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DRAWINGS - ISSUED FOR PERMIT AND TENDER

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LIST OF DRAWINGS

MECHANICAL

M100 MECHANICAL SPECIFICATION-1
M101 MECHANICAL SPECIFICATION-2
M102 MECHANICAL SPECIFICATION-3
M103 MECHANICAL SPECIFICATION & LEGEND
M300 DEMOLITION WORK - HEAT RECOVERY UNIT
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M302 DEMOLITION WORK - DOMESTIC HOT WATER TANK
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M500 CONTROL SCHEMATIC AND EQUIPMENT SCHEDULES
M600 EQUIPMENT SCHEDULE
M700 STANDARDS DETAILS

ELECTRICAL

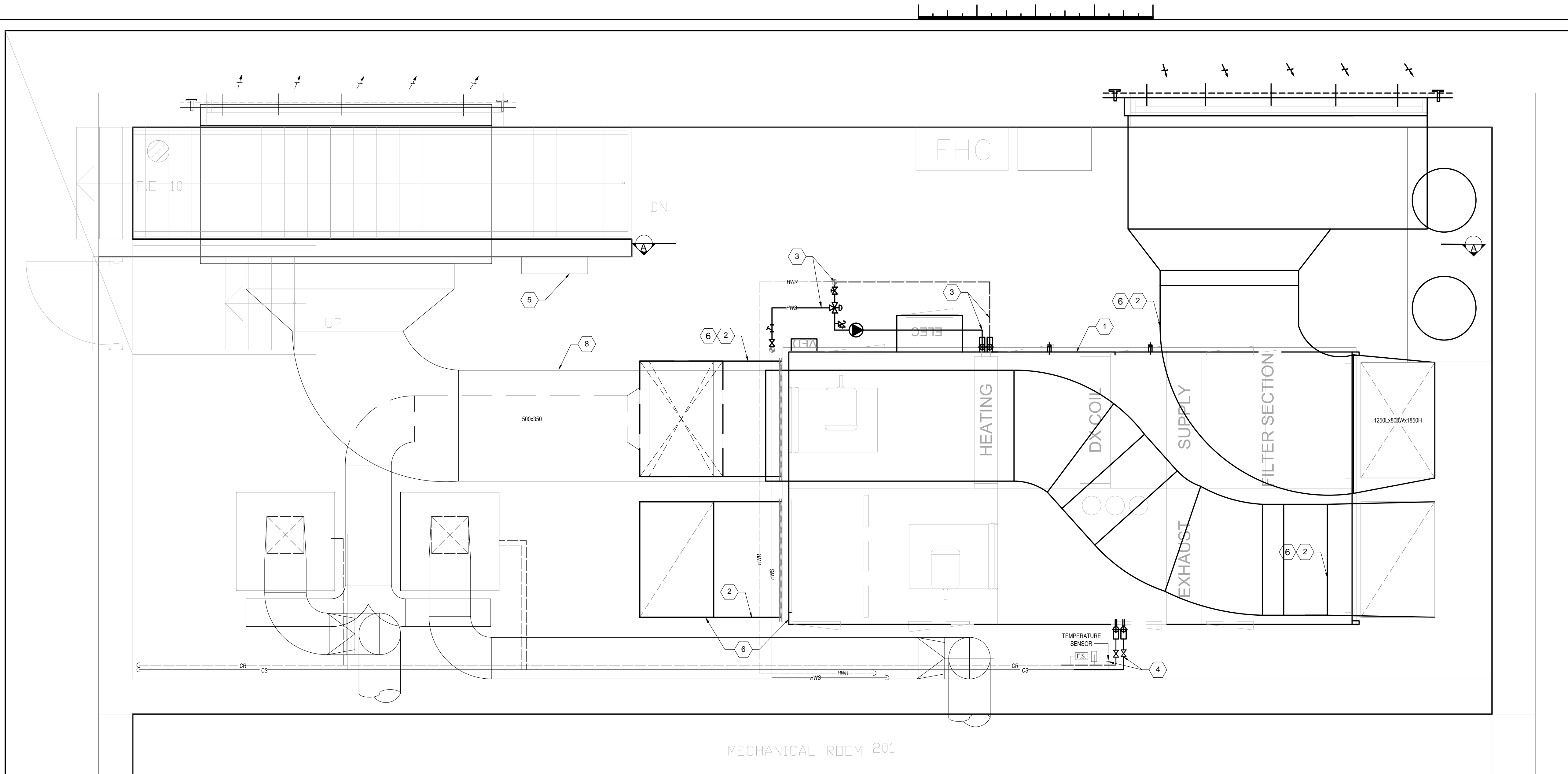
E-001 LEGEND & SPECIFICATIONS
E-002 SINGLE LINE DIAGRAM
E-100 POWER LAYOUT DEMOLITION WORKS - FIRST & SECOND FLOOR
E-200 POWER LAYOUT NEW WORKS - FIRST & SECOND FLOOR

STRUCUTRAL

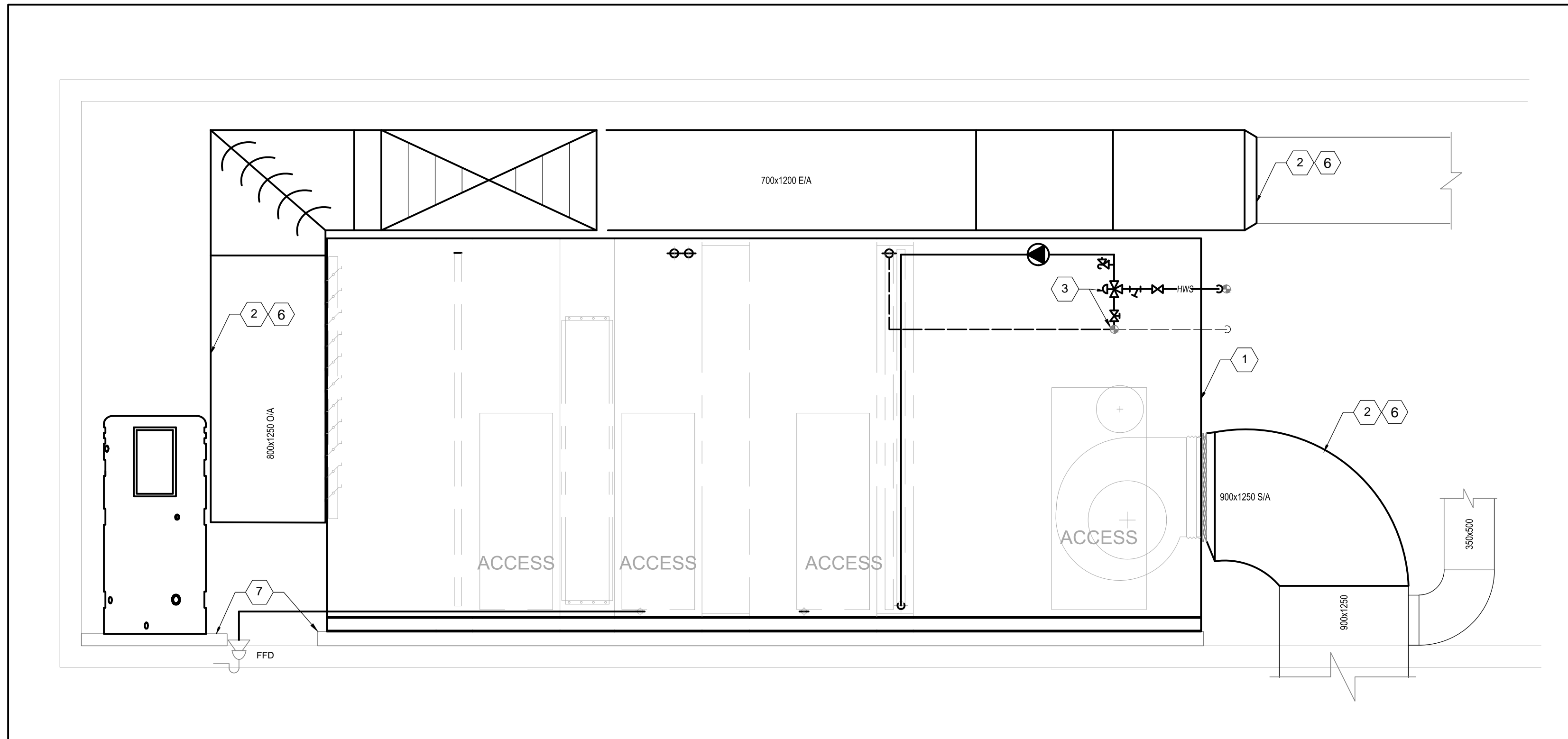
S-01 GENERAL NOTES AND SPECIFICATIONS
S-02 KEY PLAN AND DETAILS

BUILDING AUTOMATION SYSTEM & CONTROLS		BAS & CONTROLS (CONT'D)		BAS & CONTROLS (CONT'D)		BAS & CONTROLS (CONT'D)	
PART 1 GENERAL		PART 2 PRODUCTS		PART 2 PRODUCTS		PART 2 PRODUCTS	
1.1 GENERAL REQUIREMENTS		2.0 SYSTEM HARDWARE		2.1 AUTOMATIC CONTROL VALVES		POOLS	
1.1.A PROVIDE THE NECESSARY DESIGN, INSTALLATION, PROGRAMMING, SUPERVISION, COMMISSIONING AND OPERATOR TRAINING TO ENSURE FOR A COMPLETE AND FULLY OPERATIONAL SYSTEM.		2.1 GENERAL		2.1.A AUTOMATIC CONTROL VALVES SHALL BE SUPPLIED BY THE CONTROLS CONTRACTOR AND INSTALLED BY THE MECHANICAL CONTRACTOR.		2.4.5.D MOUNT SENSORS AT A HEIGHT OF 80" ABOVE THE FINISHED FLOOR, UNLESS INDICATED OTHERWISE, MOUNT NEW SENSORS ADJACENT TO THE EXISTING THERMOSTAT IN THE SPACE.	
1.1.B PERFORM AN IN-DEPTH REVIEW OF ALL EXISTING CONTROL COMPONENTS (E.G. CONTROL VALVES, CONTROL DAMPERS, LINKAGES, ACTUATORS, ETC.) TO BE RE-USED BY THE NEWLY INSTALLED BAS. IMMEDIATELY REPORT ANY DEFECTIVE OR INOPERATIVE COMPONENTS TO THE ENGINEER.		2.1.1 PRIMARY CONTROL UNITS (PCU)		2.1.B AUTOMATIC CONTROL VALVES, UNLESS OTHERWISE SPECIFIED, SHALL BE GLOBE TYPE VALVES. THE USE OF BALL VALVES IN SIZES 1-1/2" (40MM) AND SMALLER SHALL ALSO BE ACCEPTABLE. VALVES AND ACTUATORS SHALL BE ORDERED AS ONE FACTORY-ASSEMBLED AND TESTED UNIT.		2.4.5.E END-TO-END ACCURACY +/- 0.3 °C OVER THE ENTIRE OPERATING RANGE.	
1.1.C CO-ORDINATE THE WORK OF THE MECHANICAL CONTRACTOR (SEE SECTION 3.1) AND ALL SUB-CONTRACTORS REQUIRED TO COMPLETE THE SCOPE OF WORK AS SPECIFIED IN THE CONTRACT DOCUMENTS.		2.1.1.A USE ONLY PRIMARY CONTROL UNITS TO DIRECTLY CONTROL ANY MAJOR MECHANICAL EQUIPMENT. MAJOR MECHANICAL EQUIPMENT INCLUDES AIR HANDLING UNITS, BOILER PLANTS, CHILLER PLANTS, COOLING TOWERS, ROOF-TOP UNITS AND OTHER CRITICAL EQUIPMENT.		2.1.C SUBMIT TO THE ENGINEER FOR REVIEW, A VALVE SCHEDULE CONTAINING THE FOLLOWING INFORMATION FOR EACH VALVE:		2.4.5.F PROVIDE A HEAVY-DUTY METAL GUARD FOR EXISTING ZONE THERMOSTATS THAT REMAIN IN SERVICE. IN A TYPICALLY CLASSROOM, THIS WOULD BE A PNEUMATIC THERMOSTAT CONTROLLING A PERIMETER HEATING VALVE. IN THIS SITUATION, THE SPACE SENSOR IS MONITORING TEMPERATURE ONLY AND NOT DIRECTLY CONTROLLING AN END DEVICE.	
1.1.D THE CONTROLS CONTRACTOR AND ALL SUB-CONTRACTORS SHALL EMPLOY ONLY CERTIFIED TRADEPERSONS TO CARRY OUT ALL APPLICABLE WORK.		2.1.1.B FOR DELTA CONTROLS, EXAMPLES OF CONTROLLERS THAT SHALL BE ACCEPTED AS A PCU:		2.1.D VALVES 2" (50MM) AND SMALLER SHALL BE CONSTRUCTED OF BRONZE. VALVES 2 1/2" (65MM) AND LARGER SHALL HAVE IRON BODIES AND BRONZE MOUNTINGS.		2.4.5.G DO NOT MOUNT SENSORS ON OUTSIDE WALLS OR OTHER LOCATIONS INFLUENCED BY EXTERNAL THERMAL SOURCES (E.G. COMPUTERS, BOILER ROOMS).	
1.1.E PROVIDE HAND-OFF-AUTO (H-O-A) SWITCHES FOR EXISTING EQUIPMENT STARTERS WHERE SPECIFIED.		2.1.1.C FOR AUTOMATED LOGIC, EXAMPLES OF CONTROLLERS THAT SHALL BE ACCEPTED AS A PCU:		2.1.E ALL CONTROL VALVES SHALL HAVE STAINLESS STEEL STEMS. BALL VALVES SHALL BE EQUIPPED WITH STAINLESS STEEL BALLS AND STEMS.		2.4.5.H STANDARD OF ACCEPTANCE:	
1.1.F PROVIDE ALL NECESSARY POWER WIRING AND HARDWARE TO COMPLETE THE ENTIRE PROJECT, INCLUDING BUT NOT LIMITED TO, WIRING, FITTINGS, CONNECTORS, CONDUITS, HANGERS/SUPPORTS, BOX COVERS AND ALL OTHER ACCESSORIES REQUIRED TO ENSURE COMPLETE, SAFE AND FULLY OPERATIONAL SYSTEMS. THIS SHALL INCLUDE THE POWER WIRING FOR ALL THE EQUIPMENT INSTALLED BY THE MECHANICAL CONTRACTOR.		2.1.1.D EACH PCU SHALL CONTAIN A REAL TIME CLOCK AND SUFFICIENT MEMORY TO STORE THE ITS OWN APPLICATION DATABASE, OPERATING PARAMETERS, USER PROGRAMS AND TREND DATA STORAGE.		2.1.F THE BRONZE IN BODIES AND BONNETS OF ALL BRONZE VALVES SHALL CONFORM TO ASTM B62 FOR VALVES RATED UP TO 150PSIG (1035 KPA) WORKING PRESSURE AND TO ASTM B61 FOR VALVES RATED AT 200 PSIG (1380 KPA) WORKING PRESSURE.		ENERCORP, GREYSTONE	
1.1.G ARRANGE FOR ELECTRICAL AUTHORITY INSPECTION OF ALL ELECTRICAL WORK. ARRANGE FOR A SEPARATE INSPECTION OF ANY FIELD ASSEMBLED ELECTRICAL PANELS OR SYSTEMS THAT HAVE NOT BEEN PRE-APPROVED BY CSA/ULC. SUBMIT THE CERTIFICATE OF INSPECTION AND PRODUCT APPROVAL CERTIFICATE WITH THE AS-BUILT DOCUMENTATION.		2.1.1.E EACH PCU SHALL CONTAIN A REAL TIME CLOCK AND SUFFICIENT MEMORY TO STORE THE ITS OWN APPLICATION DATABASE, OPERATING PARAMETERS, USER PROGRAMS AND TREND DATA STORAGE.		2.1.G THE BODIES AND BONNETS OF IRON BODY VALVES SHALL CONFORM TO ASTM A126, CLASS B.		2.4.6 HEATING/COOLING THERMOSTATS (LOW VOLTAGE)	
1.1.H IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE WRITTEN NOTIFICATION TO THE KPRDSB PRIOR TO TENDER CLOSING, OF ANY ERRORS, OMISSIONS, DISCREPANCIES OR AMBIGUITIES CONTAINED IN THESE DOCUMENTS. FOLLOWING THE AWARD OF THE CONTRACT, KPRDSB RESERVES THE RIGHT TO ACT AS THE SOLE ARBITER OF ANY DISPUTES ARISING FROM THE INTERPRETATION OF THESE CONTRACT DOCUMENTS.		2.1.1.F EACH PCU SHALL CONTAIN A REAL TIME CLOCK AND SUFFICIENT MEMORY TO STORE THE ITS OWN APPLICATION DATABASE, OPERATING PARAMETERS, USER PROGRAMS AND TREND DATA STORAGE.		2.1.H CONTROL VALVE DISCS AND SEATS SHALL BE OF BRONZE FOR 100 °C OR LESS FLUID TEMPERATURE AND OF STAINLESS STEEL FOR FLUID TEMPERATURES ABOVE 100 °C.		2.4.6.A PROVIDE NEW THERMOSTATS TO REPLACE EXISTING WHERE SPECIFIED.	
1.2 APPROVED CONTROL SYSTEM MANUFACTURERS		2.1.1.G EACH PCU SHALL CONTAIN A REAL TIME CLOCK AND SUFFICIENT MEMORY TO STORE THE ITS OWN APPLICATION DATABASE, OPERATING PARAMETERS, USER PROGRAMS AND TREND DATA STORAGE.		2.1.I THE CONTROL VALVES SHALL HAVE TIGHT SHUT-OFF. FLAT DISK VALVES ARE NOT ACCEPTABLE.		2.4.6.B UNLESS INDICATED OTHERWISE, THERMOSTATS SHALL BE EQUIPPED WITH COILED BIMETAL SENSING ELEMENTS AND MERCURY SWITCHES. INDIVIDUAL HEATING AND COOLING SETPOINT LEVERS, MULTIPLE STAGES OF HEATING AND COOLING AS REQUIRED, ADJUSTABLE HEATING ANTICIPATOR AND FIXED COOLING ANTICIPATOR, SYSTEM AND FAN SWITCHING SUBBASE (OFF-HEAT-COOL-AUTO) AND KEY LOCK COVER WITH INTERNAL THERMOMETER.	
1.2.A ONLY APPROVED BUILDING AUTOMATION SYSTEMS WILL BE ACCEPTED. NO SUBSTITUTES OR ALTERNATES ARE ALLOWED. THE ACCEPTED SYSTEM MANUFACTURERS AND VENDORS ARE:		2.1.1.H EACH PCU SHALL CONTAIN A REAL TIME CLOCK AND SUFFICIENT MEMORY TO STORE THE ITS OWN APPLICATION DATABASE, OPERATING PARAMETERS, USER PROGRAMS AND TREND DATA STORAGE.		2.1.J CONTROL VALVES 2" (50MM) AND SMALLER SHALL BE COMPLETE WITH SCREWED ENDS TYPE, EXCEPT FOR BRONZE VALVES INSTALLED IN SOLDERED COPPER PIPING WHICH SHALL BE COMPLETE WITH SOLDERING ENDS. CONTROL VALVES LARGER THAN 2" (50MM) SHALL BE COMPLETE WITH FLANGED END TYPE AND PROPER FLANGED ADAPTERS TO COPPER SHALL BE PROVIDED WHERE FLANGED VALVES ARE INSTALLED IN COPPER PIPING.		2.4.6.C MOUNT NEW THERMOSTATS IN THE SAME LOCATION AS EXISTING.	
1. SETPOINT BUILDING AUTOMATION INC. 400 SPINNAKER WAY, UNIT#1 CONCORD, ONTARIO, L4K 5Y9 905-669-8012		2.1.1.I EACH PCU SHALL CONTAIN A REAL TIME CLOCK AND SUFFICIENT MEMORY TO STORE THE ITS OWN APPLICATION DATABASE, OPERATING PARAMETERS, USER PROGRAMS AND TREND DATA STORAGE.		2.1.K THE WATER CONTROL VALVES SHALL BE SIZED FOR A PRESSURE DROP OF 6 FT. WATER COLUMN OR AS INDICATED ON MECHANICAL DRAWINGS.		2.4.6.D THE STANDARD OF ACCEPTANCE SHALL BE HONEYWELL T874 WITH Q674E SUBBASE AND T6504A1025 KEY LOCK COVER WITH INTERNAL THERMOMETER.	
1.3 SHOP DRAWING SUBMITTALS		2.1.1.J EACH PCU SHALL CONTAIN A REAL TIME CLOCK AND SUFFICIENT MEMORY TO STORE THE ITS OWN APPLICATION DATABASE, OPERATING PARAMETERS, USER PROGRAMS AND TREND DATA STORAGE.		2.1.L THE ZONE STEAM CONTROL VALVES SHALL BE SIZED FOR THE RESPECTIVE STEAM FLOWS AND PRESSURE DROP OF 25% OF THE INLET ABSOLUTE MAXIMUM OPERATING PRESSURE.		2.4.6.E THE USE OF A FULLY PROGRAMMABLE, NATIVE BACNET, DIGITAL ROOM CONTROLLER SHALL BE ACCEPTED AS AN ALTERNATE TO THE THERMOSTAT IN 2.4.6.D. THE CONTROLLER SHALL BE EQUIPPED WITH A STYLIZED HOUSING SUITABLE FOR WALL MOUNTING IN FINISHED AREAS, AN LCD DISPLAY AND KEYPAD. THE STANDARD OF ACCEPTANCE SHALL BE DELTA DNT-T305.	
1.3.A PREPARE AND SUBMIT SIX (6) COPIES OF SHOP DRAWING MANUALS FOR THE REVIEW AND APPROVAL OF THE ENGINEER. UNDER NO CIRCUMSTANCES SHALL THE CONTROLS CONTRACTOR COMBINE SITE WORK PRIOR TO THE ACCEPTANCE OF SHOP DRAWINGS BY THE ENGINEER.		2.1.1.K EACH PCU SHALL CONTAIN A REAL TIME CLOCK AND SUFFICIENT MEMORY TO STORE THE ITS OWN APPLICATION DATABASE, OPERATING PARAMETERS, USER PROGRAMS AND TREND DATA STORAGE.		2.1.M EACH AUTOMATIC CONTROL VALVE MUST PROVIDE THE DESIGN OUTPUT AND FLOW RATES AT PRESSURE DROPS COMPATIBLE WITH EQUIPMENT SELECTED.		2.4.6.F RETURN EXISTING THERMOSTATS, WHERE REPLACED, TO THE ENGINEER.	
1.3.B THE CONTRACTOR SHALL INCLUDE WITH THE SHOP DRAWING SUBMITTAL, A LISTING OF ALL BAS PROGRAMMING CODE OR LOGIC DIAGRAMS FOR REVIEW BY THE ENGINEER. THIS REVIEW SHALL BE FOR GENERAL CONFORMANCE WITH THE DRAWINGS AND SPECIFICATIONS. ACCEPTANCE OF THE INITIAL PROGRAMMING SUBMISSION BY THE ENGINEER DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITIES UNDER 1.3.C BELOW.		2.1.1.L EACH PCU SHALL CONTAIN A REAL TIME CLOCK AND SUFFICIENT MEMORY TO STORE THE ITS OWN APPLICATION DATABASE, OPERATING PARAMETERS, USER PROGRAMS AND TREND DATA STORAGE.		2.1.N EACH AUTOMATIC CONTROL VALVE MUST BE SUITABLE FOR THE PARTICULAR SYSTEM WORKING PRESSURE.		2.4.7 CURRENT SENSORS (ANALOG)	
1.3.C THE ENGINEER AND/OR DESIGNATE SHALL CONDUCT A SUBSEQUENT DETAILED REVIEW OF PROGRAMMING CODE AND WORKSTATION GRAPHICS DURING THE SUBSTANTIAL COMPLETION INSPECTION OF THE WORK WHEN ALL SPECIFIED SYSTEMS AND EQUIPMENT ARE OPERATING UNDER BAS CONTROL. THE INTENT OF THIS REVIEW SHALL BE TO OPTIMIZE AND FINE-TUNE THE PROGRAMMED STRATEGIES, SETTINGS, PARAMETERS AND WORKSTATION GRAPHICS. THE CONTRACTOR SHALL MAKE ADDITIONAL MODIFICATIONS AND/OR CHANGES TO THE PROGRAMMING CODE AND/OR WORKSTATION GRAPHICS AS DIRECTED BY THE ENGINEER.		2.1.1.M EACH PCU SHALL CONTAIN A REAL TIME CLOCK AND SUFFICIENT MEMORY TO STORE THE ITS OWN APPLICATION DATABASE, OPERATING PARAMETERS, USER PROGRAMS AND TREND DATA STORAGE.		2.1.O EACH AUTOMATIC CONTROL VALVE SHALL BE FITTED WITH A POSITION INDICATOR.		2.4.7.A CURRENT SENSORS (CT) SHALL BE USED FOR STATUS MONITORING OF ALL MOTOR-DRIVEN EQUIPMENT, WHERE SPECIFIED.	
1.3.D THE SHOP DRAWING SUBMITTAL SHALL INCLUDE THE FOLLOWING:		2.1.1.N EACH PCU SHALL CONTAIN A REAL TIME CLOCK AND SUFFICIENT MEMORY TO STORE THE ITS OWN APPLICATION DATABASE, OPERATING PARAMETERS, USER PROGRAMS AND TREND DATA STORAGE.		2.1.P ALL THE SAME TYPE CONTROL VALVES SHALL BE THE PRODUCTS OF A SINGLE MANUFACTURER AND HAVE THE MANUFACTURER'S NAME, PRESSURE RATING AND SIZE CLEARLY MARKED ON THE OUTSIDE OF THE BODY.		2.4.7.B TECHNICAL PERFORMANCE - OUTPUT SHOULD BE ONLY 4-20MA ONLY. VOLTAGE OUTPUT WILL NOT BE ACCEPTED. END-TO-END ACCURACY +/- 1% OF FULL SCALE AT EACH RANGE.	
1. CONTROL SCHEMATICS FOR EACH SYSTEM		2.1.1.O EACH PCU SHALL CONTAIN A REAL TIME CLOCK AND SUFFICIENT MEMORY TO STORE THE ITS OWN APPLICATION DATABASE, OPERATING PARAMETERS, USER PROGRAMS AND TREND DATA STORAGE.		2.1.Q UNLESS OTHERWISE INDICATED AND EXCEPT THE STEAM ZONE CONTROL VALVES, CONTROL VALVES FOR PROPORTIONAL OPERATION SHALL HAVE EQUAL PERCENTAGE CHARACTERISTICS. WHILE THE CONTROL VALVES FOR OPEN/SHUT TWO-POSITION OPERATION SHALL HAVE STRAIGHT LINE FLOW CHARACTERISTICS.		2.4.7.C THE CURRENT SENSORS SHALL BE MOUNTED INSIDE THE STARTER CABINETS WHENEVER POSSIBLE. IF THIS IS NOT POSSIBLE DUE TO SPACE LIMITATION, PROVIDE AN ENCLOSURE TO HOUSE THE SENSOR.	
2. DETAILED SEQUENCE OF OPERATION FOR EACH CONTROLLED SYSTEM.		2.1.1.P EACH PCU SHALL CONTAIN A REAL TIME CLOCK AND SUFFICIENT MEMORY TO STORE THE ITS OWN APPLICATION DATABASE, OPERATING PARAMETERS, USER PROGRAMS AND TREND DATA STORAGE.		2.1.R THE ZONE STEAM CONTROL VALVES SHALL HAVE LINEAR CHARACTERISTICS.		2.4.7.D STANDARD OF ACCEPTANCE:	

BAS & CONTROLS (CONT'D)	BAS & CONTROLS (CONT'D)	BAS & CONTROLS (CONT'D)	BAS & CONTROLS (CONT'D)	BAS & CONTROLS (CONT'D)
<p>2.4.14 CURRENT SWITCHES</p> <p>2.4.14.A THE CURRENT SWITCH SHALL INDUCE POWER FROM THE MONITORED LOAD</p> <p>2.4.14.B THE CURRENT SENSOR SHALL PROVIDE ON/OFF STATUS INDICATION OF ELECTRICAL LOADS FROM 0.15 TO 60A (MINIMUM).</p> <p>2.4.14.C THE CURRENT SENSORS SHALL BE MOUNTED INSIDE THE STARTER CABINETS WHENEVER POSSIBLE. IF THIS IS NOT POSSIBLE DUE TO SPACE LIMITATION, PROVIDE AN ENCLOSURE TO HOUSE THE SENSOR.</p> <p>2.4.14.D THE CURRENT SENSOR SHALL BE ISOLATED TO 600VAC RMS (UL RATINGS), 300VAC RMS (CE RATINGS).</p> <p>2.4.14.E THE CURRENT SENSOR OUTPUT SHALL BE N.O., SOLID STATE, 1A @30VAC/DC</p> <p>2.4.14.F STANDARD OF ACCEPTANCE:</p> <p>a. VERIS INDUSTRIES - HAWKEYE H300H600</p> <p>2.4.15 FIRESTOPPING AND SMOKE SEAL MATERIALS</p> <p>2.4.15.A ASBESTOS-FREE ELASTOMERIC MATERIALS TESTED, LISTED AND LABELLED BY ULC IN ACCORDANCE WITH CAN-515-16-MRS. FOR INSTALLATION IN ULC DESIGNATED FIRESTOPPING AND SMOKE SEAL SYSTEMS. THESE SYSTEMS SHALL PROVIDE A POSITIVE FIRE, WATER AND SMOKE SEAL AND A FIRE- RESISTANCE RATING (FLAME, SMOKE HOSE STREAM AND TEMPERATURE) NOT LESS THAN THE FIRE RESISTANCE RATING OF SURROUNDING CONSTRUCTION.</p> <p>2.4.15.B MATERIALS SHALL FORM ULC LISTED OR UL CLASSIFIED ASSEMBLIES AND BE COMPATIBLE WITH ABUTTING DISSIMILAR MATERIALS AND FINISHES.</p> <p>2.4.15.C STANDARD OF ACCEPTANCE:</p> <p>a. 3M CANADA LIMITED</p> <p>b. AD FIRE PROTECTION SYSTEM LTD.</p> <p>c. FIRE STOP SYSTEM</p> <p>2.4.16 MOTOR STARTERS AND ACCESSORIES</p> <p>2.4.16.A STARTERS SHALL BE CSA AND ULC APPROVED.</p> <p>2.4.16.B STARTERS SHALL BE FULL VOLTAGE, NON-REVERSING MAGNETIC STARTERS. FULL PROTECTION IS TO BE PROVIDED IN THE STARTERS BY MEANS OF ONE THERMAL OVERLOAD RELAY PER PHASE PER STARTER WITH MANUAL RESET BUTTON TO SUIT THE SERVICE FACTOR AND ACCELERATION TIME OF THE MOTOR SERVED.</p> <p>2.4.16.C STARTERS SHALL BE EQUIPPED WITH AUXILIARY CONTACTS TO SATISFY INTERLOCKING AND AUTOMATIC CONTROL REQUIREMENTS. "HAND-OFF-AUTOMATIC" SWITCHES, PILOT LIGHTS (GREEN/ON, RED/OFF, THERMAL, OVERLOAD, NECESSARY FUSES AND CONTROL TRANSFORMER (IF REQUIRED) FOR OPERATION OF ALL CONTROLS ON 120V SINGLE PHASE.</p> <p>2.4.16.D WHEN REQUIRED BY APPLICABLE CODES, STARTERS SHALL BE EQUIPPED WITH "QUICK-MAKE" AND "QUICK-BREAK" FUSED DISCONNECTS.</p> <p>2.4.16.E STANDARD OF ACCEPTANCE:</p> <p>a. SQUARE D CO. LTD.</p> <p>b. ALLEN-BRADLEY CANADA LTD.</p> <p>c. SIEMENS</p> <p>d. EATON/CUTLER-HAMMER</p> <p>e. MOELLER</p> <p>2.4.16.F FUSES IN STARTERS TO BE CSA CERTIFIED FORM 1, CURRENT AND ENERGY LIMITING TYPE 200,000 AMPERE INTERRUPTING CAPACITY WITH NEMA CLASS "J" REJECTION TYPE MOUNTINGS.</p> <p>2.4.16.G SIZE FUSES INSTALLED IN STARTERS OR IN DISCONNECT SWITCHES USED IN CONJUNCTION WITH MAGNETIC STARTERS FOR MOTOR AND BRANCH CIRCUIT PROTECTION IN ACCORDANCE WITH FUSE MANUFACTURER'S RECOMMENDATIONS. PROVIDE ONE SPARE SET OF THREE FUSES FOR EACH RATING AND TYPE OF FUSE USED.</p> <p>2.4.16.H STANDARD OF ACCEPTANCE:</p> <p>a. APPLETON ELECTRIC COMPANY</p> <p>b. CHASE SHAWMUTT-AMP. TRAP</p> <p>c. ENGLISH ELECTRIC COMPANY OF CANADA</p> <p>2.4.16.I ENCLOSURES FOR LOOSE STARTERS ARE TO BE EEMAC 1A, UNLESS OTHERWISE SPECIFIED.</p> <p>2.4.17 VARIABLE FREQUENCY MOTOR DRIVES</p> <p>2.4.17.1 PRODUCTS</p> <p>1. ENVIRONMENTAL OPERATING CONDITIONS: 0 TO 40C CONTINUOUS. VFD'S THAT CAN OPERATE AT 40 C INTERMITTENTLY (DURING A 24 HOUR PERIOD) ARE NOT ACCEPTABLE AND MUST BE OVERSIZED. ALTITUDE 0 TO 3300 FEET ABOVE SEA LEVEL, LESS THAN 95% HUMIDITY, NON-CONDENSING.</p> <p>2. ENCLOSURE SHALL BE RATED UL TYPE 1 AND SHALL BE UL LISTED AS A PLENUM RATED VFD. VFD'S WITHOUT THESE RATINGS ARE NOT ACCEPTABLE.</p> <p>3. FOR 600V NETWORKS, THE INPUT VOLTAGE OF THE VFD SHALL BE RATED 500V -10% TO 600V + 10% MINIMUM. VFD RATED FOR 575V +/- 10% OR LESS ARE NOT ACCEPTABLE.</p> <p>4. ALL VFD'S SHALL HAVE THE FOLLOWING STANDARD FEATURES:</p> <p>a. ALL VFD'S SHALL HAVE THE SAME CUSTOMER INTERFACE, INCLUDING DIGITAL DISPLAY, AND KEYPAD. REGARDLESS OF HORSEPOWER RATING, THE KEYPAD SHALL BE REMOVABLE, CAPABLE OF REMOTE MOUNTING AND ALLOW FOR UPLOADING AND DOWNLOADING OF PARAMETER SETTINGS AS AN AID FOR START-UP OF MULTIPLE VFD'S.</p> <p>b. THE KEYPAD SHALL INCLUDE HAND-OFF-AUTO SELECTIONS AND MANUAL SPEED CONTROL. THE DRIVE SHALL INCORPORATE "BUMPLESS TRANSFER" OF SPEED REFERENCE WHEN SWITCHING BETWEEN "HAND" AND "AUTO" MODES. THERE SHALL BE FAULT RESET AND "HELP" BUTTONS ON THE KEYPAD. THE "HELP" BUTTON SHALL INCLUDE "ON-LINE" ASSISTANCE FOR PROGRAMMING AND TROUBLESHOOTING.</p> <p>c. THERE SHALL BE A BUILT-IN TIME CLOCK IN THE VFD KEYPAD. THE CLOCK SHALL HAVE A BATTERY BACKUP WITH 10 YEARS MINIMUM LIFE SPAN. THE CLOCK SHALL BE USED TO DATE AND TIME STAMP FAULTS AND RECORD OPERATING PARAMETERS AT THE TIME OF FAULT. IF THE BATTERY FAILS, THE VFD SHALL AUTOMATICALLY REVERT TO HOURS OF OPERATION SINCE INITIAL POWER UP. THE CLOCK SHALL ALSO BE PROGRAMMABLE TO CONTROL START/STOP FUNCTIONS, CONSTANT SPEEDS, PID PARAMETER SETS AND OUTPUT RELAYS. THE VFD SHALL HAVE A DIGITAL INPUT THAT ALLOWS AN OVERRIDE TO THE TIME CLOCK (WHEN IN THE OFF MODE) FOR A PROGRAMMABLE TIME FRAME. THERE SHALL BE FOUR (4) SEPARATE, INDEPENDENT TIMER FUNCTIONS THAT HAVE BOTH WEEKDAY AND WEEKEND SETTINGS.</p> <p>d. THE VFD'S SHALL UTILIZE PRE-PROGRAMMED APPLICATION MACROS SPECIFICALLY DESIGNED TO FACILITATE START-UP. THE APPLICATION MACROS SHALL PROVIDE ONE COMMAND TO REPROGRAM ALL PARAMETERS AND CUSTOMER INTERFACES FOR A PARTICULAR APPLICATION TO REDUCE PROGRAMMING TIME. THE VFD SHALL HAVE TWO USER MACROS TO ALLOW THE END-USER TO CREATE AND SAVE CUSTOM SETTINGS.</p> <p>e. THE VFD SHALL HAVE COOLING FANS THAT ARE DESIGNED FOR EASY REPLACEMENT. THE FANS SHALL BE DESIGNED FOR REPLACEMENT WITHOUT REQUIRING THE REMOVAL OF THE VFD FROM THE WALL OR REMOVAL OF CIRCUIT BOARDS. THE VFD COOLING FANS SHALL OPERATE ONLY WHEN REQUIRED. TO EXTEND THE FAN AND BEARING OPERATING LIFE, OPERATING TEMPERATURE WILL BE MONITORED AND USED TO CYCLE THE FANS ON AND OFF AS REQUIRED.</p> <p>f. THE VFD SHALL BE CAPABLE OF STARTING INTO A COASTING LOAD (FORWARD OR REVERSE) UP TO FULL SPEED AND ACCELERATE OR DECELERATE TO SETPOINT WITHOUT SAFETY TRIPPING OR COMPONENT DAMAGE (F.V.ING START).</p> <p>g. THE VFD SHALL HAVE THE ABILITY TO AUTOMATICALLY RESTART AFTER AN OVER-CURRENT, OVER-VOLTAGE, UNDER-VOLTAGE, OR LOSS OF INPUT SIGNAL PROTECTIVE TRIAL. THE NUMBER OF RESTART ATTEMPTS, TRIAL TIME, AND TIME BETWEEN ATTEMPTS SHALL BE PROGRAMMABLE.</p> <p>h. THE OVERLOAD RATING OF THE DRIVE SHALL BE 110% OF ITS NORMAL DUTY CURRENT RATING FOR 1 MINUTE EVERY 10 MINUTES, 130% OVERLOAD FOR 2 SECONDS. THE MINIMUM FLA RATING SHALL MEET OR EXCEED THE VALUES IN THE NEC/UL TABLE 430-150 FOR 4-POLE MOTORS.</p> <p>i. THE VFD SHALL HAVE AN INTEGRAL 5% IMPEDANCE LINE REACTORS TO REDUCE THE HARMONICS TO THE POWER LINE AND TO ADD PROTECTION FROM AC LINE TRANSIENTS. THE 5% IMPEDANCE MAY BE FROM DUAL, POSITIVE AND NEGATIVE DC BUS REACTORS, OR 5% AC LINE REACTORS. VFD'S WITH ONLY ONE DC REACTOR SHALL ADD AC LINE REACTORS.</p> <p>j. THE INPUT CURRENT RATING OF THE VFD SHALL BE NO MORE THAN 3% GREATER THAN THE OUTPUT CURRENT RATING.</p> <p>k. THE VFD SHALL INCLUDE A COORDINATED AC TRANSIENT PROTECTION SYSTEM CONSISTING OF 4-120 JOULE RATED MOV'S (PHASE TO PHASE AND TO GROUND), A CAPACITOR CLAMP, AND 5% IMPEDANCE REACTORS.</p> <p>l. THE VFD SHALL BE CAPABLE OF SENSING A LOSS OF LOAD (BROKEN BELT / BROKEN COUPLING) AND SHUTTING THE DRIVE DOWN. THE DRIVE SHALL BE REMOVABLE, PROGRAMMABLE TO SIGNAL THIS CONDITION VIA A KEYPAD WARNING, RELAY OUTPUT AND/OR OVER THE SERIAL COMMUNICATIONS BUS. RELAY OUTPUTS SHALL INCLUDE PROGRAMMABLE TIME DELAYS THAT WILL ALLOW FOR DRIVE ACCELERATION FROM ZERO SPEED WITHOUT SIGNALLING A FALSE UNDER-LOAD CONDITION.</p> <p>m. IF THE INPUT REFERENCE (4-20MA OR 2-10V) IS LOST, THE VFD SHALL GIVE THE USER THE OPTION OF EITHER (1) STOPPING AND DISPLAYING A FAULT, (2) RUNNING AT A PROGRAMMABLE PRESET SPEED, (3) HOLD THE PRESET SPEED BASED ON THE LAST GOOD REFERENCE RECEIVED, OR (4) CAUSE A WARNING TO BE ISSUED, AS SELECTED BY THE USER. THE DRIVE SHALL BE PROGRAMMABLE TO SIGNAL THIS CONDITION VIA A KEYPAD WARNING, RELAY OUTPUT AND/OR OVER THE SERIAL COMMUNICATION BUS.</p>	<p>n. THE VFD SHALL HAVE PROGRAMMABLE "SLEEP" AND "WAKE UP" FUNCTIONS TO ALLOW THE DRIVE TO BE STARTED AND STOPPED FROM THE LEVEL OF A PROCESS FEEDBACK SIGNAL.</p> <p>5. ALL VFD'S TO HAVE THE FOLLOWING ADJUSTMENTS:</p> <p>a. THREE (3) PROGRAMMABLE CRITICAL FREQUENCY LOCKOUT RANGES TO PREVENT THE VFD FROM OPERATING THE LOAD CONTINUOUSLY AT AN UNSTABLE SPEED.</p> <p>b. TWO (2) PID SETPOINT CONTROLLERS SHALL BE STANDARD IN THE DRIVE, ALLOWING PRESSURE OR FLOW SIGNALS TO BE CONNECTED TO THE VFD USING THE MICROPROCESSOR IN THE VFD FOR THE CLOSED LOOP CONTROL. THE VFD SHALL HAVE 250 MA OF 24 VDC AUXILIARY POWER AND BE CAPABLE OF LOG POWERING A TRANSMITTER SUPPLIED BY OTHERS. THE PID SETPOINT SHALL BE ADJUSTABLE FROM THE VFD KEYPAD, ANALOG INPUTS, OR OVER THE COMMUNICATIONS BUS. THERE SHALL BE TWO PARAMETER SETS FOR THE FIRST PID THAT ALLOW THE SETS TO BE SWITCHED VIA A DIGITAL INPUT, SERIAL COMMUNICATIONS OR FROM THE KEYPAD FOR NIGHT SETBACK, SUMMER/WINTER SETPOINTS, ETC. THERE SHALL BE AN INDEPENDENT, SECOND PID LOOP THAT CAN UTILIZE THE SECOND ANALOG INPUT AND MODULATE ONE OF THE ANALOG OUTPUTS TO MAINTAIN SETPOINT OF AN INDEPENDENT PROCESS (IE. VALVES, DAMPERS, ETC.). ALL SETPOINTS, PROCESS VARIABLES, ETC. TO BE ADJUSTED FROM THE SERIAL COMMUNICATION NETWORK. THE SETPOINTS SHALL BE SET IN ENGINEERING UNITS AND NOT REQUIRE A PERCENTAGE OF THE TRANSDUCER INPUT.</p> <p>c. TWO (2) PROGRAMMABLE ANALOG INPUTS SHALL ACCEPT CURRENT OR VOLTAGE SIGNALS.</p> <p>d. TWO (2) PROGRAMMABLE ANALOG OUTPUTS (0-20MA OR 4-20 MA). THE OUTPUTS MAY BE PROGRAMMED TO OUTPUT PROPORTIONAL, TO FREQUENCY, MOTOR SPEED, OUTPUT VOLTAGE, OUTPUT CURRENT, MOTOR TORQUE, MOTOR POWER (KW), DC BUS VOLTAGE, ACTIVE REFERENCE, AND OTHER DATA.</p> <p>e. SIX (6) PROGRAMMABLE DIGITAL INPUTS FOR MAXIMUM FLEXIBILITY IN INTERFACING WITH EXTERNAL DEVICES, TYPICALLY PROGRAMMED AS FOLLOWS:</p> <p>f. THERE SHALL BE A RUN PERMISSIVE CIRCUIT FOR DAMPER OR VALVE CONTROL. REGARDLESS OF THE SOURCE OF A RUN COMMAND (KEYPAD, INPUT CONTACT CLOSURE, TIME-CLOCK CONTROL, OR SERIAL COMMUNICATIONS) THE VFD SHALL PROVIDE A DRY CONTACT CLOSURE THAT WILL SIGNAL THE DAMPER TO OPEN (VFD MOTOR DOES NOT OPERATE).</p> <p>g. WHEN THE DAMPER IS FULLY OPEN, A NORMALLY OPEN DRY CONTACT (END-SWITCH) SHALL CLOSE. THE CLOSED END-SWITCH IS WIRED TO AN VFD DIGITAL INPUT AND ALLOWS VFD MOTOR OPERATION. TWO SEPARATE SAFETY INTERLOCK INPUTS SHALL BE PROVIDED.</p> <p>h. WHEN EITHER SAFETY IS OPENED, THE MOTOR SHALL BE COMMANDED TO COAST TO STOP, AND THE DAMPER SHALL BE COMMANDED TO CLOSE. THE KEYPAD SHALL DISPLAY "START ENABLE 1" (OR 2 MISSING). THE SAFETY STATUS SHALL ALSO BE TRANSMITTED OVER THE SERIAL COMMUNICATIONS BUS. ALL DIGITAL INPUTS SHALL BE PROGRAMMABLE TO INITIATE UPON AN APPLICATION OR REMOVAL OF A SAFETY INTERLOCK.</p> <p>i. THREE (3) PROGRAMMABLE DIGITAL FORM-C-RELAY OUTPUTS. THE RELAYS SHALL INCLUDE PROGRAMMABLE ON AND OFF DELAY TIMES AND ADJUSTABLE HYSTERESIS. DEFAULT SETTINGS SHALL BE FOR RUN, NOT FAULTED (FAIL SAFE), AND RUN PERMISSIVE. THE RELAYS SHALL BE RATED FOR MAXIMUM SWITCHING 8 AMP/424 VAC AND RUN PERMISSIVE AT 250 VAC, MAXIMUM VOLTAGE 300 VDC AND 250 VAC, CONTINUOUS CURRENT RATING 2 AMPS RMS. OUTPUTS SHALL BE TRUE FORM C TYPE CONTACTS; OPEN CURRENT RATING OUTPUTS ARE NOT ACCEPTABLE.</p> <p>j. SEVEN (7) PROGRAMMABLE PRESET SPEEDS.</p> <p>k. TWO INDEPENDENTLY ADJUSTABLE ACCELERATION AND DECELERATION RAMP WITH 1 - 1800 SECONDS ADJUSTABLE TIME RAMP.</p> <p>l. THE VFD SHALL INCLUDE A MOTOR FLUX OPTIMIZATION CIRCUIT THAT WILL AUTOMATICALLY REDUCE APPLIED MOTOR VOLTAGE TO THE MOTOR TO OPTIMIZE ENERGY CONSUMPTION AND AUDIBLE MOTOR NOISE.</p> <p>m. THE VFD SHALL INCLUDE A CARRIER FREQUENCY CONTROL CIRCUIT THAT REDUCES THE CARRIER FREQUENCY BASED ON ACTUAL VFD TEMPERATURE THAT ALLOWS THE HIGHEST CARRIER FREQUENCY WITHOUT DE-RATING THE VFD OR OPERATING AT HIGH CARRIER FREQUENCY ONLY AT LOW SPEEDS.</p> <p>n. THE VFD SHALL INCLUDE PASSWORD PROTECTION AGAINST PARAMETER CHANGES.</p> <p>6. THE KEYPAD SHALL INCLUDE A BACKLIT LCD DISPLAY. THE DISPLAY SHALL BE IN COMPLETE ENGLISH WORDS FOR PROGRAMMING AND FAULT DIAGNOSTICS (ALPHA-NUMERIC CODES ARE NOT ACCEPTABLE). THE KEYPAD SHALL UTILIZE THE FOLLOWING ASSISTANTS:</p> <p>a. START-UP ASSISTANTS</p> <p>b. PARAMETER ASSISTANTS</p> <p>c. MAINTENANCE ASSISTANT</p> <p>d. TROUBLESHOOTING ASSISTANT</p> <p>7. ALL APPLICABLE OPERATING VALUES SHALL BE CAPABLE OF BEING DISPLAYED IN ENGINEERING (USER) UNITS. A MINIMUM OF THREE OPERATING VALUES FROM THE LIST BELOW SHALL BE CAPABLE OF BEING DISPLAYED AT ALL TIMES. THE DISPLAY SHALL BE IN COMPLETE ENGLISH WORDS (ALPHA-NUMERIC CODES ARE NOT ACCEPTABLE):</p> <p>a. OUTPUT FREQUENCY</p> <p>b. MOTOR SPEED (RPM, % OR ENGINEERING UNITS)</p> <p>c. MOTOR CURRENT</p> <p>d. CALCULATED MOTOR TORQUE</p> <p>e. CALCULATED MOTOR POWER (KW)</p> <p>f. DC BUS VOLTAGE</p> <p>g. OUTPUT VOLTAGE</p> <p>8. THE VFD SHALL INCLUDE A FIREMAN'S OVERRIDE INPUT. UPON RECEIPT OF A CONTACT CLOSURE FROM THE FIREMAN'S CONTROL STATION, THE VFD SHALL OPERATE AT AN ADJUSTABLE PRESET SPEED. THE MODE SHALL OVERRIDE ALL OTHER INPUTS (ANALOG/DIGITAL, SERIAL, COMMUNICATION, AND ALL KEYPAD COMMANDS) AND FORCE THE MOTOR TO RUN AT THE ADJUSTABLE PRESET SPEED. "OVERRIDE MODE" SHALL BE DISPLAYED ON THE KEYPAD. UPON REMOVAL OF THE OVERRIDE SIGNAL, THE VFD SHALL RESUME NORMAL OPERATION.</p> <p>9. SERIAL COMMUNICATIONS</p> <p>a. THE VFD SHALL HAVE AN RS-485 PORT AS STANDARD. THE PROTOCOLS SHALL BE BACNET. EACH INDIVIDUAL DRIVE SHALL HAVE THE PROTOCOL IN THE BASE VFD. THE USE OF THIRD PARTY GATEWAYS AND MULTIPLEXERS IS NOT ACCEPTABLE. ALL PROTOCOLS SHALL BE "CERTIFIED" BY THE GOVERNING AUTHORITY. USE OF NON-CERTIFIED PROTOCOLS IS NOT ALLOWED.</p> <p>b. THE BACNET CONNECTION SHALL BE AN RS485, M5/PT INTERFACE OPERATING AT 9.6, 19.2, 38.4, OR 76.8 Kbps. THE CONNECTION SHALL BE TESTED BY THE BACNET TESTING LABS (BTL) AND BE BTL LISTED. THE BACNET INTERFACE SHALL CONFORM TO THE BACNET STANDARD DEVICE TYPE OF AN APPLICATION SPECIFIC CONTROLLER (B-ASO). THE INTERFACE SHALL SUPPORT ALL BIBBS DEFINED BY THE BACNET STANDARD PROFILE FOR A B-ASC INCLUDING, BUT NOT LIMITED TO:</p> <p>a. DATA SHARING - READ PROPERTY - B</p> <p>b. DATA SHARING - WRITE PROPERTY - B</p> <p>c. DEVICE MANAGEMENT - DYNAMIC DEVICE BINDING (WHO-IS, I-AM)</p> <p>d. DEVICE MANAGEMENT - DYNAMIC OBJECT BINDING (WHO-HAS, I-HAVE)</p> <p>e. DEVICE MANAGEMENT - COMMUNICATION CONTROL - B</p> <p>IF ADDITIONAL HARDWARE IS REQUIRED TO OBTAIN THE BACNET INTERFACE, THE VFD MANUFACTURER SHALL SUPPLY ONE BACNET GATEWAY PER DRIVE. MULTIPLE VFD'S SHARING ONE GATEWAY SHALL NOT BE ACCEPTABLE.</p> <p>c. SERIAL COMMUNICATION CAPABILITIES SHALL INCLUDE, BUT NOT BE LIMITED TO: RUN-STOP CONTROL, SPEED SET ADJUSTMENT, PROPORTIONAL/INTEGRAL/DERIVATIVE PID CONTROL ADJUSTMENTS, CURRENT LIMIT, ACCELERATION/DECELERATION TIME ADJUSTMENTS, AND LOCK AND UNLOCK THE KEYPAD. THE DRIVE SHALL HAVE THE CAPABILITY OF ALLOWING THE DDC TO MONITOR FEEDBACK SUCH AS PROCESS VARIABLE FEEDBACK, OUTPUT SPEED / FREQUENCY, CURRENT (IN AMPS), % TORQUE, POWER (KW), KILOWATT HOURS (RE-SETTABLE), OPERATING HOURS (RE-SETTABLE), AND DRIVE TEMPERATURE.</p> <p>d. THE DDC SHALL ALSO BE CAPABLE OF MONITORING THE VFD RELAY OUTPUT STATUS, DIGITAL INPUT STATUS, AND ALL ANALOG INPUT AND ANALOG OUTPUT VALUES. ALL DIAGNOSTIC WARNING AND FAULT INFORMATION SHALL BE TRANSMITTED OVER THE SERIAL COMMUNICATIONS BUS. REMOTE VFD FAULT RESET SHALL BE POSSIBLE. THE FOLLOWING ADDITIONAL STATUS INDICATIONS AND SETTINGS SHALL BE TRANSMITTED OVER THE SERIAL COMMUNICATIONS BUS - KEYPAD "HAND" OR "AUTO" SELECTED, BYPASS SELECTED, THE ABILITY TO CHANGE THE PID SETPOINT, AND THE ABILITY TO FORCE THE UNIT TO BYPASS (IF BYPASS IS SPECIFIED). THE DDC SYSTEM SHALL ALSO BE ABLE TO MONITOR IF THE MOTOR IS RUNNING IN THE VFD MODE OR BYPASS MODE (IF BYPASS IS SPECIFIED) OVER SERIAL COMMUNICATIONS. A MINIMUM OF 15 FIELD PARAMETERS SHALL BE CAPABLE OF BEING MONITORED.</p> <p>e. THE VFD SHALL ALLOW THE DDC TO CONTROL THE DRIVE'S DIGITAL AND ANALOG OUTPUTS VIA THE SERIAL INTERFACE. THIS CONTROL SHALL BE INDEPENDENT OF ANY VFD FUNCTION. FOR EXAMPLE, THE ANALOG OUTPUTS MAY BE USED FOR MODULATING CHILLED WATER VALVES OR COOLING TOWER BYPASS VALVES. THE DRIVE'S DIGITAL (RELAY) OUTPUTS MAY BE USED TO ACTUATE A DAMPER, OPEN A VALVE OR CONTROL ANY OTHER DEVICE THAT REQUIRES A MAINTAINED CONTACT FOR OPERATION. IN ADDITION, ALL OF THE DRIVE'S DIGITAL AND ANALOG INPUTS SHALL BE CAPABLE OF BEING MONITORED BY THE DDC SYSTEM.</p> <p>f. THE VFD SHALL INCLUDE AN INDEPENDENT PID LOOP FOR CUSTOMER USE. THE INDEPENDENT PID LOOP MAY BE USED FOR COOLING TOWER BYPASS VALVE CONTROL, CHILLED WATER VALVE CONTROL, ETC. BOTH THE VFD CONTROL PID LOOP AND THE INDEPENDENT PID LOOP SHALL CONTINUE FUNCTIONING EVEN IF THE SERIAL COMMUNICATIONS CONNECTION IS LOST. THE VFD SHALL KEEP THE LAST GOOD SET-POINT COMMAND AND LAST GOOD DO & AO COMMANDS IN MEMORY IN THE EVENT THE SERIAL COMMUNICATIONS CONNECTION IS LOST.</p> <p>10. ALL VFD'S THROUGH 60HP SHALL BE PROTECTED FROM INPUT AND OUTPUT POWER MIS-WIRING. THE VFD SHALL SENSE THIS CONDITION AND DISPLAY AN ALARM ON THE KEYPAD.</p> <p>11. OPTIONAL FEATURES TO BE PROVIDED ARE:</p> <p>1. OPTIONAL FEATURES TO BE FURNISHED AND MOUNTED BY THE DRIVE MANUFACTURER. ALL OPTIONAL FEATURES SHALL BE UL LISTED AND CSA APPROVED BY THE DRIVE MANUFACTURER.</p>	<p>AS A COMPLETE ASSEMBLY AND CARRY A UL508 AND CSA LABEL.</p> <p>2. A COMPLETE FACTORY WIRED AND TESTED BYPASS SYSTEM CONSISTING OF AN OUTPUT CONTACTOR AND BYPASS CONTACTOR. OVERLOAD PROTECTION AND SHALL BE PROVIDED IN BOTH DRIVE AND BYPASS MODES.</p> <p>3. DOOR INTERLOCKED, PADLOCKABLE CIRCUIT BREAKER THAT WILL DISCONNECT ALL INPUT POWER FROM THE DRIVE AND ALL INTERNALLY MOUNTED OPTIONS.</p> <p>4. FUSED VFD ONLY DISCONNECT (SERVICE SWITCH). FAST ACTING FUSES EXCLUSIVE TO THE VFD - FAST ACTING FUSES ALLOW THE VFD TO DISCONNECT FROM THE LINE PRIOR TO CLEARING UPSTREAM BRANCH CIRCUIT PROTECTION, MAINTAINING BYPASS CAPABILITY, BYPASS DESIGNS, WHICH HAVE NO SUCH FUSES, OR THAT INCORPORATE FUSES COMMON TO BOTH THE VFD AND THE BYPASS WILL NOT BE ACCEPTED. THREE CONTACTOR BYPASS SCHEMES ARE NOT ACCEPTABLE.</p> <p>5. THE DRIVE / BYPASS SHALL PROVIDE SINGLE-PHASE MOTOR PROTECTION IN BOTH THE VFD AND BYPASS MODES.</p> <p>THE FOLLOWING OPERATIONS SHALL BE PROVIDED:</p> <p>a. BYPASS HAND-OFF-AUTO</p> <p>b. DRIVE MODE SELECTOR</p> <p>c. BYPASS MODE SELECTOR</p> <p>d. BYPASS FAULT RESET</p> <p>6. THE FOLLOWING INDICATING LIGHTS (LED TYPE) SHALL BE PROVIDED. A TEST MODE OR PUSH TO TEST FEATURE SHALL BE PROVIDED:</p> <p>a. POWER ON (READY)</p> <p>b. SIX (6) PROGRAMMABLE LIGHTS (OR FETTERIES) OPEN</p> <p>c. DRIVE MODE SELECT DAMPER OPENING</p> <p>d. BYPASS MODE SELECTED</p> <p>e. DRIVE RUNNING</p> <p>f. BYPASS RUNNING</p> <p>g. DRIVE FAULT</p> <p>h. BYPASS FAULT</p> <p>i. BYPASS H-O-A MODE</p> <p>j. AUTOMATIC TRANSFER TO BYPASS SELECTED</p> <p>k. SAFETY OPEN</p> <p>l. DAMPER OPENING</p> <p>m. DAMPER END-SWITCH MADE</p> <p>7. THE FOLLOWING RELAY (FORM C) OUTPUTS FROM THE BYPASS SHALL BE PROVIDED:</p> <p>a. SYSTEM STARTED</p> <p>b. SYSTEM RUNNING</p> <p>c. BYPASS OVERRIDE ENABLED</p> <p>d. DRIVE FAULT</p> <p>e. BYPASS FAULT (MOTOR OVERLOAD OR UNDER-LOAD (BROKEN BELT))</p> <p>f. BYPASS H-O-A POSITION</p> <p>8. THE DIGITAL INPUTS FOR THE SYSTEM SHALL ACCEPT 24V OR 115VAC (SELECTABLE). THE BYPASS SHALL INCORPORATE INTERNALLY SOURCED POWER SUPPLY AND NOT REQUIRE AN EXTERNAL CONTROL POWER SOURCE.</p> <p>9. DOOR INTERLOCK, TERMINAL STRIP - PROVIDE A SEPARATE TERMINAL STRIP FOR CONNECTION OF FREEZE, FIRE, SMOKE CONTACTS, AND EXTERNAL START COMMAND. ALL EXTERNAL SAFETY INTERLOCKS SHALL REMAIN FULLY FUNCTIONAL WHETHER THE SYSTEM IS IN HAND, AUTO, OR BYPASS MODES (NOT FUNCTIONAL IN FIREMAN'S OVERRIDE 2). THE REMOTE START/STOP CONTACT SHALL OPERATE IN VFD AND BYPASS MODES.</p> <p>10. DEDICATED DIGITAL INPUT THAT WILL TRANSFER MOTOR FROM VFD MODE TO BYPASS MODE UPON DRY CONTACT CLOSURE FOR FIREMAN'S OVERRIDE. TWO MODES OF OPERATION ARE REQUIRED:</p> <p>a. ONE MODE FORCES THE MOTOR TO BYPASS OPERATION AND OVERRIDES BOTH THE VFD AND BYPASS H-O-A SWITCHES AND FORCES THE MOTOR TO OPERATE ACROSS THE LINE (TEST MODE). THE SYSTEM WILL ONLY RESPOND TO THE DIGITAL INPUTS AND MOTOR PROTECTIONS.</p> <p>b. THE SECOND FIREMAN'S OVERRIDE MODE REMAINS AS ABOVE, BUT WILL ALSO DEFEAT THE OVERLOAD AND SINGLE-PHASE PROTECTION FOR BYPASS AND IGNORE ALL KEYPAD AND DIGITAL INPUTS TO THE SYSTEM (RUN UNTIL DESTRUCTION).</p> <p>11. THE VFD SHALL INCLUDE A "RUN PERMISSIVE CIRCUIT" THAT WILL PROVIDE A NORMALLY OPEN CONTACT WHENEVER A RUN COMMAND IS PROVIDED (LOCAL OR REMOTE START OR COMMAND IN VFD OR BYPASS MODE). THE VFD SYSTEM (VFD OR BYPASS) SHALL OPERATE THE MOTOR UNTIL IT RECEIVES A DRY CONTACT CLOSURE FROM A DAMPER OR VALVE END-SWITCH. WHEN THE VFD SYSTEM SAFETY INTERLOCK (FIRE DETECTOR, FREEZE/ST, HIGH STATIC PRESSURE SWITCH, ETC) OPENS, THE MOTOR SHALL COAST TO A STOP AND THE RUN PERMISSIVE CONTACT SHALL OPEN, CLOSING THE DAMPER OR VALVE.</p> <p>12. CLASS 20 OR 30 (SELECTABLE) ELECTRONIC MOTOR OVERLOAD PROTECTION SHALL BE INCLUDED.</p> <p>13. THERE SHALL BE AN INTERNAL SWITCH TO SELECT MANUAL OR AUTOMATIC BYPASS.</p> <p>14. THERE SHALL BE AN ADJUSTABLE CURRENT SENSING CIRCUIT FOR THE BYPASS TO PROVIDE LOSS OF LOAD INDICATION (BROKEN BELT) WHEN IN THE BYPASS MODE.</p> <p>2.4.17.2 PRODUCTS</p> <p>CERTIFIED FACTORY START-UP SHALL BE PROVIDED FOR EACH DRIVE BY A FACTORY AUTHORIZED SERVICE CENTER. A CERTIFIED START-UP FORM SHALL BE FILLED OUT FOR EACH DRIVE WITH A COPY PROVIDED TO THE OWNER.</p> <p>PROVIDE AN ALLOWANCE FOR THE FACTORY-AUTHORIZED TECHNICIAN OF ONE SITE VISIT OF ONE DAY TO TRAIN OPERATING STAFF IN THE OPERATING AND MAINTENANCE OF THE DRIVE.</p> <p>FOR THE DURATION OF THE WARRANTY PERIOD, PROVIDE A CALL BACK WITHIN 30 MINUTES OF RECEIVING AN EMERGENCY CALL FOR SERVICE AND PROVIDE ON-SITE SERVICE WITHIN TWO (2) HOURS.</p> <p>2.4.17.3 STANDARD OF ACCEPTANCE:</p> <p>a. ABB</p> <p>b. DANFOSS</p> <p>2.4.18 LIGHTING RELAYS</p> <p>2.4.18.A ALL RELAYS USED FOR SWITCHING LIGHTING LOADS SHALL BE THE LATCHING TYPE. MAINTAINED RELAYS OR CONTACTORS SHALL NOT BE ACCEPTED.</p> <p>2.4.18.B PROVIDE CUSTOM LIGHTING ENCLOSURES TO HOUSE ALL LIGHTING RELAYS. THE ENCLOSURES SHALL BE EQUIPPED WITH BARRIERS TO SEPARATE THE CONTROL AND LOAD WIRING.</p> <p>2.4.18.C PROVIDE LOCAL ON PUSHBUTTONS AT EACH LIGHTING RELAY ENCLOSURE TO ALLOW FOR MANUAL OPERATION OF ALL LIGHTING RELAYS IN THE CASE OF BAS PANEL FAILURE. PRESSING THE PUSHBUTTON SHALL TURN ON ALL LIGHTING RELAYS BY APPLYING VOLTAGE DIRECTLY TO THE RELAY (I.E. BYPASS THE BAS). IF A LIGHTING PANEL IS LOCATED IN AN AREA ACCESSIBLE BY STUDENTS OR TEACHING STAFF, PROVIDE MOMENTARY KEY SWITCHES IN LIEU OF PUSHBUTTONS. THE KEY TYPE SHALL BE DESIGNATED BY THE ENGINEER. DELIVER ALL KEYS TO THE ENGINEER AT THE COMPLETION OF THE PROJECT.</p> <p>2.4.18.D THE STANDARD OF ACCEPTANCE SHALL BE G.E. RR-7 AND RR-8 RELAYS.</p> <p>2.4.19 CO2 SENSORS</p> <p>2.4.19.A PROVIDE CO2 SENSORS FOR EITHER WALL OR DUCT MOUNTING APPLICATIONS AS SPECIFIED. PROVIDE A HEAVY DUTY METAL GUARD TO PROTECT THE SENSOR WHEN MOUNTED ON WALLS. PROVIDE THE FACTORY-SUPPLIED DUCT MOUNTING KIT FOR ALL DUCT MOUNT APPLICATIONS.</p> <p>2.4.19.B THE SENSOR SHALL BE MICROPROCESSOR CONTROLLED, FULLY DIGITAL, NON-DISPERSIVE DUAL WAVELENGTH INFRARED TECHNOLOGY WITH TEMPERATURE COMPENSATION. THE DEVICE OUTPUT SHALL BE 4 TO 20MA.</p> <p>2.4.19.C THE SENSOR SHALL HAVE A MEASUREMENT RANGE OF 0 TO 2000PPM WITH AN ACCURACY OF +/-30PPM.</p> <p>2.4.19.D INSTALL THE SENSOR IN ACCORDANCE WITH ALL MANUFACTURER'S INSTRUCTIONS. WALL MOUNTED SENSORS SHALL BE INSTALLED AT A MINIMUM HEIGHT OF 80" ABOVE THE FINISHED FLOOR. SENSORS SHALL NOT BE MOUNTED ON AN OUTSIDE WALL, CLOSE TO A WINDOW, DOOR OR IN DRAFT AREAS WITH DIRECT AIRFLOW.</p> <p>2.4.19.E THE SENSOR SHALL BE AUTO CALIBRATING FOR A GUARANTEED INTERVAL OF 5 YEARS.</p> <p>2.4.19.F THE STANDARD OF ACCEPTANCE SHALL BE GREYSTONE CDD4A.</p> <p>2.4.20 THERMOSTAT GUARDS</p> <p>2.4.20.A PROVIDE A HEAVY DUTY, METAL THERMOSTAT GUARD FOR SPECIFIED EXISTING, STAND-ALONE THERMOSTATS.</p> <p>2.4.20.B THE GUARD SHALL HAVE A MINIMUM 18 GAUGE METAL COVER AND 22 GAUGE RING BASE. THE UNIT SHALL BE TAMPER-RESISTANT AND EQUIPPED WITH A LOCK AND KEY. THE COLOUR OF THE UNIT SHALL BE BEIGE.</p> <p>2.4.20.C THE STANDARD OF ACCEPTANCE SHALL BE WHITE RODGERS MODEL #F29-0222.</p>	<p>PART 3 EXECUTION</p> <p>3.1 COORDINATION WITH NEW MECHANICAL WORK</p> <p>3.1.A IN A FACILITY WHERE MECHANICAL RETROFITS ARE PLANNED, OBTAIN AND REVIEW THE MECHANICAL DRAWINGS AND MECHANICAL SPECIFICATIONS FOR EACH SITE. COORDINATE ALL SITE WORK WITH THE MECHANICAL CONTRACTOR.</p> <p>3.1.B PROVIDE ALL SPECIFIED LABOUR AND MATERIAL AS INDICATED IN THE MECHANICAL DRAWINGS AND SPECIFICATIONS. PROVIDE WRITTEN INSTALLATION INSTRUCTIONS FOR ALL SUPPLIED EQUIPMENT AND DEVICES TO BE INSTALLED BY THE MECHANICAL CONTRACTOR.</p> <p>3.1.C THE CONTROLS CONTRACTOR SHALL SUPPLY ALL REQUIRED VALVES, DAMPERS AND THERMOWELLS TO THE MECHANICAL CONTRACTOR FOR INSTALLATION, WHERE SPECIFIED. IF A SEPARATE MECHANICAL CONTRACTOR HAS NOT BEEN HIRED BY KPRDSB TO WORK ON THE PROJECT, THE CONTROLS CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION OF THESE DEVICES.</p> <p>3.1.D THE CONTROLS CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING AND MARKING THE LOCATION OF NEW THERMOWELLS TO BE INSTALLED IN PIPING. MAKE ARRANGEMENTS TO HAVE THE MECHANICAL CONSULTANT OR KPRDSB (WHERE APPLICABLE) REVIEW AND APPROVE ALL THERMOWELL LOCATIONS PRIOR TO INSTALLATION.</p> <p>3.1.E INSTALL AND COMMISSION ANY BAS POINTS ASSOCIATED WITH THE NEW MECHANICAL WORK DURING THE SAME TIME FRAME AS THIS WORK.</p> <p>3.1.F THE CONTROLS CONTRACTOR SHALL PROVIDE ALL MATERIAL AND LABOUR TO CARRY OUT ALL THE ELECTRICAL WORK (POWER AND CONTROLS) ASSOCIATED WITH THE NEW MECHANICAL WORK.</p> <p>3.2 GENERAL - INSTALLATION OF CONTROLS</p> <p>3.2.A REMOVE ALL EXISTING FIELD AND PANEL MOUNTED CONTROL DEVICES (E.G. TRANSDUCERS, CONTROLLERS, THERMOWELLS, ETC.) THAT HAVE BEEN MADE REDUNDANT OR INOPERATIVE BY THE NEW BAS CONTROL STRATEGIES. REMOVE ANY OTHER CONTROLS AS SPECIFIED OR DIRECTED BY THE ENGINEER.</p> <p>3.2.B ENSURE THAT ALL SYSTEMS REMAIN OPERATIVE AT ALL TIMES, WHETHER UNDER THE EXISTING CONTROLS OR UNDER THE NEW CONTROLS. DO NOT LEAVE ANY SYSTEM WITHOUT SOME FORM OF AUTOMATIC CONTROL. DO NOT DISCONNECT OR MODIFY EXISTING EQUIPMENT UNTIL READY TO ENERGISE SAME UNDER THE NEW WORK.</p> <p>3.2.C PROPERLY CUT AND CAP ALL REMAINING ACTIVE CONTROL AIR LINES.</p> <p>3.2.D PROVIDE PROPERLY SIZED COVER PLATES FOR ALL OPENINGS RESULTING FROM THE REMOVAL OF REDUNDANT CONTROL DEVICES. THIS SHALL BE APPLICABLE TO WALLS, DUCTWORK AND CONTROL PANELS. IN OCCUPIED AREAS, COVER PLATES SHALL BE STAINLESS STEEL.</p> <p>3.2.E THE CONTROL SEQUENCES INDICATE ONLY THE PRINCIPAL ITEMS OF EQUIPMENT CONTROLLING THE SYSTEM. SUPPLEMENT EACH CONTROL SYSTEM WITH RELAYS AND AUXILIARIES TO ENABLE EACH SYSTEM TO PERFORM AS SPECIFIED AND TO PERMIT PROPER OPERATION AND SUPERVISION OF IT.</p> <p>3.2.F PROVIDE COMPLETE IDENTIFICATION AND LABELLING FOR NEW AND EXISTING DEVICES AND EQUIPMENT.</p> <p>3.2.G PROVIDE NEW CABLEING, CONDUITS, CONTROL CABINETS, POWER SUPPLIES AND OTHER AUXILIARY EQUIPMENT, AS REQUIRED FOR A COMPLETE OPERATIONAL SYSTEM.</p> <p>3.3 POWER SOURCES AND WIRING METHODS</p> <p>3.3.A ALL WIRING SHALL BE INSTALLED IN EMT CONDUIT UNLESS SPECIFIED OTHERWISE. EXPOSED WIRING IN FINISHED AREAS (E.G. CORRIDORS, CLASSROOMS, GYMNASIUMS, ETC.) SHALL BE INSTALLED IN WIREMOLD (COLOUR TO MATCH SURROUNDING AREA).</p> <p>3.3.B WIRING FROM DDC CONTROLLERS TO SENSORS AND ACTUATORS AND CONTROL SYSTEM NETWORK AND LOW VOLTAGE WIRING RUNNING IN ACCESSIBLE CEILINGS MAY BE INSTALLED USING LVT CABLE. WHERE THE CEILING IS USED AS A RETURN AIR PLENUM, PLENUM RATED CABLE SHALL BE USED IN LIEU OF LVT CABLE.</p> <p>3.3.C INSTALL EMT AND CABLE AT RIGHT ANGLES TO BUILDING LINES, SECURELY FASTENED, AND IN ACCORDANCE WITH CURRENT ELECTRICAL CODES AND STANDARDS.</p> <p>3.3.D POWER AND CONTROL WIRING SHALL BE COPPER CONDUCTOR (RW90). FOR POWER WIRING, PROVIDE #12 AWG (MINIMUM) WITH A 3% MAXIMUM VOLTAGE DROP IN ACCORDANCE WITH CEC REQUIREMENTS. CONTROL WIRING SHALL BE A MINIMUM OF #14 AWG, UNLESS OTHERWISE SPECIFIED.</p> <p>3.3.E WIRING SMALLER THAN 18 GAUGE SHALL NOT BE ACCEPTED ON THE PROJECT. EXCEPTIONS ARE MADE FOR WIRING BETWEEN TERMINAL COMPUTER DEVICES, WIRE IN STANDARD COMMUNICATION CABLES, SUCH AS PRINTERS AND SHORT HALL MODEMS, WIRE USED IN COMMUNICATION NETWORKS, I.E. ANY CABLE TRANSFERRING DIGITAL DATA, USING TWISTED SHIELDED PAIRS.</p> <p>3.3.F THE WIRING FROM PANELS TO DEVICES SHALL BE INSTALLED WITHOUT SPLICES. THE USE OF THE ADJUSTABLE, PRESET SPEED MATERIALS SHALL BE INSTALLED TO SENSOR OR DEVICE LEADS. THE USE OF WIRE NUTS IS ACCEPTABLE IN THIS APPLICATION.</p> <p>3.3.G POWER FOR CONTROL SYSTEM SHALL NOT BE OBTAINED BY TAPPING INTO MISCELLANEOUS CIRCUITS THAT COULD BE INADVERTENTLY SWITCHED OFF. ONLY DEDICATED CIRCUITS SHALL POWER THE CONTROL SYSTEM. PROHIBITION: DRIVERS OR ELECTRICAL PANELS AS REQUIRED.</p> <p>3.3.H MOUNT TRANSFORMERS AND OTHER PERIPHERAL EQUIPMENT IN PANELS LOCATED IN SERVICEABLE AREAS. PROVIDE LINE-SIDE BREAKERS/FUSES FOR EACH TRANSFORMER.</p> <p>3.3.I ALL 120 VAC POWER FOR ANY CONTROLS EQUIPMENT SHALL BE FROM DEDICATED CIRCUITS. PROVIDE A BREAKER LOCK FOR EACH BREAKER USED TO SUPPLY THE CONTROL SYSTEM. UPDATE THE PANEL CIRCUIT DIRECTORY.</p> <p>3.3.J A DEDICATED POWER CIRCUIT MAY BE USED TO POWER DDC PANELS AND EQUIPMENT WITHIN THE SAME OR ADJOINING MECHANICAL ROOMS. THE USE OF ONE POWER CIRCUIT TO POWER DDC PANELS DISTRIBUTED THROUGHOUT THE BUILDING IS NOT ACCEPTABLE.</p> <p>3.3.L THE CONTROLLER MAY BE POWERED FROM THE EQUIPMENT THAT IT IS DIRECTLY CONTROLLING (I.E. HEAT PUMP, ROOFTOP UNIT) ONLY IF THE CONTROLLER CONTROLS NO OTHER EQUIPMENT AND THE POWER SUPPLY TO THE CONTROLLER REMAINS ENERGIZED INDEPENDENTLY OF UNIT OPERATION OR STATUS.</p> <p>3.3.M PROVIDE ALL REQUIRED CODE GAUGE BOXES, CONNECTORS AND OTHER WIRING ACCESSORIES.</p> <p>3.3.N FOR ALL DC WIRING, POSITIVE CONDUCTORS SHALL BE WHITE OR RED IN COLOUR WHILE NEGATIVE CONDUCTORS SHALL BE BLACK IN COLOUR.</p> <p>3.3.O ON EXTERIOR BUILDING SURFACES, WIRING SHALL BE RATED FOR 90C AND WET ENVIRONMENTS. CONDUIT SHALL BE RIGID METAL OR RIGID PVC WITH WATERPROOF JOINTS AND CONNECTORS USED THROUGHOUT.</p> <p>3.4 INSTALLATION OF TEMPERATURE SENSORS IN PIPING</p> <p>3.4.A THE CONTROLS CONTRACTOR SHALL SUPERVISE AND DIRECT THE MECHANICAL CONTRACTOR TO ENSURE THAT THE THERMOWELLS ARE INSTALLED AS DESCRIBED HEREIN.</p> <p>3.4.B FOR EACH IMMERSION SENSOR, PROVIDE A COMPATIBLE THERMOWELL TO THE MECHANICAL CONTRACTOR FOR INSTALLATION. PROVIDE STAINLESS STEEL THERMOWELLS WHERE INSTALLED IN PIPING CARRYING CORROSIVE OR CHEMICALLY REACTIVE FLUIDS.</p> <p>3.4.C INSTALL THERMOWELLS IN PIPING SUCH THAT THE BOTTOM OF THE WELL DOES NOT MAKE CONTACT WITH THE PIPE. INSTALL THE WELL AT A 90 DEGREE ELBOW OR TEE WHERE THE PIPE DIAMETER IS LESS THAN THE WELL LENGTH.</p> <p>3.4.D IF THE USE OF STRAP-ON SENSORS HAS BEEN APPROVED BY THE ENGINEER, USE METAL CLAMPS TO SECURELY FASTEN THE SENSOR TO THE PIPING. APPLY HEAT TRANSFER COMPOUND TO THE CONTACT AREA BETWEEN THE SENSOR AND PIPING. RE-INSULATE ALL PIPING.</p> <p>3.5 INSTALLATION OF STANDARD CONTROL DAMPERS AND ACTUATORS.</p> <p>3.5.A SUPPLY NEW AUTOMATIC CONTROL DAMPERS WHERE SPECIFIED.</p> <p>3.5.B THE NEW DUCTS AND/OR PLENUMS-MOUNTED DAMPERS SHALL BE INSTALLED AS PART OF THE AIR DISTRIBUTION WORK SPECIFIED IN A DIFFERENT SECTION OF THE SPECIFICATION.</p> <p>3.5.C THE DAMPERS SHALL BE MADE AVAILABLE AT THE SITE AT THE LOCATION WHERE THEY ARE REQUIRED.</p> <p>3.5.D ENSURE THAT EACH DAMPER ASSEMBLY IS PROPERLY MOUNTED.</p> <p>3.5.E THE LINKAGE AND MOTORS SHALL BE PROVIDED AND COMPLETELY CONNECTED FOR ALL CONTROL DAMPERS, INCLUDING FOR DAMPERS FACTORY SUPPLIED WITH EQUIPMENT.</p> <p>3.5.F WHERE NEWLY INSTALLED DAMPER SIZES EXCEED 28 SQ. FT. (2.6 SQ. M) MULTIPLE OPERATORS SHALL BE PROVIDED.</p> <p>3.5.G WHEREVER POSSIBLE, THE NEW DAMPER ACTUATORS SHALL BE INSTALLED SO THEY ARE</p>	<p>ACCESSIBLE FROM OUTSIDE DUCTS, PLENUMS AND EQUIPMENT CASINGS.</p> <p>3.6 INSTALLATION OF AUTOMATIC CONTROL VALVES AND ACTUATORS.</p> <p>3.6.A ALL CONTROL VALVES SHALL BE SUPPLIED BY THE CONTROLS CONTRACTOR AND INSTALLED BY THE MECHANICAL CONTRACTOR, UNLESS SPECIFIED OTHERWISE.</p> <p>3.6.B EACH CONTROL VALVE SHALL BE EQUIPPED WITH ITS OWN ACTUATOR.</p> <p>3.6.C THE CONTROLS CONTRACTOR SHALL ENSURE THAT EACH CONTROL VALVE ASSEMBLY IS PROPERLY CONNECTED AND INSTALLED.</p> <p>3.6.D THE CONTROLS CONTRACTOR SHALL TEST, ADJUST AND VERIFY THE OPERATION OF EACH CONTROL VALVE TO ENSURE THAT IT IS PROPERLY FUNCTIONING, AS REQUIRED AND LEFT IN SAFE WORKING ORDER.</p> <p>3.6.E MOTORIZED BUTTERFLY VALVES (USUALLY INSTALLED FOR BOILER ISOLATION) SHALL BE SUPPLIED AND INSTALLED BY THE MECHANICAL CONTRACTOR BUT SHALL BE WIRED BY THE CONTROLS CONTRACTOR. THE VALVE DETAILS ARE IN THE MECHANICAL SPECIFICATIONS.</p> <p>3.7 INSTALLATION OF OUTDOOR AIR TEMPERATURE SENSORS</p> <p>3.7.A THE OUTDOOR AIR SENSORS SHALL BE MOUNTED SO THAT THE VENTILATION SLOTS ON THE SOLAR SHIELDS ARE FACING DOWNWARD (WHEN MOUNTED HORIZONTALLY) OR TOWARDS THE WALL (WHEN MOUNTED VERTICALLY).</p> <p>3.7.B MOUNT THE SENSORS ON THE NORTH-FACING SIDE OF THE BUILDING AWAY FROM DIRECT SUNLIGHT.</p> <p>3.7.C MOUNT THE SENSORS IN AN EASILY SERVICEABLE LOCATION.</p> <p>3.7.D ENSURE THAT THE SENSORS ARE LOCATED AWAY FROM BUILDING EXHAUST AIR OR EQUIPMENT AIR FLOWS.</p> <p>3.8 COLD ALARM AQUASTATS IN EXISTING BUILDINGS</p> <p>3.8.A IDENTIFY THE LOCATION OF ALL EXISTING COLD ALARM AQUASTATS INSTALLED ON THE HEATING WATER PIPING. THESE AQUASTATS (USUALLY STRAP-ON TYPE) ARE NORMALLY LOCATED IN THE BOILER ROOM BUT MAY ALSO BE FOUND IN OTHER FAN ROOMS THROUGHOUT THE BUILDING.</p> <p>3.8.B FOR INFORMATION PURPOSES ONLY, THE LOCATION OF KNOWN COLD ALARM AQUASTATS MAY BE INDICATED IN THE SITE SPECIFIC INFORMATION FOR EACH SITE (SEE APPENDIX A). REGARDLESS OF THE INFORMATION PROVIDED, IF ANY, THE CONTROLS CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR LOCATING ALL EXISTING COLD ALARM AQUASTATS IN EACH FACILITY AND CARRYING OUT THE WORK DESCRIBED HEREIN.</p> <p>3.8.C ONCE ALL EXISTING COLD ALARM AQUASTATS IN THE FACILITY HAVE BEEN LOCATED, RELOCATE OR REPOSITION EXISTING COLD ALARM AQUASTATS TO THE BOILER ROOMS. PROVIDE A TYPICAL SUPPLY WATER HEADER. PROVIDE NEW WIRING TO CONNECT TO THE EXISTING ALARM CIRCUIT. THE RELOCATED BOILER ROOM AQUASTAT SHALL BE THE ONLY DEVICE IN THE ALARM CIRCUIT.</p> <p>3.8.D REMOVE ALL ADDITIONAL COLD ALARM AQUASTATS AND WIRING IN THE FACILITY.</p> <p>3.8.E TEST TRIP THE RELOCATED OR NEW BOILER ROOM AQUASTAT AND VERIFY THAT A CORRECT ALARM SIGNAL HAS BEEN RECEIVED BY THE BUILDING SURVEILLANCE SYSTEM.</p> <p>3.9 PNEUMATIC FAIL SAFE INTERLOCKS</p> <p>3.9.A EXISTING PNEUMATIC DAMPER ACTUATORS UNDER BAS CONTROL SHALL BE PHYSICALLY INTERLOCKED (E.G. SOLENOID AIR VALVE EXHAUSTS CONTROL AIR WHEN FAN IS OFF) TO RETURN TO THEIR FAIL SAFE POSITIONS WHEN THEIR RESPECTIVE FAN IS OFF, REGARDLESS OF BAS COMMAND.</p> <p>3.9.B THE CONTROLS CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY SITUATION IN WHICH AN EXISTING PNEUMATIC DAMPER ACTUATOR TO BE PLACED UNDER BAS CONTROL IS NOT PNEUMATICALLY INTERLOCKED TO THE FAN STARTER OR WHERE AN EXISTING PNEUMATIC INTERLOCK IS INOPERATIVE OR DEFECTIVE.</p> <p>3.9.C IF THE CONTROLS CONTRACTOR FAILS TO REPORT TO THE ENGINEER ANY ABNORMALITIES AS DESCRIBED IN 3.9.B, IT SHALL BE ASSUMED THAT ALL PNEUMATIC INTERLOCKS WERE PRESENT AND FUNCTIONING AT THE TIME OF THE CONTROLS INSTALLATION. ANY SUBSEQUENT DEFICIENCIES RELATIVE TO ANY PNEUMATIC INTERLOCK OR THE VFD'S SHALL BE CORRECTED BY THE CONTROLS CONTRACTOR AT NO ADDITIONAL COST TO KPRDSB.</p> <p>3.9.D UNLESS SPECIFIED OTHERWISE, PNEUMATIC HEATING VALVES UNDER BAS CONTROL IN AIR HANDLERS SHALL NOT BE PHYSICALLY INTERLOCKED (E.G. SOLENOID AIR VALVE EXHAUSTS CONTROL AIR WHEN FAN IS OFF) TO THE RESPECTIVE FAN STARTER.</p> <p>3.9.E PROVIDE LABOUR AND MATERIAL, AS REQUIRED, TO ENSURE THAT ALL NEW AND EXISTING ELECTRIC-TO-PRESSURE TRANSDUCERS (EPT) CONTROLLING HEATING VALVES ARE SUPPLIED WITH NON-SWITCHED MAIN CONTROL AIR.</p> <p>3.10 INSTALLATION OF FIRESTOPPING AND SMOKE SEAL MATERIALS</p> <p>3.10.A WHERE CONDUITS PENETRATE THE FIRE-RATED CONSTRUCTION, ULC LISTED AND LABELLED FIRESTOPPING AND SMOKE SEAL MATERIALS SHALL BE INSTALLED AND INSTALLED IN ACCORDANCE WITH ULC FIRESTOP SYSTEM REQUIREMENTS TO SEAL HOLES AND VOIDS IN THE WALLS OR SLABS AND AS FOLLOWS:</p> <p>1. CONDUIT THROUGH A FLOOR WITH A SLEEVED OR CORE DRILLED CIRCULAR OPENING - ULC SYSTEM SP115.</p> <p>2. CONDUIT THROUGH A FLOOR WITH A CAST OR CUT RECTANGULAR OPENING - ULC SYSTEM SP116.</p> <p>3. CONDUIT THROUGH A WALL WITH A SLEEVED OR CORE DRILLED CIRCULAR OPENING - ULC SYSTEM SP114.</p> <p>4. CONDUIT THROUGH A WALL WITH A RECTANGULAR CAST OR CUT OPENING - ULC SYSTEM SP107.</p> <p>3.10.B SELECT THICKNESS AND ARRANGEMENT OF BACK-UP MATERIALS TO SUIT SIZE OF SERVICE, LENGTH OF SLEEVE AND ANTICIPATED MOVEMENT.</p> <p>3.10.C AT THE TIME OF APPLICATION ALL SURFACES SHALL BE PROPERLY CLEANED, DRIED AND FREE FROM DUST, OIL, GREASE, LOOSE OR FLAKING PAINT AND FOREIGN MATERIALS.</p> <p>3.11 INSTALLATION OF WALL OPENING COVER PLATES</p> <p>3.11.A ALL EXISTING WALL OPENINGS OF THE REMOVED ELECTRICAL AND CONTROL DEVICES SHALL BE COVERED WITH PROPERLY SIZED PLATES IN AN APPROVED MANNER SO THAT THE FINISHED WORK PRESENTS A NEAT AND CLEAN APPEARANCE.</p> <p>3.12 CUTTING AND PATCHING</p> <p>3.12.A ALL CUTTING, PATCHING, PAINTING AND MAKING GOOD FOR THE INSTALLATION OF THE BAS WORK SHALL BE DONE BY THE BAS CONTRACTOR. ALL CUTTING SHALL BE PERFORMED IN A NEAT AND TRUE FASHION, WITH PROPER TOOLS AND EQUIPMENT TO THE ENGINEER AND/OR KPRDSB PROJECT REPRESENTATIVE APPROVAL. THE SURFACES SHALL BE MADE GOOD TO REASONABLY MATCH EXISTING FINISHES TO THE ENGINEER AND/OR KPRDSB PROJECT REPRESENTATIVE APPROVAL.</p> <p>3.12.B LOCATION OF THE EXISTING SERVICES CONCEALED IN THE CONSTRUCTION, IF ANY, SHALL BE DETERMINED PRIOR TO DRILLING OR CUTTING AN OPENING. IF REQUIRED, THE CONTRACTOR IS TO X-RAY THE WALLS OR SLABS AND IN ANY CASE HE SHALL NOT DRILL OR CUT ANY SURFACE WITHOUT THE KPRDSB PROJECT REPRESENTATIVES APPROVAL.</p> <p>3.12.C THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OF ANY DAMAGE TO EXISTING SERVICES, EXPOSED OR CONCEALED, CAUSED AS A RESULT OF THIS WORK.</p> <p>3.13 PACKING AND SEALING CORE DRILLED CONDUIT OPENINGS</p> <p>3.13.A THE VOID BETWEEN THE CONDUIT OPENING AND THE CONDUIT SHALL BE PACKED AND SEALED FOR THE LENGTH OF THE OPENING AS FOLLOWS:</p> <p>1. PACK OPENINGS IN NON-FIRE RATED INTERIOR CONSTRUCTION WITH MINERAL WOOL AND SEAL BOTH ENDS OF THE OPENING WITH NON-HARDENING SILICONE BASE CAULKING COMPOUND TO PRODUCE A WATERTIGHT SEAL.</p> <p>2. PACK AND SEAL OPENINGS IN FIRE RATED WALLS AND SLABS AS SPECIFIED IN THIS SECTION AND AS PER ARTICLE ENTITLED "INSTALLATION OF FIRESTOPPING AND SMOKE SEAL MATERIALS"</p> <p>3.14 ACCESS DOORS INSTALLATION</p> <p>3.14.A ALL ACCESS DOORS SHALL BE FLUSH MOUNTED.</p> <p>3.14.B ACCESS DOORS SHALL BE INSTALLED SUCH AS TO GIVE PROPER ACCESS TO ALL NEWLY INSTALLED ELECTRICAL AND CONTROL EQUIPMENT AND OTHER SMD OR ELECTRICAL WORK WHICH MAY NEED MAINTENANCE OR REPAIR BUT WHICH ARE CONCEALED IN INACCESSIBLE CONSTRUCTION.</p> <p>3.14.C ALL ACCESS DOORS SHALL BE INSTALLED BY THE PROFESSIONAL TRADES SPECIALIZED IN WORKING ON THE PARTICULAR TYPE OF CONSTRUCTION IN WHICH THE DOORS ARE REQUIRED.</</p>



1 HEAT RECOVERY UNIT NEW PLAN
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2 SECTION A-A
SCALE: 1:25

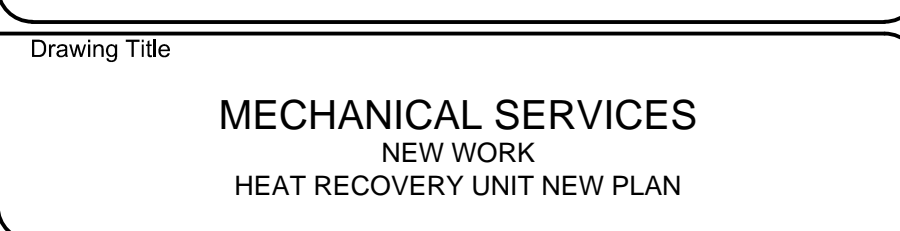
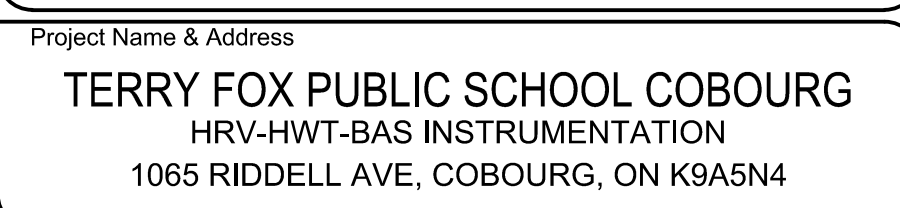
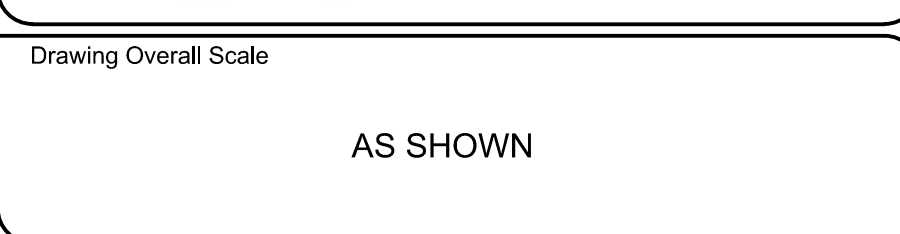
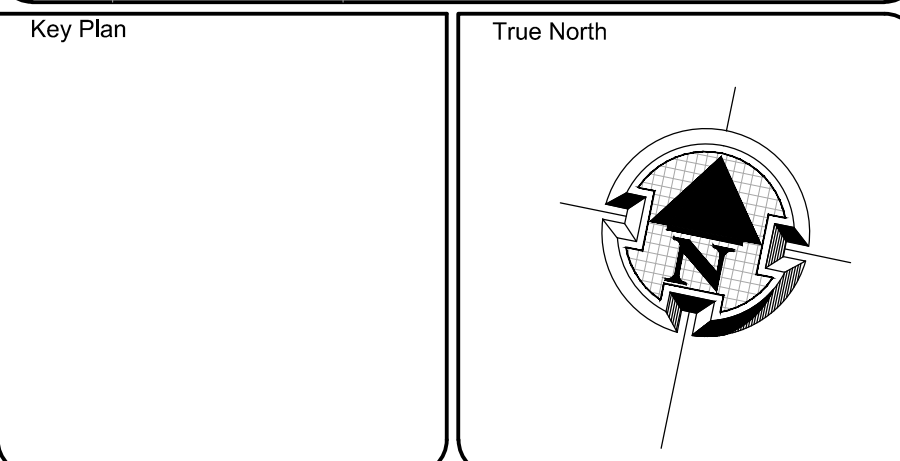
DESIGN NOTES:

1. PROVIDE AND INSTALL NEW HRV AS PER EQUIPMENT SCHEDULE AND IN ACCORDANCE WITH MANUFACTURE'S INSTALLATION INSTRUCTION. THE UNIT SHALL BE BROUGHT INTO THE MECHANICAL ROOM IN SECTIONS THROUGH THE OUTSIDE O/A LOUVER OPENING, AND ASSEMBLED BY MECHANICAL CONTRACTOR ON SITE. RE-CONNECT ALL EXISTING SERVICES INCLUDING POWER AND CONTROL. COMMISSION THE NEW UNIT AND SUBMIT THE REPORT FOR REVIEW AND APPROVAL. MODIFY THE DUCTWORK AS REQUIRED TO SUIT FOR CONNECTION TO THE NEW UNIT. CONNECT THE UNIT TO THE NEW CONTROLLER.
2. PROVIDE AND INSTALL NEW INSULATED S/A, R/A, O/A AND E/A DUCTWORK AND CONNECT TO EXISTING SUPPLY DUCTS AS SHOWN. EXACT DUCT LAYOUT AND TIE-IN POINTS TO EXISTING DUCTWORK SHALL BE VERIFIED ON SITE. PROVIDE ACCESS DOOR ON DUCTS FOR ALL NEW DAMPERS AS REQUIRED. PROVIDE SUPPORT AS REQUIRED PER DETAIL DRAWING AS REQUIRED.
3. PROVIDE AND INSTALL NEW INSULATED 750 HOT WATER PIPING CONNECTION FOR THE NEW HRV C/W CONTROL VALVES, REUSED PUMP AND ALL ASSOCIATED ACCESSORIES, AND CONNECT TO EXISTING PIPES. EXACT PIPING LAYOUT SHALL BE VERIFIED AT SITE. PROVIDE AUTOMATIC AIR VENT AT THE HIGHEST POINT OF THE PIPING SYSTEM AS REQUIRED. SUPPORT SHALL BE PROVIDED AS PER DETAIL DRAWING. CONTRACTOR TO COORDINATE ENOUGH SPACE FOR MAINTENANCE PURPOSE OF HEATING COIL.
4. PROVIDE AND INSTALL NEW 750 CS & CR CONDENSER PIPING TO AHU AND ASSOCIATED SOLENOID VALVE, TEMPERATURE SENSOR, FLOW SWITCHES AND THERMOMETER.
5. EXISTING BAS PANEL (TO BE VERIFIED AT SITE). CONTRACTOR TO REVIEW THE BAS PANEL DURING THE TENDER WALK-THROUGH AND ALLOW FOR ANY MODIFICATION AS REQUIRED INCLUDING ALL CONTROLS AND ELECTRICAL REQUIREMENTS. A NEW PANEL SHALL BE PROVIDED IF REQUIRED TO ACHIEVE THE DESIRED CONTROL. REFER TO CONTROL SCHEMATIC FOR NEW WORK.
6. CONTRACTOR TO RE-BALANCE ENTIRE DUCTWORK ASSOCIATED WITH NEW HRV UNIT. AS SHOWN ON THE DRAWING AND EQUIPMENT SCHEDULE.
7. NEW HRV SHALL BE ON FURNISHED PAD. THE UNIT TO BE INSTALLED ON NEOPRENE ALL ALONG THE FRAME. FOR MORE DETAIL REFER TO STRUCTURAL DRAWING.
8. CONTRACTOR TO VACUUM CLEAN THE EXISTING S/A, R/A AND E/A DUCT.
9. CONTROL CONTRACTOR SHALL PROVIDE AND INSTALL DAMPER ACTUATOR, POWER AND ALL REQUIRED ACCESSORIES AS SHOWN ON DRAWING. REFER TO DWG M-500 FOR CONTROL SCHEMATIC. ALL SIZES TO BE VERIFIED ON SITE AND COORDINATED WITH THE EHV SUPPLIER.
10. PROVIDE AND INSTALL ALL O/A DUCT TO HRV AND 3150mmx1600mm LOUVER C/W BIRD SCREEN IN THIS MECHANICAL ROOM.
11. PROVIDE NEW 1" CONDENSATE DRAIN PIPING AND P-TRAP FOR HRV UNIT. TERMINATE NEW DRAIN PIPING ABOVE EXISTING FUNNEL FLOOR DRAIN.

GENERAL NOTES:

1. ALL EXISTING SERVICES SHOWN HAS BEEN EXTRACTED FROM AVAILABLE BASE BUILDING DRAWINGS AND RANDOM SITE SURVEYS. NOT ALL EXISTING SERVICES/SITE INFORMATION HAS BEEN SHOWN NOR CAN THE INFORMATION SHOWN BE GUARANTEED FOR PRECISE ACCURACY. CONTRACTOR SHALL THEREFORE VISIT THE SITE PRIOR TO SUBMITTING A BID TO SATISFY THEMSELVES THAT ALL WORK SHOWN AND/OR SPECIFIED CAN BE CARRIED OUT IN ACCORDANCE WITH THE CONTRACT DOCUMENT.
2. ALL EXISTING EQUIPMENT TAG NOS. USED ON THIS DRAWING ARE BASED ON EXISTING BASE BUILDING STANDARDS.
3. ALL CUTTING/PATCHING/CORING OF WALLS AND FLOORS REQUIRED TO ACCOMMODATE NEW MECHANICAL WORK IS TO BE ARRANGED AND PAID FOR BY MECHANICAL CONTRACTOR. X-RAY FLOORS/CONCRETE WALLS PRIOR TO CORING/CUTTING.
4. THE MECHANICAL DRAWINGS DO NOT SHOW ALL THE ARCHITECTURAL AND STRUCTURAL DETAILS. ANY SPECIFIC INFORMATION INVOLVING ACCURATE MEASURING OF THE BUILDING SHALL BE TAKEN FROM THE BUILDING DRAWINGS OR AT THE BUILDING. MAKE WITHOUT ADDITIONAL CHARGE. ANY NECESSARY CHANGES OR ADDITIONS TO THE RUNS OF DUCTS AND PIPES TO ACCOMMODATE THE ABOVE CONDITIONS.
5. COORDINATE WITH ALL OTHER TRADES AND SITE SUPERINTENDENT ON ALL WORK.
6. ALL ABANDONED PIPING WHICH ARE NO LONGER BEING USED SHALL BE REMOVED FROM THE SITE. CONTRACTOR SHALL ENSURE PRIOR TO REMOVAL OF ANY PIPING THAT THE SYSTEM IS COMPLETELY ISOLATED AND IS NOT ALIVE.
7. WORK SHALL INCLUDE STARTUP OF ALL SYSTEMS, FURNISHING OF OPERATING AND MAINTENANCE INSTRUCTIONS, AND ONE (1) YEAR GUARANTEE, COMMENCING ON THE DATE OF ACCEPTANCE BY THE TENANT.
8. CONNECTIONS BETWEEN DUCTS AND FANS/AHUS SHALL BE MADE WITH 6" LONG FLEXIBLE NEOPRENE.
9. SUPPORT ALL NEW DUCTS AND PIPES FROM THE CEILING/ROOF STRUCTURE.
10. ALL ROOFING AND PENETRATIONS SHALL BE DONE IN STRICT ACCORDANCE WITH KPRDSB STANDARD DETAILS AND ONLY BY KPRDSB APPROVED ROOFING TRADES. IF THE ROOF IS UNDER WARRANTY, ONLY THE WARRANTY HOLDER SHALL BE RETAINED TO PERFORM THE WORK.
11. NEW CONTROL SYSTEM TO BE DDC AS PER KPRDSB STANDARD.
12. ALL REDUNDANT WALL / ROOF OPENINGS SHALL BE SEALED AND FIRE-STOPPED AS REQUIRED.

REV.	DATE	DESCRIPTION
1	04/01/2022	RE-ISSUED FOR PERMIT & TENDER
0	8/12/2021	ISSUED FOR PERMIT AND TENDER




DATE: 11/11/2021	Engineer / Architect Stamp
DESIGNED BY: J.L.	
DRAWN BY: J.L.	
APPROVED BY: M. A.	
PROJECT NO.: 1021225	

Drawing No.	Phase	Revision
M-301	T	0



- ## **DEMOLITION NOTES:**
- 1** REMOVE EXISTING DOMESTIC HOT WATER HEATER AT THIS APPROXIMATE LOCATION. REMOVE ASSOCIATED HOT AND COLD WATER PIPES/VALVES AS SHOWN, AND COORDINATE WITH ELECTRICAL CONTRACTOR TO MAKE SAFE POWER.
 - 2** CUT AND CAPPED EXISTING DHW & COW & DHWR PIPES AND VALVES
 - 3** CUT AND CAPPED EXISTING GAS LINE C/W VALVE AND DIRT LEG. DURING RENOVATION PERIOD OF TIME.
 - 4** REMOVE AND DEMOLISH FLUE VENTS. COORDINATE WITH GENERAL CONTRACTOR TO PATCH AND MAKE GOOD ALL FLUE VENT PENETRATIONS THROUGH THE ROOF OR SLAB.
 - 5** UNDERNEATH CONCRETE PAD TO REMAIN. PREPARE FOR INSTALLATION OF NEW UNIT. REFER TO NEW WORK PLAN FOR MORE DETAIL.
 - 6** EXISTING FLOOR DRAIN TO REMAIN AND MODIFIED AS REQUIRED FOR CONNECTING TO THE NEW UNIT DRAIN.

<p>Key Plan</p>	<p>True North</p> 
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Engineer Logo



**Spectra
Engineering
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Client

 **Kawartha Pine Ridge
District School Board**

Drawing Overall Scale

AS SHOWN

Project Name & Address

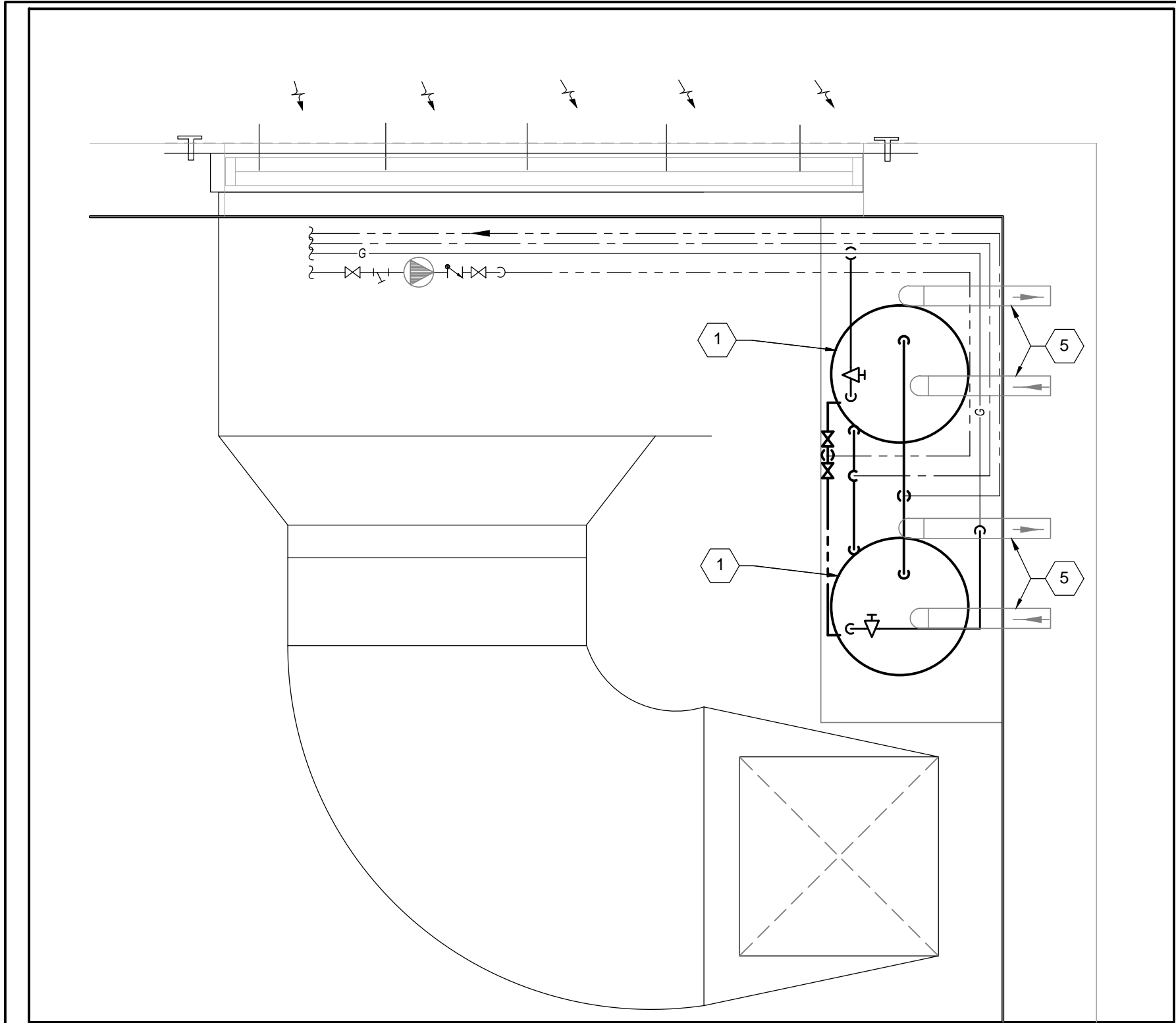
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HRV-HWT-BAS INSTRUMENTATION
1065 RIDDELL AVE, COBOURG, ON K9A5N4

Drawing Title

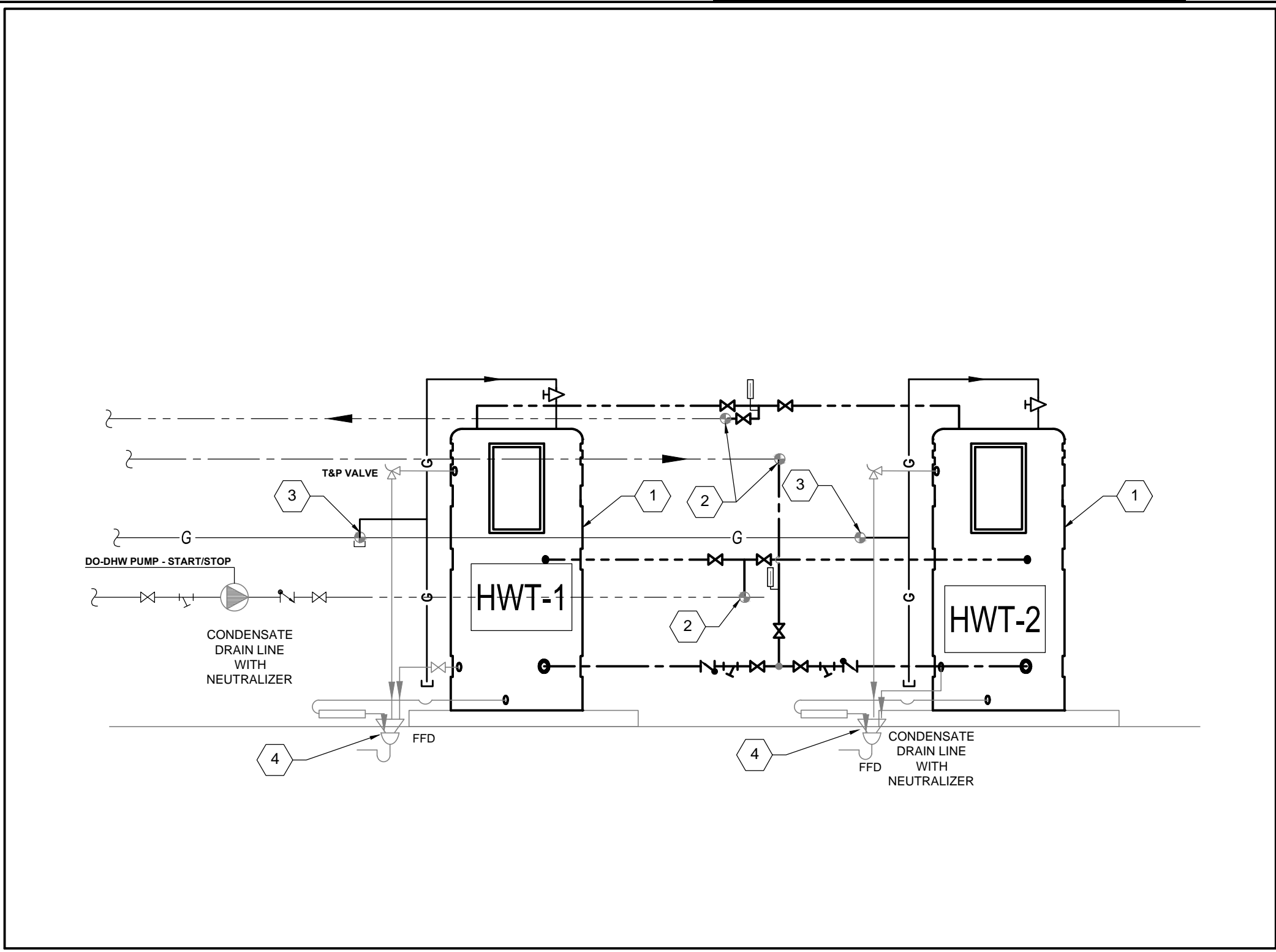
MECHANICAL SERVICES
DEMOLITION WORK
DOMESTIC HOT WATER TANK DEMOLITION PLAN

DATE:	11/11/2021	Engineer / Architect Stamp
DESIGNED BY:	J.L	
DRAWN BY:	J.L.	
APPROVED BY:	M. A	
PROJECT NO.:	1021225	

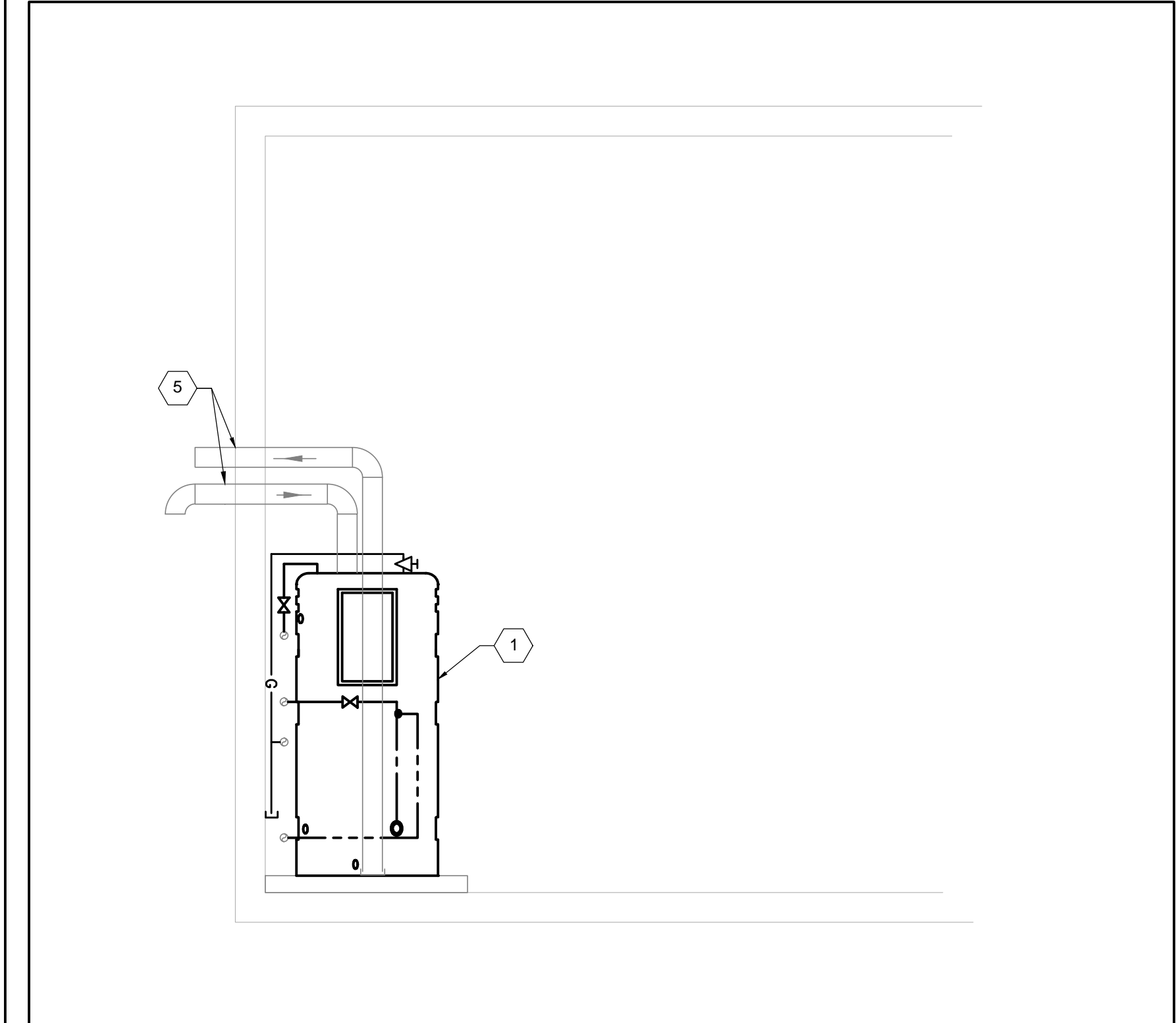
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1 DOMESTIC HOT WATER TANK NEW PLAN
SCALE: 1:25



2 DOMESTIC HOT WATER TANK NEW DETAIL
SCALE: N.T.S



3 SECTION A-A
SCALE: 1:25

DESIGN NOTES:

- 1 PROVIDE AND INSTALL NEW FLOOR MOUNTED GAS-FIRED HIGH EFFICIENCY GAS HOT WATER HEATER HWT-1 & HWT-2 AS PER SCHEDULE. MOUNT WATER HEATER ON EXISTING CONCRETE HOUSEKEEPING PAD. MODIFY EXISTING PAD AS REQUIRED TO SUIT NEW WATER HEATER. LAYOUT UNITS PROPERLY TO ALLOW SUFFICIENT CLEARANCE SPACE AS SHOWN ON THE DRAWING AND AS PER MANUFACTURER'S RECOMMENDATIONS. (TYPICAL)
- 2 RE-CONNECT AND EXTEND DHW & DCW AND DHWR PIPES, VALVES AND T.P., TO WATER HEATER AS SHOWN ON THE DRAWING.
- 3 RE-CONNECT AND EXTEND GAS LINE TO WATER HEATER C/W GAS VALVE AND DIRT LEG.
- 4 TERMINATE NEUTRALIZER KIT DRAIN; T&P VALVE AND DRAIN VALVE, AT EXISTING FUNNEL FLOOR DRAINS.
- 5 PROVIDE AND RUN 30" AIR INLET AND FLUE OUTLET, TERMINATED THROUGH THE SIDEWALL. MIN. 300MM ABOVE HIGHEST SNOW LEVEL. INSTALL ACCORDING TO MANUFACTURE RECOMMENDATION.

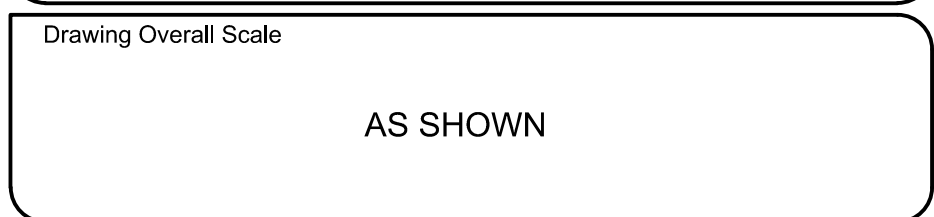
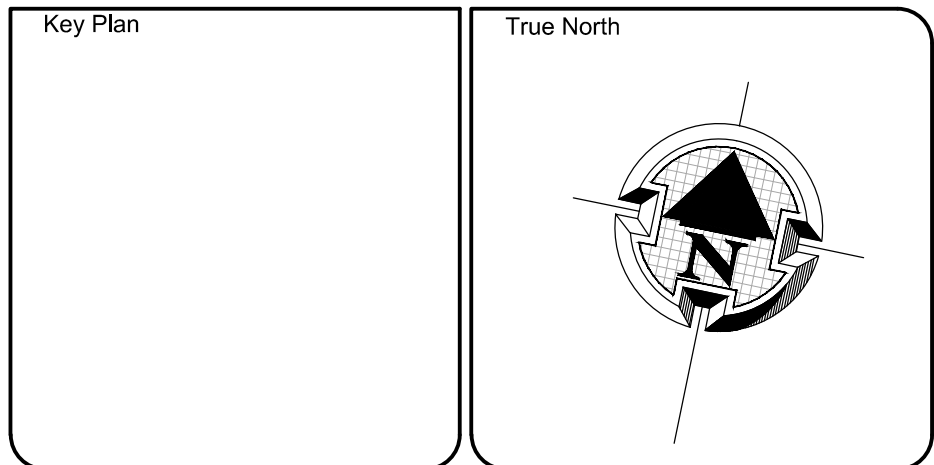
DHW TANK CONTROL SEQUENCE:

THE HAT WATER TANK SHALL BE SCHEDULED TO START WITH A WEEKLY SCHEDULE AND WILL BE COMMAND OFF FOR HOLIDAYS.

THE DHW PUMP SHALL BE COMMAND OFF WHEN THE PHASE LOSS ALARM IS ACTIVE

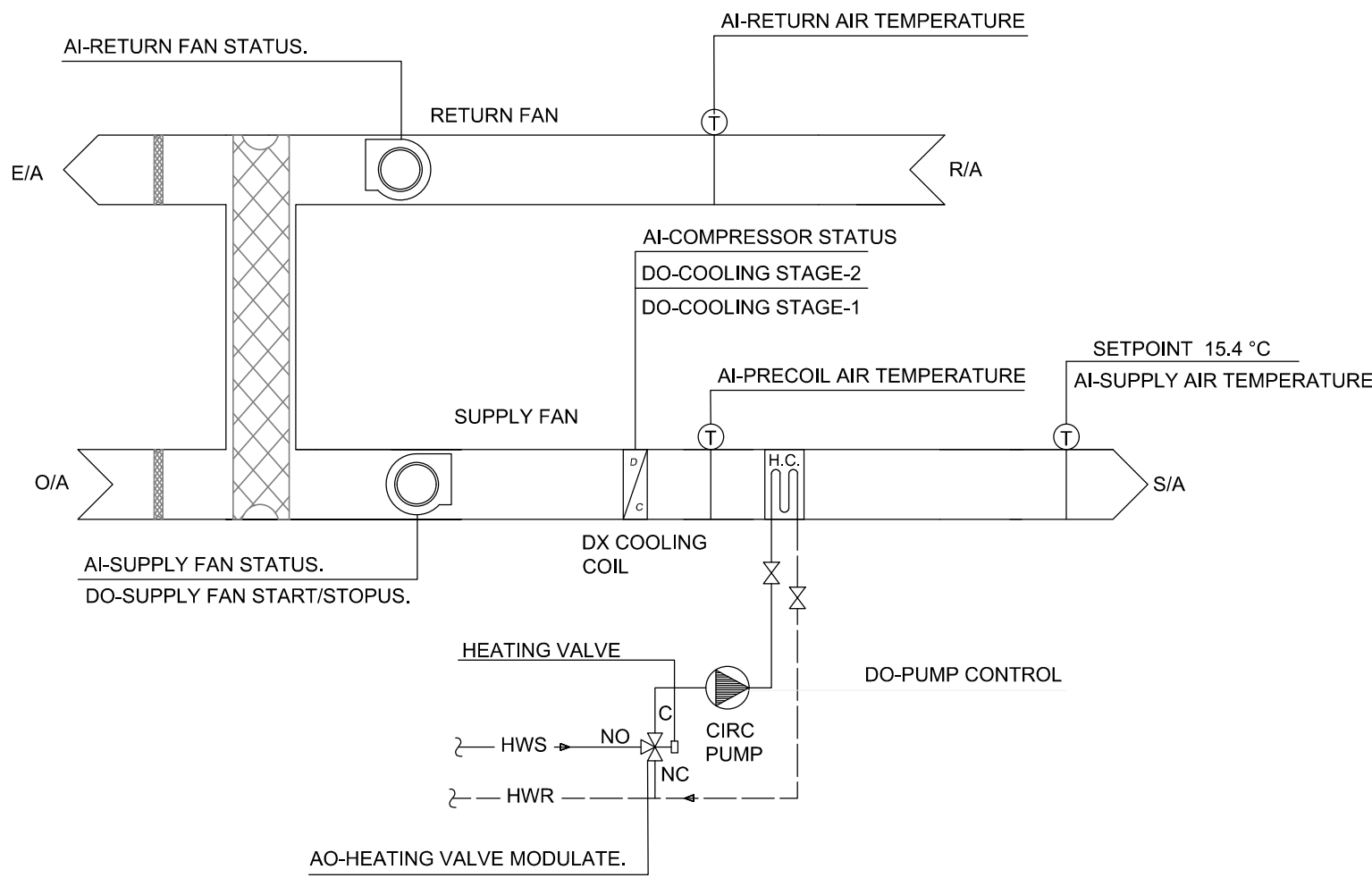
CONTRACTOR TO DISCONNECT AND RECONNECT ALL CONTROL WIRING AND COMMISSION THE SYSTEM

REV.	DATE	DESCRIPTION
1	04/01/2022	RE-ISSUED FOR PERMIT & TENDER
0	8/12/2021	ISSUED FOR PERMIT AND TENDER



DATE: 11/11/2021 DESIGNED BY: J.L. DRAWN BY: J.L. APPROVED BY: M. A. PROJECT NO.: 1021225	Engineer / Architect Stamp
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Drawing No.	Phase	Revision
M-303	T	0



CLASSROOM HRV CONTROL SEQUENCES

1. THE HRV SHALL BE SCHEDULED TO START BY A WEEKLY SCHEDULE AND WILL BE COMMANDED OFF FOR HOLIDAYS.
2. THE BAS SHALL MONITOR THE SUPPLY FAN STATUS AND THE SUPPLY AIR TEMPERATURE.
3. THE HRV SHALL BE COMMANDED OFF IF THE PHASE LOSS ALARM IS ACTIVE.
4. WHEN THE HRV IS STARTED BY THE WEEKLY SCHEDULE IT WILL HAVE A START UP RAMPING TIME OF 5 MINUTES BEFORE REACHING NORMAL OPERATION.
5. THE SUPPLY AIR TEMPERATURE SETPOINT CAN BE SET BETWEEN 12.7°C AND 17.5°.
6. THE DX COOLING SHALL BE COMMANDED OFF. THE MIXED AIR DAMPERS AND THE HEATING VALVE SHALL BE CONTROLLED TO MAINTAIN SUPPLY AIR TEMPERATURE SETPOINT.
7. THE BAS SHALL ENABLE THE DX COOLING WHEN THE OUTDOOR TEMPERATURE IS ABOVE 21°C TO 22°C.
8. THE BAS SHALL ENABLE FREE COOLING MODE WHEN THE OUTDOOR TEMPERATURE IS BELOW 21°C.
9. THE HEATING VALVE SHALL BE COMMANDED CLOSED, THE BAS SHALL STAGE THE DX COMPRESSORS TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT.
10. THE DX COOLING STAGES SHALL HAVE A MINIMUM OFF TIME OF 5 MINUTES AND A MINIMUM RUN TIME OF 4 MINUTES.
11. THE BAS SHALL STOP ALL DX COOLING STAGES IF THE SUPPLY AIR TEMPERATURE DROPS BELOW 7°C.
12. WHEN AN HRV IS COMMANDED OFF, IT WILL NOT BE STARTED AGAIN FOR A MINIMUM OF 5 MINUTES. THE DX COOLING WILL BE OFF. MIXED AIR DAMPERS SHALL RETURN TO THEIR RESPECTIVE NORMAL POSITIONS AND THE HEATING VALVE SHALL BE CONTROLLED TO PROTECT THE HEATING COIL FROM FREEZING.
13. THE BAS SHALL MONITOR THE AIR TEMPERATURE IN RETURN DUCT AND BEFORE HEATING COIL.

DESIGN NOTE

CONTROL CONTRACTOR SHALL MODIFY EXISTING BAS PANEL AS REQUIRED FOR CONNECTION TO NEW TERMINAL CONTROL PANELS OR ADD NEW BAS PANEL C/W POWER PANELS AS NEEDED. CONTRACTOR SHALL SUPPLY AND INSTALL ANY NEW EQUIPMENT AND INSTRUMENT TO INTEGRATE NEW EQUIPMENT TO EXISTING BASE BUILDING BAS SYSTEM. UPGRADE THE GRAPHIC ON THE BAS AND RE-COMMISSION THE NEW SYSTEM.

CONTROL CONTRACTOR TO RECONNECT THE EXISTING POINTS TO THE NEW HRV UNITS AND RE-COMMISSION THE SYSTEM.

DECOMMISSION THE POINTS ASSOCIATED WITH STEAM HUMIDIFIER.

GENERAL NOTES:

1. ALL EXISTING SERVICES SHOWN HAS BEEN EXTRACTED FROM AVAILABLE BASE BUILDING DRAWINGS AND RANDOM SITE SURVEYS. NOT ALL EXISTING SERVICES/SITE INFORMATION HAS BEEN SHOWN. NOR CAN THE INFORMATION SHOWN BE GUARANTEED FOR PRECISE ACCURACY. CONTRACTOR SHALL THEREFORE VISIT THE SITE PRIOR TO SUBMITTING A BID TO SATISFY THEMSELVES THAT ALL WORK SHOWN AND/OR SPECIFIED CAN BE CARRIED OUT IN ACCORDANCE WITH THE CONTRACT DOCUMENT.
2. ALL EXISTING EQUIPMENT TAG NOS. USED ON THIS DRAWING ARE BASED ON EXISTING BASE BUILDING STANDARDS.
3. ALL CUTTING/PATCHING/CORING OF WALLS AND FLOORS REQUIRED TO ACCOMMODATE NEW MECHANICAL WORK IS TO BE ARRANGED AND PAID FOR BY MECHANICAL CONTRACTOR. X-RAY FLOORS/CONCRETE WALLS PRIOR TO CORING/CUTTING.
4. COORDINATE WITH ALL OTHER TRADES AND SITE SUPERINTENDENT ON ALL WORK.
5. WORK SHALL INCLUDE STARTUP OF ALL SYSTEMS, FURNISHING OF OPERATING AND MAINTENANCE INSTRUCTIONS, AND ONE (1) YEAR GUARANTEE, COMMENCING ON THE DATE OF ACCEPTANCE BY THE TENANT.
6. CONNECTIONS BETWEEN DUCTS AND FANS/AHUs SHALL BE MADE WITH 6" LONG FLEXIBLE NEOPRENE.
7. REMOVE ALL EXISTING PNEUMATIC CONTROL DEVICES. NEW CONTROL SYSTEM TO BE DDC AS PER KPRDSB STANDARD.
8. ALL REDUNDANT WALL / ROOF OPENINGS SHALL BE SEALED AND FIRE-STOPPED AS REQUIRED.
9. CONTROL CONTRACTOR SHALL MATCH ALL NEW AHU AND FAN CONTROL WITH EXISTING BAS PANEL(S) AS REQUIRED (FOR CONNECTION TO NEW TERMINAL CONTROL PANELS OR ADD NEW BAS PANEL C/W POWER AS NEEDED FOR THE NEW POINTS), CONTRACTOR SHALL SUPPLY AND INSTALL ANY NEW EQUIPMENT AND INSTRUMENT TO INTEGRATE ALL NEW CONTROL WORK INTO THE EXISTING BASE BUILDING BAS SYSTEM. UPGRADE THE GRAPHICS ON THE BAS BUILDING CONTROLS SYSTEM AND COMMISSION ALL NEW WORK.
10. CONTRACTOR SHALL HIRE THE BASE BUILDING CONTROL CONTRACTOR TO CONNECT NEW EQUIPMENT TO BAS, UPDATE THE SYSTEM GRAPHICS, AND PROVIDE THE SEQUENCE OF OPERATION AS PER DRAWING. BAS COMMISSIONING REPORT SHALL BE SUBMITTED TO KPRDSB AND CONSULTANT FOR REVIEW AND APPROVAL.
11. UPDATE GRAPHICS AND FIRMWARE VERSION OF ALL BAS CONTROLLERS, (IF APPLICABLE)
12. INCORPORATE SCHEDULING STANDARDS OF KPRDSB.
13. BACNET INTEGRATION FOR BOTH SF AND RF VFD TO READ STATUS.
14. 2 BI TO MONITOR SECURITY SYSTEM.(IF APPLICABLE)

1 HEAT RECOVERY UNIT CONTROL SCHEMATIC AND SEQUENCE OF OPERATION

SCALE: N.T.S

1	04/01/2022	RE-ISSUED FOR PERMIT & TENDER
0	8/12/2021	ISSUED FOR PERMIT AND TENDER
REV.	DATE	DESCRIPTION
Key Plan		
True North		
Engineer Logo		
Spectra Engineering		
250 SHEPPARD AVE EAST, SUITE#306, TORONTO, ONTARIO, M2N 6M9 TEL: (647) 478-6156 FAX: (647) 478-6917		
Client		
Kawartha Pine Ridge District School Board		
Drawing Overall Scale		
AS SHOWN		
Project Name & Address		
TERRY FOX PUBLIC SCHOOL COBOURG HRV-HWT-BAS INSTRUMENTATION 1065 RIDDELL AVE, COBOURG, ON K9A 5N4		
Drawing Title		
MECHANICAL SERVICES CONTROL SCHEMATIC AND EQUIPMENT SCHEDULES		
DATE: 11/11/2021 DESIGNED BY: J.L. DRAWN BY: J.L. APPROVED BY: M. A PROJECT NO.: 1021225		Engineer / Architect Stamp
		LICENSED PROFESSIONAL ENGINEER M. A. KHAVANBAZ 100088319 8 DEC. 2021 PROVINCE OF ONTARIO
Drawing No. Phase Revision		
M-500 T 0		

SCHEDULE OF HVAC HEAT RECOVERY UNIT																											
TAG	SERVICES	LOCATION	MAKE	MODEL	FAN			HEAT RECOVERY WHEEL						HEATING COIL CAPACITY			COOLING			CONDENSER		ELECTRICAL		WEIGHT (LBS)			
					SUPPLY AIR			RETURN AIR			SUPPLY				EXHAUST		MBH	EWT/L WT (°F)	GPM	CAPACITY TOTAL/SENSIBLE (MBH)	EDB/EWB (°F)	LDB/LWB (°F)	EWT/LWT (°F)		GPM	POWER SUPPLY	MINIMUM CIRCUIT AMPACITY
					L/S (CFM)	ESP/TSP "WC	MOTOR (BHP/HP)	L/S (CFM)	ESP/TSP "WC	MOTOR (BHP/HP)	ENTER TEMP. DB/WB (°F)	LEAV TEMP. DB/WB (°F)	ENERGY RECOVERY (MBH)	ASHRAE EFFICIENCY	ENTER TEMP. DB/WB (°F)	LEAV TEMP. DB/WB (°F)											
HRV	SCHOOL CLASSROOM	MECH. NO. 201	ENGA	UPEW253/HR P/MV/C	6326 13405	1 / 3.8	13.1 / 20	6244 13231	1 / 3.3	11.4 / 15	-15.0/-16.0°	38.3/26.0	771	62.1%	72	18.0/14.5°	812	190/162	67	303 / 225	89.6/75.2	74/69.5	90/ 100	69	208 / 3 / 60	202.7 AMPS	16000
NOTE:																											

NAT. GAS HOT WATER TANK (HWT)							
MARK/TYPE	INPUT (MBH)	VOLTS (V)	MANUFACTURER	MODEL	SIZE (in)	WEIGHT (LB)	REMARKS
HWT-1	300	120 (1)	PVI	30 L 100A-GCL	Ø28"x75-3/4"	1470	REFER TO NOTES
HWT-2	300	120 (1)	PVI	30 L 100A-GCL	Ø28"x75-3/4"	1470	REFER TO NOTES
NOTES: 1- REFER TO FLOOR PLAN FOR LOCATION 2- PROVIDE WITH TEMPERATURE AND PRESSURE RELIEF VALVE							

1	04/01/2022	RE-ISSUED FOR PERMIT & TENDER
0	8/12/2021	ISSUED FOR PERMIT AND TENDER
REV.	DATE	DESCRIPTION

Key Plan	True North
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Engineer Logo



Spectra Engineering Ltd.
250 SHEPPARD AVE. EAST, SUITE #306, TORONTO, ONTARIO, M2N 6M9
TEL: (647) 478-5156
FAX: (647) 478-5917

Client



Kawartha Pine Ridge District School Board

Drawing Overall Scale

AS SHOWN

Project Name & Address

TERRY FOX PUBLIC SCHOOL COBOURG
HRV-HWT-BAS INSTRUMENTATION
1065 RIDDELL AVE, COBOURG, ON K9A5N4

Drawing Title

MECHANICAL SERVICES
EQUIPMENT SCHEDULE

DATE: 11/11/2021 DESIGNED BY: J.L. DRAWN BY: J.L. APPROVED BY: M. A PROJECT NO.: 1021225	Engineer / Architect Stamp 
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Drawing No.

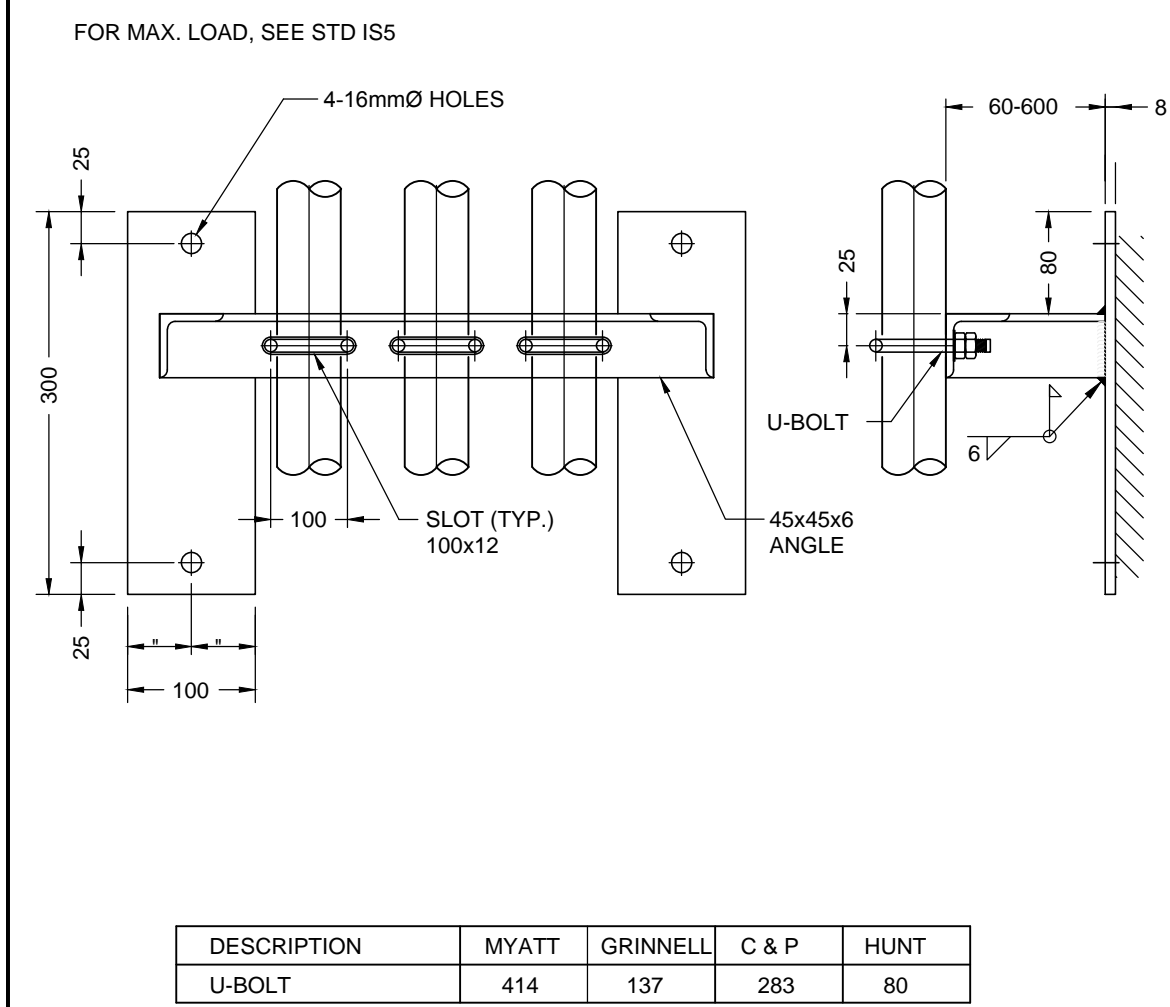
Phase

Revision

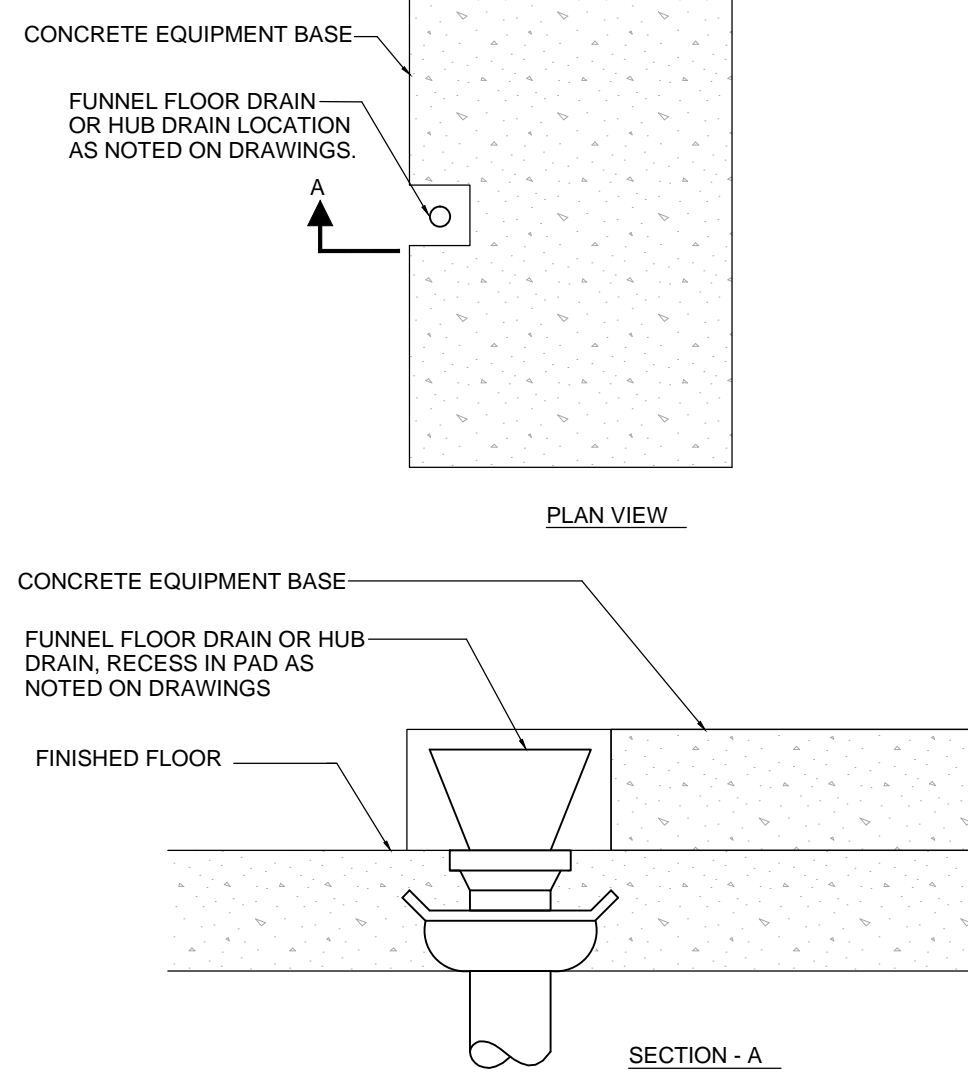
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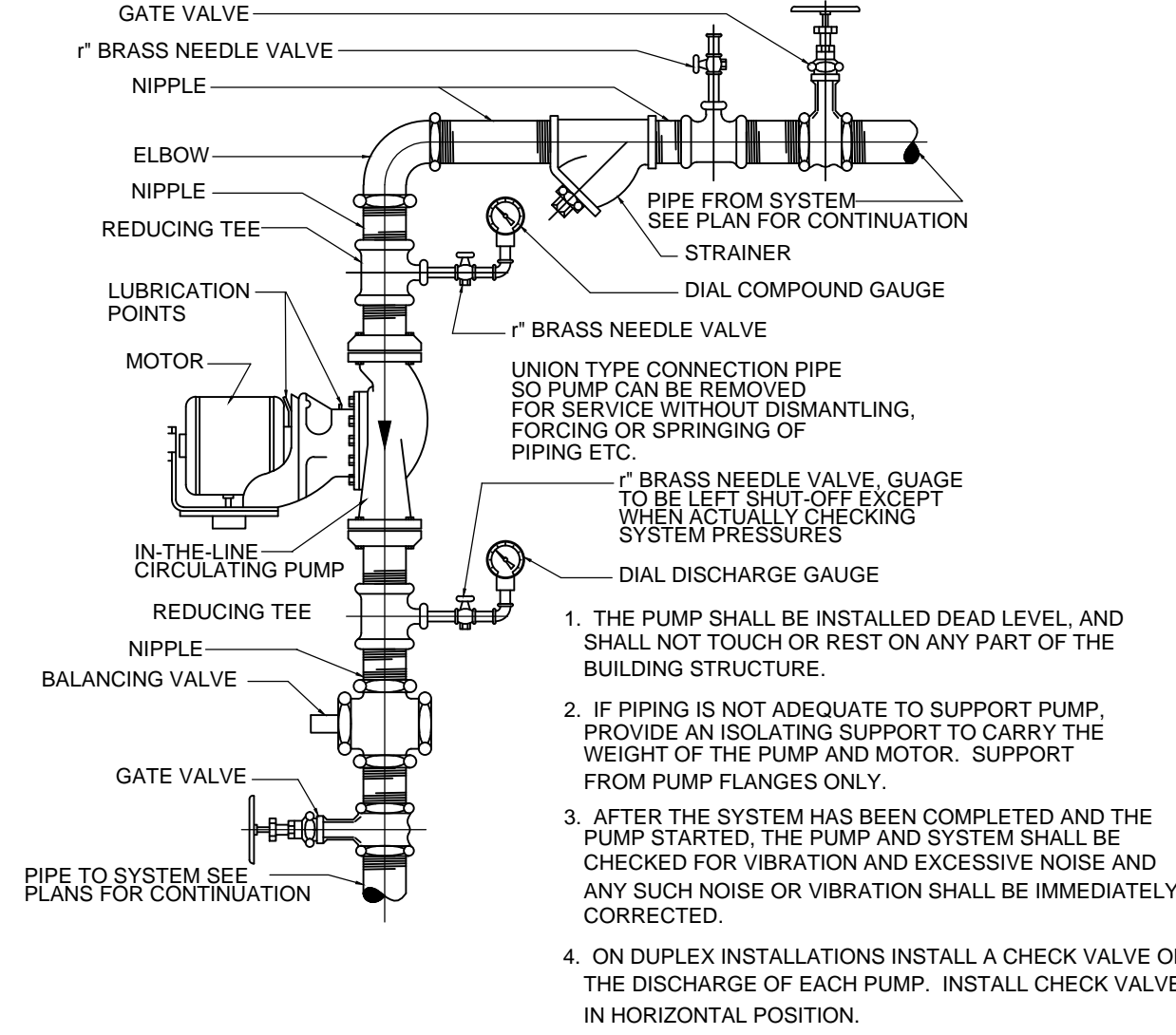
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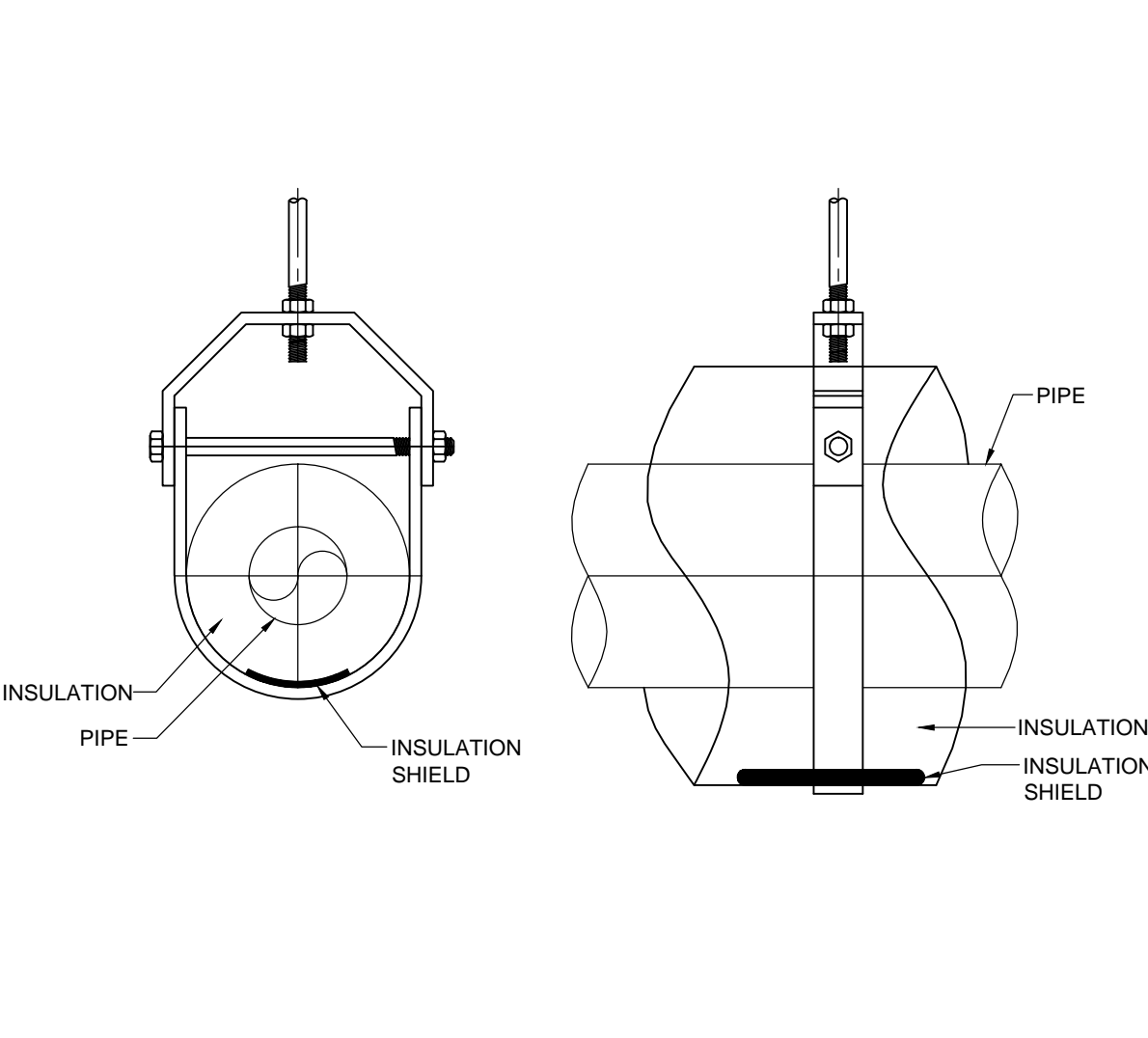
1 WALL MOUNTED MULTIPLE PIPE SUPPORT
N.T.S



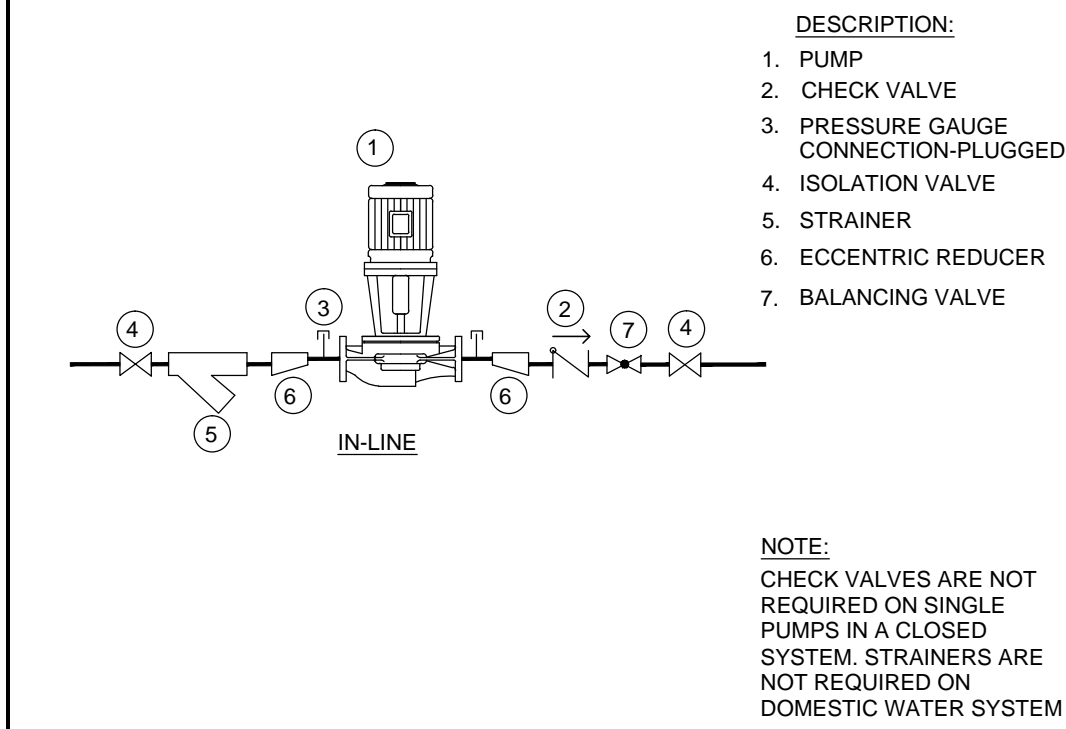
2 EQPT.BASE FUNNEL FLOOR HUB DRAIN
N.T.S



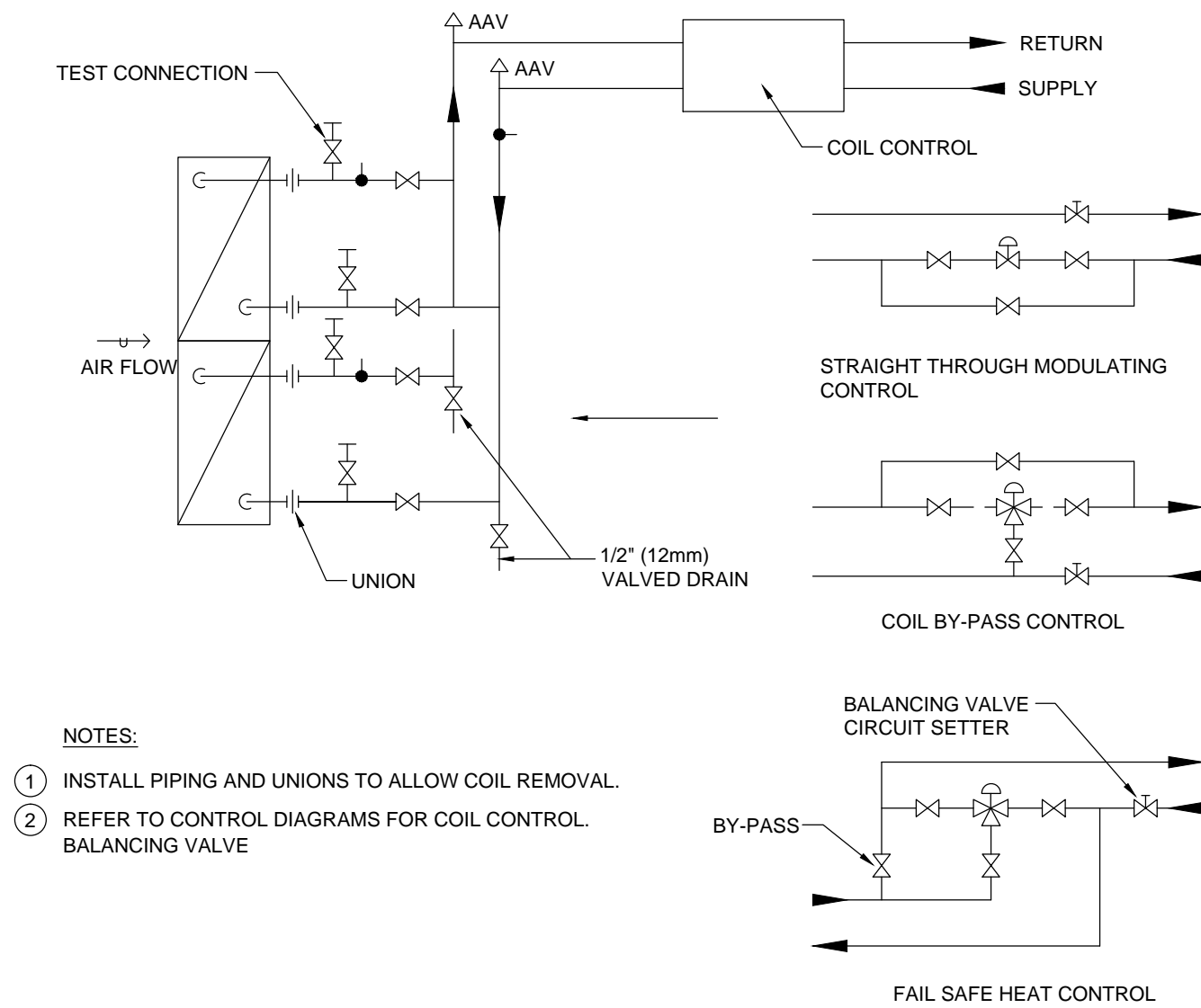
3 IN LINE CIRCULATION PUMP(HEATING ONLY)
N.T.S



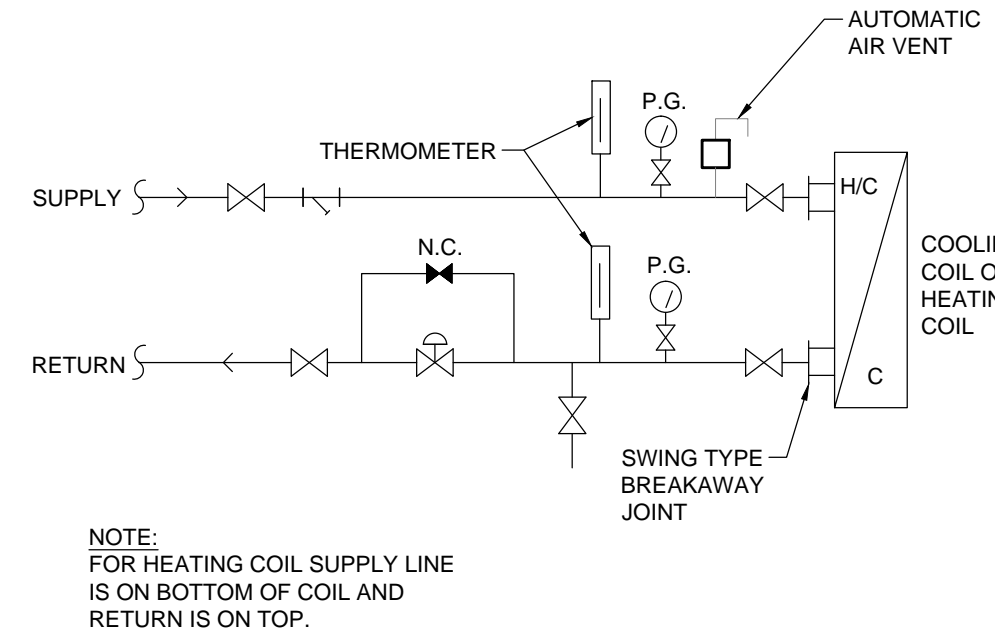
4 PIPE HANGER DETAIL
N.T.S



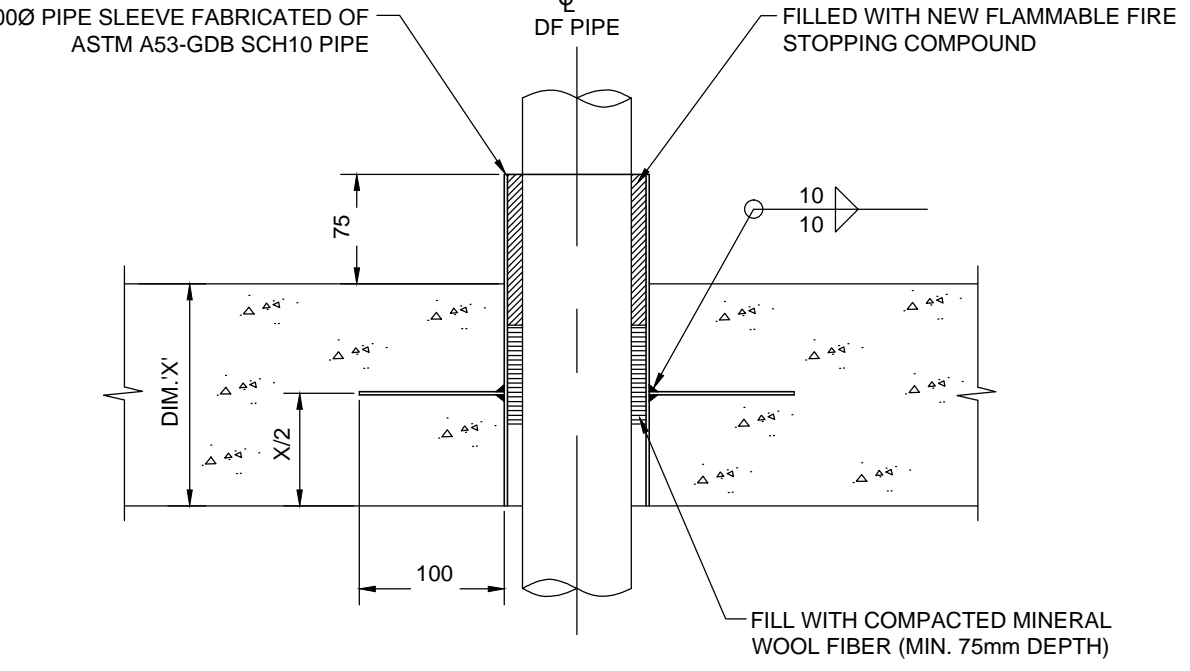
5 PUMP PIPING CONNECTION
N.T.S



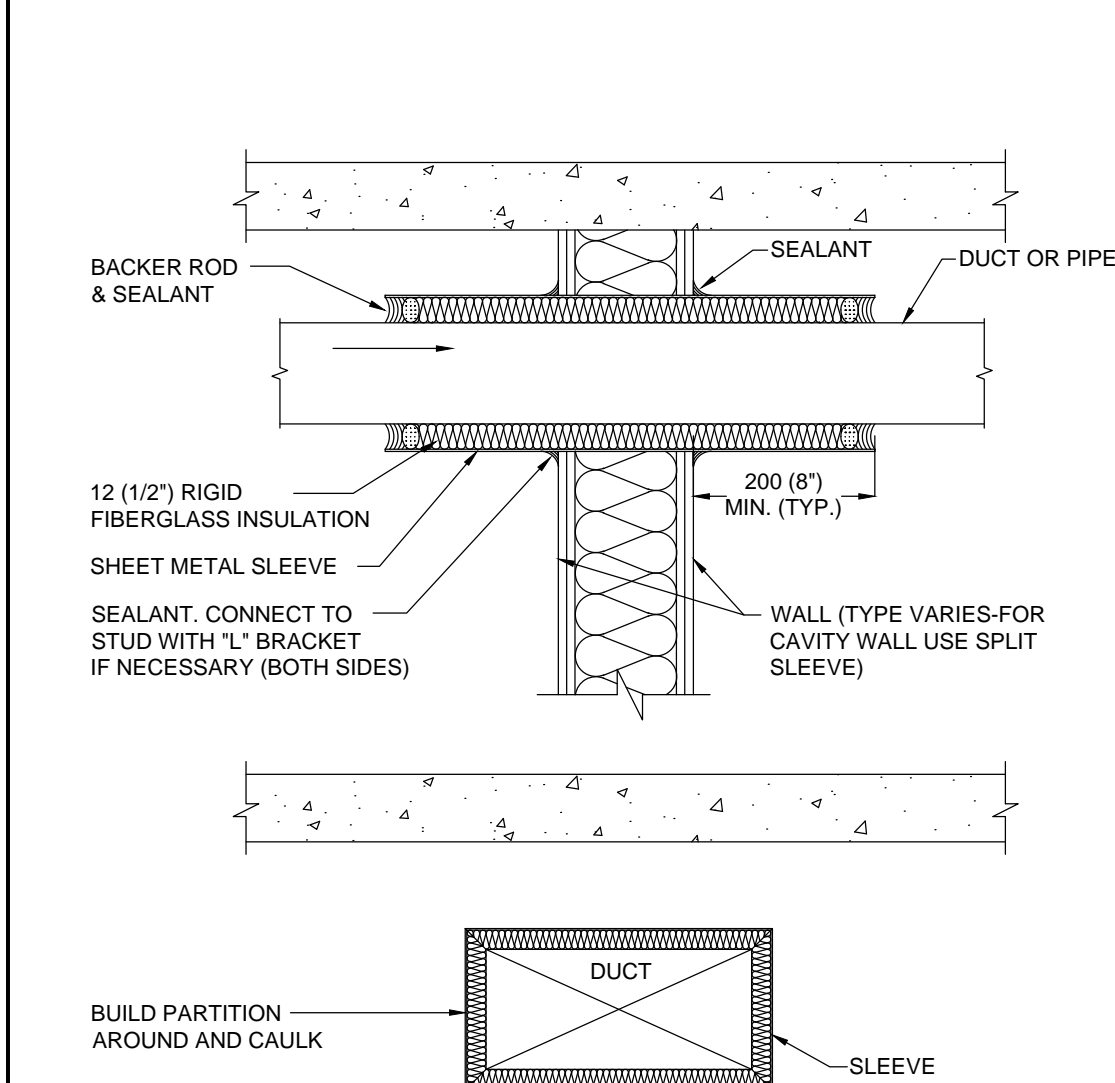
6 WATER COIL PIPING CONNECTIONS
N.T.S



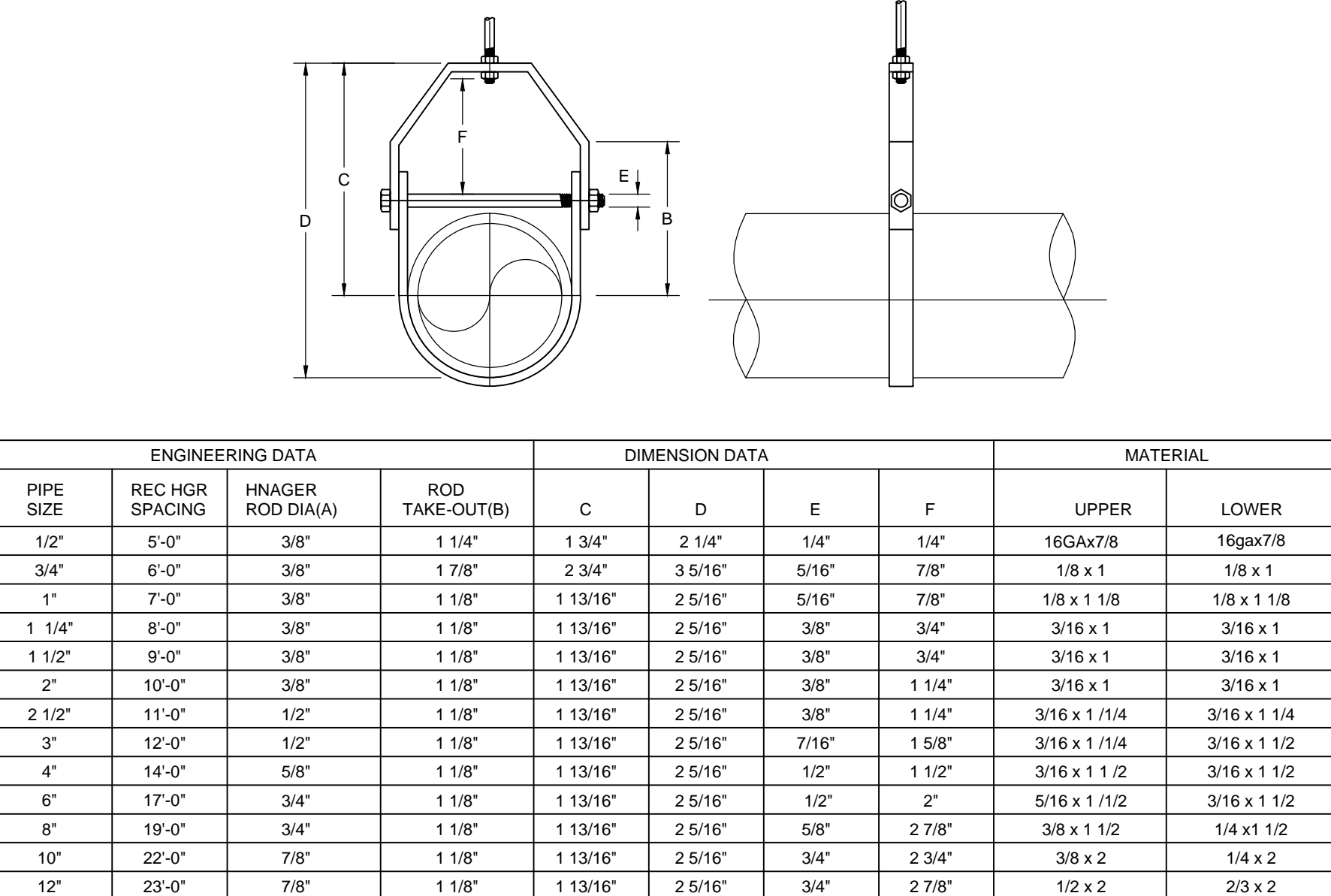
7 COOLING/HEATING COIL CONNECTION DETAIL
N.T.S



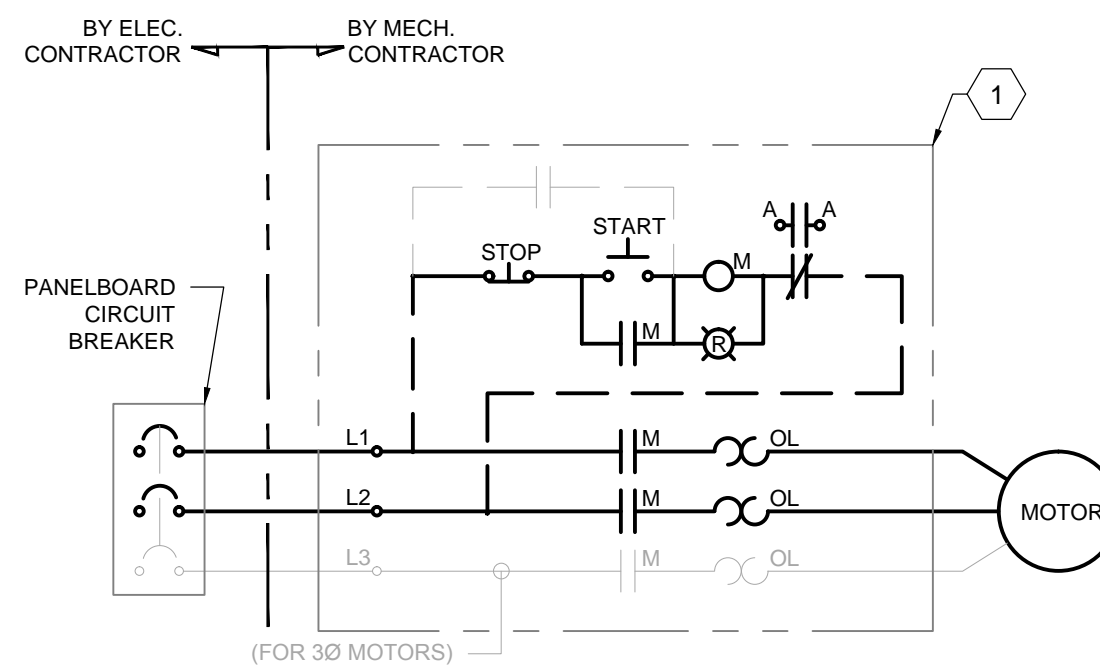
8 WEATHER PROOF OUTDOOR PIPE PENETRATION
N.T.S



9 SEALING PIPE PENETRATION THROUGH WALLS
N.T.S



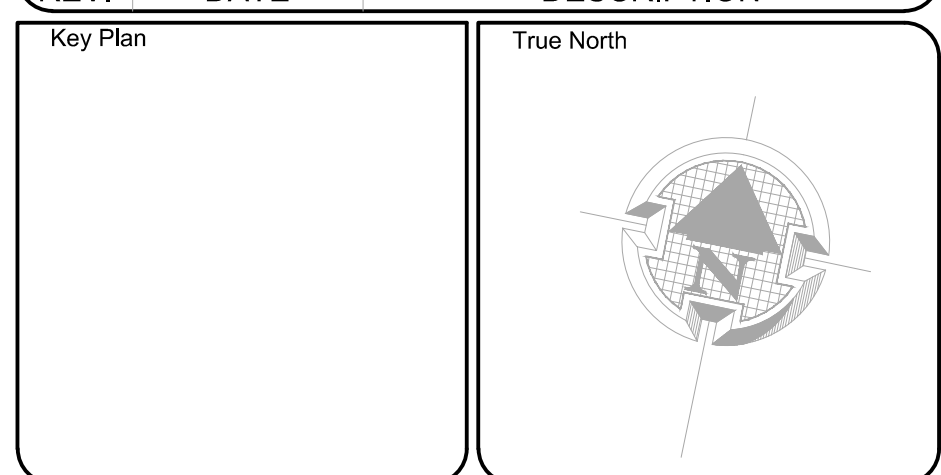
10 STANDARD CLEVIS HANGER
N.T.S



GENERAL NOTES:
1. WIRING DIAGRAM SHOWN IS INDICATIVE OF DESIGN INTENT ONLY. INCLUDE ALL NECESSARY RELAYS AND CONTACTS FOR COMPLETE INTEGRATION WITH EXISTING BASE BUILDING BAS. SUBMIT SHOP DRAWING FOR ENGINEER'S APPROVAL.
2. COORDINATE WITH ELECTRICAL CONTRACTOR FOR DEMARCATION OF WORKS.
DESIGN NOTES:
1. NEW DIRECT-ON-LINE MAGNETIC STARTER IN NEMA 12 ENCLOSURE. PROVIDE LAMACOID LABELS AS REQUIRED. REFER TO EQUIPMENT SCHEDULE FOR MOTOR SPECIFICATIONS AND SCHEMATIC FOR SEQUENCE OF OPERATIONS.
LEGEND:
N.C. NORMALLY CLOSED (N.C.) PUSH BUTTON MOMENTARY CONTACT
N.O. NORMALLY OPEN (N.O.) PUSH BUTTON MOMENTARY CONTACT
N.O. NORMALLY OPEN (N.O.) INSTANT OPERATING CONTACT
N.C. NORMALLY CLOSED (N.C.) INSTANT OPERATING CONTACT
C.O. CONTACTOR COIL
T.O. THERMAL OVERLOAD RELAY
P.L. PILOT LIGHT (R = RED COLOR, LIT WHEN MOTOR IS OPERATIONAL)

11 MAGNETIC STARTER DETAILS
N.T.S

REV.	DATE	DESCRIPTION
1	04/01/2022	RE-ISSUED FOR PERMIT & TENDER
0	8/12/2021	ISSUED FOR PERMIT AND TENDER



Drawing Overall Scale
AS SHOWN

Project Name & Address
TERRY FOX PUBLIC SCHOOL COBOURG
HRV-HWT-BAS INSTRUMENTATION
1065 RIDDELL AVE, COBOURG, ON K9A5N4

Drawing Title
MECHANICAL SERVICES
STANDARD DETAILS

DATE: 11/11/2021 DESIGNED BY: M.A. DRAWN BY: J.L. APPROVED BY: M.A. PROJECT NO.: 1021225	Engineer / Architect Stamp M. Akhavanbazzaz 100068319 8 DEC. 2021 PROVINCE OF ONTARIO
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Drawing No.	Phase	Revision
M 7 0 0	T	0

SPECIFICATIONS

PART A - GENERAL ELECTRICAL SPECIFICATIONS

1. CODES & REGULATIONS

- 1.1. ALL WORK SHALL COMPLY WITH THE LATEST EDITIONS OF THE BUILDING CODE, ELECTRICAL CODE, C.S.A. STANDARDS, UNDERWRITERS' LABORATORIES, ALL APPLICABLE LOCAL CODES, AND ALL OTHER AUTHORITIES HAVING JURISDICTION. THESE CODES AND REGULATIONS CONSTITUTE AN INTEGRAL PART OF THE SPECIFICATIONS.

2. BUILDING STANDARDS.

- 2.1. COMPLETE ALL ELECTRICAL WORK IN ACCORDANCE WITH THE RELEVANT SECTIONS OF THE BASE BUILDING SPECIFICATIONS, DRAWINGS, AND STANDARDS TO THE SATISFACTION OF THE CONSULTANT AND THE BUILDING OWNER. THE BASE BUILDING DOCUMENTS WILL BE MADE AVAILABLE FOR REVIEW BY THE BUILDING OWNER IF SO REQUIRED.

3. SITE VISIT

- 3.1. THE CONTRACTOR SHALL VISIT THE SITE AND EXAMINE ALL DRAWINGS CAREFULLY TO DETERMINE THE EXTENT OF WORK AFFECTING THE EXISTING BUILDING. DETERMINE AND INCLUDE IN THE TOTAL PRICE, THE TOTAL COST OF LABOUR AND MATERIAL TO DISCONNECT, REMOVE, RELOCATE, BLANK OFF, REROUTE OR MAKE SAFE ALL EXISTING SERVICES, CONDUITS, WIRE, BOXES, LUMINAIRES AND EQUIPMENT AS REQUIRED.

4. PERMITS & INSPECTIONS

- 4.1. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE TO OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND INSPECTIONS AS REQUIRED OR REQUESTED.
4.2. ONCE THE ELECTRICAL WORK HAS BEEN COMPLETED AND ACCEPTED BY THE OWNER, THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE OWNER WITH CERTIFICATES VERIFYING THAT THE WORK HAS BEEN COMPLETED IN ACCORDANCE WITH ALL CODES, BUILDING STANDARDS AND ALL AUTHORITIES HAVING JURISDICTION.

5. INSURANCE

- 5.1. PROVIDE INSURANCE FOR THE DURATION OF THE PROJECT TO PROTECT THE BUILDING OWNER, TENANT, AND TRADES FROM ALL CLAIMS. SUBMIT, AT THE TIME OF THE BID, PROOF OF AN AMOUNT ACCEPTABLE TO BUILDING OWNER AND TENANT.

6. CONTRACT DOCUMENTS

- 6.1. THE DRAWINGS FOR THE WORK OF THIS DIVISION ARE IN PART DIAGRAMMATIC INTENDED TO CONVEY THE SCOPE OF WORK. GENERAL ARRANGEMENT, APPROXIMATE SIZES AND LOCATIONS OF THE EQUIPMENT AND OUTLETS.
6.2. REPORT ANY DISCREPANCIES BETWEEN THE ARCHITECTURAL, INTERIOR DESIGNER, MECHANICAL, STRUCTURAL, SECURITY, AUDIO VISUAL, KITCHEN LANDSCAPE DRAWINGS, ETC., AND THE ENGINEER'S DRAWING TO THE ENGINEER PRIOR TO INSTALLATION.
6.3. WHENEVER DIFFERENCES OCCUR BETWEEN PLANS AND DIAGRAMS, SCHEMATICS, AND BETWEEN SPECIFICATIONS AND DRAWINGS, THE MAXIMUM CONDITION SHALL GOVERN AND THE TENDER SHALL BE BASED ON WHICHEVER IS THE GREATER AMOUNT.

7. SHOP DRAWINGS

- 7.1. SUBMIT SHOP DRAWINGS OF LUMINAIRES, PANELBOARDS, AND OTHER MAJOR ELECTRICAL EQUIPMENT, AS REQUESTED BY THE ENGINEER, UNLESS OTHERWISE NOTED. EACH SHOP DRAWING SHALL BE CHECKED AND STAMPED AS BEING CORRECT BY THE GENERAL CONTRACTOR AND THE APPROPRIATE TRADE BEFORE SUBMISSION TO THE ENGINEER FOR APPROVAL.

8. RECORD DRAWINGS

- 8.1. KEEP A RECORD SET OF DRAWINGS ON THE SITE ON WHICH SHALL BE CLEARLY INDICATED, THE EXACT LOCATION OF ALL OUTLETS, FIXTURES, FEEDER RUNS, PANELS, CONDUITS, JUNCTION BOXES, PULL BOXES, ETC. INFORMATION ON THESE DRAWINGS SHALL BE INCORPORATED IN THE AS-BUILT DRAWINGS UPON COMPLETION OF THE PROJECT.

9. EXTRA WORK

- 9.1. IN CASES WHERE EXTRA WORK OF ANY KIND IS REQUIRED, OBTAIN WRITTEN INSTRUCTIONS FROM THE ARCHITECT/DESIGN CONSULTANT BEFORE PROCEEDING. PAYMENTS WILL BE MADE FOR AUTHORIZED CHANGES ONLY.
9.2. QUOTATION WITH BREAKDOWN OF MATERIAL, LABOUR, OVERHEAD, PROFIT, ETC. SHALL BE SUBMITTED FOR EACH CHANGE. LABOUR UNITS SHALL BE BASED ON LATEST NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA) LABOUR UNITS COLUMN ONE FOR THE COMPLETE DURATION OF THE PROJECT. MATERIAL PRICES SHALL BE BASED ON THE CURRENT NATIONAL PRICE SYSTEM WITH TRADE DISCOUNTS. HOURLY LABOUR RATE SHALL INCLUDE RELATED CHARGES FOR SUPERVISION, HYDRO INSPECTION, HAND TOOLS, PARKING, CLEAN-UP, AS-BUILT DRAWINGS AND ADDITIONAL BONDING.

10. WARRANTY

- 10.1. THE CONTRACTOR SHALL PROVIDE THE TENANT WITH A WRITTEN ONE-YEAR WARRANTY, COMMENCING ON THE DATE OF ACCEPTANCE. THE WARRANTY SHALL COVER THE COMPLETE ELECTRICAL INSTALLATION. THE ELECTRICAL CONTRACTOR SHALL REPAIR AND/OR REPLACE ANY DEFECTS IN MATERIALS OR WORKMANSHIP THAT OCCUR DURING THE WARRANTY PERIOD AT A TIME CONVENIENT TO THE TENANT/BUILDING OWNER, AND AT NO EXTRA COST.

11. AS-BUILTS

- 11.1. PROVIDE AS-BUILT DRAWINGS OF THE ACTUAL INSTALLATION AS ELECTRONICS FILES IN AUTOCAD 2001 FORMAT AND IN PDF.
11.2. AS-BUILT DRAWINGS SHALL INCORPORATE ALL CHANGES AND DEVIATIONS FROM TENDER DRAWINGS, INCLUDING ALL MAIN CONDUIT RUNS, CABLE TRAYS, JUNCTION BOXES, AND INFORMATION RECORDED ON RECORD DRAWINGS DURING CONSTRUCTION.
11.3. ENGINEER'S STAMP AND COMPANY LOGO SHALL BE REMOVED FROM DRAWINGS. DRAWINGS SHALL BE MARKET "AS-BUILT" ALONG WITH ELECTRICAL CONTRACTOR'S NAME.

12. CLOSE-OUT DOCUMENTS

- 12.1. AFTER COMPLETION OF THE PROJECT, PROVIDE THE FOLLOWING DOCUMENTS TO THE BUILDING OWNER, THE TENANT, AND THE ENGINEER.
12.1.1. THREE USB'S (ELECTRONIC COPY) AND 13-RING BINDER (HARD COPY) OF THE CLOSE-OUT DOCUMENTS.
12.1.2. INCLUDE AS BUILT DRAWINGS (CAD 2001 FILE AND PDF) AS PART OF THE CLOSEOUT DOCUMENTS
12.1.3. HYDRO ELECTRICAL INSPECTION REPORT.
12.1.4. FIRE ALARM VERIFICATION REPORT AND CERTIFICATE.
12.1.5. WRITTEN WARRANTY.

PART B - EXECUTION

1. WORKMANSHIP

- 1.1. ALL WORK SHALL BE CARRIED OUT AND PERFORMED IN A WORKMANLIKE MANNER TO THE SATISFACTION OF THE ARCHITECT/DESIGN CONSULTANT. ANY UNSATISFACTORY WORK BY THIS DIVISION SHALL BE REPLACED WITHOUT EXTRA COST TO THE OWNER.
1.2. THE CONSTRUCTION SITE SHALL BE KEPT CLEAN AND ANY DEBRIS AND CONSTRUCTION MATERIAL SHALL BE REMOVED FROM THE SITE THROUGHOUT THE CONSTRUCTION PERIOD AND ON COMPLETION OF THE WORK.

2. SCHEDULING

- 2.1. ALL WORK SHALL BE SCHEDULED AND COORDINATED TO AVOID ANY CONFLICTS WITH OTHER TRADES, BUILDING OWNER AND TENANT(S) DURING OR AFTER CONSTRUCTION. ALLOW FOR ALL NECESSARY PREMIUM TIME. ALL ALLOWANCE FOR THIS SHALL BE INCLUDED IN THE TENDER PRICE.

3. DELIVERY OF EQUIPMENT

- 3.1. DELIVERY SCHEDULE OF ALL MAJOR ITEMS OF EQUIPMENT SUPPLIED UNDER THIS CONTRACT SHALL BE SUBMITTED IN WRITING TO THE GENERAL CONTRACTOR AT THE START OF THE PROJECT. FAILURE TO IDENTIFY DELIVERY PROBLEMS MAY RESULT IN DELAY CLAIMS.

4. TEMPORARY POWER

- 4.1. PROVIDE TEMPORARY ELECTRICAL POWER FOR THE WORK OF THIS TRADE AND OTHER TRADES AS REQUIRED BY THE GENERAL CONTRACTOR OR THE TENANT.

5. LOCATION OF OUTLETS

- 5.1. THE ARCHITECT/DESIGN CONSULTANT SHALL HAVE NE RIGHT, AT ANY TIME, TO CHANGE THE LOCATION OF ANY OUTLET UP TO TEN FEET WITHOUT EXTRA COST TO THE TENANT, PROVIDED THAT NOTIFICATION OF SUCH CHANGES ARE ISSUED PRIOR TO NE INSTALLATION OF NE OUTLET.

6. ROUTING OF EQUIPMENT

- 6.1. NEW CONDUITS AND OTHER NEW SERVICES SHALL BE CAREFULLY ROUTED SO THAT THEY DO NOT INTERFERE WITH ANY EXISTING INSTALLATIONS. ROUTING OF EQUIPMENT IN BUILDING COMMON AREAS AND RISER ROOMS SHALL BE REVIEWED AND APPROVED BY BUILDING OWNER PRIOR TO INSTALLATION. ANY EXISTING CONDUITS, CABLE TRAYS, BUS DUCTS OR OTHER SERVICES NOT INTERFERE WITH NE NEW INSTALLATION SHALL BE RELOCATED UNDER THIS CONTRACT.

7. FLOOR PENETRATION

- 7.1. X-RAY AND OBTAIN WRITTEN APPROVAL FROM BUILDING OWNER PRIOR TO PENETRATING ANY STRUCTURAL SURFACES OR FLOOR SLABS AND CARRY OUT THE WORK IN ACCORDANCE WITH THE BUILDING STANDARDS. THE CONTRACTOR SHALL REPLACE OR

- REPAIR ANY ITEMS WHICH ARE DAMAGED DUE TO THIS WORK AT NO EXTRA COST TO NE BUILDING OWNER.

- 7.2. ALL NEW SERVICES NOT PENETRATE THE FLOOR SLAB OR ARE RATED WALLS OR CEILINGS SHALL BE IN CONDUIT AND SHALL BE SEALED WITH AN APPROVED, NON-SHRINK, WATERPROOF AND FIREPROOF SEALANT.

8. CUTTING AND PATCHING

- 8.1. ALL CUTTING AND PATCHING REQUIRED TO THE BUILDING STRUCTURE FOR THE WORK SHALL BE INCLUDED AS PART OF THIS CONTRACT, UNLESS OTHERWISE ADVISED BY THE GENERAL CONTRACTOR.

9. ACCESS PANEL

- 9.1. ACCESS PANELS SHALL BE PROVIDED IN CEILINGS WHERE JUNCTION BOXES AND OTHER ELECTRICAL EQUIPMENT CAN NOT BE LOCATED IN ACCESSIBLE LOCATIONS PROVIDED THAT APPROVAL HAS BEEN OBTAINED FROM THE ARCHITECT/DESIGN CONSULTANT.

10. NOISE & VIBRATION

- 10.1. ALL ELECTRICAL EQUIPMENT SHALL OPERATE WITHOUT OBJECTIONABLE NOISE OR VIBRATION TO THE OWNER'S SATISFACTION.

11. MECHANICAL WIRING

- 11.1. CONTROL WIRING FOR ALL MECHANICAL EQUIPMENT TO BE SUPPLIED AND INSTALLED BY DIV.25. ALL STARTERS, INCLUDING FAN SWITCHES TO BE SUPPLIED BY DIV.25 AND INSTALLED BY DIV.28 UNLESS OTHERWISE NOTED. DIV.26 TO PROVIDE ALL POWER WIRING AND REQUIRED DISCONNECT SWITCHES.

12. GROUNDING

- 12.1. ALL GROUNDING SHALL CONFORM TO NE ELECTRICAL SAFETY CODE AND LOCAL AUTHORITY REQUIREMENTS.
12.2. PROVIDE SEPARATE GREEN INSULATED GROUND CONDUCTOR IN EVERY POWER CONDUIT TO ALL DEVICES, LUMINAIRES, EQUIPMENT, AND WIRE IN FEEDERS.

13. DIRECTORY

- 13.1. PROVIDE TYPEWRITTEN DIRECTORIES FOR NEW AND EXISTING PANELBOARDS WITHIN THE AREA OF WORK, TO REFLECT THE LATEST REVISIONS. LABELING TO BE BASED ON ROOM NUMBERS AND/OR LOCATION AND LOAD TYPES.

14. DISRUPTION OF EXISTING SERVICES

- 14.1. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ANY DISRUPTION TO THE EXISTING SERVICES. THE EXISTING BUILDING MUST BE KEPT IN OPERATION AT ALL TIMES. ARRANGE WORK IN SUCH A MANNER THAT INTERRUPTIONS IN SERVICES OCCUR ONLY AT SCHEDULED TIMES. INTERRUPTIONS SHALL BE SCHEDULED WITH NE ARCHITECT/DESIGN CONSULTANT AT LEAST 48 HOURS IN ADVANCE. OVERTIME WORK NOT MAY BE REQUIRED TO TIE-IN SERVICES AT NIGHT OR ON WEEKENDS SHALL BE INCLUDED IN THE TENDER AMOUNT.

15. DEFECT OR INTERFERENCE

- 15.1. EXAMINE THE WORK OF THE OTHER TRADES, AS THEY AFFECT THIS DIVISION, REPORT AT ONCE TO NE ARCHITECT/DESIGN CONSULTANT ANY DEFECT OR INTERFERENCE NOT MAY AFFECT NE WORK OF THIS DIVISION OR NE GUARANTEE OF THIS WORK.

16. REMOVAL OF EXISTING EQUIPMENT

- 16.1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DISCONNECTING AND REMOVING ALL ELECTRICAL EQUIPMENT FROM AREAS BEING ALTERED OR DEMOISHED. WIRING, CONDUIT AND EQUIPMENT WHICH IS REQUIRED TO MAINTAIN SERVICE IN OTHER PARTS OF THE BUILDING SHALL BE TEMPORARILY SUPPORTED, REROUTED, SERVICED OR RELOCATED AS REQUIRED.
16.2. EQUIPMENT TO BE RELOCATED SHALL BE VERIFIED FOR WORKING CONDITION. PROVIDE NEW IF NECESSARY AND FEASIBLE. EXTEND WIRING/CONDUIT AND RECONNECT TO SUIT.
16.3. OBSOLETE CONDUITS AND CABLES SHALL BE DISCONNECTED FROM THEIR SOURCE OF SUPPLY, CUT BACK AS FAR AS POSSIBLE, AND SHALL BE REMOVED. ALL EXISTING WIRING NOT REMOVED SHALL BE DISCONNECTED, BLANKED-OFF AND MADE SAFE.
16.4. UNLESS OTHERWISE ADVISED, ALL BASE BUILDING LUMINAIRES, TRANSFORMERS, PANELBOARDS AND DISCONNECT SWITCHES WHICH ARE REMOVED SHALL BE HANDED OVER TO THE BUILDING OWNER.
16.5. ALL REMOVED EQUIPMENT AND MATERIALS WHICH ARE NO LONGER REQUIRED, UNLESS OTHERWISE NOTED, SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE UPON COMPLETION OF THE WORK.

- 16.6. PROVIDE BLANK COVER PLATE WHERE OUTLETS ARE REMOVED FROM EXISTING WALLS TO REMAIN.
16.7. BE RESPONSIBLE AND PAY FOR ANY DAMAGE TO THE BASE BUILDING INCURRED BY WORK OF THIS DIVISION, OR REPAIR TO THE SATISFACTION OF THE CONSULTANT.

- 16.8. CARRY OUT THE WORK WITH MINIMUM OF NOISE, DUST AND DISTURBANCE.

17. OPERATION AND MAINTENANCE MANUALS

- 17.1. PROVIDE 4 (FOUR) SETS OF OPERATION AND MAINTENANCE MANUALS SUBMITTED IN USB'S. ALSO INCLUDE 1 COPY IN PDF FORMAT CONTRACTOR RED LINES AND O&M MANUAL. INCLUDE THE FOLLOWING INFORMATION IN THE OPERATIONS AND MAINTENANCE MANUALS:
- NAMES AND ADDRESS OF LOCAL SUPPLIERS FOR THE ITEMS INCLUDES.
 - TECHNICAL DATA, PRODUCT DATA, SUPPLEMENTED BY BULLETINS, COMPONENT ILLUSTRATIONS, EXPLODED VIEWS, TECHNICAL DESCRIPTIONS OF ITEMS, AND PARTS LISTS. ADVERTISING OR SALES LITERATURE IS NOT ACCEPTABLE.
 - THE CONSULTANT'S REVIEWED SHOP DRAWINGS.
 - CERTIFICATE(S) OF ACCEPTANCE FOR ANY NEW FIRE ALARM COMPONENTS OR TIE-INS AND ANY BASE BUILDING TIE-INS FOR MISCELLANEOUS SYSTEMS (IE. SECURITY, LIGHTING CONTROL, DIGITAL METERING).
 - LOAD BALANCE REPORT.
 - WRITTEN GUARANTEE.

- 17.2. REVIEW INFORMATION PROVIDED IN THE MAINTENANCE INSTRUCTIONS AND MANUAL WITH THE TENANT'S OPERATING PERSONNEL AND LANDLORD'S OPERATING PERSONNEL WHERE BASE BUILDING SYSTEMS ARE REVISED, TO ENSURE A COMPLETE UNDERSTANDING OF THE ELECTRICAL EQUIPMENT AND SYSTEMS AND THEIR OPERATION.

18. COMMUNICATION

- 18.1. COMPLETE THE INSTALLATION OF THE WORK IN ACCORDANCE WITH LATEST EDITIONS OF THE ONTARIO BUILDING CODE, PROVINCIAL ELECTRICAL SAFETY CODE, CSA, ANSI/ETIA/IEA, ULC, NFPA, O.S.H.A. AND OTHER CODES AS REQUIRED. ALSO, ALL COMMUNICATION WORK SHALL COMPLY WITH LANDLORD'S REQUIREMENTS AND BASE BUILDING STANDARDS.

- 18.2. PROVIDE CABLE SUPPORTS, HARNESSES AND SLEEVES AS REQUIRED. ALL FREE RUNNING CABLES SHALL BE SECURELY FASTENED TO APPROPRIATE CABLE SUPPORTS AND HARNESSES WITH A MAXIMAL INTERSUPPORT CABLE SAG OF 8". ALL CABLES SHALL BE COMPLETELY SUPPORTED BY THE HARNESSES SO THAT NO WEIGHT IS TRANSFERRED TO ANY OTHER EXISTING NON-STRUCTURAL FIXTURE OR CEILING CABLE STRUCTURE.

- 18.3. IT IS THE INTENT OF THESE DRAWINGS AND SPECIFICATIONS THAT THE CONTRACTOR PROVIDE COMPLETE AND OPERATIONAL SYSTEMS AS REQUIRED.

- 18.4. PROVIDE AND INSTALL ALL HORIZONTAL DATA COMMUNICATIONS CABLEING AS INDICATED. HORIZONTAL DATA COMMUNICATIONS CABLES SHALL BE 4-PAIR UNSHIELDED TWISTED PAIR, CSA FT600MP FIRE RATED, CERTIFIED TO EIA/TIA CATEGORY 6 SPECIFICATIONS. COMMUNICATIONS CABLES SHALL BE BELDEN, SIEMON OR APPROVED EQUIVALENT.

- 18.5. ANY HORIZONTAL CABLES THAT ARE NOT RUN IN A PLENUM SPACE FOR ANY DISTANCE MAY BE CSA FT4 RATED OR CMR RATED CABLES.

- 18.6. PROVIDE AND INSTALL FLEX FOR PROTECTION OF HORIZONTAL CABLES FROM WALL/FLOOR FEED POINT TO SYSTEMS/FURNITURE/WIREMOLD. FLEX TO BE BLACK SPIRAL WRAP TUBING SIZED TO FIT FURNITURE CABLE BUNDLE.

- 18.7. PROVIDE AND INSTALL ALL MODULAR JACKS AS INDICATED. THE MODULAR JACKS FOR DATA AND VOICE SHALL BE 8-POSITION IN EIA/TIA-568A CONFIGURATION.

- 18.8. PROVIDE NEW TERMINATION PATCH PANELS AND BIX 14A IDC STRIPS.

- 18.9. DATA PATCH PANELS ARE TO BE CATEGORY 6 48-PORT MODULAR JACK PANELS AND FULLY LOADED WITH IDENTIFIED MODULES.

- 18.10. PROVIDE AND INSTALL PLYWOOD BACKBOARD AS REQUIRED. PLYWOOD BACKBOARD SHALL BE 19mm (3/4") THICK, OF HIGHEST QUALITY FIRE RETARDANT.

- 18.11. ALL DATA/VOICE CABLES SHALL BE TESTED AFTER COMPLETE INSTALLATION FROM TERMINATION END TO TERMINATION END. DEFECTS AND DEFICIENCIES WHICH ORIGINATE OR BECOME EVIDENT DURING THE WARRANTY PERIOD MUST BE REPAIRED OR REPLACED, AT NO COST.

- 18.12. THE COMMUNICATIONS CABLEING CONTRACTOR/INSTALLER MUST BE A CERTIFIED WITH THE MANUFACTURER'S CABLEING SYSTEM. CERTIFICATION BY THIRD PARTY OR ANY OTHER MEANS IS NOT ACCEPTABLE.

19. FIRE ALARM SYSTEM

- 19.1. ALL FIRE ALARM SYSTEM INSTALLATION SHALL BE ACCORDING TO THE LATEST EDITION OF CANULC 5524-08 - INSTALLATION OF FIRE ALARM SYSTEMS AND THE REQUIREMENTS OF THE LOCAL AUTHORITIES HAVING JURISDICTION.

- 19.2. ALL WIRING SHALL BE INSTALLED IN CONDUIT AND TO CONFORM TO THE REQUIREMENT OF THE ONTARIO ELECTRICAL SAFETY CODE, 26TH EDITION OR LOCAL CODE HAVING JURISDICTION. PROVIDE A GROUND WIRE IN ALL CONDUITS.

- 19.3. FINAL LOCATION OF SYSTEM COMPONENTS AND DEVICES TO BE COORDINATED WITH THE ARCHITECT/DESIGN CONSULTANT PRIOR TO ROUGHING-IN.

- 19.4. ONLY A CERTIFIED FIRE ALARM TECHNICIAN IS ALLOWED TO WORK ON ANY FIRE ALARM SYSTEM INSTALLATION.

- 19.5. UPON COMPLETION OF WORKS AS PER CONTRACT DRAWINGS, OBTAIN THE SERVICES OF

- BASE BUILDING FIRE ALARM MANUFACTURER TO MAKE A COMPLETE INSPECTION AND VERIFICATIONS OF ALL INSTALLED FIRE ALARM EQUIPMENT AND DEVICES.

- 19.6. PERFORM ANY CHANGES NECESSARY AS A RESULT OF THE ABOVE VERIFICATION AND INSPECTION IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS.

- 19.7. ON COMPLETION OF THE VERIFICATION, INSPECTION AND TESTING OBTAIN THE VERIFICATION CERTIFICATE AND INSPECTION REPORTS FROM THE MANUFACTURER AND FORWARD TO THE OWNER.

- 19.8. FIRE ALARM SIGNALING DEVICES TO BE INSTALLED AND TESTED IN COMPLIANCE WITH 2012 ONTARIO BUILDING CODE SECTION 3.2.4.20 AUDIBILITY. INCLUDE FOR ALL COSTS IN TENDER.

- 19.9. ENSURE THAT ALL COSTS FOR THE ABOVE TESTING, VERIFICATION, INSPECTION ARE INCLUDED IN THE TENDER PRICE.

- 19.10. WHERE THE INTEGRITY OF THE EXISTING LIFE SAFETY INPUT AND OUTPUT DEVICES ARE AFFECTED DUE TO RELOCATIONS, CEILING DEMOLITIONS AND/OR RE-INSTALLATIONS ONTO NEW SUSPENDED CEILING, ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE TO MAINTAIN THE SYSTEM OPERATION AT ALL TIMES. ALL SUSPENSION ACCESSORIES REQUIRED FOR THE INSTALLATION (E.G., MOUNTING CHANNELS AND FRAMES, ETC.) AND VERIFICATION OF THE SYSTEM SHALL BE INCLUDED IN THE TENDER PRICES.

PART C - MATERIAL

1. GENERAL

- 1.1. ALL ELECTRICAL EQUIPMENT SHALL BE C.S.A. APPROVED AND BEAR NE C.S.A. STAMP. ALL EQUIPMENT SHALL BE NEW UNLESS OTHERWISE NOTED.

2. WIRE AND CABLE

- 2.1. ALL WIRE AND CABLE SHALL BE COPPER WITH TYPE R-90, X-LINK INSULATION, AND MINIMUM NO.12 AWG WIRE SIZE. NO.10 AND 12 TO BE SOLID, AND NO.8 AND LARGER TO BE STRANDED.
2.2. SIZE ALL WIRE FOR MAXIMUM 3% VOLTAGE DROP AT 80% LOAD AND 90% POWER FACTOR.

3. CONDUIT

- 3.1. ALL WIRING IN CEILINGS AND PARTITIONS SHALL BE IN EMT CONDUIT WITH STEEL SETSCREW COUPLING AND CONNECTORS.
3.2. ALL WIRING IN SLABS SHALL BE IN RIGID PVC CONDUIT.

- 3.3. AC-90 CABLE MAY BE PERMITTED FOR DOWN-DROPS FROM JUNCTION BOXES TO LUMINAIRES AND IN PARTITIONS UNLESS PROHIBITED BY CODE OR BUILDING STANDARDS. AC-90 CABLE SHALL NOT BE USED IN ANY EXPOSED AREAS UNLESS OTHERWISE NOTED. AC-90 CABLE RUNS IN CEILING SPACE SHALL NOT EXCEED 3048MM (10') IN LENGTH. DO NOT TERMINATE AC-90 CABLE DIRECTLY TO PANEL BOARDS.

- 3.4. PROVIDE FLEXIBLE METAL CONDUIT FOR CONNECTION TO TRANSFORMERS AND MOTORS, MINIMUM 1M (3') LENGTH.

- 3.5. ALL CONDUITS FOR COMMUNICATION WIRING SHALL BE INSTALLED WITH BUSHINGS AT EACH END. CONDUITS SHALL BE TERMINATED ON EQUIPMENT RACK, BACKBOARD OR CABLE TRAY WITHIN NE ROOM.

- 3.6. ALL EMPTY CONDUITS SHALL BE COMPLETE WIN NYLON PULL STRING. DO NOT CADDIE CLIP CONDUITS TO CEILING HANGERS.

- 3.7. PROVIDE GLAND WATERTIGHT CONNECTORS WITH FACTORY-INSTALLED INSULATED THROATS AND COMPRESSION TYPE COUPLINGS (CAST FITTINGS /SET -SCREWS NOT ACCEPTABLE) TO BE FORGED STEEL WHERE EMT CONDUITS ARE REQUIRED.

4. PULL BOXES

- 4.1. A MINIMUM OF ONE PULL BOX SHALL BE INSTALLED FOR EVERY 303.1 (100') OF CONDUIT (EACH 90 DEGREE BEND SHALL EQUATE TO A 9M (30') LENGTH OF CONDUIT). NO MORE THAN TWO 90 DEGREE BENDS SHALL BE INSTALLED BETWEEN TWO PULL BOXES.

5. SWITCHES

- 5.1. LOCAL SNITCHES SHALL BE 20 AMP, SPECIFICATION GRADE, AND VOLTAGE, AS INDICATED. VERIFY EXACT LOCATION, MOUNTING HEIGHT AND COLOUR WITH ARCHITECT/DESIGN CONSULTANT PRIOR TO INSTALLATION.

- 5.2. MANUFACTURER - 120V- P&S 2621 SERIES (UNLESS OTHERWISE NOTED) - 347V- P&S 2621 SERIES (UNLESS OTHERWISE NOTED)

6. RECEPTACLES

- 6.1. DUPLEX RECEPTACLES SHALL BE 120 VOLT, 15 AMP AND SPECIFICATION GRADE UNLESS OTHERWISE NOTED. VERIFY EXACT LOCATION, MOUNTING HEIGHT AND COLOUR WITH ARCHITECT/DESIGN CONSULTANT PRIOR TO INSTALLATION. 6.2 MANUFACTURER - P&S 26252 SERIES (UNLESS OTHERWISE NOTED)

7. COVERPLATES

- 7.1. EXPOSED COVERPLATES SHALL BE MADE OF UNBREAKABLE NYLON AND INSTALLED AFTER FINAL PAINTING, FLUSH WITH THE WALL. COLOUR TO MATCH DEVICES UNLESS OTHERWISE NOTED.

- 7.2. MANUFACTURER - P&S 7 26 SERIES (UNLESS OTHERWISE NOTED)

8. DIMMERS

- 8.1. ALL DIMMERS SHALL BE SIZED TO SUIT LOADS IN WATTAGE AND TYPES (FLUORESCENT, LOW VOLTAGE MAGNETIC, LOW VOLTAGE ELECTRONIC, ETC.)

- 8.2. PROVIDE LAMP DE-BUZZING COILS FOR ALL INCANDESCENT AND LOW VOLTAGE DIMMING CIRCUITS.

- 8.3. ALL DIMMING CIRCUITS ARE TO HAVE SEPARATE NEUTRAL CONDUCTOR.

- 8.4. MANUFACTURER - LUTRON NOVA-T SERIES (UNLESS OTHERWISE NOTED)

9. SERVICE EQUIPMENT

- 9.1. ALL NEW PANELBOARDS, DISCONNECT SWITCHES, SPLITTERS, ETC. TO BE OF THE SAME MANUFACTURER, RATING AND TYPE TO COMPLY WITH BASE BUILDING EQUIPMENT WHERE POSSIBLE. MOULDED CIRCUIT BREAKERS SHALL BE BOLT-ON TYPE. ALL PANELBOARDS SHALL HAVE LOADS BALANCED ON THE FEEDERS (OPERATING AT NORMAL BUSINESS HOURS). ADJUST BRANCH CIRCUITS AS REQUIRED. DISCONNECT SWITCHES SHALL BE OF QUICK-MAKE/QUICK-BREAK TYPE.

- 9.2. MANUFACTURER - FEDERAL PIONEER, SIEMENS, SQUARE D, CUTLER-HAMMER, WESTINGHOUSE

10. FUSES

- 10.1. FUSES SHALL BE BUSSMAN 'FUSETRON' DUAL ELEMENT SLOW BLOW TYPE, SIZED AS NOTED.

11. TRANSFORMERS

- 11.1. ALL DRY TYPE TRANSFORMERS SHALL BE MINIMUM K13 RATED AND WITH ELECTRO STATICALLY SHIELDED WINDINGS. TRANSFORMER TO HAVE DOUBLE LUGS TO ACCOMMODATE DOUBLE NEUTRALS. MANUFACTURER: (TO MATCH BASE BUILDING WHERE POSSIBLE) - HAMMOND, POLYGON, REX.

- 11.2. WHERE INDICATED ON NE DRAWINGS USE HARMONIC MITIGATION TRANSFORMERS. MANUFACTURER: (TO MATCH BASE BUILDING WHERE POSSIBLE) - HARMONY SERIES FROM MIRUS POWERSMITHS.

- 11.3. ALL TRANSFORMERS UP TO AND INCLUDING 75 KVA ARE TO BE CEILING MOUNTED WITH SUSPENSION RODS UNLESS OTHERWISE NOTED.

12. LUMINAIRES

- 12.1. ALL NEW LUMINAIRES SHALL BE AS SPECIFIED ON DRAWINGS. ALTERNATES ARE NOT ACCEPTABLE WITHOUT APPROVAL BY ENGINEER AND CLIENT.

- 12.2. ALL LUMINAIRES INSTALLED IN OR ON BASE BUILDING CEILINGS SHALL BE INDEPENDENTLY SUPPORTED FROM BUILDING STRUCTURE WITH CHAIN UNLESS OTHERWISE NOTED.

- 12.3. NEW AND RELOCATED EXISTING BASE BUILDING LUMINAIRES SHALL BE INSTALLED WITH CHAIN SUPPORTS UNLESS BASE BUILDING CEILING SYSTEM IS DESIGNED AND CONSTRUCTED TO SUPPORT THE ADDITIONAL WEIGHT OF NE BASE BUILDING LUMINAIRES. PROVIDE WRITTEN CONFIRMATION FROM CEILING MANUFACTURER.

13. LAMPS

- 13.1. ALL LUMINAIRES SHALL BE COMPLETE WITH SUITABLE LAMPS AS RECOMMENDED BY MANUFACTURER. COLOUR TEMPERATURE, BEAM ANGLE, CRI, FROSTED/CLEAR, ETC. SHALL BE CONFIRMED WITH ENGINEER AND ARCHITECT/DESIGN CONSULTANT PRIOR TO ORDERING LAMPS.

- 13.2. COMPACT FLUORESCENT, FLUORESCENT, AND H.I.D. LAMPS SHALL BE GUARANTEED FOR A PERIOD OF TWELVE MONTHS FROM THE DATE OF ACCEPTANCE.

- 13.3. LOW VOLTAGE, HALOGEN, AND INCANDESCENT LAMPS SHALL BE GUARANTEED FOR A PERIOD OF SIX MONTHS FROM NE DATE OF ACCEPTANCE.

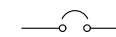
- 13.4. MANUFACTURER - PHILIPS, G.E.CANADA, OSRAM/SYLVANIA

14. PLYWOOD BACKBOARDS

- 14.1. PLYWOOD BACKBOARDS SHALL BE FIRE RETARDANT VENEER CORE FIR, 19MM(3/4") NICK AND SIZED AS INDICATED ON DRAWINGS. BACKBOARDS COLOUR AS SPECIFIED BY ARCHITECT/DESIGN CONSULTANT. SHALL BE PRIMED AND PAINTED WITH APPROVED FIRE RETARDANT PAINT.

15. NAMEPLATE

- 15.1. PROVIDE ENGRAVED LAMICOID NAMEPLATE ON ALL MAJOR ELECTRICAL EQUIPMENT IDENTIFYING NAME, VOLTAGE, PHASE, CURRENT RATING, "FED FROM ..." AND USE. LETTERING SHALL BE MINIMUM .4" HIGH, WHITE ON BLACK BACKGROUND.



CIRCUIT BREAKER



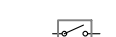
FIRE ALARM SMOKE DETECTOR



FUSED DISCONNECT SWITCH



FIRE ALARM HEAT DETECTOR



DISCONNECT SWITCH



FIRE ALARM MANUAL CALL POINT



KILOWATT-HOUR METER



FIRE ALARM HORN STROBE COMBO



ELECTRICAL PANEL, RECESSED OR SURFACE MOUNTED



FIRE ALARM HORN / BELL



DRY TYPE TRANSFORMER



FIRE ALARM END OF LINE RESISTOR

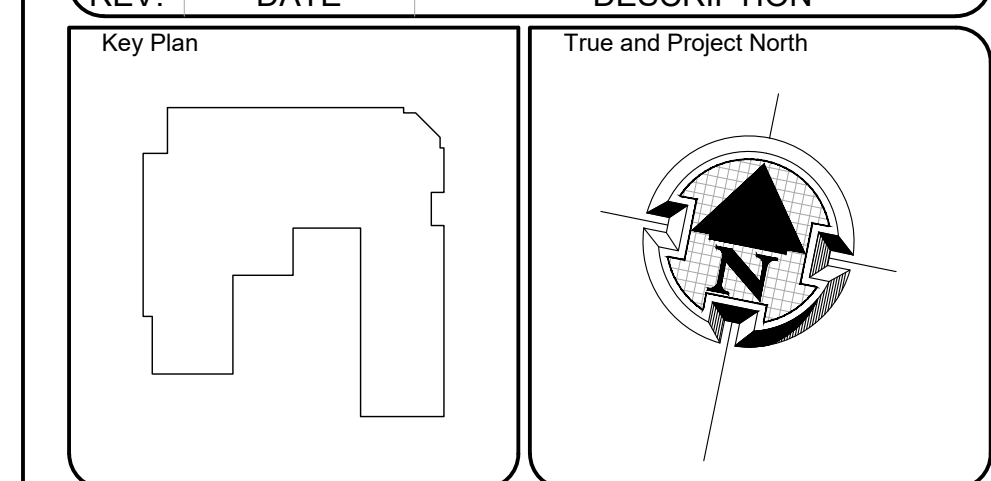


SINGLE PHASE MOTOR LOAD, SEE MECH. DWGS FOR RATING



- ## DESIGN NOTES:
1. EXISTING WIRING, CONDUIT, DISCONNECT SWITCH, ETC. TO BE REMOVED IN COORDINATION WITH DEMOLITION OF HEAT RECOVERY UNIT AND HUMIDIFIER.
 2. NEW HEAT RECOVERY UNIT TO BE FED FROM SPLITTER #1. SUPPLY AND INSTALL NEW 225A FUSED DISCONNECT SWITCH.
 3. NEW HOT WATER TANKS HWT-1 & HTW-2 TO BE FED FROM PANEL 'HA' CCT #23 & CCT #25 SPARE SPACE. SUPPLY AND INSTALL NEW 15A-1P CIRCUIT BREAKERS.

1	04/01/2022	RE-ISSUED FOR PERMIT & TENDER
0	08/12/2021	ISSUED FOR PERMIT & TENDER
REV	DATE	DESCRIPTION



Drawing Overall Scale


AS SHOWN

Project Name & Address

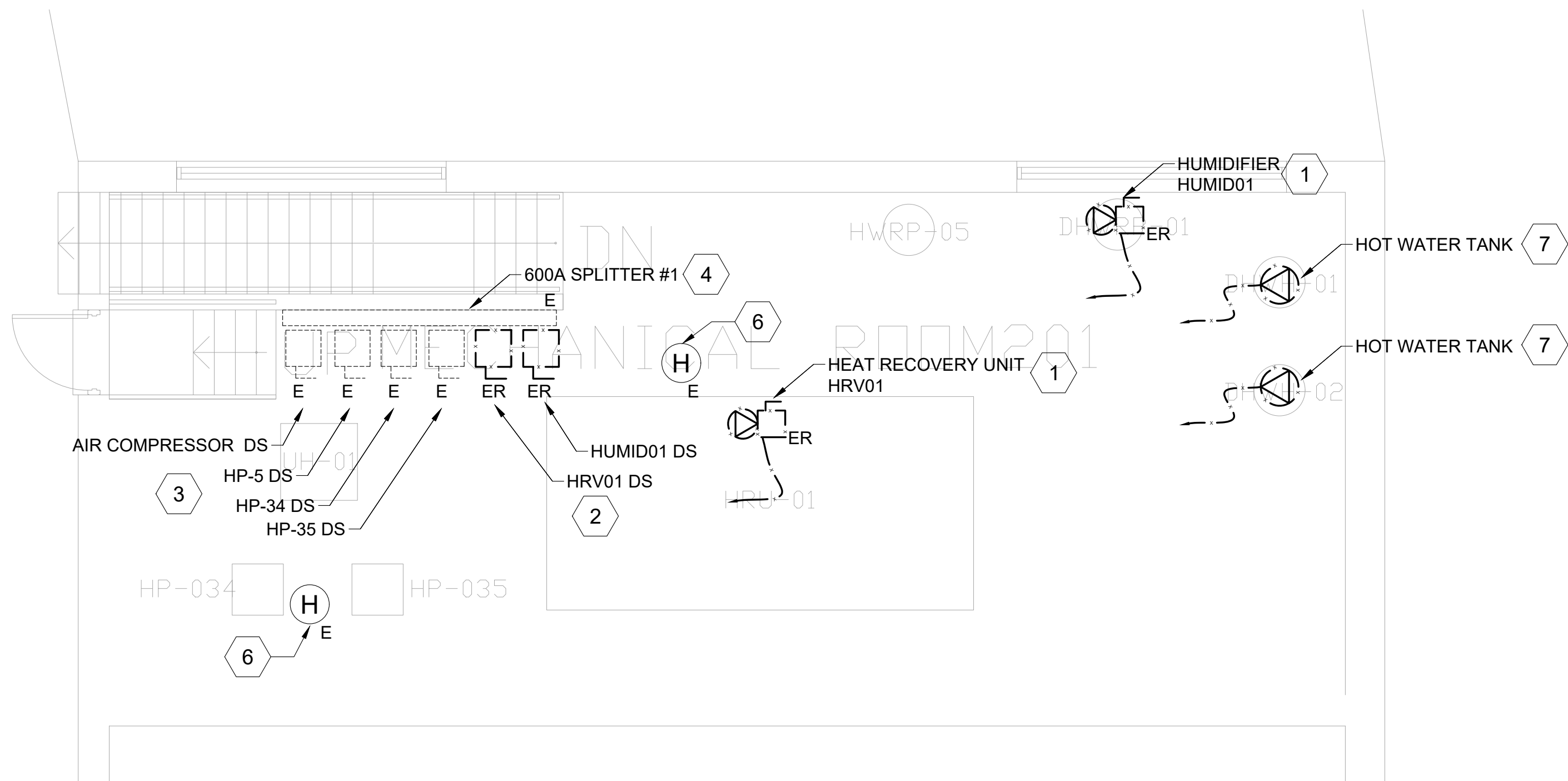
TERRY FOX PUBLIC SCHOOL
HRV-HWT-BAS INSTRUMENTATION
1065 RIDDELL AVE, COBOURG, ON K9A5N4

Drawing Title

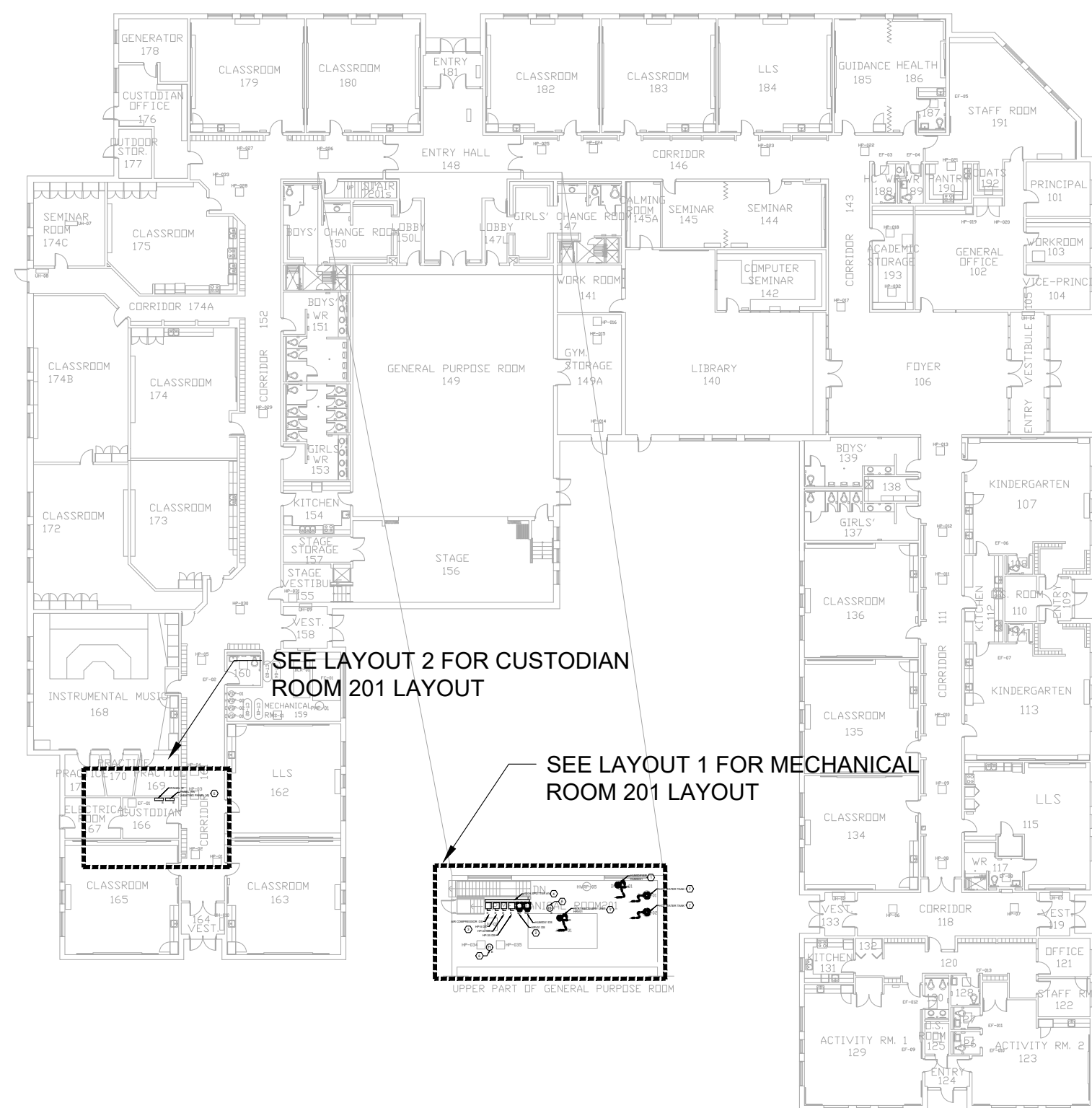
ELECTRICAL SERVICES
SINGLE LINE DIAGRAM

DATE:	02/12/2021	Engineer / Architect Stamp
DESIGNED BY:	S.ZHU	
DRAWN BY:	S.ZHU	
APPROVED BY:	J. ELOWE	
PROJECT NO.:	1021225	

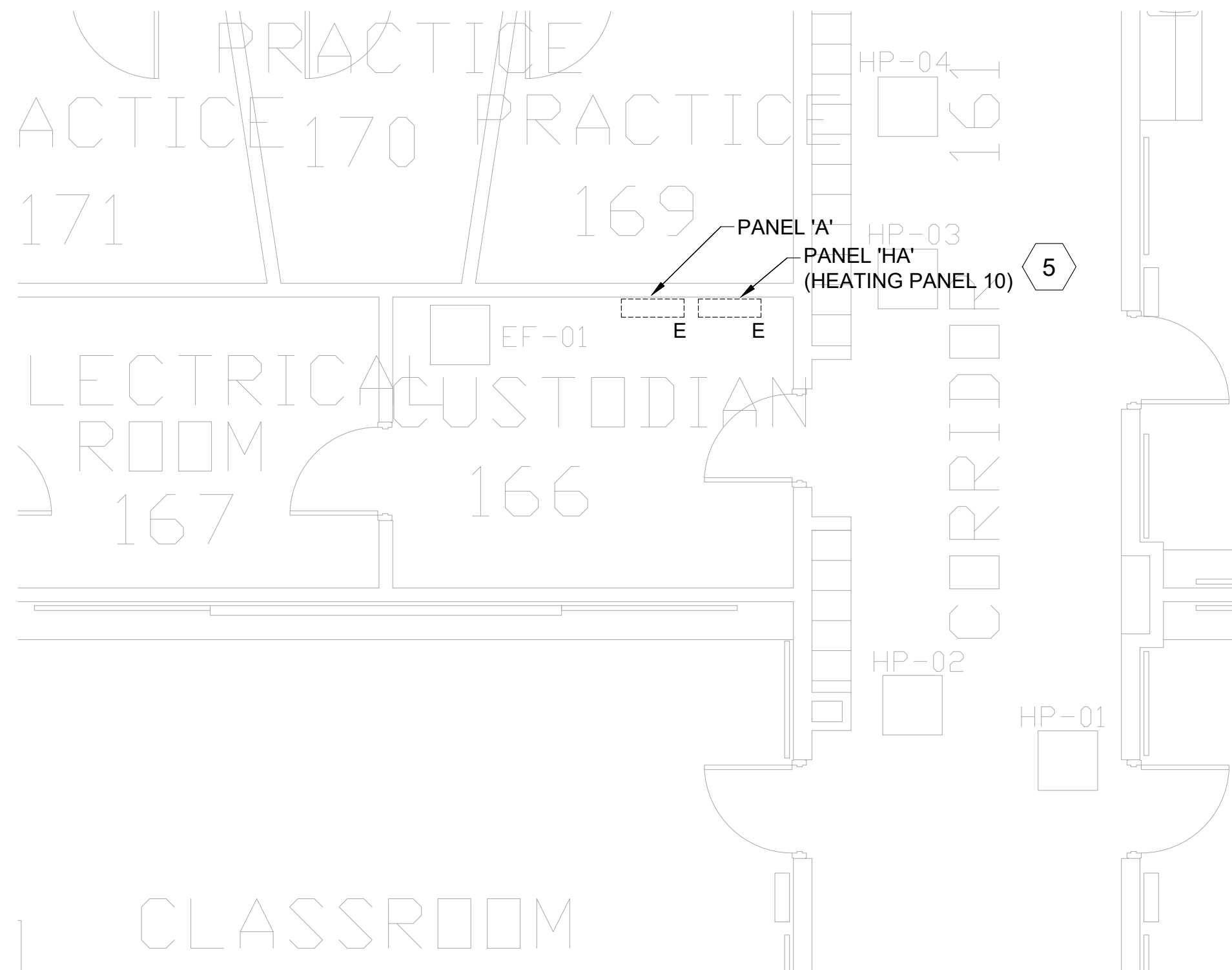
Drawing No.	Phase	Revision
E-002	T	1



1 MECHANICAL ROOM 201 - DEMOLITION WORK



KEY PLAN - FIRST & SECOND FLOOR



2 CUSTODIAN ROOM 166 LAYOUT

DESIGN NOTES:

- EXISTING WIRING, CONDUIT, DISCONNECT, ETC. TO BE REMOVED IN COORDINATION WITH DEMOLITION OF HEAT RECOVERY UNIT AND HUMIDIFIER.
- EXISTING FUSED DISCONNECTION SWITCHES OF HRV AND HUMIDIFIER TO BE REMOVED C/W ALL ASSOCIATED CONDUIT, WIRING AND CONTROL RELAY.
- EXISTING POWER CONNECTIONS, DISCONNECT SWITCHES TO EXISTING FANS AND COMPRESSOR IN MECHANICAL ROOM 201 TO REMAIN.
- EXISTING 600A SPLITTER #1 IN MECHANICAL ROOM 201 TO REMAIN.
- EXISTING PANEL HA (HEATING PANEL 10) IN CUSTODIAN ROOM #166 TO REMAIN.
- EXISTING CEILING MOUNTED HEAT DETECTORS TO REMAIN.
- EXISTING WIRING, CONDUIT, DISCONNECT, ETC. TO BE REMOVED IN COORDINATION WITH DEMOLITION OF HOT WATER TANKS.

GENERAL NOTES:

- UNLESS OTHERWISE INDICATED, ALL EXISTING EQUIPMENT TO REMAIN.
- SINGLE LINE DRAWING BASED ON AS-BUILT DWG. PROVIDED BY KPRDSB AND SITE SURVEY. ANY DISCREPANCY BETWEEN ACTUAL INSTALLATION AND INFORMATION CONTAINED IN THIS DRAWING RELEVANT TO PROJECT SCOPE OF WORKS TO BE HIGHLIGHTED TO THE ENGINEER FOR CLARIFICATION.
- MOUNTING AND ROUTING OF ELECTRICAL EQUIPMENT AND DISTRIBUTION SHALL BE COORDINATED WITH ALL OTHER SERVICES.
- COORDINATE ELECTRICAL CONNECTIONS FOR MECHANICAL EQUIPMENT WITH MECHANICAL TRADE PRIOR TO INSTALLATION.
- PENETRATION THROUGH FIRE RATED WALL AND ROOF TO BE SEALED WITH NON-SHRINK, WATERPROOF AND FIREPROOF SEALANT AND APPROVED BY THE DESIGNER OWNER PRIOR TO INSTALLATION.
- ALL WORKS THAT WILL REQUIRE THE SHUT DOWN OF ELECTRICAL POWER TO BE COORDINATED WITH OWNER PRIOR TO COMMENCEMENT OF WORK. ANY LOSS OF REVENUE FROM FAILURE TO DO SO WILL BE SOLE RESPONSIBILITY OF CONTRACTOR.
- INCLUDE IN TENDER PRICE FOR PROTECTION, REMOVAL, RELOCATION & VERIFICATION OF EXISTING, PANELS, DISCONNECT SWITCHES, CONTROLLERS, SPLITTERS, LIGHT FIXTURES, ELECTRICAL DEVICES, HEAT DETECTORS, AND CONDUITS AS PRESENT IN THE ROOM TO ALLOW FOR DEMOLITION AND PROPOSED SCOPE OF WORK. PROVIDE NEW CONDUIT AND WIRING AS REQUIRED TO SUIT SCOPE OF WORK. LIGHT FIXTURES SHALL BE POSITIONED TO SUSPEND JUST BELOW MECHANICAL PIPING/DUCTWORK AND TO PROVIDE OPTIMUM ILLUMINATION.

REV.	DATE	DESCRIPTION
1	04/01/2022	RE-ISSUED FOR PERMIT & TENDER
0	08/12/2021	ISSUED FOR PERMIT & TENDER

Key Plan

True and Project North

Engineer Logo

Client

Drawing Overall Scale

AS SHOWN

Project Name & Address

TERRY FOX PUBLIC SCHOOL
HRV-HWT-BAS INSTRUMENTATION
1065 RIDDELL AVE, COBOURG, ON K9A5N4

Drawing Title

ELECTRICAL SERVICES
POWER LAYOUT DEMOLITION WORKS
FIRST & SECOND FLOOR

DATE: 02/12/2021

DESIGNED BY: S.ZHU

DRAWN BY: S.ZHU

APPROVED BY: J. ELOWE

PROJECT NO.: 1021225

Engineer / Architect Stamp

Drawing No. Phase Revision

E-100 T 1

1. DESIGN CONFORMS TO THE 2012 ONTARIO BUILDING CODE (OBC), ONTARIO REGULATION 88/19 AND AMENDMENTS.
2. THE GENERAL NOTES AND TYPICAL DETAILS ARE APPLICABLE TO ALL PARTS OF THE PROJECT AND SHALL BE READ IN CONJUNCTION WITH THE DRAWINGS AND SPECIFICATIONS.
3. USE ONLY THE LATEST ISSUES OF ANY GOVERNMENT CODES, STANDARDS OR REGULATIONS MENTIONED IN THE FOLLOWING NOTES, UNLESS NOTED OTHERWISE.
4. VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE CONSULTANT BEFORE PROCEEDING WITH THE WORK.
5. FOR DETAILS AND DIMENSIONS NOT GIVEN ON STRUCTURAL DRAWINGS REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS. VERIFY LOCATIONS AND DIMENSIONS OF ALL OPENINGS, PIPE SLEEVES, ETC. AS REQUIRED WITH THE MECHANICAL AND ELECTRICAL CONTRACTORS.
6. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DIMENSIONS AND FOR COORDINATION OF SUB-TRADES.
7. DO NOT SCALE THE DRAWINGS, USE FIGURE DIMENSIONS ONLY.
8. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO SAFEGUARD ALL EXISTING STRUCTURES AFFECTED BY THIS CONSTRUCTION. ON ANY NEW STRUCTURE, DO NOT EXCEED THE DESIGN LOADINGS INDICATED ON THESE DRAWINGS.
9. ALL STRUCTURAL MEMBERS SHOWN ARE NEW UNLESS NOTED OTHERWISE.
10. DRAWINGS AND DETAILS ARE INTENDED TO SHOW THE END RESULT OF DESIGN. MODIFICATIONS TO THE DESIGN NECESSARY TO SUIT SITE DIMENSIONS OR CONDITIONS SHALL BE SUBMITTED TO CONSULTANT FOR APPROVAL BEFORE PROCEEDING.
11. THE SCHEDULING OF ALL WORK, INCLUDING ACCESSIBILITY AND LOGISTICS SHALL BE COORDINATED AND AGREED WITH THE OWNER PRIOR TO COMMENCEMENT.
12. CO-ORDINATE WORK WITH MECHANICAL AND ELECTRICAL TRADES REGARDING ANY EXISTING MECHANICAL AND ELECTRICAL SERVICES ADJACENT TO THE WORK.
13. DO NOT CUT THROUGH, CORE-DRILL OR OTHERWISE ALTER ANY EXISTING OR NEW PART OF THE STRUCTURE UNLESS SHOWN ON THE DRAWINGS, OR UNLESS APPROVED BY THE CONSULTANT. PROVIDE ADDITIONAL REINFORCING OR FRAMING AT OPENINGS AS SHOWN OR DIRECTED, PRIOR TO MAKING ANY OPENINGS.
14. THE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF THE CONSULTANT AND MAY NOT BE REPRODUCED IN ANY FORM WITHOUT WRITTEN AUTHORIZATION.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MONITORING EXISTING STRUCTURES ADJACENT TO NEW CONSTRUCTION AND AS OTHERWISE DIRECTED DURING ALL PHASES OF WORK.

- DESIGN, FABRICATION AND ERECTION SHALL CONFORM TO CAN/CSA-S16 S16S1 SUPPLEMENT AND CISR CODE OF STANDARD PRACTICE FOR STRUCTURAL STEEL.
2. ALL STRUCTURAL STEEL TO CONFORM TO CAN/CSA-G40.20/G2040.21 WITH THE FOLLOWING MIN. GRADES:
 - 350W (50 KSI) CLASS C, FOR HSS SECTIONS
 - 350W (50 KSI), FOR WELDED OR ROLLED W-SECTIONS
 - 300W (44 KSI), FOR CHANNELS, ANGLES AND PLATES
 - 350W (50 KSI), FOR ALL OTHER SECTIONS, UNLESS NOTED OTHERWISE
3. ALL BOLTS TO BE HIGH STRENGTH TYPE TO ASTM A325 REQUIREMENTS. USE BEARING-TYPE CONNECTIONS. MINIMUM TWO M20 (3/4") BOLTS PER CONNECTION UNLESS OTHERWISE NOTED. THREADS MUST BE EXCLUDED FROM THE BOLT SHEAR PLANES.
4. ANCHOR BOLTS: ASTM F1554 GRADE 55 UNLESS OTHERWISE NOTED.
5. WELDING:
 - a. WELDING WORK TO BE IN ACCORDANCE WITH CSA-W59.
 - b. WELDING TO BE UNDERTAKEN ONLY BY WELDERS CERTIFIED TO CSA-W55.
 - c. WELDING TO BE UNDERTAKEN BY A FABRICATOR CERTIFIED TO CSA-W47.1 FOR DIVISION 1 OR 2.
 - d. EXPOSED WELDS SHALL BE CONTINUOUS AND GROUND SMOOTH.
 - e. REPAIR DAMAGED OR FIELD CUT AREAS OF GALVANIZED SURFACES WITH TWO COATS OF ZINC RICH PAINT. REFER TO FINISHING PROCESS.
 - f. ALL NECESSARY PRECAUTIONS SHALL BE UNDERTAKEN TO PREVENT FIRES CAUSED BY WELDING, INCLUDING BUT NOT LIMITED TO THE PRESENCE OF FIRE WATCHERS, USE OF FIRE SHIELDS, AND REMOVAL OF COMBUSTIBLE MATERIALS. SUITABLE FIRE EXTINGUISHING EQUIPMENT SHALL BE PRESENT AND WITHIN REACH OF THE WELDING CREW.
 - g. NEARBY SURFACES SCORCHED OR OTHERWISE AFFECTED BY WELDING SHALL BE RESTORED TO ITS ORIGINAL CONDITION PER THE SATISFACTION OF THE CLIENT, UNLESS OTHERWISE AGREED UPON.
6. PROVIDE ALL REQUIRED GUSSETS, SPACERS, FILLERS AND SHIM PLATES.
7. PROVIDE BUTTER COAT OF NON-SHRINK GROUT BETWEEN SURFACES WHERE CONNECTING STEEL PLATE TO STRUCTURAL CONCRETE OR MASONRY, UNLESS NOTED OTHERWISE.
8. CENTRE BEARING PLATES UNDER BEAMS EXCEPT WHERE NOTED OTHERWISE.
9. CONNECT ALL BEAMS TO END BEARING PLATES WITH A MIN. OF 50 mm (1/2") LENGTH OF 6 mm (1/4") FILLET WELD EACH SIDE OF FLANGE.
10. PROVIDE 4.8 mm (3/16") THICK CAP PLATES WITH ALL-AROUND SEAL WELD ON OPEN ENDS OF HSS MEMBERS UNLESS NOTED OTHERWISE.
11. DO NOT MAKE HOLES IN ANY STRUCTURAL MEMBER OTHER THAN THOSE SHOWN ON REVIEWED SHOP DRAWINGS WITHOUT THE PRIOR APPROVAL OF THE CONSULTANT.
12. MAKE NO HOLES IN ANY STRUCTURAL STEEL MEMBER OTHER THAN THOSE ON REVIEWED SHOP DRAWINGS WITH PRIOR APPROVAL OF CONSULTANT.
13. STRUCTURAL STEEL EXPOSED TO THE WEATHER (INCLUDING ALL MASONRY LINTELS) SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH S16S14, WITH A MINIMUM ZINC COATING OF 600 GRAMS PER SQUARE METRE. ALL INTERIOR STEEL TO BE PRIME PAINTED OR GALVANIZED, UNLESS NOTED OTHERWISE.

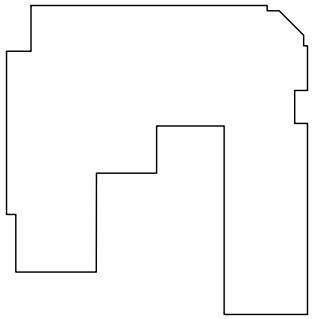
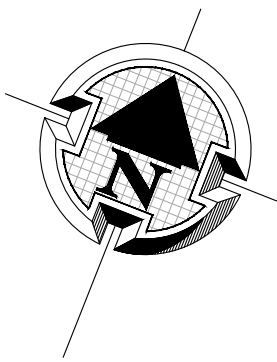



1. ALL FRAMING LUMBER TO BE KILN-DRIED D-FIR OR SPF NO.2 OR BETTER.
2. ALL METAL CONNECTORS ARE SIMPSON STRONG-TIE OR APPROVED EQUIVALENT.
3. ALL FRAMING NAILS SHALL BE COMMON NAILS. NO BOX NAILS ALLOWED.

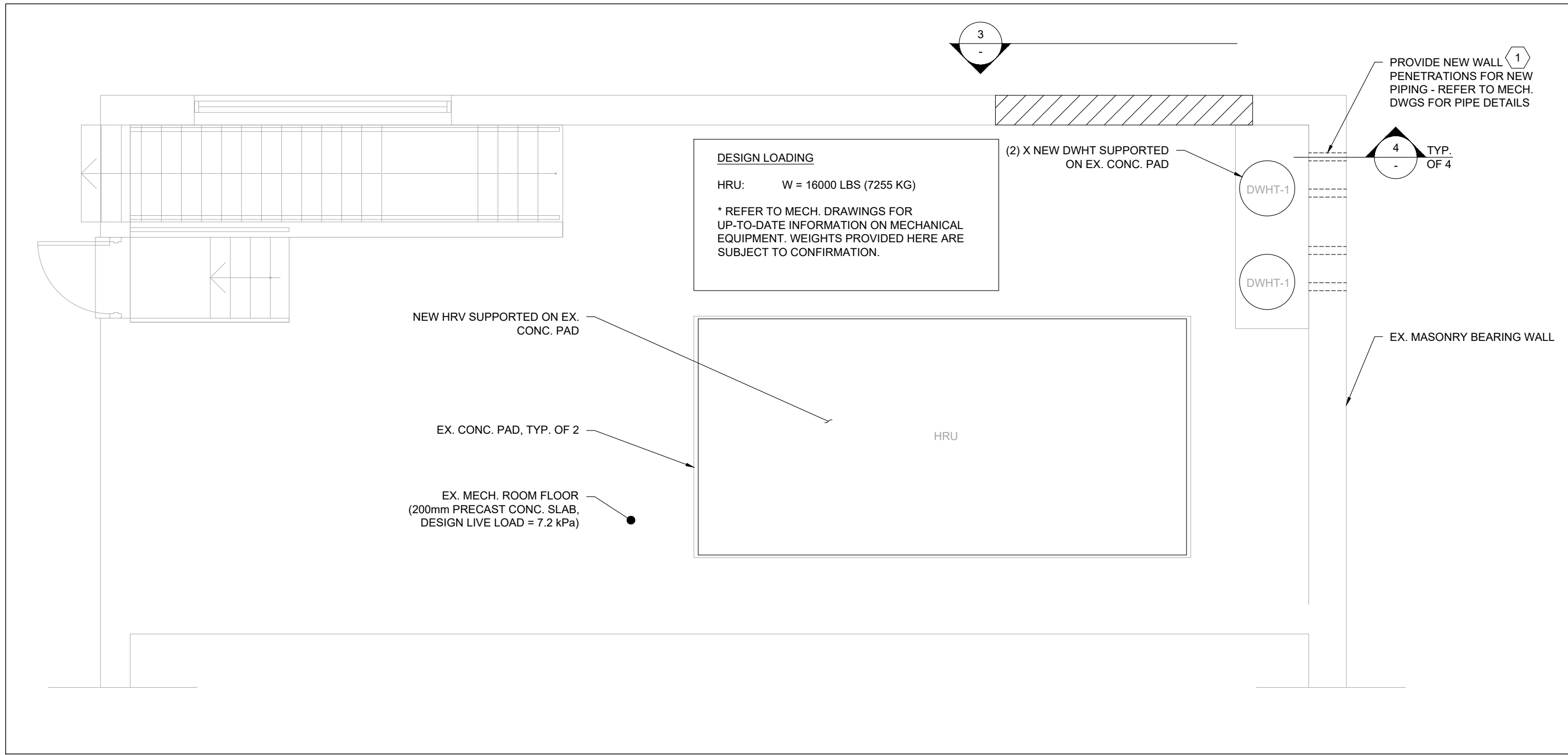
1. ALL MASONRY WORK TO BE IN ACCORDANCE WITH THE LATEST VERSIONS OF CSA-A371 AND CSA-A179.
2. STRUCTURAL DRAWINGS SHOW LOAD-BEARING MASONRY WALLS ONLY U.N.O. REFER TO ARCHITECTURAL DRAWINGS FOR ALL NON-LOADBEARING MASONRY WALLS.
3. PROVIDE TYPE H1/S/M UNITS CONFORMING TO CSA A165 SERIES FOR ALL CONCRETE BLOCK MASONRY.
4. USE TYPE 'S' MORTAR AND 12.5 MPa 28-DAY STRENGTH GROUT FOR ALL MASONRY WALLS, CONFORMING TO CSA-A179.
5. CONSTRUCT WALLS IN RUNNING BOND ONLY. USE FULL MORTAR BEDDING.
6. PROVIDE 100% SOLID OR GROUTED MASONRY AT TOP AND BOTTOM COURSES OF WALLS. TWO COURSES DEEP AND TWO BLOCKS WIDE UNDER ALL BEAMS OR LINTEL BEARINGS. GROUTED CELLS CONTAINING VERTICAL STEEL BOND BEAMS. KEYWAYS AT EACH SIDE OF CONTROL JOINTS, AND CELLS CONTAINING DOWELS, ANCHOR BOLTS OR OTHER EMBEDDED HARDWARE.
7. PROVIDE CONTINUOUS LAGS ADEQUATE-TYPE GALVANIZED HORIZONTAL JOINT REINFORCEMENT AT EVERY SECOND COURSE AND AT THE FIRST COURSE AT THE TOP AND BOTTOM OF THE WALL.
8. PROVIDE PREFABRICATED CORNERS AND TEES FOR HORIZONTAL JOINT REINFORCING.
9. PROVIDE VERTICAL WALL REINFORCING IN ALL NEW CONCRETE BLOCK WALLS IN ACCORDANCE WITH TYPICAL WALL REINFORCING DETAILS, UNLESS NOTED OTHERWISE. VERTICAL WALL REINFORCING TO BE CONTINUOUS BETWEEN FLOORS AND ROOF. PROVIDE FULL CLASS B TENSION LAP SPLICE. INDICATE LOCATION OF ALL PROPOSED LAP SPLICES ON SHOP DRAWINGS FOR APPROVAL.
10. PROVIDE BULLNOSE BLOCKS AT EXPOSED CORNERS.
11. NEW MASONRY WALLS TO BE TOOTHED INTO EXISTING MASONRY WALLS WHERE SHOWN.
12. BOND BEAMS ARE TO BE CONTINUOUS WHERE INDICATED ON PLANS AND OR SPECIFICATIONS.
13. REFER TO ARCHITECTURAL DRAWINGS FOR CONTROL JOINT (HORIZONTAL MOVEMENT) LOCATIONS.
14. PROVIDE 100% SOLID OR FULLY GROUTED MASONRY AT:
 - a. TOP AND BOTTOM COURSE OF WALLS.
 - b. TWO COURSES DEEP AND TWO BLOCKS WIDE UNDER ALL BEAMS OR LINTEL BEARINGS.
 - c. GROUTED CELLS CONTAINING VERTICAL REINFORCING.
 - d. BOND BEAMS.
 - e. ALL PIERS BETWEEN ADJACENT OPENINGS LESS THAN 800 mm DEEP. FOR FULL HEIGHT OF PIER.
 - f. ALL BELOW GRADE MASONRY.
 - g. KEYWAYS AT EACH SIDE OF CONTROL JOINTS, AND
 - h. CELLS CONTAINING DOWELS, ANCHOR BOLTS OR OTHER EMBEDDED HARDWARE.
17. SOLID MASONRY MEANS GROUT FILL IN HOLLOW MASONRY, OR 100% SOLID UNITS.
18. CONTRACTOR TO BE RESPONSIBLE FOR THE DESIGN AND PROVISION OF ADEQUATE TEMPORARY BRACING WHEN INSTALLING MASONRY.

1. SUBMIT SHOP DRAWINGS TO CONSULTANT FOR REVIEW BEFORE COMMENCING FABRICATION. ALLOW 7 DAYS FOR RETURN OF SHOP DRAWINGS.
2. SHOP DRAWINGS FOR CONCRETE REINFORCEMENT AND PLACEMENT SHALL BE SUFFICIENTLY DETAILED AND DIMENSIONED TO PERMIT CORRECT PLACEMENT OF REINFORCEMENT AND ACCESSORIES WITHOUT REFERENCE TO ARCHITECTURAL AND STRUCTURAL DRAWINGS
3. NOTIFY CONSULTANT IN WRITING AT TIME OF SUBMISSION OF ANY DEVIATIONS IN SHOP DRAWINGS FROM REQUIREMENTS OF CONTRACT DOCUMENTS.
4. CONFIRM CONTRACTOR'S REVIEW OF EACH SHOP DRAWING BY STAMP, DATE AND SIGNATURE OF A RESPONSIBLE PERSON.

1. ENSURE THAT EXISTING AND NEW STRUCTURE IS AT ALL TIMES MAINTAINED IN A SAFE CONDITION AND THAT THE PUBLIC IS PROTECTED FROM DEMOLITION ACTIVITIES
2. DESIGN AND PROVIDE ALL REQUIRED SHORING OR TEMPORARY FALSEWORK REQUIRED FOR SUPPORT OF EXISTING STRUCTURE DURING DEMOLITION REWORK OR INSTALLATION ACTIVITIES. BEFORE UNDERTAKING WORK, SUBMIT TO CONSULTANT FOR REVIEW (DRAWING/S) BEARING THE SEAL OF THE LICENSED PROFESSIONAL ENGINEER RESPONSIBLE FOR DESIGN. CONTRACTOR'S ENGINEER IS THE ENGINEER OF RECORD FOR ALL SHORING AND FALSEWORK. CONSULTANT'S REVIEW OF DRAWING(S) IS ONLY ON THE OWNER'S BEHALF TO ENSURE COMPLIANCE WITH CONTRACT REQUIREMENTS, REFER TO SPECIFICATIONS.

1

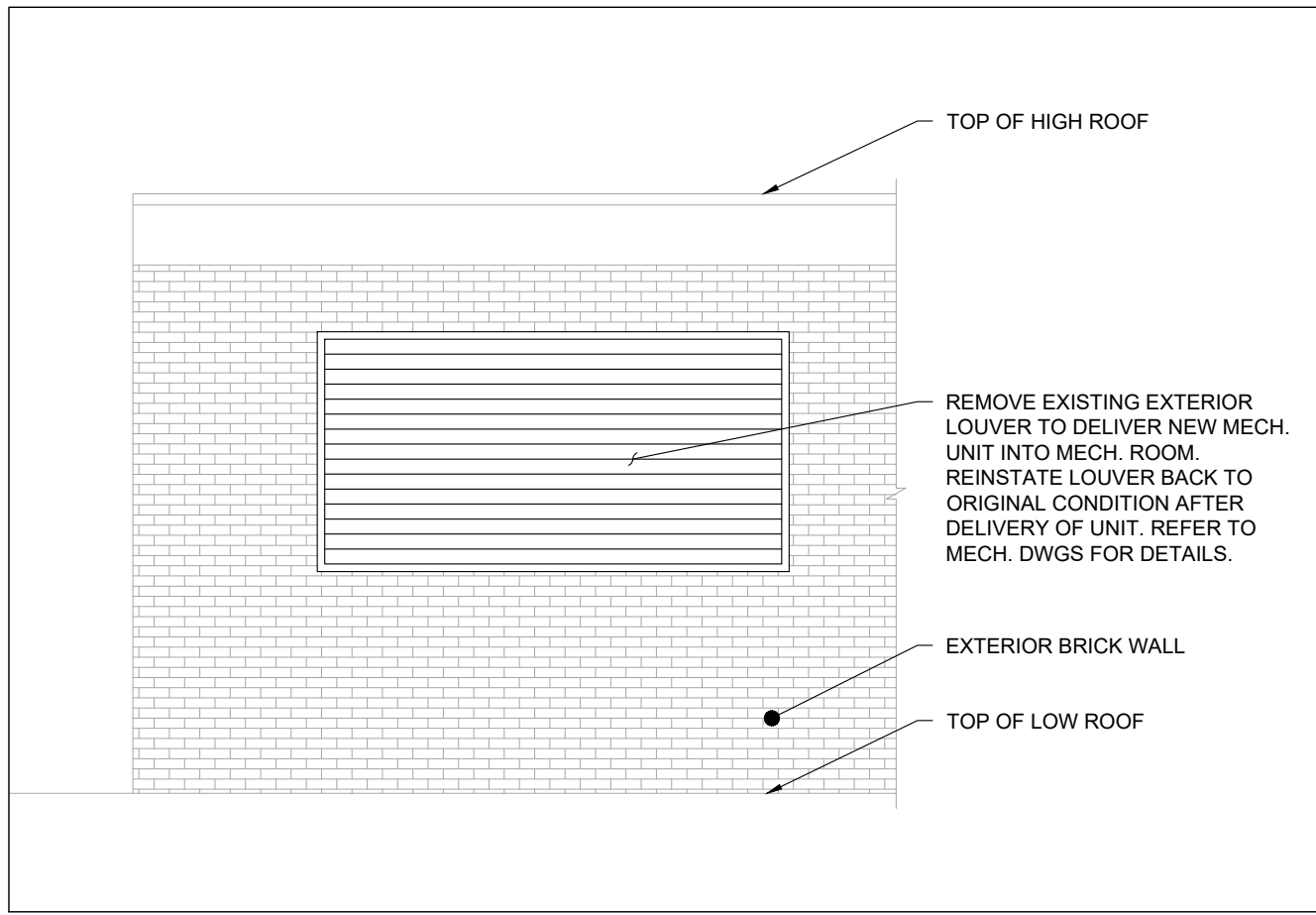
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0	2021-DEC-08	ISSUED FOR PERMIT AND TENDER	
REV.	DATE	DESCRIPTION	
Key Plan		True North	
			
Engineer Logo 		Spectra Engineering 250 SHEPPARD AVE EAST, SUITE#306, TORONTO, ONTARIO, M2N 6M9 TEL: (416) 478-5156 FAX: (416) 478-5917	
Client 		Kawartha Pine Ridge District School Board	
Drawing Overall Scale AS SHOWN			
Project Name & Address TERRY FOX PUBLIC SCHOOL COBOURG HRV-HWT-BAS INSTRUMENTATION 1065 RIDDELL AVE, COBOURG, ON K9A 5N4			
Drawing Title STRUCTURAL SERVICES GENERAL NOTES AND SPECIFICATIONS			
DATE: 2021-DEC-01 DESIGNED BY: D.YEUNG DRAWN BY: D.YEUNG APPROVED BY: D.HUM PROJECT NO.: 1021225		Engineer / Architect Stamp 	
		Drawing No. Phase Revision S - 0 1 T 1	



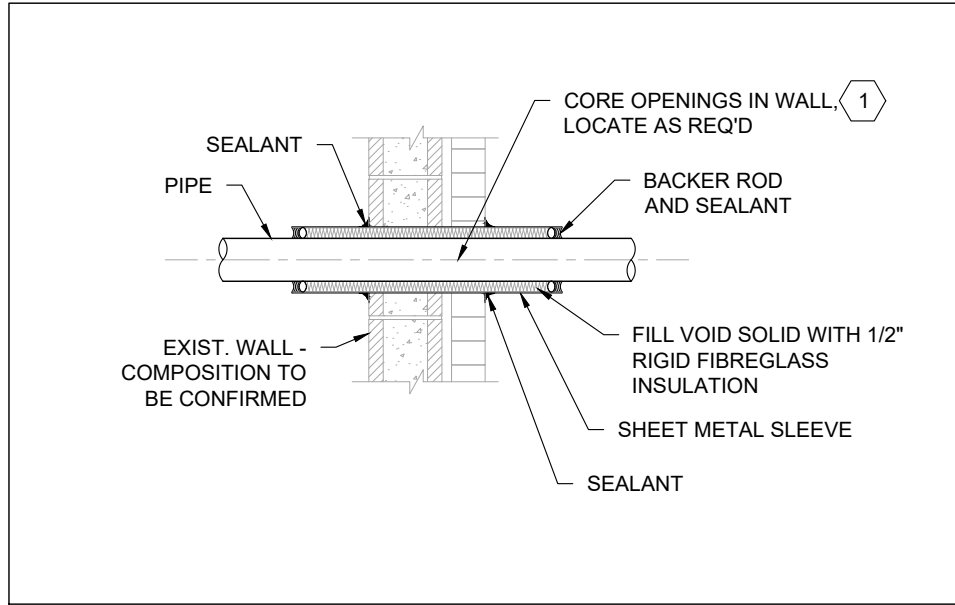
1 PARTIAL SECOND FLOOR PLAN - MECH. ROOM 201
Scale: 1:50



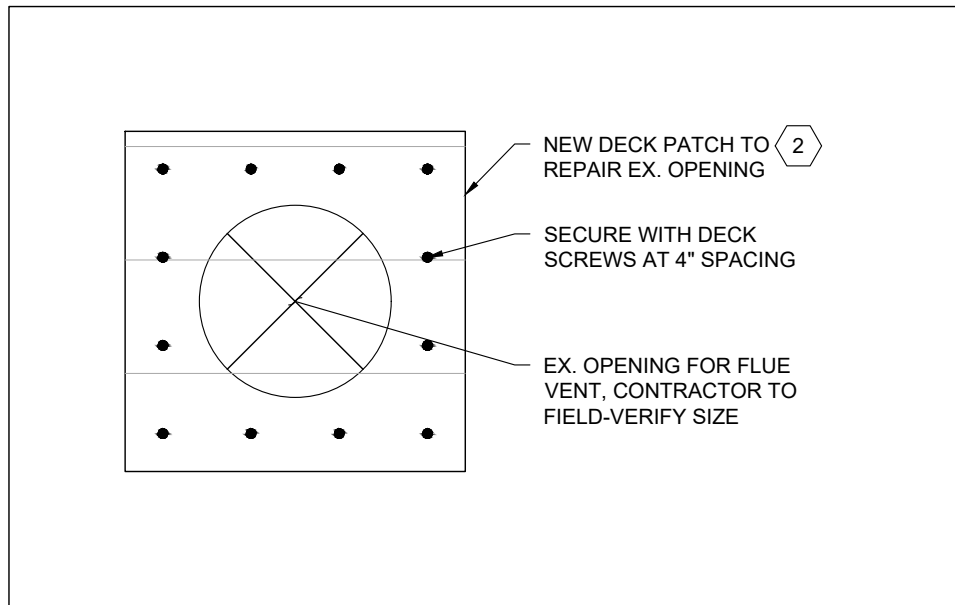
2 PARTIAL ROOF PLAN (ABOVE MECH. ROOM 201)
Scale: 1:50



3 LOUVER DEMOLITION ELEVATION
Scale: 1:50



4 PIPE PENETRATION DETAIL
Scale: 1:20



5 LOUVER DEMOLITION ELEVATION
Scale: 1:10

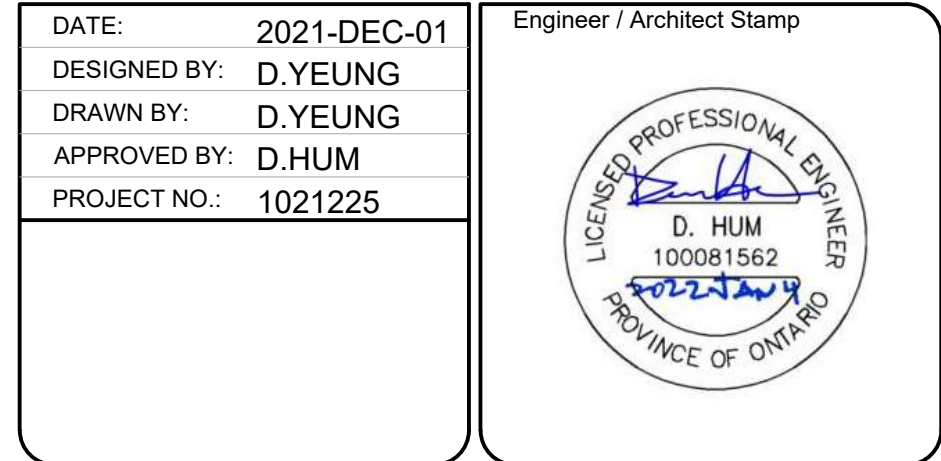
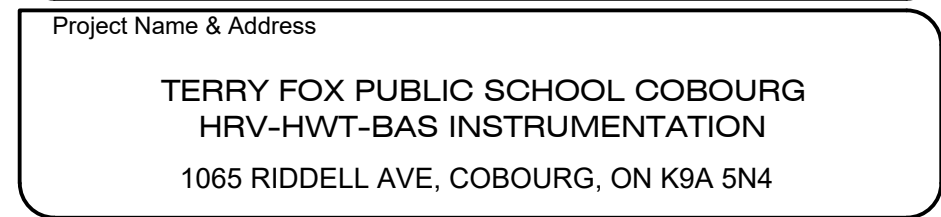
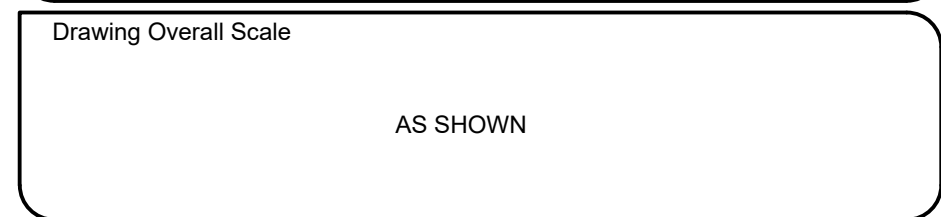
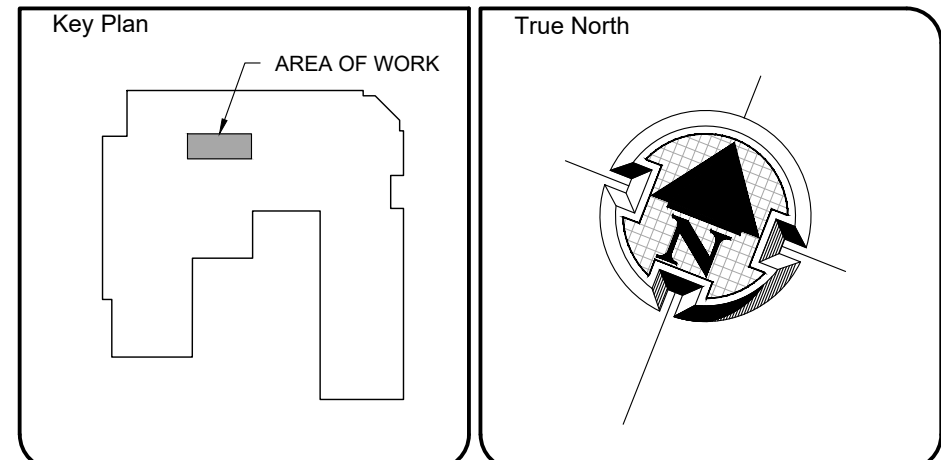
GENERAL NOTES

1. CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING POSSIBLE INTERFERENCES. SHOULD ANY DISCREPANCIES APPEAR BETWEEN THE DRAWINGS AND SPECIFICATIONS WHICH LEAVE THE CONTRACTOR IN DOUBT AS TO THE TRUE INTENT AND MEANING OF THE PLANS AND SPECIFICATIONS, THE CONTRACTOR SHALL OBTAIN A RULING FROM THE CONSULTANT IN WRITING BEFORE SUBMITTING A TENDER. IF THIS IS NOT DONE IT WILL BE ASSUMED THAT THE MOST EXPENSIVE ALTERNATIVE HAS BEEN INCLUDED IN THE TENDER PRICE. FOR ANY RULING TO BECOME BINDING, THE CONSULTANT MUST ISSUE THE NEW DIRECTION IN A PUBLISHED FORM.

DESIGN NOTES

1. SPREAD MULTIPLE PENETRATIONS AS FAR APART AS POSSIBLE. DO NOT CUT OPENINGS LARGER THAN 8" IN DIAMETER. PROVIDE MINIMUM CLEAR SPACING BETWEEN OPENINGS AT LEAST EQUAL TO THE LARGER DIAMETER OF THE ADJACENT OPENINGS. CHECK FOR ANY EMBEDDED ELEMENTS IN WALL PRIOR TO DRILLING. OTHER METHODS OF WALL PENETRATION MAY BE USED WITH CONSULTANT'S APPROVAL.
2. SELECT DECK PATCH TO MATCH EXISTING DECK. OVERLAP OPENINGS BY MINIMUM 100mm AROUND THE PERIMETER. ENSURE THAT FLUTE SPACING MATCHES EXISTING FOR PROPER FIT. APPLY SEALANT TO SECURE PIECE IN PLACE, THEN SECURE WITH SHEET METAL DECK SCREWS AROUND PERIMETER AT ±100mm SPACING. REPAIR ROOFING ABOVE OPENINGS TO SAME CONDITION AS SURROUNDING ROOFING.

REV.	DATE	DESCRIPTION
1	2022-JAN-04	RE-ISSUED FOR PERMIT AND TENDER
0	2021-DEC-08	ISSUED FOR PERMIT AND TENDER



Drawing No.	Phase	Revision
S - 0 2	T	1