





PACKAGED DUCTLESS MINI SPLIT SYSTEM HEAT PUMP SCHEDULE													
SYMBOL	MFG.	MODEL NO.	CFM	COOLING CAPACITY		ELECTRICAL CHARACTERISTICS						REMARKS	
				TOTAL MBH	S.E.E.R.	COMPRESSOR		O.D. FAN		POWER SUPPLY			VOLTAGE
						R.L.A.	L.R.A.	H.P.	F.L.A.	MCA	MFA		
CC-1	* MITSUBISHI	NTXCKS12A112A	335	12.0	—	—	—	—	—	0.3	—	230-1Ø	①②④⑤
CC-2	* MITSUBISHI	NTXCKS12A112A	335	12.0	—	—	—	—	—	0.3	—	230-1Ø	①②④⑤
HP-1	* MITSUBISHI	NTXMPH24A132CA	—	23.6	17.25	—	—	—	—	31.5	40	230V-1Ø	①③

#### REMARKS

- UNIT SHALL BE PROVIDED WITH THE FOLLOWING ACCESSORIES: TIME DELAY RELAY, LOW AMBIENT CONTROLLER, WINTER START CONTROL EVAPORATOR DEFROST CONTROL KIT, HIGH LOW PRESSURE CUT-OUT SWITCH AND WALL BRACKET.
- REFRIGERANT LINE SETS SHALL BE SIZED PER MANUFACTURERS RECOMMENDATIONS AND SHALL BE INSULATED WITH 1" AP ARMAFLEX.
- WIRED AND INTERLOCKED WITH INDOOR UNITS CC-X.
- WALL MOUNTED THERMOSTAT WITH REMOTE CONTROL.
- INDOOR UNIT POWERED BY OUTDOOR UNIT. WIRED BY E.C.

\* OR APPROVED EQUAL

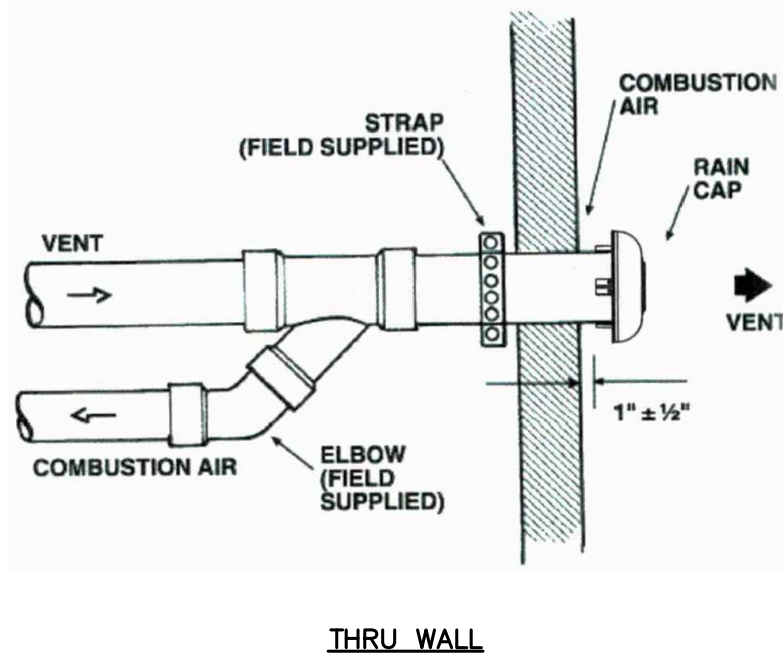
EXHAUST FAN SCHEDULE											
SYMBOL	SERVING	TYPE	C.F.M.	E.S.P.	R.P.M.	WATTS OR HP	VOLTAGE	REFERENCE		WEIGHT LBS.	REMARKS
								MFG.	MODEL NO.		
CEF-1	RESTROOM/JAN. CL.	C	125	.25	975	115	115/60/1	GREENHECK	SP-B125	12	NOTE 1, 3, 4
CEF-2	RESTROOM/BREAK RM.	C	150	.25	1050	150W	115/60/1	GREENHECK	SP-B150	12	NOTE 1, 3, 4
CEF-3	TOOL STORAGE	C	450	.25	1050	108W	115/60/1	GREENHECK	SP-A290	25	NOTE 2, 3, 4
ILF-1	MECHANICS SHOP	IL	740 *2630	.50	VAR.	1 HP	115/60/1	GREENHECK	SQ-160-VG	167	NOTE 5, 6, 8
ILF-2	WASH BAY	IL	875 *4450	.50	VAR.	2 HP	230/60/1	GREENHECK	SQ-160-VG	176	NOTE 5, 6, 8
ILF-3A	GARAGE BAY #1 OCCUPIED FAN/EM.VENT	IL	1600	.50	1103	1/2 HP	230/60/1	GREENHECK	BSQ-140	127	NOTE 5
ILF-3B	GARAGE BAY #1 EM.VENT/HEAT REMOV.	IL	5850	.50	724	2 HP	230/60/1	GREENHECK	BSQ-240	256	NOTE 5, 6, 7, 8
ILF-4A	GARAGE BAY #2 OCCUPIED FAN/EM.VENT	IL	2120	.50	958	3/4 HP	230/60/1	GREENHECK	BSQ-160	151	NOTE 5
ILF-4B	GARAGE BAY #2 EM.VENT/HEAT REMOV.	IL	7760	.50	543	2 HP	230/60/1	GREENHECK	BSQ-300	453	NOTE 5, 6, 7, 8

\* C = CEILING MOUNTED RT = ROOF TOP WM = WALL MOUNTED IL = IN LINE

#### NOTES:

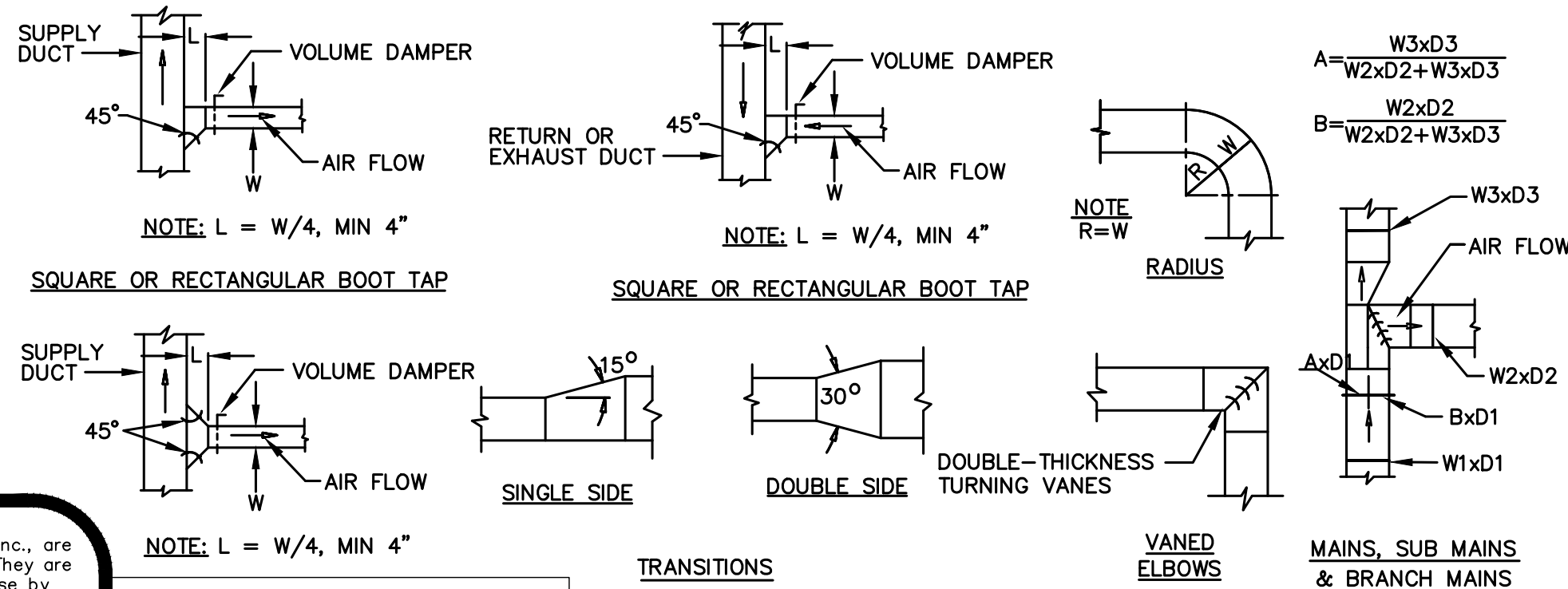
- CONTROLLED BY LIGHTING CONTROL FOR TOILET ROOMS/SHOWER RM. REFER TO ELECTRICAL DRAWING FOR INFORMATION.
- CONTROLLED BY REVERSE ACTING THERMOSTAT IN UTILITY ROOM.
- CONTROLLED BY DEDICATED SWITCH IN BREAK ROOM, JANITORS CLOSET AND TOOL STORAGE ROOM.
- PROVIDE WITH BACKDRAFT DAMPER, INSECT SCREEN AND WALL CAP OR BRICK VENT AS SPECIFIED BY ARCHITECT. MANUFACTURED BY GREENHECK.
- CONTROLLED BY OCCUPANCY SENSOR, CO SENSOR, NOX SENSOR, REVERSE ACTING THERMOSTAT & DEDICATED SWITCH. PROVIDE WITH LOUVER, BACKDRAFT DAMPER, INSECT SCREEN AND WALL CAP OR BRICK VENT AS SPECIFIED BY ARCHITECT. MANUFACTURED BY GREENHECK.
- TWO STAGE OPERATION FIRST STAGE OCCUPIED VENTILATION, SECOND STAGE EMERGENCY & HEAT REMOVAL VENTILATION. FAN CONTROLS REQUIRE 0-10V INPUT FOR STAGING.
- PROVIDE WITH VFD FOR 230V-1Ø POWER SUPPLY TO CONVERT TO 230V-3Ø FOR FAN POWER.
- FAN CONTROL BY 0-10V CONTROL INPUT FOR FIRST STAGE - OCCUPIED VOLUME AND EMERGENCY/HEAT REMOVAL - SECOND STAGE CONTROL, ONCE STAGES ARE SET, BALANCE.

\* OR APPROVED EQUAL



TYPICAL THRU THE WALL CONCENTRIC VENT/FLUE KIT DETAILS

SCALE: NONE



NOTE: L = W/4, MIN 4"

SQUARE OR RECTANGULAR BOOT TAP

NOTE: L = W/4, MIN 4"

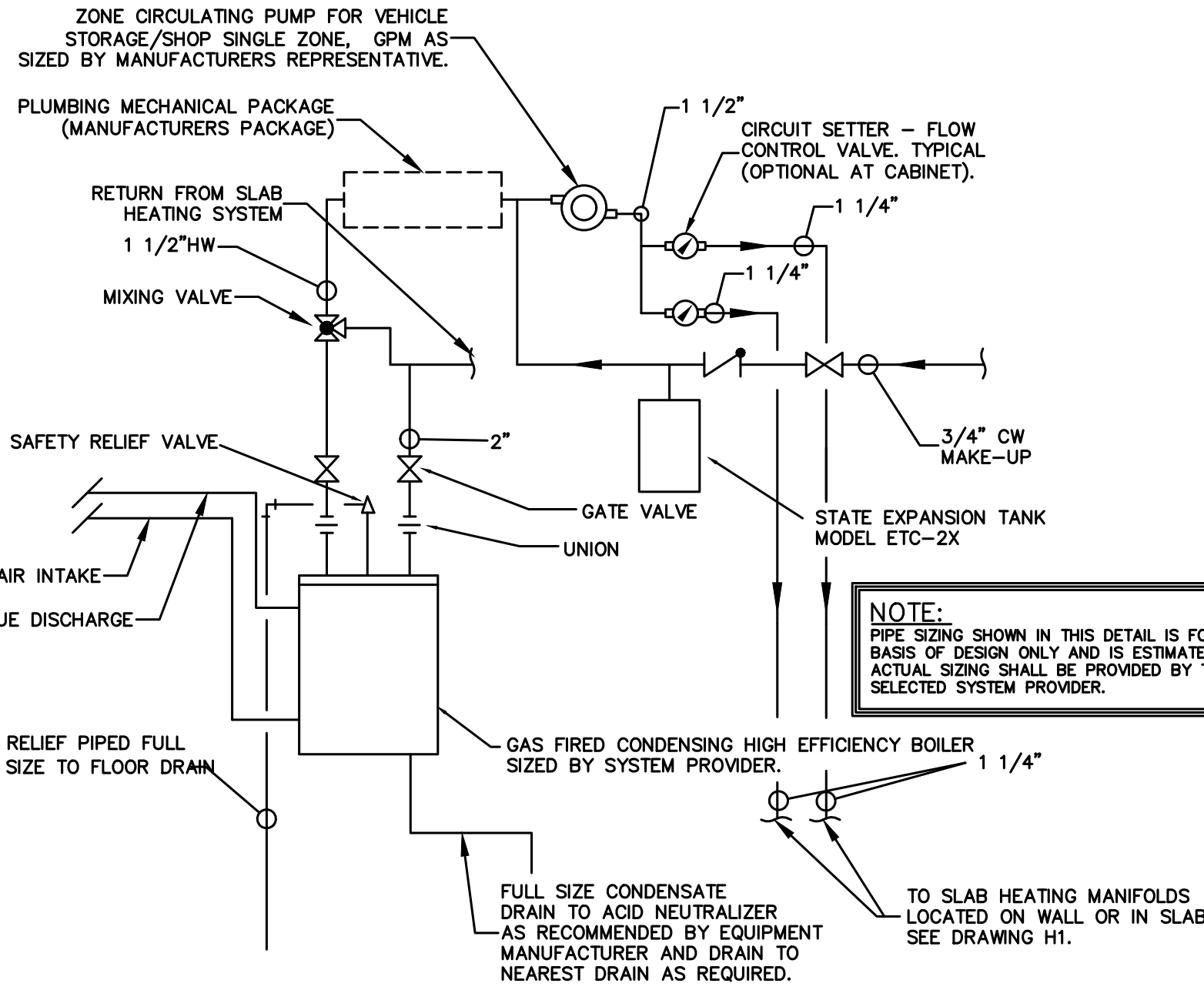
ROUND CONICAL TAP

NO SCALE

TRANSITIONS

MAINS, SUB MAINS & BRANCH MAINS

NO SCALE



#### NOTE:

- FURNISH AND INSTALL VISSMANN/RENNAI TUBE CONDENSING TYPE HIGH EFFICIENCY GAS BOILER WITH ALL APERTENANCES AS REQUIRED BY APPLICABLE CODES AND MANUFACTURE'S RECOMMENDED INSTALLATION REQUIREMENTS.
- PROVIDE PLUMBING MECHANICAL PACKAGE AS REQUIRED BY RADIANT SYSTEM MANUFACTURER.
- PROVIDE BALANCING VALVES ON ALL LOOPS.
- VERIFY ALL PIPING SIZING AND MANIFOLD SUPPLY PIPING SIZE WITH SYSTEM MANUFACTURER PRIOR TO BIDDING.
- ARCHITECT SHALL PROVIDE INSULATED SLAB AS PER MANUFACTURERS INSTALLATION INSTRUCTIONS. COORDINATE INSTALLATION REQUIREMENTS WITH ARCHITECTURAL DRAWINGS.
- LOOP MANIFOLDS SHALL BE INSTALLED ON THE WALL OR IN THE FLOOR AS RECOMMENDED BY SYSTEM MANUFACTURER AND OWNERS DIRECTION. SEE APPROXIMATE LOCATIONS ON DRAWING H1. VERIFY INSTALLATION LOCATION WITH OWNER AND MANUFACTURERS REPRESENTATIVE PRIOR TO INSTALLATION AND CONSTRUCTION.
- THIS DETAIL IS A SCHEMATIC OF A TYPICAL INSTALLATION AND MAY NOT INCLUDE ALL ITEMS REQUIRED FOR A COMPLETE INSTALLATION FOR EACH APPLICATION. THE CONTRACTOR SHALL VERIFY ALL REQUIREMENTS WITH THE MANUFACTURERS REPRESENTATIVE FOR A COMPLETE AND FUNCTIONAL SYSTEM TO MEET THE DESIGN INTENT FOR THIS PROJECT.
- THE CONTRACTOR SHALL PROVIDE SHUT-OFF VALVES AT LOCATIONS REQUIRED FOR MAINTENANCE OF ALL ITEMS.
- CONTRACTOR SHALL PROVIDE ALL CONTROLS, SENSORS, LOW VOLTAGE WIRING, VALVES, ETC. TO PROVIDE THE HYDRONIC HEATING COIL WITH REQUIRED TEMPERATURE FLUID AND RADIANT SLAB SYSTEM MIXED DOWN TO TEMPERATURE AS RECOMMENDED BY THE SYSTEM MANUFACTURER FOR SLAB HEATING AND SNOW MELTING SYSTEMS AS REQUIRED.

TYPICAL SLAB HEATING SYSTEM SCHEMATIC DETAIL

NO SCALE

## HORIZONTAL UNIT HEATER SCHEDULE

SYMBOL	TYPE *	MFG.	MODEL NO.	C.F.M.	GAS CAPACITIES (MBH)		ELECTRICAL DATA.			REMARKS
							FAN MOTOR		VOLTAGE	
					INPUT	OUTPUT	H.P.	AMPS		
HUH-1	H	* MODINE	HDS-45	720	45	36.9	1/15	3.75	120V-1Ø	MOUNT TOP OF UNIT 18" MIN. FROM CEILING. CONCENTRIC VENT ARRANGEMENT THROUGH THE WALL.
HUH-2	H	* MODINE	HDS-60	1650	60	49.2	1/12	3.3	120V-1Ø	MOUNT TOP OF UNIT 18" MIN. FROM CEILING. CONCENTRIC VENT ARRANGEMENT THROUGH THE WALL.
HUH-3	H	* MODINE	HDS-100	1650	100	82.0	1/6	5.05	120V-1Ø	MOUNT TOP OF UNIT 18" MIN. FROM CEILING. CONCENTRIC VENT ARRANGEMENT THROUGH THE WALL.
NOTE : PROVIDE WITH WALL MONUNTED THERMOSTAT, MOUNTED AT 42" ABOVE FINISHED FLOOR. PROVIDE WITH 2 STAGE GAS VALVE.										
* H= HORIZONTAL C= CABINET										

\* H= HORIZONTAL C= CABINET

NOTE: PROVIDE WITH WALL MOUNTED THERMOSTAT, MOUNTED AT 42" ABOVE FINISHED FLOOR. PROVIDE WITH 2 STAGE GAS VALVE.

\* OR APPROVED EQUAL

## EXHAUST GRILL SCHEDULE

SYMBOL	DESCRIPTION	C.F.M. RANGE	NECK SIZE	MANUFACTURER	MODEL	MATERIAL	FINISH	REMARKS
EG-1	EXHAUST GRILLE	1570 2400	22X22	TUTTLE & BAILEY	CRE500	ALUMINUM	WHITE	① ②
EG-1	EXHAUST GRILLE	2400 3500	24X24	TUTTLE & BAILEY	CRE500	ALUMINUM	WHITE	① ②

#### NOTES:

- PROVIDE WITH FRAME TO SECURE TO DUCTWORK.
- PROVIDE ALL ALUMINUM CONSTRUCTION.
- PROVIDE WITH INTEGRAL OPPOSED BLADE BALANCING DAMPER.

#### DRAWING KEY

CD- = DIFFUSER, GRILLE & REGISTER TYPE  
250 = AIR QUANTITY IN CFM

\* OR APPROVED EQUAL

## ELECTRIC HEAT SCHEDULE

NOTE: ALL ELECTRIC HEATERS SHALL HAVE POSITIVE SHUT-OFF AND OFF POSITION.

SYMBOL	SERVING	TYPE *	KW	VOLTAGE	REFERENCE		REMARKS
					MFG.	MODEL NO.	
WIH-1	RESTROOM	W	1.5	115/60/1	* QMARK	CWH3150F	INTEGRAL THERMOSTAT POSITIVE SHUT-OFF
WIH-2	RESTROOM	W	2.0	230/60/1	* QMARK	CWH3404F	INTEGRAL THERMOSTAT POSITIVE SHUT-OFF

\* C = CEILING MOUNTED R = ROOF TOP W = WALL MOUNTED F = FLOOR MOUNTED

\* OR APPROVED EQUAL

## GAS FIRED INFRARED RADIANT HEATING UNIT SCHEDULE

SYMBOL	MFG.	MODEL NO.	CAPACITY		UNIT AMPS	VOLTAGE	UNIT WEIGHT	REMARKS
			INPUT MBH	OUTPUT MBH				
RT-1	MODINE	IP150	75	5.5	120V-1Ø	—	—	30"-0" - 4" TUBE CONTROLLED BY SPACE STAT USED IN GARAGE

#### REMARKS:

COORDINATE REFLECTOR DIRECTIONS WITH ALL CONSTRUCTION AFTER INSTALLATION. PROVIDE WITH 4" TYPE 'B' GAS VENT THROUGH WALL WITH VENT HOOD. PROVIDE WITH REMOTE THERMOSTAT, HONEYWELL DIGITAL ROUND HEAT ONLY. MOUNT AT 42" A.F.F. PROVIDE DIRECT CONNECTED COMBUSTION AIR INTAKE KIT THROUGH THE WALL.

\* OR APPROVED EQUAL

## SYMBOLS

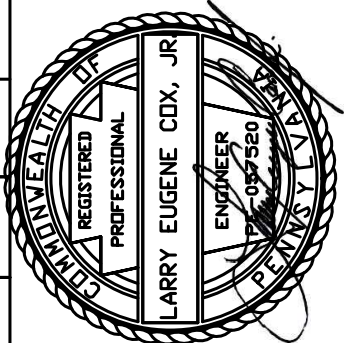
- ① THERMOSTAT
- AIR FLOW DIRECTION
- MANUAL BALANCING DAMPER
- └ TURNING VANES OR RADIUS ELBOW

## ABBREVIATIONS

AC	AIR CONDITIONING	HZ	HERTZ
AFF	ABOVE FINISHED FLOOR	IN	INCHES
AHU	AIR HANDLING UNIT	LRA	LOCKED ROTOR AMPS
APPROX	APPROXIMATELY	MAX	MAXIMUM
BLD'G	BUILDING	MBH	THOUSAND BTU'S PER HOUR
BTU	BRITISH THERMAL UNITS	MC/A	MINIMUM CIRCUIT AMPS
BTU/H	BRITISH THERMAL UNITS PER HOUR	MECH	MECHANICAL
CAP	CAPACITY	MFG	MANUFACTURER
CFM	CUBIC FEET PER MINUTE	MIN	MINIMUM
CLG	CEILING	MTD	MOUNTED OR MOUNTING
CONT'D	CONTINUED	NIC	NOT IN CONTRACT
DB	DRY BULB	OA	OUTSIDE AIR
DEG	DEGREE	PC	PLUMBING CONTRACTOR
DIA	DIAMETER	PH	PHASE
DN	DOWN	QTY	QUANTITY
DWG	DRAWING	REQ'D	REQUIRED
EAT	ENTERING AIR TEMPERATURE	RG	REGISTER
EC	ELECTRICAL CONTRACTOR	RLA	RUNNING LOAD AMPS
EER	ENERGY EFFICIENCY RATING	RPM	REVOLUTIONS PER MINUTE
EF	EXHAUST FAN	SA	SUPPLY AIR
ESP	EXTERNAL STATIC PRESSURE	SEER	SEASONAL ENERGY EFFICIENCY RATING
EXH	EXHAUST	SENS	SENSIBLE
EXIST	EXISTING	SP	STATIC PRESSURE
F	FAHRENHEIT	STAT	THERMOSTAT
FD	FIRE DAMPER	STD	STANDARD
FL	FLOOR	TEMP	TEMPERATURE
FLA	FULL LOAD AMPS	TSP	TOTAL STATIC PRESSURE
GC	GENERAL CONTRACTOR	TYP	TYPICAL
HC	HEATING CONTRACTOR	W	WATTS
HVAC	HEATING VENTILATING AIR CONDITIONING	WB	WET BULB
HP	HORSE POWER		

NOTE: THE ABOVE SCHEDULE IS A STANDARD. THE ABBREVIATIONS DO NOT NECESSARILY APPEAR ON THE DRAWINGS FOR THIS PROJECT.

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NO.	REVISION NOTES	DATE
1	ADDENDUM - ADD (2) EX. FANS	09/06/23

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EQUIPMENT BUILDING  
CONSTRUCTION DRAWING  
FOR  
PROPOSED FIRST FLOOR PLAN  
CUMBERLAND COUNTY, PA  
SOUTHAMPTON TWP.

Drawn By: LEC  
Designed By: LEC  
Checked By: LEC  
File: 2022-SH-009  
Date: 08/18/2023  
Scale: 3/16"=1'-0"

Drawing No.

H-2

NOT FOR CONSTRUCTION - ISSUED FOR BID AND PERMIT 08-21-23



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PENNSYLVANIA ONE CALL SYSTEM, INC.  
1-800-242-1776  
PENNSYLVANIA LAW REQUIRES NOT LESS THAN THREE WORK MORE THAN TEN WORKING DAYS NOTICE BEFORE EXCAVATION  
REFER TO PENNSYLVANIA ONE CALL SYSTEM, INC.  
UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE.

#### HVAC GENERAL NOTES

- THIS CONTRACTOR SHALL PERFORM IS WORK IN COMPLIANCE WITH ALL PERTINENT CODES, RULES, ORDINANCES AND REGULATIONS OF ALL STATE, LOCAL AND NATIONAL GOVERNING AUTHORITIES THAT HAVE JURISDICTION OVER THIS BUILDING.
- DO NOT SCALE DRAWINGS – ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED BY THIS CONTRACTOR. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DEVIATIONS THAT ARE FOUND BETWEEN THE DRAWINGS AND SITE CONDITIONS.
- CONTRACTOR SHALL REPORT ALL DISCREPANCIES FOUND IN THE DRAWINGS AND/OR IN THE SPECIFICATIONS FOR CLARIFICATION.
- THE DRAWINGS ARE DIAGRAMMATIC AND SHOW ONLY THE GENERAL ARRANGEMENT OF ALL DUCTWORK, PIPING AND EQUIPMENT LAYOUT. BECAUSE OF THE SMALL SCALE OF THE DRAWINGS, IT IS NOT POSSIBLE TO SHOW OR INDICATE ALL OFFSETS, FITTINGS AND ACCESSORIES WHICH MAY BE REQUIRED TO AVOID EXISTING PIPING OR STRUCTURAL FEATURES THEREFORE THE CONTRACTOR SHALL PROVIDE WHAT IS REQUIRED TO INSTALL A COMPLETE SYSTEM.
- ALL DUCTWORK SIZES NOTED ARE FREE AREA SIZES. THE FIRST FIGURE OF THE DUCT SIZE INDICATES THE DIMENSION OF THE FACE SHOWN OR INDICATED. FOR DUCTWORK INSULATION THICKNESS AND REQUIREMENTS REFER TO THE SPECIFICATION.
- ALL MANUAL BALANCING VOLUME DAMPERS SHALL BE OF THE LOCKING BLADE TYPE.
- ALL SUPPLY AIR SQUARE DUCT ELBOWS SHALL HAVE TURNING VANES INSTALLED.
- ALL INTERIOR DUCTWORK SHALL BE WRAPPED WITH 2" INSULATION WITH VAPOR BARRIER OR LINED WITH MINIMUM 1" INSULATION ON THE SUPPLY AIR DUCTS AND 1/2" ON RETURN AIR DUCTS. (MIN. R=5.0 INSTALLED VALUE INSIDE THERMAL ENVELOPE).
- FLEXIBLE DUCTWORK SHALL BE INSULATED AND SHALL NOT EXCEED 14'-0" IN LENGTH.
- INSURE THAT ALL EXHAUST, FLUE AND VENTS ARE MINIMUM 10'-0" FROM ALL FRESH AIR INTAKES.
- HVAC EQUIPMENT SHALL BE CLEANED, LUBRICATED AND HAVE NEW FILTERS INSTALLED PRIOR TO START-UP.
- ALL DUCTWORK SHALL BE RUN ABOVE DROP CEILING.
- ALL CUTTING AND PATCHING REQUIRED FOR THIS WORK SHALL BE DONE BY THE GENERAL CONTRACTOR.
- DUCTWORK AND EQUIPMENT INSTALLATION SHALL BE COORDINATED WITH ALL OTHER TRADES.
- THIS CONTRACTOR SHALL COORDINATE ALL HVAC POWER REQUIREMENTS WITH THE ELECTRICAL CONTRACTOR.
- RADIANT SLAB HEATING SYSTEM SHALL BE COORDINATED WITH SYSTEM MANUFACTURER FOR ALL REQUIRED COMPONENTS, CONTROLS, TUBING, SPACING, EQUIPMENT, MANIFOLDS, VALVES, CIRCULATORS, ETC. TO INSURE A COMPLETE FUNCTIONAL SYSTEM INSTALLATION. THIS CONTRACTOR SHALL INSURE THAT THE DESIGN AND ALL COMPONENTS REQUIRED FOR A COMPLETE RADIANT SLAB HEATING SYSTEM ARE REVIEWED BY THE SYSTEM MANUFACTURER AND ARE INCLUDED IN THE BID.
- THE CONTRACTOR SHALL INSURE THAT THE ALL-WEATHER LOUVERS INSTALLED FOR FRESH AIR INTAKE DO NOT EXCEED THE WATER PENETRATION VELOCITY.
- THE PADDLE FANS SHALL BE INTERLOCKED WITH THE RESPECTIVE MOTORIZED DAMPERS ON INTAKE LOUVERS AS REQUIRED.
- PROVIDE FIRE DAMPERS IF REQUIRED.
- THIS CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING JOIST CONFIGURATION WITH EQUIPMENT LOCATIONS AND DUCT LAYOUT, PRIOR TO ORDERING DUCT PACKAGE, TO INSURE THAT LAYOUT WILL FIT IN AVAILABLE SPACE. THIS CONTRACTOR SHALL MAKE CHANGES AS REQUIRED WITHOUT COST TO THE OWNER.
- CAP AND SEAL ALL DUCTWORK, PIPING, FLUES, INTAKES, ETC. UNTIL FINAL CONNECTION IS MADE.
- DO NOT RUN DUCTWORK OVER ELECTRICAL EQUIPMENT.
- PROVIDE RECOMMENDED MANUFACTURER CLEARANCES AROUND EQUIPMENT FOR SERVICING AND OPERATION.
- VERIFY ALL MOUNTING HEIGHTS AND REQUIREMENTS FOR EQUIPMENT WITH ARCHITECTURAL DRAWINGS, CODE ENFORCEMENT OFFICER AND OWNER.
- CONTRACTOR SHALL PAINT THE INSIDE OF DUCTS BLACK WHERE THE INSIDE CAN BE SEEN THROUGH THE AIR DEVICE.
- DUCTWORK SHALL BE SHEET METAL WITH WRAPPED INSULATION UNLESS OTHERWISE DIRECTED.
- ELECTRICAL DISCONNECT SWITCHES BY E.C.

#### HVAC SPECIFICATIONS:

- THE WORK REQUIRED UNDER THIS CONTRACT SHALL INCLUDE ALL LABOR, MATERIALS, APPURTENANCES, EQUIPMENT AND SERVICES NECESSARY AND REQUIRED TO FURNISH AND INSTALL ALL ITEMS INDICATED OR REQUIRED FOR COMPLETE INSTALLATION IN ACCORDANCE WITH STANDARD PROCEDURES UNDER HVAC CONSTRUCTION.
- THE ENTIRE INSTALLATION SHALL CONFIRM WITH ALL PERTINENT CODES AND REGULATIONS OF LOCAL, MUNICIPAL, COUNTY AND STATE AUTHORITIES, THE PENNSYLVANIA DEPARTMENT OF LABOR AND INDUSTRY, THE NATIONAL BOARD OF FIRE UNDERWRITERS, AND THE NATIONAL ELECTRIC CODE.
- WHERE APPLICABLE MATERIALS AND EQUIPMENT SHALL BEAR STAMPS OR SEALS OF NFPA, ASME, NEMA, AND OTHER INDUSTRY REGULATIONS AGENCIES, IF ANY OF THE WORK SHOWN OR SPECIFIED CONFLICT WITH CODES OR REGULATIONS THE CONTRACTOR SHALL MAKE SURE CHANGES ARE AS REQUIRED WITHOUT ADDITIONAL COST TO THE OWNER.
- ALL WORK UNDER THIS SPECIFICATION SHALL BE GUARANTEED FREE OF DEFECTS IN MATERIAL, DESIGN, OR WORKMANSHIP FOR A PERIOD OF (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE OF THE WORK. ANY DEFECTS IN THE WORK DEVELOPING DURING THIS PERIOD SHALL BE REMEDIED WITHOUT COST TO THE OWNER.
- THE CONTRACTOR SHALL SECURE AND PAY FOR THE PERMITS AND TESTS REQUIRED.
- THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND SPECIFICATIONS COVERING ALL ITEMS TO BE PROVIDED.
- ALL DUCTWORK SHALL BE INSTALLED AS REQUIRED TO PROVIDE MAXIMUM HEAD ROOM.
- FURNISH AND INSTALL ALL HANGERS AND SUPPORTS FOR DUCTWORK AS REQUIRED AND IN ACCORDANCE WITH STANDARD CONSTRUCTION REQUIREMENTS.
- ALL CONTROL WIRING AND THERMOSTATS SHALL BE FURNISHED AND INSTALLED BY THE HVAC CONTRACTOR.
- SUPPLY, RETURN AND EXHAUST DUCTWORK CONSTRUCTION SHALL BE 24 GAUGE ZINC-COATED IRON OR STEEL. ROUND DUCTWORK CONSTRUCTION SHALL BE 24 GAUGE ZINC-COATED IRON OR STEEL. SHEET METAL FOR CUPS AND DRIVE CAPS SHALL BE OF THE SAME MATERIAL AN THICKNESS AS THE DUCTWORK. ALL DUCTWORK SHALL BE SEALED AIR TIGHT WITH DUCT SEALER.
- ELBOW SHALL HAVE A CENTERLINE RADIUS EQUAL TO 1 1/2 TIMES THE WIDTH OF THE DUCT IN DIRECTION OF TURN UNLESS DRAWINGS INDICATE SQUARE ELBOW IN WHICH CASE, TURNING VANES SHALL BE PROVIDED AS MANUFACTURED BY HART & COOLEY (DUCTURNS).
- DAMPERS SHALL BE INSTALLED IN DUCTS WHERE SHOWN AND WHEREVER REQUIRED TO PERMIT COMPLETE ADJUSTMENT OF AIR QUANTITIES AT ALL OUTLETS. DAMPERS SHALL BE LOCATED WHERE THEY CAN BE ADJUSTED AT ANY TIME AFTER COMPLETION OF THE WORK.
- INSULATION FOR ALL FRESH AIR, SUPPLY AND RETURN AIR DUCTWORK SHALL BE OWENS CORNING 3/4 LB. DENSITY TYPE 75 EXTERIOR DUCT WRAP INSULATION. INSULATION SHALL HAVE FACTORY APPLIED FOIL-SCRM-CRAFT FACING AND SHALL BE 2" THICK. (MINIMUM R=5.0 INSIDE THERMAL ENVELOPE MINIMUM R=8.0 OUTSIDE THERMAL ENVELOPE)
- FLEXIBLE AIR DUCT FOR CONNECTIONS BETWEEN MAIN DUCT AND AIR DEVICES SHALL BE THERMAFLEX MODEL G-KM AIR DUCT LISTED BY UNDERWRITERS LABORATORIES, INC., UNDER STANDARD 181 AS A CLASS I FLEXIBLE AIR DUCT AND COMPLYING WITH NFPA STANDARDS 90A AND 90B OR APPROVED EQUAL. DUCT SHALL BE FACTORY MADE AND COMPOSED OF A CPE LINER DUCT PERMANENTLY BONDED TO A COATED SPRING STEEL WIRE HELIX SUPPORTING A FIBERGLASS SCRM AND FIBERGLASS INSULATING BLANKET. LOW PERMEABILITY OUTER VAPOR BARRIER SHALL COMPLETE THE ASSEMBLY.
- ALL DUCTWORK INSTALLATION SHALL CONFORM TO SMACNA AND ASHRAE STANDARDS.
- FURNISH AND INSTALL ALL DIFFUSERS, REGISTERS AND GRILLES AS SHOWN ON THE PLANS.  
  
THEY SHALL BE OF A COMMERCIAL GRADE CONSTRUCTED OF ALUMINUM OR STEEL WITH MITERED CORNER AND SPONGE RUBBER GASKETS.  
  
ALL DIFFUSERS, GRILLES AND REGISTERS SHALL BE FINISHED AS SELECTED BY THE OWNER AND SHALL BE AS MANUFACTURED BY TUTTLE & BAILEY.  
  
ALL DIFFUSERS, REGISTERS AND GRILLES SHALL BE PROVIDED WITH INTEGRAL OPPOSED BLADE DAMPERS FOR BALANCING PURPOSES.
- UNDERFLOOR RADIANT SYSTEM SHALL BE AS MANUFACTURED BY VEGA OR APPROVED EQUAL. COORDINATE DESIGN AND INSTALLATION REQUIREMENTS WITH SYSTEM MANUFACTURER PRIOR TO BIDDING AND CONSTRUCTION.  
  
TUBING SHALL BE VEGAPEX BARRIER SIZED AS RECOMMENDED BY MANUFACTURER. BALANCING VALVES SHALL BE PROVIDED FOR EACH LOOP AND FLOW RATES PER CIRCUIT SHALL BE AS RECOMMENDED BY SYSTEM MANUFACTURER.  
  
FLOOR SENSORS SHALL BE INSTALLED IN BRASS FITTING AT LOCATIONS AS RECOMMENDED BY MANUFACTURER.  
  
IN-LINE CIRCULATING PUMPS SHALL BE BY GRUNDFOS AS RECOMMENDED BY MANUFACTURER.  
  
CONTRACTOR SHALL HAVE VEGA OR APPROVED MANUFACTURER DESIGN THE SYSTEM AS INDICATED AND PROVIDE INFORMATION WITH REGARD TO THE TUBING SIZE, TUBING LENGTH, TUBING SPACING, GPM FLOW PER CIRCUIT, FLUID TEMPERATURE RANGE, FLUID SOLUTION RECOMMENDED, CIRCULATING PUMPS(S), MANIFOLDS, VALVING, FLOW CONTROLS, ETC. TO PROVIDE A COMPLETE SYSTEM TO MAINTAIN MINIMUM SPACE TEMPERATURE OF 60° F. MAXIMUM EFFICIENCY AND COST EFFECTIVENESS OF THE DESIGN ALONG WITH ANY RECOMMENDATIONS FOR PIPING, TO PROVIDE A BETTER INSTALLATION.  
  
RADIANT SLAB SYSTEM SHALL CONSIST OF THE FOLLOWING:  
  
VEGAPEX BARRIER TUBE IN THE SLAB. INSTALL 1" FROM BOTTOM OF SLAB. PROVIDE OXYGEN BARRIER TYPE.  
  
(1) ONE GAS FIRED BOILER AS MANUFACTURED BY VISSMANN MODEL B2HA-60, OR APPROVED EQUAL, LIQUID PROPANE GAS INPUT MODULATION 60 CFH TO 212 CFH, 94% AFU, MAXIMUM HEATING OUTPUT 194 MBH @140° F., 1.9 GALLON VOLUME, PROVIDE WITH OUTDOOR RESET CONTROLS, STAINLESS STEEL BURNER, 1 1/2" SUPPLY AND 1 1/2" RETURN CONNECTIONS, 1" LIQUID PROPANE GAS CONNECTION, 3.25" VENT AND 5" COMBUSTION AIR INTAKE, INTEGRAL CONTROLS, 30 PSI RELIEF VALVE PIPED TO FLOOR DRAIN AS REQUIRED, CONDENSATE TRAP AND DRAIN PIPING TO FLOOR DRAIN, AUTOMATIC AIR VENT, WALL MOUNTED, 15"x19"x40 5/8", APPROXIMATE WEIGHT 155 LBS. INCLUDE BASE MIXING STATION, WITH HIGH HEAD 3-SPEED CIRCULATOR, PROPRESS. (1) IN-LINE CIRCULATING PUMP, SIZED BY MANUFACTURER/VENDOR FOR GPM, FT. HD LOSS, HP, RPM, 120V-1φ, AMPS, AS MANUFACTURED BY GRUNDFOS OR APPROVED EQUAL.  
  
MANIFOLD CABINET SYSTEM AS SPECIFIED BY SYSTEM MANUFACTURER, CONTAINING STAINLESS STEEL MANIFOLD BALL VALVE SET, UNION XF NPT; STAINLESS MANIFOLD SHUT OFF BALANCING, OUTLETS AND INLETS. UNIT SHALL BE CAPABLE OF CONNECTIONS AS DESIGNED BY MANUFACTURER. MANIFOLD SHALL INCLUDE MANUAL AIR VENTS, SWIVEL PURGING VALVES, BUILT-IN POSITIVE SHUT-OFF VALVES, FLOW INDICATORS, SOUND ISOLATING BRACKET, AND FILL AND DRAIN VALVES AS MANUFACTURED BY VEGA OR APPROVED EQUAL.  
  
PROVIDE TWO MANIFOLD STATIONS – EACH CONFIGURED AS DESIGNED BY SYSTEM MANUFACTURER FOR LOOPS OF PEX TUBING, LINEAL FEET FOR EACH LOOP. TO BE INSTALLED 12 INCHES FROM PERIMETER WALLS AND SPACING AS SPECIFIED BY SYSTEM MANUFACTURER. EACH LOOP SHALL BE PROVIDED WITH GPM AND TEMPERATURE AS SPECIFIED BY SYSTEM MANUFACTURER. SYSTEM TOTAL GPM SHALL BE PROVIDED BY SYSTEM MANUFACTURER. PRESSURE LOSSES WILL BE PROVIDED BY MANUFACTURER IN FT. OF WATER. MINIMUM HEATING CAPACITY OF 165,000 BTUH WITH A 10° TEMPERATURE DROP IN LOOP TEMPERATURE.  
  
WATER WITH A PERCENTAGE OF PROPYLENE GLYCOL AS RECOMMENDED BY THE SYSTEM MANUFACTURER SHALL BE PROVIDED TO THE LOOPS AT GPM, TEMPERATURE, HEAD LOSS AND BTUH HEATING LOAD AS CALCULATED BY SYSTEM MANUFACTURER.  
  
FLOOR PREPARATION AND CONSTRUCTION SHALL BE AS RECOMMENDED BY SYSTEM MANUFACTURER AND GOOD INSTALLATION PRACTICES FOR PREVENTION OF SLAB SEPARATION AND POTENTIAL FOR DAMAGE TO TUBING. SLAB PERIMETER AND FLOOR SHALL BE INSULATED IN ACCORDANCE WITH SYSTEM MANUFACTURER'S RECOMMENDATIONS WITH TUBING RUN INTERIOR OF THE INSULATION.
- PROVIDE FULLY FUNCTIONAL TESTING OF ALL EQUIPMENT AND PROVIDE DOCUMENTATION FOR VERIFICATION.
- PROVIDE PERMANENT IDENTIFICATION TAGS FOR ALL EQUIPMENT. TAG SHALL INCLUDE DRAWING ID, CAPACITY AND ELECTRICAL CHARACTERISTICS. OUTDOOR UNITS REQUIRE STAMPED METAL PLATES FIXED TO EQUIPMENT.
- HEAT PUMP SEQUENCE OF OPERATION:  
OCCUPIED CYCLE:  
OPEN OUTSIDE AIR DAMPER TO THE MINIMUM SETTING, AND RUN SUPPLY FAN CONTINUOUSLY.  
  
UPON A RISE IN SPACE TEMPERATURE ABOVE THE COOLING SET POINT OF 75°F., ENERGIZE THE HEAT PUMP UNIT TO PROVIDE COOLING AND SATISFY THE THERMOSTAT.  
  
UPON A FALL IN SPACE TEMPERATURE BELOW THE HEATING SET POINT OF 70°F. AND THE OUTSIDE AIR DAMPER AT MINIMUM, OPERATE THE HEAT PUMP UNIT TO SATISFY THE THERMOSTAT. IF THE HEAT PUMP UNIT CANNOT SATISFY THE THERMOSTAT, DE-ENERGIZE THE OUTDOOR HEAT PUMP UNIT AND OPEN CONTROL VALVE FOR THE AUXILIARY HYDRONIC HEATING COIL TO SATISFY THE THERMOSTAT.  
  
UNOCCUPIED CYCLE:  
CLOSE THE OUTSIDE AIR DAMPER.  
  
UPON A RISE IN SPACE TEMPERATURE ABOVE NIGHT TIME SETBACK TEMPERATURE, ENERGIZE THE HEAT PUMP UNIT TO COOL AND SATISFY THE THERMOSTAT.  
  
UPON A FALL IN SPACE TEMPERATURE BELOW THE HEATING NIGHT TIME SETBACK OPERATE THE HEAT PUMP UNIT TO SATISFY THE THERMOSTAT. IF THE HEAT PUMP UNIT CANNOT SATISFY THE THERMOSTAT, DE-ENERGIZE THE HEAT PUMP UNIT AND OPEN THE CONTROL VALVE FOR THE AUXILIARY HYDRONIC HEATING COIL TO SATISFY THE THERMOSTAT.  
  
PROVIDE 7-DAY PROGRAMMABLE THERMOSTAT WITH NIGHT TIME SET BACK CAPABILITY AND TWO STAGE HEATING CAPABILITY – 1ST STAGE HEAT PUMP, 2ND STAGE AUXILIARY HYDRONIC HEATING COIL.

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NO.	REVISION NOTES	DATE

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MAINTENANCE BUILDING

CONSTRUCTION DRAWING

FOR

PROPOSED FIRST FLOOR PLAN

CUMBERLAND COUNTY, PA

SOUTH HAMPTON TWP.

Drawn By: LEC  
Designed By: LEC  
Checked By: LEC  
File: 2022-SH-009  
Date: 02/03/2023  
Scale: 3/16"=1'-0"  
Drawing No.  
H-3