						P	UMP SCI	HEDULE (P)						
TAG	SERVES	FLOW	HEAD	MOTOR	NPSH	SPEED	MOTOR	FL	UID		ELEC.	WEIGHT	BACC 9 BAODEL	NOTES
TAG	SERVES	GPM	FT	BHP	FT HD	RPM	HP	TYPE	AVG TEMP. F	AMPS	V/HZ/PH	LBS	MFG & MODEL	NOTES
P-CHW1 & 2	CHILLED WATER LOOP	600	50	9.83	7.13	1760	15	20% P.GLY.	50	***************************************	460/60/3		GRUNDFOS 50957-4P-15HP VLSE	
P-HW1&2	HOT WATER LOOP	400	50	6.47	12.68	1775	10	100% WATER	150		460/60/3		GRUNDFOS 40957-4P-10HP-VLSE	
P-CH1	CHILLER #1 CIRCULATOR	315	35	3.61	8.76	1775	7.5	20% P.GLY.	50		460/60/3		GRUNDFOS 40957-4P-7.5HP-VLSE	
P-CH2	CHILLER #2 CIRCULATOR	315	35	3.61	8.76	1775	7.5	20% P.GLY.	50		460/60/3		GRUNDFOS 40957-4P-7.5HP-VLSE	
P-B1,2,3,4	BOILER CIRCULATOR	110	30	1.26	4.18	1183	2	100% WATER	150	460/60/3			GRUNDFOS 25953-VL	
P-SM1	SNOWMELT CIRCULATOR	8	32	178 W			0.5	40% P.GLY.	120	1.6	120/60/1	14	GRUNDFOS MAGNA1 32-100F	

1. PUMP TO RUN CONTINUOUSLY.

	MEC	HANICAL PIP	E INSULATION	SCHEDULE	_							
	(SEE NOTES, INSULAT	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	CATIONS & ABBREV	IATIONS BELOW 1		AL DIDE	OD TUD	C 0175 /IN	ICHES)			
PIPING SYSTEM	PIPING MATERIAL	FLUID OPERATING TEMPERATURE RANGE	INSULATION CONDUCTIVITY RANGE (BTU- IN/HR-FT2 DEG F)	1	PIPE BRANCH RUN OUTS (SEE NOTE 2 BELOW)	< 1	1 TO < 1-1/2		4 TO < 8	8 TO > 8	INSULATION MATERIAL	VAPOR BARRIE REQUIRE
CHILLED WATER SUPPLY & RETURN (ABOVE SLAB)	WELDED STEEL, PP-R OR PEX-A	(DEG F) 40-60	0.21 - 0.27	75	N/A	0.5	0.5	ESS (INC)	1	1	MF or FC	YES
CHILLED WATER SUPPLY & RETURN (BELOW SLAB)	FUSION WELDED HDPE OR PP-R	40-60	0.21 - 0.27	75	N/A	0.5	0.5	1	1	1	PISO	
HEATING WATER SUPPLY & RETURN (ABOVE SLAB)	WELDED STEEL, PP-R OR PEX-A	141 - 200	0.25 - 0.29	125	N/A	1.5	1.5	2	2	2	MF	NO
HEATING WATER SUPPLY & RETURN (BELOW SLAB)	FUSION WELDED HDPE OR PP-R	141 - 200	0.25 - 0.29	125	N/A	1.5	1.5	2	2	2	PISO	NO
SNOWMELT WATER SUPPLY & RETURN (ABOVE SLAB)	PP-R OR PEX-A	105-140	0.22 - 0.28	100	N/A	1	1	1.5	N/A	N/A	FC	YES
SNOWMELT WATER SUPPLY & RETURN (BELOW SLAB)	PP-R OR PEX-A	105-140	0.22 - 0.28	100	N/A	1	1	1.5	N/A	N/A	FC	YES
CONDENSATE DRAINS	PVC	40-60				0	0					
REFRIGERANT SUCTION & LIQUID (SEE NOTE 3 BELOW)	CU	10 & UP	0.21 - 0.27	75	0.5	0.75	0.75	N/A	N/A	N/A	FC	NO

1.THE TABLE ABOVE APPLIES TO METALLIC PIPES AND SCHEDULE 80 OR LESS NON-METALLIC PIPES. THE BASIS OF THE ABOVE SCHEDULE IS ECONOMIC THICKNESS, PREVENTION OF CONDENSATION, AND COMPLIANCE WITH ASHRAE 90.1-2013 MINIMUM INSULATION THICKNESSES. ASHRAE 90.1-2013 DOES NOT PROVIDE REDUCED INSULATION THICKNESS FOR BRANCH RUNOUTS.

2. PIPING INSULATION THICKNESSES MAY BE REDUCED AS INDICATED ABOVE FOR BRANCH RUNOUTS BETWEEN COIL CONTROL VALVE AND THE COIL WHEN THE CONTROL VALVE IS LOCATED WITHIN 4 FEET OF THE COIL AND THE PIPE SIZE IS 1 INCH OR LESS.

3. FOR OUTDOOR ABOVEGROUND REFRIGERANT PIPING, INSULATION REQUIREMENTS SHALL BE THE SAME AS FOR INDOOR ABOVEGROUND REFRIGERANT PIPING, WITH THE FOLLOWING EXCEPTION: INSULATION SHALLE BE JACKED WITH FLEXCAD-250, OR APPROVED EQUAL, ALUMINUM JACKETING SYSTEM, INSTALLED PER THE MANUFACTUREER'S RECOMMENDATIONS.

PIPE INSULATION SPECIFICATIONS:

FLEXIBLE ELASTOMERIC INSLATION (FC): CLOSED-CELL, FIBER-FREE, ELASTOMERIC FOAM RUBBER TUBULAR INSULATION, ARMSTRONG AP ARMAFLEX, OR APPROVED EQUAL. COMPLY WITH ASTM C 534, TYPE 1 FOR TUBULAR MATERIALS WITH FLAME SPREAD INDEX LESS THAN 25 AND SMOKE DEVELOPED INDELX LESS THAN 50. INSTALL INSULATION PER THE MANUFACTURER'S RECOMMENDATIONS.

MINERAL-FIBER PREFORMED PIPE INSULATION (MF): TYPE 1, MINERAL OR GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 547, TYPE 1, GRADE A. INSULATION SHALL HAVE A FACTORY-APPLIED ALL-SERVICE JACKET (ASJ). JACKET SHALL BE WHITE, KRAFT-PAPER, FIBERGLASS-REINFORCED SCRIM WITH ALUMINUM-FOIL BACKING; COMPLYING WITH ASTM C 1136, TYPE 1. FOR INDOOR EXPOSED PIPING REQUIRING FIBERGLASS INSULATION, PROVIDE A WHITE HIGH-IMPACT RESISTANT PVC JACKET COMPLYING WITH ASTM D 1784 CLASS 16354-C. INSTALL INSULATION PER THE MAUFACTURER'S RECOMMENDATIONS

ABBREVIATIONS: (APPLIES TO PIPE INSULATION THICKNESS SCHEDULES & PIPE INSULATION SPECIFICATIONS ON THIS DRAWING)

FC - FLEXIBLE CLOSED-CELL MF - MINERAL FIBER

N/A - NOT APPLICABLE

						,						<u>BOILI</u>	ER SCHEI	<u>DULE</u>										
			BOILER	BOILER	EFF.			WA	ATER SI	DE				BURNER GAS PRESSURES	ELECTRICA	L			PHY	SICAL				
TAG	DESCRIPTION	FUEL	INPUT	OUTPUT	EFF.	HWST	HWRT	FLOW	WPD	CONN.	VOL.	PRV	BURNER CONTROLS	(MIN/MAX)	VOLTAGE/PHASE	MFA	VENT	INTAKE	WIDTH	HEIGHT	DEPTH	WEIGHT	MANUF. & MODEL	NOTES
			MBH	MBH	%	F	F	GPM	FT	IN	GAL	PSI		IN WC	VOLTAGE/PHASE	AMPS	IN	IN	IN	IN	IN	LBS		
B-1,2,3,4	COUNTER-FLOW WATER TUBE CONDENSING BOILER IN PENTHOUSE	NG	1,600	1,517	95	160.0	130.0	110.0	9.0	2.5"	9.9	30	5:1 MOD.	7" / 14"	120 / 60 / 1	20	7"	12"	30"	74"	32"	875	CAMUS DYNAFORCE 1600	ALL

- 1. FLOOR MOUNTED BOILER, MOUNTED ON 6" HOUSEKEEPING PAD
- 2. PROVIDE CONDENSATE NEUTRALIZER KIT FOR ALL BOILERS OR COMMON KIT FOR ALL.
- 3. BOILERS PROVIDED WITH BUILT-IN FACTORY CONTROLS FOR STAGING AND SEQUENCING, INCLUDING OUTSIDE AIR RESET AND DOMESTIC HEAT PRIORITY
- 4. BOILERS PROVIDED WITH NETWORK COMMUNCATION CARD (TYPE TBD).
- 5. BOILER IS CONSTRUCTED WITH SS 439 TUBES AND SS 316L HEADERS. MAXIMUM WORKING PRESSURE OF 160 PSIG. 6. BOILER SHALL USE CATEGORY IV DIRECT VENTING. MULTIPLE BOILERS CAN NOT BE COMBINED. VENT MATERIAL SHALL BE AL29-4C, PREFERED VERTICAL TERMINATION.
- 7. PROVIDE LOW AND HIGH GAS PRESSURE SWITCH, AUTO RESET 8. BOILER SHALL PROVIDE POWER AND CONTROL TO BOILER CIRCULATOR PUMP
- 9. PROVIDE LOW WATER CUT-OFF, MANUAL RESET

							<u>UN</u>	IT HE	<u>ATER</u>	SCH	EDULE	(<u>UH</u>)								
		HEATING		AIRSIDE							E	LECT	RIC			SI	ZE			
TAG	DESCRIPTION	CAPACITY MBH	CFM	EAT DEG F	<u>LAT</u> DEG F	FLOW GPM	WPD FT	ROWS	EWT F	LWT F	MOTOR	V	PH	MCA	W IN	H IN	D IN	LBS	MAKE & MODEL	NOTES
UH-1,2	PENTHOUSE	22.6	405	60.0		3.0		2.0	160.0	140.0	0.1	120	1	2.1	32.0	12.0	18.0	70.0	MODINE HHD-30	ALL
UH-3	MECH RM.	22.6	405	60.0		2.0		2.0	160.0	140.0	0.1	120	1	2.1	32.0	12.0	18.0	70.0	MODINE HHD-30	ALL
UH-4	LOADING DOCK	22.6	405	60.0		3.0		2.0	160.0	140.0	0.1	120	1	2.1	32.0	12.0	18.0	70.0	MODINE HHD-30	ALL
NOTES:										-	•									

I. HYDRONIC UNIT HEATER TO SERVE AS PRIMARY HEAT FOR SPACE, SECONDARY IS GAS UNIT HEATER

. PROVIDE UNIT WITH MOUNTING BRACKETS TO BE HUNG FROM ROOF STRUCTURE. MOUNTING HEIGHT: 9'-0" AFF.

1. SYSTEM TO BE 40% PROPYLENE GLYCOL

3. PROVIDE WITH BASIC CONTROLS AND REMOTE MOUNTED T-STAT. 4. SETUP UNIT WITH HORIZONTAL DISCHARGE

		RA	DIANT H	HEAT AN	ND SNOWME	LT MAN	FOLD	SCHE	<u>DULE</u>				F:
MANIFOLD	ZONE NAME	AREA	ROOM	LOAD	TOTAL LOAD	SURFACE	TUBE	SPACE	CIRCUITS	FPD	EWT	LWT	FLOW
WANIFOLD	ZONE NAME	SF	BTU/SF	BTU	BTU	F	IN	IN OC	CIRCUITS	FT	F	F	GPM
SMZ-1	FRONT ENTRY DOOR	300	110.0	33,000	39,600	NA	5/8"	6"	1	<12	110	85	3.2
SMZ-2	STAIR C EXIT DOOR	48	110.0	5,280	6,336	NA	5/8"	6"	1	<12	110	85	1.0
SMZ-3	REAR ENTRY DOOR	144	110.0	15,840	19,008	NA	5/8"	6"	1	<12	110	85	1.5
SMZ-4	STAIR B EXIT DOOR	106	110.0	11,660	13,992	NA	5/8"	6"	1	<12	110	85	1.1
SMZ-5	UTILITY EXIT DOOR	68	110.0	7,480	8,976	NA	5/8"	6"	1	<12	110	85	1.0
SMZ-6	RETAIL #2 EXIT DOOR	112	110.0	12,320	14,784	NA	5/8"	6"	1	<12	110	85	1.2
SMZ-7	RETAIL #1 EXIT DOOR	40	110.0	4,400	5,280	NA	5/8"	6"	1	<12	110	85	1.0
SMZ-8	SIDE DOOR	40	110.0	4,400	5,280	NA	5/8"	6"	1	<12	110	85	1.0
SMZ-9	SIDE DOOR	40	110.0	4,400	5,280	NA	5/8"	6"	1	<12	110	85	1.0
SMZ-10	PATIO ROOF	626	110.0	68,860	82,632	NA	5/8"	6"	4	<12	110	85	6.6
					102,696					(2)			9.0

		ELE	CTRIC	C UNI	ГНЕА	TER	SCH	EDU	LE (E	UH)				
TAG	DESCRIPTION	HEATING CAPACITY		AIRSIDE EAT	LAT	EL	ECTR	IC	w	S H	IZE D		MANUFACTURER &	NOTES
140	DESCRIPTION	KW / MBH	CFM	DEG F	DEG F	V	PH	MCA	IN	IN	וו	LBS	MODEL	NOTES
EUH-1	STAIR B	6.0 / 20.5		60	85	480	1	12.5	32.0	22.0	3.8	50.0	QMARK EFQ60048	ALL
EUH-2	STAIR C	6.0 / 20.5		60	85	480	1	12.5	32.0	22.0	3.8	50.0	QMARK EFQ60048	ALL

2. SLAB MOISTURE SENSOR AND OUTDOOR AIR TEMP SENSOR TO BE USED FOR AUTOMATIC OPERATION OF SNOWMELT ZONES

- HEATER IS PROVIDED WITH INTEGRAL TAMPER RESISTANT T-STAT.
- 2. HEATER IS PROVIDED WITH INTEGRAL DISCONNECT SWITCH INSIDE ENCLOSURE B. HEATER IS PROVIDED WITH MOUNTING HARDWARE NECESSARY FOR RECESSED WALL MOUNTING.

					-	EXPAI	NSION TA	ANK SCH	IEDULE (E	<u>T)</u>							
			SYSTEM		MIN	MAX	FILL	MAX	TOTAL CALC.	TANK	TANK			SIZE			
TAG	SYSTEM	TYPE	VOLUME	FLUID	TEMP	TEMP	PRESSURE	PRESSURE	EXPANSION	VOLUM.	ACCEPTANCE	DIA.	Н	EMPTY WEIGHT	FULL WEIGHT	MANUFACTURER & MODEL	NOTES
			GAL		F	F	PSI	PSI	GAL	GAL	GAL	(IN)	(IN)	(LBS)	(LBS)		
ET-1,2	HEATING WATER	FULL ACCEPTANCE BUTYL BLADDER	1400	100% WATER	60	180	20	60	36.8	37	37	20"	46"	195	503	TACO CA-140	1,2
ET-3	CHILLED WATER	FULL ACCEPTANCE BUTYL BLADDER	1600	20% P.GLY.	40	80	20	60	4.0	23	23	20"	32"	120	312	TACO CA-90	2
ET-SM1	SNOWMELT	FULL ACCEPTANCE BUTYL BLADDER	200	40% P.GLY.	20	160	15	30	4.0	23	23	20"	32"	120	312	TACO CA-90	2
		***************************************											T				1

- 1. EXPANSION TANKS SIZED TO HANDLE 1/2 OF TOTAL SYSTEM EXPANSION MINIMUM
- 2. ASME RATED FOR 125 PSI @ 240 DEG F.

												<u>C</u>	HILLER S	CHEDUL	<u>.E (CH)</u>											
			DESI	GN PERF	ORMANCI	Ξ		EVAP	ORATO	R				COND	ENSER				ELECTRIC	AL DATA			ACOL	ISTICAL		
TAG	DESCRIPTION	NOM. SIZE	CAPACITY	COOL	ING EFFIC	IENCY	TYPE	FLOW	LWT	EWT	WPD	NO.	AMBIENT TEMP	FAN POWER	REFRIG	CIRCUIT 1 CHARGE	CIRCUIT 2 CHARGE		PH HZ	MCA	MFS	WEIGHT OPERATING	POWER	PRESSURE	MANUFACTURER & MODEL	NOTES
		TONS	TONS	EER	IPLV.IP	NPLV.IP		GPM	F	F	FT HD	FANS	F	KW	TYPE	LBS	LBS			AMPS	AMPS	LBS	dBA	dBA		
CH-1	AIR-COOLED CHILLER	165.0	148	10.94	18.67	17.76	3-PASS, 2-CIRCUIT	313.8	42	54	28.4	10	95	7.82	HFC- 134A	181	181	460	3 60	323	450	13,400	91	63	TRANE RTAE165	1,2,3,4
CH-2	AIR-COOLED CHILLER	165.0	148	10.94	18.67	17.76	3-PASS, 2-CIRCUIT	313.8	42	54	28.4	10	95	7.82	HFC- 134A	181	181	460	3 60	323	450	13,400	91	63	TRANE RTAE165	1,2,3
NOTEC.																										-

TAG	DESCRIPTION	SIZE	CAPACITY	COOL	ING EFFIC	CIENCY		FLOW	LWT	EWT	WPD		AMBIENT	FAN	REFRIG	CIRCUIT 1	CIRCUIT 2				MCA	MFS	OPERATING			MANUFACTURER &
IAG	DESCRIPTION		CAFACITI	0001	ING EFFIC	JIENO I	TYPE	PLOW	LAAI	CAAI	VVPD	NO. FANS	TEMP	POWER	KEFKIG	CHARGE	CHARGE	VOLTS	PH	HZ		MILO		POWER	PRESSURE	MODEL
		TONS	TONS	EER	IPLV.IP	NPLV.IP		GPM	F	F	FT HD		F	KW	TYPE	LBS	LBS		***************************************		AMPS	AMPS	LBS	dBA	dBA	
CH-1	AIR-COOLED CHILLER	165.0	148	10.94	18.67	17.76	3-PASS, 2-CIRCUIT	313.8	42	54	28.4	10	95	7.82	HFC- 134A	181	181	460	3	60	323	450	13,400	91	63	TRANE RTAE165
CH-2	AIR-COOLED CHILLER	165.0	148	10.94	18.67	17.76	3-PASS, 2-CIRCUIT	313.8	42	54	28.4	10	95	7.82	HFC- 134A	181	181	460	3	60	323	450	13,400	91	63	TRANE RTAE165
NOTES:	•											•							•							
1. UNIT PF	ROVIDED WITH INTE	GRAL NO	N-FUSED DISC	ONNECT (ON CABINE	Т																				
2. UNIT PF	ROVIDED WITH NET	WORK CO	MMUNICATION	CARD (T)	/PE TBD).																					
3. UNIT PF	ROVIDED WITH ULTI	IMATE SOL	JND ATTENTU	ATION PAC	KAGE.																					
4. UNIT PR	OVIDED WITH FREE	E-COOLING	G ECONOMIZE	R COIL																						

S Project: 0 HANCOCK

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