. ON A FALL IN THE REQUIRED DIFFERENTIAL PRESSURE AS SENSED BY EITHER TRANSMITTER THE PUMP DRIVE SHALL GRADUALLY INCREASE THE PUMP SPEED FROM MINIMUM TO MAXIMUM AS REQUIRED TO MAINTAIN THE SETPOINT. ON A RISE IN DIFFERENTIAL PRESSURE THE REVERSE SHALL OCCUR. THE DPT'S SHALL BE LOCATED INDICATED ON THE DRAWINGS OR AS DIRECTED BY UMB. PROVIDE A MINIMUM OF 2 DPT'S.

PROCESS CHILLED WATER PUMPS

1. THE LEAD PROCESS CHILLED WATER PUMP SHALL BE STARTED AT REDUCED SPEED THROUGH ITS VSD WHEN SYSTEM START IS INITIATED. REDUCED SPEED STARTING SHALL BE THE MINIMUM SETTING OF THE VSD AND SHALL BE FULLY ADJUSTABLE THROUGHOUT THE RANGE OF THE DRIVE.
2. DIFFERENTIAL PRESSURE TRANSMITTER (DPT'S) WITH ADJUSTABLE SETPOINT, THROUGH A LOGIC CONTROLLER, SHALL MODULATE THE VSD TO MAINTAIN THEIR SETPOINT IF 10 PSI (ADJUSTABLE). THE TRANSMITTER CALLING FOR AN INCREASE IN DIFFERENTIAL PRESSURE ABOVE ITS MINIMUM SETPOINT SHALL TAKE CONTROL OF THE PUMP DRIVE. ON A FALL IN THE REQUIRED DIFFERENTIAL PRESSURE AS SENSED BY EITHER TRANSMITTER THE PUMP DRIVE SHALL GRADUALLY INCREASE THE PUMP SPEED FROM MINIMUM TO MAXIMUM AS REQUIRED TO MAINTAIN THE SETPOINT. IN A RISE IN DIFFERENTIAL PRESSURE THE REVERSE SHALL OCCUR. THE DPT'S SHALL BE LOCATED WHERE INDICATED ON THE DRAWINGS OR AS DIRECTED BY UMB. PROVIDE A MINIMUM OF 2 DPT'S.
3. DISTRIBUTION PUMP CYCLES SHALL BE LIMITED TO STARTING BY AN ADJUSTABLE TIME PERIOD OF ONE (1) HOUR. PUMP STARTS AND STOPS SHALL BE LIMITED BY THE TIME PERIOD AND INDICATED ON THE BAS.
4. THE PROCESS CHILLED WATER LOOP SHALL BE MAINTAINED AT A CONSTANT TEMPERATURE BY A CONTROL VALVE V-22 AND TEMPERATURE SENSOR T-4 WHERE LOCATED AS INDICATED ON THE DRAWINGS. TEMPERATURE SENSOR T-4 LOCATED IN THE PIPING SYSTEM SHALL SIGNAL THE CONTROL VALVE TO MODULATE IN ORDER TO MAINTAIN ITS SET POINT OF 70F (ADJUSTABLE).
5. WHEN THE CHILLED WATER SYSTEM IS ACTIVATED VALVE V-20 IS OPEN AND VALVE V-21 IS CLOSED. WHEN THE CHILLED WATER SYSTEM IS DEACTIVATED VALVE V-20 IS CLOSED, VALVE V-21 IS OPEN AND THE AHU COOLING COIL CONTROL VALVES ARE FULLY OPEN.

CHILLED WATER PLANT POINTS LIST

System, Apparatus, or Area Point Description	INPUTS: ANALOG MEASURED: Temperature	KW	Flow	Press.	Diff. Pres.	CALC.: Tons	INPUTS: BINARY: Status	Hi-Lo-Full	Current	OUTPUTS: DIGITAL: On-Off	Off-On	Open-Close	Siren/Strobe	ANALOG: Valve Control	Set Point Adj.	SYSTEM FEATURES: ALARMS: Vari Drive	Hi Analog	Hi Binary	Low Binary	PROGRAMS: Proof	Freeze Prot.	Trend	Alarm	GEN.: DDC Control	Orographic	Utility	Supplementary Notes
Chilled Water System		X													X												
Chiller #1							X		X											X							
Chiller #1 Supply Water	X		X												X			X									T-1, Utility Meter
Chiller #1 Return Water	X																										T-6
Chiller #1 Load Limit															X												
Chiller #1 Return Condenser Water	X		X														X	X									T-7, Utility Meter
Refrigerant Detection System				X			X										X		X								
Exhaust Fan								X		X										X							EF-11
Machine Room	X																X										
Equipment Shutdown							X					X							X								Switch Located at each Door
Primary Chilled Pumps								X	X											X		X				X	Pumps 11 & 12
Campus Loop Supply Water	X																										T-8
Campus Loop Return Water	X																X										T-9
Secondary Chilled Pumps								X	X						X					X							Pumps 15 & 16, VSD
Secondary Chilled Water Supply	X																X										T-3
Secondary Chilled Water Return	X																X										T-5
Secondary Chilled Water			X		X												X	X									Utility Meter
Export Pump			X		X			X	X						X					X		X				X	Pump 32, VSD, Utility Meter
Campus Isolation Valve												X		X								X					V-19
Condenser Water System																					X			X	X	X	
Condenser Water Pumps								X	X											X							Pumps 17 & 18
Tower Fan								X	X						X												VSD
Condenser Water Supply	X																X	X									T-7, T-13
Condenser Water Return	X																X										T-10
Condenser Water Mix	X																X										T-11
Condenser Water Bypass Valve													X							X							V-23
Condenser Water Filter Pump							X		X																		
Tower Make-Up Water Valve							X					X															
Tower Level								X									X	X	X								
Chemical Treatment System							X		X														X				
City Water Supply Meter			X																								
Tower Water Bleed			X																								
Filter Backwash Discharge			X																								
Cooling Tower Drain			X																								
Process Cooling Loop																								X	X	X	
Process Pumps					X				X	X					X					X							Pumps 21 & 22, VSD
Process Water Supply	X		X														X	X									T-4, Utility Meter
Process Water Return	X																X	X									T-12
Process Water												X		X													V-20, V-21
Process Water Temperature Control														X													V-22



1 **CHILLER PLANT CONTROL DIAGRAM**
NONE

DRAWING NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. SEE DETAILS, FLOW SCHEMATICS AND CONTROL DIAGRAMS FOR ALL ASSOCIATED VALVES, METERS, SENSORS, FITTINGS AND ETC. NOT SHOWN ON THE CONTROL DIAGRAMS.

SON/CC/HSHSL CHILLER PLANTS OPERATION

CAMPUS CENTER IS MANUALLY SELECTED PRIMARY PLANT THROUGH THE BAS

CAMPUS CENTER PLANT CHILLED WATER TEMPERATURE AT T-1 IS 45 DEGREES F

CAMPUS CENTER: CC PRIMARY, SECONDARY AND SUPPLEMENTAL CHILLED WATER SYSTEM SHALL OPERATE AS STATED ON CHILLED WATER PLANT CONTROL SEQUENCE. VALVE V-16 IS CLOSED. PUMP-32 SHALL START. PUMP-32 VSD SHALL BE CONTROLLED BY THE SON SECONDARY PUMPS DIFFERENTIAL PRESSURE SENSORS.
SON: PRIMARY CHILLED WATER PLANT IS OFF. SECONDARY PUMPS ARE OFF. VALVES V-13 AND V-15 ARE OPEN, VALVE V-14 IS CLOSED.
HSHSL: PRIMARY CHILLED WATER PLANT IS OFF. SECONDARY PUMPS ARE ON. VALVE V-18 IS CLOSED.

CAMPUS CENTER PLANT CHILLED WATER TEMPERATURE AT T-1 RISES ABOVE 46 DEGREES F, HSHSL PLANT OPERATES

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CC AND HSHSL PLANTS CHILLED WATER TEMPERATURES RISE ABOVE 46 DEGREES F, SON PLANT OPERATES

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PLANTS DROP OFF IN REVERSE ORDER AS PLANT DISCHARGE TEMPERATURES FALL BELOW 44 DEGREES F.

SCHOOL OF NURSING IS MANUALLY SELECTED PRIMARY PLANT THROUGH THE BAS

SON PLANT CHILLED WATER TEMPERATURE IS 45 DEGREES F

CAMPUS CENTER: CC SECONDARY AND SUPPLEMENTAL CHILLED WATER SYSTEM SHALL OPERATE AS STATED ON CHILLED WATER PLANT CONTROL SEQUENCE. PRIMARY PLANT IS OFF. VALVE V-16 IS OPEN. PUMP-32 IS OFF.
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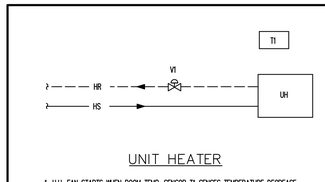
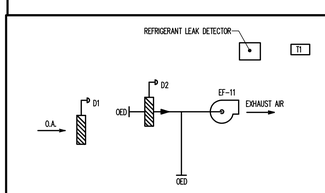


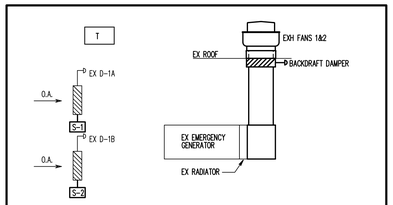
UNIT HEATER

1. U.H. FAN STARTS WHEN ROOM TEMP. SENSOR T1 SENSES TEMPERATURE DECREASE TO 60 DEG. F.
2. T-1 MODULATES V1 TO MAINTAIN 60 DEG. F TEMPERATURE
3. U.H. FAN STOPS WHEN ROOM TEMP. SENSOR T1 SENSES TEMPERATURE INCREASE TO 65 DEG. F.



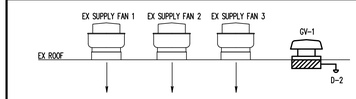
CHILLER PLANT VENTILATION

1. ROOMSTAT T1 SHALL OPEN D1 AND D2 AND THEN START EF-11 WHEN TEMPERATURE RISES TO 85 DEGREES F.
2. EF-11 SHALL STOP AND THEN D1 AND D2 SHALL CLOSE WHEN SPACE TEMPERATURE FALLS TO 75 DEGREES F.
3. AN ALARM CONDITION AT THE REFRIGERANT LEAK DETECTOR SHALL OPEN DAMPER D1, CLOSE DAMPER D2, AND START EF-11. IF EF-11 IS RUNNING AT THE TIME OF AN ALARM, DAMPER D2 SHALL CLOSE, DAMPER D1 SHALL REMAIN OPEN, AND THE FAN SHALL REMAIN ON.
4. EF-11 AND DAMPERS D1 AND D2 SHALL RETURN TO NORMAL OPERATION 30 MINUTES AFTER THE END OF AN ALARM CONDITION.



1. WHEN GENERATOR STARTS EXISTING OUTDOOR AIR INTAKE MOTOR OPERATED DAMPERS D-1A AND D-1B OPEN AND FANS 1 AND 2 START, END SWITCHES S-1 AND S-2 PROVE DAMPERS OPEN. IF DAMPER FAILS TO OPEN, AN ALARM SHALL BE SENT THROUGH THE BAS.
2. EXISTING EMERGENCY GENERATOR CONTROLS SHALL BE MODIFIED BY GENERATOR MANUFACTURER TO OPERATE EXHAUST FANS 1 AND 2 WHEN GENERATOR OPERATES.
3. WHEN EMERGENCY GENERATOR IS NOT OPERATING, DAMPERS D-1A AND D-1B SHALL BE OPEN WHEN ROOM TEMPERATURE SENSED BY EXISTING TEMPERATURE SENSOR IS ABOVE 90 DEGREES F. WHEN END SWITCHES S-1 AND S-2 ARE PROVEN OPEN THEN FANS 1 AND 2 START.
4. EXHAUST FANS 1 AND 2 SHALL BE MONITORED BY THE BAS. IF EITHER FAN FAILS TO OPERATE, A LOCAL ALARM SHALL SOUND AND AN ALARM SHALL BE SENT THROUGH THE BAS.
5. WHENEVER ROOM TEMPERATURE AS SENSED BY TEMPERATURE SENSOR T IS ABOVE 100 DEGREES F OR BELOW 40 DEGREES F, AN ALARM SHALL BE SENT THROUGH THE BAS.

SON EMERGENCY GENERATOR VENTILATION



WHEN EITHER SUPPLY FAN 1, 2 AND/OR 3 IS COMMANDED BY THE EXISTING CONTROL SYSTEM TO OPERATE DAMPER D-2 SHALL BE OPEN. WHEN ALL 3 FANS ARE OFF DAMPER D-2 SHALL BE CLOSED.

SON ELECTRIC ROOM VENTILATION VENTILATION

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Rev.	Date:	Comment:
4	01/29/10	Record Drawing
3	04/09/09	Bulletin # 107
2	09/04/08	Bulletin # 63
1	03/31/08	Bulletin # 34
0	05/02/07	For Construction

Issued: May 2, 2007

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Automatic Temp. Controls

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H6.5

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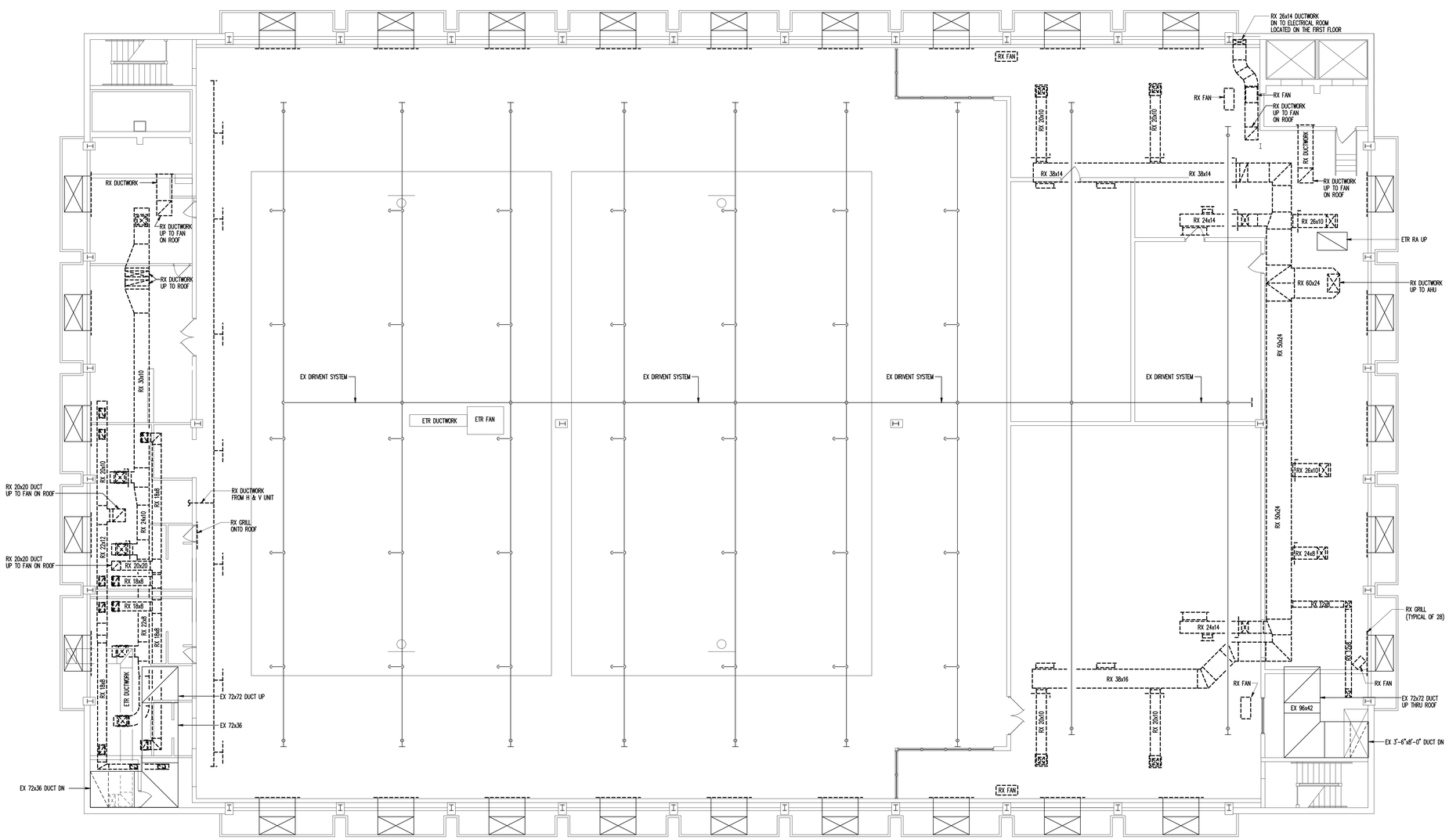

1 DEMOLITION - TENTH FLOOR PLAN
1/8" = 1'-0"

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1	01/29/10	Record Drawing
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HVAC Demolition AC 10th Floor Plan

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HAD1.1

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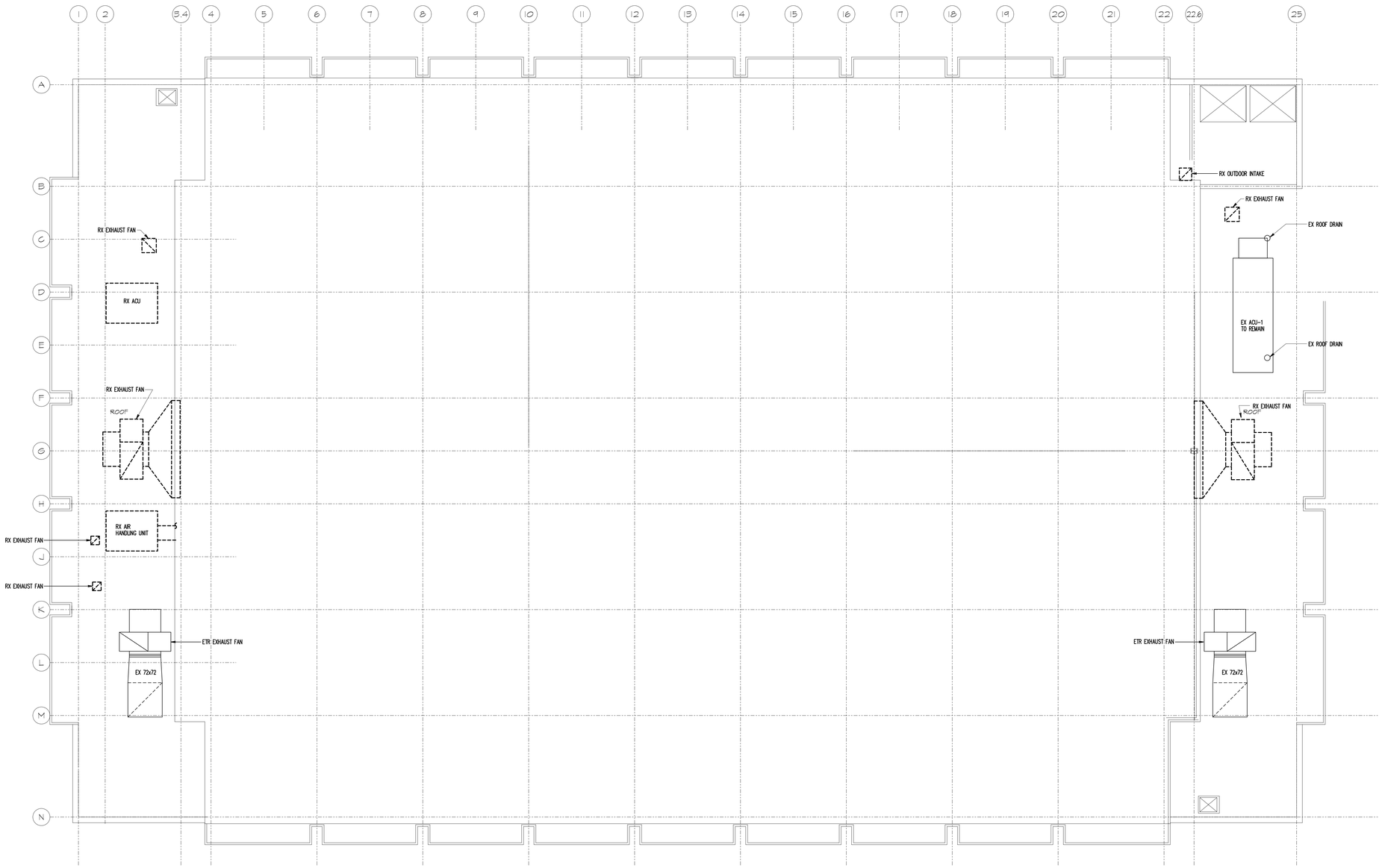

1 DEMOLITION - ROOF PLAN
1/8" = 1'-0"

0 4' 8' 16'

N

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HVAC Demolition AC Roof Plan

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HAD1.2

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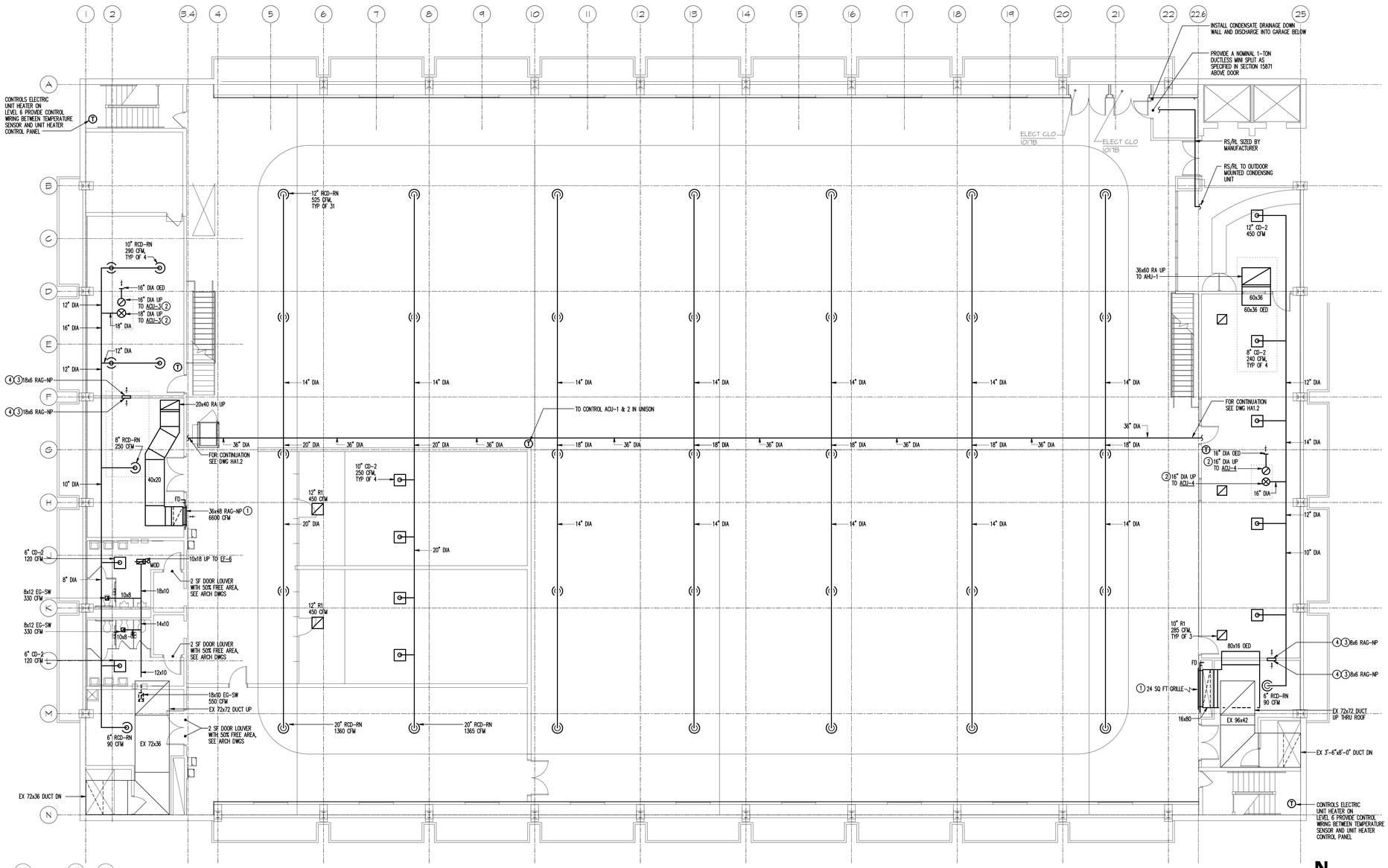
SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

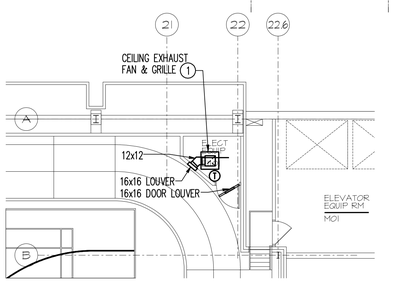
1. MOUNT BOTTOM OF REGISTER 6" AFF.
2. TRANSISTION TO SIZE OF AHU CONNECTION IN VERTICAL
3. MOUNT TOP OF GRILLE 6" BELOW STRUCTURE ABOVE
4. REGISTER SHALL BE PROVIDED WITHOUT DAMPER

DRAWING NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. EX DIRVENT SYSTEM NOT SHOWN FOR CLARITY.



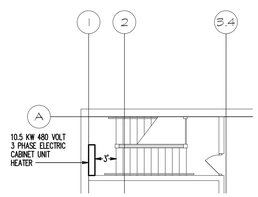
1 DUCTWORK - TENTH FLOOR PLAN
1/8" = 1'-0"



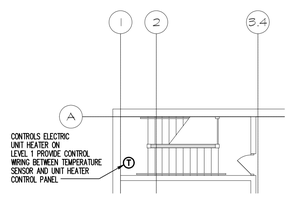
NOTE:

1. GREENHECK SP-228 (400 CFM) W/WALL MOUNTED THERMOSTAT SET TO OPERATE FAN WHENEVER ROOM TEMPERATURE RISES ABOVE 80 DEG F.

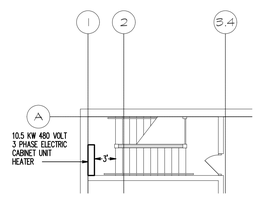
7 10TH FLOOR GARAGE
1/4" = 1'-0"



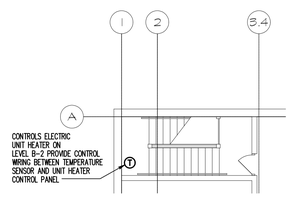
2 INTERMEDIATE LANDING BETWEEN LEVELS 6 & 7
1/8" = 1'-0"



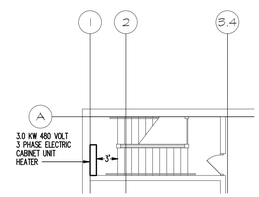
3 INTERMEDIATE LANDING BETWEEN LEVELS 5 & 6
1/8" = 1'-0"



4 INTERMEDIATE LANDING BETWEEN LEVELS 1 & 2
1/8" = 1'-0"



5 INTERMEDIATE LANDING BETWEEN LEVELS B-1 & 1
1/8" = 1'-0"



6 INTERMEDIATE LANDING BETWEEN LEVELS B-2 & B-1
1/8" = 1'-0"

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Ductwork-AC 10th Floor Plan

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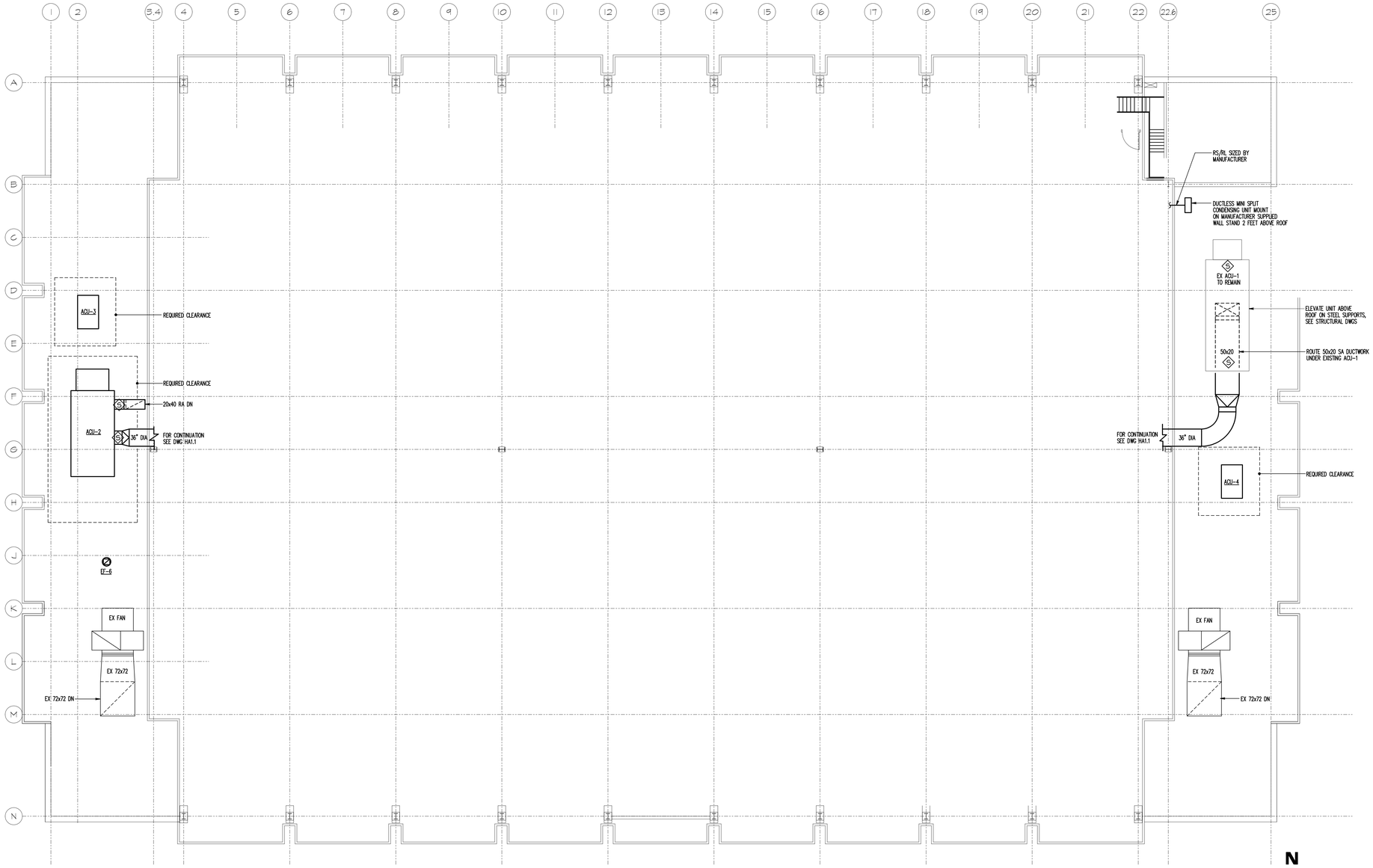
HA1.1

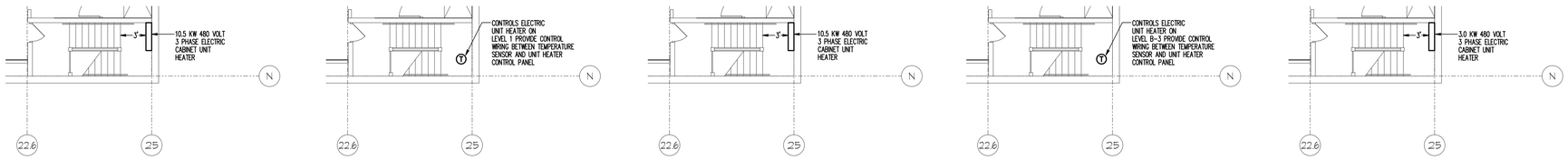
HALLC JOB NO.: U0472A0

DRAWING NOTES: (APPLIES TO THE DRAWING ONLY)

1. REFER TO SPECIFICATIONS FOR ACU CONTROL SEQUENCES.
2. EF-6 SHALL BE INTERLOCKED TO OPERATE WITH ACU-1 & 2.



1 DUCTWORK - ROOF PLAN
1/8" = 1'-0"



2 INTERMEDIATE LANDING BETWEEN LEVELS 6 & 7
1/8" = 1'-0"

3 INTERMEDIATE LANDING BETWEEN LEVELS 5 & 6
1/8" = 1'-0"

4 INTERMEDIATE LANDING BETWEEN LEVELS 1 & 2
1/8" = 1'-0"

5 INTERMEDIATE LANDING BETWEEN LEVELS B-1 & 1
1/8" = 1'-0"

6 INTERMEDIATE LANDING BETWEEN LEVELS B-3 & B-2
1/8" = 1'-0"

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Campus Center

621 West Lombard Street
University of Maryland, Baltimore
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Ductwork-AC Roof Plan

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WTW PROJECT NO. 70-4091
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HALLC JOB NO.: U0472A0

PLUMBING ABBREVIATIONS

ACU	AIR CONDITIONING UNIT
AD	ACCESS DOOR
ADJ	ADJUSTABLE, ADJACENT
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AL	ALUMINUM
ALT	ALTERNATE
AP	ACCESS PANEL
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
AVG	AVERAGE
B	BOTTOM
BAS	BUILDING AUTOMATION SYSTEM
BFP	BACK FLOW PREVENTER
BHP	BRAKE HORSEPOWER
BLDG	BUILDING
BM	BEAM
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
BWV	BACK WATER VALVE
CAB	CABINET
CAP	CAPACITY
CC	COOLING COIL
CFH	CUBIC FEET PER HOUR
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
CI	CAST IRON
CIP	CAST IRON PIPE
CIRC	CIRCULATING
CL	CENTERLINE
CLG	CEILING
CNTR	CENTER
CO	CLEANOUT
CO2	CARBON DIOXIDE
COL	COLUMN
COMP	COMPRESSOR
CONC	CONCRETE
CONN	CONNECTION
CONT	CONTINUOUS/CONTINUED
CONV	CONVERTER/CONVECTOR
CT	COOLING TOWER
CU	COPPER/CUBIC
CV	CONSTANT VOLUME/CHECK VALVE
CW	COLD WATER
CX	CONNECT TO EXISTING
D	DEPTH/DEEP/DRAIN
DEG	DEGREES
DESIG	DESIGNATION
DET	DETAIL
DIA	DIAMETER
DIM	DIMENSION
DN	DOWN
DSCH	DISCHARGE
DWC	DRINKING WATER COOLER
DWG	DRAWING
DWH	DOMESTIC WATER HEATER
EA	EACH
EER	ELECTRICAL EQUIPMENT ROOM
EFF	EFFICIENCY
EFT	ENTER FLUID TEMPERATURE
EL	ELEVATION
ELEC	ELECTRIC
EMER	EMERGENCY
EQ	EQUAL
EQUIP	EQUIPMENT
ETR	EXISTING TO REMAIN
EWT	ENTERING WATER TEMPERATURE
EX	EXISTING
EXP	EXPOSED/EXPANSION
EXT	EXTERIOR/EXTERNAL
F	FAHRENHEIT/FIRE/FIRE LINE
FD	FLOOR DRAIN
FF	FINISHED FLOOR/FLOOR-TO-FLOOR
FH	FIRE HYDRANT
FIG	FIGURE
FIN	FINISH
FLR	FLOOR
FP	FIRE PROTECTION
FPD	FLUID PRESSURE DROP
FT	FOOT/FEET
FTG	FOOTING
FW	FILTERED WATER
G	GAS
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GEN	GENERAL
GPH	GALLONS PER HOUR
GR	GRADE
GRD	GREASE RECOVERY DEVICE
GS	GREASE SANITARY
GV	GREASE VENT
H	HEIGHT/HIGH
HB	HOSE BIBB
HORIZ	HORIZONTAL
HP	HORSEPOWER/HIGH PRESSURE
HW	HOT WATER
HWR	HOT WATER RETURN
HX	HEAT EXCHANGER
I	INLET
ID	INSIDE DIAMETER
IN	INCH
INSUL	INSULATION/INSULATED
INT	INTERIOR
INV	INVERT
IW	INDIRECT WASTE
JT	JOINT
KW	KILOWATT
KWH	KILOWATT HOURS
L	LENGTH
LAV	LAVATORY
LB	POUNDS
LFT	LEAVING FLUID TEMPERATURE
LLS	LIQUID LEVEL SENSOR
LP	LOW PRESSURE
LVG	LEAVING
LWT	LEAVING WATER TEMPERATURE
MATL	MATERIAL
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MECH	MECHANICAL
MER	MECHANICAL EQUIPMENT ROOM
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MRS	MANIFOLD RECIRCULATION SYSTEM
MTD	MOUNTED
MTG	MOUNTING
MV	MIXING VALVE
N	NORTH
N/A	NOT APPLICABLE
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NUMBER/NORMALLY OPEN
NOM	NOMINAL
NPSHR	NET POSITIVE SUCTION HEAD REQUIRED
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OF	OVERFLOW
OH	OVERHEAD
P	PIPE/PLUMBING FIXTURE TYPE/PRESSURE
PD	PRESSURE DROP
PREL	PRELIMINARY
PRIM	PRIMARY
PRV	PRESSURE REDUCING VALVE
PSIG	PRESSURE - POUNDS PER SQ INCH, GAUGE
R	RISER/RISE/RADIUS
RAD	RADIUS
RD	ROOF DRAIN
REC	RECOVERY
RED	REDUCING/REDUCED/REDUCTION
REF	REFERENCE
REL	RELOCATE/RELIEF
REQD	REQUIRED
RET	RETURN
REV	REVISION/REVISE
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
RPZ BFP	REDUCED PRESSURE ZONED BACKFLOW PREVENTER
RV	RELIEF VALVE
RX	REMOVE EXISTING
S	SOUTH/SOIL/SECONDS/SANITARY
SAN	SANITARY
SB	SLEEVE BEAM
SCH	SCHEDULE
SD	STORM DRAIN
SERV	SERVICE
SH	SHOWER
SHT	SHEET
SL	SLOPE/SLEEVE
SMH	SANITARY MANHOLE
SP	SPRINKLER PIPING
SPEC	SPECIFICATION
SQ	SQUARE
SS	SERVICE SINK
SSW	SECONDARY STORM WATER
STD	STANDARD
STL	STEEL
STM	STEAM
STR	STRUCTURAL
SUP	SUPPLY
SUSP	SUSPEND/SUSPENDED
SW	STORM WATER
SYS	SYSTEM
TBD	TO BE DETERMINED
TEMP	TEMPERATURE
THRU	THROUGH
TOT	TOTAL
TRANS	TRANSFER
TW	TEMPERED WATER
TWV	TEMPERING WATER VALVE
TYP	TYPICAL
UC	UNDERCUT
UG	UNDERGROUND
V	VENT/VALVE
VAR	VARIABLE/VARIES
VEL	VELOCITY
VERT	VERTICAL
VOL	VOLUME
VTR	VENT THROUGH ROOF
VV	VAPOR VENT
W	WASTE/WATER
W/	WITH
W/O	WITHOUT
WC	WATER CLOSET
WG	WATER GAGE
WH	WALL HYDRANT
WL	WATER LEVEL
WPD	WATER PRESSURE DROP
WTR	WATER
XMET	X PSIG STEAM
XMTM	X PSIG COND. RETURN

PLUMBING LEGEND

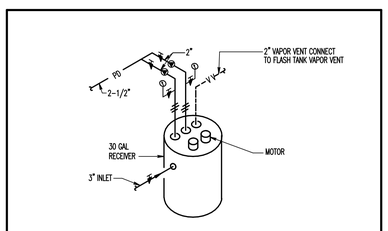
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	SOIL OR WASTE		AUTOMATIC CONTROL VALVE
	VENT		RELIEF VALVE
SW	STORM WATER		PRESSURE REDUCING VALVE
D-()	DRAIN (ALL TYPES)		UNION
BWV	BACK WATER VALVE		STRAINER
	FOUNDATION DRAIN		ANCHOR
LP	LOW PRESSURE COLD WATER		PRESSURE GAUGE
LP	LOW PRESSURE HOT WATER		THERMOMETER
140	HIGH PRESSURE 140 DEG. HOT WATER		AIR VENT
140	HIGH PRESSURE 140 DEG. HOT WATER RETURN	PD	PUMP DISCHARGE
HP	HIGH PRESSURE COLD WATER	F	FIRE LINE
HP	HIGH PRESSURE 110 DEG. HOT WATER	SP	SPRINKLER PIPING
	HIGH PRESSURE 110 DEG. HOT WATER RETURN	A / M-1	SECTION DESIGNATION TOP - REFERENCE, BOTTOM - DRAWING
CHS	CHILLED WATER SUPPLY	S-1	RISER DESIGNATION
CHR	CHILLED WATER RETURN		REDUCED PRESSURE ZONED BACK FLOW PREVENTER
	WALL HYDRANT		DOUBLE CHECK BACK FLOW PREVENTER
	HOSE BIBB		FLOW INDICATOR FOR PORTABLE METER
D	DRAIN		SHUTOFF VALVE
	CHECK VALVE	(GPM)	BALANCING VALVE

PLUMBING GENERAL NOTES: (APPLICABLE TO ALL DRAWINGS)

1. THE LOCATION OF EXISTING UNDERGROUND UTILITIES IS SHOWN IN AN APPROXIMATE WAY ONLY. DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. REPAIR ALL DAMAGES OCCASIONED BY FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDER GROUND UTILITIES.
2. RUN ALL SOIL, WASTE AND DRAIN PIPING WITH 2 PERCENT MINIMUM GRADE UNLESS OTHERWISE NOTED. HORIZONTAL VENT PIPING SHALL BE GRADED TO DRIP BACK TO THE SOIL OR WASTE PIPE BY GRAVITY.
3. ELEVATIONS NOTED ARE TO CENTERLINES OF PIPES FOR ALL PRESSURE LINES AND TO INVERT FOR ALL GRAVITY FLOW LINES.
4. MAINTAIN MINIMUM OF 3'-0" COVER OVER UNDERGROUND WATER MAINS AND MINIMUM OF 2'-6" COVER OVER UNDERGROUND SEWERS AND DRAINS.
5. PROVIDE SHUTOFF VALVES IN DOMESTIC WATER SYSTEMS IN BRANCH LINES SERVING TWO OR MORE FIXTURES.
6. UNLESS OTHERWISE NOTED, ALL PIPING IS OVERHEAD, TIGHT TO UNDERSIDE OF SLAB, WITH SPACE FOR INSULATION IF REQUIRED.
7. INSTALL PIPING SO THAT ALL VALVES ARE ACCESSIBLE.
8. COORDINATE ALL MECHANICAL WORK WITH ELECTRICAL WORK, ETC., SHOWN ON OTHER DRAWINGS.
9. MAINTAIN MINIMUM 6"-8" CLEARANCE TO UNDERSIDE OF PIPES, DUCTS, CONDUIT, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ACCESS ROUTES IN MECHANICAL AND ELECTRICAL ROOMS.
10. WHERE HOT AND COLD WATER PIPING DROPS INTO PIPE CHASE, THE SIZE SHOWN FOR THE PIPE DROPS SHALL BE USED TO THE LAST FIXTURE.
11. CERTAIN ITEMS SUCH AS ACCESS DOORS, RISE AND DROPS IN PIPING, ETC., ARE INDICATED ON THE DRAWINGS FOR CLARITY OR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THESE ITEMS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THESE ITEMS AS REQUIRED ELSEWHERE IN THE CONTRACT DOCUMENTS.
12. WHERE THE INSTALLATION OF NEW SERVICES OR THE EXTENSION OF EXISTING SERVICES REQUIRE CUTTING OF EXISTING FLOORS, WALLS, PARTITIONS, ETC., IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CHECK FOR THE PRESENCE OF EXISTING MECHANICAL AND/OR ELECTRICAL SERVICES WITHIN OR IMMEDIATELY BENEATH CONSTRUCTION AND EXERCISE NECESSARY PRECAUTIONS TO PREVENT DAMAGE TO THE SERVICES OR INJURY TO HIS PERSONNEL DUE TO CONTACT WITH SAME. WHERE PRACTICAL, SUCH EXISTING SERVICES SHALL BE TEMPORARILY DISCONNECTED DURING THE CUTTING OPERATION. SUCH OUTAGES IN SERVICE SHALL BE SCHEDULED IN ADVANCE WITH THE OWNER.
13. FLOW SCHEMATIC AND RISER DIAGRAMS INDICATE FLOW AND OPERATION CONCEPT AS WELL AS GENERAL ARRANGEMENT OF EQUIPMENT. VALVES, PRESSURE GAUGES, ETC. ARE INDICATED FOR THIS PURPOSE. ADDITIONAL VALVES, PRESSURE GAUGES, ETC. SHALL BE PROVIDED AS SHOWN ON VARIOUS EQUIPMENT DETAILS. SEE PLANS AND DETAILS FOR PIPE SIZES NOT INDICATED ON FLOW SCHEDULE AND RISER DIAGRAMS.

PLUMBING POINTS LIST

System, Apparatus, or Area Point Description	INPUTS: ANALOG: MEASURED: Temperature	Pressure	KW	PPM	Diff. Pres.	INPUTS: BINARY: Status	Hi-Lo-Fail	Smoke	Freeze	SYSTEM FEATURES: ALARMS: Hi Analog	Low Analog	Hi Binary	Low Binary	Proof	PROGRAMS: Time Scheduling	Alarm Distribut	Night Set-back	DDC Control	Occ/Unocc	GENERAL: Color Graphic	Utility Management				Supplementary Notes
Domestic Heater																									
Recirc Pump						X							X												
Supply Temperature Hi-Limit	X									X															
Miscellaneous Alarms																	X			X					
Sump Pit						X						X													
Sewage Pit						X						X													
Domestic Booster Package		X				X				X	X														



PUMPS 34 AND 35
CONDENSATE PUMP AND RECEIVER SET

PRESSURE REDUCING VALVES (1)

UNIT NO.	LOCATION	SERVICE	PRESSURE, PSIG: INLET	PRESSURE, PSIG: OUTLET	CAPACITY GPM	PIPE SIZE	NOTES
PRV-1	MECHANICAL M009	110 DEG HOT WATER	87	50	5	3/4	
PRV-2	MECHANICAL M009	110 DEG HOT WATER	87	50	2	1/2	
PRV-3	STORAGE J017	110 DEG HOT WATER	87	50	7	1	

NOTES FOR PRESSURE REDUCING VALVES:

(1) PIPE DRAIN TO CLOSEST FLOOR DRAIN.

GAS PRESSURE REGULATORS

UNIT NO.	LOCATION	SERVICE	PRESSURE, IN. WG: INLET MAX.	INLET MIN	OUTLET	CAPACITY CFH	PIPE SIZE	NOTES
GPR-1	MECHANICAL M009	CAMPUS CENTER GAS	19	12	10	1200	4	
GPR-2	LOUNGE 111	FIREPLACE GAS	10	10	6	48	1	
GPR-3	LAUNDRY 419	DRYER GAS	10	10	7	330	2	

SPECIAL EQUIPMENT (1)(2)(3)(4)

DESIG. #	NAME	CW	HW	IW	G	NOTES
SE-1	WASHING MACHINE	(1) 3/4; (1) 1/2	(1) 3/4; (1) 1/2	3	-	
SE-2	CLOTHES DRYER	3/4	-	-	3/4	165 CFH
SE-3	SWIMSUIT EXTRACTOR	-	-	1-1/2	-	(5)
SE-4	FIREPLACE	-	-	-	1/2	48 CFH (6)

NOTES FOR SPECIAL EQUIPMENT:

(1) PIPE SIZES ARE FOR BRANCHES TO ROUGH-IN LOCATION FOR EQUIPMENT CONNECTION. WHERE EQUIPMENT CONNECTION SIZE IS DIFFERENT THAN ROUGH-IN SIZE, PROVIDE UNION AND ADAPTER AT CONNECTION POINT.

(2) PROVIDE SHUTOFF VALVE FOR EACH ITEM IN CW, HW, AND GAS PIPING NEAR THE POINT OF CONNECTION IN AN ACCESSIBLE LOCATION.

(3) PROVIDE UNION OR EQUIVALENT FITTING AT EACH CONNECTION POINT.

(4) PROVIDED UNDER ANOTHER DIVISION

(5) SEE SWIMSUIT EXTRACTOR DETAIL

(6) UNDER SEPARATE BID PACKAGE

KITCHEN EQUIPMENT (5)(2)(3)(1)

DESIG. #	NAME	CW	HW	S/W	IW	V (4)	NOTES
1	ICE BIN	-	-	-	(1)3/4 (1)1	-	1/2" TW FROM ITEM 2 (6)
2	FILTER SYSTEM, ICEMAKER	3/4	-	-	-	-	1/2" TW TO ITEM 1
7	SINGLE COMPARTMENT SINK	1/2	1/2	-	1-1/2	-	140 DEG HW (9)(10)
8	DISPOSER	1/2	-	-	2	-	(8)
10	UNDERCOUNTER DISHWASHER	-	3/4	3/4	-	-	140 DEG HW (7)
13	SINK, HAND, WALL MOUNT	1/2	1/2	1-1/2	-	1-1/2	110 DEG HW
19	BEVERAGE WORK TABLE W/ SINK	1/2	1/2	1-1/2	-	1-1/2	110 DEG HW

NOTES FOR KITCHEN EQUIPMENT:

(1) PIPE SIZES ARE FOR BRANCHES TO ROUGH-IN LOCATION FOR EQUIPMENT CONNECTION. WHERE EQUIPMENT CONNECTION SIZE IS DIFFERENT THAN ROUGH-IN SIZE, PROVIDE UNION AND ADAPTER AT CONNECTION POINT.

(2) PROVIDE SHUTOFF VALVE FOR EACH ITEM IN CW AND HW PIPING NEAR THE POINT OF CONNECTION IN AN ACCESSIBLE LOCATION.

(3) PROVIDE UNION OR EQUIVALENT FITTING AT EACH CONNECTION POINT.

(4) INDIVIDUAL VENT PIPE SIZE SHALL BE FROM EQUIPMENT DRAIN TO BRANCH VENT OR VENT STACK, EXCEPT WHERE INDICATED OTHERWISE.

(5) PROVIDED UNDER ANOTHER DIVISION.

(6) PIPE IW TO CLOSEST FLOOR DRAIN.

(7) SEE DISHWASHER DETAIL

(8) PROVIDE A VACUUM BREAKER IN THE CW LINE.

(9) ONE COMPARTMENT CONNECTED TO DISPOSER, ITEM 8.

(10) PROVIDE CHECK VALVES IN HOT AND COLD WATER SUPPLY TO PREVENT CROSS FLOW IF SANITIZER MIXERS ARE CONNECTED. CHECK VALVES TO BE INSTALLED IN PIPING AND NOT IN FAUCET SHANKS.

INSTANTANEOUS STEAM DOMESTIC WATER HEATERS

UNIT NO.	LOCATION	STEAM PSIG	STEAM LBS/HR	WATER SERVICE: GPM	EWT	LWT	NOTES
DWH-1	MECHANICAL M009	60	3,000	60	40	140	
DWH-2	MECHANICAL M009	60	3,000	60	40	140	

ELECTRIC DOMESTIC WATER HEATERS

UNIT NO.	LOCATION	SERVICE	KW	STORAGE GALLONS	NOTES
DWH-3	ATHLETIC CENTER ROOM 1008	DOMESTIC HOT WATER	6	10	

DOMESTIC HOT WATER EXPANSION TANKS

UNIT NO.	LOCATION	SERVICE	ACCEPTANCE VOLUME GALLONS	APPROX SIZE Dxl.	CONNECTION SIZE	INITIAL CHARGE PSIG	NOTES
ET-1	MECHANICAL M009	DWH-1 & DWH-2	1	10x11	3/4	87	
ET-2	ATHLETIC CENTER ROOM 1008	DWH-3	1	10x11	3/4	40	

GAS BOOSTERS

UNIT NO.	LOCATION	SERVICE	VOLUME CFH	BOOST PRESSURE IN WC	CONNECTION SIZE	MOTOR HP	NOTES
GB-1	MECHANICAL M009	NATURAL GAS	5400	9	3	1/2	
GB-2	MECHANICAL M009	NATURAL GAS	5400	9	3	1/2	

PUMPS

UNIT NO.	TYPE	LOCATION	SERVICE	FLUID	GPM	TOTAL HEAD	TEMP.	MOTOR HP	RPM	NOTES
PUMP-23	H	MECHANICAL M009	STORM WATER	WATER	200	30	60	3	1750	(1)(4)
PUMP-24	G	MECHANICAL M009	SEWAGE	EFFLUENT	100	35	60	2	1750	(1)(5)
PUMP-25	F	MECHANICAL M009	CAMPUS CENTER BOOSTER	WATER	160	105	40	10	1760	(1)(2)
PUMP-26	F	GARAGE LEVEL B-1	ATHLETIC CENTER BOOSTER	WATER	30	85	40	5	3600	(1)(3)
PUMP-27	I	ELEVATOR 1&2 PIT	ELEVATOR 1&2 SUMP	WATER	20	30	60	1/2	3600	
PUMP-28	I	ELEVATOR 3 PIT	ELEVATOR 3 SUMP	WATER	20	30	60	1/2	3600	
PUMP-29	I	ELEVATOR 4 PIT	ELEVATOR 4 SUMP	WATER	20	30	60	1/2	3600	
PUMP-30	A	MECHANICAL M009	HOT WATER RECIRC	WATER	15	20	110	1/8	1725	
PUMP-31	A	MECHANICAL M009	HOT WATER RECIRC	WATER	10	15	140	1/8	1725	
PUMP-34	J	MECHANICAL M009	STM CONDENSATE	140 WATER	30	23	140	1/3	3500	(1)
PUMP-35	J	MECHANICAL M009	STM CONDENSATE	140 WATER	30	23	140	1/3	3500	(1)

NOTES FOR PUMPS:

(1) DUTY INDICATED IS FOR EACH PUMP OF A DUPLEX PUMP SET.

(2) SET BOOSTER SYSTEM PRV FOR 87 PSI

(3) SET BOOSTER SYSTEM PRV FOR 80 PSI

(4) 42" DIAMETER BASIN

(5) 36" DIAMETER BASIN

PLUMBING FIXTURES

DESIG. (1)	NAME	CW (2)	HW (2)	S/W (2)	VENT (3)	NOTES
P-1	WATER CLOSET	1	-	4	2	
P-2	URINAL	3/4	-	2	1-1/2	
P-3	LAVATORY - WALL MOUNTED	1/2	1/2	1-1/2	1-1/2	
P-4	LAVATORY - COUNTERTOP	1/2	1/2	1-1/2	1-1/2	
P-5	MOP RECEPTOR	1/2	1/2	3	1-1/2	(4)
P-6	ELECTRIC WATER COOLER	1/2	-	1-1/2	1-1/2	
P-7	SHOWER	1/2	1/2	2	1-1/2	
P-8	SERVICE SINK - WALL MOUNTED	1/2	1/2	3	1-1/2	
P-9	KITCHEN SINK - RESIDENTIAL	1/2	1/2	1-1/2	1-1/2	
P-10	ELECTRIC WATER COOLER (NATATORIUM)	1/2	-	1-1/2	1-1/2	
P-11	LAUNDRY SINK	1/2	1/2	(2) 1-1/2	1-1/2	
P-12	EYE WASH	-	-	1-1/2	1-1/2	1" TW FROM P-13
P-13	EYE WASH MIXING VALVE	1/2	1/2	-	-	1" TW TO P-12

NOTES FOR PLUMBING FIXTURES:

(1) PLAN DESIGNATION MAY INCLUDE LETTER(S) FOR DIFFERENT FEATURES OR "A" TO DESIGNATE MOUNTING HEIGHT FOR WHEEL CHAIR USE. PIPING CONNECTION SIZES ARE THE SAME FOR ALL FIXTURES WITH THE SAME NUMBER DESIGNATION.

(2) PIPING CONNECTION SIZES ARE BRANCH SIZES WHICH SHALL BE TO FIXTURE ROUGH-IN LOCATION. PROVIDE ADAPTER WHERE PIPE CONNECTION SIZE AT FIXTURE IS DIFFERENT THAN ROUGH-IN PIPE SIZE.

(3) INDIVIDUAL VENT PIPE SIZE SHALL BE FROM FIXTURE DRAIN OR DRAINAGE FITTING TO BRANCH VENT OR VENT STACK, EXCEPT WHERE INDICATED OTHERWISE.

(4) PROVIDE CHECK VALVES IN HOT AND COLD WATER SUPPLY TO PREVENT CROSS FLOW IF DETERGENT MIXERS ARE CONNECTED. CHECK VALVES TO BE INSTALLED IN PIPING AND NOT IN FAUCET SHANKS.

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Campus Center

621 West Lombard Street
University of Maryland, Baltimore
Baltimore, MD

General Notes,Abbs, Legend, Schedules

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PLUMBING LEGEND

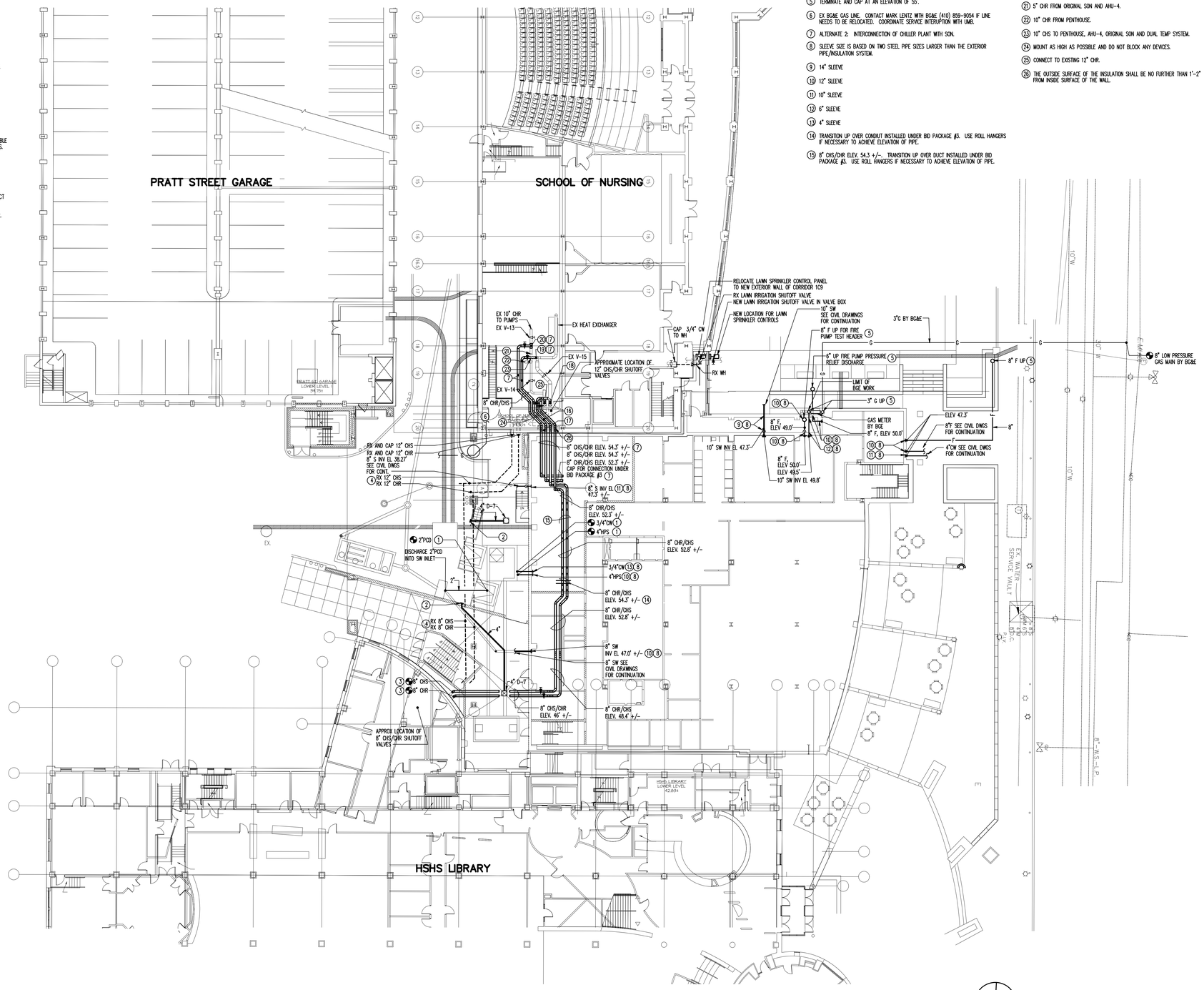
SYMBOL	DESCRIPTION
———	SOIL OR WASTE
——SW——	STORM WATER
- - - - - - -	FOUNDATION DRAIN/SUBSOIL DRAINAGE
——-——-	COLD WATER
——F——	FIRE LINE
——G——	GAS
——	SHUTOFF VALVE
	CONNECT TO EXISTING

PLUMBING GENERAL NOTES: (APPLICABLE TO ALL DRAWINGS)

1. THE LOCATION OF EXISTING UNDERGROUND UTILITIES IS SHOWN IN AN APPROXIMATE WAY ONLY. DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. REPAIR ALL DAMAGES OCCASIONED BY FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDER GROUND UTILITIES.
2. RUN ALL SOIL, WASTE AND DRAIN PIPING WITH 2 PERCENT MINIMUM GRADE UNLESS OTHERWISE NOTED. HORIZONTAL VENT PIPING SHALL BE GRADED TO DRIP BACK TO THE SOIL OR WASTE PIPE BY GRAVITY.
3. ELEVATIONS NOTED ARE TO CENTERLINES OF PIPES FOR ALL PRESSURE LINES AND TO INVERT FOR ALL GRAVITY FLOW LINES.
4. ADJUST SEWER INVERTS TO KEEP TOPS OF PIPES IN LINE WHERE PIPE SIZE CHANGES.
5. MAINTAIN MINIMUM OF 3'-0" COVER OVER UNDERGROUND WATER MAINS AND MINIMUM OF 2'-6" COVER OVER UNDERGROUND SEWERS AND DRAINS.
6. UNLESS OTHERWISE NOTED, ALL PIPING SHALL BE INCH SIZE.
7. INSTALL PIPING SO THAT ALL VALVES ARE ACCESSIBLE.
8. COORDINATE ALL MECHANICAL WORK WITH ELECTRICAL WORK, ETC., SHOWN ON OTHER DRAWINGS.
9. CERTAIN ITEMS SUCH AS RISE AND DROPS IN PIPING, ETC., ARE INDICATED ON THE DRAWINGS FOR CLARITY OR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THESE ITEMS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THESE ITEMS AS REQUIRED ELSEWHERE IN THE CONTRACT DOCUMENTS.
10. WHERE THE INSTALLATION OF NEW SERVICES OR THE EXTENSION OF EXISTING SERVICES REQUIRE CUTTING OF EXISTING FLOORS, WALLS, PARTITIONS, ETC., IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CHECK FOR THE PRESENCE OF EXISTING MECHANICAL AND/OR ELECTRICAL SERVICES WITHIN OR IMMEDIATELY BENEATH CONSTRUCTION AND EXERCISE NECESSARY PRECAUTIONS TO PREVENT DAMAGE TO THE SERVICES OR INJURY TO HIS PERSONNEL DUE TO CONTACT WITH SAME. WHERE PRACTICAL, SUCH EXISTING SERVICES SHALL BE TEMPORARILY DISCONNECTED DURING THE CUTTING OPERATION. SUCH OUTAGES IN SERVICE SHALL BE SCHEDULED IN ADVANCE WITH THE OWNER.

PLUMBING ABBREVIATIONS

+/-	APPROXIMATELY
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
BGAE	BALTIMORE GAS AND ELECTRIC COMPANY
BLDG	BUILDING
BWV	BACK WATER VALVE
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
CL	CENTERLINE
CNTR	CENTER
CO	CLEANOUT
COL	COLUMN
CONN	CONNECTION
CONT	CONTINUOUS/CONTINUED/CONTINUATION
CW	COLD WATER
CX	CONNECT TO EXISTING
D	DEPTH/DEEP/DRAIN
DESIG	DESIGNATION
DET	DETAIL
DIA	DIAMETER
DIM	DIMENSION
DN	DOWN
DSCH	DISCHARGE
DWGS	DRAWING
EA	EACH
EL	ELEVATION
ELEV	ELEVATION
ETR	EXISTING TO REMAIN
EWT	ENTERING WATER TEMPERATURE
EX	EXISTING
EXP	EXPOSED/EXPANSION
EXT	EXTERIOR/EXTERNAL
F	FAHRENHEIT/FIRE/FIRE LINE
FD	FLOOR DRAIN/FOUNDATION DRAIN
FF	FINISHED FLOOR/FLOOR-TO-FLOOR
FH	FIRE HYDRANT
FIG	FIGURE
FIN	FINISH
FLR	FLOOR
FT	FOOT/FEET
FTG	FOOTING
G	GAS
GEN	GENERAL
GPM	GALLONS PER MINUTE
GR	GRADE
H	HEIGHT/HIGH
HPS	HIGH PRESSURE STEAM
HSHSL	HSHS LIBRARY
I	INLET
ID	INSIDE DIAMETER
IN	INCH
INSUL	INSULATION/INSULATED
INV	INVERT
L	LENGTH
LB	POUNDS
LP	LOW PRESSURE
MAX	MAXIMUM
MECH	MECHANICAL
MER	MECHANICAL EQUIPMENT ROOM
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MTD	MOUNTED
MTG	MOUNTING
N	NORTH
N/A	NOT APPLICABLE
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NUMBER/NORMALLY OPEN/NITROUS OXIDE
NOM	NOMINAL
OC	ON CENTER
OD	OUTSIDE DIAMETER
OPNG	OPENING
OPP	OPPOSITE
P	PIPE/PLUMBING FIXTURE TYPE/PRESSURE
PCD	PUMPED CONDENSATE DISCHARGE
PSIG	PRESSURE - POUNDS PER SQ INCH, GAUGE
R	RISER/RISE/RADIUS
REQD	REQUIRED
RET	RETURN
REV	REVISION/REVISE
RX	REMOVE EXISTING
S	SOUTH/SOIL/SECONDS/SANITARY
SD	SUBSOIL DRAINAGE
SERV	SERVICE
SL	SLOPE/SLEEVE
SMH	SANITARY MANHOLE
SON	SCHOOL OF NURSING
SPEC	SPECIFICATION
SQ	SQUARE
SS	SERVICE SINK
STD	STANDARD
STL	STEEL
STM	STEAM
STR	STRUCTURAL
SUP	SUPPLY
SW	STORM WATER
SYS	SYSTEM
TEMP	TEMPERATURE
THRU	THROUGH
TYP	TYPICAL
UG	UNDERGROUND
V	VENT/VALVE
VERT	VERTICAL
VOL	VOLUME
W	WASTE/WATER
WG	WATER GAGE
WPD	WATER PRESSURE DROP
WT	WEIGHT



1 SITE WORK PLAN
1/16" = 1'-0"

DRAWING NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. CHILLED WATER SYSTEM BETWEEN SON AND HSHSL SHALL BE OPERATIONAL WHENEVER OUTDOOR AIR TEMPERATURE IS ABOVE 55 DEGREES F.

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. COORDINATE ELEVATIONS WITH BID PACKAGE 1.
2. DISCHARGE DRAIN 8" ABOVE GRADE OUT OF THE SIDE OF THE LOADING DOCK.
3. TRANSITION PIPE TO COORDINATE WITH EXISTING PIPE ELEVATIONS.
4. REMOVE EXISTING CHILLED WATER SUPPLY AND RETURN LINES BACK TO NEW WORK CONNECTION POINTS.
5. TERMINATE AND CAP AT AN ELEVATION OF 55'.
6. EX BGAE GAS LINE. CONTACT MARK LENTZ WITH BGAE (410) 859-9054 IF LINE NEEDS TO BE RELOCATED. COORDINATE SERVICE INTERUPTION WITH UMB.
7. ALTERNATE 2: INTERCONNECTION OF CHILLER PLANT WITH SON.
8. SLEEVE SIZE IS BASED ON TWO STEEL PIPE SIZES LARGER THAN THE EXTERIOR PIPE/INSULATION SYSTEM.
9. 14" SLEEVE
10. 12" SLEEVE
11. 10" SLEEVE
12. 6" SLEEVE
13. 4" SLEEVE
14. TRANSITION UP OVER CONDUIT INSTALLED UNDER BID PACKAGE #3. USE ROLL HANGERS IF NECESSARY TO ACHIEVE ELEVATION OF PIPE.
15. 8" CHS/CHR ELEV. 54.3 +/-. TRANSITION UP OVER DUCT INSTALLED UNDER BID PACKAGE #3. USE ROLL HANGERS IF NECESSARY TO ACHIEVE ELEVATION OF PIPE.
16. RELOCATE LIGHT FIXTURE TO ALLOW FOR INSTALLATION OF PIPING.
17. RELOCATE EXISTING CONDUIT AND JUNCTION BOX TO NEW PARTITION.
18. CONNECT TO EXISTING 12" CHS.
19. CONNECT TO EXISTING 10" CHR AFTER V-15 TAKEOFF.
20. CONNECT TO EXISTING 10" CHR.
21. 5" CHR FROM ORIGINAL SON AND AHU-4.
22. 10" CHR FROM PENTHOUSE.
23. 10" CHS TO PENTHOUSE, AHU-4, ORIGINAL SON AND DUAL TEMP SYSTEM.
24. MOUNT AS HIGH AS POSSIBLE AND DO NOT BLOCK ANY DEVICES.
25. CONNECT TO EXISTING 12" CHR.
26. THE OUTSIDE SURFACE OF THE INSULATION SHALL BE NO FURTHER THAN 1'-2" FROM INSIDE SURFACE OF THE WALL.

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Issued: February 16, 2007

Campus Center

621 West Lombard Street
University of Maryland, Baltimore
Baltimore, MD

Key Plan

Site Work Plan

PLAN REVISIONS
05/09/08

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P0.2

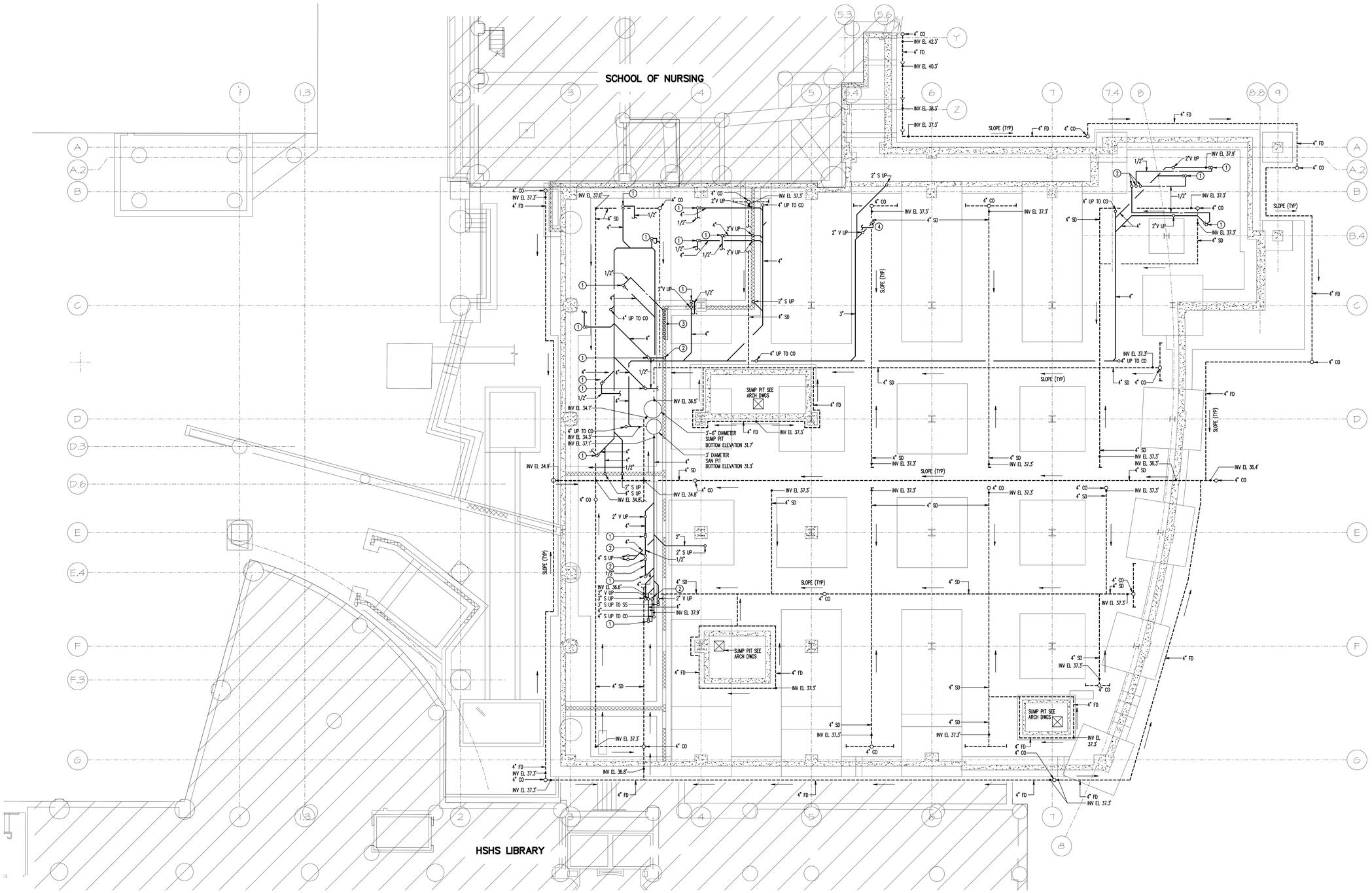
HALLC JOB NO.: U0472A0

DRAWING NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. SLOPE FOUNDATION DRAINAGE PIPING TOWARDS SUMP PUMP.
2. GARDEN LEVEL WALLS ARE SHOWN FOR REFERENCE.
3. ALL SANITARY AND VENT PIPING THAT RISES ABOVE THE GARDEN LEVEL ELEVATION CAP 12" ABOVE FINISHED FLOOR FOR FUTURE CONNECTION.

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. 4" FLOOR DRAIN. PROVIDE 1/2" CW CONNECTION TO TRAP FOR FUTURE INSTALLATION OF TRAP PRIMER.
2. 1/2" CW UP AND CAPPED 12" ABOVE GARDEN LEVEL ELEVATION FOR FUTURE CONNECTION.
3. 1/2" CW UP AND CAPPED 12" ABOVE GARDEN LEVEL ELEVATION FOR FUTURE CONNECTION. PROVIDE 1/2" CW CONNECTION TO MECHANICAL ROOM FLOOR DRAINS.
4. 3" FLOOR DRAIN. PROVIDE 1/2" CW CONNECTION TO TRAP FOR FUTURE INSTALLATION OF TRAP PRIMER.



1 FOUNDATION PLAN
1/8" = 1'-0"

0 4' 8' 16'

N

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Campus Center

621 West Lombard Street
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Key Plan

Foundation Plan

PLAN REVISIONS
05/09/08

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P1.F

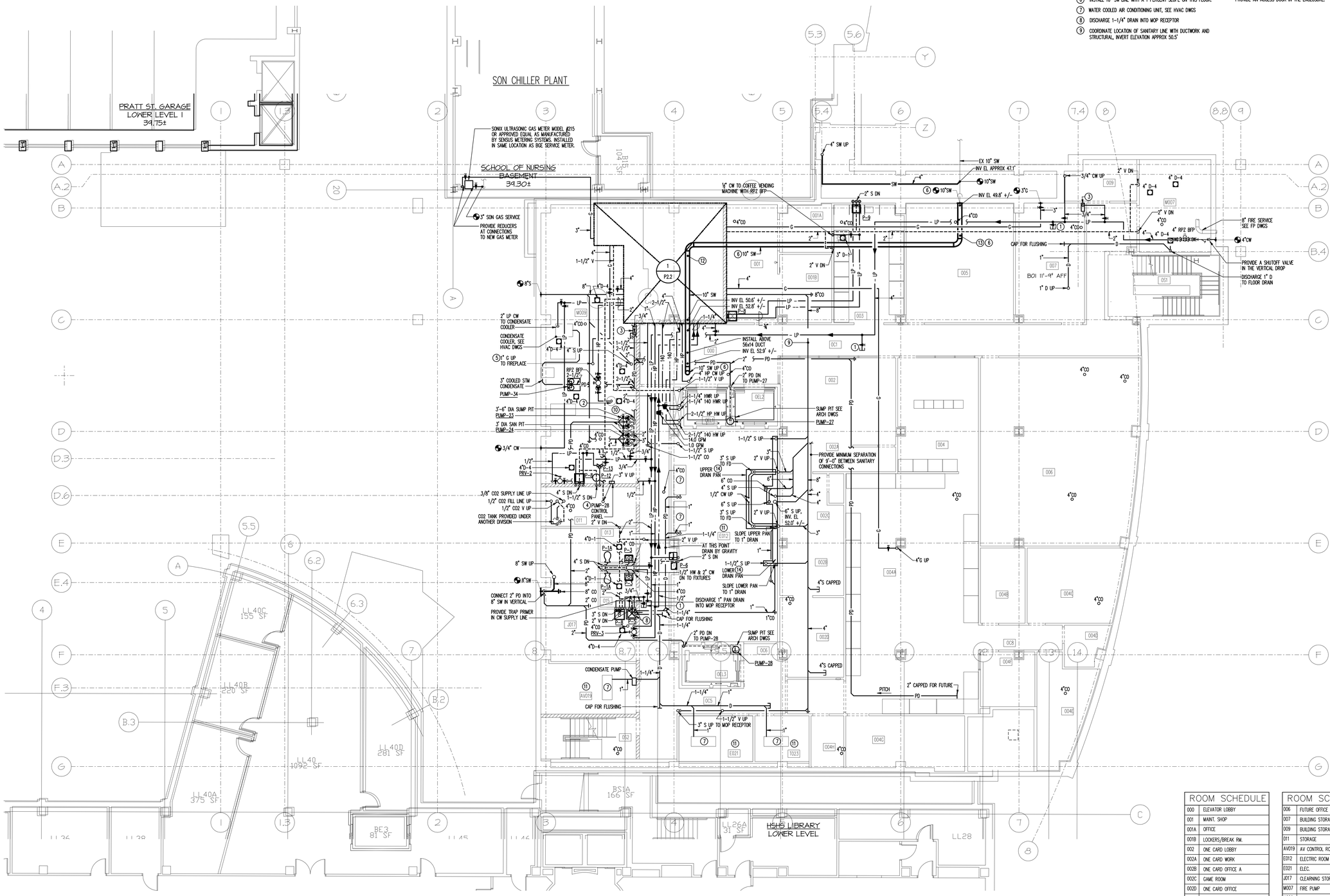
HALLC JOB NO.: U0472A0

DRAWING NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1) SEE SPECIFICATIONS FOR TOILET ROOM TRAP PRIMER REQUIREMENTS.

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. PROVIDE A ONE-INCH VALVED AND CAPPED CONNECTION FOR FUTURE EXPANSION.
2. 2" CW MAKE-UP CONNECTION TO HEATING WATER SYSTEM. SEE MECHANICAL DWG 1/M3.2 FOR EXACT LOCATION OF AIR SEPARATOR.
3. TRAP PRIMING STATION. PIPE CW INDIVIDUALLY TO EACH FLOOR DRAIN. MOUNT BOTTOM OF PANEL 60" AFF.
4. MOUNT BOTTOM OF PANEL 60" AFF.
5. UNDER SEPARATE BID PACKAGE
6. INSTALL 10" SW LINE WITH A 1 PERCENT SLOPE ON THIS FLOOR.
7. WATER COOLED AIR CONDITIONING UNIT, SEE HVAC DWGS
8. DISCHARGE 1-1/4" DRAIN INTO MOP RECEPTOR
9. COORDINATE LOCATION OF SANITARY LINE WITH DUCTWORK AND STRUCTURAL, INVERT ELEVATION APPROX 50.5'
10. DISCHARGE 3" PUMPED DISCHARGE INTO SUMP PIT BASIN
11. NO ADDITIONAL PIPING SHALL RUN THROUGH ELECTRICAL SPACES OTHER THAN WHAT HAS BEEN SHOWN ON PLAN.
12. COORDINATE LOCATION OF STORM WATER LINE WITH DUCTWORK, INVERT ELEVATION APPROX 50.5' +/-
13. COORDINATE LOCATION OF STORM WATER LINE WITH DUCTWORK, INVERT ELEVATION APPROX 49.9' +/-
14. PROVIDE A GALVANIZED-STEEL SHEET-METAL ENCLOSURE AROUND SANITARY PIPING LOCATED ABOVE DRAIN PANS. AT CLEANOUTS PROVIDE AN ACCESS DOOR IN THE ENCLOSURE.



1 GARDEN LEVEL PLAN
1/8" = 1'-0"

0 4' 8' 16'

N

ROOM SCHEDULE	
000	ELEVATOR LOBBY
001	MAINT. SHOP
001A	OFFICE
001B	LOCKERS/BREAK RM.
002	ONE CARD LOBBY
002A	ONE CARD WORK
002B	ONE CARD OFFICE A
002C	GAME ROOM
002D	ONE CARD OFFICE
002D	ONE CARD OFFICE B
003	VENDING
004	CUSTOMER SERVICE
004A	WORK AREA
004B	MANAGER'S OFFICE
004C	CONFERENCE ROOM
004D	COMPUTER ROOM
004E	EMPLOYEE LOCKERS
004F	MANAGER'S OFFICE
004G	STORAGE
004H	BUILDING STORAGE
005	SIMS ROOM
005	CORRIDOR

ROOM SCHEDULE	
006	FUTURE OFFICE SERVICES
007	BUILDING STORAGE
009	BUILDING STORAGE
011	STORAGE
AV019	AV CONTROL ROOM
E012	ELECTRIC ROOM
E021	ELEC.
J017	CLEARNING STOR & BREAK ROOM
M007	FIRE PUMP
M009	MECHANICAL
OC1	CORRIDOR
OC5	CORRIDOR
OC6	ELEV LOBBY
OC7	CORRIDOR
OC8	CORRIDOR
0EL1	ELEV 1
0EL2	ELEV 2
0EL3	ELEV 3
0S1	STAIR S1
0S2	STAIR S2
T023	TELE.

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Garden Level Plan

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P1.0

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. PROVIDE A ONE-INCH VALVED AND CAPPED CONNECTION FOR FUTURE EXPANSION.
2. COORDINATE LOCATION OF RISERS WITH FIREPLACE FLUE, 8" FIRE LINES, AND STRUCTURAL BEAMS.
3. UNDER SEPARATE BID PACKAGE.
4. 1" 140 HWR UP/1-1/4" 140 HWR DN;
   1-1/4" HWR UP/DN;
   2-1/2" LP CW DN;
   2-1/2" HW UP/DN;
   2-1/2" 140 HW UP/DN.
5. NOT USED
6. PROVIDE GPR-2 ON GAS SUPPLY LINE TO FIREPLACE WITH SHUTOFF VALVES BEFORE AND AFTER REGULATOR.
7. MOUNT BOTTOM OF FILL STATION 3'-6" AFF
8. WATER COOLED AIR CONDITIONING UNIT, SEE HVAC DWGS
9. DISCHARGE 3/4" DRAIN THRU AN AIR GAP INTO MOP RECEPTOR
10. NO ADDITIONAL PIPING SHALL RUN THROUGH ELECTRICAL SPACES OTHER THAN WHAT HAS BEEN SHOWN ON PLAN.

1 FIRST FLOOR PLAN
1/8" = 1'-0"

0 4' 8' 16'

N

ROOM SCHEDULE	
100	VESTIBULE
101	LOBBY
M102	FCC
103	SECURITY
104	DINING
104A	ATM
105	LOBBY
106/8	FOOD OUTLET
109	LOUNGE
110	OFFICE
111	LOUNGE
112	INFORMATION DESK
114	ELEVATOR LOBBY
115	STORAGE
115A	VALVE ROOM
116	WOMEN'S TOILET ROOM
117	RECEIVING
118	MEN'S TOILET ROOM
J119	JANITOR
E121	ELECTRICAL ROOM
T123	TELE. ROOM

ROOM SCHEDULE	
128	LOADING DOCK
128A	DOCK
IC1	CORRIDOR
IC2	VESTIBULE
IC3	CORRIDOR
IC4	CORRIDOR
IC5	CORRIDOR
IC6	ELEVATOR LOBBY
IC7	CORRIDOR
IC8	RAMP
IC9	RAMP
IC10	CORRIDOR
IS1	STAIR S1
IS2	STAIR S2
IS3	STAIR S3
IS5	STAIR S5
IS7	STAIR S7
IS9	STAIR S9
IS10	STAIR S10

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First Floor Plan

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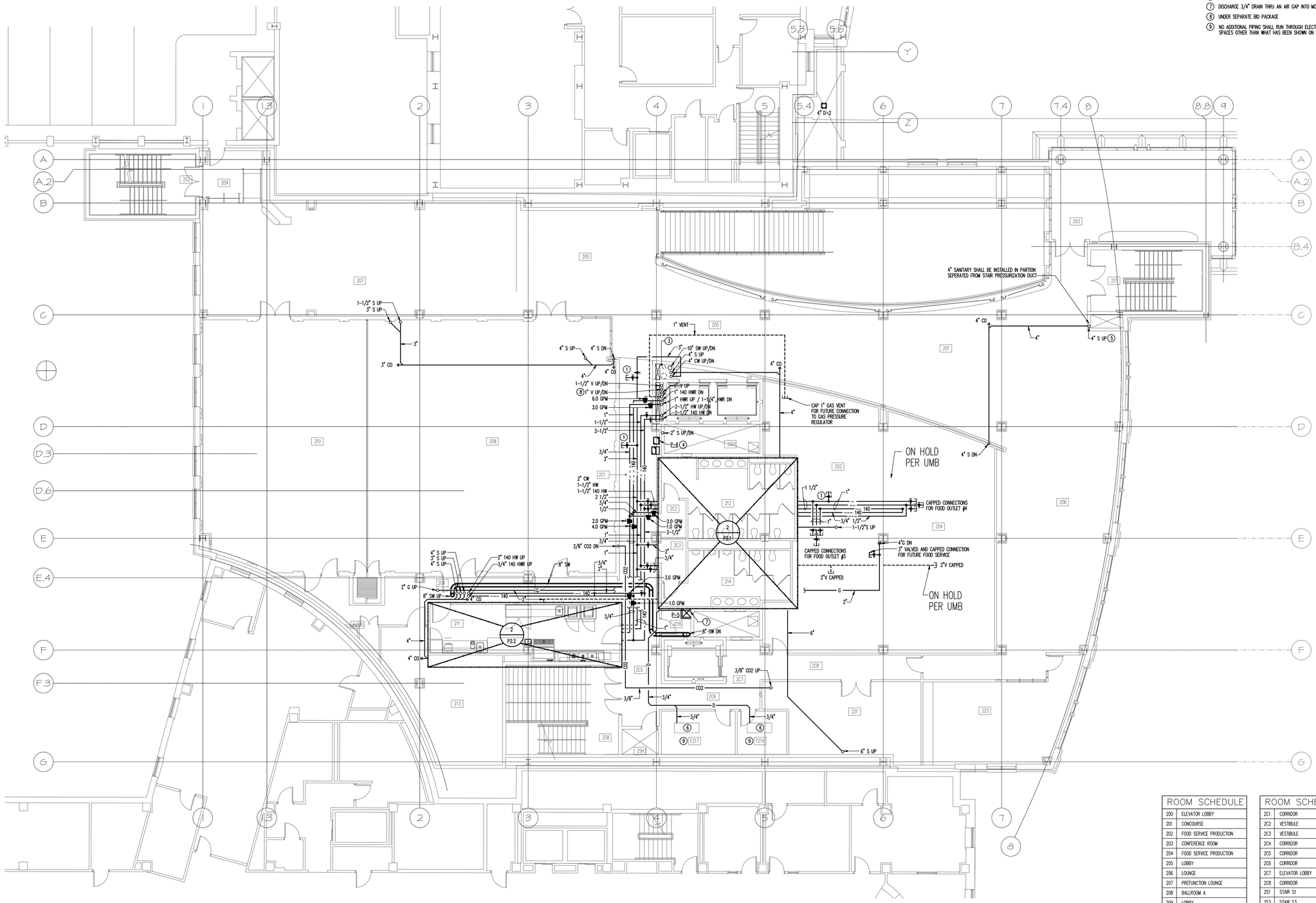
P1.1

HALLC JOB NO.: U0472A0

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. PROVIDE A ONE-INCH VALVED AND CAPPED CONNECTION FOR FUTURE EXPANSION.
2. PROVIDE A SOLIDS SEPARATOR AND FLOW CONTROL DEVICE IN THE WASTE LINE PRIOR TO THE CONNECTION TO THE GRD.
3. COORDINATE LOCATION OF RISERS WITH FIREPLACE FIRE, 8" FIRE LINE, AND STRUCTURAL BEAMS.
4. ROUTE DWC SANITARY THRU WALL TO 2" S RISER.
5. COORDINATE WITH DUCTWORK IN SHAFT, SEE HVAC DWGS.
6. WATER COOLED AIR CONDITIONING UNIT, SEE HVAC DWGS
7. DISCHARGE 3/4" DRAIN THRU AN AIR GAP INTO MOP RECEPTOR
8. UNDER SEPARATE BID PACKAGE
9. NO ADDITIONAL PIPING SHALL RUN THROUGH ELECTRICAL SPACES OTHER THAN WHAT HAS BEEN SHOWN ON PLAN.



1 SECOND FLOOR PLAN
1/8" = 1'-0"

0 4' 8' 16' N

ROOM SCHEDULE	
200	ELEVATOR LOBBY
201	CONCOURSE
202	FOOD SERVICE PRODUCTION
203	CONFERENCE ROOM
204	FOOD SERVICE PRODUCTION
205	LOBBY
206	LOUNGE
207	PREFUNCTION LOUNGE
208	BALLROOM A
209	LOBBY
210	BALLROOM B
211	BANQUET STAGING
212	WOMEN'S TOILET ROOM
213	BALLROOM STORAGE
214	MEN'S TOILET ROOM
221	STORAGE
AV215	A/V
J216	JANITOR
E217	ELECTRICAL
T219	TELE. ROOM
223	CONFERENCE ROOM

ROOM SCHEDULE	
2C1	CORRIDOR
2C2	VESTIBULE
2C3	VESTIBULE
2C4	CORRIDOR
2C5	CORRIDOR
2C6	CORRIDOR
2C7	ELEVATOR LOBBY
2C8	CORRIDOR
2S1	STAIR S1
2S3	STAIR S3
2S8	STAIR S8
2SH1	SHAFT
2SH3	CHASE

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Campus Center

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Second Floor Plan

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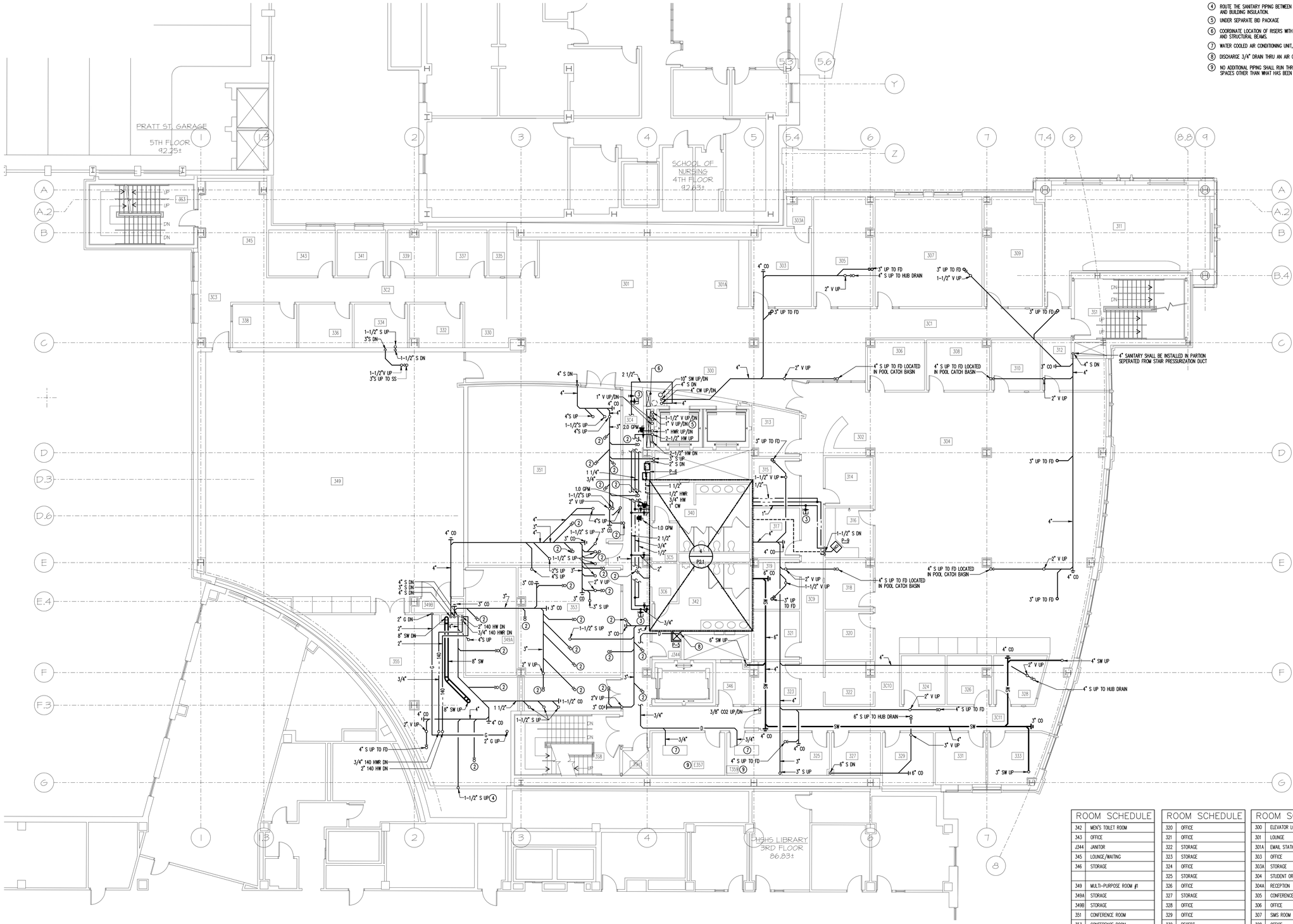
P1.2

HALLC JOB NO.: U0472A0

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. DRAIN LOCATED IN POOL CATCH BASIN.
2. 3"S UP TO FLOOR DRAIN
3. PROVIDE A ONE-INCH VALVED AND CAPPED CONNECTION FOR FUTURE EXPANSION.
4. ROUTE THE SANITARY PIPING BETWEEN THE FINISHED WALL AND BUILDING INSULATION.
5. UNDER SEPARATE BID PACKAGE
6. COORDINATE LOCATION OF RISERS WITH FIREPLACE FLUE AND STRUCTURAL BEAMS.
7. WATER COOLED AIR CONDITIONING UNIT, SEE HVAC DWGS
8. DISCHARGE 3/4" DRAIN THRU AN AIR CAP INTO MOP RECEPTOR
9. NO ADDITIONAL PIPING SHALL RUN THROUGH ELECTRICAL SPACES OTHER THAN WHAT HAS BEEN SHOWN ON PLAN.



1 THIRD FLOOR PLAN
1/8" = 1'-0"

0 4' 8' 16'

N

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ROOM SCHEDULE	
3C11	CORRIDOR
3S1	STAIR S1
3S3	STAIR S3
3S8	STAIR S8
3SH3	SHAFT
349C	STORAGE
T359	TELE
302	RECEPTION

ROOM SCHEDULE	
342	MEN'S TOILET ROOM
343	OFFICE
J344	JANITOR
345	LOUNGE/WAITING
346	STORAGE
349	MULTI-PURPOSE ROOM #1
349A	STORAGE
349B	STORAGE
351	CONFERENCE ROOM
353	CONFERENCE ROOM
355	STORAGE
E357	ELECTRICAL
359	TELE. ROOM
3C1	CORRIDOR
3C2	CORRIDOR
3C3	CORRIDOR
3C4	CORRIDOR
3C5	VESTIBULE
3C6	VESTIBULE
3C9	CORRIDOR
3C10	CORRIDOR

ROOM SCHEDULE	
320	OFFICE
321	OFFICE
322	STORAGE
323	STORAGE
324	OFFICE
325	STORAGE
326	OFFICE
327	STORAGE
328	OFFICE
329	OFFICE
330	RECEPT
331	OFFICE
332	OFFICE
333	OFFICE
334	OFFICE
335	OFFICE
336	OFFICE
337	OFFICE
338	OFFICE
339	OFFICE
340	WOMEN'S TOILET ROOM
341	OFFICE

ROOM SCHEDULE	
300	ELEVATOR LOBBY
301	LOUNGE
301A	EMAIL STATIONS
303	OFFICE
303A	STORAGE
304	STUDENT ORG. WORK AREA
304A	RECEPTION
305	CONFERENCE ROOM
306	OFFICE
307	SIMS ROOM
308	OFFICE
309	CONFERENCE ROOM
310	OFFICE
311	CONFERENCE ROOM
312	OFFICE
313	OFFICE
314	OFFICE
315	OFFICE
316	KITCHEN
317	OFFICE
318	OFFICE
319	OFFICE

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Rev.	Date:	Comment:
5	01/29/10	Record Drawing
4	12/19/08	Bulletin #82
3	11/26/08	Bulletin #79
2	11/26/08	Bulletin #77
1	08/24/07	Bulletin #14
0	05/02/07	For Construction

Issued: May 2, 2007

Campus Center

621 West Lombard Street
University of Maryland, Baltimore
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Third Floor Plan

UMB PROJECT NO. 99-311
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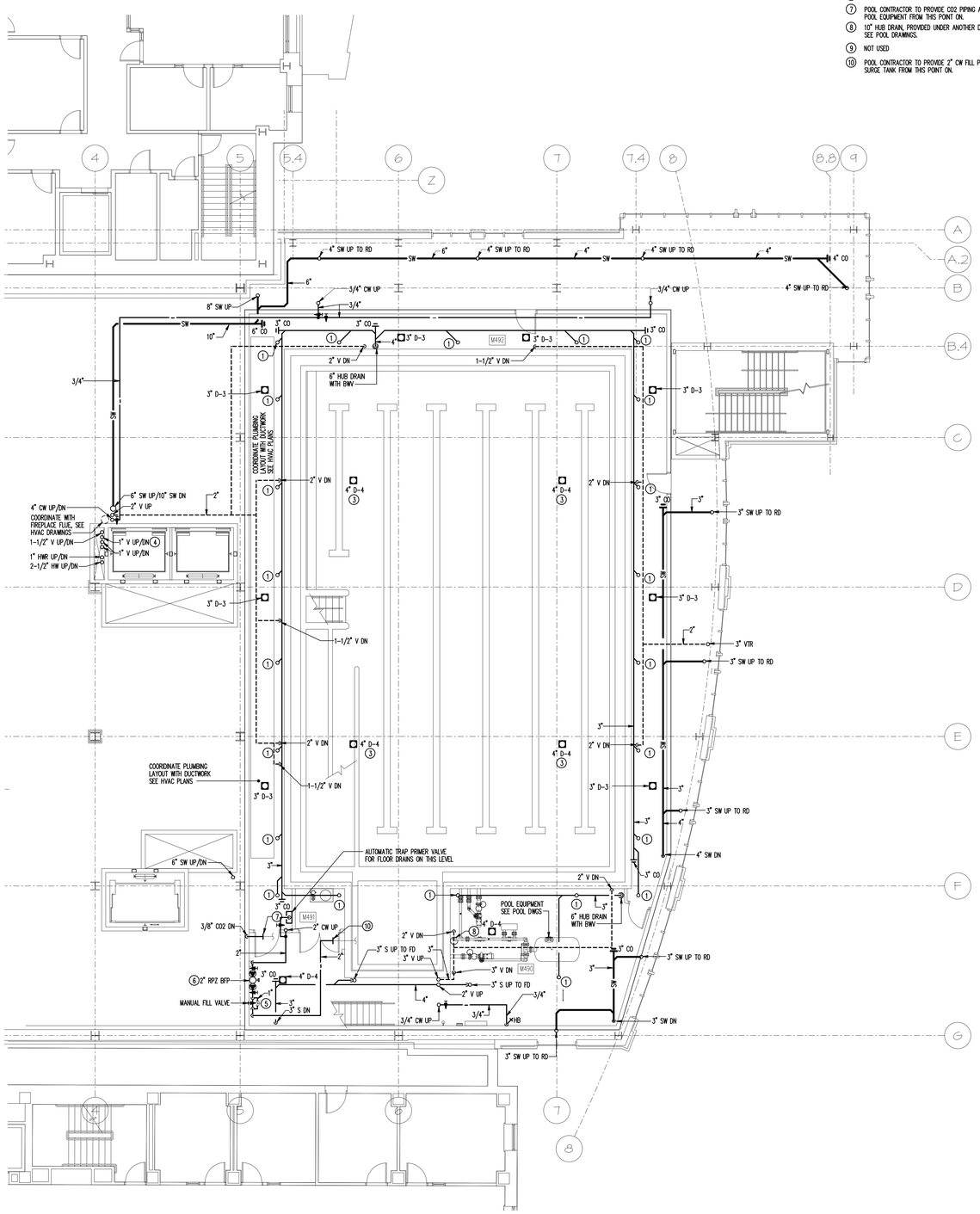
P1.3

DRAWING NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1) NO ADDITIONAL PIPING SHALL RUN THROUGH ELECTRICAL SPACES OTHER THAN WHAT HAS BEEN SHOWN ON PLAN.

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. 3" INDIRECT WASTE UP TO FLOOR DRAIN.
2. NOT USED
3. DRAIN LOCATED IN THE POOL CATCH BASIN
4. UNDER SEPARATE BID PACKAGE
5. POOL FILL SOLENOID VALVE, PROVIDED UNDER ANOTHER DIVISION.
6. MOUNT 48" ABOVE FINISHED FLOOR
7. POOL CONTRACTOR TO PROVIDE CO2 PIPING AND CONNECTION TO POOL EQUIPMENT FROM THIS POINT ON.
8. 10" HUB DRAIN, PROVIDED UNDER ANOTHER DIVISION. SEE POOL DRAWINGS.
9. NOT USED
10. POOL CONTRACTOR TO PROVIDE 2" CW FILL PIPING TO SURGE TANK FROM THIS POINT ON.



1 LOWER POOL LEVEL PLAN
1/8" = 1'-0"

0 4' 8' 16'

N

ROOM SCHEDULE	
M490	FILTER ROOM
M491	SANITIZER ROOM
M492	MECHANICAL AREA

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3	01/29/10	Record Drawing
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Campus Center

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Lower Pool Level Plan

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P1.3A

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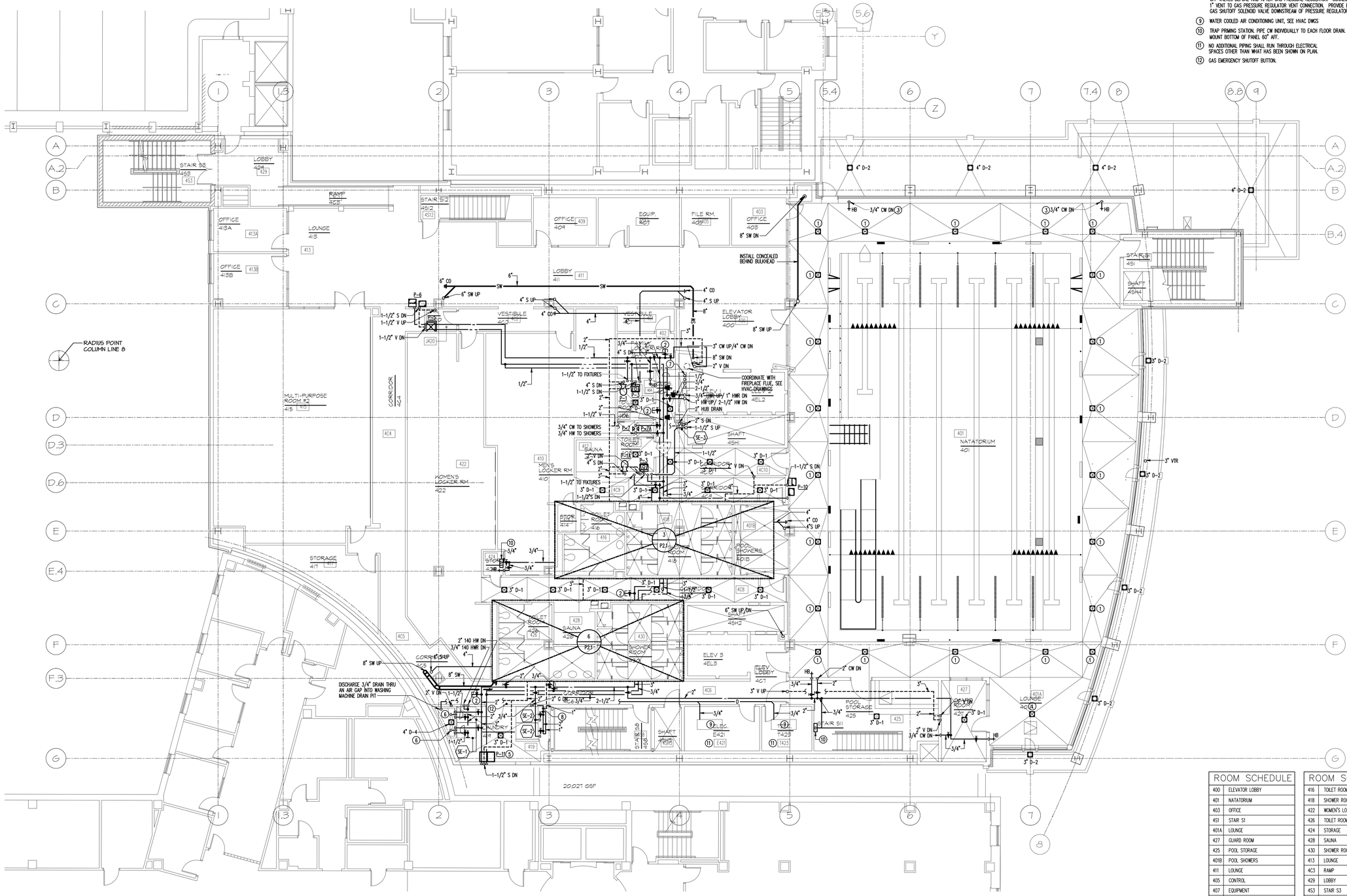

1 FOURTH FLOOR PLAN
1/8" = 1'-0"

0 4' 8' 16'

N

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. 3" D-1
2. PROVIDE A ONE-INCH VALVED AND CAPPED CONNECTION FOR FUTURE EXPANSION.
3. ROUTE THE CW PIPING FOR THE HOSE BIBB BETWEEN THE FINISHED WALL AND BUILDING INSULATION.
4. 2"CW TO POOL FILL. SEE POOL DWGS FOR POOL FILL LOCATION AND REQUIREMENTS.
5. ROUTE THE CW/HW/SAN PIPING FOR THE SINK BETWEEN THE FINISHED WALL AND BUILDING INSULATION.
6. DISCHARGE 3" DRAIN FROM WASHING MACHINE WITH A MINIMUM 1" AIR GAP
7. 1-1/2" V UP/DN; 1" V UP/DN (UNDER SEPARATE BID PACKAGE); 1" V UP/DN; 1" V UP/DN
8. PROVIDE GRR-3 ON 2" GAS SUPPLY LINE ALONG THE BACK WALL. PROVIDE SHUT OFF VALVES BEFORE AND AFTER GAS PRESSURE REGULATOR. CONNECT 1" VENT TO GAS PRESSURE REGULATOR VENT CONNECTION. PROVIDE EMERGENCY GAS SHUTOFF SOLENOID VALVE DOWNSTREAM OF PRESSURE REGULATOR.
9. WATER COOLED AIR CONDITIONING UNIT, SEE HVAC DWGS
10. TRAP PRIMING STATION. PIPE CW INDIVIDUALLY TO EACH FLOOR DRAIN. MOUNT BOTTOM OF PANEL 60" AFF.
11. NO ADDITIONAL PIPING SHALL RUN THROUGH ELECTRICAL SPACES OTHER THAN WHAT HAS BEEN SHOWN ON PLAN.
12. GAS EMERGENCY SHUTOFF BUTTON.

ROOM SCHEDULE	
400	ELEVATOR LOBBY
401	NATATORIUM
403	OFFICE
451	STAIR S1
401A	LOUNGE
427	GUARD ROOM
425	POOL STORAGE
401B	POOL SHOWERS
411	LOUNGE
405	CONTROL
407	EQUIPMENT
409	OFFICE
4C1	VESTIBULE
402	FAMILY LOCKER ROOM
404	CLOSET
406	TOILET ROOM
408	TOILET ROOM
J420	JANITOR
4C2	VESTIBULE
410	MEN'S LOCKER ROOM
412	SAUNA
414	STORAGE
4S12	STAIR S12
4C6	CORRIDOR

ROOM SCHEDULE	
416	TOILET ROOM
418	SHOWER ROOM
422	WOMEN'S LOCKER ROOM
426	TOILET ROOM
424	STORAGE
428	SAUNA
430	SHOWER ROOM
413	LOUNGE
4C3	RAMP
429	LOBBY
4S3	STAIR S3
415	MULTI-PURPOSE ROOM #2
417	STORAGE
419	LAUNDRY
458	STAIR S8
45H3	SHAFT
E421	ELECTRICAL
T423	TELE. ROOM
4C7	ELEVATOR LOBBY
4C8	CORRIDOR
4C9	CORRIDOR
4C5	CORRIDOR
4C4	CORRIDOR
4C10	CORRIDOR

ROOM SCHEDULE	
413A	OFFICE
413B	OFFICE

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3	01/29/10	Record Drawing
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Campus Center

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Fourth Floor Plan

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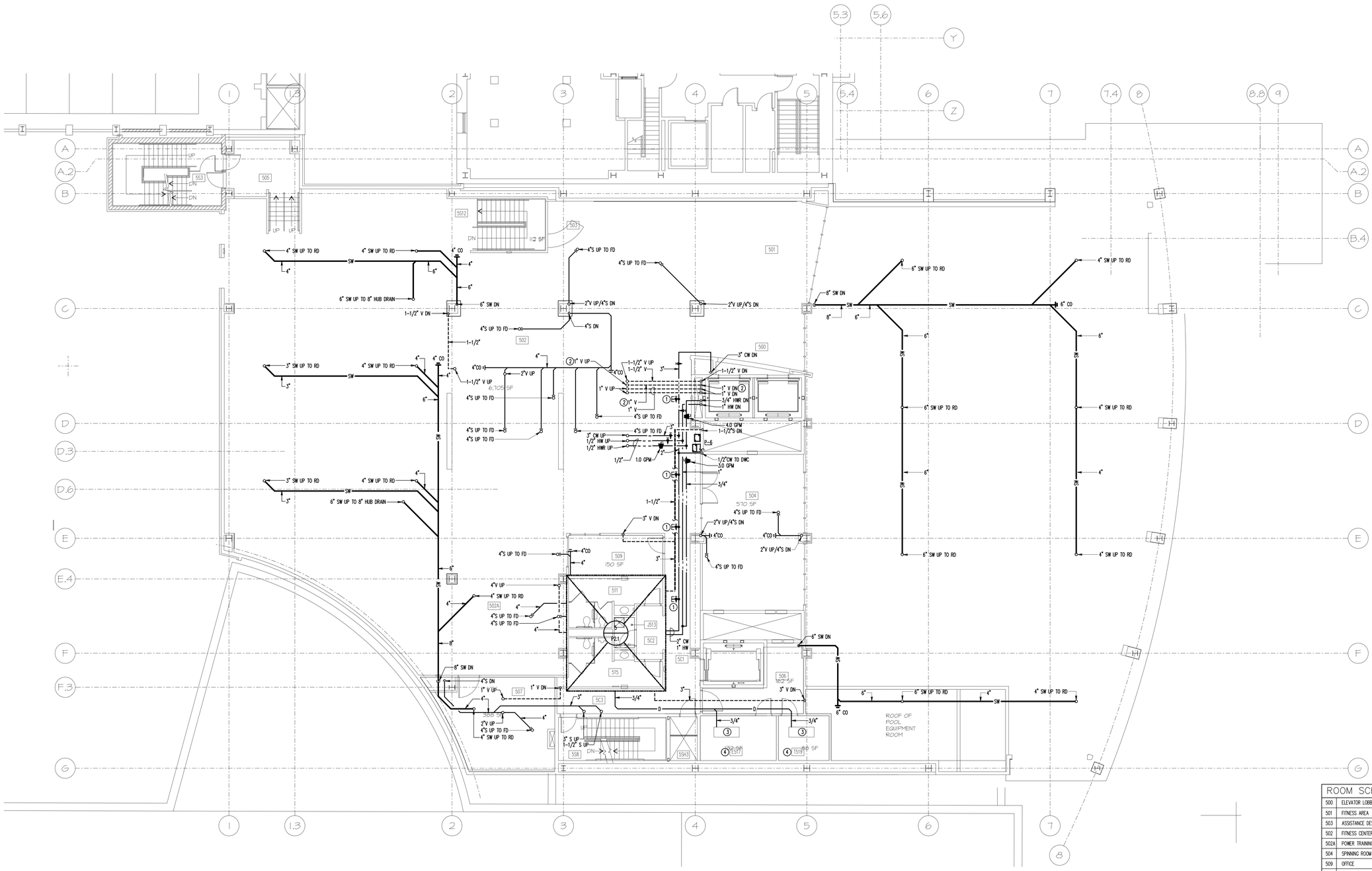
P1.4

HALLC JOB NO.: U0472A0

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. PROVIDE A ONE-INCH VALVED AND CAPPED CONNECTION FOR FUTURE EXPANSION.
2. UNDER SEPARATE BID PACKAGE
3. WATER COOLED AIR CONDITIONING UNIT, SEE HVAC DWGS
4. NO ADDITIONAL PIPING SHALL RUN THROUGH ELECTRICAL SPACES OTHER THAN WHAT HAS BEEN SHOWN ON PLAN.



1 FIFTH FLOOR PLAN
1/8" = 1'-0"

0 4' 8' 16'

N

ROOM SCHEDULE	
500	ELEVATOR LOBBY
501	FITNESS AREA
503	ASSISTANCE DESK
502	FITNESS CENTER
502A	POWER TRAINING
504	SPINNING ROOM
509	OFFICE
507	STORAGE
511	WOMEN'S TOILET
J513	JANITOR
515	MEN'S TOILET
5C2	VESTIBULE
5SB	STAIR S8
5SH3	SHAFT
506	STORAGE
E517	ELECTRICAL
T519	TELE. ROOM
553	STAIR S3
5C3	CORRIDOR
505	VESTIBULE
5S12	STAIR S12
5C1	CORRIDOR

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Campus Center

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Fifth Floor Plan

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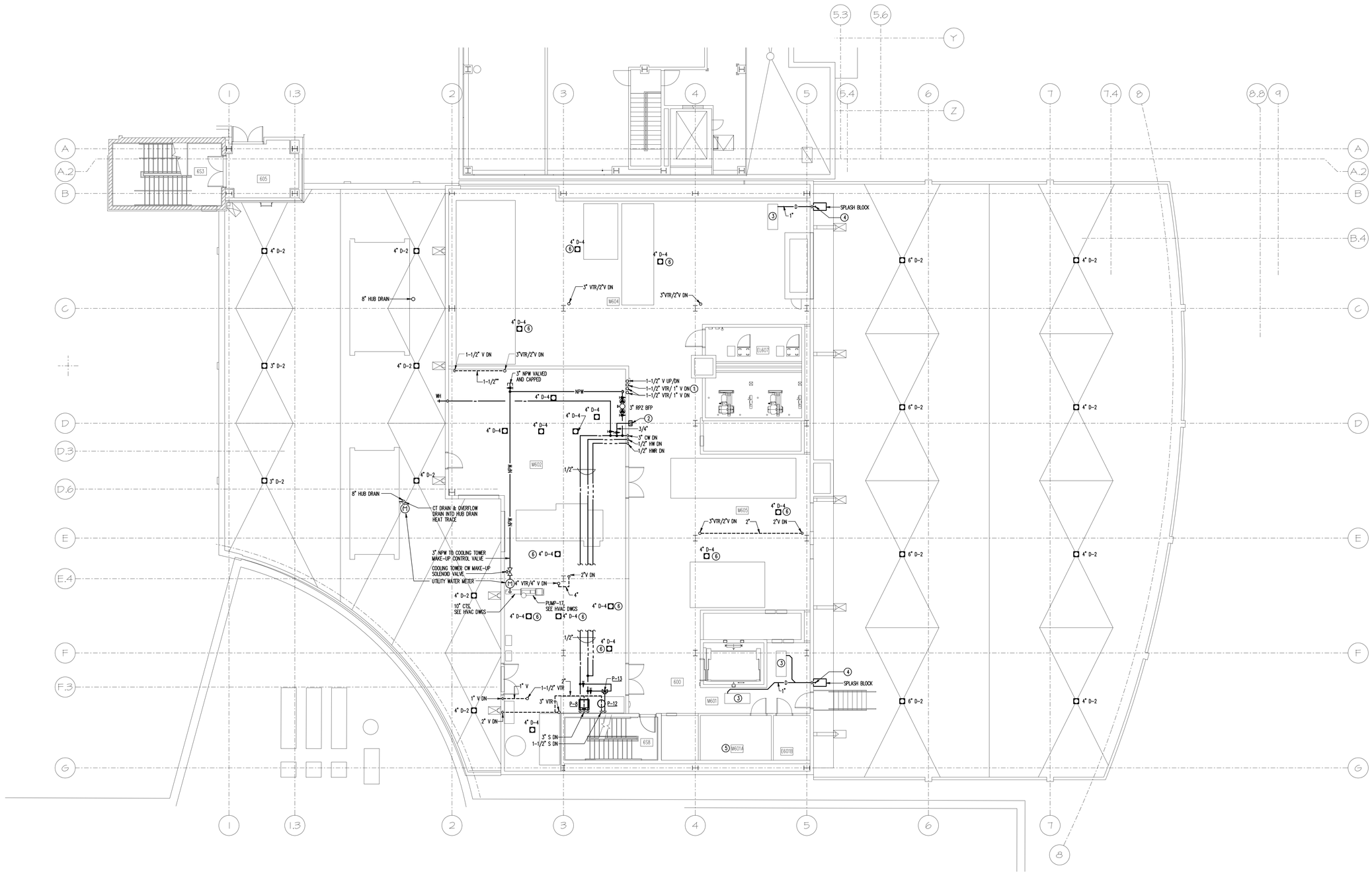
P1.5

HALLC JOB NO.: U04720

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. UNDER SEPARATE BID PACKAGE
2. TRAP PRIMING STATION. PIPE CW INDIVIDUALLY TO EACH FLOOR DRAIN. MOUNT BOTTOM OF PANEL 60" AFF.
3. WATER COOLED AIR CONDITIONING UNIT, SEE HVAC DWGS
4. DISCHARGE 1" CONDENSATE DRAIN 12" ABOVE THE SPLASH BLOCK
5. NO ADDITIONAL PIPING SHALL RUN THROUGH ELECTRICAL SPACES OTHER THAN WHAT HAS BEEN SHOWN ON PLAN.
6. COORDINATE FLOOR DRAIN LOCATION WITH FINAL EQUIPMENT LAYOUT.



1 PENTHOUSE PLAN
1/8" = 1'-0"

0 4' 8' 16'

N

ROOM SCHEDULE	
M601	MECHANICAL EQUIPMENT
M602	MECHANICAL EQUIPMENT
M604	MECHANICAL EQUIPMENT
M605	MECHANICAL EQUIPMENT
600	ELEVATOR LOBBY
658	STAIR S8
M601A	ELECTRICAL ROOM
605	VESTIBULE
EL607	ELEVATOR EQUIPMENT ROOM
653	STAIR S3
E601B	ELECTRICAL EQUIPMENT

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Penthouse Plan

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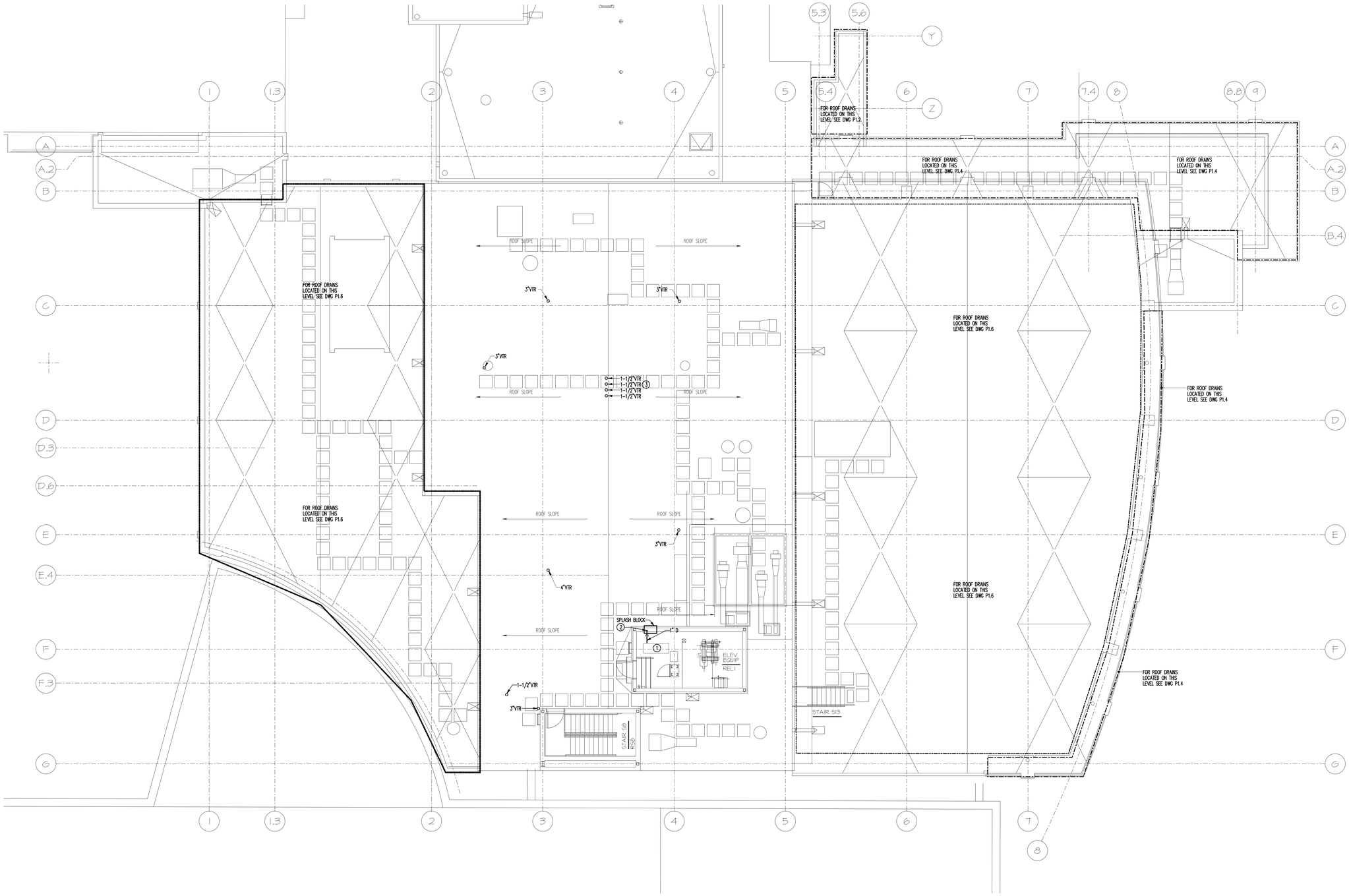
P1.6

HALLC JOB NO.: U0472A0

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. WATER COOLED AIR CONDITIONING UNIT, SEE HVAC DWGS
2. DISCHARGE 1" CONDENSATE DRAIN 12" ABOVE THE SPLASH BLOCK
3. UNDER SEPARATE BID PACKAGE



1 ROOF PLAN
1/8" = 1'-0"

0 4' 8' 16'

N

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Campus Center

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Roof Plan

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P1.7

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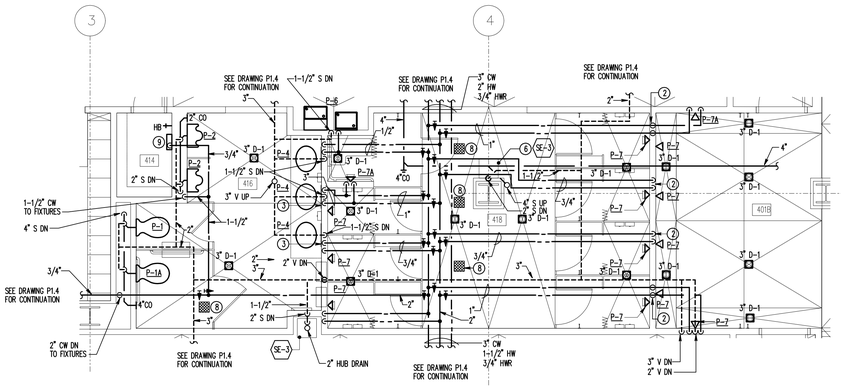
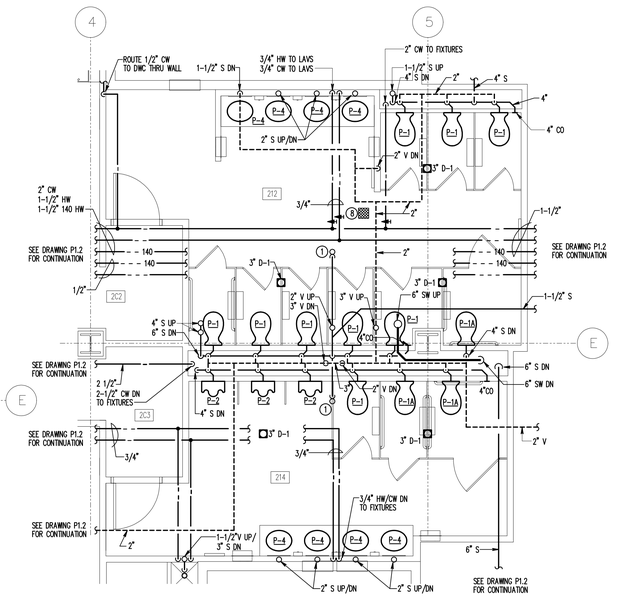
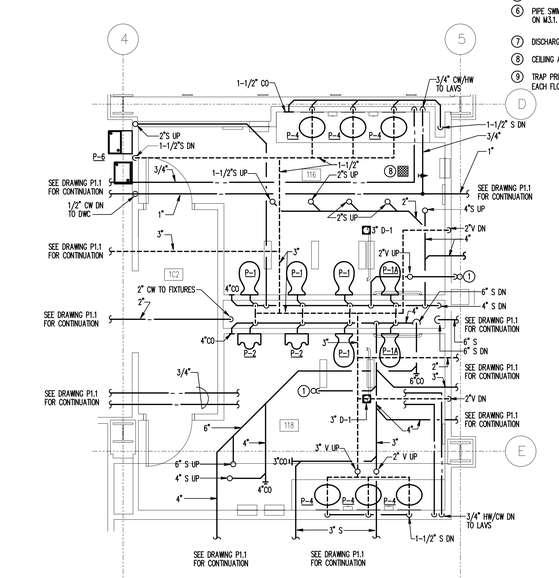


3 FOURTH FLOOR MENS LOCKER ROOM - PART PLAN
1/4" = 1'-0"



2 SECOND FLOOR TOILET ROOMS - PART PLAN
1/4" = 1'-0"



1 FIRST FLOOR TOILET ROOMS - PART PLAN
1/4" = 1'-0"

GENERAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. SEE SPECIFICATION FOR TOILET ROOM TRAP PRIMER REQUIREMENTS.

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. 3" S UP TO FLOOR DRAIN
2. 3/4" CW/HW DN TO (2) SHOWERS
3. 3/4" CW/HW DN TO SHOWER & LAV
4. NOT USED
5. NOT USED
6. PIPE SWIMSUIT EXTRACTOR DRAIN TO HUB DRAIN AS SHOWN ON M3.1.
7. DISCHARGE 3/4" DRAIN THRU AN AIR GAP TO THE MOP RECEPTOR
8. CEILING ACCESS DOOR, SEE ARCH DWGS
9. TRAP PRIMING STATION. PIPE CW INDIVIDUALLY TO EACH FLOOR DRAIN. MOUNT BOTTOM OF PANEL 60" AFF.

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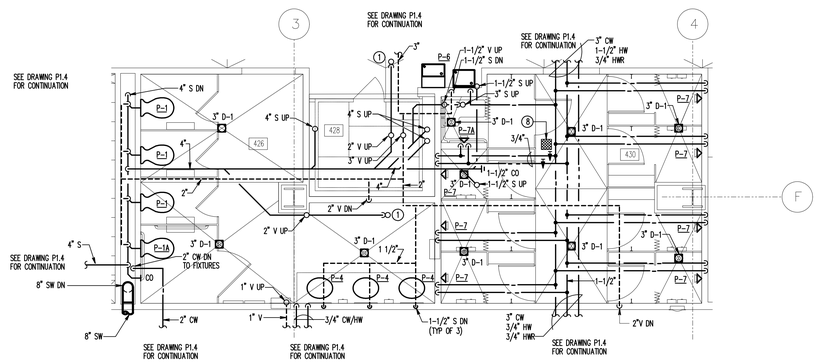
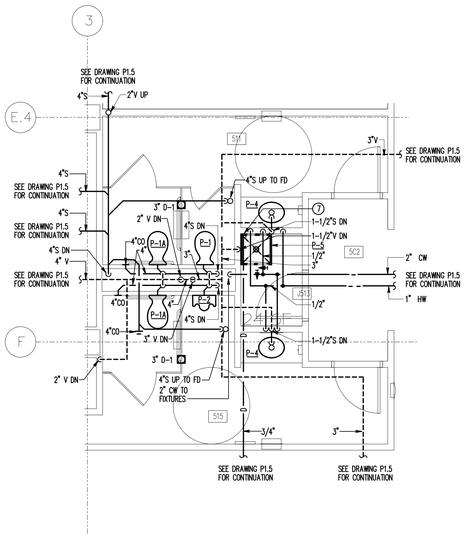
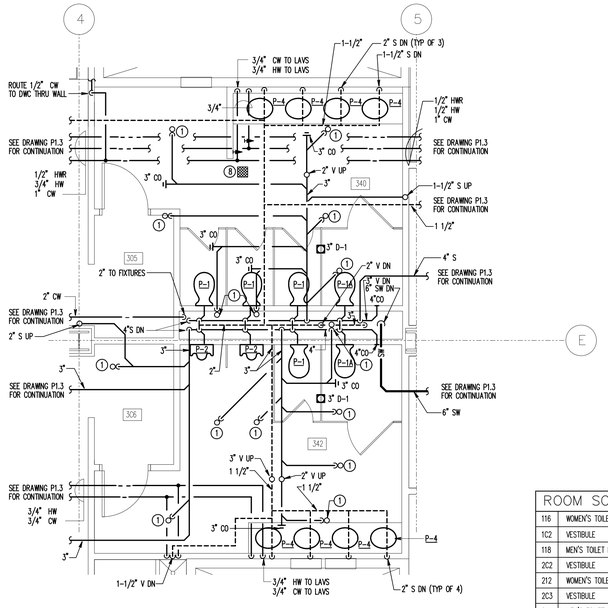


6 FOURTH FLOOR WOMENS LOCKER ROOM - PART PLAN
1/4" = 1'-0"



5 FIFTH FLOOR TOILET ROOMS - PART PLAN
1/4" = 1'-0"



4 THIRD FLOOR TOILET ROOMS - PART PLAN
1/4" = 1'-0"

ROOM SCHEDULE	
116	WOMEN'S TOILET ROOM
1C2	VESTIBULE
118	MEN'S TOILET ROOM
2C2	VESTIBULE
212	WOMEN'S TOILET ROOM
2C3	VESTIBULE
214	MEN'S TOILET ROOM
305	VESTIBULE
340	WOMEN'S TOILET ROOM
342	MEN'S TOILET ROOM
306	VESTIBULE
401B	POOL SHOWERS
414	STORAGE
416	TOILET ROOM
418	SHOWER ROOM
426	TOILET ROOM
428	SAUNA
430	SHOWER ROOM
5C2	VESTIBULE
511	WOMEN'S TOILET ROOM
515	MEN'S TOILET ROOM
J513	JANITORS

Rev.	Date:	Comment:
2	01/29/10	Record Drawing
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0	05/02/07	For Construction

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Part Plans

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P2.1

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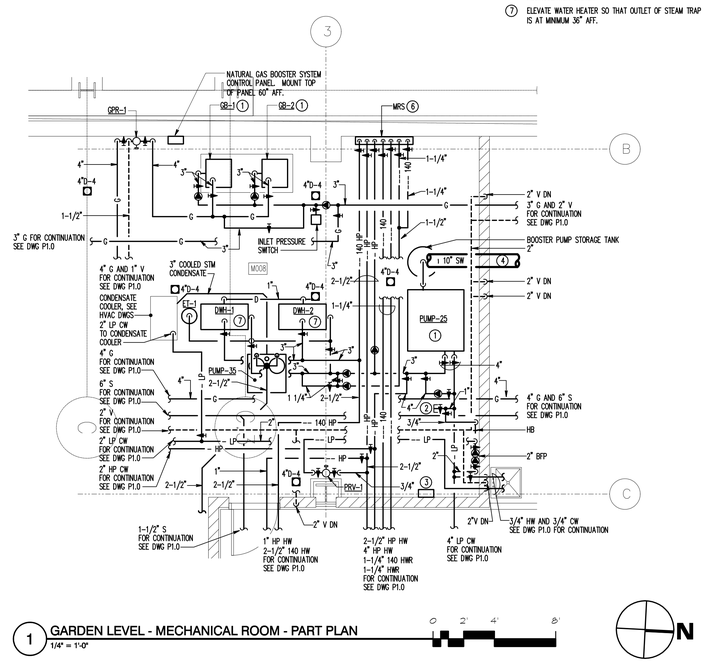
SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

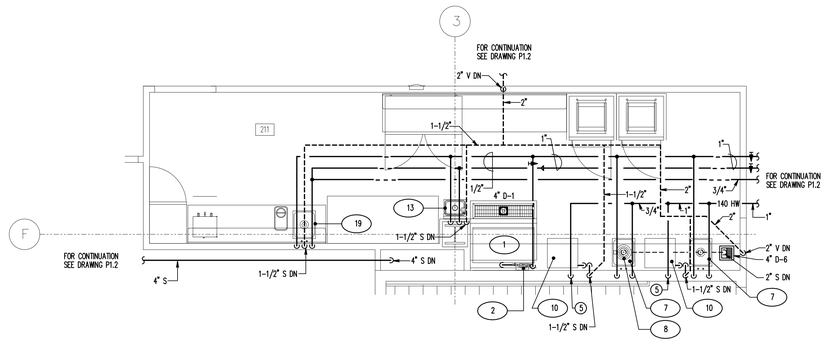
1. MOUNT EQUIPMENT ON CONCRETE PAD.
2. PROVIDE A ONE-INCH VALVED AND CAPPED CONNECTION FOR FUTURE EXPANSION.
3. PUMP-27 CONTROL PANEL MOUNT BOTTOM OF PANEL 60" ABOVE FINISHED FLOOR.
4. FOR THE ROUTING OF THE 10" SW LINE THRU THIS AREA SEE DRAWING P1.0
5. PROVIDE BACKFLOW PREVENTION FOR DISHWASHERS PER CODE
6. PUMP-30 AND PUMP-31 SHALL BE PACKAGED WITH MANIFOLD RECIRCULATION SYSTEM
7. ELEVATE WATER HEATER SO THAT OUTLET OF STEAM TRAP IS AT MINIMUM 36" AFF.



1 GARDEN LEVEL - MECHANICAL ROOM - PART PLAN
1/4" = 1'-0"

0 2' 4' 8'

N



2 SECOND FLOOR - BANQUET STAGING - PART PLAN
1/4" = 1'-0"

0 2' 4' 8'

N

ROOM SCHEDULE	
M008	MECHANICAL ROOM
211	BANQUET STAGING

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5	01/29/10	Record Drawing
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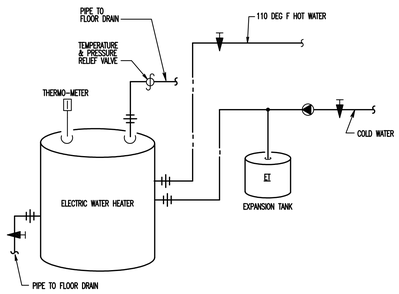
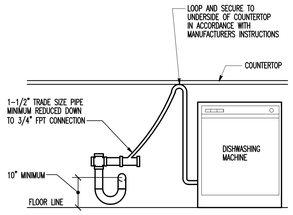
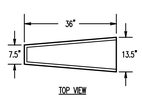


ELECTRIC WATER HEATER

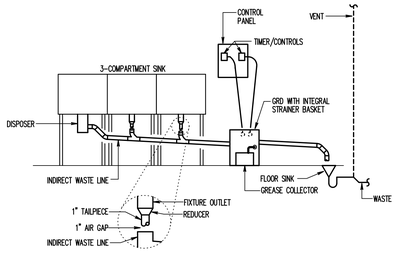
NOTE: APPLICABLE TO DWH-3



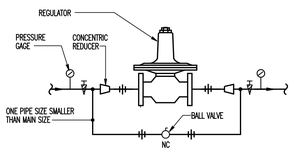
DISHWASHER WASTE CONNECTION



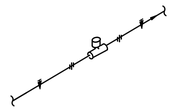
PRECAST CONCRETE SPLASH BLOCK



INSTALLATION OF GREASE RECOVERY DEVICE

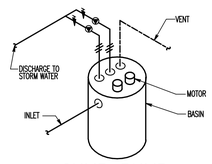


WATER PRESSURE REDUCING VALVE PIPING



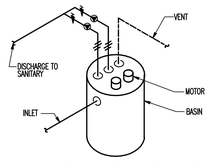
IN-LINE CIRCULATOR

NOTE: APPLICABLE TO PUMP-30 AND PUMP-31



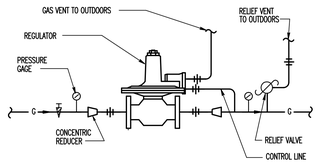
SUMP PUMP

NOTE: APPLICABLE TO PUMP-23

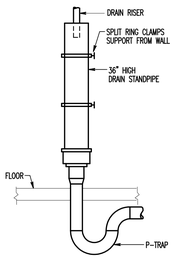


SEWAGE EJECTOR

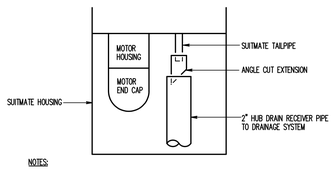
NOTE: APPLICABLE TO PUMP-24



GAS PRESSURE REGULATOR PIPING



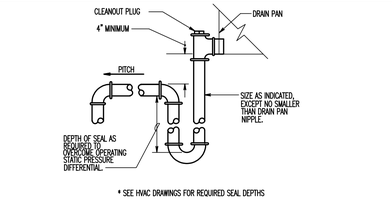
HUB DRAIN



NOTES:

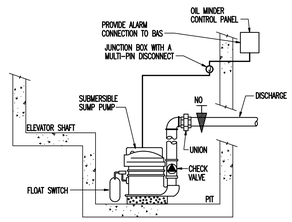
1) LOCATE THE TOP OF THE RECEIVER PIPE BELOW THE TOP OF THE MOTER END CAP.
2) LOCATE THE TOP OUTER EDGE OF THE RECEIVER PIPE AT LEAST 1-1/4" FROM THE BODY OF THE MOTOR.
3) CUT OFF END OF DRAIN EXTENSION TUBE SHALL BE INSTALLED BELOW THE TOP OF THE RECEIVER WITH THE ANGLE CUT FACING AWAY FROM THE MOTOR, AS SHOWN.

SWIMSUIT EXTRACTOR



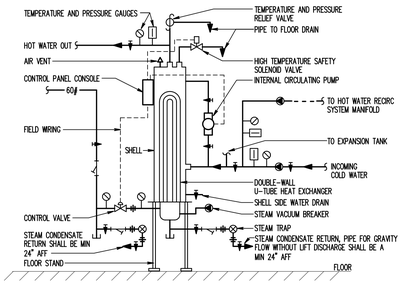
* SEE HVAC DRAWINGS FOR REQUIRED SEAL DEPTHS

AHU CONDENSATE DRAIN TRAP



ELEVATOR PIT SUBMERSIBLE SUMP PUMP

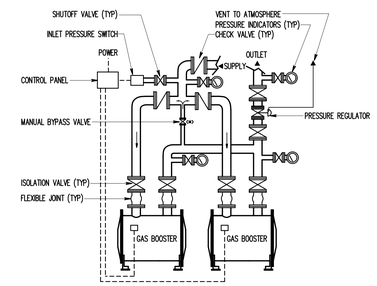
NOTE: APPLICABLE TO PUMP-27, PUMP-28, AND PUMP-29



INSTANTANEOUS STEAM DOMESTIC WATER HEATERS

NOTES:

1) APPLICABLE TO DWH-1 AND DWH-2
2) STEAM CONDENSATE FROM 60# INLET STEAM AND FROM HEAT EXCHANGER SHALL BE PIPED SEPARATELY TO CONDENSATE RECEIVER.



NOTES:

1) ALTHOUGH THE PRESSURE REGULATOR IS SHOWN IN A VERTICAL POSITION IT SHOULD BE INSTALLED IN A HORIZONTAL POSITION FOR PROPER OPERATION.
2) (*) THE BYPASS PIPING SHOULD BE A MINIMUM OF 3" DIAMETER BY 10 FEET IN OVERALL LENGTH TO DISSIPATE SLIGHT HEAT RISE GENERATED BY GAS COMPRESSION.
3) ---- FIELD WIRING

GAS BOOSTER SYSTEM

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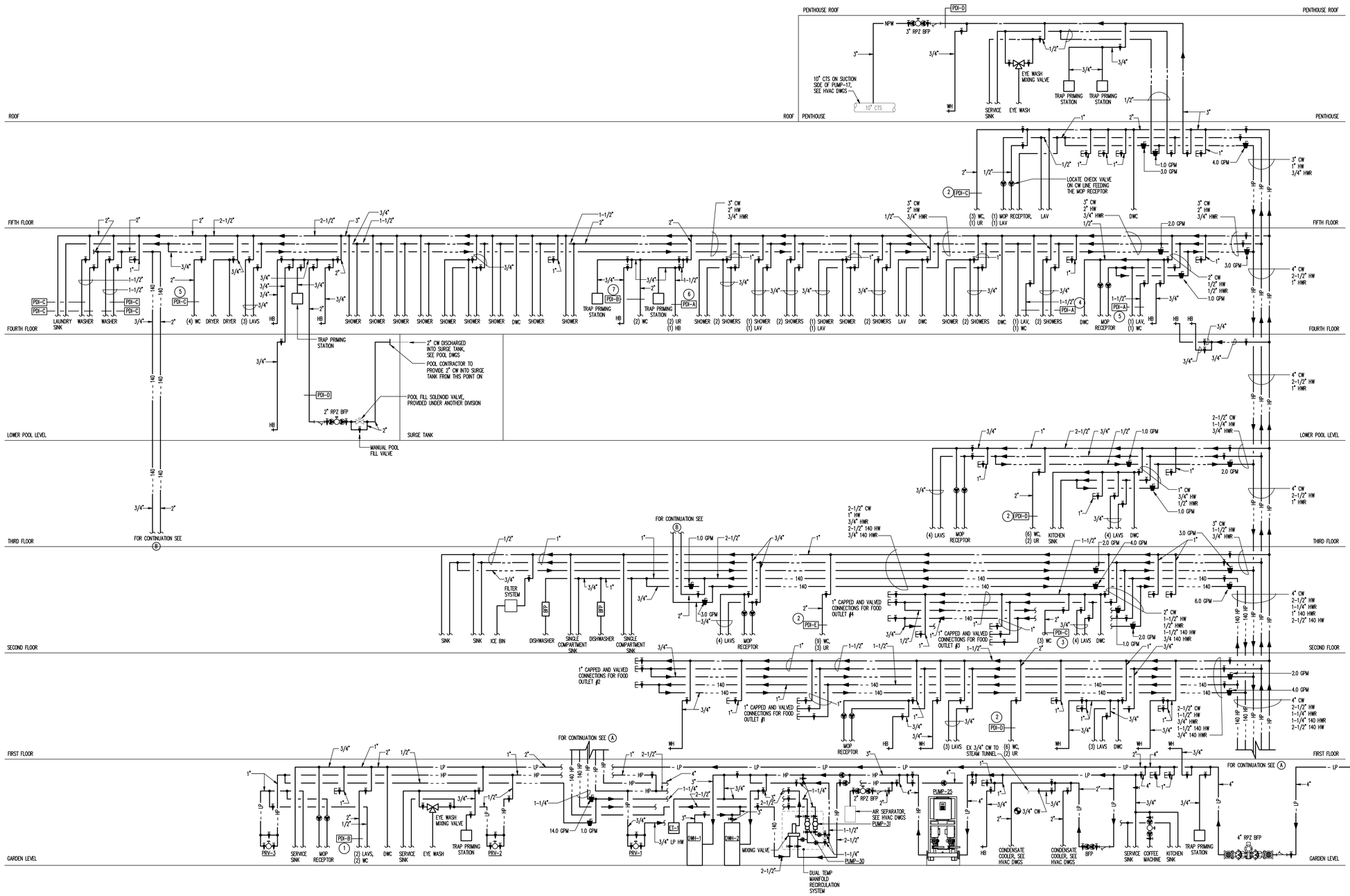

1 DOMESTIC WATER RISER DIAGRAM

NO SCALE

GENERAL NOTE: (APPLICABLE TO THIS DRAWING ONLY)

1. WATER CLOSET TO HAVE TRAP PRIMER AFTER FLUSH VALVE TO PRIME FLOOR DRAINS IN TOILET ROOMS.

SPECIAL NOTES: (APPLICABLE TO THIS DRAWING ONLY)

1. INSTALL SHOCK ABSORBER IN COLD WATER LINE BETWEEN THE TWO WATER CLOSET FEEDS IN ACCORDANCE WITH PDI STANDARDS. INSTALL THE SHOCK ABSORBER SO THAT IT IS ACCESSIBLE FROM ABOVE THE ADJACENT BREAK ROOM LAY IN CEILING.
2. INSTALL SHOCK ABSORBER IN COLD WATER LINE BETWEEN THE LAST TWO WATER CLOSET FEEDS IN ACCORDANCE WITH PDI STANDARDS. INSTALL THE SHOCK ABSORBER SO THAT IT IS ACCESSIBLE FROM ABOVE THE ADJACENT TOILET ROOM GWB CEILING. PROVIDE ACCESS PANEL.
3. INSTALL SHOCK ABSORBER IN COLD WATER LINE BETWEEN THE LAST TWO WATER CLOSET FEEDS IN ACCORDANCE WITH PDI STANDARDS. INSTALL THE SHOCK ABSORBER SO THAT IT IS ACCESSIBLE FROM ABOVE THE ADJACENT TOILET ROOM GWB CEILING. PROVIDE ACCESS PANEL.
4. INSTALL SHOCK ABSORBER IN COLD WATER LINE BETWEEN THE LAST TWO WATER CLOSET FEEDS IN ACCORDANCE WITH PDI STANDARDS. INSTALL THE SHOCK ABSORBER SO THAT IT IS ACCESSIBLE FROM ABOVE THE ADJACENT CORRIDOR LAY IN CEILING.
5. INSTALL SHOCK ABSORBER IN COLD WATER LINE BETWEEN THE LAST TWO WATER CLOSET FEEDS IN ACCORDANCE WITH PDI STANDARDS. INSTALL THE SHOCK ABSORBER SO THAT IT IS ACCESSIBLE FROM ABOVE THE ADJACENT LOCKER ROOM LAY IN CEILING.
6. INSTALL SHOCK ABSORBER IN COLD WATER LINE BETWEEN THE TWO URINAL FEEDS IN ACCORDANCE WITH PDI STANDARDS. INSTALL THE SHOCK ABSORBER SO THAT IT IS ACCESSIBLE FROM ABOVE THE ADJACENT STORAGE ROOM.
7. INSTALL SHOCK ABSORBER IN COLD WATER LINE BETWEEN THE LAST TWO WATER CLOSET FEEDS IN ACCORDANCE WITH PDI STANDARDS. INSTALL THE SHOCK ABSORBER SO THAT IT IS ACCESSIBLE FROM ABOVE THE ADJACENT TOILET ROOM GWB CEILING. PROVIDE ACCESS PANEL.

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Riser Diagrams

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