PINE RIVER AREA SCHOOLS HVAC IMPROVEMENT PROJECTS LEROY ELEMENTARY SCHOOL HVAC IMPROVEMENTS LEROY, MICHIGAN

CODE DATA

BUILDING USE GROUP: E-EDUCATIONAL

CONSTRUCTION TYPE:
2012 MBC TYPE IIB
NFPA TYPE II(000)

BUILDING AREA:
EXISTING TO REMAIN: 30,760 sf
REMODELING: 0 sf
NEW: 0 sf

OCCUPANT LOAD:
STUDENTS: 289
STAFF: 32

BID ALTERNATES

BID ALTERNATE L1 — ADD HEATING SYSTEM BACK—UP PUMPS.

PROVIDE AND INSTALL NEW HEATING SYSTEM BACK—UP PUMPS H—1B & H—2B, NEW PIPING, NEW CONTROLS, NEW ELECTRICAL, ETC. AS SHOWN.

BID ALTERNATE L2 — ADD GLYCOL TO HEATING SYSTEM.

PROVIDE AND INSTALL 30% GLYCOL / 70% WATER SOLUTION TO HEATING SYSTEM.

BID ALTERNATE L3 — ADD CAFETERIA ENERGY RECOVERY VENTILATOR (ERV).

PROVIDE AND INSTALL NEW ERV—C, NEW REHEAT COIL RH—C, NEW CONTROLS, ELECTRICAL WORK, ETC. AS SHOWN.

BID ALTERNATE L4 — REPLACE GYM AIR HANDLING UNIT (AHU).

REMOVE EXISTING HEATING AND VENTILATING UNIT AND PROVIDE AND INSTALL NEW AHU—G, NEW EF—G, NEW CONTROLS, ELECTRICAL WORK, ETC. AS SHOWN.

BID ALTERNATE L5 — ADD DX A/C COILS TO NEW VUVS / HUVs FOR

PROVIDE AND INSTALL DX A/C COOLING COILS IN ALL NEW VUVs /

FUTURE COOLING.

HUVs AS SHOWN ON THE PLANS

WORK DESCRIPTION

IN GENERAL, WORK OF THE CONTRACT INCLUDES:
1. REPLACEMENT AND OR ADDITION OF DESIGNATED HEATING, VENTILATING AND AIR CONDITIONING UNITS, EXHAUST FANS AND CONTROLS;
2. ADDITION OF BACK-UP HEATING SYSTEM PUMPS;
3. ADDITION OF GLYCOL TO HEATING WATER SYSTEM.

SHEET INDEX

T TITLE SHEET & PROJECT INFORMATION

A0.1 COMPOSITE FLOOR PLAN / FIRE SEPARATION PLAN
A1.1 FLOOR PLAN PART "B" — DEMOLITION & NEW WORK
A2.1 CEILING PLAN PART "B" — DEMOLITION & NEW WORK

M0.1 MECHANICAL TITLE SHEET
M1.1 MECHANICAL PIPING DEMOLITION PLAN — PART "B"
M1.2 MECHANICAL HVAC DEMOLITION PLAN — PART "B"
M2.1 MECHANICAL PIPING NEW WORK PLAN — PART "B"
M2.2 MECHANICAL HVAC NEW WORK PLAN — PART "B"
M3.1 MECHANICAL DETAILS
M3.2 MECHANICAL DETAILS

M3.3 MECHANICAL DETAILS
M3.4 MECHANICAL DETAILS
M3.5 MECHANICAL DETAILS
M3.6 MECHANICAL DETAILS
M3.7 MECHANICAL DETAILS
E0.1 ELECTRICAL TITLE SHEET
E1.1 ELECTRICAL DEMOLITION PLAN — PART "B"

E1.2 LIGHTING DEMOLITION PLNA — PART "B"
E2.1 ELECTRICAL NEW WORK PLAN — PART "B"
E2.2 LIGHTING NEW WORK PLAN — PART "B"
E3.1 ELECTRICAL DETAILS

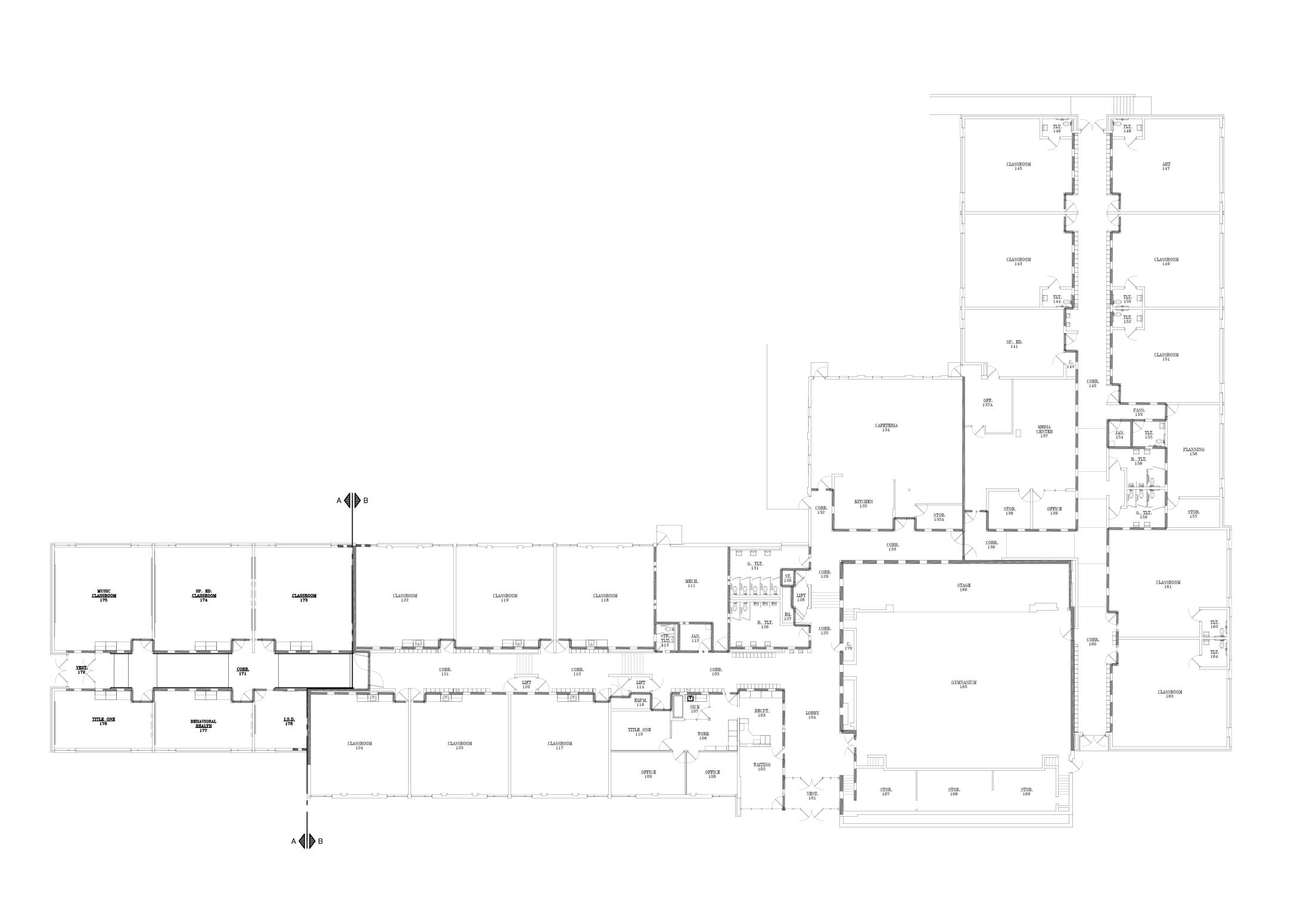
STATE OF MICHIGAN

STATE OF MICHIGAN

MARCH 18, 2002

REGISTRATION

ANTHONY P. ESSON ARCHITECT





PIRE WALL LEGEND

2 hr. FIRE RATED AREA SEPARATION FIRE WALL.

1 hr. FIRE RATED FIRE BARRIER.

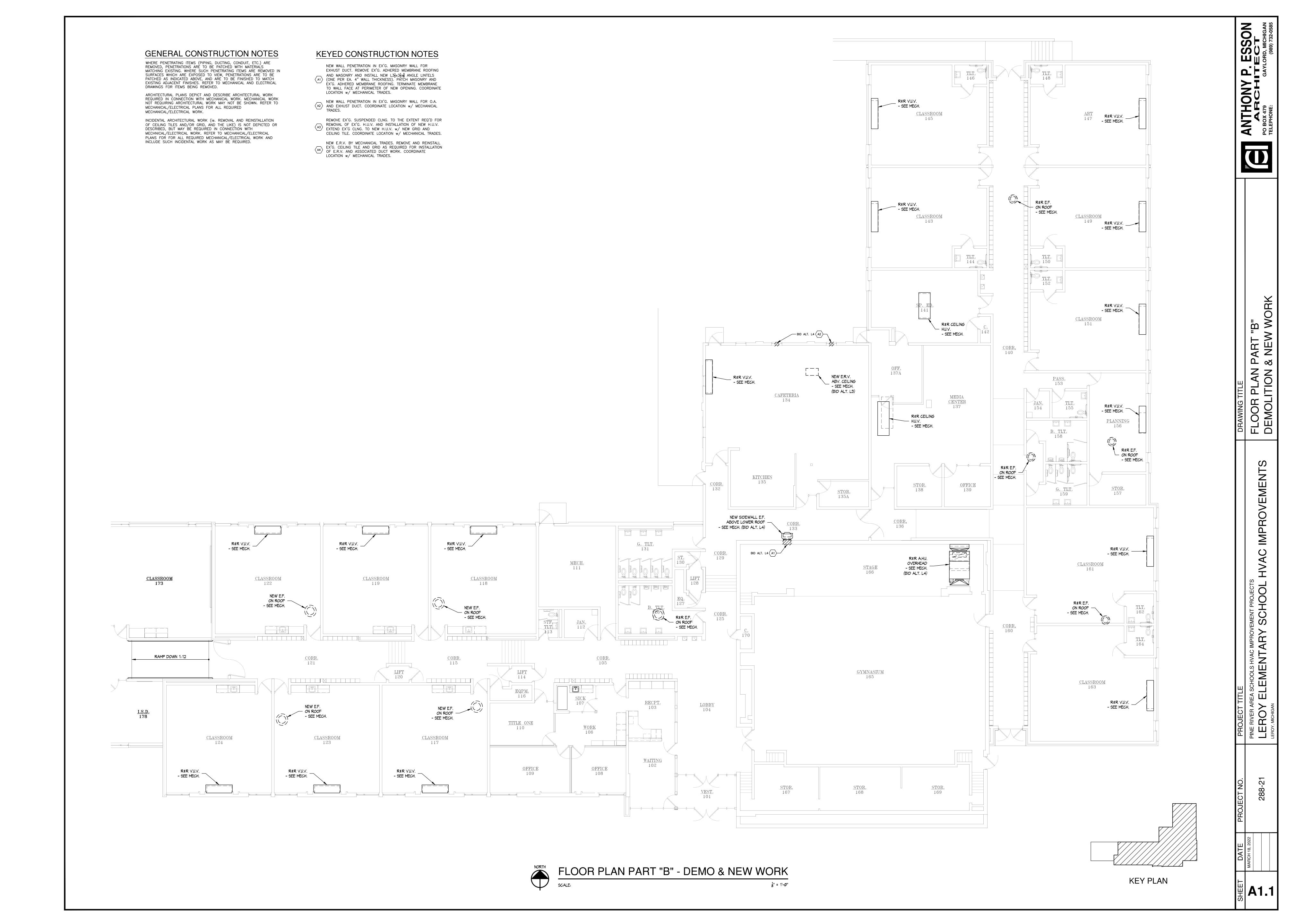
1 hr. FIRE RATED CORRIDOR FIRE PARTITION.

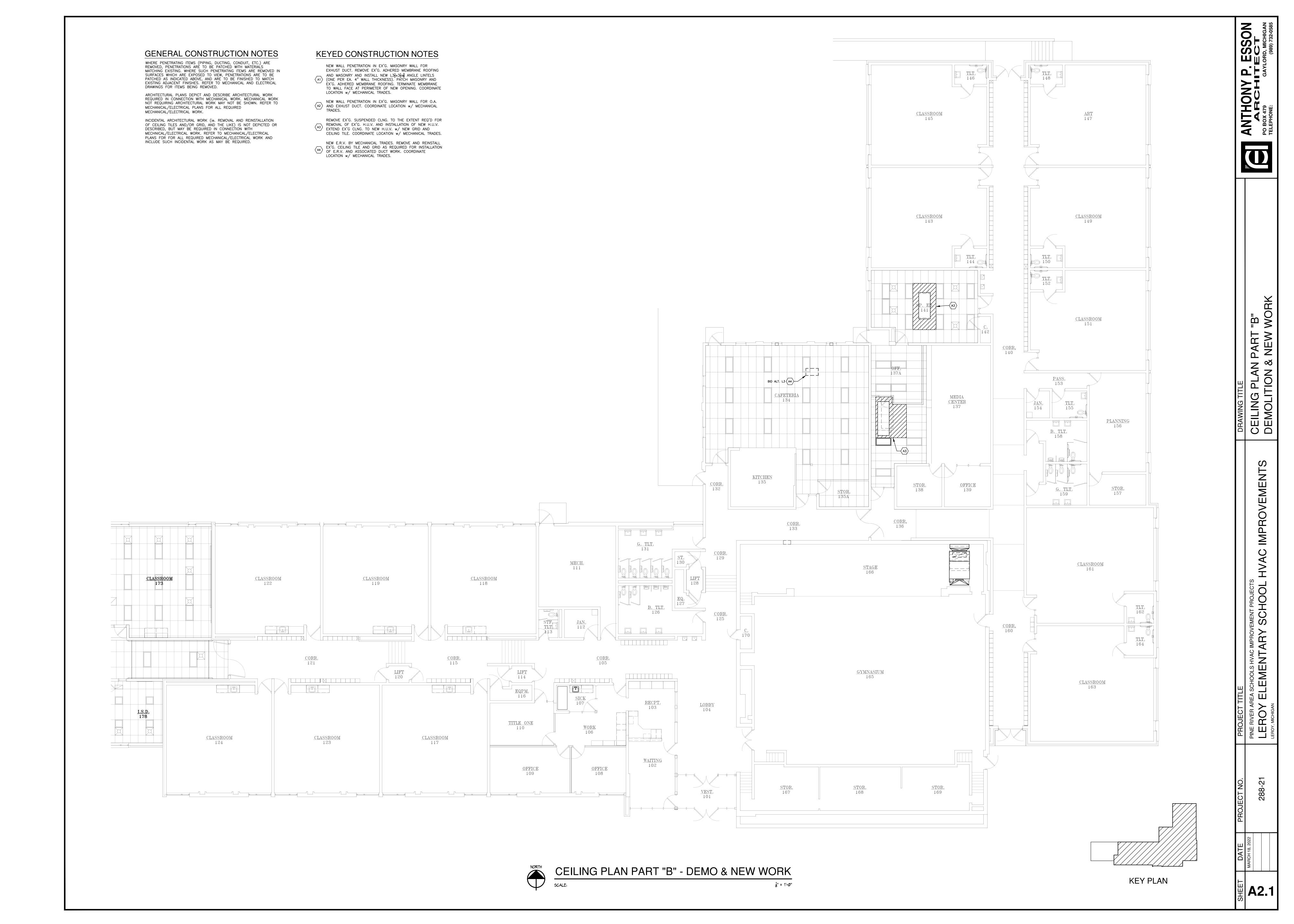
NOTE: FIRE SEPARATIONS DEPICTED HEREIN ARE "AS REQUIRED" UNDER THE NOW CURRENT MICHIGAN BUILDING CODE AND NFPA 1Ø1 LIFE SAFETY CODE. CONSTRUCTION EXISTING PRIOR TO THE ADOPTION OF SUCH CODES MAY NOT MEET FIRE SEPARATION REQUIREMENTS OF CURRENT CODES, HOWEVER, ALL NEW PENETRATIONS MADE IN EXISTING CONSTRUCTION, SHALL BE CONSTRUCTED AND FIRE

STOPPED IN ACCORDANCE WITH CURRENT CODE REQUIREMENTS FOR

THE FIRE RATINGS PROVIDED HEREIN.

ANTHONY P. ESSON
ARCHITECT
PO BOX 479
GAYLORD, MICHIGAN
TELEPHONE:





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RECTANGULAR TAKE-OFF (SINGLE LINE)

RECTANGULAR TAKE-OFF (DOUBLE LINE)

SPIN-IN FITTING (WITH VOLUME DAMPER)

RECTANGULAR ELBOW (WITH TURNING VANES)

ROUND TAKE-OFF (SINGLE LINE)

ROUND TAKE-OFF (DOUBLE LINE)

RADIUS RECTANGULAR ELBOW

RADIUS ROUND ELBOW

RECTANGULAR ELBOW UP

DUCT UP (SINGLE LINE)

ROUND ELBOW DOWN

RECTANGULAR ELBOW DOWN

DUCT DOWN (SINGLE LINE)

CONCENTRIC TRANSITION (DOUBLE LINE)

CONCENTRIC TRANSITION (SINGLE LINE)

ECCENTRIC TRANSITION (DOUBLE LINE)

ECCENTRIC TRANSITION (SINGLE LINE)

CROSS SECTION OF SUPPLY AIR DUCT

RETURN OR EXHAUST CEILING GRILLE

VOLUME DAMPER (MANUALLY ADJUSTABLE)

ROOF OUTDOOR AIR INTAKE HOOD (OA.H)

METHODS OF NOTATION

10" DIAMETER NECK SIZE

22×10 NECK SIZE

350 CFM - TYPICAL FOR 4

640 CFM - TYPICAL FOR 2

350-4

22×10

640-2

SUPPLY AIR GRILLE/DIFFUSER SCHEDULE TAG

RETURN AIR GRILLE/REGISTER SCHEDULE TAG

EXHAUST REGISTER (E) DESIGNATION SIMILAR

EQUIPMENT DESIGNATION (E.G. EXHAUST

CONSTRUCTION KEYED NOTE NUMBER

FLEXIBLE CONNECTION (DUCT)

SQUARE CEILING DIFFUSER

FIRE DAMPER (HORIZONTAL)

MOTORIZED CONTROL DAMPER

ROOF EXHAUST FAN (PLAN VIEW)

ROOF RELIEF AIR HOOD (REL.H)

FIRE DAMPER (VERTICAL)

TRANSFER AIR

CROSS SECTION OF EXHAUST/RETURN AIR DUCT

ROUND ELBOW UP

DESCRIPTION

UNION

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BFP——

PIPE ELBOW UP

PIPE ELBOW DOWN

DIRECTION OF FLOW

CONCENTRIC REDUCER

ECCENTRIC REDUCER

PIPE CAP OR PLUG

CIRCULATING PUMP

ISOLATION VALVE

BUTTERFLY VALVE

BALANCE VALVE

STRAINER (Y-TYPE)

TRAP (PLAN VIEW)

ROOF DRAIN SUMP

CLEAN OUT (IN FLOOR)

BACKFLOW PREVENTER

PRESSURE RELIEF VALVE

PRESSURE REDUCING VALVE

PRESSURE REGULATING VALVE

PRESSURE GAUGE AND COCK

THERMOMETER

MANUAL AIR VENT

AUTOMATIC AIR VENT

CONDENSATE DRAIN

PRESSURE AND TEMPERATURE RELIEF VALVE

PRESSURE AND TEMPERATURE TEST PLUG

ELECTRICAL CONTROL VALVE - TWO WAY

HOT WATER HEATING SUPPLY PIPING

HOT WATER HEATING RETURN PIPING

DOMESTIC HOT WATER RETURN PIPING

GAS PIPING (NATURAL GAS OR PROPANE)

THERMOSTAT - WITH LOCK BOX COVER

THERMOSTAT - LOCAL CONTROL

THERMOSTATIC RADIATOR VALVE (TV) - DANFOSS

CLEAR PLASTIC VENTED LOCKABLE T-STAT BOX

WIRE GUARD IN HIGH ABUSE AREAS (GYM, LOCKERS, ETC.)

THERMOSTATIC RADIATOR REMOTE DIAL (RD) - DANFOSS

TEMP/CO2/OCCUPANCY SENSOR-ANALOG INPUT TO BMS (KMC #STE-9501W OR EQUAL)

TEMP SENSOR-ANALOG INPUT TO BMS (KMC #STE-9001W OR EQUAL)

DOMESTIC COLD WATER PIPING

DOMESTIC HOT WATER PIPING

SANITARY WASTE PIPING

RAIN CONDUCTOR PIPING

SANITARY VENT PIPING

NON POTABLE COLD WATER

STORM SEWER PIPING

ELECTRICAL CONTROL VALVE - THREE WAY

CLEAN OUT (IN LINE)

STRAINER (BLOW OFF TYPE)

FLOOR DRAIN (PLAN VIEW)

FLOOR DRAIN (ELEVATION)

FUNNEL FLOOR DRAIN (PLAN VIEW)

FUNNEL FLOOR DRAIN (ELEVATION)

CHECK VALVE (SWING)

CHECK VALVE (SPRING)

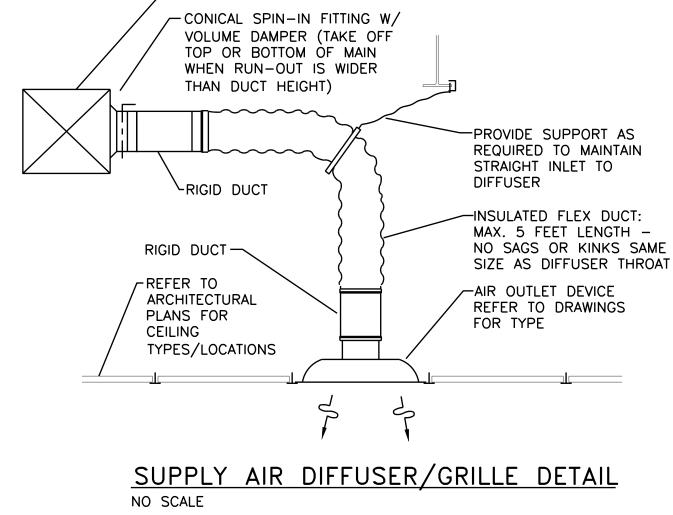
COMBO BALANCE VALVE/FLOW MEASURING DEVICE

GLOBE VALVE

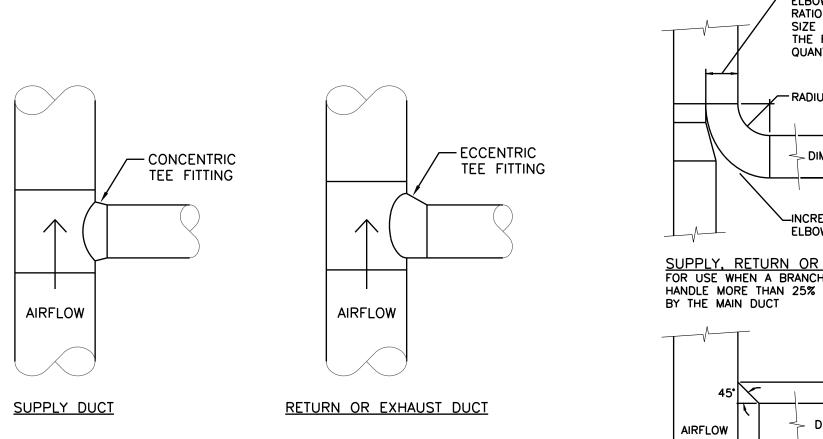
BALL VALVE

CONICAL SPIN IN - RIGID DUCT FITTING ROUND OR RECTANGULAR DUCT RECTANGULAR (SEE PLANS) WITH VOLUME DAMPER -- CONICAL SPIN-IN FITTING RETURN OR FOR ROUND CONNECTIONS EXHAUST AIR BRANCH DUCT -CEILING (REFER TO ARCH PLANS FOR INSULATED FLEXIBLE DUCT MAX 12" (TYP) ____ TYPES & HEIGHTS) AIR OUTLET

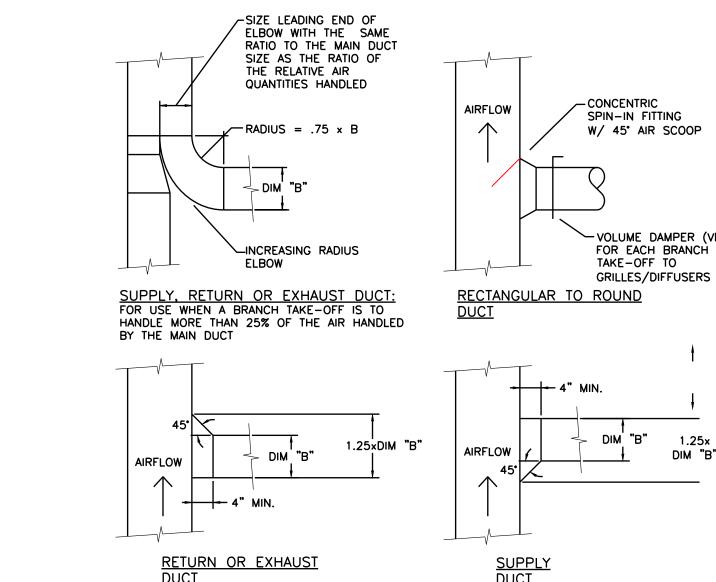
RETURN OR EXHAUST AIR INLET DETAIL NO SCALE



- MAIN SUPPLY DUCT



ROUND DUCT TAKE-OFF DETAILS NO SCALE



RECTANGULAR DUCT TAKE-OFF DETAILS

UNIT I.D.	FACE SIZE	NECK SIZE	FRAME TYPE	ACCESSORY	CONSTRUCTION	FINISH	MODEL NO.	REMARKS
SG-1	24x24	SEE PLANS	T-BAR FLUSH NOTE 2	_	STEEL	WHITE	TMSA	SQUARE CEILING DIFFUSER SEE NOTE 4
RG-1	24x24	SEE PLANS	T-BAR FLUSH NOTE 2	_	STEEL	WHITE	PAR	24"x24" PERFORATED RETURN GRILL
	NECK SIZE		SURFACE	OPPOSED				FOC CDATE FACE DETUDN
RG-EC	NECK SIZE + 1-3/4"	SEE PLANS	MOUNT	DAMPER	ALUMINUM	WHITE	50F	EGG CRATE FACE RETURN 1/2" x 1/2" x 1/2" AL GRID CORE

1. MODEL NUMBERS ARE TITUS UNLESS OTHERWISE NOTED. PRICE, NAILOR, CARNES, KRUEGER, TUTLE & BAILEY MAY BE BID AS EQUALS. 2. WHERE LOCATED IN GYPSUM BOARD OR SIMILAR HARD CEILING, PROVIDE TITUS MODEL TRM RAPID MOUNT FRAME TO CREATE LAY-IN FUNCTION. COORDINATE WITH ARCHITECTURAL REFLECTED CEILING PLANS FOR CEILING TYPE AT EACH LOCATION (LAY-IN CEILING VS. HARD CEILING).

LEROY ELEMENTARY ALTERNATE BID ITEMS:

ALTERNATE #L1 (ADDER) - ADDITION OF LEROY HEATING SYSTEM BACKUP PUMPS -STATE THE COST OF MATERIALS & LABOR REQUIRED FOR ADDING THE FOLLOWING WORK TO THE SCOPE OF THE PROJECT: ADDITION OF NEW LEROY ELEMENTARY HEATING SYSTEM BACKUP PUMPS HP-L1B & HP-L2B, AND ASSOCIATED PIPING/TEMP. CONTROLS/ELECTRICAL/ETC., AS SHOWN

ALTERNATE #L2 (ADDER) - ADDITION OF LEROY HEATING SYSTEM GLYCOL -STATE THE COST OF MATERIALS & LABOR REQUIRED FOR ADDING THE FOLLOWING WORK TO THE SCOPE OF THE PROJECT: ADDITION OF 25% GLYCOL/75% WATER SOLUTION TO THE LEROY HEATING SYSTEM.

ALTERNATE #L3 (ADDER) — ADDITION OF NEW LEROY CAFETERIA ERV SYSTEM -STATE THE COST OF MATERIALS & LABOR REQUIRED FOR ADDING THE FOLLOWING WORK TO THE SCOPE OF THE PROJECT: NEW ENERGY RECOVERY VENTILATOR ERV-C, AND ASSOCIATED DUCTWORK/REHEAT COIL/TEMP. CONTROLS/ELECTRICAL/ETC., AS SHOWN ON THE PLANS.

ALTERNATE #L4 (ADDER) - ADDITION OF NEW LEROY GYM AHU-G & EF-G -STATE THE COST OF MATERIALS & LABOR REQUIRED FOR ADDING THE FOLLOWING WORK TO THE SCOPE OF THE PROJECT: REMOVAL OF OLD LEROY GYM H&V UNIT AND NEW AHU-G, NEW EF-G, NEW CONTROLS, ELECTRICAL WORK, ETC. AS SHOWN ON THE PLANS.

ALTERNATE #L5 (ADDER) - ADDITION OF DX A/C COOLING COILS WITHIN THE NEW VUVS/HUVS FOR FUTURE COOLING -STATE THE COST OF MATERIALS & LABOR REQUIRED FOR ADDING THE FOLLOWING WORK TO THE SCOPE OF THE PROJECT: ADDITION OF DX A/C COOING COILS WITHIN THE NEW VUVs/HUVs AS SHOWN ON THE PLANS - (15) VUVs @ LEROY, (2) HUVs @ LEROY.

GENERAL MECHANICAL & PLUMBING DEMOLITION NOTES:

1. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. THE EXACT LIMITS OF DEMOLITION WORK SHALL BE AS REQUIRED BY THE NEW WORK.

MECHANICAL & PLUMBING ABBREVIATION LIST

<u>ABBREVIATION</u>

KVA

KW

LDB

LRA

LWB

MAX

MBH

MCA

MFR

N.C

NIC

NO

OΑ

OD

P.C.

PRV

PSIG

RAG/RG

REL.A

RPM

SpGr

TYP

UON

 $\mathsf{UV} - \mathsf{C}$

OA.H

NOM

MECH

M.C

LWT

DESCRIPTION

KILOWATT

MIXED AIR

MAXIMUM

MECHANICAL

MINIMUM

NOMINAL

MANUFACTURER

MISCELLANEOUS

NOISE CRITERIA

NOT IN CONTRACT

NORMALLY OPEN

OUTSIDE/OUTDOOR AIR

OUTSIDE DIAMETER

PUMPED CONDENSATE

PRIOR TO ROUGH-IN

ROOF EXHAUST FAN

REFRIGERANT LIQUID

RELATIVE HUMIDITY

REFRIGERANT SUCTION

SUPPLY AIR DIFFUSER

SANITARY WASTE

STORM DRAIN

SMOKE DAMPER

STATIC PRESSURE

SPECIFIC GRAVITY

STORM WATER

UNIT HEATER

UNIT VENTILATOR

VOLUME DAMPER

VENT THRU ROOF

WALL CLEAN OUT WATER GAUGE

WALL HYDRANT

WASTE & VENT

VENTILATION

TYPICAL

REVOLUTIONS PER MINUTE

SUPPLY AIR GRILLE/DIFFUSER

SQUARE FOOT/SQUARE FEET

UNDERGROUND (BELOW GRADE)

ULTRAVIOLET RADIATION (GERMICIDAL)

UNDERWRITERS LABORATORY

VARIABLE FREQUENCY DRIVE

VERTICAL UNIT VENTILATOR

WET BULB TEMPERATURE

UNLESS OTHERWISE NOTED

VARIABLE AIR VOLUME

VARIABLE SPEED DRIVE

TOTAL STATIC PRESSURE

TEMPERATURE CONTROLS SUBCONTRACTOR

RELIEF AIR HOOD

PRESSURE DROP

RETURN AIR

RELIEF AIR

SUPPLY AIR

PLUMBING CONTRACTOR

OUTDOOR AIR INTAKE HOOD

PRESSURE REDUCING VALVE

RETURN AIR GRILLE/REGISTER

POUNDS PER SQUARE INCH (GAUGE)

ON CENTER/CENTER TO CENTER

MANUAL AIR VENT

NORMALLY CLOSED

KILO-VOLT-AMPERE

LEAVING AIR TEMPERATURE

LOCKED ROTOR AMPS

LEAVING DRY BULB TEMPERATURE

LEAVING WET BULB TEMPERATURE

THOUSAND BRITISH THERMAL UNITS PER HOUR

MILLION BRITISH THERMAL UNITS PER HOUR

LEAVING WATER TEMPERATURE

MECHANICAL CONTRACTOR

MINIMUM CIRCUIT AMPS

DESCRIPTION

AIR CONDITIONING

AIR HANDLING UNIT

AIR PRESSURE DROP

BACKFLOW PREVENTER

BRITISH THERMAL UNIT

CASED COOLING COIL

CUBIC FEET PER HOUR

CUBIC FEET PER MINUTE

CONTINUATION OR CONTINUED

CENTRAL OPERATOR STATION

BRAKE HORSEPOWER

BI POLAR IONIZER

CAPACITY

CLEAN OUT

CONDENSATE

CONTRACTOR

CONVECTOR

COORDINATE

DEGREES

EXISTING

EXHAUST AIR

EXHAUST FAN

ELECTRICAL

ELEVATION

EXHAUST

FUTURE

FRESH AIR

FAN COIL

FLOOR

FURNACE

HOSE BIB

HEATING

HYDRANT

INCHES

INSIDE DIAMETER

INVERT ELEVATION

HORSEPOWER

FACE VELOCITY

FLOOR DRAIN

FIRE DAMPER

FIRE PROTECTION

DOWN

CIRCULATING PUMP

CONTROL VALVE

DUCTLESS SPLIT

CABINET UNIT HEATER

DOMESTIC COLD WATER

DRY BULB TEMPERATURE

DIRECT DIGITAL CONTROL

DOMESTIC WATER HEATER

ENTERING AIR TEMPERATURE

ENTERING DRY BULB TEMPERATURE

ENTERING WET BULB TEMPERATURE

FIRE SUPPRESSION SUBCONTRACTOR

COMBINATION FIRE/SMOKE DAMPER

GAS (NATURAL GAS/PROPANE)

HORIZONTAL UNIT VENTILATOR

HOT WATER HEATING RETURN HOT WATER HEATING SUPPLY DOMESTIC HOT WATER RETURN

INTEGRAL FACE & BYPASS DAMPER

INTERNAL STATIC PRESSURE

ENTERING WATER TEMPERATURE

EXHAUST GRILLE OR REGISTER

ENERGY MANAGEMENT SYSTEM

EXTERNAL STATIC PRESSURE

FIRE ALARM SUBCONTRACTOR

FACE & BYPASS DAMPER

FUNNEL FLOOR DRAIN

FINNED TUBE RADIATOR

GALLONS PER HOUR

GALLONS PER MINUTE

DOMESTIC HOT WATER

FULL LOAD AMPS

FEET PER MINUTE

ELECTRICAL CONTRACTOR

ABOVE FINISHED FLOOR

AIR CONDITIONING CONDENSER

BUILDING MANAGEMENT SYSTEM

BRITISH THERMAL UNITS PER HOUR

ABBREVIATION

AFF

CFM

CONT

CONTR

CONV

COORD

ELEV

- 2. CONTRACTORS SHALL VISIT THE SITE AND FAMILIARIZE THEMSELVES WITH THE EXISTING SYSTEMS/EQUIPMENT PRIOR TO ISSUING THEIR BID AND INSTALLING THEIR WORK. ALL EXISTING PIPE/DUCT SIZES AND ROUTINGS/LOCATIONS SHOWN ARE APPROXIMATE AND SHALL BE FIELD VERIFIED/CONFIRMED BY THE CONTRACTOR.
- 3. ALL MECHANICAL & PLUMBING ITEMS TO BE REMOVED SHALL BE REMOVED COMPLETE WITH ALL RELATED ITEMS INCLUDING, BUT NOT LIMITED TO, HANGERS, SUPPORTS, CONTROLS, ETC. CONTRACTOR SHALL ASK OWNER IF OWNER WANTS ANY EXISTING EQUIPMENT/PARTS/ETC. PRIOR TO DEMOLITION. REMOVED ITEMS SHALL BE LEGALLY DISPOSED OF OFF SITE. CAP ALL OPEN ENDED PIPING AND DUCTWORK OFF WATER-TIGHT/AIR-TIGHT.
- 4. ANY INTERRUPTION OF EXISTING BUILDING SERVICES AND/OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED BY THE OWNER OR OWNER'S REPRESENTATIVE, AT LEAST (7) DAYS IN ADVANCE SO AS NOT TO INTERFERE WITH THE PRESENT BUILDING OPERATION.
- WHERE DEMOLITION OF EXISTING (E) SERVICES ARE REQUIRED TO ACCOMMODATE THE PROJECT PHASING/SCHEDULING, AND THE (E) SERVICES ARE TO BE INTERRUPTED IN AREAS THAT ARE REMAINING OCCUPIED. THE CONTRACTOR SHALL PROVIDE TEMPORARY SERVICES AND/OR CONNECTIONS TO THE OCCUPIED AREAS AS REQUIRED TO MAINTAIN ITS PRESENT OPERATION. IF SYSTEM SHUT DOWNS ARE REQUIRED, THE CONTRACTOR SHALL SCHEDULE WORK TO BE PERFORMED AT UNOCCUPIED HOURS.
- 6. ALL ITEMS TO BE REMOVED AND/OR RELOCATED SHALL BE REMOVED AND/OR RELOCATED TOGETHER WITH ALL RELATED ITEMS AS REQUIRED BY THE NEW WORK TO BE PERFORMED.
- 7. COORDINATE ALL REMOVAL AND/OR RELOCATION WITH THE EXTENT OF THE NEW WORK AND WITH ALL OTHER TRADES (E.G. ELECTRICAL, FIRE ALARM, TELECOM, CEILINGS, ETC.) INVOLVED.
- 8. UNLESS NOTED OTHERWISE, EACH SUBCONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING, CORING, PATCHING ASSOCIATED WITH THEIR WORK. CUTTING. CORING. PATCHING WORK SHALL BE PERFORMED BY A QUALIFIED SUB-CONTRACTOR AND MATCH EXISTING OR NEW FINISHES.

GENERAL MECHANICAL & PLUMBING NOTES:

CONSTRAINTS, ETC.

1. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL SCOPE OF WORK. CONTRACTOR SHALL PROVIDE MECHANICAL & PLUMBING SYSTEMS AND RELATED EQUIPMENT COMPLETE AND INCLUDE ALL NECESSARY OFFSETS, FITTINGS, AND OTHER COMPONENTS REQUIRED DUE TO INTERFERENCES, SPACE

PROJECT ABBREVIATIONS

MS = MIDDLE SCHOOL

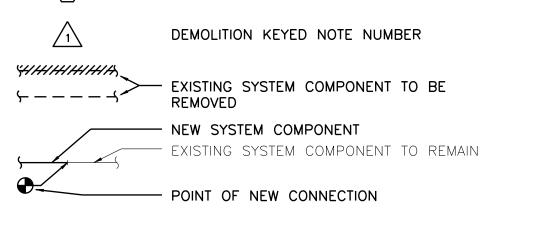
HS = HIGH SCHOOL

PRAS = PINE RIVER AREA SCHOOLS (OWNER)

LE/LES = LEROY ELEMENTARY SCHOOL

- 2. MECHANICAL & PLUMBING SYSTEMS SHALL BE INSTALLED PER CURRENT MICHIGAN MECHANICAL CODE, MICHIGAN PLUMBING CODE, (I.E. MICHIGAN BUILDING CODE, ETC.).
- 3. COORDINATE THE INSTALLATION OF MECHANICAL & PLUMBING WORK WITH ALL OTHER TRADES (E.G. ELECTRICAL, FIRE ALARM, CEILINGS, ETC.). CONTRACTOR SHALL VERIFY ALL MECHANICAL, PLUMBING AND ELECTRICAL CLEARANCES PRIOR TO FABRICATION OF ANY NEW WORK. DUCTWORK, PIPING, ETC. SHALL NOT BE LOCATED DIRECTLY OVER ELECTRICAL EQUIPMENT AND PANELS, OR INTERFERE WITH
- 4. VERIFY REQUIREMENTS OF ALL EQUIPMENT WITH SHOP DRAWING SUBMITTALS PRIOR TO INSTALLATION. NOTIFY THE ENGINEER OF ANY CONFLICTS BETWEEN SHOP DRAWINGS, THE PLANS, AND EXISTING CONDITIONS.
- 5. ALL EQUIPMENT/FIXTURES SHALL BE PROVIDED WITH ISOLATION/STOP VALVES, INSTALLED IN ACCESSIBLE LOCATIONS.
- 6. COORDINATE ALL FLOOR/WALL/CEILING/ROOF PENETRATIONS, LINTELS, ROOF CURBS, LOUVERS, ETC. WITH ARCHITECTURAL/STRUCTURAL TRADES PRIOR TO ROUGH-IN. UNLESS NOTED OTHERWISE, EACH SUBCONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING/CORING/PATCHING ASSOCIATED WITH THEIR WORK. CUTTING/CORING/PATCHING WORK SHALL BE PERFORMED BY A QUALIFIED SUB-CONTRACTOR AND MATCH EXISTING OR NEW FINISHES. ANY ROOFING WORK SHALL BE COMPLETED BY QUALIFIED ROOFING TRADE AS REQUIRED TO MAINTAIN OWNER'S EXISTING ROOF WARRANTY (DUROLAST? COORD./CONFIRM WITH G.C./ROOFER).
- 7. UNLESS OTHERWISE NOTED, EACH SUBCONTRACTOR SHALL BE RESPONSIBLE FOR SEALING ALL NEW PENETRATIONS THROUGH ALL WALLS WITH FIRE CAULK IN ACCORDANCE WITH CURRENT BUILDING CODE REQUIREMENTS.

- INTERNATIONAL FUEL GAS CODE, APPLICABLE NFPA BUILDING CODES (I.E. NFPA 101, NFPA 90A, ETC.), AND APPLICABLE BUILDING CODES
- ELECTRICAL/MECHANICAL EQUIPMENT CLEARANCE SPACES.

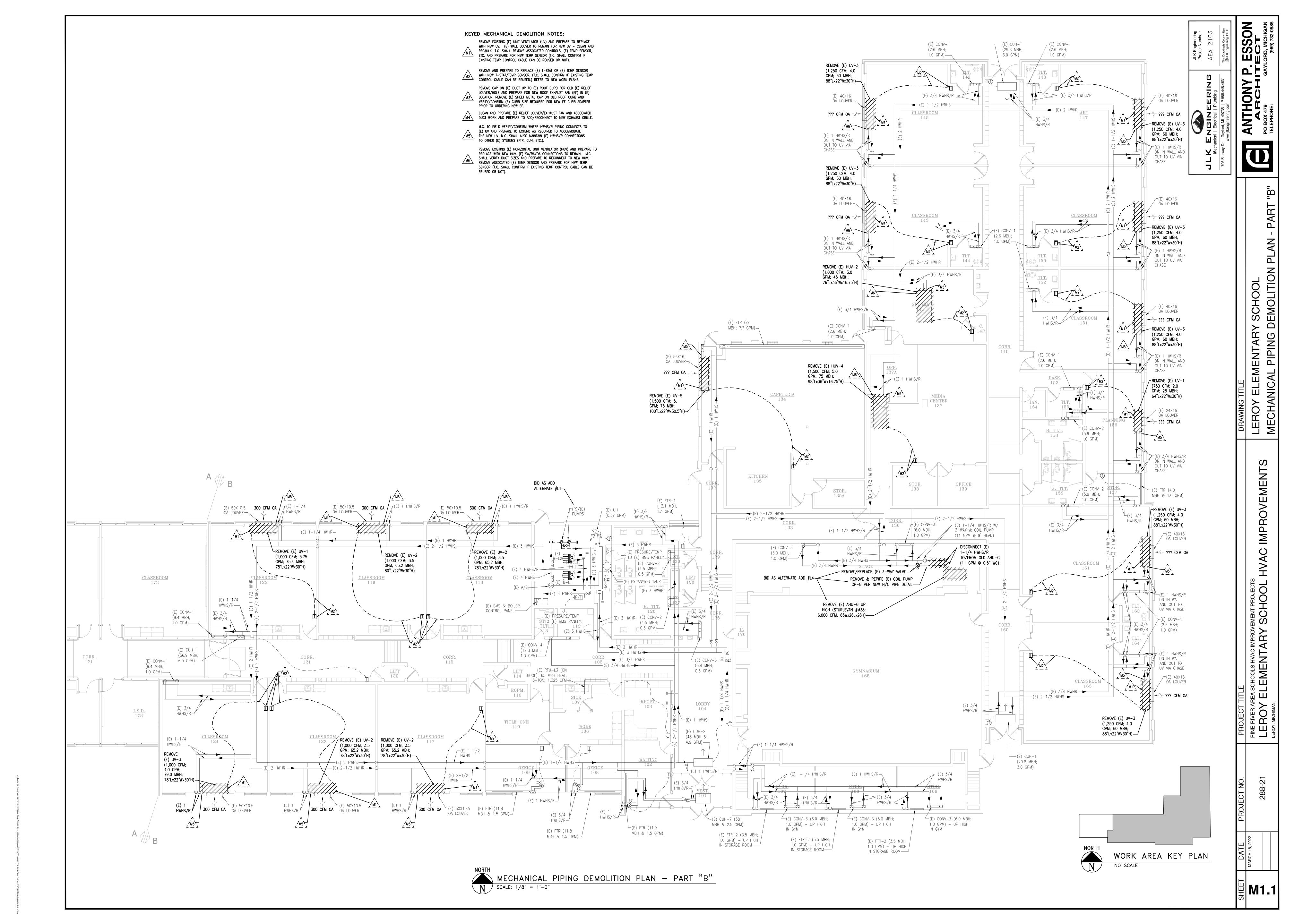


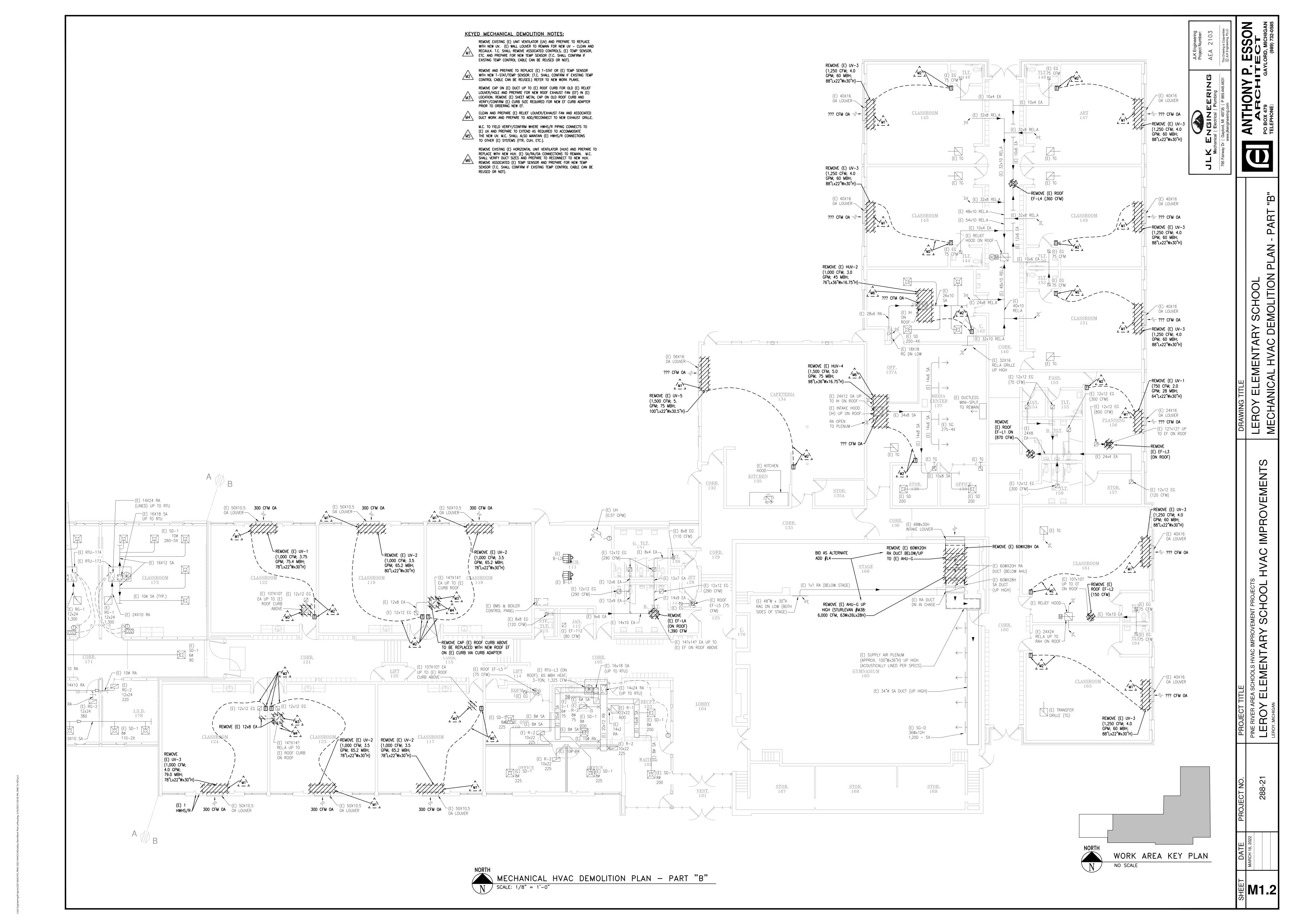
MECHANICAL DRAWING INDEX

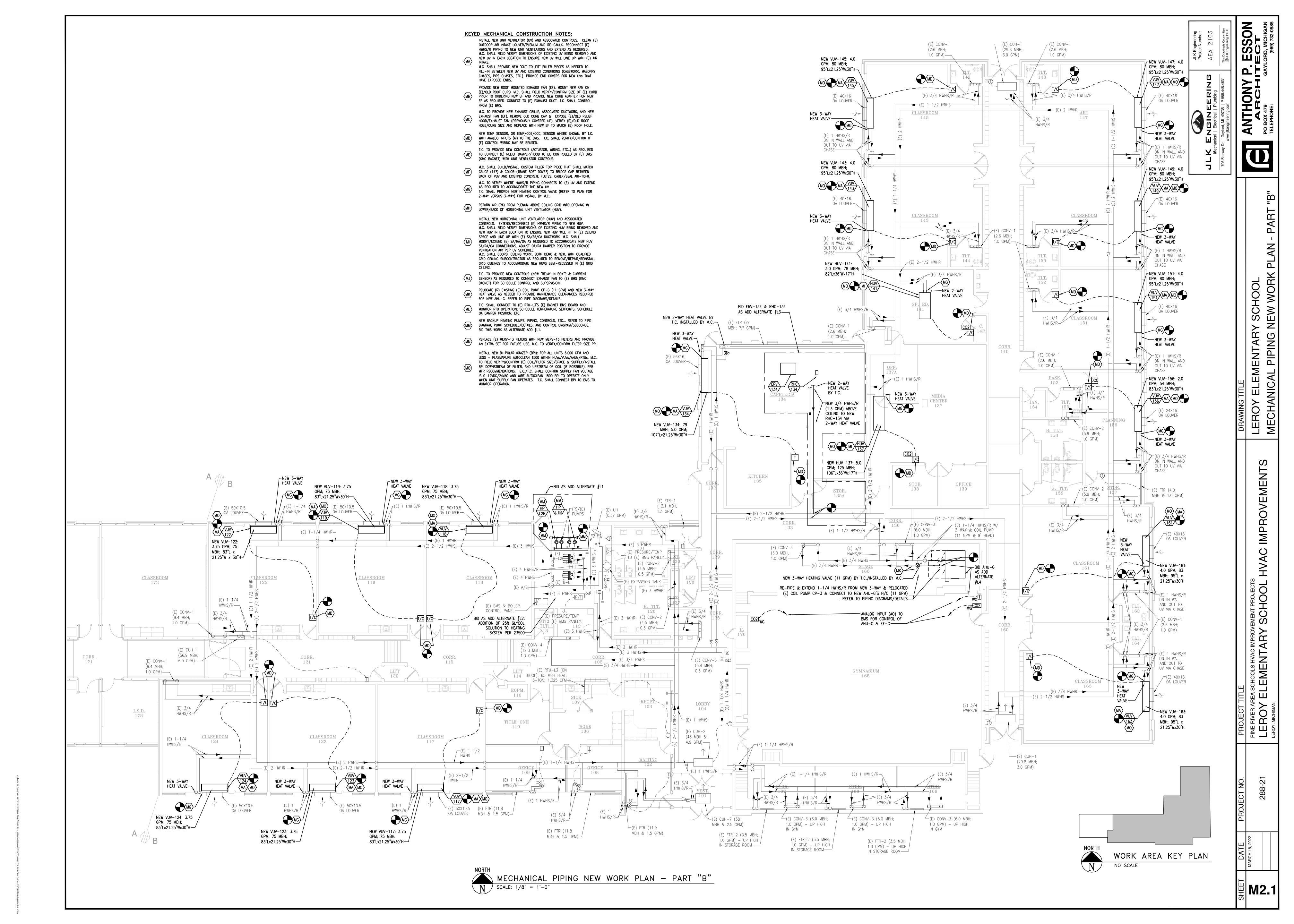
MO.1	MECHANICAL	TITLE SHEET
M1.1 M1.2		PIPING DEMOLITION PLAN — PART "B" HVAC DEMOLITION PLAN — PART "B"
M2.1 M2.2		PIPING NEW WORK PLAN — PART "B" HVAC NEW WORK PLAN — PART "B"
M3.1 M3.2 M3.3 M3.4 M3.5	MECHANICAL MECHANICAL MECHANICAL MECHANICAL MECHANICAL	DETAILS DETAILS DETAILS

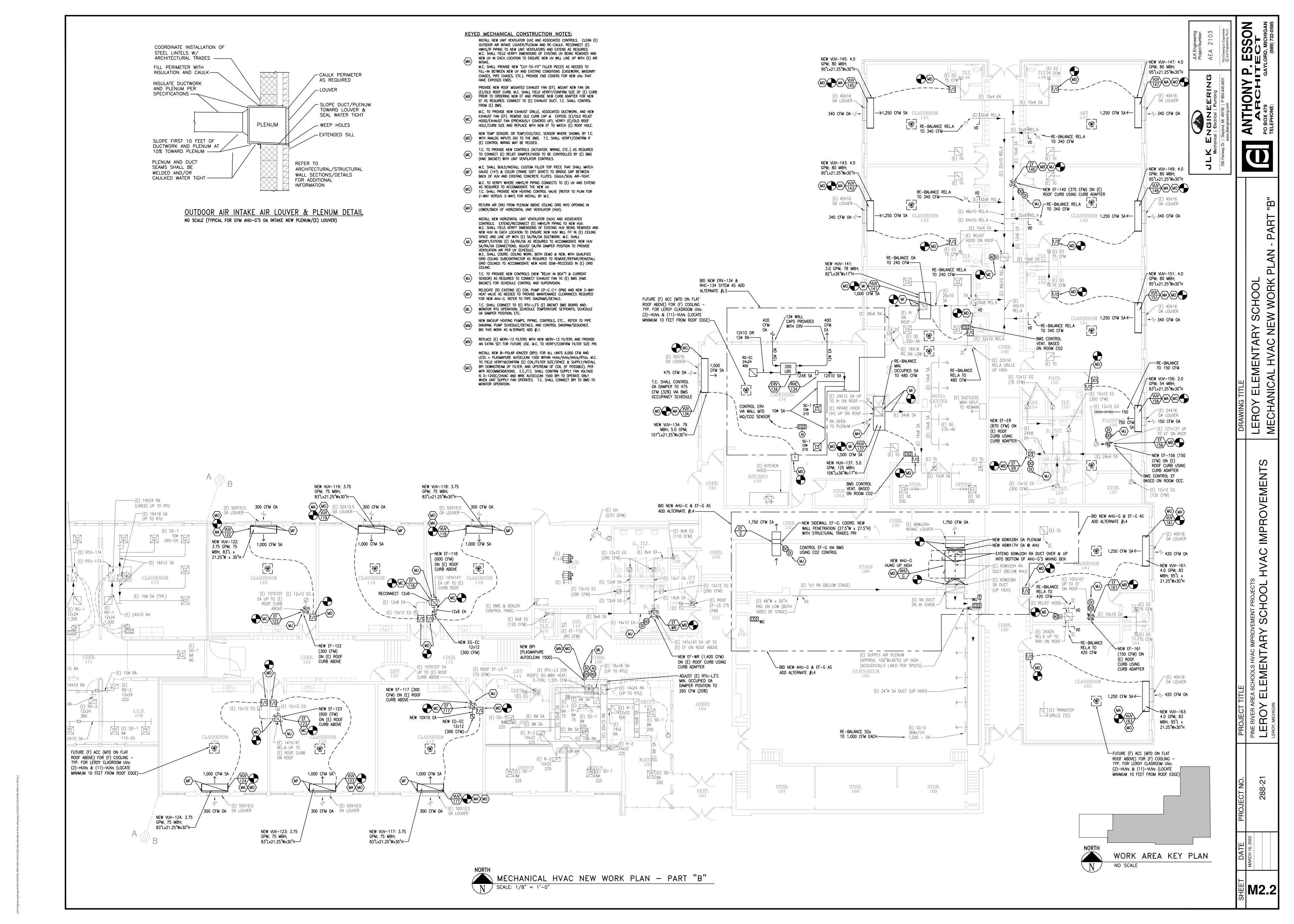
M3.6 MECHANICAL DETAILS

M3.7 MECHANICAL DETAILS



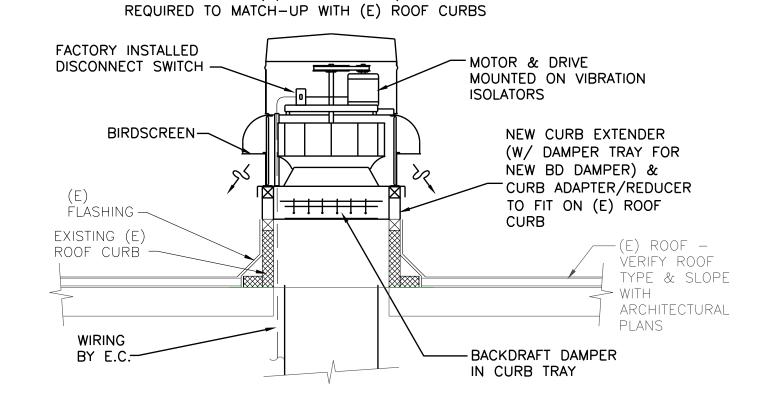






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NEW ROOF MOUNTED CENTRIFUGAL EXHAUST FAN MOUNTED ON EXISTING (E) CURB DETAIL

								FAN	SCHE	DULE					
UNIT I D	ROOM/SYSTEM	TYPE	AIRFLOW	E.S.P.	RPM		M	OTOR		ELECT	RICAL	CURB	WEIGHT	MODEL NO	DEMARKS
	SERVED		CFM	IN. W.G.		BHP/W	HP	RPM	DRIVE	VOLTS	PHASE	HEIGHT (IN)	LBS	MODEL NO.	REMARKS
		DOOF MOUNTED													
EF-117	CLASSROOM 117	ROOF MOUNTED DOWNBLAST	300	0.25	999	0.03	1/12	1300	DIRECT	115	1	(E) CURB	75	G-095-G	SEE NOTES 1, 2, E, 3.9 SONES VERIFY (E) CURB FOR CURB ADAPTER
EF-118	CLASSROOMS 118 & 119	ROOF MOUNTED DOWNBLAST	600	0.25	964	0.05	1/6	1140	DIRECT	115	1	(E) CURB	94	G-100-B	SEE NOTES 1, 3, E, 4.1 SONES VERIFY (E) CURB FOR CURB ADAPTER
EF-122	CLASSROOM 122	ROOF MOUNTED DOWNBLAST	300	0.25	999	0.03	1/12	1300	DIRECT	115	1	(E) CURB	75	G-095-G	SEE NOTES 1, 2, E, 3.9 SONES VERIFY (E) CURB FOR CURB ADAPTER
EF-123	CLACCDOOMC	ROOF MOUNTED DOWNBLAST	600	0.25	964	0.05	1/6	1140	DIRECT	115	1	(E) CURB	94	G-100-B	SEE NOTES 1, 3, E, 4.1 SONES VERIFY (E) CURB FOR CURB ADAPTER
EF-WR	WEST RESTROOMS	ROOF MOUNTED DOWNBLAST	1,400	0.375	982	0.19	1/4	1140	DIRECT	115	1	(E) CURB	108	G-140-B	SEE NOTES 1, 4, E, 7.6 ZONES VERIFY (E) CURB FOR CURB ADAPTER
EF-161	TOILETS 162 & 164	ROOF MOUNTED DOWNBLAST	150	0.25	1093	0.02	1/20	1550	DIRECT	115	1	(E) CURB	70	G-080-D	SEE NOTES 1, 5, E, 4.4 SONES VERIFY (E) CURB FOR CURB ADAPTER
EF-156	PLANNING 156	ROOF MOUNTED DOWNBLAST	150	0.25	1093	0.02	1/20	1550	DIRECT	115	1	(E) CURB	70	G-080-D	SEE NOTES 1, 6, E, 4.4 SONES VERIFY (E) CURB FOR CURB ADAPTER
EF-ER	EAST RESTROOMS	ROOF MOUNTED DOWNBLAST	870	0.625	1025	0.18	1/4	1140	DIRECT	115	1	(E) CURB	110	G-140-B	SEE NOTES 1, 7, E, 6.8 SONES VERIFY (E) CURB FOR CURB ADAPTER
EF-140	1 4 4 1 4 6 1 4 9	ROOF MOUNTED DOWNBLAST	375	0.375	1229	0.05	1/8	1550	DIRECT	115	1	(E) CURB	75	G-095-D	SEE NOTES 1, 8, E, 5.9 SONES VERIFY (E) CURB FOR CURB ADAPTER

1. MODEL NUMBERS ARE GREENHECK UNLESS OTHERWISE NOTED. COOK, AND S&P MAY BE BID AS EQUAL.

BIRDSCREEN - GALV.; DAMPER, SHIPPED LOOSE, BD-100-PB-10X10, GRAVITY OPERATED.

2. PROVIDE THE FOLLOWING OPTIONS/ACCESSORIES: MOTOR WITH THERMAL OVERLOADS (T.O.); STANDARD CURB CAP SIZE - 17" SQUARE; UL 705 LISTED; SWITCH, NEMA 1, TOGGLE, J-BOX MOUNTED & WIRED; CURB EXTENSION-GALV, GPE-17-12, WITH DAMPER TRAY; FOAM CURB SEAL (FIELD APPLIED, SHIPPED WITH UNIT); CURB ADAPTER/REDUCER - GALV., CURB CAP ADAPTED TO 19"? X 19"? (SEE NOTE E); WIRING PIGTAIL, INTERNAL, GENERAL, 9 FT FROM UNIT OF FLEX METAL CONDUIT; SOLID STATE SPEED CONTROL, 6 AMP, SHIPPED WITH UNIT; BIRDSCREEN -GALV.; DAMPER, SHIPPED LOOSE, BD-100-PB-10X10, GRAVITY OPERATED.

TOGGLE, J-BOX MOUNTED & WIRED; CURB EXTENSION-GALV, GPE-19-12, WITH DAMPER TRAY; FOAM CURB SEAL (FIELD APPLIED, SHIPPED WITH UNIT); CURB ADAPTER/REDUCER - GALV., CURB CAP ADAPTED TO 21"? X 21"? (SEE NOTE E); WIRING PIGTAIL, INTERNAL, GENERAL, 9 FT FROM UNIT OF FLEX METAL CONDUIT; SOLID STATE SPEED CONTROL, 6 AMP, SHIPPED WITH UNIT; BIRDSCREEN - GALV.; DAMPER, SHIPPED LOOSE, BD-100-PB-12X12, GRAVITY OPERATED. 4. PROVIDE THE FOLLOWING OPTIONS/ACCESSORIES: MOTOR WITH THERMAL OVERLOADS (T.O.); PSC MOTOR; STANDARD CURB CAP SIZE - 22" SQUARE; UL 705 LISTED; SWITCH, NEMA 1,

3. PROVIDE THE FOLLOWING OPTIONS/ACCESSORIES: MOTOR WITH THERMAL OVERLOADS (T.O.); PSC MOTOR; STANDARD CURB CAP SIZE - 19" SQUARE; UL 705 LISTED; SWITCH, NEMA 1,

TOGGLE, J-BOX MOUNTED & WIRED; CURB EXTENSION-GALV, GPE-22-12, WITH DAMPER TRAY; FOAM CURB SEAL (FIELD APPLIED, SHIPPED WITH UNIT); CURB ADAPTER/REDUCER - GALV., CURB CAP ADAPTED TO 24"? X 24"? (SEE NOTE E); WIRING PIGTAIL, INTERNAL, GENERAL, 9 FT FROM UNIT; SOLID STATE SPEED CONTROL, 6 AMP, SHIPPED WITH UNIT; BIRDSCREEN - GALV.; DAMPER, SHIPPED LOOSE, BD-100-PB-16X16, GRAVITY OPERATED. 5. PROVIDE THE FOLLOWING OPTIONS/ACCESSORIES: MOTOR WITH THERMAL OVERLOADS (T.O.); STANDARD CURB CAP SIZE - 17" SQUARE; UL 705 LISTED; SWITCH, NEMA 1, TOGGLE, J-BOX

MOUNTED & WIRED; CURB EXTENSION-GALV, GPE-17-12, WITH DAMPER TRAY; FOAM CURB SEAL (FIELD APPLIED, SHIPPED WITH UNIT); CURB ADAPTER/REDUCER - GALV., CURB CAP ADAPTED TO 19"? X 19"? (SEE NOTE E); WIRING PIGTAIL, INTERNAL, GENERAL, 9 FT FROM UNIT OF FLEX METAL CONDUIT; SOLID STATE SPEED CONTROL, 6 AMP, SHIPPED WITH UNIT; BIRDSCREEN -GALV.; DAMPER, SHIPPED LOOSE, BD-100-PB-10X10, GRAVITY OPERATED. 6. PROVIDE THE FOLLOWING OPTIONS/ACCESSORIES: MOTOR WITH THERMAL OVERLOADS (T.O.); STANDARD CURB CAP SIZE - 17" SQUARE; UL 705 LISTED; SWITCH, NEMA 1, TOGGLE, J-BOX

TO 20"? X 20"? (SEE NOTE E); WIRING PIGTAIL, INTERNAL, GENERAL, 9 FT FROM UNIT OF FLEX METAL CONDUIT; SOLID STATE SPEED CONTROL, 6 AMP, SHIPPED WITH UNIT; BIRDSCREEN -GALV.; DAMPER, SHIPPED LOOSE, BD-100-PB-10X10, GRAVITY OPERATED. 7. PROVIDE THE FOLLOWING OPTIONS/ACCESSORIES: PSC MOTOR WITH THERMAL OVERLOADS (T.O.); PSC MOTOR; STANDARD CURB CAP SIZE - 22" SQUARE; UL 705 LISTED; SWITCH, NEMA 1, TOGGLE, J-BOX MOUNTED & WIRED; CURB EXTENSION-GALV, GPE-22-12, WITH DAMPER TRAY; FOAM CURB SEAL (FIELD APPLIED, SHIPPED WITH UNIT); CURB ADAPTER/REDUCER - GALV., CURB

CAP ADAPTED TO 24"? X 24"? (SEE NOTE E); WIRING PIGTAIL, INTERNAL, GENERAL, 9 FT FROM UNIT OF FLEX METAL CONDUIT; SOLID STATE SPEED CONTROL, 6 AMP, SHIPPED WITH UNIT;

MOUNTED & WIRED; CURB EXTENSION-GALV, GPE-17-12, WITH DAMPER TRAY; FOAM CURB SEAL (FIELD APPLIED, SHIPPED WITH UNIT); CURB ADAPTER/REDUCER - GALV., CURB CAP ADAPTED

BIRDSCREEN - GALV.; DAMPER, SHIPPED LOOSE, BD-100-PB-16X16, GRAVITY OPERATED. 8. PROVIDE THE FOLLOWING OPTIONS/ACCESSORIES: PSC MOTOR WITH THERMAL OVERLOADS (T.O.); STANDARD CURB CAP SIZE - 17" SQUARE; UL 705 LISTED; SWITCH, NEMA 1, TOGGLE, J-BOX MOUNTED & WIRED; CURB EXTENSION-GALV, GPE-17-12, WITH DAMPER TRAY; FOAM CURB SEAL (FIELD APPLIED, SHIPPED WITH UNIT); CURB ADAPTER/REDUCER - GALV., CURB CAP ADAPTED TO 19"? X 19"? (SEE NOTE E); WIRING PIGTAIL, INTERNAL, GENERAL, 9 FT FROM UNIT OF FLEX METAL CONDUIT; SOLID STATE SPEED CONTROL, 6 AMP, SHIPPED WITH UNIT;

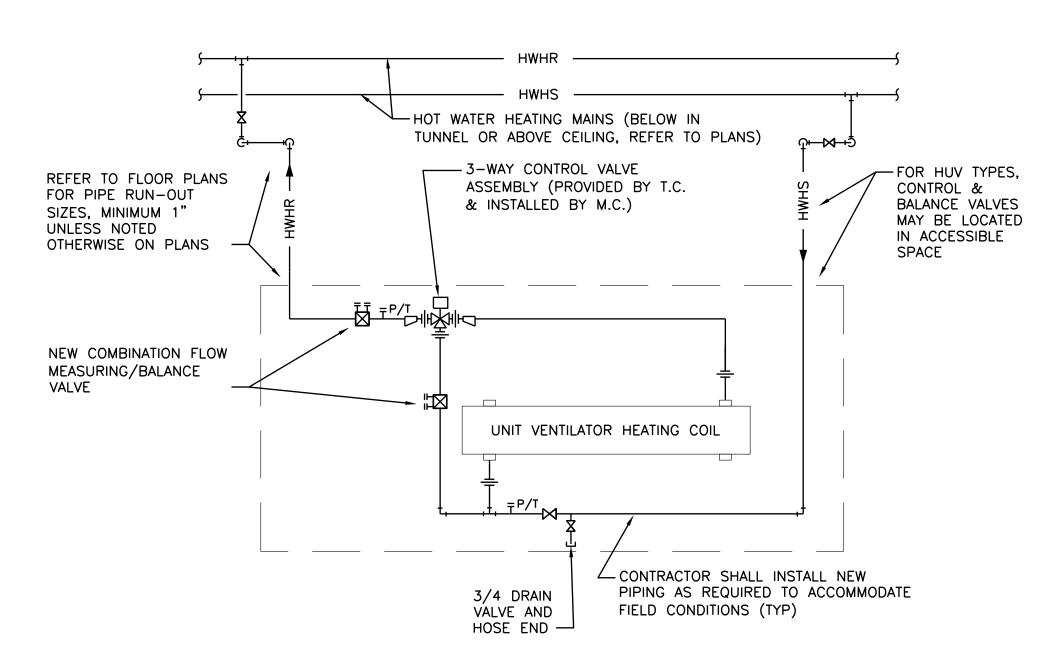
E. NOTE REGARDING EXISTING (E) ROOF CURBS AND NEW CURB ADAPTERS - (E) CURB SIZES ARE ASSUMED & CONTRACTOR SHALL FIELD VERIFY & CONFIRM EXACT SIZE OF EXISTING ROOF CURB PRIOR TO ORDER AS REQUIRED FOR PROPERLY SIZED ADAPTER TO (E) CURB SIZE TO FIT NEW FAN ON TOP OF (E) CURB.

VENTILATION LOAD CALCULATIONS

2015 Michigan Mechanical Code Justin Kowatch, PE - JLK Engineering PRAS 2022 HVAC Improvements Project #: AEA2103 3/12/2022

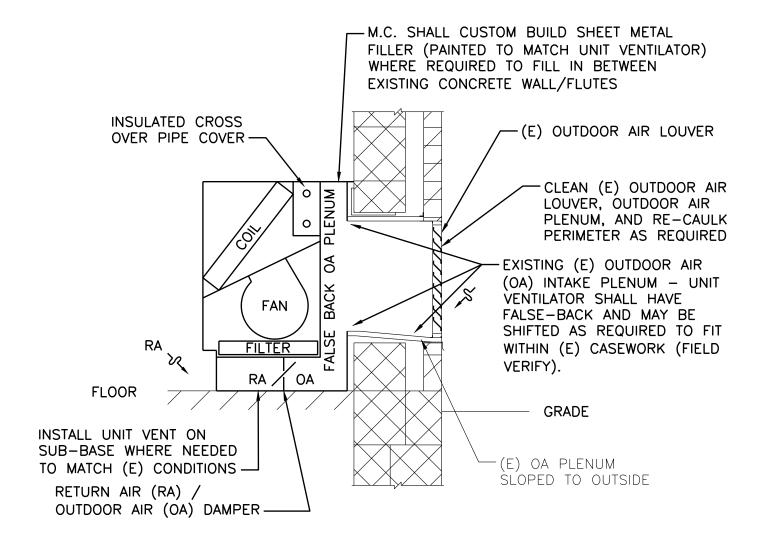
	Room / Zone		Natural \	/entilation		Occupants	ı	Decrete OA	A			al Ventilation			
		Az Size	Area	Provided	Default # Per 403.3	Pz	Pz Actual	People OA Rp CFM/Person	Area OA Ra CFM/SqFt	Exhaust Airflow CFM/SqFt	Exhaust Airflow	Ez - Zone Effectiveness	Zone Vbz Vbz = RpPz+RaAz	Zone OA Voz = Vzb/Ez	
Room ID	Room Name	(SqFt)	@4% (SqFt)	(SqFt)	(/1000 SqFt)	Estimated OR Actual	Seating #	Per 403.3	Per 403.3	Per 403.3	Required CFM	per 403.3.1.2	CFM	CFM	Notes:
	LEBOY ELEMENTARY														
404	LEROY ELEMENTARY	'	0.0	10.0		0.0			,		0.0	0.8	0.0	0.0	
101	VESTIBULE	125	5.0	42.0		0.0	,				0.0	0.8	0.0	0.0	
102	WAITING	194	7.8	21.0	30.0	5.8		5.0	0.06		0.0	0.8	40.7 0.0	50.9	VENTILATED BY (E) RTU-L3
103	RECEPT.	194	7.8		5.0	1.0 0.0		5.0	0.06		0.0	0.8	16.5 0.0	20.6	VENTILATED BY (E) RTU-L3
104	LOBBY	541	21.6 0.0	42.0	10.0	5.4 0.0		5.0	0.06		0.0	0.8	59.5 0.0	74.4	
105, 115, 121	CORRIDORS, LIFT, EQUIP	1250	50.0			0.0			0.06	,	0.0	0.8	75.0	93.8	
106	WORK	211	0.0 8.4		5.0	0.0 1.1		5.0	0.06		0.0	0.8	0.0 17.9	0.0 22.4	VENTILATED VIA (E) RTU-L3
107	SICK	68	0.0 2.7		5.0	0.0		5.0	0.06		0.0	0.8	0.0 5.8	7.2	VENTILATED VIA (E) RTU-L3
108	OFFICE	169	0.0 6.8		5.0	0.0		5.0	0.06		0.0	0.8	0.0 14.4	0.0	VENTILATED VIA (E) RTU-L3
109	OFFICE	248	0.0 9.9		5.0	0.0		5.0	0.06		0.0	0.8	0.0 21.1	0.0 26.4	VENTILATED VIA (E) RTU-L3
110	TITLE ONE	182	0.0 7.3		5.0	0.0		5.0	0.06	,	0.0	0.8 0.8	0.0 15.5	0.0 19.3	VENTILATED VIA (E) RTU-L3
111	MECH.	449	0.0			0.0					0.0	0.8	0.0	0.0	
112	JAN.	64	0.0			0.0				1.3	0.0	0.8	0.0	0.0	EXHAUSTED VIA EF-112
113	STF TLT	37	0.0			0.0				3.2	0.0	0.8	0.0	0.0	EXHAUSTED VIA EF-WR
113	SIF ILI	31	0.0			0.0			,	3.2	0.0	0.8	0.0	0.0	
117	CLASSROOM	756	30.2		25.0	18.9		10.0	0.12		0.0	1.0	279.7	279.7	VENTILATE VIA VUV-117 & NEW EF-117 (300 CFM)
			0.0			0.0					0.0	0.8	0.0	0.0	VENTILATE VIA VUV-118 AND NEW
118	CLASSROOM	754	30.2		25.0	18.9 0.0		10.0	0.12		0.0	1.0 0.8	279.0 0.0	279.0 0.0	EF-118 (600 CFM)
119	CLASSROOM	754	30.2		25.0	18.9		10.0	0,12		0.0	1.0	279.0	279.0	VENTILATE VIA VUV-119 AND NEW EF-118 (600 CFM)
		,	0.0			0.0	,		,	,	0.0	8.0	0.0	0.0	VENTILATE VIA VUV-122 AND NEW
122	CLASSROOM	761	30.4		25.0	19.0 0.0		10.0	0.12		0.0	1.0 0.8	281.6 0.0	281.6 0.0	EF-122 (300 CFM)
123	CLASSROOM	756	30.2	'	25.0	18.9		10.0	0.12	,	0.0	1.0	279.7	279.7	VENTILATE VIA VUV-123 AND NEW EF-123 (600 CFM)
			0.0			0.0					0.0	0.8	0.0	0.0	VENTILATE VIA VUV-124 AND NEW
124	CLASSROOM	753	30.1		25.0	18.8 0.0		10.0	0.12		0.0	1.0 0.8	278.6 0.0	278.6 0.0	EF-123 (600 CFM)
125, 129, 132	CORRIDORS	316	12.6 0.0	21.0		0.0			0.06	,	0.0	0.8	19.0 0.0	23.7	
126	B. TLT.	223	8.9 0.0			0.0				2.6	579.8 0.0	0.8	0.0	0.0	EXHAUSTED VIA EF-WR (1,400)
127, 128, 130	EQPM, LIFT,ST	117	4.7			0.0	,	,	,		0.0	0.8	0.0	0.0	
131	G. TLT.	237	9.5			0.0		,		2.5	0.0 580.7	0.8	0.0	0.0	EXHAUSTED VIA EF-WR (1,400)
133	CORR.	297	0.0	21.0		0.0			0.06		0.0	0.8	0.0 17.8	0.0 22.3	
		,	0.0		-	0.0					0.0	0.8	0.0	0.0	VENTILATE 475 CFM VIA VUV-134
134	CAFETERIA	1269	50.8		70.0	88.8		7.5	0.18		0.0	1.0 0.8	894.6 0.0	894.6 0.0	& OTHER 420 CFM VIA ERV-134
135	KITCHEN	245	9.8	,		0.0				0.7	171.5	0.8	0.0	0.0	VENTILATED VIA (E) RANGE HOOD EXHAUST
135A	STOR.	86	0.0 3.4			0.0					0.0	0.8	0.0	0.0	
136, 140, 153, 160	CORR & PASS	1823	0.0 72.9	88.0		0.0			0.06		0.0	0.8	0.0 109.4	0.0 136.7	
137	MEDIA CENTER	996	0.0 39.8		25.0	0.0 24.9		10.0	0.12		0.0	0.8	0.0 368.5	0.0 460.7	VIA HUV-137 & (E) RELIEF AIR
138	STOR.	123	0.0 4.9			0.0			0.06		0.0	0.8	0.0 7.4	9.2	VIA HUV-137 & (E) RELIEF AIR
139	OFFICE	127	0.0 5.1		5.0	0.0		5.0	0.06		0.0	0.8	0.0 10.8	0.0 13.5	VIA HUV-137 & (E) RELIEF AIR
141, 142	SP. ED.	520	0.0		25.0	0.0 13.0		10.0	0.12		0.0	0.8	0.0 192.4	0.0 240.5	VIA HUV-141 & (E) RELIEF AIR
143	CLASSROOM	717	0.0		35.0	0.0 25.1		10.0	0.12		0.0	0.8	0.0	0.0	VIA VUV-143 & (E) RELIEF AIR
144	TLT.	42	0.0			0.0	,	1010	0.12	1.8	0.0 75.6	0.8	0.0	0.0	EXHAUSTED VIA EF-140
145	CLASSROOM	717	0.0		35.0	0.0 25.1		10.0	0.12	1.0	0.0	0.8 1.0	0.0	0.0 337.0	VIA VUV-145 & (E) RELIEF AIR
			0.0		35.0	0.0		10.0	0.12	4.0	0.0	0.8	0.0	0.0	
146	TLT.	716	1.7 0.0 28.6		35.0	0.0 0.0 25.1		10.0	0.12	1.8	75.6 0.0 0.0	0.8 0.8	0.0 0.0 336.5	0.0	VIA VUV-147 & (E) RELIEF AIR
		716	0.0		35.0	0.0		10.0	U. 12	4.0	0.0	1.0 0.8	0.0	336.5	
148	TLT.	42	0.0			0.0		15.5	0.15	1.8	75.6 0.0	0.8	0.0	0.0	EXHAUSTED VIA EF-140
149	CLASSROOM	717	28.7		35.0	25.1 0.0		10.0	0.12		0.0	1.0	337.0 0.0	337.0	VIA VUV-149 & (E) RELIEF AIR
150	TLT.	42	0.0			0.0				1.8	75.6 0.0	0.8	0.0	0.0	EXHAUSTED VIA EF-10
151	CLASSROOM	716	28.6		35.0	25.1 0.0		10.0	0.12		0.0	1.0 0.8	336.5 0.0	336.5 0.0	VIA VUV-151 & (E) RELIEF AIR
152	TLT.	42	1.7			0.0				1.8	75.6 0.0	0.8	0.0	0.0	EXHAUSTED VIA EF-140
154	JAN.	42	1.7			0.0				1.8	75.6 0.0	0.8	0.0	0.0	EXHAUSTED VIA EF-ER
155	TLT.	63	2.5			0.0				1.2	75.6 0.0	0.8	0.0	0.0	EXHAUSTED VIA EF-ER
156	PLANNING	377	15.1 0.0		50.0	18.9		5.0	0.06		0.0	0.8	116.9 0.0	146.1	VIA VUV-158 & EF-158 (150 CFM)
157	STOR.	117	4.7			0.0				1.0	120.5 0.0	0.8	0.0	0.0	EXHAUSTED VIA EF-ER
158	B. TLT.	140	5.6 0.0			0.0				2.2	301.0 0.0	0.8	0.0	0.0	EXHAUSTED VIA EF-ER
159	G. TLT.	140	5.6 0.0			0.0				2.2	301.0	0.8 0.8	0.0	0.0	EXHAUSTED VIA EF-ER
161	CLASSROOM	900	36.0		35.0	31.5		10.0	0.12		0.0	1.0	423.0	423.0	VIA VUV-161 & (E) RELIEF AIR
162	TLT.	54	0.0 2.2			0.0			,	1.4	75.6	0.8	0.0	0.0	EXHAUSTED VIA EF-161
163	CLASSROOM	884	0.0 35.4		35.0	30.9		10.0	0.12		0.0	0.8	0.0 415.5	0.0 415.5	VIA VUV-163 & (E) RELIEF AIR
164	TLT	54	0.0		,	0.0				1.4	0.0 75.6	0.8	0.0	0.0	EXHAUSTED VIA EF-161
			0.0			0.0					0.0	0.8	0.0	0.0	VENTILATED VIA AHU-G & NEW EF
165, 166, 167, 168, 169	GYM	3312	132.5 0.0	21.0	35.0	115.9 0.0		10.0	0.06		0.0	0.8 0.8	1357.9 0.0	1697.4 0.0	G (1,750 CFM)
			0.0			0.0					0.0	0.8	0.0	0.0	
	-		0.0			0.0					0.0	0.8	0.0	0.0	

UNIT VENTILATOR (UV) WITH 2-WAY VALVE PIPING DIAGRAM NO SCALE - TYPICAL FOR ALL UNIT VENTILATORS WITH 2-WAY VALVES (1-LEROY HUVs)



UNIT VENTILATOR (UV) WITH 3-WAY VALVE PIPING DIAGRAM NO SCALE - TYPICAL FOR ALL UNIT VENTILATORS WITH 3-WAY VALVES

(15-LEROY VUVs & 1-LEROY HUVs)



UNIT VENTILATOR DETAIL WITH FALSE-BACK

LEROY ELEMENTARY HORIZONTAL UNIT VENTILATOR (HUV) WITH HYDRONIC HOT WATER HEATING COIL & DX COOLING COIL SCHEDULE

				FAI	١					HYDRONI	C HEATI	NG COIL			UNIT EL	ECTRICAL	UNIT CABINET DIMENSIONS	WEIGHT			
LOCATION	UNIT	AIRFLOW (CFM)	EXTERNAL	MIN.	MOTOR	MOTOR	MOTOR	TOTAL		NR		WATER (3	0% GLYCOL)	UNIT	UNIT	LENGTHXWIDTHXHEIGHT	LBS	KEYED NOTES	MODEL NO.	REMARKS
	NO.	(CFM) N/R	EXTERNAL STATIC IN WG	O.A. CFM	MOTOR HP/W	MOTOR RPM	MOTOR VOLTS/ PHASE	CAPACITY MBH	EDB DEG. F.	LDB DEG. F.	FLOW GPM	EWT DEG. F.	LWT DEG. F.	MAX WPD FT. HEAD	VOLTAGE/ PHASE	FLA/ MFS	INCHES	(SHIPPED)			
MEDIA 137	HUV-13	1.000	0.25/0.0	480	1/357	1,330	115/1	125	43	115	5.0	180	127	2.6	115/1	5.3/15	106"Lx35.6"Wx17"H	500	KEYNOTES 1, R, 2.5	HUV-C-150-1-H	SEE NOTES BELOW.
SPECIAL ED 14	11 HUV-14	1 1,000/ 1 1,224	0.25/0.0	240	1/287	1,330	115/1	78	48	109	3.0	180	125	0.8	115/1	5.3/15	82"L×35.6"W×17"H	375	KEYNOTES 1, R, 1.5	HUV-C-100-1-H	SEE NOTES BELOW.

A. ALL MODEL NUMBERS ARE TRANE. BASE BID TRANE, OTHER MANUFACTURER'S MAY ONLY BE BID AS ALTERNATES AND MUST BE CLARIFIED IN THE BID AS SUCH.

B. PROVIDE 1" MERV-13 FILTERS. PROVIDE 2 EXTRA SETS OF FILTERS FOR EACH UNIT VENTILATOR.

C. PROVIDE OUTDOOR AIR (OA) / RETURN AIR (RA) DAMPER W/ SPRING FAILED CLOSED OA / OPEN RA. . PROVIDE HIGH STATIC ECM MOTOR (WITH LOW FLA), UNIT MOUNTED VARIABLE SPEED CONTROL, & NON-FUSED DISCONNECT.

PROVIDE STANDARD CABINET WITH 14 GAUGE FRONT PANEL "SOFT DOVE"? (COORDINATE COLOR WITH ARCHITECT/OWNER PRIOR TO ORDERING). G. T.C. SHALL RELOCATE ENTIRE FREEZE STAT SENSOR FROM END POCKET TO COIL SPACE. H. M.C. SHALL VERIFY/CONFIRM FIELD CONDITIONS FOR RIGHT/LEFT COIL HOOK-UP LOCATION PRIOR TO ORDER: IF EXISTING HEAT ON RIGHT, THEN LEFT HAND COOLING...OR IF EXISTING HEAT ON LEFT, THEN RIGHT HAND COOLING.

PROVIDE STANDARD RECESSING FLANGE (SHIPPED SEPARATELY), DIGIT 23 = "1".

J. PROVIDE STANDARD OPERABLE ACCESS PANEL, REMOVABLE WITH SAFETY CHAIN. K. PROVIDE UNIT MOUNTED NEEDLE POINT BI-POLAR IONIZER (BPI): PLASMA AIR #PLASMAPURE AUTOCLEAN 1500-BMS? (UP TO 6,000 CFM, 12V DC/24V AC, BMS CONTACT) OR EQUAL BY GPS; M.C. SHALL MOUNT IN AHU/UV PER MFR REQUIREMENTS, DOWNSTREAM OF FILTER & IN ACCESSIBLE LOCATION FOR MAINT.; M.C./T.C. SHALL VERIFY/CONFIRM SUPPLY FAN CONTROL VOLTAGE AND PROVIDE NEW BPI TO MATCH THAT VOLTAGE, & INTERLOCK/WIRE BPI TO OPERATE WITH SUPPLY FAN OPERATION;

PROVIDE BPI WITH BMS DRY CONTACT, T.C. SHALL WIRE/INTERCONNECT THE BPI TO THE BMS FOR MONITORING OPERATION OF BPI. L. NO FACTORY INSTALLED DELUXE PIPING PACKAGE. M.C. SHALL SUPPLY & FIELD INSTALL STRAINER/PT PORT/SHUT-OFF BALL VALVE ON SUPPLY; CIRCUIT SETTING BALANCE VALVE & CONTROL VALVE ON RETURN - HEATING CONTROL VALVE (SPRING FAILED

OPEN, SEE PLANS FOR 2-WAY VRS 3-WAY) SHALL BE PROVIDED BY T.C. AND FIELD INSTALLED BY M.C.. M. PROVIDE CUSTOMER SUPPLIED TERMINAL INTERFACE (CSTI) WITH LOW TEMP (CONTROL TYPE #9) FOR CONTROL BY OWNER'S KMC BMS (COORD./CONFIRM WITH T.C.) THAT INCLUDES A RELAY BOARD WITH 24V XFMR AND DISCONNECT SWITCH FOR BMS INTERFACE TO CONTROL FAN SPEED, HEAT VALVE CONTROL, OA/RA DAMPER CONTROL (DAMPER ACTUATOR TO BE PROVIDED & FIELD INSTALLED BY T.C.), FUTURE A/C COIL-CONDENSER, CONDENSATE OVERFLOW.

N. PROVIDE AIR-TIGHT RA/OA DAMPER, BUT NO RA/OA DAMPER ACTUATOR. T.C. WILL BE PROVIDING THE RA/OA DAMPER ACTUATOR (SPRING FAILED OA CLOSED / RA OPEN) FOR FIELD INSTALL. O. AUXILIARY DRAIN PAN.

KEYED NOTES:

1 = UNIT SHALL BE PARTIALLY EXPOSED (UNIT IS RECESSED IN EXISTING CEILING WITH BOTTOM OF UNIT EXPOSED TO ROOM) WITH SUPPLY AIR (SA) DUCT CONNECTION (??"Wx5"H) AT FRONT/TOP OF UNIT WITH DUCT COLLAR DISCHARGE @ 3/4" FROM TOP (DIGIT 21 = "3"); FRESH AIR (FA) INLET DUCT CONNECTION (??"Wx5"H) ON TOP OR BACK OF UNIT (CONFIRM: LEROY ELEMENTARY HUVs ARE TYPE "A" INLET ARRANGEMENT (DIGIT 20 = A) WITH FA DUCT ON TOP & RA DUCT LOWER BACK. MIDDLE SCHOOL/HIGH SCHOOL HUVS ARE TYPE "F" INLET ARRANGEMENT (DIGIT 20 = F) WITH FA DUCT ON UPPER BACK & RA DUCT LOWER BACK.), & RETURN AIR (RA) DUCT CONNECTION (??"Wx5"H) AT LOWER/BACK OF UNIT (OPEN TO RA PLENUM); CONTRACTOR SHALL FIELD VERIFY/CONFIRM EXISTING DUCTWORK AND DETERMINE IF FRONT TOP OR FRONT LOW IS BEST FIT PRIOR TO ORDER. PROVIDE HI-STATIC ECM MOTOR WITH NON-FUSED TOGGLE DISCONNECT.

R = M.C./TAB SUB SHALL RE-BALANCE EXISTING OUTDOOR AIR (OA) MINIMUM DAMPER POSITION TO MATCH NEW OA AIRFLOW RATE TO UNIT VENTILATOR. 1.0 - PROVIDE UNIT WITH A 1.0-TON DX COOLING COIL (R-410A) FOR FUTURE (F) USE WITH A FUTURE (F) 1.0-TON OUTDOOR AIR COOLED CONDENSING UNIT (208V-3Ø) TO BE MOUNTED ON GRADE/ROOF. BID AS ALTERNATE ADD #L5. 1.5 - PROVIDE UNIT WITH A 1.5-TON DX COOLING COIL (R-410A) FOR FUTURE (F) USE WITH A FUTURE (F) 1.5-TON OUTDOOR AIR COOLED CONDENSING UNIT (208V-3Ø) TO BE MOUNTED ON GRADE/ROOF. BID AS ALTERNATE ADD #L5.

2.0 - PROVIDE UNIT WITH A 2.0-TON DX COOLING COIL (R-410A) FOR FUTURE (F) USE WITH A FUTURE (F) 2.0-TON OUTDOOR AIR COOLED CONDENSING UNIT (208V-3Ø) TO BE MOUNTED ON GRADE/ROOF. BID AS ALTERNATE ADD #L5. 2.5 - PROVIDE UNIT WITH A 2.5-TON DX COOLING COIL (R-410A) FOR FUTURE (F) USE WITH A FUTURE (F) 2.5-TON OUTDOOR AIR COOLED CONDENSING UNIT (208V-3Ø) TO BE MOUNTED ON GRADE/ROOF. BID AS ALTERNATE ADD #L5. 3.0 - PROVIDE UNIT WITH A 3.0-TON DX COOLING COIL (R-410A) FOR FUTURE (F) USE WITH A FUTURE (F) 3.0-TON OUTDOOR AIR COOLED CONDENSING UNIT (208V-3Ø) TO BE MOUNTED ON GRADE/ROOF. BID AS ALTERNATE ADD #L5.

LEROY ELEMENTARY VERTICAL UNIT VENTILATOR (VUV) WITH HYDRONIC HOT WATER HEATING COIL & DX COOLING COIL SCHEDUL	-E
--	----

			FAN	٧					HYDRON	IC HEATI	NG COIL			UNIT EL	LECTRICAL	UNIT CABINET DIMENSIONS	WEIGHT			
LOCATION	UNIT NO.	AIRFLOW CFM N/R	MIN. O.A. CFM	MOTOR HP/W	MOTOR RPM	MOTOR VOLTS/ PHASE	TOTAL CAPACITY MBH	EDB	AIR LDB DEG. F.	FLOW	ATER (30 EWT DEG. F.	O% GLYC LWT DEG. F.	MAX WP[UNIT VOLTAGE/ PHASE	UNIT ' MCA/ MFS	LENGTHXWIDTHXHEIGHT INCHES	LBS (SHIPPED)	ARRANGEMENT	MODEL NO.	REMARKS
CLASSROOM 1	17 VUV-11	7 1,000/ 765	300	.25/235	1,105	115/1	75	45	135	3.75	180	138	2.2	115/1	3.5/15	81"x21.25"x30"	405	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-100	SEE NOTES BELOW. KEYED NOTES R, 2.0 (2-TON C/C)
CLASSROOM 1	18 VUV-11	1,000/ 765	300	.25/235	1,105	115/1	75	45	135	3.75	180	138	2.2	115/1	3.5/15	81"x21.25"x30"	405	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-100	SEE NOTES BELOW. KEYED NOTES R, 2.0 (2-TON C/C)
CLASSROOM 1	19 VUV-11	/65	300	.25/235	1,105	115/1	75	45	135	3.75	180	138	2.2	115/1	3.5/15	81"x21.25"x30"	405	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-100	SEE NOTES BELOW. KEYED NOTES R, 2.0 (2-TON C/C)
CLASSROOM 1	22 VUV-12	/65	300	.25/235	1,105	115/1	75	45	135	3.75	180	138	2.2	115/1	3.5/15	81"x21.25"x30"	405	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-100	SEE NOTES BELOW. KEYED NOTES R, 2.0 (2-TON C/C)
CLASSROOM 1	23 VUV-12	/65	300	.25/235	1,105	115/1	75	45	135	3.75	180	138	2.2	115/1	3.5/15	81"x21.25"x30"	405	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-100	SEE NOTES BELOW. KEYED NOTES R, 2.0 (2-TON C/C)
CLASSROOM 1	24 VUV-12	1,000/ 765	300	.25/235	1,105	115/1	75	45	135	3.75	180	138	2.2	115/1	3.5/15	81"x21.25"x30"	405	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-100	SEE NOTES BELOW. KEYED NOTES R, 2.0 (2-TON C/C)
CAFETERIA 13	34 VUV-13	1,500/ 1,176	475	.25/327	1,116	115/1	79	45	107	5.0	180	147	15	115/1	4.4/15	105"x21.25"x30"	470	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-150	SEE NOTES BELOW. KEYED NOTES R, 3.5(3.5-TON C/C)
CLASSROOM 1	43 VUV-14	950	340	.25/276	1,116	115/1	80	45	123	4.0	180	138	2.9	115/1	4.4/15	93"x21.25"x30"	450	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-125	SEE NOTES BELOW. KEYED NOTES R, 2.0 (2-TON C/C)
CLASSROOM 1	45 VUV-14	950	340	.25/276	1,116	115/1	80	45	123	4.0	180	138	2.9	115/1	4.4/15	93"x21.25"x30"	450	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-125	SEE NOTES BELOW. KEYED NOTES R, 2.0 (2-TON C/C)
CLASSROOM 1	47 VUV-14	950	340	.25/276	1,116	115/1	80	45	123	4.0	180	138	2.9	115/1	4.4/15	93"x21.25"x30"	450	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-125	SEE NOTES BELOW. KEYED NOTES R, 2.0 (2-TON C/C)
CLASSROOM 1	49 VUV-14	950	340	.25/276	1,116	115/1	80	45	123	4.0	180	138	2.9	115/1	4.4/15	93"x21.25"x30"	450	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-125	SEE NOTES BELOW. KEYED NOTES R, 2.0 (2-TON C/C)
CLASSROOM 1	151 VUV-15	1 1,250/ 950	340	.25/276	1,116	115/1	80	45	123	4.0	180	138	2.9	115/1	4.4/15	93"x21.25"x30"	450	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-125	SEE NOTES BELOW. KEYED NOTES R, 2.0 (2-TON C/C)
PLANNING 15	56 VUV-15	1,000/ 765	150	.25/235	1,105	115/1	54	52	118	2.0	180	123	0.7	115/1	3.5/15	81"x21.25"x30"	405	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-100	SEE NOTES BELOW. KEYED NOTES R, 1.5(1.5-TON C/C)
CLASSROOM 1	161 VUV-16	950	420	.25/276	1,116	115/1	83	40	121	4.0	180	136	2.9	115/1	4.4/15	93"x21.25"x30"	450	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-125	SEE NOTES BELOW. KEYED NOTE R, 2.5 (2.5-TON C/C)
CLASSROOM 1	63 VUV-16	3 1,250/ 950	420	.25/276	1,116	115/1	83	40	121	4.0	180	136	2.9	115/1	4.4/15	93"x21.25"x30"	450	VERTICAL: RETURN AIR FRONT – FRESH AIR BACK	VUV-E-125	SEE NOTES BELOW. KEYED NOTE R, 2.5 (2.5-TON C/C)

A. ALL MODEL NUMBERS ARE TRANE. BASE BID TRANE, OTHER MANUFACTURER'S MAY ONLY BE BID AS ALTERNATES AND MUST BE CLARIFIED IN THE BID AS SUCH.

B. PROVIDE 1" MERV-13 FILTERS. PROVIDE 2 EXTRA SETS OF FILTERS FOR EACH UNIT VENTILATOR. VERTICAL UNITS SHALL HAVE 4.5" INSULATED FALSE BACK (21.25 DEEP WITHOUT BAFFLE) WITH RAISED OA OPENING TO ALLOW FOR VARIABLE HEIGHT LOCATION OF EXISTING OUTDOOR AIR INTAKE

D. PROVIDE INSULATED OUTDOOR AIR (OA) DAMPER W/ SEALS.

E. PROVIDE ECM MOTOR (WITH LOW FLA) & NON-FUSED TOGGLE DISCONNECT. F. PROVIDE 2-1/8 INCH INSULATED CROSSOVER PIPING CHASE.

G. PROVIDE STANDARD CABINET WITH 14 GAUGE FRONT PANEL (INSULATED FOR UVs WITH COOLING) "SOFT DOVE"? (COORDINATE COLOR WITH ARCHITECT/OWNER PRIOR TO ORDERING) AND BAR GRILLE DISCHARGE WITH MULTIPLE DIRECTION DISCHARGE. H. PROVIDE END COVERS, AND/OR CUT-TO-FIT FILLERS, ETC...FOR NEW UNIT VENTILATORS WHERE REQUIRED TO ACCOMMODATE EXISTING CABINETRY. NOTE: PRIOR TO ORDER, M.C. SHALL FIELD VERIFY & CONFIRM EXISTING CONDITIONS TO DETERMINE IF/WHERE END COVERS, CUT-TO-FIT FILLERS, ETC...ARE REQUIRED TO MEET FIELD CONDITIONS. SUPPLIER SHALL ASSUME NEW END COVERS WILL BE REQUIRED ON ALL VUVS IN ORDER TO BE SAFE ON PRICING.

I. T.C. SHALL RELOCATE ENTIRE FREEZE STAT SENSOR FROM END POCKET TO COIL SPACE. H. M.C. SHALL VERIFY/CONFIRM FIELD CONDITIONS FOR RIGHT/LEFT COIL HOOK-UP LOCATION PRIOR TO ORDER: IF EXISTING HEAT IS ON RIGHT, THEN PROVIDE LEFT HAND COOLING...OR IF EXISTING HEAT ON LEFT, THEN PROVIDE RIGHT HAND COOLING. K. PROVIDE UNIT MOUNTED NEEDLE POINT BI-POLAR IONIZER (BPI): PLASMA AIR #PLASMAPURE AUTOCLEAN 1500-BMS? (UP TO 6,000 CFM, 12V DC/24V AC, BMS CONTACT) OR EQUAL BY GPS; M.C. SHALL MOUNT IN AHU/UV PER MFR REQUIREMENTS, DOWNSTREAM OF FILTER & IN ACCESSIBLE LOCATION FOR MAINT.; M.C./T.C. SHALL VERIFY/CONFIRM SUPPLY FAN CONTROL VOLTAGE AND PROVIDE NEW BPI TO MATCH THAT VOLTAGE, & INTERLOCK/WIRE BPI TO OPERATE WITH SUPPLY FAN OPERATION;

PROVIDE BPI WITH BMS DRY CONTACT, T.C. SHALL WIRE/INTERCONNECT THE BPI TO THE BMS FOR MONITORING OPERATION OF BPI. L. NO FACTORY INSTALLED DELUXE PIPING PACKAGE. M.C. SHALL SUPPLY & FIELD INSTALL STRAINER/PT PORT/SHUT-OFF BALL VALVE ON SUPPLY; CIRCUIT SETTING BALANCE VALVE & CONTROL VALVE ON RETURN - HEATING CONTROL VALVE (SPRING FAILED OPEN, SEE PLANS FOR 2-WAY VRS 3-WAY) SHALL BE PROVIDED BY T.C. AND FIELD INSTALLED BY M.C..

M. PROVIDE CUSTOMER SUPPLIED TERMINAL INTERFACE (CSTI) WITH LOW TEMP (CONTROL TYPE #9) FOR CONTROL BY OWNER'S KMC BMS (COORD./CONFIRM WITH T.C.) THAT INCLUDES A RELAY BOARD WITH 24V XFMR AND DISCONNECT SWITCH FOR BMS INTERFACE TO CONTROL FAN SPEED, HEAT VALVE CONTROL, OA/RA DAMPER CONTROL (MODULATING? OR 2-10 VDC? - FAILED OA CLOSED/RA OPEN), FUTURE A/C COIL-CONDENSER, CONDENSATE OVERFLOW. N. INSULATED FRONT PANEL. O. AUXILIARY DRAIN PAN.

N. PROVIDE AIR-TIGHT RA/OA DAMPER, BUT NO RA/OA DAMPER ACTUATOR. T.C. WILL BE PROVIDING THE RA/OA DAMPER ACTUATOR (SPRING FAILED OA CLOSED / RA OPEN) FOR FIELD INSTALL.

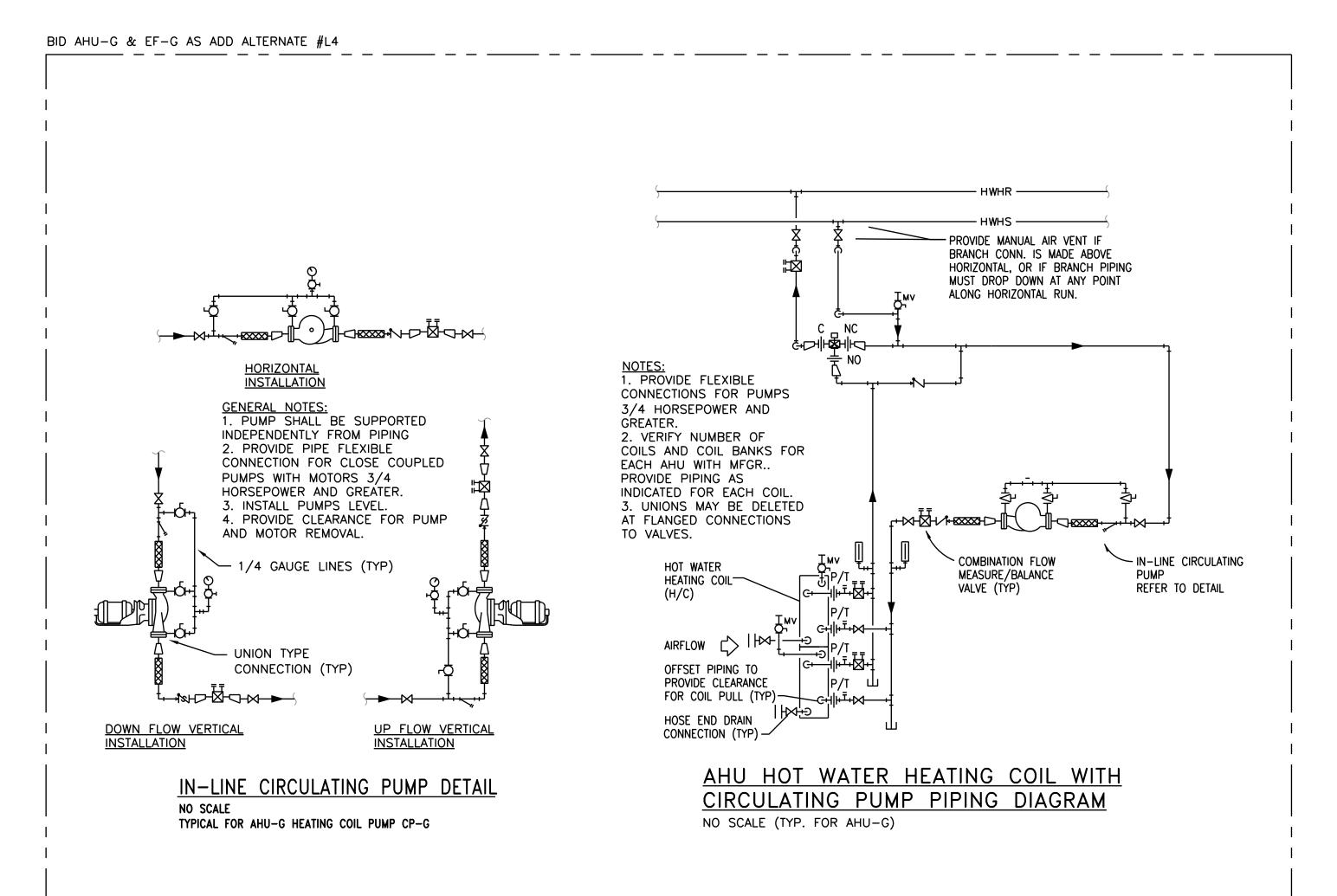
R = M.C./TAB SUB SHALL RE-BALANCE EXISTING OUTDOOR AIR (OA) MINIMUM DAMPER POSITION TO MATCH NEW OA AIRFLOW RATE TO UNIT VENTILATOR.

1.0 - PROVIDE UNIT WITH A 1.0-TON DX COOLING COIL (R-410A) FOR FUTURE (F) USE WITH A FUTURE (F) 1.0-TON OUTDOOR AIR COOLED CONDENSING UNIT (208V-3Ø) TO BE MOUNTED ON GRADE/ROOF. BID AS ALTERNATE ADD #L5. 1.5 - PROVIDE UNIT WITH A 1.5-TON DX COOLING COIL (R-410A) FOR FUTURE (F) USE WITH A FUTURE (F) 1.5-TON OUTDOOR AIR COOLED CONDENSING UNIT (208V-3Ø) TO BE MOUNTED ON GRADE/ROOF. BID AS ALTERNATE ADD #L5. 2.0 - PROVIDE UNIT WITH A 2.0-TON DX COOLING COIL (R-410A) FOR FUTURE (F) USE WITH A FUTURE (F) 2.0-TON OUTDOOR AIR COOLED CONDENSING UNIT (208V-3Ø) TO BE MOUNTED ON GRADE/ROOF. BID AS ALTERNATE ADD #L5. 2.5 - PROVIDE UNIT WITH A 2.5-TON DX COOLING COIL (R-410A) FOR FUTURE (F) USE WITH A FUTURE (F) 2.5-TON OUTDOOR AIR COOLED CONDENSING UNIT (208V-3Ø) TO BE MOUNTED ON GRADE/ROOF. BID AS ALTERNATE ADD #L5.

3.0 - PROVIDE UNIT WITH A 3.0-TON DX COOLING COIL (R-410A) FOR FUTURE (F) USE WITH A FUTURE (F) 3.0-TON OUTDOOR AIR COOLED CONDENSING UNIT (208V-3Ø) TO BE MOUNTED ON GRADE/ROOF. BID AS ALTERNATE ADD #L5. 3.5 - PROVIDE UNIT WITH A 3.0-TON DX COOLING COIL (R-410A) FOR FUTURE (F) USE WITH A FUTURE (F) 3.5-TON OUTDOOR AIR COOLED CONDENSING UNIT (208V-3Ø) TO BE MOUNTED ON GRADE/ROOF. BID AS ALTERNATE ADD #L5.

DE

BID AHU-G & EF-G AS ADD ALTERNATE #L4 FAN SCHEDULE ELECTRICAL SYSTEM SERVED CFM IN. W.G. LBS 1,750 | 0.15 | 801 | 2.9 | 1/4 | 825 | DIRECT | 115 | 1 207 | AER-E20C-620-VG 1. MODEL NUMBERS ARE GREENHECK UNLESS OTHERWISE NOTED. COOK, S&P MAY BE BID AS EQUAL 2. STANDARD FEATURES: GALVANIZED STEEL FAN PANEL; GALV. STEEL DRIVE FRAME; CAST ALUMINUM AIRFOIL BLADE PROPELLER; BALL BEARING MOTORS; CORROSION RESISTANT 3. PROVIDE THE FOLLOWING OPTIONS/ACCESSORIES: MOTOR-VARI GREEN, CONTROL DIAL MOUNTED ON MOTOR FOR BALANCING; UL 705 LISTED; EXHAUST AIR-FLOW DIRECTION; LONG WALL HOUSING, FLUSH EXTERIOR WITH OSHA GUARD; MOTOR ACCESS FROM BLDG; CLOSURE ANGLES; WEATHERHOOD, GALVANIZED 45 DEGREE WITH BIRD-SCREEN; ONE POINT WIRING; WIRING PIGTAIL, GENERAL, 9' FROM UNIT IN FLEX METAL CONDUIT; DAMPER MOUNTED = WD-320-PB-22X22, DAMPER ACTUATOR (MP-310?), 115 VAC ACTUATED MOUNTED/WIRED (NORMALLY-SPRING FAILED CLOSED).



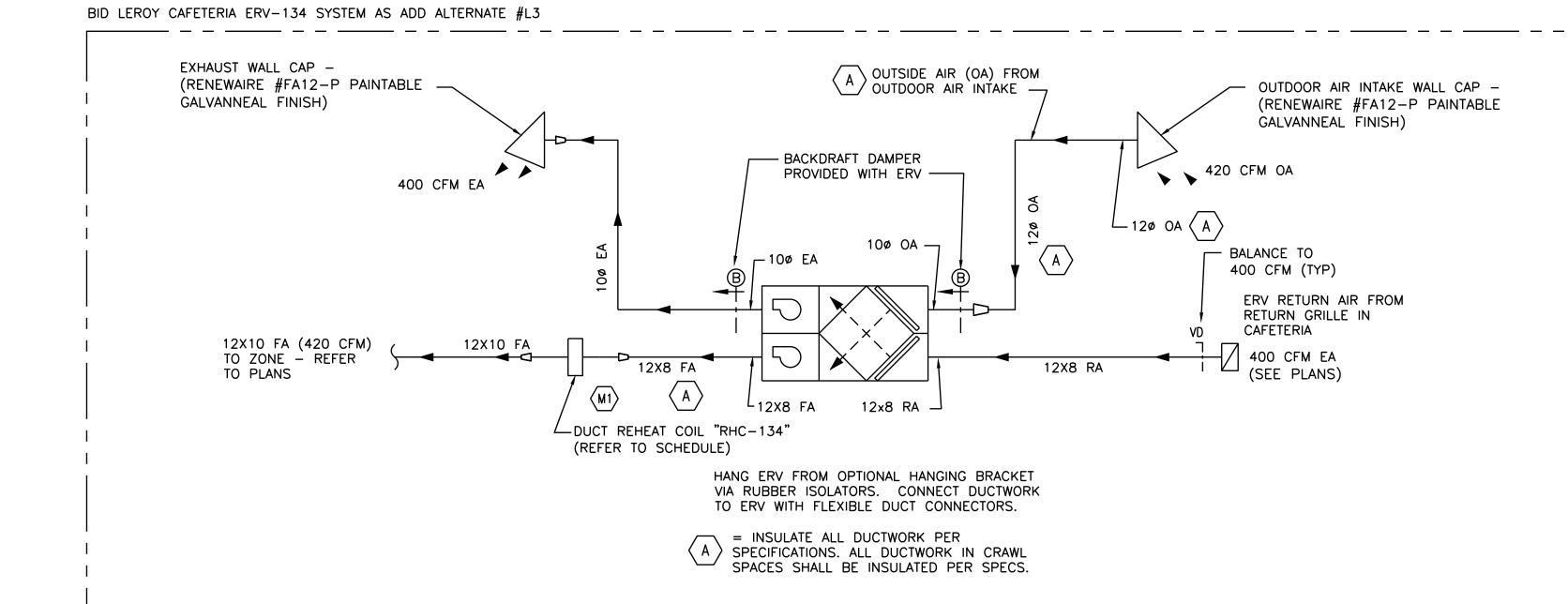
BID AHU-G & EF-G AS ADD ALTERNATE #L4

LINIT	ADEA				F	AN						HYDRON	IC HEAT	ING COIL			MIXING	UNIT CABINET	WEIGHT		
UNIT NO.	AREA SERVED	AIRFLOW	MIN.		TOTAL	FAN	MOTOR	FAN	MOTOR	TOTAL	A	JR			0% GLYCOL	.)	BOX WITH	DIMENSIONS	LBS	MODEL	REMARKS
		CFM	OA CFM	SP IN WC	SP IN WC	BHP FLA/MCA	HP	TYPE/ DISCHARGE		CAPACITY MBH	EDB DEG. F.	LDB DEG. F.	FLOW GPM	EWT DEG. F.	I	MAX WPD FT. HEAD		LENGTH×WIDTH×HEIGHT INCHES		NO.	
													Q 2 3 4 2								
AHU-G	LEROY ELEM. GYM	5,000	1,750	0.50	2.07	3.3 BHP 23A/28A	5	DPP F.TOP	208/3	239	43	87	11	180	132	0.45	WITH 2" MERV-13 FLAT FILTERS	86"Lx63"Wx44"H 95.6"L WITH VFD	1,250	UCCA-G-10-A-0	SEE NOTES BID AHU-G AS ALT

MODEL NO.

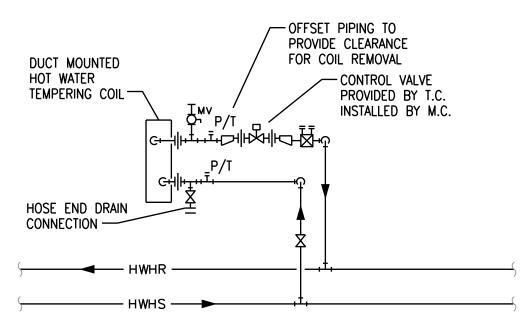
SEE NOTES BELOW 26"Wx26"H; 8.4 SONES

- 1. ALL MODEL NUMBERS ARE TRANE "UCCA" PERFORMANCE CLIMATE CHANGER AHU. BASE BID TRANE CARRIER & MCQUAY MAY BE BID AS ALTERNATE ADD/DEDUCTS. 2. ALL MODULES SHALL BE DOUBLE WALL UNITS WITH 2" THICK FOAM INSULATION.
- 3. INDOOR UNIT CONFIGURATION SHALL BE AS FOLLOWS (IN ORDER FROM RETURN END TO SUPPLY END):
- 3.1. MIXING BOX MODULE WITH BACK & BOTTOM OPENINGS, 2" FLAT FILTER (MERV 13, PROVIDE 2 SETS OF FILTERS), & ACCESS DOOR.
- 3.2.1. HORIZONTAL DIRECT DRIVE PLENUM (DDP) FAN WITH SHAFT GROUNDING, FRONT TOP DISCHARGE, & ACCESS DOOR ON LEFT SIDE (LOOKING INTO AIRSTREAM).
- 3.2.2. HEATING COIL (2-ROW) WITH COIL HOOKUP ON LEFT (LOOKING INTO AIRSTREAM). NOTE: M.C. SHALL FIELD VERIFY & CONFIRM ACCESS DOOR & COIL HOOKUP LOCATIONS PRIOR TO ORDER. 4. PROVIDE 2" MERV-13 FILTERS. PROVIDE (2) EXTRA SETS OF FILTERS FOR EACH UNIT.
- 5. PROVIDE 6" TALL UNIT BASE RAIL FOR HANGING UNIT UP HIGH ABOVE STAGE VIA THREADED ROD 6. PROVIDE TERMINAL BLOCK CONTROL INTERFACE PANEL FOR CONTROLLING AHU FROM OWNER'S EXISTING BMS/EMS (KMC CONTROLS-BACNET LANGUAGE, COORD./CONFIRM WITH T.C. = GREG SALISBURY @ AIR-N-ENERGY PRIOR TO ORDER).
- 6.1. DO NOT INCLUDE FACTORY END DEVICES THE TEMPERATURE CONTROLS SUB (T.C.) WILL PROVIDE/INSTALL THE LOW LIMIT FREEZESTAT, DIRTY FILTER SWITCH, FAN STATUS, DISCHARGE AIR SENSOR, MIXED AIR SENSOR, MIXING BOX ACTUATOR (0-10 VDC, SPRING FAIL TO CLOSE OUTDOOR AIR & OPEN RA 100%), OUTDOOR AIR (OA) TEMP. SENSOR, DUCT STATUS PRESSURE SENSOR
- . INCLUDE VFD FOR SUPPLY FAN (W/ SHAFT GROUNDING) TO BE CONTROLLED BY OWNER'S EXISTING BMS/EMS (KMC BACNET LANGUAGE, COORD./CONFIRM WITH T.C. PRIOR TO ORDER). 8. PROVIDE UNIT MOUNTED NEEDLE POINT BI-POLAR IONIZER (BPI): PLASMA AIR #PLASMAPURE AUTOCLEAN 1500-BMS? (UP TO 6,000 CFM, 12V DC/24V AC, BMS CONTACT) OR EQUAL BY GPS; M.C. SHALL MOUNT IN AHU/UV PER MFR REQUIREMENTS, DOWNSTREAM OF FILTER & IN ACCESSIBLE LOCATION FOR MAINT.; M.C./T.C. SHALL VERIFY/CONFIRM SUPPLY FAN CONTROL VOLTAGE AND PROVIDE NEW BPI TO MATCH THAT VOLTAGE, & INTERLOCK/WIRE BPI TO OPERATE WITH SUPPLY FAN OPERATION; PROVIDE BPI WITH BMS DRY CONTACT, T.C. SHALL WIRE/INTERCONNECT THE BPI TO THE BMS FOR MONITORING OPERATION OF BPI.
- 8. AHU-G / EF-G WORK SHALL BE BID AS ADD ALTERNATE #L4.



DUCT REHEAT COIL INSTALLATION REQUIREMENTS: MINIMUM 4 FEET FROM ERV - MINIMUM 3 FEET STRAIGHT DUCT UPSTREAM AND DOWNSTREAM

ENERGY RECOVERY VENTILATOR SCHEMATIC DIAGRAM - ERV-134 (FOR CAFETERIA) NO SCALE



HOT WATER TEMPERING COIL WITH TWO-WAY CONTROL VALVE PIPING DIAGRAM NO SCALE (TYPICAL FOR DUCT MOUNTED REHEAT COILS)

				ENERG	Y RECO	/ERY	VENTIL	_ATOR	(ERV) SCHEDULE	
UNIT I.D.	SYSTEM	AIRFLOW (CFM) OA&FA / RA&EA		IN. W.G.	1104 (1	ELECTRIC		WEIGHT	MODEL NO.	REMARKS
	SERVED	OACLA / INACLA	OA&FA	RA&EA	MCA/	FA VOLTS	PHASE	(LBS)		
ERV-134	CAFETERIA	420 / 400	0.75	0.70	9/1	5 120	1	200	EV450IN ECM (55"Lx37"Wx17"	"H) SEE NOTES A, B, 1 CONTROL FROM BMS VIA CO2 SENSORS

A. BASIS OF DESIGN IS RENEWAIRE.

B. SUPPLY ONE EXTRA SET OF FILTERS FOR EACH ERV FOR OWNER'S USE.

1. FOR ERV-134 (SERVING CAFETERIA), PROVIDE FOLLOWING: STANDARD FEATURES: NON-FUSED DISCONNECT; 24V TRANSFORMER/RELAY PACKAGE; DIMENSIONS = 55"L X 37"W X 17"H; ONE (1) DIRECT DRIVE MOTOR BLOWER

(0.6 HP).FACTORY OPTIONS: FUSED DISCONNECT.

OPTIONS/ACCESSORIES FOR FIELD INSTALLATION: FILTERS-MERV 13 2" FILTERS (PROVIDE ONE EXTRA SET OF FILTERS FOR OWNER USE); TWO (2)-10" ROUND BACKDRAFT DAMPERS (RENEWAIRE #BD10); TWO (2) 12" DIA. HOODED WALL VENTS PAINTABLE (#FA12-P); VIBRATION ISOLATION KIT; HANGING BRACKET (RENEWAIRE #45EVHB); 10" TRANSITION KIT (1-QTY / 2-TOTAL); 12"X8" FLANGE KIT (1-QTY / 2-TOTAL); SOLID STATE SPEED CONTROL KIT - LOCATE ON SIDE OF THE ERV

M.C. SHALL COORDINATE POWER/CONTROLS WITH E.C./T.C. PRIOR TO ROUGH-IN.

							DUCT MO	UNTE	НОТ	WATER	HEATING	COIL S	CHEDUI	LE				
UNIT I.D.			MINIMUM			AIR			WATER (3	0% GLYC	OL)	FACE	FINN	ED DIMEN	ISIONS	WEIGHT	MODEL NO.	REMARKS
		ROWS		AIRFLOW CFM	E.D.B. • F	L.D.B. • F	MAX A.P.D. IN. W.G.	FLOW GPM	E.W.T.	L.W.T.	MAX W.P.D. FT. HEAD		HEIGHT INCHES	WIDTH INCHES	DEPTH INCHES	(LBS)	WODEL NO.	
RHC-134	ERV-134	2	24	450	45	94	0.2	1.3	180	140	< 0.7	600	9	12	6.5	20	TT	

1. MODEL NUMBERS ARE TRANE.

- NEW INTEGRATED BUILDING MANAGEMENT SYSTEM (BMS) CONTROLS FOR LEROY ELEMENTARY SCHOOL HVAC IMPROVEMENTS INCLUDE CAPACITY FOR ALL THE FUTURE (F) COOLING VIA (F) ACCs TO PROVIDE COOLING TO SPARE D/X C/Cs IN THE NEW UNIT VENTILATORS (F) 120V BY T.C. 120V BY NEW 120V NEW 120V NEW 120V —(E) BCU EXISTING BMS - - -NETWORK CONTROLLER FUTURE (F) (E) DIRECT DIGITAL DIRECT DIGITAL CONTROLLER CONTROLLER CONTROLLER CONTROLLER CONTROLLER CONTROLLER SERVES SERVES SERVES NEW LEROY SERVES SERVES NEW FUTURE (F) DDC EXISTING (E) CAFETERIA ERV-134 EXISTING LEROY LEROY GYM EXISTING (E) CONTROLLER FOR (F) AHU-G, H/C PUMP, 3-WAY **VENTILATION: ERV-134,** SYSTEMS ELEMENTARY BOILERS & (E) RHC-134, SCHEDULING, ELEMENTARY ADDITION ROOF HEAT VALVE, & TOP UNITS HEATING PUMPS (RTUs) T.C. SHALL PROVIDE QUANTITY/SIZE OF DDC CONTROLLERS AS REQUIRED TO MEET INTENT OF SEQUENCES OF OPERATIONS.

GENERAL BMS TEMPERATURE CONTROL NOTES

REQUIRED.

1. THE EXISTING DDC BASED BMS IS A HYBRID AUTOMATIX (OLDER: 19??) AND A NEWER BACNET KMC CONTROLS (BY AIR-N-ENERGY) AND SHALL BE EXTENDED AS REQUIRED TO INCORPORATE THE NEW TEMPERATURE CONTROL WORK SHOWN ON THE PLANS WITH ALL NEW EQUIPMENT, CONTROLLERS, WIRING, DEVICES, ETC. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND ILLUSTRATE THE GENERAL INTENT OF WORK

2. ALL BMS CONTROLS SHALL BE FURNISHED, INSTALLED AND WIRED BY THE BMS TEMPERATURE CONTROLS CONTRACTOR (T.C.) UNLESS NOTED OTHERWISE.

3. T.C. SHALL PROVIDE POWER SUPPLY TO ALL CONTROLS UNLESS NOTED OTHERWISE. REFER TO ELECTRICAL DRAWINGS FOR PANEL LOCATIONS. ALL WIRING SHALL BE PERFORMED PER DIVISION 26000 SPECIFICATION REQUIREMENTS AND BMS SPECIFICATION REQUIREMENTS. NOTE THAT WIRING INSTALLED IN RA PLENUMS SHALL BE PLENUM RATED CABLE. ALL EXPOSED CONTROL WIRING (I.E. MECHANICAL ROOMS, STORAGE ROOMS, ETC.) SHALL BE INSTALLED IN CONDUIT/WIREMOLD PER SPECS. COORDINATE WHERE TO USE CONDUIT VERSUS WIREMOLD WITH ARCHITECT/OWNER PRIOR TO ROUGH-IN.

4. T.C. SHALL COORDINATE WITH EQUIPMENT MANUFACTURERS (I.E. UNIT VENTILATORS, AIR HANDLERS, ERVS, ETC.) FOR CONTROL SYSTEM INTERFACE TO PROVIDE CONTROL SEQUENCES AS SPECIFIED.

5. WIRING DIAGRAMS AND CONTROL SCHEMATICS ARE SHOWN DIAGRAMMATICALLY FOR ILLUSTRATION OF THE INTENT OF EQUIPMENT OPERATING/INTERLOCKING FUNCTIONS, AND SHALL NOT BE INTERPRETED AS DETAILED INSTRUCTIONS OR AS-BUILT CONDITIONS.

6. ALL CURRENT SENSORS USED FOR PROOF-OF-OPERATION STATUS SHALL BE ADJUSTABLE CURRENT SENSITIVE SET SUCH THAT DRIVE OR BELT FAILURE SHALL CAUSE AN ALARM TO THE DDC SYSTEM.

- 7. "ADJUSTABLE" = AN ADJUSTABLE SETPOINT VIA THE CENTRAL OPERATING STATION (COS).
- 8. ALL RELAYS (RIBS) SHALL HAVE HAND-OFF-AUTO SWITCHES ON THEM.
- 9. REFER TO SPECIFICATIONS FOR MORE INFORMATION.

FOR FUTURE EXPANSION.

BMS/DDC SYSTEM ARCHITECTURE
NO SCALE

(I.E. HVAC CONTROLS, UTILITY MANAGEMENT SYSTEMS, ETC.).

THE OWNER'S EXISTING INFRASTRUCTURE

CONTACT GREG SALISBURY (231-995-9890 OR

GREG.SALISBURY1@GMAIL.COM) AT AIR-N-ENERGY FOR

INFORMATION ON EXISTING CONTROL SYSTEM AND FOR BIDS ON THE TEMPERATURE CONTROLS WORK ON THESE PROJECTS.

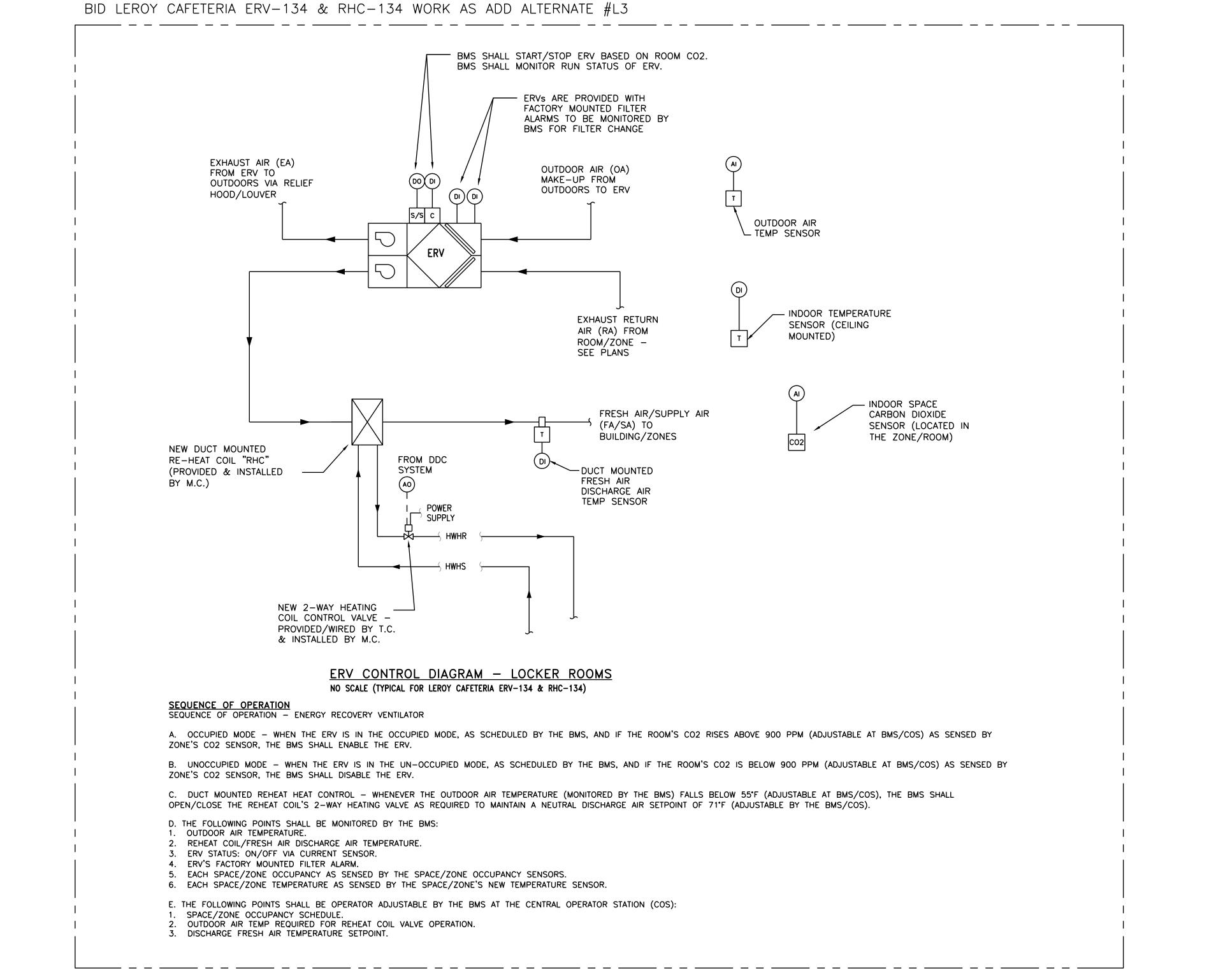
1. BMS = BUILDING MANAGEMENT SYSTEM. BMS SHALL BE OPEN PROTOCOL TYPE

2. BMS SYSTEM, CONTROLLER QUANTITIES, CONFIGURATIONS, ETC...FOR FUTURE (F)

D/X COOLING VIA (F) ACCs...AND ALSO SHALL INCLUDE 25% SPARE POINT CAPACITY

NEW DDC/BMS CONTROLS SHALL BE KMC TO INTEGRATE INTO

- BACNET COMPATIBLE FOR CONNECTION TO OTHER BUILDING CONTROL SYSTEMS



EXHAUST AIR GENERAL AND TOILET EXHAUST REFER TO FLOOR PLANS FOR

TYPICAL EXHAUST FAN (EF) CONTROL DIAGRAM

LOCATION AND QUANTITY

NO SCALE - TYPICAL FOR NEW AND/OR EXISTING (E) EFS

EXHAUST FAN SEQUENCE OF OPERATION:

T.C. SHALL PROVIDE/INSTALL ALL CONTROLS

INCLUDING ROOM/ZONE SENSORS, CO2

SENSORS, INTERLOCKING IAQ IONIZERS TO

UV/AHU FANS & BMS MONITORING, WIRING

CONNECT TO EXISTING (E) BMS, ETC...AS

REQUIRED FOR A COMPLETE/FUNCTIONAL

CONTROL SYSTEM

1. WITH THE EXHAUST FAN'S MOTOR STARTER HAND/OFF/AUTO SWITCHES IN THE "AUTO" POSITION, THE EXHAUST FAN SHALL BE OPERATED DURING OCCUPIED HOURS AND STOPPED DURING UNOCCUPIED HOURS (ADJUSTABLE VIA BMS/EMS AT COS). IF EF IS PART OF VENTILATION SYSTEM WITH AHU/UV THEN THE EXHAUST FANS SHALL BE SOFTWARE INTERLOCKED WITH SUPPLY FAN AND SHALL START WHENEVER THE SUPPLY FAN IS STARTED DURING OCCUPIED HOURS.

2. EACH EXHAUST FAN'S OPERATING STATUS SHALL BE PROVEN TO THE DDC CONTROL SYSTEM BMS/EMS VIA IT'S RESPECTIVE CURRENT SENSOR.

3. TEMPERATURE CONTROLS (T.C.) SUBCONTRACTOR SHALL PROVIDE ALL NECESSARY CHANGES TO THE EXISTING (E) 115V WIRING CURRENTLY FEEDING THE EXISTING (E) EXHAUST FANS INCLUDING INSTALLING BLANK COVER PLATES, INSTALLING NEW RELAY-IN-BOXES (RIBs), NEW CONDUIT/J-BOXES/ETC TO CONNECT/CONTROL TO/BY NEW BMS...

4. FOR EFs WITH POWERED ISOLATION DAMPERS, T.C. SHALL WIRE SUCH THAT WHEN THE EXHAUST FANS START ITS ASSOCIATED ISOLATION DAMPER SHALL SIMULTANEOUSLY OPEN. WHEN THE EXHAUST FAN IS STOPPED, ITS ASSOCIATED ISOLATION DAMPER SHALL CLOSE.

DIFFERENTIAL PRESSURE TRANSMITTER SENSOR OR DETECTOR, WITH RIGID TYPE ELEMENT DIFFERENTIAL PRESSURE SWITCH SMOKE DETECTOR SPEED CONTROL DIGITAL INPUT SIGNAL (BMS/DDC) START/STOP CONTROL DIGITAL OUTPUT SIGNAL (BMS/DDC) STATIC PRESSURE TRANSMITTER FLOW MEASURING DEVICE STATIC PRESSURE SENSOR OR DETECTOR FS FLOW SWITCH FREEZE STAT HIGH LIMIT TEMPERATURE GAUGE LIMIT SWITCH THERMOSTAT TEMPERATURE SENSOR OR DETECTOR MANUAL GRADUAL POSITION SWITCH TEMPERATURE / CO2 SENSOR MOTOR STARTER CARBON MONOXIDE SENSOR MOTORIZED ACTUATOR

TEMPERATURE CONTROLS SYMBOLS

SYMBOL DESCRIPTION

SENSOR OR DETECTOR, MOUNTED IN WELL

SENSOR OR DETECTOR, WITH AVERAGING ELEMENT

NITROGEN DIOXIDE SENSOR

CARBON DIOXIDE SENSOR

VARIABLE SPEED DRIVE

VARIABLE FREQUENCY DRIVE

SENSOR OR DETECTOR, MOUNTED ON SURFACE

DESCRIPTION

PRESSURE GAUGE

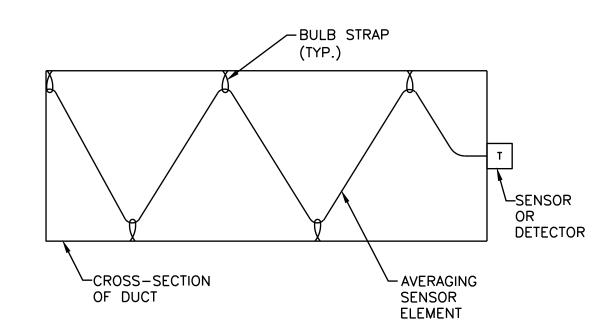
PRESSURE SENSOR OR DETECTOR

ANALOG INPUT SIGNAL (BMS/DDC)

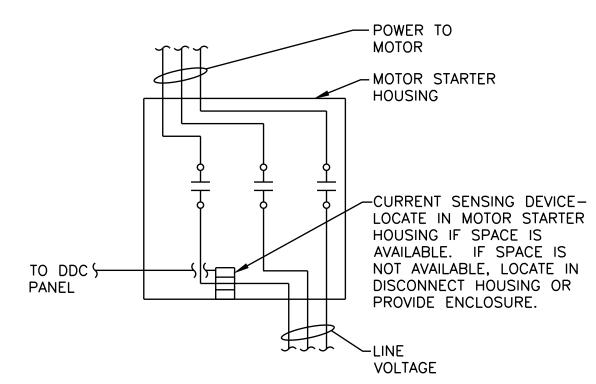
CURRENT SENSOR OR DETECTOR

ANALOG OUTPUT SIGNAL (BMS/DDC)

<u>SYMBOL</u>



TYPICAL DUCT TEMPERATURE SENSOR OR DETECTOR WITH AVERAGING ELEMENT DIAGRAM



CURRENT SENSING DEVICE DETAIL NO SCALE

RELIEF AIR TO OUTDOORS VIA NEW ROOF MOUNTED

EXHAUST FANS (BY M.C.)

RELIEF AIR

FROM ROOM

RELAY-IN-BOX

BY T.C. (IF IT

DOESN'T EXIST

ALREADY)

BI-POLAR IONIZER (BPI) PROVIDED WITH AHU BY M.C.

AHU SUPPLIER & ORDER APPROPRIATE BPI).

CONTACT ALARM.

SUPPLY >-

DAMPER

SUPPLY

OUTDOOR

AIR (OA)

INTAKE

RETURN AIR

(RA) FROM

DAMPER

ON PRAS 2022 HVAC PROJECT: T.C.

SHALL PROVIDE CONTROL VALVES

FOR FIELD INSTALL BY M.C.

ROOM

WIRE/INTERCONNECT BPI TO OPERATE WITH RESPECTIVE AHU'S FAN (CONFIRM 12?V/24?V/120?V SF VOLTAGE W/

BMS SHALL MONITOR ALARM STATUS OF BPI VIA IT'S DRY

NEW FREEZESTAT

(INTERLOCKED WITH SF)

T.C. SHALL RELOCATE

THE ENTIRE FREEZESTAT

FROM THE END POCKET

UNIT VENTILATOR WITH EXHAUST FAN(S) CONTROL DIAGRAM

(TYPICAL FOR HUVs / VUVs WITH (E)/NEW EFs)

TO THE COIL FACE

- WHERE SHOWN ON PLANS FOR

OF RA/OA DAMPER AND EXH.

FAN/RELIEF AIR DAMPER

 $ldsymbol{oxedsymbol{oxed}{}}$ NEW DDC/BMS TEMPERATURE

2-WAY OR 3-WAY VALVES - REFER

NEW HWHR PIPING (REFER

TO PLAN OR EQUIP. SCHEDULE

TO PLANS FOR SIZES)

NEW HWHS PIPING (REFER

TO PLANS FOR SIZES)

SENSOR (OR TEMP/CO2/OCC

SENSOR WHERE SHOWN) - REFER

TO PLANS FOR LOCATIONS WITH

LOCK-BOX (LB) WHERE NOTED

DEMAND CONTROL VENTILATION VIA

INPUT TO BMS FOR BMS CONTROL

CO2 SENSOR(S) OR OCC. SENSOR(S)

Ш

SEQUENCE OF OPERATION - UNIT VENTILATOR WITH DDC CONTROLLER — SINGLE ZONE VAV APPLICATION

(REFER TO PLANS & DIAGRAMS FOR VARYING METHODS OF RELIEVING/EXHAUSTING OUTDOOR AIR)

- 1. SPACE TEMPERATURE CONTROL THE APPLICATION SPECIFIC CONTROLLER (ASC) SHALL MAINTAIN SPACE COMFORT BY MODULATING THE DISCHARGE AIR TEMPERATURE OF THE UNIT. THE ASC SHALL CONTINUOUSLY MONITOR THE ERROR BETWEEN THE SPACE TEMPERATURE AND SETPOINT AND ADJUST THE DISCHARGE AIR TEMPERATURE ACCORDINGLY. THIS SHALL BE ACCOMPLISHED THROUGH THE USE OF PID LOGIC ALONG WITH A RA/OA DAMPER MODULATION; 2-WAY MODULATING HEATING VALVE/3-WAY MODULATING HEATING VALVE; DX OR 2-WAY/3-WAY COOLING VALVE; AND/OR FACE & BYPASS (F&B) HEATING COIL WHERE APPLICABLE. REFER TO PLANS/SPECS FOR SPECIFICS ON EACH UNIT.
- 1.1. WHERE SHOWN ON PLANS, THE ZONE SENSOR SHALL HAVE TEMPERATURE / CARBON-DIOXIDE / OCCUPANCY-MOTION OPTION AND BMS SHALL MONITOR ZONE TEMPERATURE / CARBON-DIOXIDE / OCCUPANCY-MOTION.
- 2. FAN OPERATION THE SUPPLY FAN SHALL START IN HIGH SPEED FOR APPROXIMATELY FIVE SECONDS, THEN OPERATE CONTINUOUSLY AT ITS SELECTED SPEED, WHILE IN THE OCCUPIED MODE. 2.1. THE ZONE SENSOR SHALL HAVE AN "AUTO" FAN SPEED POSITION WHICH WILL RUN THE UNIT AT LOW SPEED FOR NORMAL OPERATION (GAYLORD SCHOOLS PROJECT'S ZONE SENSORS SHALL NOT HAVE EXTERNAL FAN SPEED
- TEMPERATURE CONTROL. 2.2. UNITS WITH CONTROLLERS THAT DO NOT HAVE THIS CAPABILITY SHALL BE SELECTED TO MEET DESIGN CRITERIA AT LOW FAN SPEED OPERATION.

ADJUSTMENT). THE ASC SHALL AUTOMATICALLY SWITCH THE FAN TO HIGH SPEED WHEN NECESSARY TO MAINTAIN SPACE

- 2.3. BI-POLAR IONIZATION (BPI): WHERE A BPI IS PROVIDED IN UNIT/DUCTWORK, INTERLOCK BPI TO OPERATE ONLY WHEN UNIT SUPPLY FAN (SF) OPERATES. T.C. SHALL COORD./CONFIRM UNIT SF CONTROL VOLTAGE (0-10V? 24V?) FOR M.C. TO PROVIDE THE APPROPRIATE BPI VOLTAGE. THE BMS SHALL MONITOR BPI OPERATION WHERE BMS CONTACT PROVIDED
- 3. OCCUPANCY MODES THE ASC SHALL OFFER THE FOLLOWING OCCUPANCY MODES BASED ON A COMMUNICATED REQUEST OR A HARD-WIRED INPUT FROM A LOCAL TIME CLOCK. 3.1. UNOCCUPIED OPERATION - IN THE UNOCCUPIED MODE, THE SUPPLY FAN SHALL BE INDEXED OFF, THE OUTSIDE AIR DAMPER SHALL MODULATE CLOSED, AND THE RETURN AIR DAMPER SHALL MODULATE OPEN. THERE SHALL BE AN INTERLOCK BETWEEN THE THE OUTSIDE AIR DAMPER AND THE GRAVITY RELIEF DAMPER ACTUATOR/EXHAUST FAN SHALL CLOSE THE GRAVITY RELIEF DAMPER/STOP THE EXHAUST FAN. IF THE SPACE TEMPERATURE MOVES BEYOND THE UNOCCUPIED HEATING OR COOLING SETPOINTS, THE ASC SHALL BRING ON 100% OF UNIT CAPACITY WHILE KEEPING THE OUTSIDE AIR DAMPER CLOSED. IF THE SPACE TEMPERATURE RISES ABOVE THE ADJUSTABLE UNOCCUPIED COOLING SETPOINT AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE SPACE TEMPERATURE, THE FAN SHALL BE CYCLED ON,
- THE OUTSIDE AIR DAMPER SHALL BE OPENED AND RELIEF DAMPER OPENED/EXHAUST FAN STARTED. 3.2. TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE - WHEN THE UNIT TRANSITIONS FROM THE UNOCCUPIED MODE TO OCCUPIED MODE, MORNING WARM-UP/COOL-DOWN AND RANDOM START ROUTINES SHALL BE ACTIVATED. 3.3. MORNING WARM-UP - WHEN THERE IS A CALL FOR HEATING AND THE ZONE TEMPERATURE IS TWO DEGREES OR MORE BELOW SETPOINT, A MORNING WARM-UP SEQUENCE SHALL BE INITIATED. DURING MORNING WARM-UP THE FAN SHALL
- BE TURNED ON, THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED AND THE 3-WAY MODULATING HEATING VALVE/2-WAY MODULATING HEATING VALVE (F&B DAMPER), IS INDEXED TO THE FULL OPEN POSITION. WHEN THE ZONE TEMPERATURE COMES WITHIN TWO DEGREES OF THE HEATING SETPOINT, THE OUTSIDE AIR DAMPER SHALL GO TO MINIMUM OCCUPIED POSITION AND THE ASC SHALL OPERATE IN THE OCCUPIED MODE.
- 3.4. MORNING COOL-DOWN (UNITS WITH COOLING) WHEN A MORNING COOL-DOWN IS INITIATED THE UNIT SHALL OPERATE IN THE AIRSIDE ECONOMIZING MODE IF POSSIBLE, AND FAN SHALL BE INDEXED ON. WHEN THE ZONE TEMPERATURE REACHES THE COOLING SETPOINT, THE ASC SHALL OPERATE IN THE OCCUPIED MODE.
- 3.5. RANDOM START A RANDOMLY GENERATED 3-32 SECOND DELAY SHALL BE ACTIVATED WHEN ELECTRIC POWER IS APPLIED TO THE ASC OR AFTER RECEIVING AN OCCUPIED COMMAND FROM THE BAS.
- 3.6. OCCUPIED OPERATION DURING OCCUPIED PERIODS, AS SCHEDULED BY THE BMS (OR AS SENSED BY OCCUPANCY SENSORS OR AS SENSED BY CO2 SENSORS), THE ASC SHALL OPEN THE OUTSIDE AIR DAMPER TO MINIMUM POSITION (REFER TO PLANS/SCHEDULE) AND MODULATE THE HEATING AND/OR COOLING CAPACITY OF THE UNIT TO MAINTAIN SPACE VENTILATION AND TEMPERATURE SETPOINT. AN INTERLOCK BETWEEN THE THE OUTSIDE AIR DAMPER AND GRAVITY RELIEF DAMPER ACTUATOR/EXHAUST FAN SHALL OPEN THE GRAVITY RELIEF DAMPER/START THE EXHAUST FAN. OPTION: USE DEMAND CONTROL VENTILATION VIA OCCUPANCY (OCC.) AND/OR CARBON DIOXIDE (CO2) SENSORS WHERE SHOWN ON
- 3.7. HEAT/COOL SETPOINT THE SPACE TEMPERATURE SETPOINT SHALL BE DETERMINED EITHER BY THE ASC DEFAULT SETPOINT, OR BUILDING AUTOMATION MANAGEMENT SYSTEM (BMS) CONTROL. THE LOCAL SETPOINT ADJUSTMENT KNOB SHALL DETERMINE THE SETPOINT IF THE ASC IS CONFIGURED IN THE STANDALONE MODE (CONFIRM WITH OWNER IF PROJECT'S ZONE SENSORS SHALL NOT HAVE EXTERNAL LOCAL SET POINT ADJUSTMENT). IF THE ASC IS IN THE ICS MODE OR IF THE LOCAL SETPOINT KNOB FAILS, THE ASC SHALL USE THE BAS COMMUNICATED SETPOINT. IF THE BAS IS NOT COMMUNICATING. THE ASC SHALL USE DEFAULTS OR LOCAL SETPOINTS.
- 3.8. OCCUPIED STANDBY WHERE OCCUPANCY SENSORS ARE USED, THE ASC SHALL DECREASE THE OUTSIDE AIR POSITION AND INCREASES THE SEPARATION BETWEEN THE HEATING AND COOLING SETPOINTS DURING BRIEF PERIODS OF NO 3.9. OCCUPIED BYPASS - TENANTS SHALL BE ABLE TO OVERRIDE THE UNOCCUPIED MODE FROM THE ZONE SENSOR. THE
- OVERRIDE SHALL LAST FOR A MAXIMUM OF 4? HOURS, CONFIRM TIME PERIOD WITH OWNER DURING STARTUP/TRAINING. (CONFIRM WITH OWNER IF PROJECT'S ZONE SENSORS SHALL NOT HAVE EXTERNAL LOCAL SET POINT ADJUSTMENT). 3.10. RELIEF AIR DAMPER/EXHAUST FAN INTERLOCK - AN INTERLOCK BETWEEN THE THE OUTSIDE AIR DAMPER AND GRAVITY RELIEF DAMPER ACTUATOR/EXHAUST FAN SHALL OPEN/CLOSE THE GRAVITY RELIEF DAMPER OR START/STOP THE EXHAUST FAN WHEN THE OUTSIDE AIR DAMPER OPENS/CLOSES. THE RELIEF DAMPER/EXHAUST FAN SHALL OPEN/START WHEN THE UV OUTSIDE AIR DAMPER OPENS MORE THAN 30% (ADJUSTABLE VIA BMS) AND SHALL CLOSE/STOP WHEN THE UV
- 4. VENTILATION CONTROL THE ASC SHALL HAVE THE ABILITY TO MODULATE THE OUTSIDE AIR DAMPER TO MULTIPLE POSITIONS DEPENDING ON THE CURRENT ROUTINE. 4.1. ASHRAE CYCLE II - THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED DURING THE UNOCCUPIED MODE, MORNING WARM-UP/COOL-DOWN, OR WHEN THE SPACE TEMPERATURE EXCEEDS THE SETPOINT BY 3 DEGREES F. DURING THE OCCUPIED MODE, THE OUTSIDE AIR DAMPER SHALL BE AT THE MINIMUM POSITION (CONFIGURABLE/ADJUSTABLE @ BMS)
- 4.2. OUTSIDE AIR DAMPER THE OUTSIDE AIR DAMPER SHALL AUTOMATICALLY ADJUST ITS MINIMUM POSITION WHEN THE FAN SPEED IS CHANGED TO ENSURE A CONSTANT VENTILATION RATE. 4.3. OPTIONAL CO2 DEMAND VENT. CONTROL - WHERE SHOWN ON THE PLANS, THE BMS SHALL MONITOR ROOM CO2 LEVELS
- VIA ZONE TEMP/CO2/OCC SENSOR (AND/OR ADDITIONAL CO2 SENSORS WHERE NEEDED IN LARGE ROOMS). WHEN OA TEMP IS ABOVE 50°F AND WHEN ZONE CO2 IS ABOVE 800 PPM (ADJUSTABLE @ BMS/COS) THE BMS SHALL ADJUST RA/OA DAMPER POSITION TO 60% (ADJUSTABLE AT BMS/COS) AND ALSO CONTROL REL.A DAMPER/EXH FAN TO FULL
- 4.4. OPTIONAL OCCUPANCY DEMAND VENT. CONTROL WHERE SHOWN ON THE PLANS, THE BMS SHALL MONITOR ROOM OCCUPANCY VIA ZONE TEMP/CO2/OCC SENSOR (AND/OR ADDITIONAL OCCUPANCY SENSORS WHERE NEEDED IN LARGE ROOMS). WHEN ROOM IS OCCUPIED THE BMS SHALL ADJUST RA/OA DAMPER POSITION TO MINIMUM OCCUPIED POSITION (??%/??? CFM - REFER TO PLANS) AND ALSO CONTROL REL.A DAMPER/EXH FAN TO FULL OPEN/ON.
- 5. GENERIC BINARY OUTPUT THE CONTROLLER SHALL HAVE TWO (2) 24V AUXILIARY OUTPUT TO BE CONTROLLED FROM THE
- 6. GENERIC ANALOG INPUT THE CONTROLLER SHALL HAVE A 4-20MA AUXILIARY INPUT FOR USE WITH THE BMS.
- 7. AUXILIARY TEMPERATURE INPUT THE ASC SHALL BE CAPABLE OF PASSING AN AUXILIARY TEMPERATURE TO THE BAS
- 8. FUTURE COOLING: NOTE THAT ON PINE RIVER SCHOOLS 2022 HVAC PROJECT ALL OF THE UNIT VENTILATORS WILL HAVE D/X COOLING COILS FOR FUTURE (F) COOLING VIA FUTURE ACCs/REFRIGERANT LINE-SETS. PROVIDE CAPACITY IN EACH DDC/BMS CONTROLLER FOR (F) CONTROL OF FUTURE C/C & ACC.

SAFETIES AND ALARMS

- 1. RESET ALL DIAGNOSTICS SHALL BE CAPABLE OF BEING RESET THROUGH THE ZONE SENSOR, SERVICE TOOL, BAS, OR BY CYCLING POWER TO THE UNIT. 2. FREEZESTAT - A BINARY SIGNAL WILL SHUT THE UNIT DOWN, CLOSE THE OUTSIDE AIR DAMPER, AND OPEN ALL VALVES WHEN
- THE DISCHARGE AIR TEMPERATURE FALLS BELOW 35 DEGREES F. 3. UNOCCUPIED FREEZE AVOIDANCE - THE ASC SHALL OPEN ALL HEATING VALVES WHEN THE OUTSIDE AIR TEMPERATURE DROPS BELOW 30 DEGREES F (ADJUSTABLE AT BMS) DURING THE UNOCCUPIED MODE.
- 4. FILTER STATUS A MAINTENANCE TIMER, AND/OR FILTER DP SWITCH (WHERE SHOWN), SHALL BE INCORPORATED INTO THE ASC TO SIGNAL A FILTER CHANGE AFTER A CONFIGURABLE NUMBER OF FAN RUN HOURS (ADJUSTABLE AT BMS). 5. FAN STATUS - THE ASC SHALL MONITOR THE FAN OUTPUTS TO DETERMINE FAN STATUS AND REPORT IT TO A BAS/BMS.

SHALL BE DONE THROUGH A BINARY INPUT AT THE CONTROLLER

UNLESS THE ECONOMIZER IS ACTIVE.

2. UNIT IDENTIFICATION - THE ASC SHALL HAVE THE CAPABILITY OF FLASHING AND LED UPON RECEIVING A COMMAND FROM A SERVICE TOOL OR BAS. THE ASC SHALL ALSO HAVE A BINARY INPUT WHICH WILL SEND THE UNIT ADDRESS TO A SERVICE TOOL OR BAS FOR UNIT IDENTIFICATION. THIS INPUT SHALL BE ACCESSIBLE AT THE ASC AND THE UNIT ZONE SENSOR.

1. MANUAL OUTPUT TEST - THE ASC SHALL BE ABLE TO MANUALLY EXERCISE ALL OUTPUTS FOR TROUBLESHOOTING. THIS

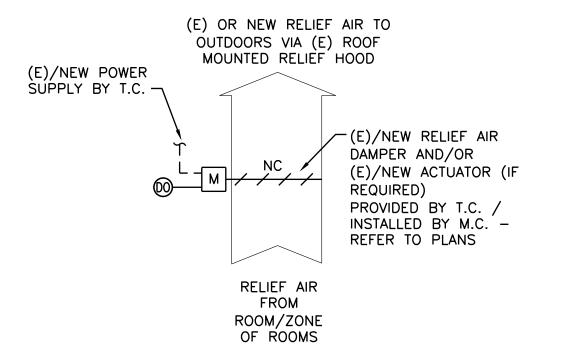
TROUBLESHOOTING

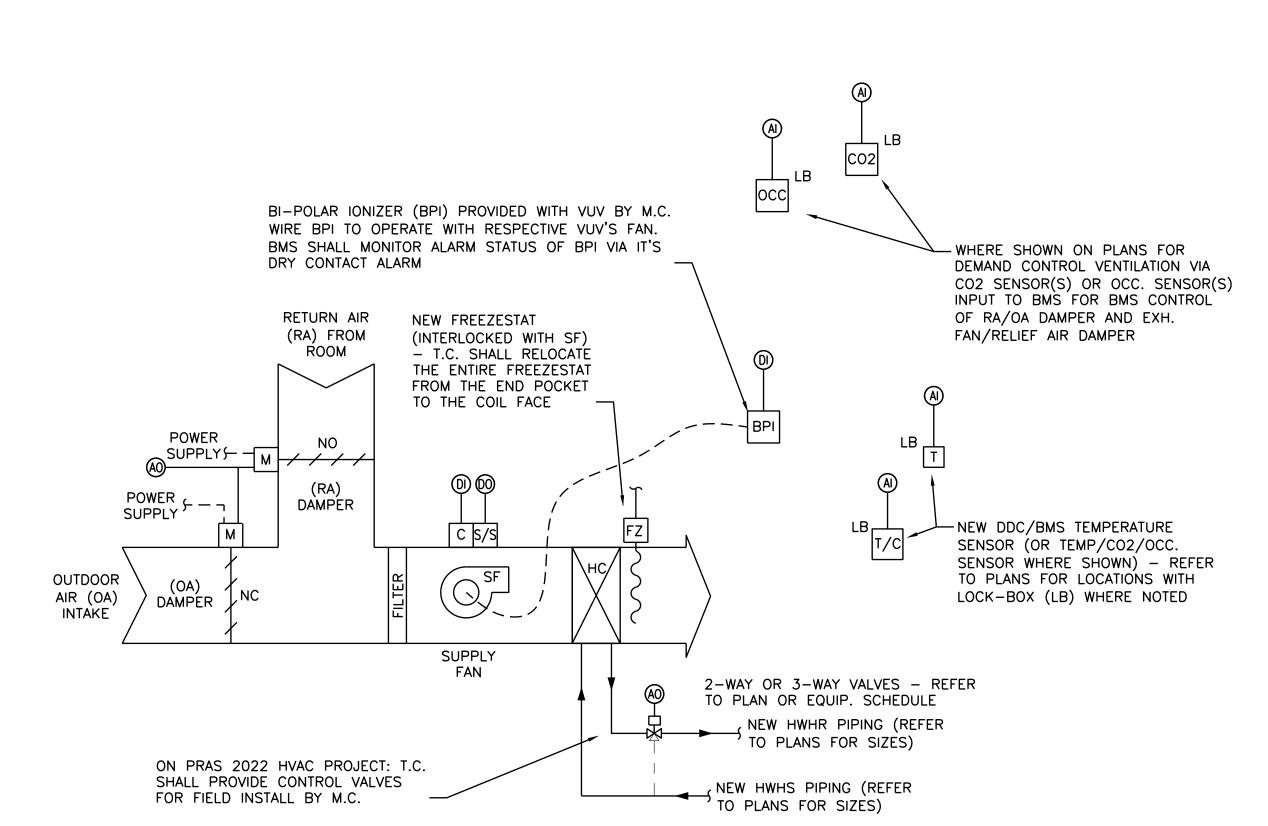
DATA SHARING - ALL ASC'S SHALL BE BACNET? AND ABLE TO COMMUNICATE IN A PEER-TO-PEER ENVIRONMENT OVER A TWISTED PAIR OF COMMUNICATIONS WIRE.

STARTUP & TRAINING

OUTSIDE AIR DAMPER IS LESS THAN 30% (ADJUSTABLE VIA BMS).

1. T.C. SHALL PROVIDE STARTUP ASSISTANCE TO M.C. AND TRAINER TO M.C./OWNER.





TYPICAL UNIT VENTILATOR (UV) WITH RELIEF AIR CONTROL DIAGRAM (TYPICAL FOR UNIT VENTILATORS WITH GRAVITY RELIEF VIA NEW/EXISTING REL. AIR DAMPERS UP TO ROOF MOUNTED RELIEF HOODS)

JLk -Project AEA

SEQUENCE OF OPERATION

SINGLE ZONE VARIABLE AIR VOLUME AIR HANDLING UNIT - LEROY ELEMENTARY GYM AHU-G

1. THIS UNIT OPERATES FROM THE DDC BASED BUILDING MANAGEMENT SYSTEM (BMS) TO PROVIDE OPTIMUM START-STOP PROGRAMMING, OCCUPIED-UNOCCUPIED PROGRAMMING, UNOCCUPIED NIGHT-TIME TEMPERATURE SETBACK/SETUP, MORNING WARM-UP, MORNING COOL-DOWN, RESET DISCHARGE AIR TEMPERATURE AND/OR ZONE TEMPERATURE CONTROL, OUTDOOR AIR CONTROL, VENTILATION FAN CONTROL, ECONOMIZER CONTROL (WHERE AHU'S HAVE APPLICABLE HUMIDITY CONTROLS).

2. WITH THE SUPPLY FAN VARIABLE SPEED DRIVE (PROVIDED WITH AHU AND CONTROLLED BY T.C.) HAND/OFF/AUTO SWITCH IN THE "AUTO" POSITION, THE SUPPLY FAN SHALL BE AUTOMATICALLY STARTED AND STOPPED BASED ON THE OPTIMUM START PROGRAM AND THE OCCUPANCY SCHEDULE AS PROGRAMMED THROUGH THE BMS.

3. PROOF OF FLOW STATUS FOR THE SUPPLY FAN SHALL BE PROVEN TO THE BMS BY MEANS OF IT'S RESPECTIVE CURRENT SENSING DEVICES.

4. PROOF OF FLOW STATUS FOR ANY BUILDING EXHAUST FAN(S), TO BE INTERLOCKED WITH THE AHU, SHALL BE PROVEN TO THE BMS BY MEANS OF IT'S RESPECTIVE CURRENT SENSING DEVICES.

5. WHEN THE AHU SUPPLY FAN IS OFF, THE OUTDOOR AIR DAMPER SHALL BE SPRING FAILED CLOSED AND THE RETURN AIR DAMPER SHALL BE SPRING FAILED OPEN. THE HOT WATER HEATING VALVE/COIL PUMP SHALL MODULATE/OPERATE AS REQUIRED TO MAINTAIN A PLENUM TEMPERATURE SETPOINT OF 50 DEGREES F (ADJUSTABLE @ BMS/COS), AS SENSED BY THE MIXED AIR TEMPERATURE SENSOR.

6. THE BMS SHALL MONITOR THE AHU FILTER DIFFERENTIAL PRESSURE STATUS, VIA THE DIFFERENTIAL PRESSURE TRANSMITTER/SWITCH, AND SEND AN DIRTY FILTER ALARM SIGNAL TO THE COS WHEN THE FILTER DIFFERENTIAL PRESSURE RISES ABOVE SET-POINT (ADJUSTABLE @ COS).

7. EXISTING DUCT SMOKE DETECTORS, LOCATED IN THE RETURN AIR DUCT (AND SUPPLY AIR DUCT), SHALL BE RELOCATED AND RE-WIRED AS REQUIRED TO SHUT DOWN THE SUPPLY AND RELIEF FANS UPON DETECTION OF SMOKE.

8. FREEZE PROTECTION: A HARDWIRED, LOW LIMIT TEMPERATURE SWITCH IS ELECTRONICALLY INTERLOCKED WITH THE AHU'S FAN STARTER/VFD. IF THE LOW LIMIT SWITCH IS TRIPPED (38F — ADJUSTABLE AT BMS/COS), THE OA DAMPER SHALL CLOSE, ALL HEAT VALVE SHALL OPEN 100% (ADJUST PER CLIMATE), COIL PUMP STARTED, AND AN ALARM WILL BE ANNUNCIATED. A MANUAL RESET OF THE LOW LIMIT TEMP. SWITCH WILL BE REQUIRED TO RESTART THE FAN.

DURING THE UNOCCUPIED MODE THE SUPPLY FAN SHALL BE OFF, THE OUTDOOR AIR DAMPER SHALL BE CLOSED, THE RETURN AIR DAMPER SHALL BE OPEN, AND THE HEAT COIL VALVE SHALL BE INDEXED TO MAINTAIN A MINIMUM MIXED AIR? OR DISCHARGE AIR TEMPERATURE? OF 50°F (ADJUSTABLE AT COS).

NIGHT TIME SET-BACK = WHEN THE SPACE TEMPERATURE IS BELOW THE UNOCCUPIED HEATING SETPOINT (60°F -ADJUSTABLE AT BMS/COS) THE SUPPLY FAN WILL START AND RUN AT MINIMUM SPEED SETPOINT (ADJUSTABLE AT BMS/COS), THE OUTDOOR AIR DAMPER WILL REMAIN CLOSED, AND THE HOT WATER HEATING VALVE WILL OPEN/MODULATE, AND THE HEAT COIL PUMP OPERATE. WHEN THE SPACE TEMPERATURE RISES ABOVE THE UNOCCUPIED HEATING TEMPERATURE SETPOINT (60°F - ADJUSTABLE AT COS) PLUS THE UNOCCUPIED TEMPERATURE DIFFERENTIAL (4°F - ADJUSTABLE AT COS) THE SUPPLY FAN WILL STOP AND THE HEATING CONTROL VALVE WILL CLOSE/HEAT COIL PUMP STOPS.

OCCUPIED MODE:

SUPPLY FAN CONTROL: DURING THE OCCUPIED MODE, THE BMS SHALL START AND OPERATE THE SUPPLY AIR FAN AT MINIMUM AIRFLOW SETTING - 30% OF MAXIMUM AIRFLOW RATE (ADJUSTABLE @ BMS/COS). THE SUPPLY FAN MAXIMUM SETTING SHALL BE 95% (ADJUSTABLE @ BMS/COS). THE BMS SHALL VARY THE SPEED OF THE SUPPLY FAN BETWEEN THE MINIMUM AND MAXIMUM AIRFLOW SETTINGS AS REQUIRED TO MEET THE ZONE TEMPERATURE SETPOINTS. BI-POLAR IONIZATION (BPI): WHERE A BPI IS PROVIDED IN UNIT/IN DUCTWORK, INTERLOCK BPI TO OPERATE ONLY WHEN UNIT SUPPLY FAN (SF) OPERATES. T.C. SHALL COORD./CONFIRM UNIT SF CONTROL VOLTAGE FOR M.C. TO PROVIDE THE APPROPRIATE BPI VOLTAGE. THE BMS SHALL MONITOR BPI OPERATION WHERE BMS CONTACT PROVIDED

SUPPLY AIR TEMPERATURE CONTROL:

THE BMS SHALL RESET THE DISCHARGE SUPPLY AIR TEMPERATURE BASED UPON THE OUTDOOR AIR TEMPERATURE AS FOLLOWS:

73°F FOR COOLING (IF COOLING AVAILABLE) AND 71°F FOR HEATING (BOTH ADJUSTABLE @ BMS/COS) THE BMS SHALL RESET THE DISCHARGE AIR TEMPERATURE BASED UPON OUTDOOR AIR TEMPERATURE AS FOLLOWS: THE DISCHARGE AIR TEMPERATURE SHALL BE 60°F (ADJUSTABLE @ BMS/COS) WHEN THE OUTDOOR AIR TEMPERATURE IS 50°F (ADJUSTABLE @ BMS/COS) OR GREATER. THE DISCHARGE AIR TEMPERATURE SHALL BE 90°F (ADJUSTABLE @ BMS/COS) WHEN THE OUTDOOR AIR TEMPERATURE

IS 49°F (ADJUSTABLE @ BMS/COS) AND BELOW. THE DISCHARGE AIR TEMPERATURE SHALL BE ACHIEVED BY WAY OF THE BMS CONTROLLING IN SEQUENCE THE HOT WATER HEATING COIL CONTROL VALVE/HEATING COIL PUMP, THE CHILLED WATER/DX COOLING CONTROL VALVE (WHERE AVAILABLE), THE OUTDOOR AIR DAMPER POSITION, AND THE RETURN AIR DAMPER POSITION.

OUTDOOR VENTILATION AIRFLOW CONTROLS:

DURING THE OCCUPIED MODE THE OUTDOOR AIRFLOW RATE SHALL BE MODIFIED BASED UPON CARBON DIOXIDE (CO2) LEVELS. CO2 SENSOR(S), LOCATED IN THE RETURN AIR DUCT(S), OR WITHIN THE ZONE AS SHOWN ON THE PLANS (AVERAGED WHERE MULTIPLE), SHALL BE USED BY THE BMS TO VARY THE AMOUNT OF OUTDOOR AIR PROVIDED TO THE ZONE. THE BMS SHALL VARY THE POSITION OF THE OUTDOOR AIR INTAKE DAMPER AS REQUIRED TO MAINTAIN A CO2 LEVEL OF 900 PPM (ADJUSTABLE @ BMS/COS).

MINIMUM OUTDOOR AIR DURING OCCUPIED PERIODS --> THE OUTDOOR AIR DAMPER POSITION SHALL NOT BE ALLOWED TO DROP BELOW 15% OPEN (ADJUSTABLE AT THE BMS/COS) DURING THE OCCUPIED MODE. NOTE SPECIAL EXHAUST FAN CONTROL ON GYM AHU-G: AHU'S CORRESPONDING EXHAUST FAN(S) SHALL ENABLE UPON IT'S AHU OUTDOOR AIR DAMPER EXCEEDING 30% (ADJUSTABLE AT BMS/COS).

ECONOMIZER CONTROL (WHERE APPLICABLE):

NOTE THAT WHEN OUTDOOR AIR CONDITIONS ARE APPROPRIATE (BASED UPON OUTDOOR AND INDOOR ENTHALPY CONDITIONS) THE BMS SHALL INITIATE THE ECONOMIZER MODE TO OVER-RIDE THE OUTDOOR AIRFLOW CONTROLS. THE OUTDOOR AIR DAMPER, RETURN AIR DAMPER, AND SUPPLY AIR FAN SHALL ALL MODULATE BETWEEN MINIMUM OCCUPIED SETTINGS (ALL ADJUSTABLE VIA THE COS) AS REQUIRED TO MAINTAIN THE SCHEDULED DISCHARGE AIR SETPOINT. THE OUTDOOR AIR DAMPER WILL BE RESET TO IT'S MINIMUM POSITION IF THE ECONOMIZER FUNCTION IS DISABLED. IF THE AHU IS IN THE MORNING WARM-UP MODE, OR THE SUPPLY FAN IS OFF THE OUTDOOR AIR DAMPER SHALL BE

MORNING WARM-UP MODE: DURING OPTIMAL START, IF THE SPACE TEMP. IS 1.5°F (ADJUSTABLE AT BMS/COS) OR MORE BELOW THE OCCUPIED HEATING SETPOINT, A MORNING WARM-UP SEQUENCE SHALL BE ACTIVATED. THE SUPPLY FAN WILL START, THE OUTDOOR AIR DAMPER WILL REMAIN CLOSED, AND THE HOT WATER HEATING VALVE WILL MODULATE/OPERATE HEAT COIL PUMP TO MAINTAIN THE DISCHARGE AIR TEMPERATURE HEATING SETPOINT OF 100°F (ADJUSTABLE AT THE COS). THE MORNING WARM-UP MODE WILL TERMINATE WHEN THE SPACE TEMPERATURE REACHES THE OCCUPIED HEATING SETPOINT OR THE OCCUPIED TIME PERIOD HAS STARTED.

MORNING COOL DOWN (IF AHU HAS COOLING):

DURING OPTIMAL START, IF THE SPACE TEMP. IS 1.5°F (ADJUSTABLE AT COS) OR MORE ABOVE THE OCCUPIED HEATING SETPOINT, A MORNING COOL-DOWN SEQUENCE SHALL BE ACTIVATED. THE SUPPLY FAN WILL START, THE OUTDOOR AIR DAMPER WILL REMAIN CLOSED, AND THE CHILLED WATER COOLING VALVE WILL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE COOLING SETPOINT OF 52°F (ADJUSTABLE AT THE COS). THE MORNING COOL-DOWN MODE WILL TERMINATE WHEN THE SPACE TEMPERATURE REACHES THE OCCUPIED COOLING SETPOINT OR THE OCCUPIED TIME PERIOD HAS STARTED. DURING MORNING COOL DOWN ALL VAV BOXES AND ASSOCIATED PRIMARY DAMPERS AND HEATING COILS SHALL BE CONTROLLED FROM THEIR RESPECTIVE ROOM SENSOR - WHICH SHALL ALL BE SET TO 67 DEGREES (ADJUSTABLE AT

SHALL PROVIDE DETAILED A POINTS LIST IN THE BMS SHOP DRAWINGS.

THE FOLLOWING POINTS SHALL BE MONITORED AND ALARMED AT THE AHU DDC CONTROLLER AND BMS CENTRAL

OPERATOR STATION (COS) -1. OUTDOOR AIR TEMPERATURE / (HUMIDITY?).

2. RETURN AIR TEMPERATURE / (HUMIDITY?).

3. MIXED AIR TEMPERATURE.

4. DISCHARGE AIR TEMPERATURE/HUMIDITY. 5. FAN STATUS.

6. FAN SPEED. 7. DAMPER POSITIONS (OUTDOOR AIR, RETURN AIR). 8. HEATING (AND COOLING?) VALVE ACTUATOR POSITIONS.

9. HEATING COIL PUMP STATUS. 9. RETURN OR ROOM AIR CARBON DIOXIDE LEVELS.

10. FILTER DIFFERENTIAL PRESSURE STATUS.

11. BPI STATUS 12. ALL SENSORS (NORM/FAIL STATUS)

THE FOLLOWING POINTS SHALL BE AUTOMATICALLY RESET BY AND/OR MANUALLY ADJUSTABLE AT BMS CENTRAL

OPERATOR STATION (COS) -

1. DISCHARGE AIR TEMPERATURE SETPOINTS (SUPPLY AIR AND OUTDOOR AIR). 2. MINIMUM OCCUPIED MODE OUTDOOR AIR DAMPER POSITION.

3. MINIMUM/MAXIMUM OCCUPIED SUPPLY FAN SPEED.

4. FILTER DIFFERENTIAL PRESSURE SWITCH ALARM SETPOINT. 5. CARBON DIOXIDE LEVEL SETPOINT FOR OUTDOOR AIR CONTROL (DAMPER AND EF OPERATION).

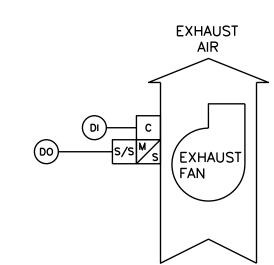
6. NIGHT TIME SET-BACK SETPOINTS. 7. NIGHT TIME SET-UP SETPOINTS?

8. MORNING WARM-UP SETPOINTS.

9. MORNING COOL-DOWN SETPOINTS (IF COOLING). 10. MIXED AIR TEMPERATURE FREEZE PROTECTION SETPOINT.

STARTUP & TRAINING 1. T.C. SHALL PROVIDE STARTUP ASSISTANCE TO M.C. AND TRAINER TO M.C./OWNER.

BID LEROY GYM AHU-G & EF-G WORK AS ADD ALTERNATE #L4



EXHAUST FAN CONTROL DIAGRAM

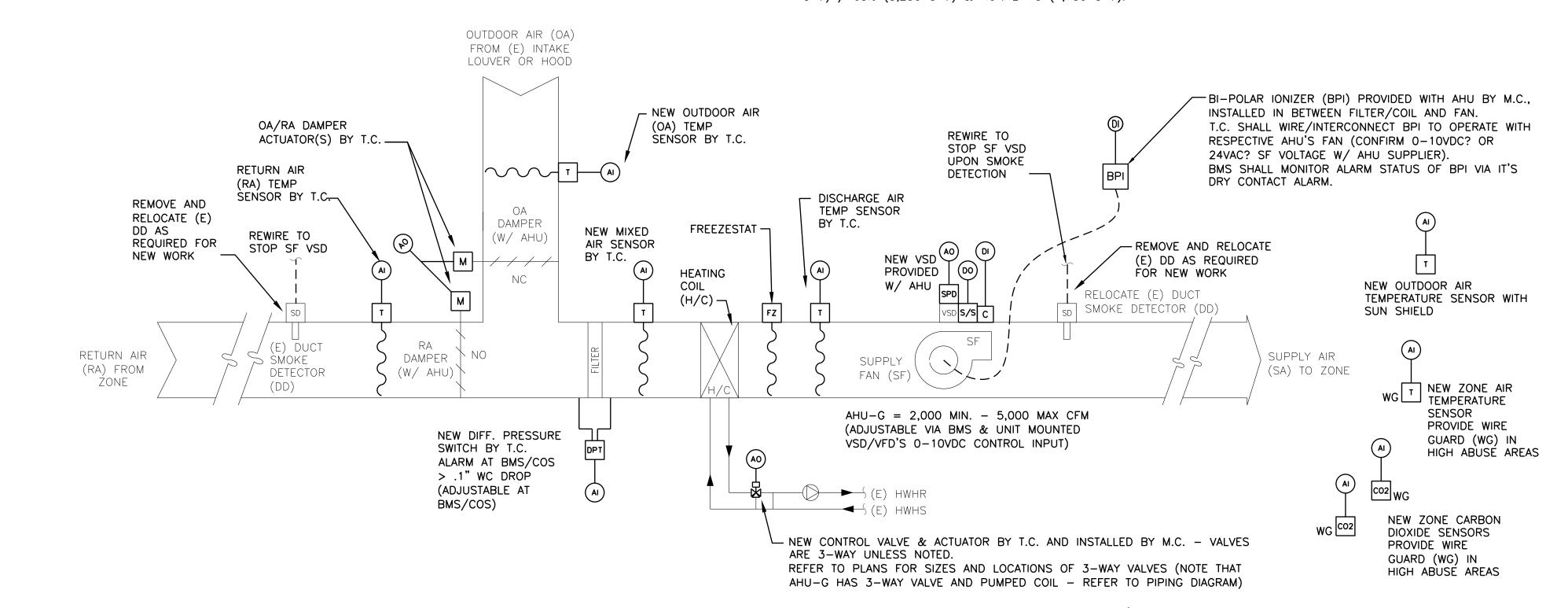
<u>SEQUENCE OF OPERATION: AHU-G & EXHAUST FAN EF-G CONTROL</u>

VENTILATION EXHAUST FANS -1. EXHAUST FANS SHALL OPERATE AS SCHEDULED BY THE BMS (OPERATE DURING OCCUPIED HOURS, OPERATE UPON OCCUPANCY SENSED BY OCC. SENSORS, OPERATE WHEN CO2 LEVELS RISE ABOVE 900 PPM, ETC...AND BE DISABLED DURING UNOCCUPIED HOURS).

2. EACH EXHAUST FAN'S OPERATION SHALL BE PROVEN TO THE BMS BY NEW CURRENT MOTOR SENSORS. BMS SHALL ALARM UPON FAN FAILURE. EACH EXHAUST FAN'S OPERATION SHALL BE VIEWABLE AT THE COS AND EACH FAN'S SCHEDULE SHALL BE INDIVIDUALLY ADJUSTABLE AT THE COS.

3. THE LEROY GYM'S AHU-G VENTILATION EXHAUST FAN EF-G SHALL ALSO BE CONTROLLED IN CONCERT WITH THEIR RESPECTIVE AHU SEQUENCE OF OPERATION. CONTROL GYM AHU-G'S OA VENTILATION VIA BMS USING 2-TIER SYSTEM:

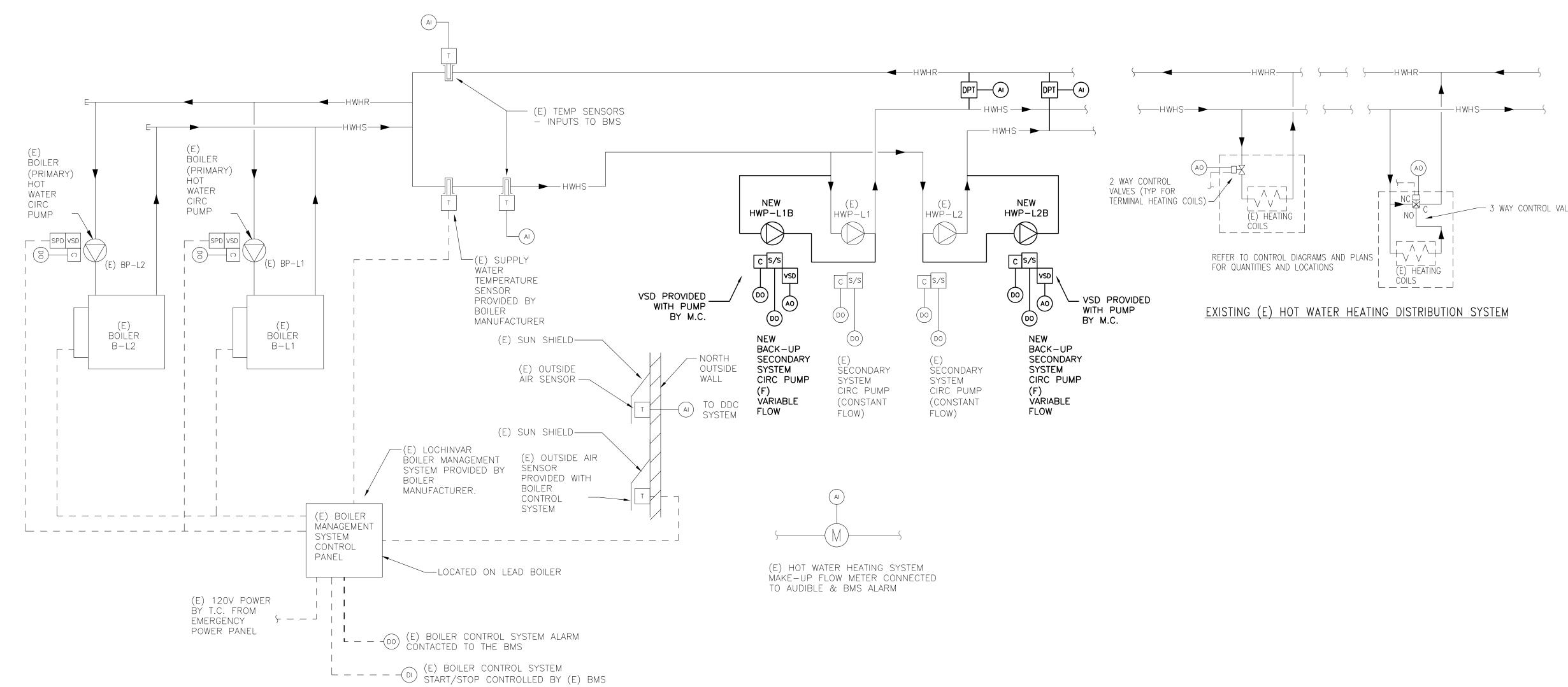
TIER #1: OCCUPANCY SCHEDULE OR OCCUPANCY SENSORS (BY T.C.) = DRIVE OA/RA DAMPER @ 15% (750 CFM) / 85% (4,250 CFM). TIER #2: IF/WHEN ROOM CO2 RISE ABOVE 900 PPM (ADJUSTABLE AT BMS) = DRIVE OA/RA DAMPER TO 35% (1,750 CFM) / 65% (3,250 CFM) & RUN EF-G (1,750 CFM).



SINGLE ZONE VARIABLE VOLUME AIR HANDLING UNIT CONTROL DIAGRAM - LEROY GYM AHU-G / EF-G

NO SCALE





<u>HOT WATER HEATING SYSTEM CONTROL DIAGRAM — LEROY ELEMENTARY BOILER REPLACEMENT</u> NO SCALE

						PU	MP SC	HEDULI	E			
UNIT I.D.	SYSTEM	LOCATION	TYPE	FLOW GPM	HEAD		MOTOR		ELECT	RICAL	MODEL NO.	REMARKS
	SERVED		_	30%GLYCOL	FT.	BHP	HP	RPM	VOLTS	PHASE	WIODEL INO.	INCIMINING
(E)HP-L1	(E)SECONDARYHEATING OLD 1966 SYSTEM	LEROY BOILER ROOM	IN-LINE CIRCULATOR CLOSE COUPLED	75	35	1.2	2	1750	208	3	(E)TACO 1941E1E11 6.2¢ IMPELLER	THIS IS (E) SYSTEM PUMP (1966 ZONE) CONSTANT FLOW — CONTROLLED BY BMS
(E)HP-L2	(E)SECONDARYHEATING 1996 SYSTEM	BOILER ROOM	IN-LINE CIRCULATOR CLOSE COUPLED	80	45	1.6	2	1750	208	3	(E)TACO 1941E1E11 6.8¢ IMPELLER	THIS IS (E) SYSTEM PUMP (1996 ZONE) CONSTANT FLOW — CONTROLLED BY BMS
HP-L1B	NEW BACKUP OLD 1966 SYSTEM	LEROY BOILER ROOM	IN-LINE CIRCULATOR CLOSE COUPLED	75 30–120	35 65?-50?	2.4	3 HP	1750	208	3	TACO 1941 + VFD 2×2 & 7.4ø? IMPEL.	NEW 1966 ZONE BACK-UP PUMP SEE NOTES
HP-L2B	NEW BACKUP 1996 SYSTEM	LEROY BOILER ROOM	IN-LINE CIRCULATOR CLOSE COUPLED	80 30-120	45 65?-50?	2.4	3 HP	1750	208	3	TACO 1941 + VFD 2×2 & 7.4ø? IMPEL.	NEW 1996 ZONE BACK-UP PUMP SEE NOTES
NOTES:		ADE TAGO	LINLESS NOTED O	T5565				PF	ROVIDE 3	HP MO	TOR ON NEW BACK-UP P	

1. ALL MODEL NUMBERS ARE IACO, UNLESS NOTED OTHERWISE. 2. TACO 1941: CAST IRON BODY WITH IN-LINE FLANGED CONNECTIONS; IMPELLER = ONE PIECE CAST S.S., CLOSED, DYNAMICALLY BALANCED; CLOSED COUPLE DIRECT DRIVEN IN-LINE PUMP; 416 S.S. SHAFT; MECHANICAL SEAL; 175 PSIG WORKING PRESSURE; PUMP FLANGES WITH PRESSURE GAUGE TAPS.

3. PROVIDE WITH PREMIUM EFFICIENCY MOTOR, INVERTER DUTY FOR POTENTIAL/FUTURE VARIABLE SPEED/FLOW CONTROL. 4. PROVIDE PUMP WITH NEW VFD/VSD (TACO #ATV212HU22M3X?), INTEGRALLY MOUNTED ON/WITH THE PUMP (OR SHIPPED LOOSE FOR FIELD MOUNTING?). 4:1 PUMP TURN DOWN RATIO; 15 HZ MINIMUM DRIVE FREQUENCY; VFD SHALL HAVE RELAY TO START/STOP & 0-10V SPEED CONTROL INPUT FOR CONTROL FROM EXISTING BMS

HOT WATER HEATING SYSTEM CONTROL SEQUENCE

1. EXISTING (E) BOILER MANAGEMENT CONTROL SYSTEM: THE BOILERS ARE CONTROLLED BY AM (E) BOILER MANAGEMENT CONTROL SYSTEM (BCS) THE (BCS) SHALL PERFORM THE FOLLOWING:

1A. THE BOILER MANAGEMENT CONTROL (BCS) SYSTEM SHALL SHALL ACTIVATE/DE-ACTIVATE AND CYCLE EACH BOILER INDIVIDUALLY IN SEQUENCE TO MAINTAIN THE HOT WATER HEATING SUPPLY TEMPERATURE SET POINT AS SENSED BY THE SUPPLY WATER TEMPERATURE SENSOR (PROVIDED BY THE BOILER MFR) AND THE OUTDOOR AIR TEMPERATURE SENSOR (PROVIDED BY THE BOILER MFR).

1B. EACH BOILER'S PRIMARY CIRCULATING PUMP SHALL BE WIRED THROUGH A RELAY IN THE BOILER MANAGEMENT SYSTEM TO OPERATE UPON BOILER START, BE SPEED CONTROLLED VIA (BCS) OUTPUT

AND INTEGRAL VSD ON BOILER PUMP, AND DEACTIVATE UPON BOILER STOP. 1C. THE (BCS) SHALL MAINTAIN AN ADJUSTABLE TIME DELAY BETWEEN BOILER START-UP AND

SHUT-DOWN TO PREVENT SHORT CYCLING. 1D. THE (BCS) SHALL LEAD/LAG THE BOILERS TO PROVIDE EQUAL AMOUNT OF RUN TIME.

1E. THE (BCS) SHALL RESET (ADJUSTABLE VIA CONTROL PANEL) THE SUPPLY WATER TEMPERATURE BASED UPON OUTDOOR AIR TEMPERATURE USING A MFR SUPPLIED OUTDOOR AIR TEMPERATURE SENSOR. THE RESET SUPPLY TEMPERATURE MAY ALSO BE RESET BY THE DDC/BMS VIA A TARGET SUPPLY TEMPERATURE SETPOINT CONTACT IN THE BOILER MANAGEMENT SYSTEM'S CONTROL PANEL.

1F. THE (BCS) SHALL BE CONNECTED TO THE DDC BASED BUILDING MANAGEMENT SYSTEM (BMS) VIA A "BMS GATEWAY" OPTION PROVIDED WITH/ON THE (BCS). THE (BCS) SHALL BE STARTED/STOPPED BY THE (BMS) CONTROLS SYSTEM WHENEVER THE OUTDOOR AIR TEMPERATURE DROPS BELOW 60°F (ADJUSTABLE VIA COS) VIA A CONTACT IN THE BOILER MANAGEMENT SYSTEM'S CONTROL PANEL.

1G. THE DDC/BMS SHALL MONITOR THE ALARM STATUS OF THE (BCS) VIA A CONTACT IN THE BOILER MANAGEMENT SYSTEM CONTROL PANEL.

2. SECONDARY (SYSTEM) PUMP CONTROL:

2A. ONE OF THE TWO SECONDARY HOT WATER HEATING CIRCULATING PUMPS SHALL BE DESIGNATED AS "LEAD" PUMP AND THE OTHER PUMP SHALL BE DESIGNATED AS "STANDBY" PUMP THROUGH OPERATOR INPUT TO THE BMS (ADJUSTABLE @ COS).

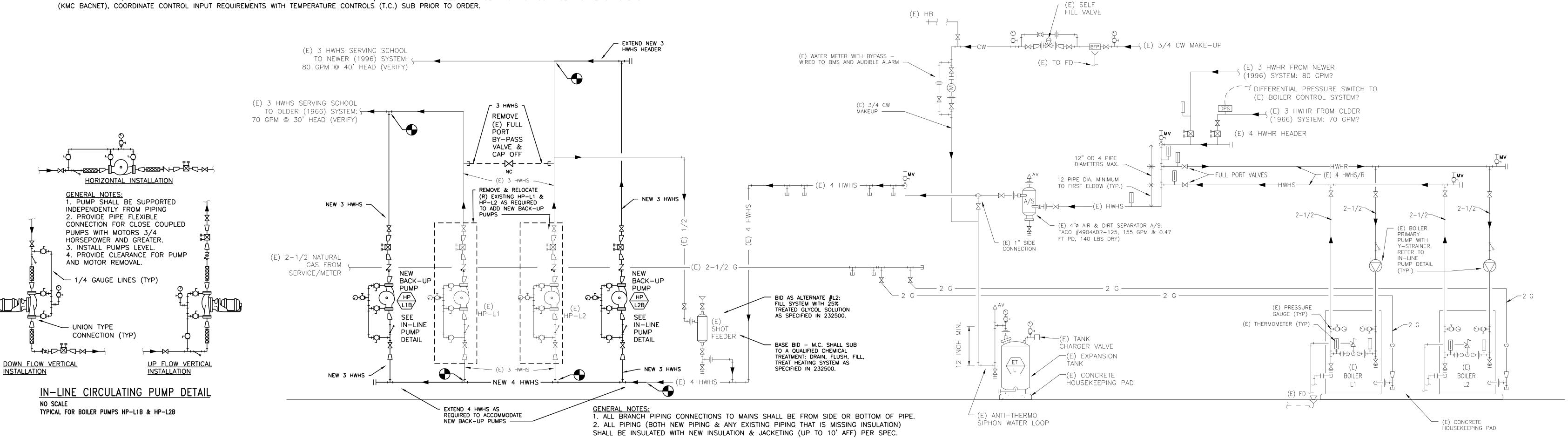
2B. EACH OF THE SECONDARY HOT WATER CIRCULATING PUMP ON/OFF STATUS SHALL BE PROVEN TO THE BMS BY MEANS OF THE PUMP'S MOTOR CURRENT SWITCH AND DISPLAYED AT THE COS. IF A "LEAD" PUMP HAS FAILED AS SENSED BY THE PUMP'S CURRENT SWITCH, THE BMS SYSTEM SHALL AUTOMATICALLY ENERGIZE THE "STANDBY" PUMP AND INDICATE A PUMP FAILURE ALARM TO THE COS. ONLY ONE PUMP SHALL RUN AT ANY TIME. THE "LEAD" PUMP AND "STANDBY" PUMP SHALL BE ALTERNATED EVERY 1000 HOURS THROUGH THE DDC SYSTEM.

2C. THE BMS SHALL START THE "LEAD" SECONDARY HOT WATER HEATING PUMP WHENEVER THE OUTDOOR AIR TEMPERATURE IS BELOW 60° F (ADJUSTABLE @ COS), AND SHALL RUN CONTINUOUSLY. 3. THE SECONDARY LOOPS HOT WATER HEATING SUPPLY AND RETURN TEMPERATURES SHALL BE MONITORED BY THE BMS VIA TEMPERATURE SENSORS AND DISPLAYED AT THE COS.

4. EACH BOILER'S PRIMARY HOT WATER CIRCULATING PUMP ON/OFF STATUS SHALL BE PROVEN TO THE BMS BY MEANS OF THE PUMP MOTOR CURRENT SWITCH AND DISPLAYED AT THE COS.

5. FOR SECONDARY SYSTEMS WITH VARIABLE FLOW CONTROL: THE BMS SHALL MODULATE THE SPEED OF THE SECONDARY PUMP VIA A NEW VSD/VFD, WITH DISCONNECT, TO BE PROVIDED WITH PUMP BY M.C. (T.C. SHALL COORDINATE CONTROL CONTACT REQUIREMENTS ON VSD/VFD DURING SHOP DRAWING PHASE FOR BMS CONTROL) AS REQUIRED TO MAINTAIN DIFFERENTIAL PRESSURE SETPOINTS (ADJUSTABLE @ COS) AS SENSED BY PRESSURE TRANSMITTERS LOCATED IN THE DISTRIBUTION PIPING SYSTEM - REFER TO PLANS FOR LOCATIONS/QUANTITIES.

6. THE BMS SHALL MONITOR THE HOT WATER HEATING SYSTEM MAKE-UP FLOW RATE VIA THE MAKE-UP WATER METER (PROVIDED BY THE CHEMICAL TREATMENT CONTRACTOR). THE DDC SYSTEM SHALL SIGNAL AN ALARM IF THE METER INDICATES MORE THAN 5 GALLON OF MAKE-UP RATE (ADJUSTABLE).



LEROY ELEMENTARY SCHOOL HOT WATER HEATING SYSTEM PIPING DIAGRAM

3. ALL ELECTRICAL ITEMS TO BE REMOVED SHALL BE REMOVED COMPLETE WITH ALL RELATED ITEMS INCLUDING, BUT NOT LIMITED TO, WIRES, CONDUITS, SUPPORTS, FIXTURES, LAMPS ETC. REMOVED ITEMS SHALL BE LEGALLY DISPOSED OF OFF

4. ANY INTERRUPTION OF EXISTING SERVICES AND/OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED, BY THE OWNER OR OWNER'S REPRESENTATIVE, AT LEAST (7) DAYS IN ADVANCE SO AS NOT TO INTERFERE WITH THE PRESENT BUILDING OPERATION.

5. WHERE DEMOLITION OF EXISTING SERVICES ARE REQUIRED TO ACCOMMODATE THE PROJECT PHASING/SCHEDULING, AND SERVICES ARE TO BE INTERRUPTED IN AREAS THAT ARE REMAINING OCCUPIED, THE CONTRACTOR SHALL PROVIDE TEMPORARY SERVICES/CONNECTIONS TO THE OCCUPIED AREAS TO MAINTAIN ITS PRESENT OPERATION. IF SYSTEM SHUT DOWNS ARE REQUIRED. THE CONTRACTOR SHALL SCHEDULE WORK TO BE PERFORMED AT UNOCCUPIED HOURS.

6. ALL ITEMS TO BE REMOVED AND/OR RELOCATED SHALL BE REMOVED AND/OR RELOCATED TOGETHER WITH ALL RELATED ITEMS AS REQUIRED BY THE NEW WORK TO BE PERFORMED

7. CONTRACTOR SHALL COORDINATE ALL REMOVAL AND/OR RELOCATION WITH THE EXTENT OF THE NEW WORK AND WITH ALL OTHER TRADES INVOLVED.

8. INSTALL STAINLESS STEEL BLANK COVER PLATES AT ALL LOCATIONS WHERE DEVICES (SWITCHES, RECEPTACLES, FIRE ALARM, ETC.) ARE TO BE REMOVED.

9. EACH SUBCONTRACTOR IS RESPONSIBLE FOR REMOVING AND REPLACING ANY/ALL CEILING TILES AND/OR GRID ASSOCIATED WITH THEIR WORK. THE RESPONSIBLE CONTRACTOR SHALL REPLACE/REPAIR ALL CEILING TILES AND/OR GRID DAMAGED DURING THE CONSTRUCTION WITH NEW CEILING TILES.

10.EACH SUBCONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING, CORING, PATCHING ASSOCIATED WITH THEIR WORK. CUTTING, CORING, PATCHING WORK SHALL BE PERFORMED BY A QUALIFIED CONTRACTOR AND MATCH EXISTING OR NEW FINISHES. **GENERAL ELECTRICAL POWER NOTES:**

1. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF WORK. THE CONTRACTOR SHALL PROVIDE AND INSTAL ALL MATERIALS (I.E. CONDUIT, WIRE, PULL BOXES, FIXTURES, ETC.) REQUIRED FOR A COMPLETE AND FUNCTIONAL SYSTEM.

2. ALL ELECTRICAL SYSTEMS SHALL BE PROVIDED/INSTALLED TO MEET APPLICABLE BUILDING CODES: MICHIGAN BUILDING CODE, MICHIGAN ELECTRICAL CODE, N.E.C., LIFE SAFETY CODE NFPA 101, MICHIGAN ENERGY CODE, ETC.

3. VERIFY REQUIREMENTS OF ALL MECHANICAL/PLUMBING/ARCHITECTURAL EQUIPMENT WITH SHOP DRAWING SUBMITTALS PRIOR TO INSTALLATION. NOTIFY THE ENGINEER OF ANY CONFLICTS BETWEEN SHOP DRAWINGS AND

4. COORDINATE LOCATIONS AND MOUNTING HEIGHTS OF ALL OUTLETS WITH LOCATIONS/HEIGHTS OF COUNTERTOPS, SINKS, FURNITURE, CABINETS, ETC. WITH ARCHITECTURAL ELEVATIONS AND OTHER TRADES.

CP

DISC

DWG

 EML

EMT

EUH

EWC

EWH

FLA

FU

GFI

GRD

GRS

HOA

KVA

KWH

MDP

MTD

MTR

P-A

TYP

UON

VFD

VSD

VARIABLE FREQUENCY DRIVE

VARIABLE SPEED DRIVE

WEATHERPROOF

TRANSFORMER

CU

5. COORDINATE REQUIREMENTS FOR FIRE ALARM SYSTEMS WITH FIRE PROTECTION SYSTEMS AND CONTRACTORS (E.G. DUCT SMOKE DETECTORS, FLOW SWITCHES, ETC.)

6. PROVIDE/INSTALL ALL MISCELLANEOUS STEEL, STRUT, ETC. REQUIRED TO SUPPORT/HANG EQUIPMENT, CONDUIT, ETC. COORDINATE ATTACHMENTS WITH STRUCTURAL TRADES.

7. COORDINATE THE INSTALLATION OF ALL ELECTRICAL WORK WITH ALL OTHER TRADES. CONTRACTOR SHALL VERIFY ALL MECHANICAL AND ELECTRICAL CLEARANCES PRIOR TO FABRICATION OF ANY NEW WORK. ELECTRICAL EQUIPMENT, WIRING, ETC. SHALL NOT INTERFERE WITH MECHANICAL EQUIPMENT CLEARANCE SPACES.

8. ALL CIRCUITS FOR POWER, LIGHTING, FIRE ALARM, ETC. SHALL BE INSTALLED IN CONDUIT AS SPECIFIED. ALL CIRCUITS SHALL BE CONCEALED IN WALLS, INCLUDING (E) WALLS. SURFACE MOUNTED RACEWAY SHALL NOT BE USED, UNLESS NOTED OTHERWISE, OR UNLESS ABSOLUTELY NECESSARY. APPROVAL FROM ARCHITECT/ENGINEER MUST BE OBTAINED PRIOR TO USING SURFACE MOUNTED RACEWAY.

9. EACH SUBCONTRACTOR IS RESPONSIBLE FOR REMOVING AND REPLACING ANY/ALL CEILING TILES AND/OR GRID ASSOCIATED WITH THEIR WORK. THE RESPONSIBLE CONTRACTOR SHALL REPLACE/REPAIR ALL CEILING TILES AND/OR GRID DAMAGED DURING THE CONSTRUCTION WITH NEW CEILING TILES.

10. UNLESS OTHERWISE NOTED, EACH SUBCONTRACTOR SHALL BE RESPONSIBLE FOR SEALING ALL NEW PENETRATIONS THROUGH ALL WALLS WITH FIRE CAULK IN ACCORDANCE WITH CURRENT BUILDING CODE REQUIREMENTS.

11.UNLESS OTHERWISE NOTED, EACH SUBCONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING, CORING, PATCHING ASSOCIATED WITH THEIR WORK. CUTTING, CORING, PATCHING WORK SHALL BE PERFORMED BY A QUALIFIED CONTRACTOR AND MATCH EXISTING OR NEW FINISHES.

12.REFER TO TEMPERATURE CONTROLS DIAGRAMS ON MECHANICAL PLANS FOR DETAILS OF WIRING AND CONTROLS OF MECHANICAL EQUIPMENT.

BRANCH	CIRCU	IT WII	RE SI	ZE/LE	NGTH	SCHE	DULE
MAX BRANCH		UIT LENG	TH (FEET)	TO LAST	CONNECT	ION IN TH	E CIRCUIT
CIRCUIT (AMPS)	50	75	100	125	150	300	
15	#12	#10	#10	#8	#6	#4	
20	#10	#10	#8	#6	#6	#3	
30	#8	#8	#6	#4	#4	# 1	

NOTES: REFER TO SPECIFICATIONS FOR WIRE TYPE. 2. SCHEDULE IS BASED UPON A MAX 3% VOLTAGE DROP ON 115-120V/1ø CIRCUITS. FOR LENGTHS BETWEEN TABLED VALUES – USE LONGER LENGTH.

RANCH	CIRCU	IT WII	RE SIZ	ZE/LE	NGTH	SCHE	DULE
AX BRANCH RCUIT (AMPS)	MAX CIRCUIT LENGTH (FEET) TO LAST CONNECTION IN THE CIRCUIT						
	50	75	100	125	150	< 300	< 500
15	#10	#10	#10	#10	#8	#4	#3
20	#10	#10	#10	#8	#6	#4	#2
30	#8	#8	#6	#6	#4	#2	#1

NOTES: 1. REFER TO SPECIFICATIONS FOR WIRE TYPE. 2. SCHEDULE IS BASED UPON A MAX 3% VOLTAGE DROP ON 208-240V/1ø CIRCUITS 3. FOR LENGTHS BETWEEN TABLED VALUES - USE LONGER LENGTH.

LEROY ELEMENTARY ALTERNATE BID ITEMS: ALTERNATE #L1 (ADDER) - ADDITION OF LEROY HEATING SYSTEM BACKUP PUMPS -STATE THE COST OF MATERIALS & LABOR REQUIRED FOR ADDING THE FOLLOWING WORK TO THE SCOPE OF THE PROJECT: ADDITION OF NEW LEROY ELEMENTARY HEATING SYSTEM BACKUP PUMPS HP-L1B & HP-L2B, AND ASSOCIATED PIPING/TEMP. CONTROLS/ELECTRICAL/ETC., AS SHOWN ON THE PLANS. ALTERNATE #L2 (ADDER) - ADDITION OF LEROY HEATING SYSTEM GLYCOL -STATE THE COST OF MATERIALS & LABOR REQUIRED FOR ADDING THE FOLLOWING WORK TO THE SCOPE OF THE PROJECT: ADDITION OF 25% GLYCOL/75% WATER SOLUTION TO THE LEROY HEATING SYSTEM. ALTERNATE #L3 (ADDER) - ADDITION OF NEW LEROY CAFETERIA ERV SYSTEM -STATE THE COST OF MATERIALS & LABOR REQUIRED FOR ADDING THE FOLLOWING WORK TO THE SCOPE OF THE PROJECT: NEW ENERGY RECOVERY VENTILATOR ERV-C, AND ASSOCIATED DUCTWORK/REHEAT COIL/TEMP. CONTROLS/ELECTRICAL/ETC., AS SHOWN ON THE PLANS. ALTERNATE #L4 (ADDER) - ADDITION OF NEW LEROY GYM AHU-G & EF-G -STATE THE COST OF MATERIALS & LABOR REQUIRED FOR ADDING THE FOLLOWING WORK TO THE SCOPE OF THE PROJECT: REMOVAL OF OLD LEROY GYM H&V UNIT AND NEW AHU-G, NEW EF-G, NEW CONTROLS, ELECTRICAL WORK, ETC. AS SHOWN ON THE PLANS.

ALTERNATE #L5 (ADDER) - ADDITION OF DX A/C COOLING COILS WITHIN THE NEW VUVS/HUVS FOR FUTURE COOLING -

STATE THE COST OF MATERIALS & LABOR REQUIRED FOR ADDING THE FOLLOWING WORK TO THE SCOPE OF THE PROJECT:

ADDITION OF DX A/C COOING COILS WITHIN THE NEW VUVs/HUVs AS SHOWN ON THE PLANS - (15) VUVs @ LEROY. (2) HUVs @ LEROY.

ELECTRICAL SYMBOL LIST ELECTRICAL ABBREVIATION LIST

<u>ABBREVIATION</u> **DESCRIPTION DESCRIPTION** <u>SYMBOL</u> AIR CONDITIONING CONDENSER FA FIXTURE TYPE AIR CONDITIONING UNIT ABOVE FINISHED FLOOR RECESSED LIGHT FIXTURE (2x4) ABOVE FINISHED GRADE AIR HANDLING UNIT RECESSED EMERGENCY LIGHT FIXTURE (2X4) AMPS INTERRUPTING CAPACITY BREAKER SURFACE MOUNTED LIGHT FIXTURE (2×4) BI POLAR IONIZER SURFACE MOUNTED EMERGENCY LIGHT FIXTURE CONDUIT CIRCUIT BREAKER CIRCUIT RECESSED LIGHT FIXTURE (2x2) COORD COORDINATE CIRCULATION PUMP CONDENSING UNIT RECESSED EMERGENCY LIGHT FIXTURE (2X2) DISCONNECT SURFACE MOUNTED LIGHT FIXTURE (2x2) DISTRIBUTION PANEL DRAWING SURFACE MOUNTED EMERGENCY LIGHT FIXTURE EXISTING EMERGENCY BATTERY UNIT PENDANT OR SURFACE MOUNTED LIGHT FIXTURE ELECTRICAL CONTRACTOR PENDANT OR SURFACE MOUNTED EMERGENCY LIGHT EXHAUST FAN EMERGENCY LIGHT ELECTRICAL METALLIC TUBING WALL MOUNTED LIGHT FIXTURE ELECTRIC UNIT HEATER ELECTRIC WATER COOLER DOWNLIGHT LIGHTING FIXTURE ELECTRIC WALL HEATER DOWNLIGHT EMERGENCY LIGHTING FIXTURE WALL MOUNTED LIGHTING FIXTURE FIRE ALARM SUBCONTRACTOR WALL SCONCE FIRE SUPPRESSION SUBCONTRACTOR FAN COIL CEILING MOUNTED LIGHTING FIXTURE FULL LOAD AMPS OUTDOOR WALL MOUNTED LIGHTING FIXTURE GROUND FAULT INTERRUPTER EMERGENCY LIGHTING UNIT GROUND GALVANIZED RIGID STEEL EXIT LIGHTING FIXTURE WITH EMERGENCY EGRESS LIGHTING AND BATTERY HAND-OFF-AUTO HORSEPOWER EXIT LIGHTING FIXTURE WITH DIRECTIONAL ARROWS SHADED AREA INDICATES FACE EXIT LIGHTING FIXTURE WITH DIRECTIONAL ARROWS ISOLATED GROUND SHADED AREA INDICATES FACE JUNCTION BOX EXIT LIGHTING FIXTURE - WALL MOUNTED KILO VOLT-AMPERES REMOTE EMERGENCY EXIT DISCHARGE LIGHT KILOWATT KILOWATT-HOURS SINGLE POLE TOGGLE SWITCH TWO POLE TOGGLE SWITCH LIGHTING CONTROLLER 3-WAY TOGGLE SWITCH LIGHTING PANEL 4-WAY TOGGLE SWITCH MAKE-UP AIR UNIT OCCUPANCY SENSOR WALL SWITCH MECHANICAL CONTRACTOR MINIMUM CIRCUIT AMPS VACANCY SENSOR WALL SWITCH MAIN CIRCUIT BREAKER DIMMER SWITCH MAIN DISTRIBUTION PANEL 3-WAY DIMMER SWITCH MAX FUSE AMPS MAX FUSE SIZE OCCUPANCY SENSOR DIMMER WALL SWITCH MAIN LUGS ONLY MOUNTED VACANCY SENSOR DIMMER WALL SWITCH MOTOR DIGITAL SWITCH NORMALLY CLOSED T-STAT (BY OTHERS) ROUGHED IN BY E.C. @ 52" NATIONAL ELECTRIC CODE AFF WITH CONDUIT PATHWAY TO EQUIPMENT NON-FUSIBLE CONTROLS CONNECTION - COORD. WITH NOT IN CONTRAC MECHANICAL TRADES NIGHT LIGHT NORMALLY OPEN NOT TO SCALE PANEL "A" WITH MECHANICAL TRADES PLUMBING CONTRACTOR PRIOR TO ROUGH-IN RELOCATED ŘECEPT RECEPTACLE WITH MECHANICAL TRADES ROOF TOP HVAC UNIT MANUAL FIRE ALARM STATION SMOKE DETECTOR SMOKE DETECTOR SPEC SPECIFICATION DUCT SMOKE DETECTOR SWBD SWITCHBOARD FIRE ALARM CONTROL PANEL TEMPERATURE CONTROLS SUBCONTRACTOR TELECOM TELECOMMUNICATIONS FAA FIRE ALARM ANNUNCIATOR PANEL **TYPICAL** UNIT HEATER UNLESS OTHERWISE NOTED ULTRAVIOLET RADIATION (GERMICIDAL) $\mathsf{UV}\mathsf{-C}$ U/G UNDERGROUND (BELOW GRADE)

SYMBOL DESCRIPTION SINGLE PHASE MOTOR THREE PHASE MOTOR /@/ COMBINATION MOTOR STARTER WITH DISCONNECT VARIABLE SPEED DRIVE COMBINATION MOTOR STARTER WITH DISCONNECT SWITCH NON-FUSABLE DISCONNECT SWITCH FUSIBLE DISCONNECT SWITCH HORSE POWER RATED SWITCH PUSH BUTTON STATION JUNCTION BOX HARD WIRE POWER CONNECTION CONDUIT UP CONDUIT DOWN COMBINATION TELE/DATA OUTLET - ROUGH-IN

ONLY. NO CABLE DROP COMBINATION TELE/DATA OUTLET - 2 CABLE COMBINATION TELE/DATA OUTLET MOUNTED 6" ABOVE COUNTERTOP - ROUGH-IN ONLY NO CABLE TELECOMMUNICATIONS BACKBOARD

XXXXXXDUPLEX RECEPTACLE DUPLEX RECEPTACLE WITH DUAL USB CHARGING DUPLEX RECEPTACLE TAMPER RESISTANT - SIMILAR FOR ISOLATED GROUND, EMERGENCY AND GFI RECEPTACLES

> DUPLEX RECEPTACLE MOUNTED AT 48" ABOVE FLOOR (UNLESS NOTED OTHERWISE) - SIMILAR FOR ISOLATED GROUND, EMERGENCY AND GFI RECEPTACLES QUAD RECEPTACLE

DUPLEX RECEPTACLE MOUNTED 6" ABOVE COUNTERTOP OR AS REQUIRED TO ACCOMMODATE

COUNTERS - REFER TO ARCHITECTURAL ELEVATIONS DUPLEX RECEPTACLE - GROUND FAULT INTERRUPTER

DUPLEX RECEPTACLE - GROUND FAULT INTERRUPTER - MOUNTED 6" ABOVE COUNTERTOP OR AS REQUIRED TO ACCOMMODATE COUNTERS -REFER TO ARCHITECTURAL ELEVATIONS DUPLEX RECEPTACLE - GROUND FAULT

INTERRUPTER - WEATHERPROOF COVER DUPLEX RECEPTACLE - GROUND FAULT INTERRUPTER - DEAD-FRONT COVER DUPLEX RECEPTACLE ISOLATED GROUND QUAD RECEPTACLE ISOLATED GROUND

TWIST TIMER

DISTRIBUTION PANEL

UTILITY CT CABINET

TRANSFORMER

UTILITY METER

SPECIAL RECEPTACLE - NEMA CONFIGURATION AS $\Phi \Phi \Phi$ MULTI-OUTLET RACEWAY

CIRCUIT BREAKER CARBON DIOXIDE SENSOR (BY OTHERS) ROUGHED IN BY E.C. @ 52" AFF WITH CONDUIT PATHWAY TO EQUIPMENT CONTROLS CONNECTION - COORD. FUSE

NODE TEMPERATURE SENSOR (BY OTHERS) ROUGHED IN BY E.C. @ 52" AFF WITH CONDUIT PATHWAY TO GROUND EQUIPMENT CONTROLS CONNECTION - COORD. TRANSIENT VOLTAGE SURGE SUPPRESSION

REMOTE TEST STATION FOR DUCT DETECTOR

PROJECT ABBREVIATIONS: PRAS = PINE RIVER AREA SCHOOLS (OWNER) MS = MIDDLE SCHOOL

LE/LES = LEROY ELEMENTARY SCHOOL

STANDARD MOUNTING HEIGHTS

HS = HIGH SCHOOL

CONVENIENCE AND SPECIAL PURPOSE RECEPTACLE OUTLETS, TELE/DATA AND COMMUNICATIONS OUTLETS, NOT OTHERWISE SPECIFIED:

• 18" AFF TO THE MIDDLE OF BOX 16" AFF TO BOTTOM OF BOX IN CMU WALLS

48" AFF TO THE TOP OF BOX IN CMU WALLS

CONVENIENCE AND SPECIAL PURPOSE RECEPTACLE OUTLETS, TELE/DATA AND COMMUNICATIONS OUTLETS LOCATED IN CLASS 1 LOCATIONS: 24" AFF TO BOTTOM OF BOX.

CONVENIENCE AND SPECIAL PURPOSE RECEPTACLE OUTLETS ABOVE COUNTERS, NOT OTHERWISE SPECIFIED: 6" ABOVE COUNTER TO CENTER OF BOX OR AS REQUIRED TO ACCOMMODATE COUNTERS. (REFER TO ARCHITECTURAL ELEVATIONS.)

LIGHT SWITCHES, MOTOR CONTROL DEVICES, ETC., NOT OTHERWISE SPECIFIED: 48" AFF TO THE MIDDLE OF BOX

T-STATS, TEMP. SENSORS, CO2 SENSORS, NOT OTHERWISE SPECIFIED: • 48" AFF TO THE MIDDLE OF BOX 48" AFF TO THE TOP OF BOX IN CMU WALLS

GFI RECEPTACLES IN TOILET ROOMS AND JANITOR CLOSETS, NOT OTHERWISE 48" AFF TO TOP OF BOX.

LIGHTING AND RECEPTACLE BRANCH CIRCUIT PANELBOARDS AND LIGHTING CONTROLLERS: 6'-6" AFF TO TOP OF ENCLOSURE.

EO.1 ELECTRICAL TITLE SHEET

E2.1 ELECTRICAL NEW WORK PLAN - PART "B" E2.2 LIGHTING NEW WORK PLAN - PART "B"

E3.1 ELECTRICAL DETAILS

CIRCUIT HOMERUN TO PANEL "A" CIRCUIT #3 LIGHTING PANEL (LP = <240V) POWER PANEL (PP = >480V)

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METHODS OF NOTATION

CONSTRUCTION KEYED NOTE NUMBER DEMOLITION KEYED NOTE NUMBER - EXISTING SYSTEM COMPONENT TO BE 5----- NEW SYSTEM COMPONENT - EXISTING SYSTEM COMPONENT TO REMAIN — POINT OF NEW CONNECTION CIRCUIT HOMERUN (BACK TO PANEL "A" -REFER TO PANEL SCHEDULE)

ELECTRICAL DRAWING INDEX

E1.1 ELECTRICAL DEMOLITION PLAN - PART "B" E1.2 LIGHTING DEMOLITION PLAN - PART "B"

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