

SCOPE OF WORK

- 1 - PROVIDE EQUIPMENT AS SCHEDULED, PER SUBMITTALS AND AS SHOWN ON THE PLANS. SUBMIT ALTERNATIVES TO ENGINEER AND SCHOOL MAINTENANCE CHIEF FOR APPROVAL
- 2 - PROVIDE COMMISSIONING REPORT BY AN INDEPENDENT AGENT, O&Ms, SUBMITTALS, AS-BUILTS, AND BALANCE REPORT TO OWNER AT CLOSEOUT.
- 3 - DUCT LAYOUT AND EQUIPMENT LOCATION IS DIAGRAMATIC. CORRIDINATE WITH MAINTENANCE CHIEF AND OTHER TRADES FOR EXACT PLACEMENT.
- 4 - PROVIDE R8 LINER INSULATION ON OSA AND EXHAUST DUCTS ON ERVS, AND DUCT LOCATED OUTSIDE ON PACKAGED HEAT PUMPS.
- 5 - DUCT DIMENSIONS ARE INSIDE CLEAR.
- 6 - EVERY PIECE OF EQUIPMENT, DUCT AND PLENUM WHICH IS A PORTION OF THE COMFORT HEATING AND OR COOLING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF THE 2019 REGION MECHANICAL SPECIALTY CODE AND/OR ASHRAE AND/OR SMACNA. CONTRACTOR TO HAVE 5 PROJECTS OF SIMILAR EQUIPMENT COMPLETED.
- 7 - ROUND AND RECTANGULAR DUCTWORK ARE INTERCHANGABLE IF THE CROSS SECTIONAL AREAS ARE EQUIVALENT AS NO ADDITIONAL CHARGE.
- 8 - THERMOSTATS SHALL BE PROGRAMMABLE WITH 7 DAY TYPES, OFF HOUR SETBACKS, 5 DEGREE DEADBAND.
- 9 - EXTERIOR DUCTWORK TO BE SEALED AND LINED W/RS, BROKEN TO FACILITATE WATER RUNOFF.
- 10 - ALL DUCTWORK IS LOW PRESSURE
- 11 - ECONOMIZERS ON PACKAGED UNITS TO PROVIDE PARTIAL COOLING AND TO GO TO FULL OSA MODE WHERE CONDITIONS ALLOW FOR FREE COOLING.
- 12 - HEAT PUMPS TO COME WITH FAULT DIAGNOSTICS
- 13 - DRAIN CONDENSATE TO APPROVED LOCATION: LANDSCAPING, SEWER OR GUTTERS.
- 14 - INSTALL EQUIPMENT PER A LICENSED STRUCTURAL DESIGN.
- 15 - PROVIDE LOCKING COVERS ON THERMOSTATS AND CO2 SENSORS.
- 16 - HEAT TAPE, INSULATE AND WRAP CONDENSATE DRAINS FROM ROOF TOP HEAT PUMPS WITH PVC PROTECTIVE COVER THE 2" DRAIN OFF THE HEAT PUMP SECONDARY DRAIN PAN. PROVIDE SECONDARY DRAIN PAN. SEE DETAIL ON SHEET M4.
- 18 - COORDINATE WITH ARCHITECT AND STRUCTURAL ENGINEER FOR MEANS OF REPLACING GYMNASIUM UNIT HEATERS.
- 19 - COORDINATE WITH OWNER FOR LOCATION OF THERMOSTATS. LOCATE MORE THAN 10' FROM AN EXTERIOR WALL.
- 20 - LOCATE CO2 SENSORS IN ACCESSIBLE LOCATION OF RETURN AIR DUCT TO CONTROL ECONOMIZER DAMPERS ON (X3) PACKAGED HEAT PUMPS. SET CO2 SENSORS TO 600 PPM. IO HVAC CONTROLS. MODEL CO2-TH OR EQUAL
- 21 - COORDINATE WITH OWNER FOR EXACT LOCATION OF FAN COILS. OBTAIN APPROVAL FROM ENGINEER WHERE MOVED MORE THAN 10 FEET FROM LOCATION SHOWN.
- 22 - CONTRACTOR TO PROVIDE AND LOCATE CURBS ON ROOF. COORDINATE WITH ROOFING CONTRACTOR TO MAINTAIN ROOFING WARRANTY.
- 23 - PIPE PROPANE FROM TANK TO EACH UNIT HEATER IN GYMNASIUM AND RADIANT HEATER IN WELDING SHOP. COORDINATE ROUTING WITH OWNER. PAINT PER OWNERS DIRECTION.
- 24 - INSULATE PIPE PER CODE.
- 26 - LOCATE ROOF TOP EQUIPMENT AT 10'-0" OFF ROOF EDGE TO AVOID NEEDING A GUARDRAIL AND TO MINIMIZE INSULATED AND HEATED DRAIN LINES ROUTED TO EXISTING HEATED GUTTERS.
- 27 - INTERLOCK OSA FANS IN GYMNASIUM WITH CO2 SENSOR AND MOTORIZED DAMPERS IN RELIEF. PROVIDE ECONOMIZER CONTROL OF THE FANS.
- 28 - PROVIDE 2 DAYS TRAINING ON UNIT HEATERS, HRUS, PACKAGED HEAT PUMPS, AND SPLIT HEAT PUMPS, INCLUDING CONTROLS. GIVE 2-WEEK NOTICE OF TRAINING TO SCHOOL AND ENGINEER.
- 29 - THESE PLANS ARE PREPARED FOR GRANT UNION HIGH SCHOOL. THE CONTRACTOR SELECTED SHALL HAVE 5 YEARS EXPERIENCE INSTALLING SIMILAR EQUIPMENT AND SHALL TAKE RESPONSIBILITY FOR FIELD VERIFICATION AND ASSOCIATED ACCOMMODATIONS, INCLUDING CUT, PATCH AND REPAIR.
- 30 - PROVIDE CONTROLS FOR MODULATING ECONOMIZER DAMPERS ON UH-2s TO CONTROL CO2 LEVELS BELOW 600 PPM. CONTROLS TO ALSO CONTROL NEW MOTORIZED DAMPERS IN EXISTING RELIEF HOODS TO OPEN FOR RELIEF AIR DURING ECONOMIZER OPERATION. ECONOMIZER RELIEF DAMPERS TO OPEN AUTOMATICALLY AT 80 DEGREES IN THE THROAT. ADJUSTABLE BY OWNER NEAR WALL LIGHT SWITCHES.
- 31 - SPARE PARTS TO INCLUDE A CASE OF EACH SIZE OF FILTERS, ONE OF EACH SIZE FAN BELT, AND TWO TF-
- 32 - PROVIDE SHEETMETAL SOFFIT PAINTED COLOR SELECTED BY OWNER ON EXPOSED REFRIGERANT LINES AND POWER.
- 33 - PROVIDE ASBESTOS TRAINED PERSONNEL WHEN CUTTING INTO CEILING TILES. TRAINING IS AVAILABLE FOR CONTRACTORS AT <https://www.360training.com/>
- 35 - MOUNT WALL HUNG FAN COILS BETWEEN 8' & 10' AFF AS DIRECTED BY OWNER.
- 36 - FIELD COORDINATE WITH GC AND OWNER FOR LOUVER PENETRATIONS. THERE ARE SOME NEEDING WINDOWS TO BE REMOVED, STUCCO WALLS, BRICK, WINDOW SHAKER REMOVAL INSTALLED IN WALLS, ETC. MINIMUM LOUVER SIZES TO BE SIZED FOR 500 FPM WITH 50% BLADE OBSTRUCTION ASSUMED. IE: 200 CFM / 500 FPM X / 0.5 X 144 = 115 SQUARE INCHES = 14X10 LOUVER, 500 CFM = 288 SQUARE INCHES = 14X20 LOUVER. LOUVER SIZES CAN BE REDUCED TO 800 FPM WHEN USING A DOUBLE DRAINABLE LOUVER
- 38 - BALANCE ALL IDU'S TO OPERATE WITH ABILITY TO MAXIMIZE AIR FLOW. EXCEPT WHERE DEEMED BY THE SCHOOL TO BE TOO DRAFTY. WHERE DEEMED TO BE TOO DRAFTY, LIMIT MAX AIR FLOW TO STAGE 3 OF 4 MAX AIR FLOW.
- 40 - FOR THE DUST COLLECTION SYSTEM, PROVIDE DEDICATED 4" 22 GA PIPE WITHOUT SLIDE GATES TO THE 8 PIECES OF EQUIPMENT THAT ARE USED THE MOST AND PROVIDE DEDICATED 4" 22 GA PIPE WITH SLIDE GATES TO 6 ADDITIONAL PIECES OF EQUIPMENT. PROVIDE PHENOLIC SIGNS ON SLIDE GATES OPEN GATE WHEN USING THIS PIECE OF EQUIPMENT, CLOSE GATE WHEN DONE. FLEX MAX LENGTH IF NEEDED TO BE LIMITED TO 12". INCLUDE TWO SNORKELS MODEL FX-50, LABS USA MFG, WITH DOME HOOD ACCESSORY MOUNTED PER OWNER'S DIRECTION WITH A 2" 22 GA DEDICATED RUN TO THE DUST COLLECTOR. CONNECT EACH 2" AND EACH 4" RUN DIRECTLY AND INDEPENDANTLY TO THE 12" STACK. SUPPORT PIPE AT 5'-0" INTERVALS
- 42 - CONTRACTOR TO HAVE 5 SIMILAR PROJECTS
- 43 - PROVIDE SUBMITTALS FOR ENGINEER'S APPROVAL PRIOR TO ORDERING EQUIPMENT.

PACKAGED HEAT PUMP SCHEDULE

ID	QUANTITY	SERVES	MANUFACTURER	MODEL	CFM	ESP	TON	SEER	V/PH	AUX HEAT	MCA	MOCp	WEIGHT	NOTES
HP-26A, B & C	3	AUDITORIUM	TRANE	WSC120H4ROA	4,000	0.5	10.0	14.1	480/3	54 KW	89.0	100	850	1, 2

- 1 - ECONOMIZER AND CO2 CONTROL OF DAMPER POSITIONS. MINIMUM OSA DRIVEN BY CO2 SENSOR LOCATED IN RETURN. PROVIDE WITH POWER RELIEF, LOW LEAKAGE DAMPERS, THERMOSTAT W/CO2 CONTROL
- 2 - EQUIPMENT PAD BY OTHERS, SIDE DISCHARGE
- 3 - PROVIDE WITH 14" CURB AND CONCENTRIC DROPS FOR DOWN DISCHARGE

ENERGY RECOVERY VENTILATOR (ERV) SCHEDULE

ID	QUANTITY	SERVES	MANUFACTURER	MODEL	CFM	HTR KW	V/PH	WEIGHT	NOTES
ERV-11	1	ADMIN OFFICES 11	LOSSNAY	LGH-300RVX2-E	200	2	208/1	250	1, 2
ERV-13	1	LIBRARY 13	LOSSNAY	LGH-600RVX2-E	600	3	208/1	250	1, 2

NOTES:

- 1 - IO HVAC CONTROLS CO2 MONITOR TO CONTROL ERV WITH LOCKING COVER, DISCONNECT, MERV 13 FILTERS, AND BACKDRAFT DAMPERS.
- 2 - PROVIDE AUX HEATER SET TO MAINTAIN DISCHARGE AIR TEMP TO 60 DEGREES.

HEATER SCHEDULE

ID	QUANTITY	SERVES	MANUFACTURER	MODEL	KW	LENGTH	AMPS	V/PH	MOCp	WEIGHT	NOTES
UH-1	6	LOCKER ROOMS, RR	REZNR	EGHB	10	-	-	208/1	50	45	2
UH-2	4	GYMNASIUM	REZNR	SCE-6	250 MBH INPUT	-	9	240/3	15	482	2, 3, 4
WH-1	2	OFFICES	REZNR	ORC0600	0.6	47"	-	208/1	15	40	2
WH-2	8	ENTRANCES	REZNR	ORC1050	1	83"	-	208/1	15	42	2
AC-1	2	ENTRANCES	BERNER	AE08E	10.8	48"	-	208/1	40	71	1
AC-2	2	AUDITORIUM ENTRANCE	BERNER	AE08E	14.4	72"	-	208/1	50	86	1
RH-1	1	WELDING SHOP	REZNR	VPS-100	100 MBH	30'-0"	5.0	120/1	15	250	1

NOTES:

- 1 - THERMOSTATICALLY CONTROLLED, BLACK COLOR
- 2 - WALL STAT AND DISCONNECT BY EC
- 3 - PROCURE TWO WITH RIGHT HAND ACCESS AND TWO WITH LEFT SIDE ACCESS
- 4 - PROPANE, MOTOR STARTER AND DISCONNECT, BURNER AIR SHUTTERS, TWO STAGE BURNER, FREEZESTAT, 4" FILTER RACK W/EXTRA CASE OF FILTERS, BOTTOM RETURN, MERV 8, CONCENTRIC VENT, 409 HX, STAINLESS STEEL DRAIN PAN, INTERMITTENT LOCKOUT PILOT RESET AT BREAKER, INTERLOCK WITH CO2 SENSOR, DUCT FLANGE, DRAIN KIT W NUTRALIZATION, DRAINED TO LANDSCAPE. 7-DAY PROGRAMMABLE STAT, MANUAL SHUTOFF VALVE AND UNION. DAYLIGHT CONDENSATE TO LANDSCAPING.

FAN SCHEDULE

ID	QUANTITY	SERVES	MANUFACTURER	MODEL	TYPE	CFM	ESP	VOLT	AMPS	WEIGHT	NOTES
TF-1	22	TRANSFER FAN	BROAN	FG 12	INLINE	150	0.2	120	1.5	5	1
EF-1	1	LADIES RESTROOM	GREENHECK	CUE-070D	WALL	250	0.2	120	1/30 HP	30	2

NOTES:

- 1 - INTERLOCK WITH OCCUPANCY SENSOR, BY EC

DUST COLLECTOR

ID	QUANTITY	SERVES	MANUFACTURER	MODEL	CFM	ESP	VOLT	WEIGHT	NOTES
DC-1	1	WOOD SHOP	ACT DUST COLLECTORS	SHK-2	3600	8"	480/3	400	1

NOTES:

- 1 - PROVIDE DEDICATED 4" 22 GA PIPE WITHOUT SLIDE GATES TO THE 8 PIECES OF EQUIPMENT THAT ARE USED THE MOST AND PROVIDE SLIDE GATES WITH DEDICATED 4" 22 GA PIPE TO REMAINING PIECES OF EQUIPMENT. PROVIDE PHENOLIC SIGNS ON SLIDE GATES OPEN GATE WHEN USING THIS PIECE OF EQUIPMENT, CLOSE GATE WHEN DONE. FLEX MAX LENGTH IF NEEDED TO BE LIMITED TO 12". INCLUDE TWO SNORKELS MODEL FX-50, LABS USA MFG WITH DOME HOOD ACCESSORY MOUNTED PER OWNER'S DIRECTION WITH A 2" 22 GA DEDICATED RUN TO DUST COLLECTOR 12" STACK. CONNECT EACH 2" AND EACH 4" RUN DIRECTLY AND INDEPENDANTLY TO THE 12" STACK. DO NOT GANG DUCTS.

MITSUBISHI ELECTRIC TRANE HVAC US: CITY MULTI VRF INDOOR UNIT SCHEDULE

System Tag	Room Name	Tag Reference	M-NET Address	Model	Type	Nominal Cooling Capacity (BTU/h)	Nominal Heating Capacity (BTU/h)	Voltage / Phase	Electrical MCA/MFS			Notes / Options
									208/230V or [460V]	RFS	MOCp	
HP-2	KITCHEN	FC-2	1	PKA-A24KA8	Wall -Mounted	24,000	26,000	208/230V/1-phase	Powered by Outdoor			1, 2, 3, 4
HP-3A	CAFETERIA - NW	FC-3A1	2	PKFY-P18NLMU-E TH	Wall -Mounted	18,000	20,000	208/230V/1-phase	0.24/0.24/15			1, 2, 3, 4
HP-3A	CAFETERIA - SW	FC-3A2	3	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-3B	CAFETERIA - NE	FC-3B1	4	PKFY-P18NLMU-E TH	Wall -Mounted	18,000	20,000	208/230V/1-phase	0.24/0.24/15			1, 2, 3, 4
HP-3B	CAFETERIA - SW	FC-3B2	5	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-4	CLASSROOM 4 NORTH	FC-4A	6	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-4	CLASSROOM 4 SOUTH	FC-4B	7	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-5	CLASSROOM 5	FC-5	8	PKA-A36KA8	Wall -Mounted	36,000	38,000	208/230V/1-phase	Powered by Outdoor			1, 2, 3, 4
HP-6	CLASSROOM 6 WEST	FC-6A	9	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-6	CLASSROOM 6 SOUTH	FC-6B	10	PKFY-P18NLMU-E TH	Wall -Mounted	18,000	20,000	208/230V/1-phase	0.24/0.24/15			1, 2, 3, 4
HP-6	OFFICE 5	FC-6C	11	PKFY-P06NLMU-E TH	Wall -Mounted	6,000	6,700	208/230V/1-phase	0.24/0.24/15			1, 2, 3, 4
HP-7A	WOOD SHOP 7 WEST	FC-7A	12	PKA-A36KA8	Wall -Mounted	36,000	38,000	208/230V/1-phase	Powered by Outdoor			1, 2, 3, 4
HP-7B	WOOD SHOP 7 EAST	FC-7B	13	PKA-A36KA8	Wall -Mounted	36,000	38,000	208/230V/1-phase	Powered by Outdoor			1, 2, 3, 4
HP-8	CLASSROOM 8 NORTH	FC-8A	14	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-8	CLASSROOM 8 SOUTH	FC-8B	15	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-9	CLASSROOM 9	FC-9	16	PKA-A36KA8	Wall -Mounted	36,000	38,000	208/230V/1-phase	Powered by Outdoor			1, 2, 3, 4
HP-10	CLASSROOM 10 NORTH	FC-10A	17	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-10	CLASSROOM 10 SOUTH	FC-10B	18	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-11	PRINCIPAL 11	FC-11A	19	MSZ-GS06NA-U1	Wall -Mounted	5,500	6,300	208/230V/1-phase	Powered by Outdoor			1, 2, 3, 4
HP-11	WEST OFFICES 11	FC-11B	20	MSZ-GS06NA-U1	Wall -Mounted	5,500	6,300	208/230V/1-phase	Powered by Outdoor			1, 2, 3, 4
HP-11	CONF 11	FC-11C	21	MSZ-GS12NA-U1	Wall -Mounted	11,000	12,300	208/230V/1-phase	Powered by Outdoor			1, 2, 3, 4
HP-12	LIBRARY RECEIPT 12	FC-12A	22	PKFY-P08NLMU-E TH	Wall -Mounted	8,000	9,000	208/230V/1-phase	0.24/0.24/15			1, 2, 3, 4
HP-12	ADMIN RECEIPT 12	FC-12B	23	PKFY-P08NLMU-E TH	Wall -Mounted	8,000	9,000	208/230V/1-phase	0.24/0.24/15			1, 2, 3, 4
HP-12	VICE PRINCIPAL 12	FC-12C	24	PKFY-P08NLMU-E TH	Wall -Mounted	8,000	9,000	208/230V/1-phase	0.24/0.24/15			1, 2, 3, 4
HP-12	LIBRARY OFFICE 12	FC-12D	25	PKFY-P06NLMU-E TH	Wall -Mounted	6,000	6,700	208/230V/1-phase	0.24/0.24/15			1, 2, 3, 4
HP-13A	LIBRARY13 NE	FC-13A1	26	PKFY-P30NKMU-E2 TH	Wall -Mounted	30,000	34,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-13A	LIBRARY13 NW	FC-13A2	27	PKFY-P30NKMU-E2 TH	Wall -Mounted	30,000	34,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-13B	LIBRARY13 SE	FC-13B1	28	PKFY-P30NKMU-E2 TH	Wall -Mounted	30,000	34,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-13B	LIBRARY13 SW	FC-13B2	29	PKFY-P30NKMU-E2 TH	Wall -Mounted	30,000	34,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-14	CLASSROOM 14 WEST	FC-14A	30	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-14	CLASSROOM 14 EAST	FC-14B	31	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-15	CLASSROOM 15	FC-15	32	PKA-A36KA8	Wall -Mounted	36,000	38,000	208/230V/1-phase	Powered by Outdoor			1, 2, 3, 4
HP-16	CLASSROOM 16	FC-16	33	PKA-A36KA8	Wall -Mounted	36,000	38,000	208/230V/1-phase	Powered by Outdoor			1, 2, 3, 4
HP-17	CLASSROOM 17 WEST	FC-17A	34	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-17	CLASSROOM 17 EAST	FC-17B	35	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-18	CLASSROOM 18 NORTH	FC-18A	36	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-18	CLASSROOM 18 SOUTH	FC-18B	37	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-19-1	WEST OFFICE 19	FC-19A1	38	PKFY-P12NLMU-E TH	Wall -Mounted	12,000	13,500	208/230V/1-phase	0.24/0.24/15			1, 2, 3, 4
HP-19-1	SMALL OFFICE 19	FC-19B1	39	PKFY-P06NLMU-E TH	Wall -Mounted	6,000	6,700	208/230V/1-phase	0.24/0.24/15			1, 2, 3, 4
HP-19-1	LOUNGE WEST 19	FC-19C1	40	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-19-2	SE OFFICE 19	FC-19D2	41	PKFY-P24NKMU-E2 TH	Wall -Mounted	24,000	27,000	208/230V/1-phase	0.63(208V)/0.63(230V)/15			1, 2, 3, 4
HP-19-2	SE OFFICE 19	FC-19E2	42	PKFY-P12NLMU-E TH	Wall -Mounted							



HVAC GENERAL NOTES:

GENERAL SPECIFICATIONS:

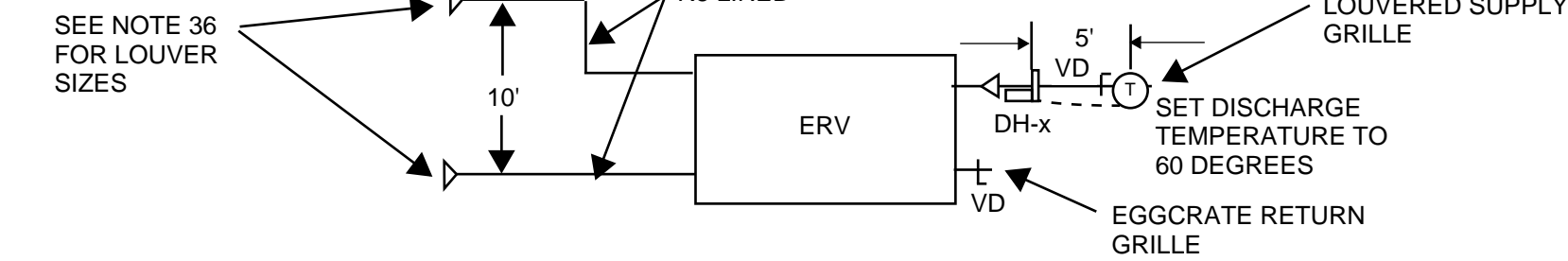
1. DUCTS SHALL BE SUPPORTED WITH APPROVED HANGERS AT INTERVALS NOT EXCEEDING 10 FEET OR BY OTHER APPROVED DUCT SUPPORT SYSTEMS DESIGNED IN ACCORDANCE WITH THE BUILDING CODE. FLEXIBLE AND OTHER FACTORY-MADE DUCTS SHALL BE SUPPORTED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
2. THIS CONTRACTOR SHALL PAY FOR ALL PERMITS AND FEES.
3. CONTROL LOW VOLTAGE WIRING BY MECHANICAL CONTRACTOR AND CONDUIT BY ELECTRICAL CONTRACTOR. WIRING, CABLE, AND RACEWAYS SHALL BE LISTED AND LABELED AS PLENUM-RATED AND SHALL BE INSTALLED IN ACCORDANCE WITH THE ELECTRICAL CODE, 2013 CMC. NEW CONDUITS SHALL BE INSTALLED IN THE NEW SHAFTS.
4. CONDENSATE DRAIN PIPING AND FINAL CONNECTION TO UNIT BY MECHANICAL CONTRACTOR.
5. DUCT PENETRATION, CUTTING AND PATCHING BY GENERAL CONTRACTOR, UNLESS OTHERWISE NOTED ON PLAN.
6. 7-DAY PROGRAMMABLE THERMOSTAT SHALL BE 24 VOLT, COOLING WITH MATCHING SUBBASE AND TAMPER PROOF COVER.
7. PROVIDE FILTER FOR AIR CONDITIONING AND/OR AIR SIDE UNITS AS REQUIRED PER ASHRAE AND CODE.
8. THIS CONTRACTOR SHALL COORDINATE WITH GENERAL CONTRACTOR FOR SIZE AND LOCATION OF DUCTWORK WALL OPENINGS AND WITH ELECTRICAL CONTRACTOR FOR ELECTRICAL REQUIREMENTS OF ALL MECHANICAL EQUIPMENT AND ARCHITECTURAL DRAWINGS FOR AIR DISTRIBUTION LOCATION.
9. THE CONTRACTOR SHALL SUBMIT BID BASED ON THE DRAWINGS AND ~~ALTERNATE FOR COST SAVING.~~ THESE DRAWINGS ARE FOR BIDDING PURPOSES.
10. COORDINATE THE LOCATION OF ALL CEILING DIFFUSERS, REGISTERS AND GRILLES WITH THE ARCHITECTURAL REFLECTED CEILING PLAN, ELECTRICAL LIGHTING LAYOUT AND ARCHITECTURAL ROOM ELEVATIONS.
11. DUCTS SHALL BE SUPPORTED WITH 1" WIDE 16-GAUGE HANGER STRAPS AND SHALL BE SPACED AT NO MORE THAN 7'-0" ON CENTERS AND SHALL BE SECURED TO STRUCTURAL MEMBER. EXPOSED DUCTWORK ON ROOF SHALL BE SUPPORTED BY GALVANIZED STEEL ANGLE & SHALL BE PER LOCAL CODE.
12. ROUND AND RECTANGULAR DUCTWORK ARE INTERCHANGEABLE IF CROSS SECTION AREAS ARE EQUIVALENT. CONTRACTOR IS TO VERIFY THE EXACT CEILING SPACE AND INTERCHANGE THE DUCT SIZE TO FIT THE CEILING SPACE WITHOUT ADDITIONAL FEE CHARGE.
- 13.
14. COORDINATE ENTIRE INSTALLATION OF THE H.V.A.C. SYSTEM WITH THE WORK OF ALL OTHER TRADES PRIOR TO ANY FABRICATION OR INSTALLATION. PROVIDE ALL FITTINGS, OFFSETS, AND TRANSITIONS AS REQUIRED FOR A COMPLETE WORKABLE INSTALLATION.
15. PROVIDE BACK-DRAFT DAMPERS FOR ALL EXHAUST AIR DUCTS UNLESS OTHERWISE NOTED PER CODE.
16. CONTRACTOR SHALL SUBMIT A COMPLETE BALANCE REPORT FOR APPROVAL. THE REPORT SHALL INCLUDE THE FOLLOWING:
 - A) AIR QUANTITIES AT EACH REGISTER.
 - B) STATIC PRESSURE READINGS AT INLET AND DISCHARGE OF EACH AIR HANDLING SYSTEM AND AT INLET OF EACH EXHAUST AIR SYSTEM.
 - C) COOLING AND HEATING SUPPLY AND RETURN AIR TEMPERATURES AT EACH AIR CONDITIONING UNIT.
17. ALL LINED DUCT DIMENSIONS ARE NET CLEAR DIMENSION AFTER LINING HAS BEEN INSTALLED.
18. ANY MATERIAL, ARTICLE OR PIECE OF EQUIPMENT OTHER THAN THAT INDICATED SHALL NOT BE USED UNLESS APPROVED IN WRITING BY THE ENGINEER AND ANY CHANGES IN MECHANICAL, ELECTRICAL AND/OR OTHER SYSTEMS REQUIRED DUE TO SUCH SUBSTITUTION SHALL BE THE RESPONSIBILITY OF THE HVAC CONTRACTOR; AND AT NO ADDITIONAL COST TO THE OWNER.
19. EXHAUST TERMINATION SHALL BE MINIMUM 10'-0" AWAY FROM ANY FRESH AIR INTAKE, OPENABLE WINDOWS, DOORS AND 10'-0" MINIMUM ABOVE GRADE.
20. THE CONTRACTOR SHALL FURNISH AND INSTALL ACCESS DOORS AND/OR ACCESS PANELS AT LOCATIONS AS NECESSARY TO SERVICE DAMPERS AND PROVIDE MAINTENANCE FOR EQUIPMENT. ALL ACCESS DOORS AND PANEL LOCATIONS SHALL BE VERIFIED WITH THE ARCHITECT PRIOR TO INSTALLATION.
21. ACCURATE AS-BUILT DRAWINGS SHALL BE MADE DURING CONSTRUCTION AND SUBMITTED FOR APPROVAL UPON COMPLETION OF INSTALLATION. SHALL BE CREATED BY THE INSTALLING CONTRACTOR DURING COSTRUCUTION.
22. THE CONTRACTOR SHALL VISIT SITE PRIOR TO BIDDING TO VERIFY LOCATIONS AND SIZES OF ALL EXISTING EQUIPMENT AND INFORM THE ARCHITECT OF ANY DISCREPANCIES.
23. THE CONTRACTOR SHALL FURNISH ALL MATERIALS, LABOR, EQUIPMENT, TRANSPORTATION AND SERVICES NECESSARY FOR COMPLETION OF THE WORK. ALL MATERIALS AND WORK SHALL COMPLY WITH APPLICABLE CODES AND GOVERNING REGULATIONS AND MEET THE APPROVAL OF THE LOCAL JURISDICTION.
24. TAKE ALL PRECAUTIONS NECESSARY TO PROTECT THE MATERIALS BEFORE, DURING AND AFTER INSTALLATION. IN THE EVENT OF DAMAGE, IMMEDIATELY REPAIR ALL DAMAGED AND DEFECTIVE WORK TO THE APPROVAL OF THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.
25. THESE DRAWINGS ARE DIAGRAMMATIC. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING HIS WORK WITH ALL OTHER TRADES. THIS INCLUDES COORDINATING THE LOCATION AND SIZE OF ALL OPENINGS, LOCATIONS OF EQUIPMENT PADS AND CHANGES OF ELEVATIONS OF DUCTWORK, PIPING AND OTHER EQUIPMENT.
26. PROVIDE ALL FRESH AIR INTAKES AND EXHAUST OUTLETS WITH HOOD, 1/4" GALVANIZED MESH SCREENS
27. DUCTWORK SHALL BE INSULATED OR LINED AS NOTED ON DRAWINGS. ALL DUCTWORK EXPOSED ON ROOF SHALL BE INTERNALLY LINED UNLESS OTHERWISE INDICATED OR SPECIFIED. ALL DUCT SIZES ARE SHEET METAL SIZES. ALL DUCT JOINTS SHALL BE SEALED
28. ALL EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE EQUIPMENT MANUFACTURER'S RECOMMENDATIONS. PROVIDE ALL FITTINGS, TRANSITIONS, DAMPERS, VALVES AND OTHER DEVICES REQUIRED FOR A COMPLETE WORKABLE INSTALLATION.

1. EVERY DUCT AND PLENUM WHICH IS A PORTION OF THE COMFORT HEATING AND/OR COOLING SYSTEM SHALL COMPLY WITH THE REQUIREMENTS OF 2021 OREGON MECHANICAL CODE AND/OR ASHRAE.

THESE PLANS ARE PREPARED FOR GRANT UNION HIGH SCHOOL. CONTRACTOR SELECTED SHALL HAVE 5 YEARS EXPERIENCE INSTALLING SIMILAR EQUIPMENT AND SHALL TAKE RESPONSIBILITY FOR FIELD VERIFICATION AND ASSOCIATED ACCOMMODATIONS.

TYPICAL ERV INSTALLATION SCHEMATIC

FIELD VERIFY LOUVER SIZES AND SIZE FOR 500 FPM USING 50% FREE AREA. SOME LOCATIONS REQUIRE REMOVAL OF A WINDOW PANE. FILL OPENING WITH LOUVER AND PROVIDE R8 INSULATION BEHIND CAN ON UNUSED AREA. SUPPLY TO HAVE DUCT HEATER. PROVIDE CO2 CONTROL. FLIP UNIT AS NECESSARY TO KEEP SUPPLY DUCT CLOSE TO WALL AND MAINTAIN NEC REQUIRED 36" AT CONTROL BOX. INSTALL PER SCHEMATIC BELOW. COORDINATE WITH THE OWNER FOR LOCATION. MOUNT TIGHT TO CEILING PER STRUCTURAL DETAIL. DUCT TO BE SHEETMETAL AND SIZED WITH FREE AREA TO MATCH COLLAR ON ERV UNLESS OTHERWISE NOTED, NO FLEX. OWNER TO PROVIDE STRUCTURAL SUPPORT DETAIL



OUTSIDE AIR INTAKE DUCT AND EXHAUST DUCT TO BE INTERNALLY LINED UP TO ERV. DISTANCE FROM INTAKE TO EXHAUST LOUVERS TO BE 10' MINIMUM OR ON PERPENDICULAR WALLS. PROVIDE WALL MOUNTED CO2 SENSOR WITH DIGITAL DISPLAY AND CONTROL ERV BASED ON CO2 = 600 PPM (USER ADJUSTABLE)

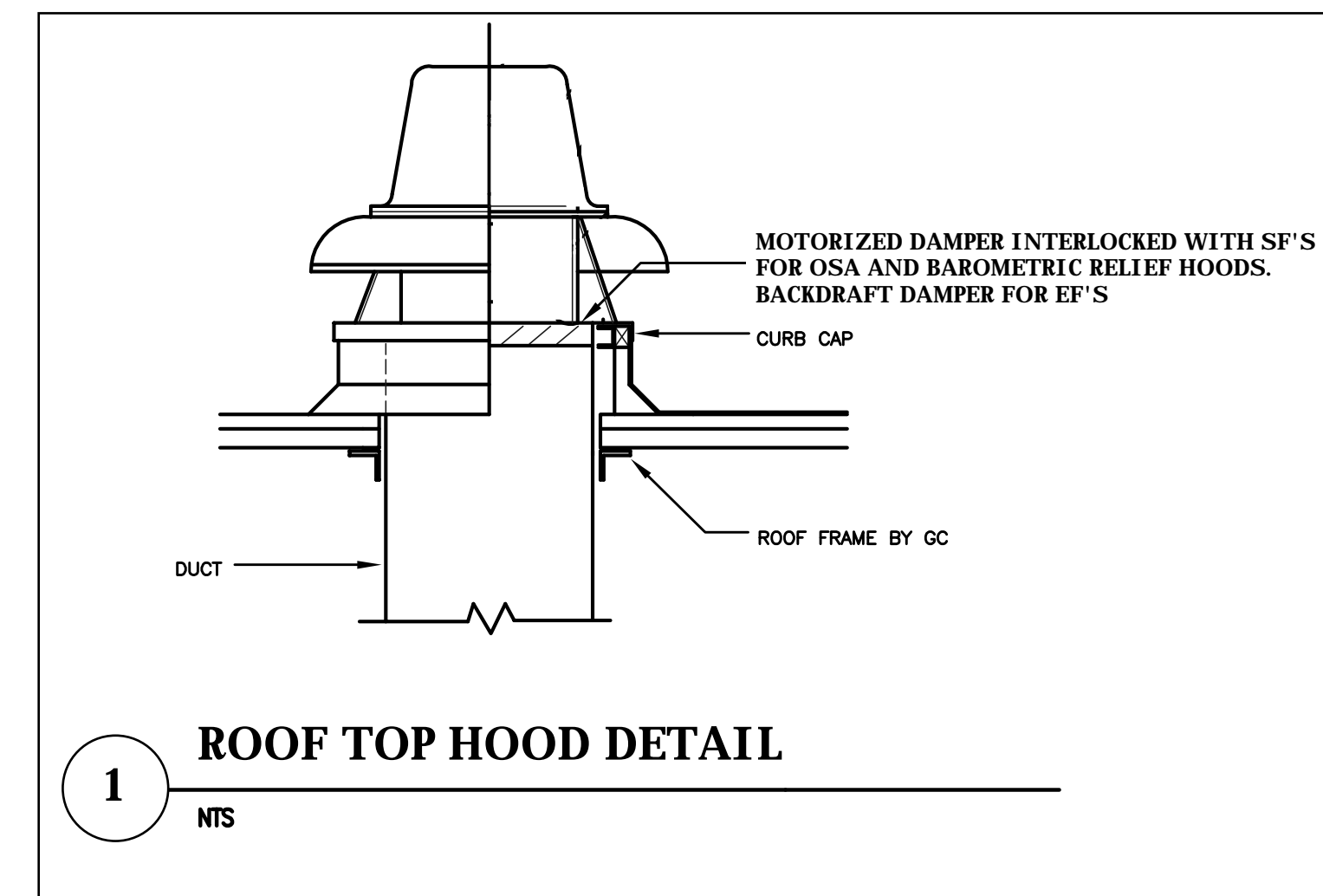
LOCATE DUCT HEATER WITH A SMACNA APPROVED, (30 DEGREE TRANSITION), SQUARE TO ROUND OFF THE ERV, THROW AIR TOWARD CENTER OF ROOM. MAINTAIN CROSSSECTIONAL PROVIDE MINIMUM DUCT LENGTHS PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.

Components										Technical data				
Part	Name	Fabric	Color	Flow Model	Primary	Placement	Secondary	Suspension	Type	Material	Strap Length (mm)	System quantity : 3		
350406100025	Air Stream Liner	Combo 70	Dark Gray 3003				FabFlow		N/A	0"	0"	MarkTest :		
101.1	Round Inlet	Combo 70	Dark Gray 3003	Outflow	0.00		FabFlow	Type 1 360	GV	0"	0"	Airflow per system : 4000 CFM		
101.2	Round Inlet	Combo 70	Dark Gray 3003	Outflow	7.00		FabFlow	Type 1 360	GV	2"	2"	Panel: 6.40 InWG		
101.3	Round Inlet	Combo 70	Dark Gray 3003	Outflow	0.00		FabFlow	Type 1 360	GV	2"	2"	Total Airflow : 12000 CFM		
101.4	Round Inlet	Combo 70	Dark Gray 3003	Outflow	7.00		FabFlow	Type 1 360	GV	2"	2"	Airflow (CFM)		
101.5	Zip Tied End Cap	Combo 70	Dark Gray 3003	Outflow	0.00		FabFlow	Type 1 360	GV	2"	2"	V in Primary Secondary		

Tag#	Injection	Distributed	Eject	R/min	Airflow	Secondary
350406100025, 101.1-101.5	4000	4000	0	1200	1170	821

Dispersion Designed for 50fpm, 4' AFF, Design Height 22' AFF
 (5.00) (-40%) 0.90" Orifices Throwing 19', 10' Horizontal Component
 (7.00) (-40%) 0.90" Orifices Throwing 19', 10' Horizontal Component
 (0.00) (-20%) 0.65" Orifices Throwing 15' Directly Downwards

MULTI-PURPOSE ROOM FABRIC DUCT
 COLOR TO BE SELECTED BY SCHOOL'S CHIEF MAINTENANCE SUPERVISOR



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Alternative materials, design, and methods of construction and equipment

Department of Consumer & Business Services
 Building Codes Division
 1535 Edgewater St. NW, Salem, Oregon
 Mailing address: P.O. Box 14470, Salem, OR 97309-0404
 503-378-4133 • Fax: 503-378-2322 • TTY: 503-373-1358
 oregon.gov/bcd

Owner / owner's agent: Marcia L. Karr, PE Permit number: _____
 Project address: 901-936 S CANYON BLVE City: CANYON CITY State: Oregon
 Email: KARR704@GMAIL.COM

Pertinent code and section relation to the modification: OSMC CHAPTER 4 - VENTILATION

Describe the modification needed: A 3-YEAR DEFERRAL TO MEETING THE VENTILATION CODE IN THIS VERY DRAFTY 100+ YR OLD BUILDING. PLEASE SEE ATTACHED LETTER FROM THE SUPERINTENDANT STATING THE PLAN TO UPGRADE THE LEAKY WINDOW SYSTEMS OVER THE NEXT THREE YEARS. ALSO NOTE THERE ARE LESS THAN 40 GRADUATES/YR IN THIS VERY HIGH GRADUATION RATED SCHOOL.

Explain the need for a modification: SINCE INCEPTION THERE HAS NOT BEEN MECHANICAL VENTILATION IN THIS VERY LEAKY BUILDING. WE ARE REPLACING THE DEFUNCT STEAM HEATING SYSTEM WITH VERY EFFICIENT MINI SPLITS. ATTACHED IS THE CONTRACT TO REPLACE THE LEAKY WINDOWS THAT WILL HAVE SUFFICIENT OPENINGS TO MEET THE VENTILATION CODE NATURALLY.

Explain how the spirit and intent of the building (or related) code is observed. (What is being provided in lieu of strict compliance with the code?): THIS BUILDING IS OVER 100 YEARS OLD WITH SINGLE PANE DRAFTY WINDOWS. THESE WINDOWS WILL REMAIN IN PLACE. THEN, OVER THE NEXT THREE YEARS THE WINDOWS WILL BE REPLACED AND WILL MEET THE VENTILATION CODE NATURALLY WITH THE NEW WINDOWS PROVIDING OPENINGS THAT EXCEED 4% OF THE FLOOR AREA AS DEFINED IN OSMC CHAPTER 12, "NATURAL VENTILATION".

Design professional's written opinion, if applicable (May be separate letter with seal): IN 2022 THERE WERE ONLY 38 GRADUATES IN THIS 24 CLASSROOM FACILITY. CLASSROOM SIZES ARE LESS THAN 1/2 THE CALCULATED OCCUPANT DENSITY. THE ENVELOPE IS ABOUT 100 YEARS OLD AND IS EXCEPTIONALLY LEAKY. AS WE SEAL UP THIS BUILDING WE WILL ACCOMMODATE THE VENTILATION CODE PRESCRIPTIVELY

Owner / agent signature: _____ Digitally signed by Marcia L. Karr, PE Date: 2023.12.19 13:09:27 -08'00'

Building official's action:

Approved Approved with condition Approved based on design professionals opinion Denied

Building official reason for denial: _____

Building official signature: _____ Date: _____



401 N Canyon City Blvd | Canyon City, OR 97820-6111

December 19, 2023

Oregon Building Codes Division
 1535 Edgewater St. NW
 Salem, OR 97304

To Tami Martin,

Our facilities team has determined due to the new HVAC system coming into fruition at Grant Union JR/SR High School we need to address long overdue improvements in our windows that are primarily single pane. This will not only assist in creating a better aesthetic for the building but will also maximize the energy efficiency that the new HVAC system will afford.

Consequently, we are committing to replace all the single pane windows in Grant Union JR/SR High School over the next three years. As superintendent, I will budget for the replacement of the windows over the next 3 years. We are already getting bids for this project. We will make sure that the new, energy efficient windows will be designed to meet the natural ventilation requirements outlined in the ventilation code.

Please let me know if you have any further questions or need additional information.

Sincerely,

Mark W. Witty
 Mark W. Witty, Superintendent
 Grant SD #3

Board of Directors:
 Kris Beal | M.T. Anderson | Amy Charette, Vice Chair | Chris Labhart | Zac Bailey | Will Blood, Chair | Jake Taylor

VENTILATION SCHEDULE SEE PROPOSED METHODS JUSTIFICATION ON THIS SHEET.

SPACE	AREA (SF)	NATURAL VENTILATION AREA REQ (OSSC 1203.1) PROPOSED AREA WITH NEW WINDOWS	NATURAL VENTILATION AREA PROVIDED	NATURAL VENTILATION PROVIDED PERCENT	P/1000 SF	# PEOPLE	CFM/P	CFM/SF	DERATE FOR CLG SUPPLY	MECH OSA CFM REQ	MIN OSA CFM PROVIDED
MENS LOCKER (EXISTING)	920	37	0	0%							-
LADIES LOCKER (EXISTING)	945	38	0	0%							-
GYMNASIUM (EXISTING)	11,664	467	0	0%	150	1750	5	0.06	80%	11810	11810
KITCHEN - Z2	880	35	20	250%	20	0	7.5	0.12	80%	-68	0
CAFETERIA - Z3-EAST	1,276	51	52	102%	100	128	7.5	0.18	80%	-28	0
CAFETERIA - Z3-WEST	1,276	51	28	55%	100	128	7.5	0.18	80%	670	0
CLASSROOM 4	1,040	42	44	106%	35	36	10	0.12	80%	-35	0
MUSIC - Z5	1,086	43	24	55%	35	38	10	0.12	80%	228	0
CLASSROOM 6	1,050	42	20	48%	35	37	10	0.12	80%	259	0
WOOD SHOP - Z7	3,240	130	46	35%	20	5	10	0.18	80%	405	0
CLASSROOM 8	1,213	49	31	64%	35	42	10	0.12	80%	206	0
CLASSROOM 9	756	30	31	103%	35	26	10	0.12	80%	-11	0
CLASSROOM 10	1,133	45	16	35%	35	40	10	0.12	80%	431	0
ADMIN OFFICES - Z11	1,513	61	15	25%	5	8	5	0.06	80%	121	120
DETENTION OFFICES - Z12	1,520	61	0	0%	5	8	5	0.06	80%	162	600
LIBRARY - Z13	2,000	80	24	30%	25	50	10	0.12	80%	518	0
CLASSROOM 14	966	39	20	52%	35	34	10	0.12	80%	274	0
CLASSROOM 15	672	27	20	74%	35	24	10	0.12	80%	101	0
CLASSROOM 16	550	22	24	109%	35	19	10	0.12	80%	-29	0
CLASSROOM 17	658	26	20	76%	35	23	10	0.12	80%	93	0
CLASSROOM 18	656	26	20	76%	35	23	10	0.12	80%	92	0
STUDENT LOUNGE - Z19	1,368	55	70	128%	35	48	10	0.12	80%	-224	0
NURSE OFFICE - Z20	750	30	32	107%	5	4	5	0.06	80%	-5	0
CLASSROOM 21	650	26	20	77%	35	23	10	0.12	80%	88	0
CLASSROOM 22	685	27	20	73%	35	24	10	0.12	80%	109	0
STAGE - Z23	900	36	0	0%	70	63	10	0.06	80%	855	0
MAINT. OFFICE - Z24	800	32	48	150%	5	4	5	0.06	80%	-43	4000
MULTI USE - Z25	5,400	432	72	17%	100	540	5	0.06	80%	3150	0

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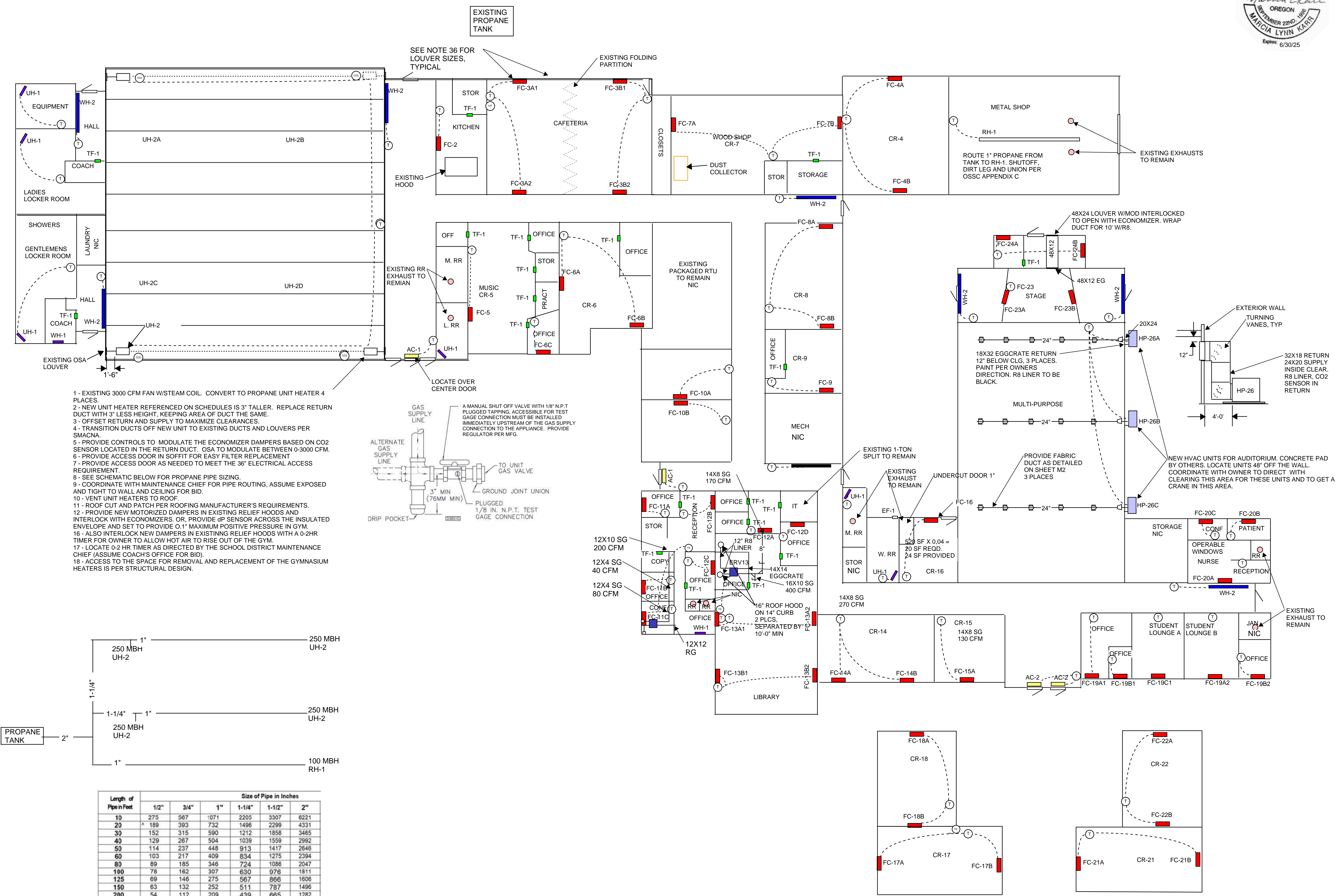
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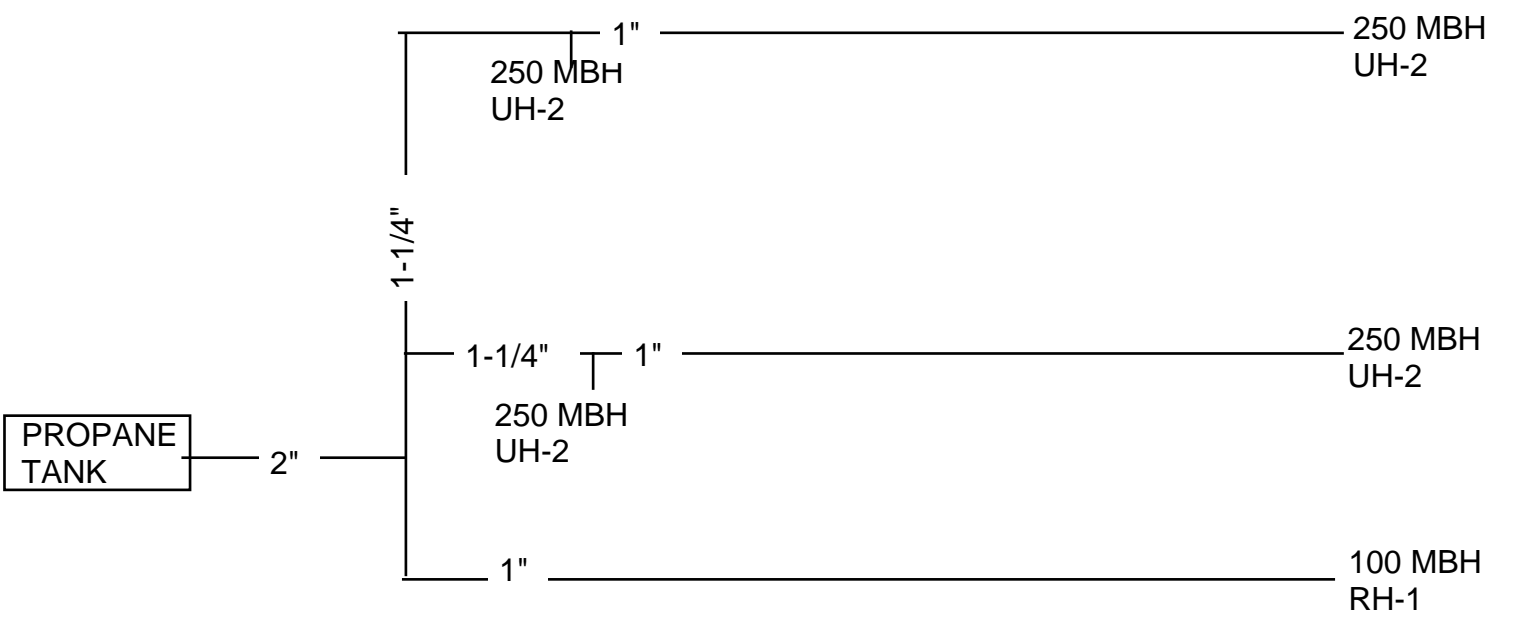
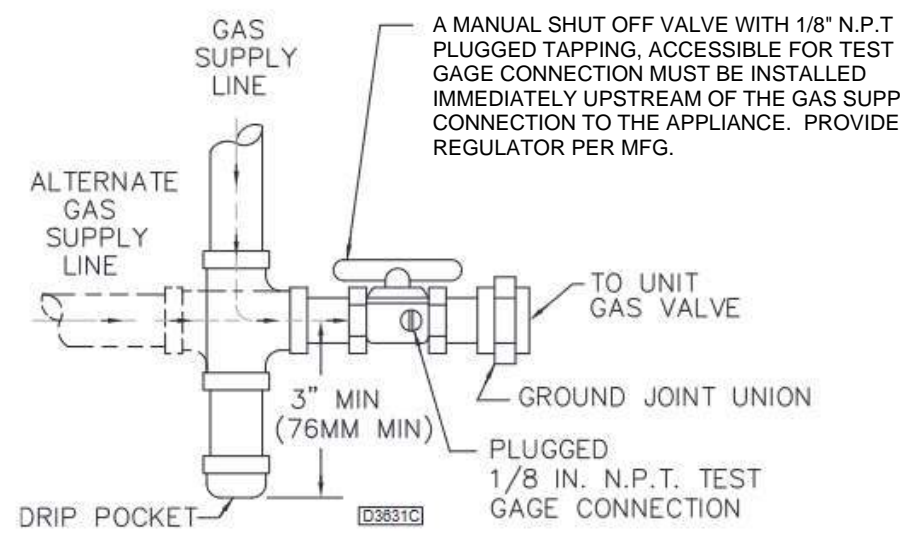




THESE PLANS ARE PREPARED FOR GRANT UNION HIGH SCHOOL. CONTRACTOR SELECTED SHALL HAVE 5 YEARS EXPERIENCE INSTALLING SIMILAR EQUIPMENT AND SHALL TAKE RESPONSIBILITY FOR FIELD VERIFICATION AND ASSOCIATED ACCOMMODATIONS.



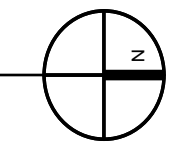
- 1 - EXISTING 3000 CFM FAN W/STEAM COIL. CONVERT TO PROPANE UNIT HEATER 4 PLACES.
- 2 - NEW UNIT HEATER REFERENCED ON SCHEDULES IS 3' TALLER. REPLACE RETURN DUCT WITH 3" LESS HEIGHT, KEEPING AREA OF DUCT THE SAME.
- 3 - OFFSET RETURN AND SUPPLY TO MAXIMIZE CLEARANCES.
- 4 - TRANSITION DUCTS OFF NEW UNIT TO EXISTING DUCTS AND LOUVERS PER SMACNA.
- 5 - PROVIDE CONTROLS TO MODULATE THE ECONOMIZER DAMPERS BASED ON CO2 SENSOR LOCATED IN THE RETURN DUCT. OSA TO MODULATE BETWEEN 0-3000 CFM.
- 6 - PROVIDE ACCESS DOOR IN SOFFIT FOR EASY FILTER REPLACEMENT
- 7 - PROVIDE ACCESS DOOR AS NEEDED TO MEET THE 36" ELECTRICAL ACCESS REQUIREMENT.
- 8 - SEE SCHEMATIC BELOW FOR PROPANE PIPE SIZING.
- 9 - COORDINATE WITH MAINTENANCE CHIEF FOR PIPE ROUTING, ASSUME EXPOSED AND TIGHT TO WALL AND CEILING FOR BID.
- 10 - VENT UNIT HEATERS TO ROOF.
- 11 - ROOF CUT AND PATCH PER ROOFING MANUFACTURER'S REQUIREMENTS.
- 12 - PROVIDE NEW MOTORIZED DAMPERS IN EXISTING RELIEF HOODS AND INTERLOCK WITH ECONOMIZERS. OR, PROVIDE dP SENSOR ACROSS THE INSULATED ENVELOPE AND SET TO PROVIDE 0.1" MAXIMUM POSITIVE PRESSURE IN GYM.
- 16 - ALSO INTERLOCK NEW DAMPERS IN EXISTING RELIEF HOODS WITH A 0-2HR TIMER FOR OWNER TO ALLOW HOT AIR TO RISE OUT OF THE GYM.
- 17 - LOCATE 0-2 HR TIMER AS DIRECTED BY THE SCHOOL DISTRICT MAINTENANCE CHIEF (ASSUME COACH'S OFFICE FOR BID).
- 18 - ACCESS TO THE SPACE FOR REMOVAL AND REPLACEMENT OF THE GYMNASIUM HEATERS IS PER STRUCTURAL DESIGN.



Length of Pipe in Feet	Size of Pipe in Inches					
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
10	275	567	1071	2205	3307	6221
20	189	393	732	1496	2299	4331
30	152	315	590	1212	1858	3465
40	129	267	504	1039	1559	2992
50	114	237	448	913	1417	2646
60	103	217	409	834	1275	2394
80	89	185	346	724	1086	2047
100	78	162	307	630	976	1811
125	69	146	275	567	866	1606
150	63	132	252	511	787	1496
200	54	112	209	439	665	1282

FLOOR PLAN

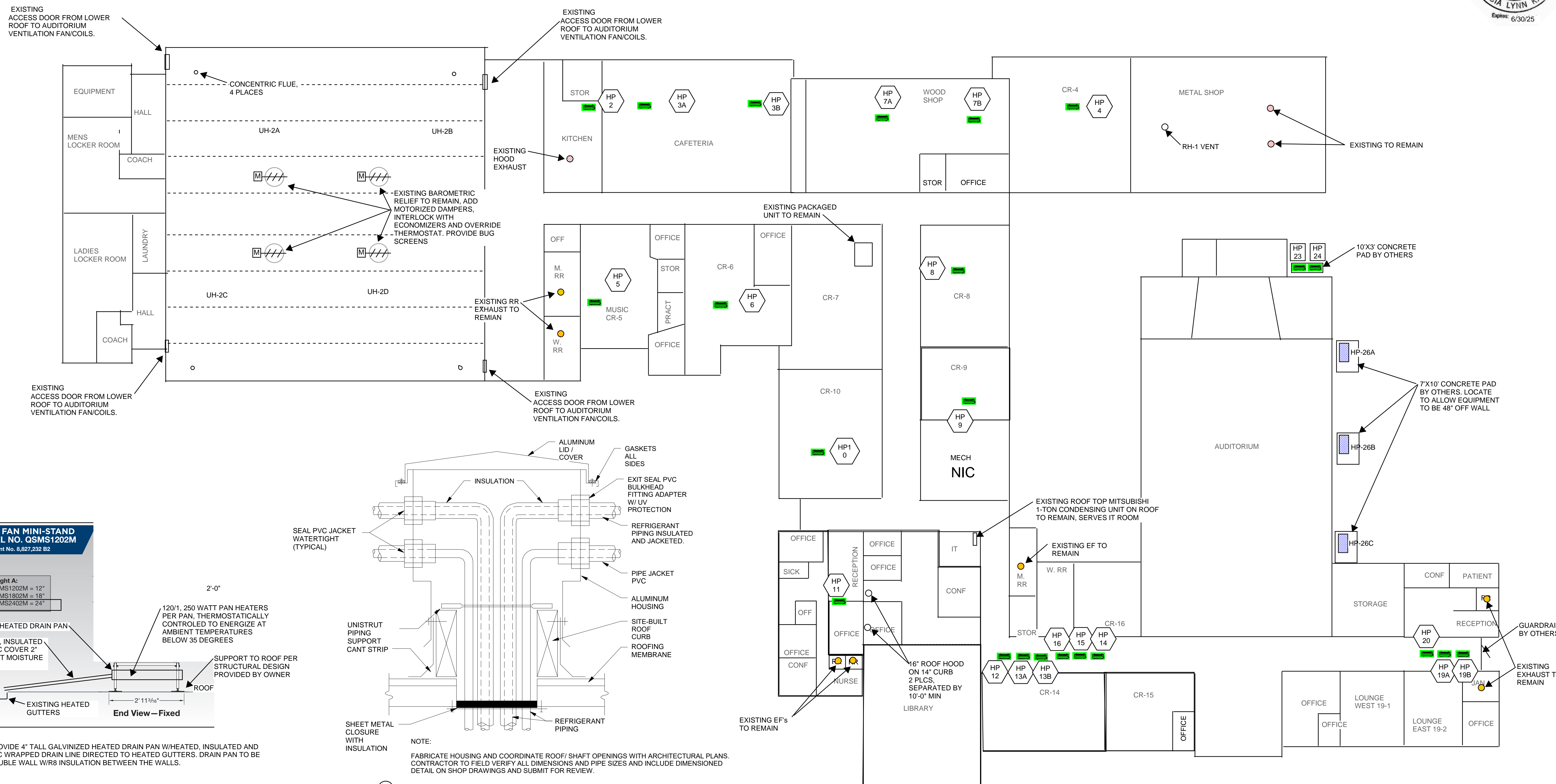
SCALE: 1/16" = 1'-0"



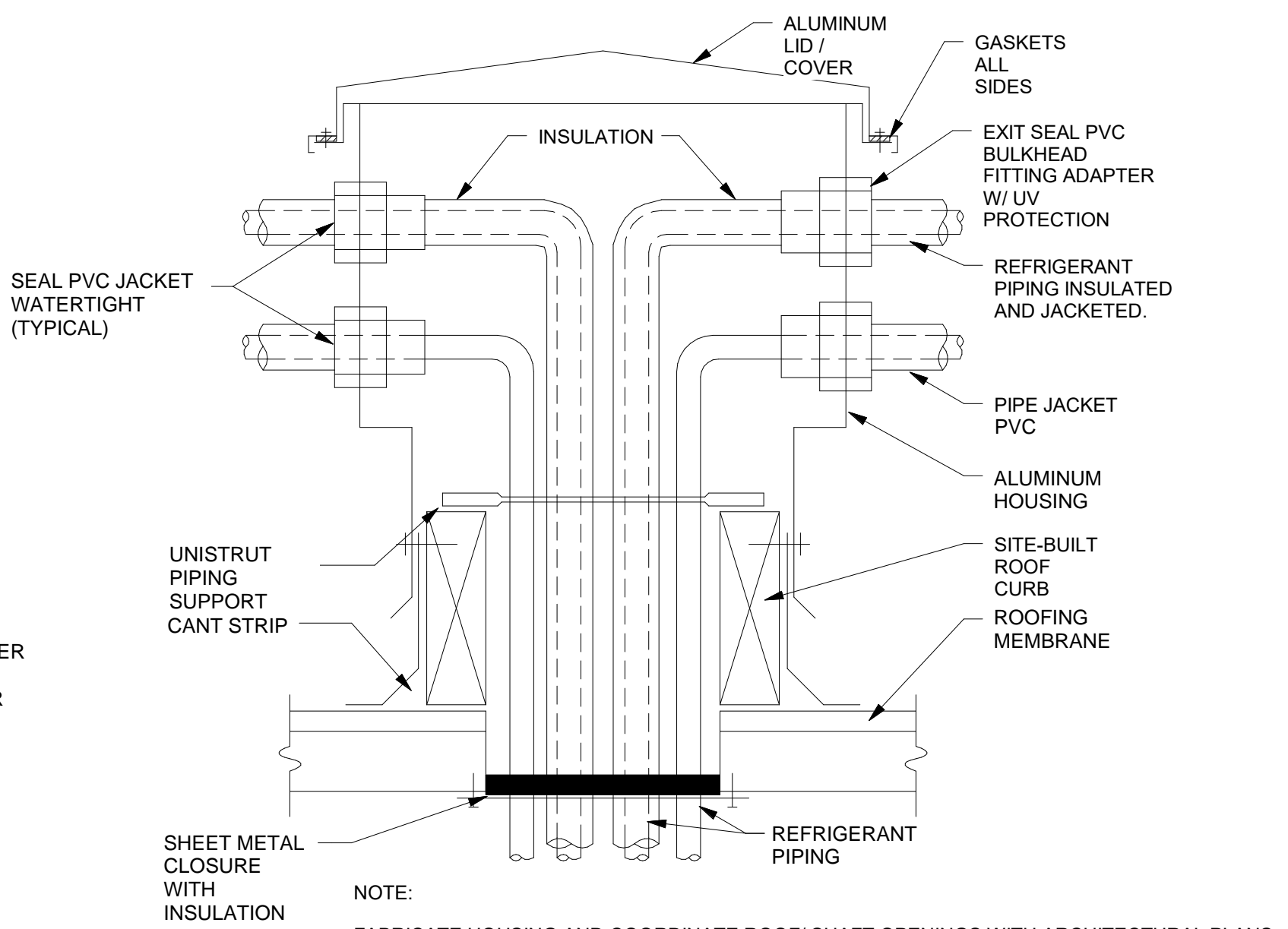
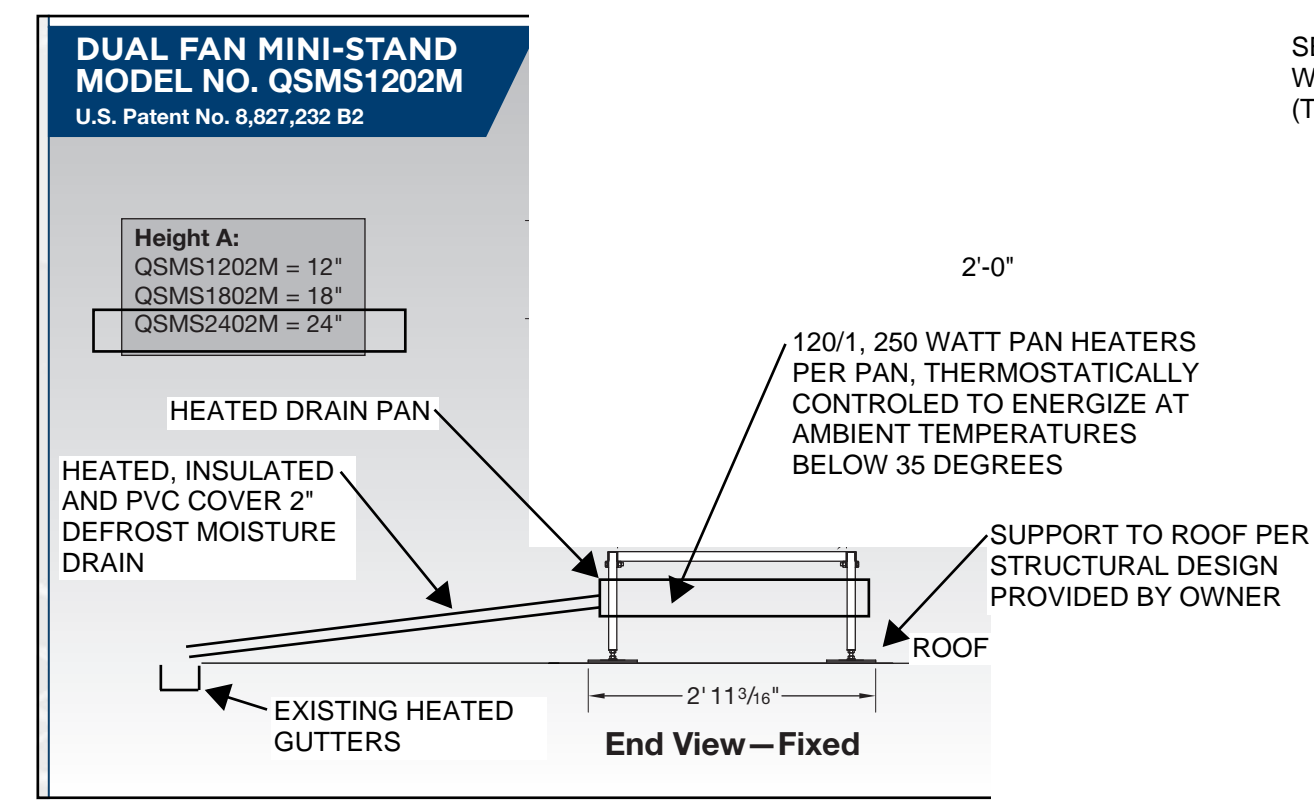
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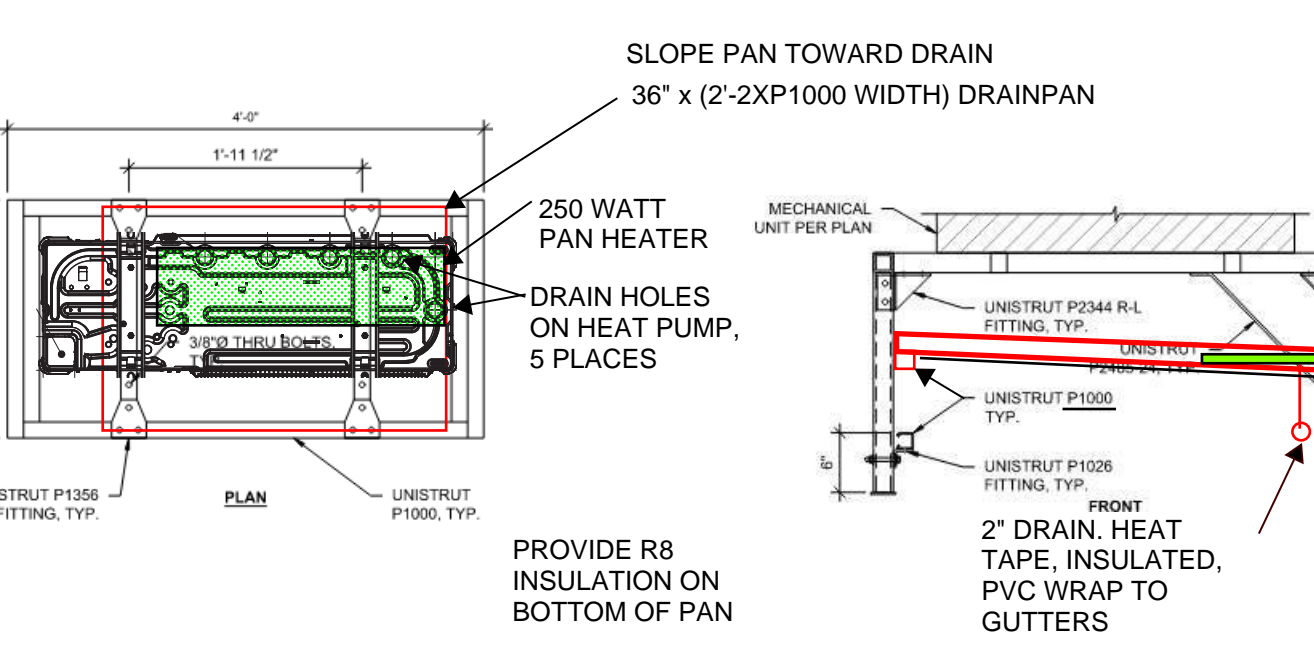


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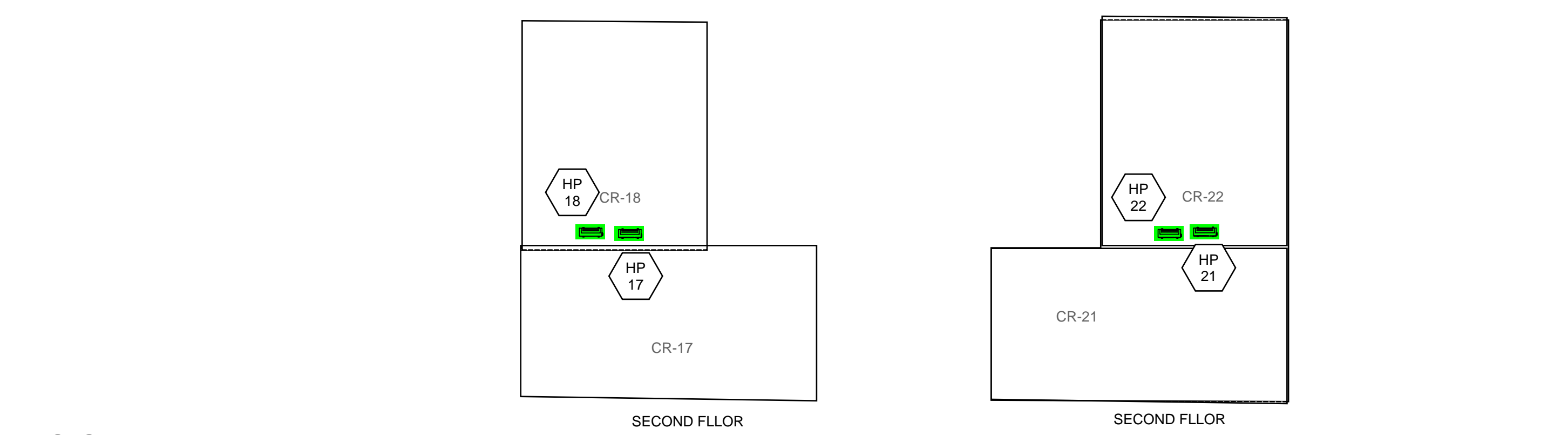


PROVIDE 4" TALL GALVANIZED HEATED DRAIN PAN W/HEATED, INSULATED AND PVC WRAPPED DRAIN LINE DIRECTED TO HEATED GUTTERS. DRAIN PAN TO BE DOUBLE WALL W/R8 INSULATION BETWEEN THE WALLS.

2. PIPE CHASE HOUSING DETAIL
SCALE: NONE



1. HEAT PUMP STAND
SCALE: NONE



ROOF PLAN

SCA 1/16" = 1'-0"

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