MECHANICAL SPECIFICATIONS

MECHANICAL CONTRACTOR SHALL SUBMIT PRICE FOR THE COST OF SUPPLY AND INSTALLATION OF EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE AND OPERATING MECHANICAL PACKAGE. MECHANICAL PACKAGE TO CONSIST OF EQUIPMENT AND MATERIALS AS DESCRIBED IN THIS OUTLINE SPECIFICATION. REFER TO MECHANICAL PLANS FOR ACTUAL REQUIREMENTS OF EQUIPMENT.

A. GENERAL CONDITIONS

1. PROVIDE ALL LABOUR, MATERIALS, AND EQUIPMENT NECESSARY TO COMPLETE THE WORK SHOWN ON ALL MECHANICAL DRAWINGS INCLUSIVE AND AS SPECIFIED HEREIN.
2. ALL NECESSARY PERMITS SHALL BE OBTAINED AND ALL FEES SHALL BE PAID TO CARRY OUT THE SPECIFIED WORK. PROVIDE ALL REQUIRED LOCAL PROVINCIAL ENGINEERING SEALS FOR DRAWINGS AND DESIGNS TO OBTAIN BUILDING CONSTRUCTION PERMITS, ETC.
3. ALL WORK SHALL BE GUARANTEED FOR TWO YEARS FROM DATE OF COMPLETED WORK ACCEPTANCE BY THE ENGINEER. SUBMIT DOCUMENTATION IDENTIFYING ADDITIONAL EQUIPMENT WARRANTY COVERAGE AND TIME FRAMES.
4. ALL WORK SHALL COMPLY IN EVERY RESPECT WITH ALL NATIONAL, PROVINCIAL, AND LOCAL BY-LAWS AND CODES, WHICH SHALL BE CONSIDERED PART OF THIS SPECIFICATION.
5. ALL CUTTING, PATCHING, FLASHING FOR WORK AS REQUIRED HEREIN SHALL BE BY THE GENERAL CONTRACTOR.
6. THE MECHANICAL CONTRACTOR SHALL INSTALL HEATING, AIR CONDITIONING, AND PLUMBING SYSTEMS IN COMPLETE ACCORDANCE WITH THE RECOMMENDATIONS OF THE ASHRAE, NATIONAL WARM AIR STANDARDS, SMACNA LATEST EDITION DUCT STANDARDS, AND LOCAL PLUMBING CODES.
7. CO-ORDINATE WORK WITH WORK OF OTHER TRADES TO AVOID CONFLICT.
8. ALTER THE LOCATION OF DUCTS OR PIPES AT THE DIRECTION OF THE ENGINEER WITHOUT CHARGE TO THE OWNER, PROVIDED THE CHANGE IS MADE BEFORE INSTALLATION AND DOES NOT NECESSITATE ADDITIONAL MATERIALS.
9. FURNISH TO THE ENGINEER ELECTRONIC PDF COPIES CONTAINING THEREIN ONE (1) COMPLETE SET OF MANUFACTURERS' OPERATING AND MAINTENANCE INSTRUCTIONS SHOWING ALL MAJOR EQUIPMENT, AND APPARATUS REQUIRING MAINTENANCE. INSTRUCTIONS SHALL BE COMPLETE FOR INSTALLATION, OPERATION AND MAINTENANCE AND SHALL INCLUDE PERTINENT INFORMATION SUCH AS DETAILED DRAWINGS AND OPERATION CURVES. SPARE PARTS, SUPPLIER LISTS AND ADDRESSES SHALL BE SUPPLIED. INSTRUCTIONS SHALL BE REQUIRED WITH THE OWNERS' REPRESENTATIVE TO ENSURE A THOROUGH UNDERSTANDING OF THE EQUIPMENT AND ITS OPERATION.
10. ALL WIRING AND SUPPLY AND INSTALLATION OF DISCONNECT SWITCHES FOR EQUIPMENT SPECIFIED HEREIN SHALL BE PERFORMED BY THE ELECTRICAL CONTRACTOR, UNLESS OTHERWISE NOTED.
11. PRIOR TO SUBMITTING TENDER PRICE, CONTRACTOR SHALL EXAMINE THE SITE AND CONDITIONS AFFECTING WORK, METHODS OF CONNECTION AND LOCATION OF ALL SERVICES INVOLVED UNDER THIS CONTRACT. FAILURE TO MAKE THIS VISIT IN NO WAY ALLEVIATES THE MECHANICAL CONTRACTOR FROM RESPONSIBILITY FOR COMPLETING THE MECHANICAL WORK OF THIS CONTRACT IN A WORKMANLIKE MANNER. NO ALLOWANCE WILL BE MADE AFTER CONTRACT AWARD FOR ANY EXPENSE INCURRED THROUGH A FAILURE TO MAKE THIS EXAMINATION AND INVESTIGATION.
12. SCHEDULING OF ALL WORK SHALL BE ARRANGED WITH THE OWNER, AND THE OWNER SHALL BE NOTIFIED AND HIS APPROVAL OBTAINED PRIOR TO SHUTTING OFF EXISTING SERVICES FOR PURPOSES OF CONNECTING NEW WORK.
13. PROVIDE AN AUTOCAD FILE OF THE CONTRACT DRAWINGS FOR RECORD 'AS-BUILT' DRAWINGS, REVISED AS REQUIRED TO SHOW ANY DEVIATIONS OF LAYOUTS FROM THAT ORIGINALLY SHOWN.
14. PROVIDE ONE SET OF SPECIAL TOOLS REQUIRED TO SERVICE EQUIPMENT AS RECOMMENDED BY MANUFACTURERS.
15. PROVIDE DIELECTRIC COUPLINGS WHEREVER PIPES OF DISSIMILAR METALS ARE JOINED.
16. THE MECHANICAL CONTRACTOR SHALL PROVIDE ELECTRONIC PDF COPIES OF SHOP DRAWINGS FOR ALL EQUIPMENT FOR REVIEW AND APPROVAL BY ENGINEERS.
17. PIPE HANGERS WHERE REQUIRED SHALL BE GRINNELL FIG. 65 FOR STEEL PIPE AND FIG. CP65 FOR COPPER PIPE, ALL WITH FIG. 140 THREADED ROD ATTACHED TO FIG. 117 EXPANSION CASE SET IN HOLES DRILLED IN CONCRETE, OR ATTACHED TO FIG. 225 OR 227 CLAMP ATTACHED TO FLOOR JOIST AND ROOF JOIST. FOR INSULATED PIPING, PROVIDE PROTECTION SADDLES SIZE HANGER TO ACCOMMODATE INSULATION WHERE APPLIED. (NO PERFORATED STRAP HANGERS WILL BE ACCEPTED FOR SUPPORT METHOD.

B. SHOP DRAWINGS

1. SHOP DRAWINGS AND DATA SHEETS FOR EQUIPMENT INTENDED FOR INSTALLATION UNDER THIS CONTRACT SHALL BE REVIEWED AND STAMPED BY MECHANICAL CONTRACTOR AS WELL AS THE GENERAL CONTRACTOR THEN SUBMITTED FOR REVIEW. AFTER CHECKING AND WHEN REVIEWED, COPIES WILL BE RETURNED TO THE CONTRACTOR. SUBMIT SHOP DRAWINGS FOR:
   - C/R AC UNITS, CONDENSER AND ALL ACCESSORIES.
   - SPLIT AC UNITS
   - REFRIGERANT PIPE AND COMPONENTS

C. GUARANTEE

1. THE CONTRACTOR SHALL EXECUTE AND DELIVER TO THE OWNER, BEFORE FINAL PAYMENT, A WRITTEN GUARANTEE IN FORM SATISFACTORY TO THE OWNER THAT ALL LABOUR AND MATERIALS FURNISHED AND WORK PERFORMED BY THE CONTRACTOR ARE IN ACCORDANCE WITH THE CONTRACT. CONTRACT DRAWINGS, SPECIFICATIONS AND AUTHORIZED ALTERATIONS AND ADDITIONS THERETO AND, SHOULD ANY DEFECT DEVELOP DURING THE CONTRACT GUARANTEE PERIOD, AS HEREINAFTER DEFINED DUE TO IMPROPER MATERIALS, WORKMANSHIP OR ARRANGEMENT, THE SAME TOGETHER WITH ANY OTHER WORK AFFECTED IN CORRECTING SUCH DEFECT SHALL, UPON WRITTEN NOTICE BE MADE GOOD BY THE CONTRACTOR WITHOUT EXPENSE TO THE OWNER.
2. THE CONTRACTOR'S AFORESAID GUARANTEE SHALL COVER ALL WORK UNDER THE CONTRACT, WHETHER OR NOT ANY PORTION OR TRADE HAS BEEN ASSIGNED OR SUBLET. IN THE EVENT ANY PORTION OF THE WORK IS PERFORMED BY ASSIGNEES AND SUBCONTRACTORS THEIR WRITTEN GUARANTEE TO THE OWNER COVERING THEIR RESPECTIVE PORTIONS OF THE WORK FOR THE PERIODS SPECIFIED AND SHALL DELIVER SAME, TOGETHER WITH HIS OWN GUARANTEE, TO THE OWNER. ASSIGNEES AND SUBCONTRACTORS' GUARANTEES SHALL EXPRESSLY PROVIDE THAT THE SAME SHALL BE ENFORCEABLE DIRECTLY BY THE OWNER AND SHALL RUN CONCURRENTLY WITH THE CONTRACTOR'S GUARANTEE.

D. CLOSE-OUT DOCUMENTS AND INSTRUCTIONS

- AS-BUILT DRAWINGS
- ALL TEST REPORTS
- WARRANTIES
- STARTUP AND COMMISSIONING REPORT FOR C/R AC AND SPLIT UNITS.
- TESTING AND AIR BALANCING REPORT
- MAINTENANCE MANUALS
- INSTRUCT OWNER IN THE OPERATION OF ALL EQUIPMENT AND MAKE FAMILIAR WITH SYSTEM.

E. COMMISSIONING AND DEMONSTRATION

1. THE COMMISSIONING PROCESS REQUIRES THE COMPLETE PROCESS TO TEST, ADJUST AND BALANCE SYSTEMS TO PERFORM IN ACCORDANCE WITH REQUIREMENTS OF CONTRACT DOCUMENTS AND TO DO ALL OTHER WORK AS SPECIFIED IN THIS SECTION.
2. THE MECHANICAL CONTRACTOR SHALL ACT AS THE COMMISSIONING AGENT FOR THIS PROJECT.
3. TO ADJUST AND REGULATE EQUIPMENT AND SYSTEMS SO AS TO MEET SPECIFIED PERFORMANCE REQUIREMENTS AND TO ACHIEVE SPECIFIED INTERACTION WITH ALL OTHER RELATED SYSTEMS UNDER ALL NORMAL AND EMERGENCY LOADS AND OPERATING CONDITIONS.
4. BALANCE SYSTEMS AND EQUIPMENT TO REGULATE FLOW RATES TO MATCH LOAD REQUIREMENTS OVER FULL OPERATING RANGES.
5. HAVE MANUFACTURER CHECK OUT INSTALLED EQUIPMENT FOR PROPER ALIGNMENT AND LUBRICATION PRIOR TO STARTUP FOR ALL UNITS.

F. PIPING AND EQUIPMENT IDENTIFICATION

1. IDENTIFY ALL PIPING SYSTEMS. INDICATE PIPE SIZE, SERVICE AND DIRECTION OF FLOW.
2. THE LETTERING SHALL BE PROPORTIONAL TO THE OUTSIDE DIAMETER OF THE PIPE OR COVERING RANGING FROM 13MM HIGH TO 20MM O.D., PIPE OR COVERING UP TO 100MM HIGH ON 300MM O.D. PIPE OR COVERING. BRADEY PIPE TAG SHALL BE THE STANDARD OF LABELS. PIPES SMALLER THAN 20MM O.D. PIPE OR COVERING MAY BE BANDED WITH COLOURED PLASTIC TAPE IN LIEU OF PAINT AND THE CONTENTS IDENTIFIED BY MEANS OF "DYMO" EMBOSSED PLASTIC LABELS. STENCIL A DIRECTION-OF-FLOW ARROW ON EACH COLOUR BAND. PIPE IDENTIFICATION SHALL BE APPLIED AT EACH HORIZONTAL OR VERTICAL CHANGE IN DIRECTION AND A MAXIMUM OF 12 METER APART.

G. REFRIGERANT PIPING

1. REFRIGERANT PIPING SHALL BE FACTORY-CLEANED AND SEALED, SEAMLESS COPPER PIPING TO ASTM B280-20. USE ONLY SILVER BRAZED JOINTS. JOINTS SHALL NOT BE SOLDERED.
2. REFRIGERANT PIPING DESIGN AND INSTALLATION SHALL CONFORM TO THE RECOMMENDATIONS AND REQUIREMENTS OF CSA STANDARD B52 - MECHANICAL REFRIGERANT CODE, ONTARIO BUILDING CODE, AIR CONDITIONING AND REFRIGERANT INSTITUTE AND AIR CONDITIONING EQUIPMENT MANUFACTURER.
3. SELECT PIPE, FITTINGS AND COMPONENTS TO SUIT SYSTEM TEST AND OPERATING PRESSURES.
4. USE ONLY LONG RADIUS ELBOWS.
5. SIZE REFRIGERANT PIPING TO ATTAIN AIR CONDITIONING EQUIPMENT MANUFACTURERS LISTED COOLING CAPACITIES.
6. PROTECT REFRIGERANT PIPING ADEQUATELY. PROVIDE PERMANENT GUARDS AS REQUIRED TO PROTECT PIPING AND FITTINGS FROM DAMAGE.
7. INSTALL REFRIGERANT PIPING IN A NEAT WORKMANLIKE MANNER WITH HORIZONTAL RUNS SLOPED TOWARDS THE COMPRESSOR AT A RATE OF 1/2" PER FOOT. SUPPORT LINES AT INTERVALS OF NOT MORE THAN 8'-0" WITH SUITABLE ANCHORS. USE RUBBER GROMMETS BETWEEN TUBING AND CLAMPS TO PREVENT LINE CHAFING.
8. WHERE VERTICAL RUNS OF MORE THAN 5'-0" OCCUR IN A SUCTION LINE, IT SHALL ENTER AT THE TOP OF THE NEXT HORIZONTAL SECTION. ARRANGE PIPING SO REFRIGERANT OR OIL CANNOT DRAIN FROM SUCTION LINE INTO COIL.
9. KEEP PIPING RUNS AND NUMBER OF ELBOWS AND FITTINGS TO A MINIMUM.
10. REDUCE THE EFFECT OF PIPING VIBRATION WITH THE USE OF FLEXIBLE METAL HOSE.
11. PIPING TO REMOTE CONDENSING UNIT SHALL INCLUDE SHUT OFF VALVES AND UNIONS.
12. ENSURE REFRIGERATION PIPING IS DEHYDRATED, TESTED AND ADEQUATELY CHARGED. REFRIGERANT PIPING WILL NOT BE ACCEPTED UNLESS IT IS GAS TIGHT.

H. REFRIGERANT PIPING INSULATION

1. COVER ALL REFRIGERANT PIPING INSTALLED INDOOR WITH 1" THICK PREFORMED GLASS FIBRE TYPE FIBERGLASS INSULATION 5.5 LB. DENSITY WITH FACTORY APPLIED FIRE RESISTIVE GLASS FIBRE REINFORCED KRAFT PAPER AND ALUMINUM FOIL VAPOUR BARRIER. HOLD INSULATION IN PLACE WITH 3/4" ALUMINUM BANDS, 18" APART. COVER PIPING INSTALLED OUTDOORS WITH 2" THICK INSULATION.
2. ALL FITTINGS, VALVES AND FLANGES CONNECTED TO REFRIGERATION PIPING UP TO 2-1/2"ø COVER WITH 1.5 LB/CU.FT. DENSITY INSULATION. VAPOUR SEAL WITH SUITABLE MASTIC AND FINISH WITH GLASS FIBRE REINFORCED KRAFT PAPER AND ALUMINUM FOIL (0.002) PASTED DOWN.
3. FOR REFRIGERATION PIPING INSTALLED OUTDOORS, INSTALL '3M' VENTURE CLAD EXTERIOR PIPE METAL JACKET OR EQUIVALENT WITH 3/4"X0.15" ALUMINUM BANDS. PROVIDE A MINIMUM OF 2" OVERLAP AT BOTH LONGITUDINAL AND CIRCUMFERENTIAL JOINTS. APPLY A HUMPED ALUMINUM ELL OVER FITTINGS AND BAND IN PLACE WHERE VALVES ARE INVOLVED.
4. FOR REFRIGERANT PIPING INDOORS THAT ARE EXPOSED TO VIEW, PROVIDE LINESET CONCEALEMENT COVERS.

I. SPLIT AIR CONDITIONING SYSTEMS - AIR COOLED

1. INSTALL INDOOR AND OUTDOOR UNITS WHERE SHOWN ON THE DRAWINGS. PROVIDE REFRIGERANT PIPING AND INSTALL IN ACCORDANCE WITH UNIT MANUFACTURER'S RECOMMENDATIONS.
2. INSTALL ALL ACCESSORIES SPECIFIED HEREIN.
3. PROVIDE CONDENSATE DRAIN PIPING FROM INDOOR UNIT TO FLOOR DRAIN/CONDENSATE .
4. ARRANGE FOR MANUFACTURER'S AUTHORIZED REPRESENTATIVE TO PROVIDE SUPERVISION AND STARTUP SERVICE. CHECK ALIGNMENT OF BEARINGS, DRIVES AND MOTORS AFTER INSTALLATION AND MAKE ANY NECESSARY ALIGNMENT ADJUSTMENTS PRIOR TO STARTUP.

J. C/R AIR CONDITIONING SYSTEMS

1.1 SUMMARY

THESE SPECIFICATIONS DESCRIBE REQUIREMENTS FOR A THERMAL MANAGEMENT SYSTEM. THE SYSTEM SHALL BE DESIGNED TO CONTROL TEMPERATURE AND HUMIDITY CONDITIONS IN ROOMS CONTAINING ELECTRONIC EQUIPMENT, WITH GOOD INSULATION AND VAPOR BARRIER. THE MANUFACTURER SHALL DESIGN AND FURNISH ALL EQUIPMENT TO BE FULLY COMPATIBLE WITH HEAT-DISSIPATION REQUIREMENTS OF THE ROOM.

1.2 DESIGN REQUIREMENTS

THE THERMAL MANAGEMENT SYSTEM SHALL BE A LIEBERT SELF-CONTAINED, FACTORY-ASSEMBLED UNIT. STANDARD 60 HZ UNITS SHALL BE CSA-CERTIFIED TO THE HARMONIZED U.S. AND CANADIAN PRODUCT SAFETY STANDARD, "CSA C22.2 NO 236/UL 1995 FOR HEATING AND COOLING EQUIPMENT" AND ARE MARKED WITH THE CSA C-US LOGO.

THE SYSTEM SHALL BE AHRI CERTIFIED[2], THE TRUSTED MARK OF PERFORMANCE ASSURANCE FOR HEATING, VENTILATION, AIR CONDITIONING, AND COMMERCIAL REFRIGERATION EQUIPMENT, USING AHRI STANDARD 1360.

1.3 SUBMITTALS

THE SPECIFIED SYSTEM SHALL BE FACTORY TESTED BEFORE SHIPMENT. TESTING SHALL INCLUDE BUT SHALL NOT BE LIMITED TO: QUALITY CONTROL CHECKS, HI-POT. THE SYSTEM SHALL BE DESIGNED AND MANUFACTURED ACCORDING TO WORLD-CLASS QUALITY STANDARDS. THE MANUFACTURER SHALL BE ISO 9001 CERTIFIED.

1.4 SERVICEABILITY/ACCESS

THE CABINET SHALL BE DESIGNED SO THAT ALL COMPONENTS ARE EASILY ACCESSIBLE FOR SERVICE AND MAINTENANCE THROUGH THE FRONT OF THE UNIT.

1.5 ACCEPTABLE ALTERNATIVES

ACCEPTABLE ALTERNATIVES SHALL BE PERMITTED WITH ENGINEER'S PRIOR APPROVAL ONLY. CONTRACTOR TO SUBMIT A DETAILED SUMMARY FORM LISTING ALL VARIATIONS TO INCLUDE SIZE DEVIATIONS, ELECTRICAL LOAD DIFFERENCES, FUNCTIONAL AND COMPONENT CHANGES, AND SAVINGS TO END USER.

1.6 QUALITY ASSURANCE

THE SPECIFIED SYSTEM SHALL BE FACTORY-TESTED BEFORE SHIPMENT. TESTING SHALL INCLUDE BUT SHALL NOT BE LIMITED TO: QUALITY CONTROL CHECKS, "HI-POT." THE SYSTEM SHALL BE DESIGNED AND MANUFACTURED ACCORDING TO WORLD-CLASS QUALITY STANDARDS. THE MANUFACTURER SHALL BE ISO 9001 CERTIFIED.

2.0 PRODUCT

2.1 FRAME

THE FRAME SHALL BE WELDED, FORMED SHEET METAL. IT SHALL BE PROTECTED AGAINST CORROSION USING THE AUTOPHORETIC COATING PROCESS. THE FRAME SHALL BE CAPABLE OF BEING SEPARATED INTO THREE PARTS IN THE FIELD TO ACCOMMODATE RIGGING THROUGH SMALL SPACES.

2.1.1 DOWNFLOW AIR FLOW CONFIGURATIONS

2.1.1.1 DOWNFLOW AIR SUPPLY

THE SUPPLY AIR SHALL EXIT FROM THE BOTTOM OF THE UNIT.

2.1.1.2 DOWNFLOW AIR RETURN

THE RETURN AIR SHALL ENTER THE UNIT FROM THE TOP.

2.1.2 EXTERIOR PANELS

THE EXTERIOR PANELS SHALL BE INSULATED WITH A MINIMUM 1 IN. (25 MM), 1.5 LB. (0.68 KG) DENSITY FIBER INSULATION. THE MAIN FRONT PANEL SHALL HAVE CAPTIVE QUARTER-TURN FASTENERS. THE MAIN UNIT COLOR SHALL BE BLACK.

2.2 FILTERS - DS070

FOR DOWNFLOW UNITS, THE FILTER CHAMBER SHALL BE LOCATED WITHIN THE CABINET, AND FILTERS SHALL BE REMOVABLE FROM THE TOP OF THE UNIT. FILTERS SHALL BE ARRANGED IN A FLAT BANK CONFIGURATION.

2.2.1 FILTERS, 4-INCH MERV8

FILTERS SHALL BE DEEP PLEATED 4-INCH FILTERS WITH AN ASHRAE 52.2-2007 MERV8 OR ASHRAE 52.2-2007 MERV11.

2.2.2 EXTRA FILTER SET

1 EXTRA SET OF FILTERS SHALL BE PROVIDED PER SYSTEM.

2.3 LOCKING DISCONNECT SWITCH

THE MANUAL DISCONNECT SWITCH SHALL BE MOUNTED IN THE HIGH VOLTAGE SECTION OF THE ELECTRICAL PANEL. THE SWITCH SHALL BE ACCESSIBLE FROM THE OUTSIDE OF THE UNIT WITH THE DOOR CLOSED AND SHALL PREVENT ACCESS TO THE HIGH VOLTAGE ELECTRICAL COMPONENTS UNTIL SWITCHED TO THE OFF POSITION.

2.4 SHORT CIRCUIT CURRENT RATING (SCCR)

THE ELECTRICAL PANEL SHALL PROVIDE AT LEAST 65,000A SCCR (60 HZ).

SHORT CIRCUIT CURRENT RATING (SCCR) IS THE MAXIMUM SHORT CIRCUIT CURRENT A COMPONENT OR ASSEMBLY CAN SAFELY WITHSTAND WHEN PROTECTED BY A SPECIFIC OVERCURRENT PROTECTIVE DEVICE(S) OR FOR A SPECIFIED TIME.

2.5 FAN SECTION

2.5.1 ELECTRONICALLY COMMUTATED (EC) FAN

THE FANS SHALL BE PLUG/PLENUM TYPE, SINGLE INLET AND SHALL BE DYNAMICALLY BALANCED. THE DRIVE PACKAGE SHALL BE DIRECT DRIVE, ELECTRONICALLY COMMUTATED, AND VARIABLE SPEED. THE FANS SHALL BE LOCATED TO DRAW AIR OVER THE COIL TO ENSURE EVEN AIR DISTRIBUTION AND MAXIMUM COIL PERFORMANCE.

2.6 INFRARED HUMIDIFIER

A HUMIDIFIER SHALL BE FACTORY INSTALLED INSIDE THE UNIT. THE HUMIDIFIER SHALL BE OF THE INFRARED TYPE, CONSISTING OF HIGH INTENSITY QUARTZ LAMPS MOUNTED ABOVE AND OUT OF THE WATER SUPPLY. THE HUMIDIFIER PAN SHALL BE STAINLESS STEEL AND ARRANGED TO BE REMOVABLE WITHOUT DISCONNECTING HIGH VOLTAGE ELECTRICAL CONNECTIONS. THE COMPLETE HUMIDIFIER SECTION SHALL BE PRE-PIPED, READY FOR FIELD CONNECTION TO THE WATER SUPPLY. THE HUMIDIFIER SHALL BE EQUIPPED WITH AN AUTOMATIC WATER SUPPLY SYSTEM AND SHALL HAVE AN ADJUSTABLE WATER OVERFEED TO PREVENT MINERAL PRECIPITATION. A HIGH WATER DETECTOR SHALL SHUT DOWN THE HUMIDIFIER TO PREVENT OVERFLOWING. A 1_INCH (24 MM) AIRGAP IN COMPLIANCE WITH ASME A112.1.2 SECTION 2.4.2 (BACKSIPHONAGE TESTING) SHALL PREVENT BACKFLOW OF THE HUMIDIFIER SUPPLY WATER. THE HUMIDIFIER CAPACITY SHALL BE 22 LB./HR (KG/HR). THE HUMIDIFIER SHALL BE REMOVABLE FROM THE FRONT OF THE CABINET.

2.7 THREE-STAGE REHEAT

THE THERMAL MANAGEMENT UNIT SHALL INCLUDE A FACTORY INSTALLED REHEAT TO CONTROL TEMPERATURE DURING DEHUMIDIFICATION.

THE ELECTRIC REHEAT COILS SHALL BE LOW WATT DENSITY, 304/304 STAINLESS STEEL FIN TUBULAR CONSTRUCTION, PROTECTED BY THERMAL SAFETY SWITCHES, SHALL BE 25 KW CONTROLLED IN THREE STAGES. THE REHEAT ELEMENTS SHALL BE REMOVABLE FROM THE FRONT OF THE CABINET.

2.8 REFRIGERATION SYSTEM

2.8.1 EVAPORATOR COIL

THE EVAPORATOR COIL SHALL BE A-FRAME DESIGN FOR DOWNFLOW UNITS.

IT SHALL BE CONSTRUCTED OF RIFLED COPPER TUBES AND ALUMINUM FINS. A STAINLESS STEEL CONDENSATE DRAIN PAN SHALL BE PROVIDED.

2.8.2 COMPRESSORIZED SYSTEMS

2.8.2.1 DIGITAL SCROLL COMPRESSORS

THE COMPRESSOR SHALL BE SCROLL TYPE WITH A VARIABLE CAPACITY OPERATION CAPABILITY. THE COMPRESSOR SOLENOID VALVE SHALL UNLOAD THE COMPRESSOR AND ALLOW FOR VARIABLE CAPACITY OPERATION. THE COMPRESSOR SHALL BE SUCTION GAS COOLED MOTOR, VIBRATION ISOLATORS, THERMAL OVERLOADS, AUTOMATIC RESET HIGH PRESSURE SWITCH WITH LOCKOUT AFTER THREE FAILURES, ROTALOCK SERVICE VALVES, LOW PRESSURE TRANSDUCER, AND A MAXIMUM OPERATING SPEED OF 3,500 RPM. CONSULT FACTORY FOR 575 V AVAILABILITY. NOT AVAILABLE ON DS077 AND DS105 UNITS.

2.8.3 EXPANSION VALVE

2.8.3.1 THERMOSTATIC EXPANSION VALVE (TXV)

A MANUAL ADJUSTABLE EXTERNALLY EQUALIZED EXPANSION VALVE THERMOSTATIC EXPANSION VALVE (TXV) SHALL CONTROL THE FLOW OF LIQUID REFRIGERANT ENTERING THE DIRECT EXPANSION COIL. THE TXV SHALL MAINTAIN CONSISTENT SUPERHEAT OF THE REFRIGERANT VAPOR AT THE OUTLET OF THE EVAPORATOR COIL OVER THE UNIT'S OPERATING RANGE. THE TXV SHALL PREVENT LIQUID REFRIGERANT FROM RETURNING TO THE COMPRESSOR.

2.8.4 CRANKCASE HEATERS

THE COMPRESSORS SHALL INCLUDE CRANKCASE HEATERS, POWERED FROM THE INDOOR UNIT ELECTRIC PANEL.

2.8.5 R-407C REFRIGERANT

2.9 THE SYSTEM SHALL BE DESIGNED FOR USE WITH R-407C REFRIGERANT, WHICH MEETS THE EPA CLEAN AIR ACT FOR PHASE-OUT OF HCFC REFRIGERANTS. COOLING SYSTEM

2.9.1 AIR COOLED SYSTEM

2.9.1.1 SYSTEM DESCRIPTION

THE INDOOR EVAPORATOR REFRIGERANT PIPING SHALL BE FILLED WITH AN INERT GAS HOLDING CHARGE AND SPUN SHUT. FIELD RELIEF OF THE SCHRADER VALVE SHALL INDICATE A LEAK-FREE SYSTEM. EVAPORATOR UNIT SHALL BE MATCHED WITH A LIEBERT[2] MC CONDENSER.

(CONTINUED)

REVISIONS

No.	ISSUE	DATE
A	ISSUED FOR CLIENT REVIEW	MAY 31, 2024
B	ISSUED FOR TENDER	SEP 05, 2024

Seal:

DO NOT SCALE DRAWINGS.
ALL DIMENSIONS TO BE CHECKED AND VERIFIED ON THE JOB. ALL DRAWINGS REMAIN THE PROPERTY OF ENGINEERS. DRAWINGS SHOULD NOT BE READ IN ISOLATION.

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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:

MECHANICAL SPECIFICATIONS - I

DRAWN BY:	SCALE:
VA	AS NOTED
CHECKED BY:	DATE:
BM	MAY 2024

PROJECT No.: 24034

DRAWING No.: **M 0.1**

3.0 CONTROLS

3.1 LIEBERT ICOM MICROPROCESSOR CONTROL WITH 7–INCH COLOR TOUCHSCREEN

THE LIEBERT ICOM SHALL BE MICROPROCESSOR BASED WITH A 7–INCH, HIGH DEFINITION, CAPACITIVE, COLOR TOUCHSCREEN DISPLAY AND SHALL BE MOUNTED IN AN ERGONOMIC, AESTHETICALLY PLEASING HOUSING. THE DISPLAY AND HOUSING SHALL BE VIEWABLE WHILE THE FRONT PANEL IS OPEN OR CLOSED. THE CONTROLS SHALL BE MENU DRIVEN. THE SYSTEM SHALL DISPLAY USER MENUS FOR ACTIVE ALARMS, EVENT LOG, GRAPHIC DATA, UNIT VIEW/STATUS OVERVIEW (INCLUDING THE MONITORING OF ROOM CONDITIONS, OPERATIONAL STATUS IN PERCENTAGE OF EACH FUNCTION, DATE AND TIME), TOTAL RUN HOURS, VARIOUS SENSORS, DISPLAY SETUP, AND SERVICE CONTACTS. A PASSWORD SHALL BE REQUIRED TO MAKE SYSTEM CHANGES. SERVICE MENUS SHALL INCLUDE SETPOINTS, STANDBY SETTINGS (LEAD/LAG), TIMERS/SLEEP MODE, ALARM SETUP, SENSOR CALIBRATION, MAINTENANCE/WELLNESS SETTINGS, OPTIONS SETUP, SYSTEM/NETWORK SETUP, AUXILIARY BOARDS, AND DIAGNOSTICS/SERVICE MODE. THE LIEBERT? ICOM? CONTROL SHALL PROVIDE ETHERNET/RS–485 PORTS DEDICATED FOR BMS CONNECTIVITY (I.E. BASE–COMMS).

- PASSWORD PROTECTION – THE LIEBERT ICOM SHALL CONTAIN TWO UNIQUE PASSWORDS TO PROTECT AGAINST UNAUTHORIZED CHANGES. AN AUTO HIDE/SHOW FEATURE SHALL ALLOW THE USER TO SEE APPLICABLE INFORMATION BASED ON THE LOGIN USED.
- UNIT BACKUP/RESTORE – THE USER SHALL BE ABLE TO CREATE SAFE COPIES OF IMPORTANT CONTROL PARAMETERS. THE LIEBERT ICOM SHALL HAVE THE CAPACITY FOR THE USER TO AUTOMATICALLY BACKUP UNIT CONFIGURATION SETTINGS TO INTERNAL MEMORY OR USB STORAGE DRIVE. CONFIGURATION SETTINGS MAY BE TRANSFERRED TO ANOTHER UNIT FOR A MORE STREAMLINED UNIT STARTUP.
- PARAMETER DOWNLOAD – THE LIEBERT ICOM SHALL ENABLE THE USER TO DOWNLOAD A REPORT THAT LISTS PARAMETER NAMES, FACTORY DEFAULT SETTINGS, AND USER PROGRAMMED SETTINGS IN .CSV FORMAT FOR REMOTE REFERENCE.
- PARAMETER SEARCH – THE LIEBERT ICOM SHALL HAVE SEARCH FIELDS FOR EFFICIENT NAVIGATION AND PARAMETER LOOKUP.
- PARAMETER DIRECTORY – THE LIEBERT ICOM SHALL PROVIDE A DIRECTORY THAT LISTS ALL PARAMETERS IN THE CONTROL. THE LIST SHALL PROVIDE LINE ID NUMBERS, PARAMETER LABELS, AND CURRENT PARAMETER VALUES.
- CONTEXT SENSITIVE HELP – THE LIEBERT ICOM SHALL HAVE AN ON–BOARD HELP DATABASE. THE DATABASE SHALL PROVIDE CONTEXT SENSITIVE HELP TO ASSIST WITH SETUP AND NAVIGATION OF THE MENUS.
- DISPLAY SETUP – THE USER SHALL BE ABLE TO CONFIGURE THE DISPLAY INFORMATION BASED ON THE SPECIFIC USER'S PREFERENCE. LANGUAGE, UNITS OF MEASURE, SCREEN CONTRAST, HOME SCREEN LAYOUT, BACKLIGHT TIMER AND THE HIDE/SHOW OF CERTAIN READOUTS SHALL BE CONFIGURABLE THROUGH THE DISPLAY.
- ADDITIONAL READOUTS – THE DISPLAY SHALL ENABLE THE USER TO CONFIGURE CUSTOM WIDGETS ON THE MAIN SCREEN. WIDGET OPTIONS WILL INCLUDE ITEMS SUCH AS FAN SPEED, CALL FOR COOLING, CALL FOR FREE COOLING, MAINTENANCE STATUS, CALL FOR HOT WATER REHEAT, CALL FOR ELECTRIC REHEAT, CALL FOR DEHUMIDIFICATION, CALL FOR HUMIDIFICATION, AIRFLOW, STATIC PRESSURE, FLUID FLOW RATE, AND COOLING CAPACITY.
- STATUS LEDS – THE LIEBERT ICOM SHALL SHOW THE UNIT'S OPERATING STATUS USING AN INTEGRAL LED. THE LED SHALL INDICATE IF THE UNIT HAS AN ACTIVE ALARM; IF THE UNIT HAS AN ACTIVE ALARM THAT HAS BEEN ACKNOWLEDGED; OR IF THE UNIT IS ON, OFF OR IN STANDBY STATUS.
- EVENT LOG – THE LIEBERT ICOM SHALL AUTOMATICALLY STORE THE LAST 400 UNIT ONLY EVENTS (MESSAGES, WARNINGS, AND ALARMS).
- SERVICE CONTACT INFORMATION – THE LIEBERT ICOM SHALL BE ABLE TO STORE THE LOCAL SERVICE OR SALES CONTACT INFORMATION.
- UPGRADEABLE – LIEBERT ICOM FIRMWARE UPGRADES SHALL BE PERFORMED THROUGH A USB CONNECTION.
- TIMERS/SLEEP MODE – THE MENUS SHALL ALLOW VARIOUS CUSTOMER SETTINGS FOR TURNING THE UNIT ON OR OFF.
- MENU LAYOUT – THE MENUS SHALL BE DIVIDED INTO TWO MAIN MENUS: USER AND SERVICE. THE USER SCREEN SHALL CONTAIN THE MENUS TO ACCESS PARAMETERS REQUIRED FOR BASIC UNIT CONTROL AND SETUP. THE SERVICE SCREEN SHALL BE DESIGNED FOR SERVICE PERSONNEL AND SHALL PROVIDE ACCESS TO ADVANCED CONTROL SETUP FEATURES AND DIAGNOSTIC INFORMATION.
- SENSOR CALIBRATION – THE MENUS SHALL ALLOW UNIT SENSORS TO BE CALIBRATED WITH EXTERNAL SENSORS.
- MAINTENANCE/WELLNESS SETTINGS – THE MENUS SHALL ALLOW REPORTING OF POTENTIAL COMPONENT PROBLEMS BEFORE THEY OCCUR.
- OPTIONS SETUP – THE MENUS SHALL PROVIDE OPERATION SETTINGS FOR THE INSTALLED COMPONENTS.
- AUXILIARY BOARDS – THE MENUS SHALL ALLOW SETUP OF OPTIONAL EXPANSION BOARDS.
- VARIOUS SENSORS – THE MENUS SHALL ALLOW SETUP AND DISPLAY OF OPTIONAL CUSTOM SENSORS. THE CONTROL SHALL INCLUDE FOUR CUSTOMER ACCESSIBLE ANALOG INPUTS FOR SENSORS PROVIDED BY OTHERS. THE ANALOG INPUTS SHALL ACCEPT A 4 TO 20MA SIGNAL. THE USER SHALL BE ABLE TO CHANGE THE INPUT TO 0 TO 5 VDC OR 0 TO 10 VDC. THE GAINS FOR EACH ANALOG INPUT SHALL BE PROGRAMMABLE FROM THE FRONT DISPLAY. THE ANALOG INPUTS SHALL BE ABLE TO BE MONITORED FROM THE FRONT DISPLAY. WHEN CONFIGURING THE ANALOG INPUTS, THE SELECTABLE ITEMS TO CHOOSE FROM SHALL INCLUDE AIR PRESSURE, FLUID PRESSURE, TEMPERATURE, PERCENTAGE, GENERAL AMPERAGE, CONDENSER AMPS, COMPRESSOR AMPS, REHEAT AMPS, HUMIDIFIER AMPS, UNIT AMPS, FAN AMPS FACTORY STANDARD, AND NOT USED.
- DIAGNOSTICS/SERVICE MODE – THE LIEBERT ICOM CONTROL SHALL BE PROVIDED WITH SELF–DIAGNOSTICS TO AID IN TROUBLESHOOTING. THE MICROCONTROLLER BOARD SHALL BE DIAGNOSED AND REPORTED AS PASS/NOT PASS. CONTROL INPUTS SHALL BE INDICATED AS ON OR OFF AT THE FRONT DISPLAY. CONTROL OUTPUTS SHALL BE ABLE TO BE TURNED ON OR OFF FROM THE FRONT DISPLAY WITHOUT USING JUMPERS OR A SERVICE TERMINAL. EACH CONTROL OUTPUT SHALL BE INDICATED BY AN LED ON A CIRCUIT BOARD.
- BASE–COMMS FOR BMS CONNECTIVITY – THE LIEBERT ICOM CONTROLLER SHALL PROVIDE ONE ETHERNET PORT AND RS–485 PORT DEDICATED FOR BMS CONNECTIVITY. PROVIDES GROUND FAULT ISOLATED RS–485 MODBUS, BACNET IP AND MODBUS IP NETWORK CONNECTIVITY TO BUILDING MANAGEMENT SYSTEMS FOR UNIT MONITORING AND MANAGEMENT. ALSO, PROVIDES GROUND FAULT ISOLATED 10/100 BASET ETHERNET CONNECTIVITY FOR UNIT MONITORING AND MANAGEMENT. THE SUPPORTED MANAGEMENT INTERFACES INCLUDE SNMP FOR NETWORK MANAGEMENT SYSTEMS, HTTP FOR WEB PAGE VIEWING, SMTP FOR EMAIL, AND SMS FOR MOBILE MESSAGING. THE LIEBERT ICOM CONTROLLER CAN SUPPORT DUAL IP ON ONE NETWORK AND ONE 485 PROTOCOL SIMULTANEOUSLY.

3.2 ALARMS

ALL UNIT ALARMS SHALL BE ANNUNCIATED THROUGH BOTH AUDIO AND VISUAL CUES, CLEARLY DISPLAYED ON THE SCREEN, AUTOMATICALLY RECORDED IN THE EVENT LOG AND COMMUNICATED TO THE CUSTOMERS BUILDING MANAGEMENT SYSTEM/BUILDING AUTOMATION SYSTEM. THE LIEBERT ICOM CONTROL SHALL ACTIVATE AN AUDIBLE AND VISUAL ALARM IN EVENT OF ANY OF THE FOLLOWING CONDITIONS:

- HIGH TEMPERATURE
- LOW TEMPERATURE
- HIGH HUMIDITY
- LOW HUMIDITY
- EC FAN FAULT
- CHANGE FILTERS
- LOSS OF AIR FLOW
- LOSS OF POWER
- COMPRESSOR OVERLOAD (OPTIONAL)
- HUMIDIFIER PROBLEM
- HIGH HEAD PRESSURE
- LOW SUCTION PRESSURE
- CUSTOM ALARMS

CUSTOM ALARM INPUTS SHALL BE PROVIDED TO INDICATE FACILITY SPECIFIC EVENTS. CUSTOM ALARMS CAN BE IDENTIFIED WITH PROGRAMMABLE LABELS. FREQUENTLY USED ALARM INPUTS INCLUDE:

- LEAK UNDER FLOOR
- SMOKE DETECTED
- STANDBY UNIT ON

EACH ALARM (UNIT AND CUSTOM) SHALL BE SEPARATELY ENABLED OR DISABLED, SELECTED TO ACTIVATE THE COMMON ALARM AND PROGRAMMED FOR A TIME DELAY OF 0 TO 255 SECONDS.

3.3 LIEBERT ICOM CONTROL METHODS AND OPTIONS

THE LIEBERT ICOM SHALL BE FACTORY SET TO ALLOW PRECISE MONITORING AND CONTROL OF THE CONDITION OF THE AIR ENTERING AND LEAVING THE UNIT. THIS CONTROL SHALL INCLUDE PREDICTIVE METHODS TO CONTROL AIR FLOW AND COOLING CAPACITY BASED CONTROL SENSORS INSTALLED. PROPORTIONAL AND TUNABLE PID SHALL ALSO BE USER SELECTABLE OPTIONS.

3.3.1 CONTROLLING SENSOR OPTIONS

LIEBERT ICOM SHALL BE FLEXIBLE IN THE SENSE THAT IT SHALL ALLOW FOR CONTROLLING THE CAPACITY AND FAN FROM MULTIPLE DIFFERENT SENSOR SELECTIONS. THE SENSOR SELECTIONS SHALL BE:

3.3.1.1 COOLING CAPACITY

- SUPPLY
- REMOTE
- RETURN

3.3.1.2 FAN SPEED

- SUPPLY
- REMOTE
- RETURN
- MANUAL (FOR DIAGNOSTIC OR TO RECEIVE A SIGNAL FROM THE BMS THROUGH THE LIEBERT REMOTE MONITORING DEVICES OR ANALOG INPUT)
- STATIC PRESSURE

3.3.2 TEMPERATURE COMPENSATION

THE LIEBERT ICOM SHALL BE ABLE TO ADJUST THE CAPACITY OUTPUT BASED ON SUPPLY AND RETURN TEMPERATURE CONDITIONS TO MEET SLA GUIDELINES WHILE OPERATING TO HIGHEST EFFICIENCY.

3.3.3 HUMIDITY CONTROL

DEW POINT AND RELATIVE HUMIDITY CONTROL METHODS SHALL BE AVAILABLE (BASED ON USER PREFERENCE) FOR HUMIDITY CONTROL WITHIN THE CONDITIONED SPACE.

3.4 MULTI–UNIT COORDINATION

LIEBERT ICOM TEAMWORK SHALL SAVE ENERGY BY PREVENTING MULTIPLE UNITS IN AN AREA FROM OPERATING IN OPPOSING MODES. TEAMWORK ALLOWS THE CONTROL TO OPTIMIZE A GROUP OF CONNECTED COOLING UNITS EQUIPPED WITH LIEBERT ICOM USING THE U2U (UNIT TO UNIT) NETWORK. THERE SHALL BE THREE MODES OF TEAMWORK OPERATION:

- TEAMWORK MODE 1 (PARALLEL): IS BEST IN SMALL ROOMS WITH BALANCED HEAT LOADS. THE CONTROLLING TEMPERATURE AND HUMIDITY SENSOR READINGS OF ALL UNITS IN OPERATION (FAN ON) ARE COLLECTED TO BE USED FOR AN AVERAGE OR WORST CASE SENSOR READING (USER SELECTABLE). THE MASTER UNIT SHALL SEND THE OPERATING REQUIREMENTS TO ALL OPERATING UNITS IN THE GROUP. THE CONTROL BAND (TEMPERATURE, FAN, AND HUMIDITY) IS DIVIDED AND SHARED AMONG THE UNITS IN THE GROUP. EACH UNIT WILL RECEIVE INSTRUCTIONS ON HOW TO OPERATE FROM THE MASTER UNIT BASED ON HOW FAR THE SYSTEM DEVIATES FROM THE SETPOINTS. EVAPORATOR FANS AND COOLING CAPACITY ARE RAMPED IN PARALLEL.
- TEAMWORK MODE 2 (INDEPENDENT): THE LIEBERT ICOM CALCULATES THE WORST CASE DEMAND FOR HEATING, COOLING HUMIDIFICATION AND DEHUMIDIFICATION. BASED ON THE GREATEST DEMAND WITHIN THE GROUP, EACH UNIT OPERATES INDEPENDENTLY, MEANING THAT THE UNIT MAY RESPOND TO THE THERMAL LOAD AND HUMIDITY CONDITIONS BASED ON THE UNIT'S CONTROLLING SENSORS.

  ALL SENSOR READINGS ARE SHARED.
- TEAMWORK MODE 3 (OPTIMIZED AISLE): MAY BE EMPLOYED IN LARGE AND SMALL ROOMS WITH VARYING HEAT LOADS. OPTIMIZED AISLE IS THE MOST EFFICIENT TEAMWORK MODE THAT ALLOWS THE UNIT TO MATCH COOLING CAPACITY WITH HEAT LOAD. IN THE OPTIMIZED AISLE MODE, THE FANS OPERATE IN PARALLEL. FANS CAN BE CONTROLLED EXCLUSIVELY BY REMOTE TEMPERATURE OR USING STATIC PRESSURE WITH A SECONDARY REMOTE TEMPERATURE SENSOR(S) AS AN OVERRIDE TO ENSURE THAT THE INLET RACK TEMPERATURE IS BEING MET. COOLING (COMPRESSORS OR ECONOMIZER) IS CONTROLLED THROUGH UNIT SUPPLY AIR CONDITIONS. LIEBERT ICOM CALCULATES THE AVERAGE OR WORST CASE SENSOR READING (USER SELECTABLE) FOR HEATING, COOLING HUMIDIFICATION, AND DEHUMIDIFICATION. BASED ON THE DEMAND WITHIN THE GROUP, UNITS WILL BE ALLOWED TO OPERATE WITHIN THAT MODE UNTIL ROOM CONDITIONS ARE SATISFIED. THIS IS THE BEST FORM OF CONTROL FOR A ROOM WITH AN UNBALANCED LOAD.

3.5 STANDBY LEAD–LAG

THE LIEBERT ICOM SHALL ALLOW SCHEDULED ROTATION TO KEEP EQUAL RUN TIME ON UNITS AND PROVIDE AUTOMATED EMERGENCY ROTATION OF OPERATING AND STANDBY UNITS.

3.6 STANDBY UNIT CASCADING

THE LIEBERT ICOM CASCADE OPTION SHALL ALLOW THE UNITS TO TURN ON AND OFF BASED ON HEAT LOAD WHEN UTILIZING TEAMWORK MODE 1, INDEPENDENT MODE OR TEAMWORK MODE 3, OPTIMIZED AISLE MODE WITH REMOTE TEMPERATURE SENSORS. IN TEAMWORK MODE 1, CASCADE MODE WILL STAGE UNITS ON BASED ON THE TEMPERATURE AND HUMIDITY READINGS AND THEIR DEVIATION FROM SETPOINT. IN TEAMWORK 3 MODE, CASCADE MODE DYNAMICALLY COORDINATES THE FAN SPEED TO SAVE ENERGY AND TO MEET THE COOLING DEMANDS. FOR INSTANCE, WITH A LIEBERT ICOM GROUP OF SIX UNITS AND ONLY 50% OF THE HEAT LOAD, THE LIEBERT ICOM SHALL OPERATE ONLY FOUR UNITS AT 80% FAN SPEED AND LEAVE THE OTHER TWO UNITS IN STANDBY. AS THE HEAT LOAD INCREASES, THE LIEBERT ICOM SHALL AUTOMATICALLY RESPOND TO THE ADDITIONAL LOAD AND BRING ON ANOTHER UNIT, INCREASING THE UNITS IN OPERATION TO FIVE. AS THE HEAT LOAD SHIFTS UP OR DOWN, THE CONTROL SHALL MEET THE NEEDS BY CASCADING UNITS ON OR PUTTING THEM INTO STANDBY.

3.7 WIRED SUPPLY SENSOR

EACH LIEBERT ICOM SHALL HAVE ONE FACTORY SUPPLIED AND CONNECTED SUPPLY AIR SENSOR THAT MAY BE USED AS A CONTROLLING SENSOR OR REFERENCE. WHEN MULTIPLE SENSORS ARE APPLIED FOR CONTROL PURPOSES, THE USER SHALL BE ABLE TO CONTROL BASED ON A MAXIMUM OR AVERAGE TEMPERATURE READING.

3.8 VIRTUAL MASTER

AS PART OF THE ROBUST ARCHITECTURE OF THE LIEBERT ICOM CONTROL, IT SHALL ALLOW FOR A VIRTUAL MASTER THAT COORDINATES OPERATION. THE VIRTUAL MASTER FUNCTION SHALL PROVIDE SMOOTH CONTROL OPERATION IF THE GROUP'S COMMUNICATION IS COMPROMISED. WHEN THE LEAD UNIT, WHICH IS IN CHARGE OF COMPONENT STAGING IN TEAMWORK, UNIT STAGING AND STANDBY ROTATION, BECOMES DISCONNECTED FROM THE NETWORK, THE LIEBERT ICOM SHALL AUTOMATICALLY ASSIGN A VIRTUAL MASTER. THE VIRTUAL MASTER SHALL ASSUME THE SAME RESPONSIBILITIES AS THE MASTER UNTIL COMMUNICATION IS RESTORED.

3.9 VIRTUAL BACK DRAFT DAMPER

THE LIEBERT ICOM SHALL ALLOW THE USE OF A VIRTUAL BACK DRAFT DAMPER, ELIMINATING THE NEED FOR A MECHANICAL DAMPER. THIS SHALL ALLOW THE FANS TO SPIN SLOWER (15% OR LESS) TO ACT AS A DAMPER.

3.10 COMPRESSOR SHORT CYCLE CONTROL

TO HELP MAXIMIZE THE LIFE OF THE COMPRESSOR(S), THERE SHALL BE START–TO–NEXT START DELAY FOR EACH SINGLE COMPRESSOR. THE CONTROL SHALL MONITOR THE NUMBER OF COMPRESSOR STARTS IN AN HOUR. IF THE COMPRESSOR STARTS MORE THAN 10 TIMES IN 60 MINUTES, THE LOCAL DISPLAY AND REMOTE MONITORING SHALL NOTIFY THE USER THROUGH A COMPRESSOR 1 OR 2 SHORT CYCLE EVENT.

3.11 LIEBERT MC CONDENSER COMMUNICATION

THE LIEBERT ICOM SHALL COMMUNICATE DIRECTLY WITH THE LIEBERT MC CONDENSER VIA FIELD SUPPLIED CANBUS COMMUNICATION WIRES AND VIA FIELD SUPPLIED, LOW VOLTAGE INTERLOCK WIRES. THIS SHALL PROVIDE ENHANCED MONITORING, ALARMING, DIAGNOSTICS, LOW NOISE MODE, AND CONDENSER FAN REVERSAL FOR CLEANING MODE.

3.12 SYSTEM AUTO RESTART

THE AUTO RESTART FEATURE SHALL AUTOMATICALLY RESTART THE SYSTEM AFTER A POWER FAILURE. TIME DELAY SHALL BE PROGRAMMABLE. AN OPTIONAL CAPACITIVE BUFFER MAY BE PROVIDED FOR CONTINUOUS CONTROL OPERATION THROUGH A POWER FAILURE.

3.13 SEQUENTIAL LOAD ACTIVATION

ON INITIAL STARTUP OR RESTART AFTER POWER FAILURE, EACH OPERATIONAL LOAD SHALL BE SEQUENCED WITH A MINIMUM DELAY OF ONE SECOND TO MINIMIZE TOTAL INRUSH CURRENT.

3.14 LOW PRESSURE MONITORING

UNITS SHALL SHIP STANDARD WITH LOW PRESSURE TRANSDUCERS FOR MONITORING INDIVIDUAL COMPRESSOR SUCTION PRESSURE. IF THE PRESSURE FALLS DUE TO LOSS OF CHARGE OR OTHER MECHANICAL CAUSE, THE CORRESPONDING CIRCUIT SHALL SHUT DOWN TO PREVENT EQUIPMENT DAMAGE. THE USER SHALL BE NOTIFIED OF THE LOW PRESSURE CONDITION THROUGH THE LOCAL DISPLAY AND REMOTE MONITORING.

3.15 WINTER START TIME DELAY––AIR COOLED MODELS

AN ADJUSTABLE SOFTWARE TIMER SHALL BE PROVIDED TO ASSIST WITH COMPRESSOR STARTING DURING COLD WEATHER. WHEN THE COMPRESSOR STARTS, THE LOW PRESSURE INPUT SHALL BE IGNORED FOR THE PERIOD SET IN THE USER ADJUSTABLE TIMER. ONCE THE TIME PERIOD HAS ELAPSED AFTER THE COMPRESSOR START, THE LOW PRESSURE INPUT SHOULD REMAIN IN THE NORMAL STATE. IF THE LOW PRESSURE INPUT DOES NOT REMAIN IN THE NORMAL STATE WHEN THE TIME DELAY HAS ELAPSED, THE CIRCUIT SHALL LOCK OUT ON LOW PRESSURE. THE LOW PRESSURE ALARM SHALL BE ANNOUNCED ON THE LOCAL DISPLAY AND COMMUNICATED TO REMOTE MONITORING SYSTEMS.

3.16 ADVANCED FREEZE PROTECTION

UNITS SHALL SHIP STANDARD WITH ADVANCED FREEZE PROTECTION ENABLED. THE ADVANCED FREEZE PROTECTION SHALL MONITOR THE PRESSURE OF EACH CIRCUIT USING A TRANSDUCER. THE CONTROL SHALL INTERACT WITH THE FAN AND COMPRESSOR TO PREVENT THE UNIT COIL FROM FREEZING IF CIRCUIT SUCTION PRESSURE DROPS. APPLYING FAN SPEED TO DIRECT EXPANSION SYSTEMS REQUIRES LIMITATIONS TO AVOID FREEZING CONDENSATE ON THE COIL WHEN THE UNIT OPERATES BELOW 100% FAN SPEED. LIEBERT ICOM ADVANCED FREEZE PROTECTION PROVIDES THE ABILITY TO PREDICT FREEZE CONDITIONS AND CORRECT THIS CONDITION AUTOMATICALLY BY ADJUSTING FAN SPEED AND COMPRESSOR CAPACITY. IF A FREEZE CONDITION IS DETECTED, THE USER SHALL BE NOTIFIED THROUGH THE LOCAL DISPLAY AND REMOTE MONITORING SYSTEMS.

3.17 ADVANCED HIGH PRESSURE PROTECTION––WATER/GLYCOL COOLED MODELS WITH VARIABLE CAPACITY COMPRESSORS

WHEN THE COMPRESSOR IS INITIALLY ACTIVATED, THE SYSTEM SHALL BE MONITORED FOR HIGH PRESSURE. WHEN HIGH PRESSURE IS DETECTED, THE CONTROL SHALL ALTER THE COMPRESSOR OPERATION AND THE CONDENSER FANS PEED TO REDUCE THE SYSTEM DISCHARGE PRESSURE, PREVENTING CIRCUIT SHUT DOWN. IF THE UNIT IS UNSUCCESSFUL IN CORRECTING THE PROBLEM THROUGH THIS INTERACTION, AN ALARM SHALL OCCUR, AND THE AFFECTED COMPRESSOR SHALL BE IMMEDIATELY LOCKED OFF. THE CONTROL SHALL RE–ENABLE THE COMPRESSOR WHEN THE PRESSURE RETURNS TO A SAFE LEVEL. THIS FEATURE IS STANDARD ON UNITS EQUIPPED WITH LIQUID LINE TRANSDUCERS AND THESE COMPRESSOR TYPES:

- 4 STEP
- DIGITAL SCROLL

3.18 REFRIGERANT PRESSURE TRANSDUCER FAILURE

THE CONTROL SHALL MONITOR THE HIGH SIDE AND LOW SIDE REFRIGERANT PRESSURE TRANSDUCERS. IF THE CONTROL SENSES THE TRANSDUCER HAS FAILED, HAS BEEN DISCONNECTED, HAS SHORTED OR THE READING HAS GONE OUT OF RANGE, THE USER SHALL BE NOTIFIED THROUGH AN EVENT ON THE LOCAL DISPLAY AND REMOTE MONITORING. THE CORRESPONDING CIRCUIT THAT THE FAILURE HAS OCCURRED ON SHALL BE DISABLED TO PREVENT UNIT DAMAGE.

3.19 OIL RETURN PROTECTION

THE CONTROL SHALL MONITOR COMPRESSOR OPERATION AND STAGING TO ENSURE THAT LIQUID AND HOT GAS VELOCITY ARE MAINTAINED FOR PROPER OIL RETURN TO THE COMPRESSOR.

3.20 DIGITAL SCROLL HIGH TEMPERATURE PROTECTION

THE CONTROL SHALL MONITOR DIGITAL SCROLL TEMPERATURE DURING UNIT OPERATION. A COMPRESSOR TEMPERATURE LIMIT SHALL BE IMPOSED TO HELP PREVENT DAMAGE TO THE COMPRESSOR. IF THE TEMPERATURE REACHES THE MAXIMUM TEMPERATURE LIMIT, THE COMPRESSOR SHALL BE LOCKED OUT FOR 30 MINUTES AND AN ALARM SHALL BE ANNUNCIATED ON THE LOCAL DISPLAY AND THROUGH MONITORING. AFTER THE INITIAL LOCKOUT, THE CONTROL SHALL CONTINUE TO MONITOR COMPRESSOR TEMPERATURE DURING THE OFF CYCLE AND RE–ENABLE THE CIRCUIT ONCE A SAFE OPERATING TEMPERATURE IS REACHED AND THE 30 MINUTES HAS ELAPSED. THE CONTROL SHALL STORE THE NUMBER OF HIGH TEMPERATURE TRIPS. THE NUMBER OF TRIPS SHALL BE ACCESSIBLE THROUGH THE LOCAL DISPLAY.

3.21 DIGITAL SCROLL SENSOR FAILURE

THE CONTROL SHALL MONITOR THE STATUS OF THE DIGITAL SCROLL SENSOR(S). IF THE CONTROL SENSES THAT THE THERMISTOR IS DISCONNECTED, SHORTED OR THE READING GOES OUT OF RANGE, THE USER SHALL BE NOTIFIED THROUGH AN EVENT ON THE LOCAL DISPLAY AND REMOTE MONITORING.

3.22 COMPRESSOR SEQUENCING

A USER SELECTABLE COMPRESSOR SEQUENCING PARAMETER SHALL BE PROVIDED AND SHALL BE ACCESSIBLE THROUGH THE LOCAL DISPLAY. THIS SEQUENCING PARAMETER SHALL PRESENT THE USER WITH THREE CHOICES:

- ALWAYS USE COMPRESSOR 1 AS THE LEAD COMPRESSOR.
- ALWAYS USE COMPRESSOR 2 AS THE LEAD COMPRESSOR.
- AUTO: THE UNIT SHALL AUTOMATICALLY STAGE COMPRESSORS TO KEEP EACH UNIT'S RUN TIME WITHIN 8 HOURS OF THE OTHER'S RUN TIME. NOTE: THE AUTO SETTING ATTEMPTS TO MAINTAIN EQUAL RUN TIMES BETWEEN COMPRESSORS. HOWEVER, THE CONTROL WILL NOT TURN OFF A COMPRESSOR TO EQUALIZE RUN TIME WHEN IT IS NEEDED TO CONTROL THE SPACE.
- FIRST PRIORITY: IF THE SAFETY TIMINGS ARE ACCEPTABLE FOR ONLY ONE COMPRESSOR, THEN IT IS THE NEXT TO BE STARTED/STOPPED.
- SECOND PRIORITY: IF BOTH COMPRESSORS ARE OFF: THE COMPRESSOR WITH FEWER WORKING HOURS IS THE NEXT TO START.
- THIRD PRIORITY: IF BOTH COMPRESSORS ARE IN OPERATION: THE COMPRESSOR THAT HAS BEEN OPERATING LONGER SINCE THE LAST START IS THE NEXT TO BE STOPPED.

3.23 COMPRESSOR HIGH AND LOW TEMPERATURE LIMIT PROTECTION

THE CONTROL SHALL MONITOR THE RETURN AIR TO ENSURE THAT THE COMPRESSOR(S) ARE OPERATED WITHIN THE MANUFACTURER'S DEFINED WINDOW OF OPERATION. IF THE RETURN AIR TEMPERATURE DEVIATES FROM THE MANUFACTURER'S WINDOW OF OPERATION, THE LIEBERT ICOM SHALL AUTOMATICALLY ADJUST TO PREVENT DAMAGE TO THE COOLING UNIT OR REDUCTION IN ITS RELIABILITY.

3.24 COMPRESSOR RUN TIME MONITORING

THE CONTROL SHALL LOG THESE COMPRESSOR STATISTICS:

- NUMBER OF COMPRESSOR STARTS
- RUN HOURS
- AVERAGE RUN TIME
- STARTS PER DAY
- STARTS PER DAY WORST
- NUMBER OF HIGH PRESSURE ALARMS
- OPERATING PHASE IN WHICH THE HIGH PRESSURE ALARM OCCURRED
- NUMBER OF LOW PRESSURE ALARMS
- OPERATING PHASE IN WHICH THE LOW PRESSURE ALARM OCCURRED
- NUMBER OF COMPRESSOR OVERLOADS
- NUMBER OF HIGH TEMPERATURE ALARMS (SCROLL COMPRESSORS)

THE USER SHALL HAVE THE ABILITY TO MONITOR COMPRESSOR OPERATING TEMPERATURE AND PRESSURE FROM THE LOCAL DISPLAY TO BE USED AS A DIAGNOSTIC TOOL.

3.25 MANUAL COMPRESSOR DISABLEMENT

THE USER SHALL HAVE THE ABILITY TO DISABLE COMPRESSOR OPERATION USING A SET OF EITHER NORMALLY OPEN OR NORMALLY CLOSED DRY CONTACTS TIED DIRECTLY TO THE CONTROL OR THROUGH REMOTE MONITORING. AN ADDITIONAL ENABLE/DISABLE FEATURE SHALL BE PROVIDED TO ALLOW THE USER TO PERMANENTLY DISABLE AN INDIVIDUAL COMPRESSOR CIRCUIT FOR MAINTENANCE USING THE LOCAL DISPLAY.

3.26 MANUAL COMPRESSOR OPERATION

THE USER SHALL BE ABLE TO OPERATE EACH COMPRESSOR(S) MANUALLY FROM THE LOCAL DISPLAY. THE USER SHALL BE ABLE TO ENERGIZE REFRIGERATION COMPONENTS INCLUDING LIQUID LINE SOLENOID VALVES, COMPRESSOR CONTACTORS, ELECTRONIC EXPANSION VALVES, AND ADJUST CAPACITY FOR TROUBLESHOOTING OR REPAIR. THE CONTROL SHALL MONITOR THE COMPRESSOR DURING MANUAL OPERATION AND SHALL SHUT THE COMPRESSOR DOWN IF NEEDED TO PREVENT ELECTRICAL OR MECHANICAL DAMAGE.

3.27 FLOODED START PROTECTION

THE CONTROL SHALL ISOLATE EACH COMPRESSOR THROUGH A DEDICATED CIRCUIT LIQUID LINE SOLENOID VALVE AND/OR ELECTRONIC EXPANSION VALVE. THESE DEVICES, COMBINED WITH AN INTEGRAL COMPRESSOR CHECK VALVE (ALL MODELS) AND CRANKCASE HEATER (AIR COOLED MODELS), SHALL HELP ENSURE REFRIGERANT DOES NOT MIGRATE/CARRY OIL OUT OF THE COMPRESSOR CASE DURING THE OFF CYCLE.

3.28 COMPRESSOR DEHUMIDIFICATION

THE CONTROL SHALL PERMIT THE USER TO SPECIFY WHICH COMPRESSOR IS USED FOR DEHUMIDIFICATION. THE CHOICES SHALL BE 1ST COMPRESSOR, 2ND COMPRESSOR, 1 OR 2, OR BOTH.

4.0 ADDITIONAL FEATURES

4.1 LOW VOLTAGE TERMINAL PACKAGE

FACTORY INSTALLED AND FACTORY WIRED TERMINALS SHALL BE PROVIDED.

- REMOTE SHUTDOWN TERMINALS – TWO ADDITIONAL PAIRS OF TERMINALS PROVIDE THE CUSTOMER WITH ADDITIONAL LOCATIONS TO REMOTELY SHUT DOWN THE UNIT BY FIELD INSTALLED DEVICES OR CONTROLS.
- EXTRA COMMON ALARM CONTACTS – TWO ADDITIONAL PAIRS OF TERMINALS PROVIDE THE CUSTOMER WITH NORMALLY OPEN CONTACTS FOR REMOTE INDICATION OF UNIT ALARMS.
- MAIN FAN AUXILIARY SWITCH – ONE SET OF NORMALLY OPEN CONTACTS WIRED TO THE EC FAN MOTOR CONTACTOR WILL CLOSE WHEN EC FAN OPERATION IS REQUIRED.
- LIQUI–TECT SHUTDOWN – ONE PAIR OF DRY CONTACTS FOR THE LIQUI–TECT SENSOR SIGNAL WILL PROVIDE UNIT SHUT DOWN. (LIQUI–TECT SENSOR IS NOT INCLUDED)

4.2 REHEAT AND HUMIDIFIER LOCK OUT TERMINALS (FACTORY INSTALLED)

4.3 MAIN FAN OVERLOAD

A PAIR OF NORMALLY OPEN CONTACTS SHALL BE FACTORY INSTALLED AND WIRED TO INDICATE MAIN FAN OVERLOAD.

4.4 COMPRESSOR OVERLOAD

A PAIR OF NORMALLY OPEN CONTACTS SHALL BE FACTORY INSTALLED AND FACTORY WIRED TO EACH COMPRESSOR TO INDICATE COMPRESSOR OVERLOAD.

4.5 WIRED REMOTE SENSORS

EACH LIEBERT ICOM SHALL HAVE UP TO TEN 2T SENSORS (20 SENSOR READINGS TOTAL) FOR CONTROL OR REFERENCE. AS PART OF THE U2U NETWORK, THOSE SENSORS SHALL BE SHARED AND USED TO CONTROL THE UNITS AND PROVIDE GREATER FLEXIBILITY, VISIBILITY, AND CONTROL USING THAT TO RESPOND TO CHANGES IN THE DATA CENTER. WHEN THE SENSORS ARE USED FOR CONTROL, THE USER MAY SET THE CONTROL TO BE BASED OFF A MAXIMUM OR AVERAGE OF A SELECT HIGHEST TEMPERATURE READING.

(CONTINUED)

REVISIONS

No.	ISSUE	DATE
A	ISSUED FOR CLIENT REVIEW	MAY 31, 2024
B	ISSUED FOR TENDER	SEP 05, 2024

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PROJECT:
HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:
MECHANICAL SPECIFICATIONS - II

DRAWN BY:	SCALE:
VA	AS NOTED
CHECKED BY:	DATE:
BM	MAY 2024

PROJECT No.: 24034

DRAWING No.: **M 0.2**

4.6 LIEBERT LIQUI-TECT SENSORS, MAXIMUM OF 2 PER UNIT

TWO SOLID STATE WATER SENSORS SHALL BE PROVIDED FOR INSTALLATION UNDER THE RAISED FLOOR.

4.7 FLOOR STAND

THE FLOOR STAND SHALL BE CONSTRUCTED OF A WELDED STEEL FRAME. THE FLOOR STAND SHALL HAVE ADJUSTABLE LEGS WITH VIBRATION ISOLATION PADS. THE FLOOR STAND SHALL BE 18 INCHES (MM) HIGH.

4.8 RETURN AIR PLENUM FOR DOWNFLOW UNITS--OPTIONAL

THE AIR PLENUM SHALL BE CONSTRUCTED OF 20-GAUGE STEEL, POWDER COATED TO MATCH UNIT COLOR. THE PLENUM SHALL BE 36 INCHES (MM) HIGH. A DOOR SHALL BE INCLUDED IN THE FRONT OF THE PLENUM TO ENABLE FRONT FILTER ACCESS. AIR SHALL ENTER THE PLENUM FROM THE TOP.

4.9 DAMPER RELAYS

FACTORY INSTALLED DAMPER RELAYS. DAMPER, DAMPER MOTOR, DAMPER MOTOR RELAY AND END SWITCH PROVIDED AND INSTALLED BY INSTALLING CONTRACTOR.

5.0 HEAT REJECTION

5.1 AIR COOLED LIEBERT MC CONDENSER

5.1.1 LIEBERT MC SUMMARY

THESE SPECIFICATIONS DESCRIBE REQUIREMENTS FOR A LIEBERT AIR COOLED CONDENSER FOR A LIEBERT THERMAL MANAGEMENT SYSTEM. THE CONDENSER SHALL BE DESIGNED TO REJECT WASTE HEAT TO OUTDOOR AIR AND TO CONTROL REFRIGERANT HEAD PRESSURE AS INDOOR EQUIPMENT LOADING AND OUTDOOR AMBIENT CONDITIONS CHANGE.

THE MANUFACTURER SHALL DESIGN AND FURNISH ALL EQUIPMENT IN THE QUANTITIES AND CONFIGURATIONS SHOWN ON THE PROJECT DRAWINGS.

STANDARD 60-HZ UNITS SHALL BE CSA-CERTIFIED TO THE HARMONIZED U.S. AND CANADIAN PRODUCT SAFETY STANDARD CSA C22.2 NO 236/UL 1995 FOR "HEATING AND COOLING EQUIPMENT" AND SHALL BE MARKED WITH THE CSA C-US LOGO.

5.1.2 LIEBERT MC DESIGN REQUIREMENTS

THE AIR COOLED CONDENSER SHALL BE A FACTORY ASSEMBLED UNIT, COMPLETE WITH INTEGRAL ELECTRICAL PANEL, DESIGNED FOR OUTDOOR INSTALLATION. THE CONDENSER SHALL BE A DRAW THROUGH DESIGN.

5.1.3 LIEBERT MC STANDARD FEATURES

CONDENSER SHALL CONSIST OF MICROCHANNEL CONDENSER COIL(S), PROPELLER FAN(S) DIRECT DRIVEN BY INDIVIDUAL FAN MOTOR(S), ELECTRICAL CONTROLS, HOUSING, AND MOUNTING LEGS. THE LIEBERT AIR COOLED CONDENSER SHALL PROVIDE POSITIVE REFRIGERANT HEAD PRESSURE CONTROL TO THE INDOOR COOLING UNIT BY ADJUSTING HEAT REJECTION CAPACITY.

MICROCHANNEL COILS SHALL PROVIDE SUPERIOR HEAT TRANSFER, REDUCE AIR SIDE PRESSURE DROP, INCREASE ENERGY EFFICIENCY AND SIGNIFICANTLY REDUCE THE SYSTEM REFRIGERANT VOLUME REQUIRED. EC FANS AND FAN OPERATING TECHNIQUES SHALL REDUCE SOUND LEVELS. VARIOUS METHODS SHALL BE AVAILABLE TO MATCH INDOOR UNIT TYPE, MAXIMUM OUTDOOR DESIGN AMBIENT AND MAXIMUM SOUND REQUIREMENTS.

5.1.4 LIEBERT MC COIL

LIEBERT^2 MC COILS SHALL BE CONSTRUCTED OF ALUMINUM MICROCHANNEL TUBES, FINS, AND MANIFOLDS. TUBES SHALL BE FLAT AND CONTAIN MULTIPLE, PARALLEL FLOW MICROCHANNELS AND SPAN BETWEEN ALUMINUM HEADERS. FULL DEPTH LOUVERED ALUMINUM FINS SHALL FILL SPACES BETWEEN THE TUBES. TUBES, FINS AND ALUMINUM HEADERS SHALL BE OVEN BRAZED TO FORM A COMPLETE REFRIGERANT TO AIR HEAT EXCHANGER COIL. COPPER STUB PIPES SHALL BE ELECTRIC RESISTANCE WELDED TO ALUMINUM COILS AND JOINTS PROTECTED WITH POLYOLEFIN TO SEAL JOINTS FROM CORROSIVE ENVIRONMENTAL ELEMENTS. COIL ASSEMBLIES SHALL BE FACTORY LEAK TESTED AT A MINIMUM OF 300 PSIG (2,068 KPAG). HOT GAS AND LIQUID LINES SHALL BE COPPER AND SHALL BE BRAZED USING NITROGEN GAS FLOW TO THE STUB PIPES WITH SPUN CLOSED ENDS FOR CUSTOMER PIPING CONNECTIONS. COMPLETE COIL/PIPING ASSEMBLY SHALL BE THEN FILLED AND SEALED WITH AN INERT GAS HOLDING CHARGE FOR SHIPMENT.

5.1.4.1 ALUMINUM MICROCHANNEL COIL WITH E-COAT--OPTIONAL

ALUMINUM MICROCHANNEL COIL WITH E-COAT SHALL BE EPOXY COATED FOR EXTENDED COIL LIFE IN CORROSIVE ENVIRONMENTS, SUCH AS COASTAL AREAS. FACTORY APPLIED E-COAT USING IMMERSION AND BAKING PROCESS SHALL PROVIDE A FLEXIBLE EPOXY COATING TO ALL COIL SURFACES. COIL COLOR SHALL BE BLACK AND SHALL BE PROTECTED FROM SOLAR UV RAY DEGRADATION WITH A FACTORY APPLIED UV TOPCOAT. E-COAT SHALL INCREASE COIL CORROSION PROTECTION AND SHALL REDUCE HEAT REJECTION CAPACITY DEGRADATION TO LESS THAN 10% AFTER A SEVERE 2,000-HOUR, 5% NEUTRAL SALT SPRAY TEST (REF. ASTM B117). THE COATING PROCESS SHALL ENSURE COMPLETE COIL ENCAPSULATION.

5.1.5 LIEBERT MC FAN MOTOR/BLADE ASSEMBLY

THE FAN MOTOR/BLADE ASSEMBLY SHALL HAVE AN EXTERNAL ROTOR MOTOR, FAN BLADES AND FAN/FINGER GUARD. FAN BLADES SHALL BE CONSTRUCTED OF CAST ALUMINUM OR GLASS REINFORCED POLYMERIC MATERIAL. FAN GUARDS SHALL BE HEAVY GAUGE, CLOSE MESHED STEEL WIRE, COATED WITH A BLACK, CORROSION RESISTANT FINISH. FAN TERMINAL BLOCKS SHALL BE IN AN IP54 ENCLOSURE ON THE TOP OF THE FAN MOTOR. FAN ASSEMBLIES SHALL BE FACTORY BALANCED, TESTED BEFORE SHIPMENT, AND MOUNTED SECURELY TO THE CONDENSER STRUCTURE.

5.1.5.1 LIEBERT MC CONDENSER EC FAN MOTOR

THE EC FAN MOTORS SHALL BE ELECTRONICALLY COMMUTATED FOR VARIABLE SPEED OPERATION AND SHALL HAVE BALL BEARINGS. THE EC FANS SHALL PROVIDE INTERNAL OVERLOAD PROTECTION THROUGH BUILT-IN ELECTRONICS. EACH EC FAN MOTOR SHALL HAVE A BUILT-IN CONTROLLER AND COMMUNICATION MODULE LINKED VIA RS485 COMMUNICATION WIRE TO EACH FAN AND THE PREMIUM CONTROL BOARD, ALLOWING EACH FAN TO RECEIVE AND RESPOND TO PRECISE FAN SPEED INPUTS FROM THE PREMIUM CONTROL BOARD.

5.1.6 LIEBERT MC ELECTRICAL CONTROLS

ELECTRICAL CONTROLS AND SERVICE CONNECTION TERMINALS SHALL BE PROVIDED AND FACTORY WIRED INSIDE THE ATTACHED CONTROL PANEL SECTION. ONLY HIGH VOLTAGE SUPPLY WIRING AND LOW VOLTAGE INDOOR UNIT COMMUNICATION/INTERLOCK WIRING ARE REQUIRED AT CONDENSER INSTALLATION.

5.1.6.1 EC FAN SPEED AND PREMIUM CONTROL

THE EC FAN/PREMIUM CONTROL SYSTEM SHALL INCLUDE AN ELECTRONIC CONTROL BOARD, EC FAN MOTOR(S) WITH INTERNAL OVERLOAD PROTECTION, REFRIGERANT AND AMBIENT TEMPERATURE THERMISTORS AND REFRIGERANT PRESSURE TRANSDUCERS. THE PREMIUM CONTROL BOARD SHALL COMMUNICATE DIRECTLY WITH THE INDOOR UNIT'S LIEBERT ICOM CONTROL VIA FIELD SUPPLIED CANBUS COMMUNICATION WIRES AND VIA FIELD SUPPLIED LOW VOLTAGE INTERLOCK WIRES. THE CONTROL BOARD SHALL USE SENSOR AND COMMUNICATION INPUTS TO MAINTAIN REFRIGERANT PRESSURE BY CONTROLLING EACH EC FAN ON THE SAME REFRIGERANT CIRCUIT TO THE SAME SPEED. THE PREMIUM CONTROL BOARD SHALL BE RATED TO A TEMPERATURE OF -30°F TO 125°F (-34.4°C TO 51.7°C). THE PREMIUM CONTROL SHALL BE FACTORY SET FOR (FAN SPEED) (FAN SPEED WITH LIEBERT LEE-TEMP) CONTROL.

5.1.6.2 LOCKING DISCONNECT SWITCH

A LOCKING TYPE DISCONNECT SWITCH SHALL BE FACTORY MOUNTED AND WIRED TO THE ELECTRICAL PANEL AND BE CAPABLE OF DISRUPTING THE FLOW OF POWER TO THE UNIT AND CONTROLLED VIA AN EXTERNALLY MOUNTED LOCKING AND LOCKABLE DOOR HANDLE. THE LOCKING DISCONNECT SHALL BE LOCKABLE IN SUPPORT OF LOCKOUT/TAGOUT SAFETY PROGRAMS.

5.1.6.3 SHORT CIRCUIT CURRENT RATING

THE ELECTRICAL PANEL SHALL PROVIDE AT LEAST 65,000A SCCR.

5.1.6.4 LIEBERT MC 575 VOLT

THE CONDENSER CABINET SHALL INCLUDE A SECONDARY, FACTORY MOUNTED, NEMA 3R WEATHERPROOF ELECTRICAL ENCLOSURE. THE SECONDARY ENCLOSURE SHALL CONTAIN A 575 V TRANSFORMER AND PROTECTIVE FUSES. ALL WIRING BETWEEN MAIN AND SECONDARY ELECTRICAL ENCLOSURES SHALL BE FACTORY PROVIDED. ALL FIELD ELECTRICAL CONNECTIONS SHALL BE MADE IN THE MAIN ELECTRICAL ENCLOSURE.

5.1.7 CABINET

THE CONDENSER CABINET SHALL BE CONSTRUCTED OF BRIGHT ALUMINUM SHEET AND DIVIDED INTO INDIVIDUAL FAN SECTIONS BY FULL WIDTH BAFFLES. INTERNAL STRUCTURAL SUPPORT MEMBERS, INCLUDING COIL SUPPORT FRAME, SHALL BE GALVANIZED STEEL FOR STRENGTH AND CORROSION RESISTANCE. PANEL DOORS SHALL BE PROVIDED ON TWO SIDES OF EACH COIL/FAN SECTION TO PERMIT COIL CLEANING. AN ELECTRICAL PANEL SHALL BE CONTAINED INSIDE A FACTORY MOUNTED NEMA 3R WEATHERPROOF ELECTRICAL ENCLOSURE. UNITS WITH THE 575 V OPTION SHALL INCLUDE A SECOND, FACTORY MOUNTED, NEMA 3R WEATHERPROOF ELECTRICAL ENCLOSURE OPPOSITE THE MAIN ELECTRICAL ENCLOSURE.

5.1.8 LIEBERT MC MOUNTING LEGS STANDARD ALUMINUM LEGS

18" ALUMINUM LEGS SHALL BE PROVIDED TO MOUNT UNIT FOR VERTICAL AIR DISCHARGE WITH RIGGING HOLES FOR HOISTING THE UNIT INTO POSITION. FACTORY SUPPLIED, SHIPPED LOOSE AND FIELD INSTALLED BY CONTRACTOR.

5.1.9 LIEBERT MC CONDENSER ACCESSORIES

5.1.10 FUSIBLE PLUG KIT

A FUSIBLE PLUG KIT SHALL BE FIELD INSTALLED ON THE LIQUID LINE FOR COMPLIANCE WITH BUILDING CODES REQUIRING REFRIGERANT RELIEF DURING HIGH TEMPERATURE AND BUILDING FIRE CONDITIONS.

6.0 EXECUTION

6.1 INSTALLATION OF THERMAL MANAGEMENT UNITS

6.1.1 GENERAL

INSTALL THERMAL MANAGEMENT UNITS IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS. INSTALL UNITS PLUMB AND LEVEL, FIRMLY ANCHORED IN LOCATIONS INDICATED AND MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES.

6.1.2 ELECTRICAL WIRING

INSTALL AND CONNECT ELECTRICAL DEVICES FURNISHED BY MANUFACTURER BUT NOT SPECIFIED TO BE FACTORY MOUNTED. FURNISH COPY OF MANUFACTURER'S ELECTRICAL CONNECTION DIAGRAM SUBMITTAL TO ELECTRICAL CONTRACTOR.

6.1.3 PIPING CONNECTIONS

INSTALL AND CONNECT DEVICES FURNISHED BY MANUFACTURER BUT NOT SPECIFIED TO BE FACTORY MOUNTED. FURNISH COPY OF MANUFACTURER'S PIPING CONNECTION DIAGRAM SUBMITTAL TO PIPING CONTRACTOR.

6.1.3.1 SUPPLY AND DRAIN WATER PIPING

CONNECT WATER SUPPLY AND DRAINS TO AIR CONDITIONING UNIT. PROVIDE PITCH AND TRAP AS MANUFACTURER'S INSTRUCTIONS AND LOCAL CODES REQUIRE.

6.2 FIELD QUALITY CONTROL

START THE SYSTEM IN ACCORDANCE WITH MANUFACTURER'S START-UP INSTRUCTIONS. TEST CONTROLS AND DEMONSTRATE COMPLIANCE WITH REQUIREMENTS. THESE SPECIFICATIONS DESCRIBE REQUIREMENTS FOR A COMPUTER ROOM ENVIRONMENTAL CONTROL SYSTEM. THE SYSTEM SHALL BE DESIGNED TO MAINTAIN TEMPERATURE AND HUMIDITY CONDITIONS IN THE ROOMS CONTAINING ELECTRONIC EQUIPMENT.

THE MANUFACTURER SHALL DESIGN AND FURNISH ALL EQUIPMENT TO BE FULLY COMPATIBLE WITH HEAT DISSIPATION REQUIREMENTS.

6.3 WARRANTY START-UP AND CONTROL PROGRAMMING

ENGAGE MANUFACTURER'S FIELD SERVICE TECHNICIAN TO PROVIDE WARRANTY START-UP SUPERVISION AND ASSIST IN PROGRAMMING OF UNIT(S) CONTROLS AND ANCILLARY PANELS SUPPLIED BY THEM.

ONE YEAR WARRANTY COVERING LABOUR BY VERTIV CANADA.

TWO YEAR WARRANTY COVERING PARTS BY VERTIV CANADA.

FIVE YEAR COMPRESSOR WARRANTY BY VERTIV CANADA.

ALL WORK TO BE PERFORMED DURING REGULAR BUSINESS HOURS (M-F, 8AM-5PM)

K. THERMOSTAT CONTROL WIRING

1. ALL THERMOSTAT/CONTROL WIRING IS TO BE 18AWG SHIELDED PLENUM RATED FT6 MINIMUM.

a. SUPPORT ALL WIRING IN CEILING PLENUM USING WIRE TIES / BRIDLE RINGS.

b. MECHANICAL CONTRACTOR IS TO WIRE AND INSTALL THERMOSTATS AND CONTROL WIRING TO EACH MECHANICAL UNIT SHOWN ON HVAC PLAN.

L. COMPLETION OF CONTRACT

1. ALL SYSTEMS SHALL BE COMPLETE, CLEANED, TESTED AND READY FOR USE, WITH ALL EQUIPMENT AND CONTROLS FUNCTIONING CORRECTLY.

2. SUBMIT ALL CERTIFICATES OF INSPECTION AND TEST RESULTS TO THE CONSULTANT FOR REVIEW.

3. PRIOR TO CONTACTING THE CONSULTANT FOR FINAL INSPECTION, THE CONTRACTOR MUST CORRECT ALL DEFICIENCIES AS SPECIFIED ON THE DEFICIENCY LIST.

4. PROVIDE A WRITTEN WARRANTY FOR ONE YEAR COVERING ALL EQUIPMENT, MATERIALS AND WORKMANSHIP FROM THE DATE OF ACCEPTANCE OF THE INSTALLATION BY THE OWNER. INCLUDE IN THE OPERATION AND MAINTENANCE MANUAL.

5. ANY DEFECTS OR DEFICIENCIES WHICH ORIGINATE OR BECOME EVIDENT DURING THE WARRANTY PERIOD MUST BE REPAIRED OR CORRECTED AT NO COST TO THE OWNER.

M. AIR TESTING AND BALANCING

1. BALANCE AND ADJUST EACH FAN. SYSTEM VOLUMES SHALL BE WITHIN 5% OF REQUIREMENTS SHOWN. ADJUST AND SET BALANCE DAMPERS, FANS AND DRIVES TO GIVE THE SPECIFIED VOLUMES AT ALL OUTLETS. THE BALANCING OF AIR SYSTEMS IS TO BE DONE BY A BALANCING FIRM SPECIALIZING IN THIS WORK. CLEAN DUCT SYSTEMS, FILTERS, ETC., BEFORE TESTING IS DONE.

2. PROVIDE ELECTRONIC PDF COPIES OF THE AIR BALANCING REPORT. AIR QUANTITIES AT EACH OUTLET SHALL BE AS INDICATED IN THE DRAWINGS. THIS REPORT SHALL SHOW THE QUANTITIES, VELOCITIES AND AREA OF EACH OUTLET, TYPE AND MODEL. NUMBER OF FANS AND MOTOR INSTALLED, ACTUAL AIR DELIVERED BY THE FAN WITH TOTAL STATIC PRESSURE AND AMPS DRAWN BY THE MOTORS. ADJUST AND RETEST TO THE SATISFACTION OF THE PROJECT COORDINATOR. PROVIDE ADDITIONAL COPY OF THE AIR BALANCE REPORT TO THE MECHANICAL CONSULTANT.

3. UPON COMPLETION OF THE AIR BALANCE TEST, SUBMIT THE AIR BALANCE REPORT TO THE OWNER. THIS CONTRACTOR SHALL PROVIDE, IF CALLED FOR, A SPOT CHECK ON THE SYSTEM WITH THE CONSULTANT. IF ACTUAL AIR QUANTITIES DO NOT AGREE WITH THE AIR BALANCE REPORT DATA, THIS CONTRACTOR MAY BE CALLED UPON TO COMPLETELY RE-BALANCE THE SYSTEM UNTIL REQUIREMENTS ARE ACHIEVED AND ACCEPTED BY THE CONSULTANT.

N. SETTING OF EQUIPMENT AND PIPING

1.1. SETTING AND ALIGNMENT OF ALL EQUIPMENT WITH ROTATING ELEMENTS MUST BE CARRIED OUT BY CERTIFIED TRADESMEN OR BY MILLWRIGHTS.

INSTALL PIPING SO AS TO BE FREE FROM STRAIN AND DISTORTION DUE TO EXPANSION AND CONTRACTION.

REVISIONS

No.	ISSUE	DATE
A	ISSUED FOR CLIENT REVIEW	MAY 31, 2024
B	ISSUED FOR TENDER	SEP 05, 2024

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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:

MECHANICAL SPECIFICATIONS - III

DRAWN BY:	SCALE:
VA	AS NOTED
CHECKED BY:	DATE:
BM	MAY 2024

PROJECT No.: 24034

DRAWING No.:

M 0.3

DUCTLESS AC UNIT SCHEDULE - MILTON FIRE STATION #2

						INDOOR UNIT								OUTDOOR UNIT								
INDOOR UNIT TAG	MITSUBISHI INDOOR UNIT MODEL No.	OUTDOOR UNIT TAG	MITSUBISHI OUTDOOR UNIT MODEL No.	OPERATING RANGE DB (°F)	REFRIGERANT	UNIT LOCATION	MOUNTING TYPE	MAX AIRFLOW (CFM)	COOLING CAPACITY (Btu/hr)	ELECTRICAL			WEIGHT (LBS)	UNIT LOCATION	MOUNTING TYPE	COOLING CAPACITY (Btu/hr)	ELECTRICAL			WEIGHT (LBS)	SOUND (dBa)	REMARKS
										V/PH/HZ	MCA	MOCP					V/PH/HZ	MCA	BREAKER SIZE			
AC-4	PKA-A36KA7	CU-4	PUY-A36NKA7	-40 TO 115	R410A	IT ROOM	WALL MOUNT	920	36,000	208/1/60	1	N/A	46	ROOF	ECOFOOT STAND	36,000	208/1/60	25	30	211	52	SEE NOTES BELOW

NOTES:
1. INDOOR UNIT POWERED BY OUTDOOR UNIT.
2. EACH UNIT C/W ULTRA LOW AMBIENT KIT, REAR SNOW GUARD (SG-1-RE), SIDE SNOW GUARD (SG-1-SD), FRONT WIND DEFLECTOR (2X MODEL: CM-S-FR-NKMU),
3. PROVIDE NEW MODEL PAR40MAA THERMOSTAT AND CONNECT TO EXISTING A/C AND NEW A/Cs FOR "BACKUP AND ROTATE" FUNCTIONALITY. ONE THERMOSTAT SHALL CONTROL BOTH A/Cs. CONFIRM WIRING AND ADDRESSING OF UNITS ARE COMPLETED PRIOR TO ENERGIZING THE SYSTEM. REFER TO INSTALLATION MANUAL. DEMONSTRATE THIS FUNCTIONALITY TO OWNER PRIOR TO PROJECT CLOSEOUT.
4. ALL UNITS TO BE INSTALLED AS PER MANUFACTURER'S WRITTEN INSTRUCTION.
5. INDOOR UNIT C/W MOUNTING BRACKETS, OUTDOOR UNIT C/W ECOFOOT STAND (SHALL BE FACTORY SHIPPED/FIELD SUPPLIED-CONFIRM SIZE OF ECOFOOT FRAMES MODEL: AN-H305)
6. INSULATE BOTH REFRIGERANT LIQUID AND SUCTION LINE. REFER TO MECHANICAL SPECIFICATIONS.

DUCTLESS AC UNIT SCHEDULE - TOWN HALL

						INDOOR UNIT								OUTDOOR UNIT								
INDOOR UNIT TAG	MITSUBISHI INDOOR UNIT MODEL No.	OUTDOOR UNIT TAG	MITSUBISHI OUTDOOR UNIT MODEL No.	OPERATING RANGE DB (°F)	REFRIGERANT	UNIT LOCATION	MOUNTING TYPE	MAX AIRFLOW (CFM)	COOLING CAPACITY (Btu/hr)	ELECTRICAL			WEIGHT (LBS)	UNIT LOCATION	MOUNTING TYPE	COOLING CAPACITY (Btu/hr)	ELECTRICAL			WEIGHT (LBS)	SOUND (dBa)	REMARKS
										V/PH/HZ	MCA	MOCP					V/PH/HZ	MCA	BREAKER SIZE			
AC-3	PKA-A18LA-TH	CU-3	PUY-A18NKA7	-40 TO 115	R410A	NETWORK CLOSET	WALL MOUNT	450	18,000	208/1/60	1	N/A	28	ROOF	ECOFOOT STAND	18,000	208/1/60	11	15	99	44	SEE NOTES BELOW

NOTES:
1. INDOOR UNIT POWERED BY OUTDOOR UNIT.
2. EACH UNIT C/W ULTRA LOW AMBIENT KIT, REAR WIND GUARD (PRE-24-30), FRONT WIND GUARD (PFR-24-30), SIDE WIND GUARDS (MODEL: PSD-24-30),
3. EQUIVALENT LENGTH (FIELD VERIFY). CONTRACTOR MUST ACCOUNT FOR REFRIGERANT CHARGE FOR THE REQUIRED LENGTH. DO NOT EXCEED MAXIMUM LENGTH CONSIDERING EACH BEND AS 2 FEET EQUIVALENT LENGTH.
4. ALL UNITS TO BE INSTALLED AS PER MANUFACTURER'S WRITTEN INSTRUCTION.
5. INDOOR UNIT C/W MOUNTING BRACKETS, OUTDOOR UNIT C/W ECOFOOT STAND (SHALL BE FACTORY SHIPPED/FIELD SUPPLIED-CONFIRM SIZE OF ECOFOOT FRAMES MODEL: AN-H305.)
6. INSULATE BOTH REFRIGERANT LIQUID AND SUCTION LINE. REFER TO MECHANICAL SPECIFICATIONS.
7. NEW PROGRAMMABLE THERMOSTAT MODEL PAR-40MAA.

C/R AC UNIT SCHEDULE - TOWN HALL

						INDOOR UNIT									OUTDOOR UNIT								
INDOOR UNIT TAG	INDOOR UNIT MAKE AND MODEL No.	OUTDOOR UNIT TAG	OUTDOOR UNIT MAKE AND MODEL No.	OPERATING RANGE DB (°F)	REFRIGERANT	UNIT LOCATION	MOUNTING TYPE	MAX AIRFLOW (CFM)	ESP (IN. WC)	NET COOLING CAPACITY (kW)	SENSIBLE COOLING CAPACITY (kW)	ELECTRICAL			WEIGHT (LBS)	UNIT LOCATION	MOUNTING TYPE	COOLING CAPACITY (Btu/hr)	ELECTRICAL			WEIGHT (LBS)	SOUND (dBa)	REMARKS
												V/PH/HZ	FLA	BREAKER SIZE					V/PH/HZ	FLA	BREAKER SIZE			
C/R AC-1,2	LIEBERT DS070A	CU-1,2	LIEBERT MCM080E	50 TO 104	R407C	I.T. DATA CENTRE	FLOOR MOUNT ON 18" STANDS LEVEL WITH RAISED FLOOR	10,400	0.2	74.1	73.2	575/3/60	46.4	60	1970	ROOF	18" LEGS	N/A	575/3/60	2.4	15	906	N/A	SEE NOTES BELOW

NOTES:
1. MECH. CONTRACTOR TO FIELD SUPPLY AND INSTALL 80"x24" MOTORIZED DAMPER IN RETURN AIR PLENUM C/W 24VAC ACTUATOR SIEMENS GCA 126.1P WITH END SWITCH PLENUM CABLE OR EQUIVALENT, LOW VOLTAGE TRANSFORMER AND CONTROL WIRING UPTO UNIT RELAY. ELECTRICAL POWER BY DIV 26.
2. EACH INDOOR UNIT SHALL BE MOUNTED ON A FLOOR STAND WITH A HEIGHT OF 18".
3. EACH INDOOR UNIT C/W A RETURN PLENUM 36" HIGH. PROVIDE 4" MERV-8 FILTERS.
4. ALL INDOOR UNITS SHALL BE C/W TWO POINT LEAK SENSORS MODEL: LT410 FOR EACH UNIT AND WIRING TO INDOOR UNIT.
5. EACH C/R AC UNIT SHALL BE C/W AN INFRARED HUMIDIFIER WITH A CAPACITY OF 22 lbs/hr AND 150 PSI IN COMPLIANCE WITH ASME A112.1.2 SECTION 2.4.2 C/W VACUUM BREAKER.
6. EACH C/R AC UNIT SHALL BE C/W AN ELECTRIC REHEAT SECTION OF CAPACITY 25 kW.
7. SUPPLY AND FIELD-INSTALL 10 IT RACK TEMPERATURE SENSORS MODEL '2T' FOR EACH C/R AC, 40 FOOT CANBUS CABLE AND DAISY CHAIN SENSORS TOGETHER. PLACE SENSORS ON EVERY OTHER IT RACK AND INTERLACE WITH IT RACKS ON OPPOSITE SIDE FOR OPTIMUM TEMPERATURE MONITORING.
8. MECH. CONTRACTOR TO FIELD SUPPLY AND INSTALL 40 FOOT LONG CAT 6 NETWORK CABLE FOR COMMUNICATION BETWEEN TWO C/R AC UNITS.
9. FACTORY INSTALLED BAS COMMUNICATION CARD FOR EACH C/R AC UNIT.
10. C/R AC UNITS SHALL BE DOWNWARD SUPPLY AIRFLOW AND CEILING RETURN FROM TOP.
11. MECH. CONTRACTOR TO FIELD SUPPLY ADDITIONAL REFRIGERANT CHARGE, LEAK TESTING OF LINES.
12. CONNECT C/R AC UNITS TO EXISTING BUILDING BAS. MECH. CONTRACTOR TO ENGAGE AND PAY FOR SERVICES OF BAS VENDOR: JOHNSON CONTROLS, RAY KAMPEN (905) 730 9695 raymond.a.kampen@jci.com

MECHANICAL LEGEND

HVAC/PIPING/PLUMBING

	SANITARY LINE
	CONDENSATE
	VENT PIPE
	PIPE UP
	PIPE DOWN
REF	REFRIGERANT PIPING
CO	CLEAN OUT
	PIPE HEAT TRACING
AC–1	NEW EQUIPMENT TAG

ANNOTATION LEGEND

CTE	CONNECT TO EXISTING
FFD	FUNNEL FLOOR DRAIN
T/B	TO BELOW
T/A	TO ABOVE
F/B	FROM BELOW
F/A	FROM ABOVE
U/C	UNDERCUT DOOR
CBV	CIRCUIT BALANCING VALVE
AP	ACCESS PANEL
VTR	VENT THRU ROOF

SPECIAL NOTE APPLICABLE FOR ALL DRAWINGS

PROVIDE ALL DEMOLITION, CLEAN–UPS, STORAGE, LIFTING, FLASHING, DRILLING, CUTTING AND PATCHING AS REQUIRED. ALL CUTTING AND PATCHING REQUIRED TO THE EXISTING BUILDING STRUCTURE FOR THE WORK SHALL BE INCLUDED UNDER THIS CONTRACT, AND BE ACCEPTABLE TO THE OWNER. PROVIDE X–RAY OF SLAB PRIOR TO CORING AND CUTTING OF FLOOR, AND OBTAIN APPROVAL FROM BASE BUILDING STRUCTURAL ENGINEER PRIOR TO DRILLING. SUBMIT WRITTEN CONFIRMATION THAT X–RAY HAS BEEN PERFORMED, AND THAT RESULTS HAVE BEEN ACCEPTED BY BASE BUILDING STRUCTURAL ENGINEER. OBTAIN WRITTEN APPROVAL FROM THE OWNER BEFORE ANY CUTTING IS CARRIED OUT. AFTER COMPLETION OF WORK, THE CONTRACTOR TO RESTORE ALL AFFECTED CEILING/WALL AREAS TO ITS ORIGINAL CONDITION.

PROJECT ADDRESSES AND ASSOCIATED DRAWINGS

ADDRESS	ASSOCIATED PLANS
MILTON TOWN HALL, 150 MARY ST, MILTON, ON L9T 6Z5	M–1.1, 1.2, 1.3, 1.4, 1.5, 1.6
MILTON FIRE STATION #2, 2665 REID SIDEROAD, MILTON, ON	M–1.7, 1.8

MECHANICAL DRAWING LIST

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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

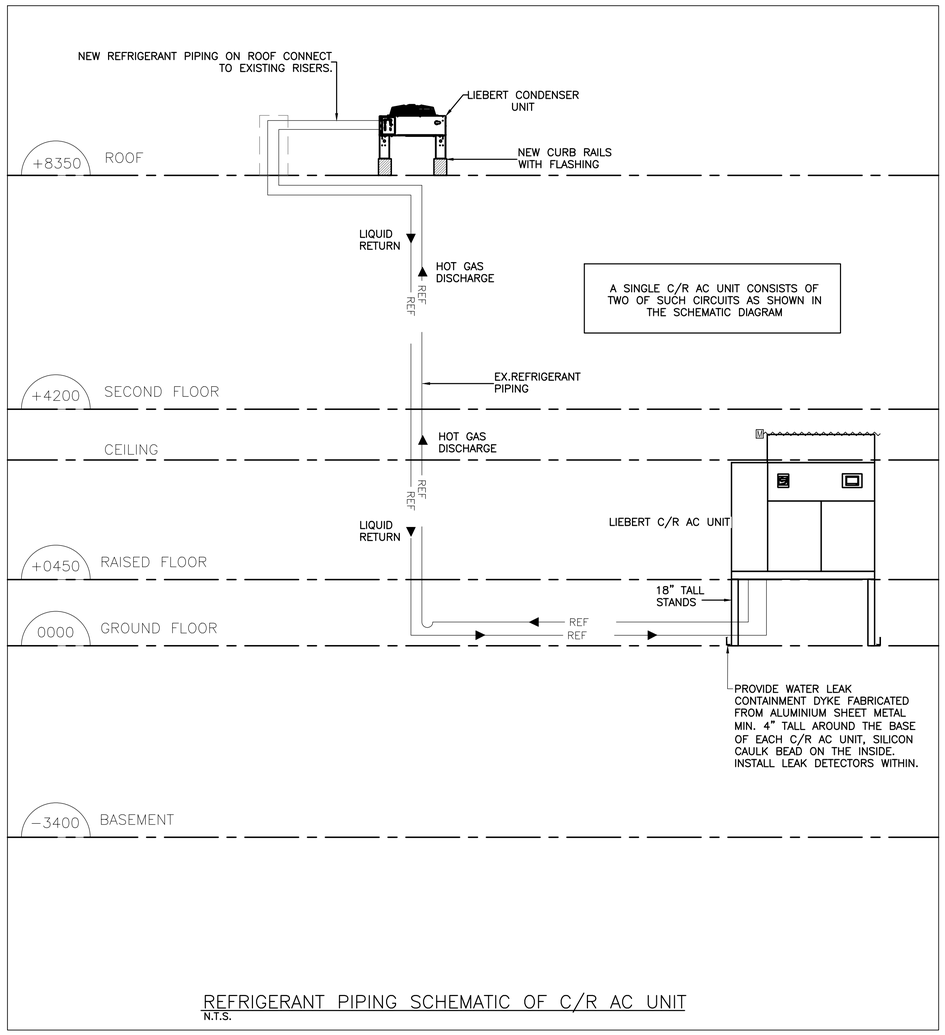
DRAWING TITLE:

MECHANICAL SCHEDULES, LEGEND AND DRAWING LISTS

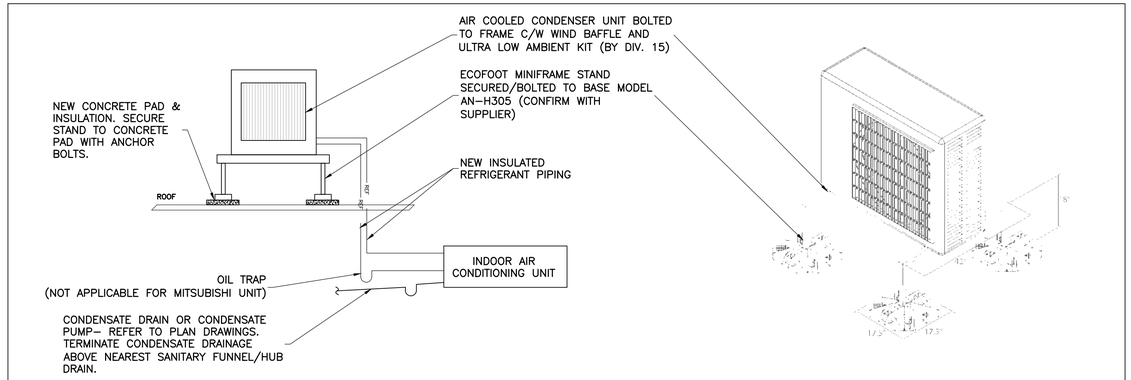
DRAWN BY:	SCALE:
VA	AS NOTED
CHECKED BY:	DATE:
BM	MAY 2024

PROJECT No.: 24034

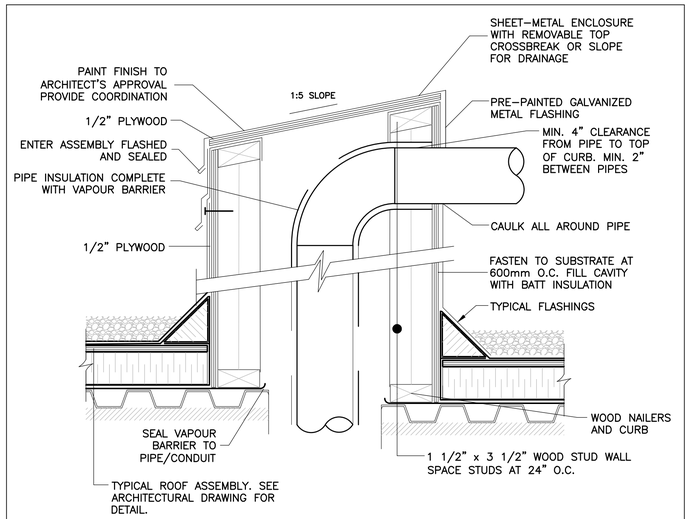
DRAWING No.: **M 0.4**



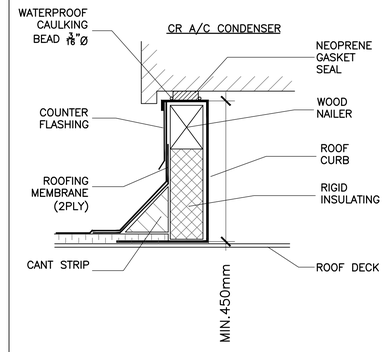
REFRIGERANT PIPING SCHEMATIC OF C/R AC UNIT
N.T.S.



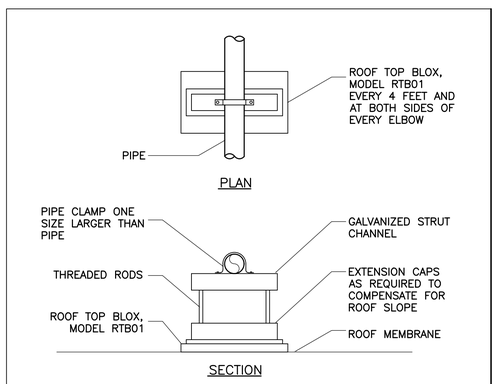
TYPICAL SPLIT AC UNIT SYSTEM INSTALLATION DETAIL
N.T.S



TYPICAL DOGHOUSE DETAIL – PIPE PENETRATIONS
SCALE: N.T.S.



TYPICAL UNIT ROOF CURB DETAIL
SCALE: N.T.S.



REFRIGERANT PIPING SUPPORT DETAIL
N.T.S.

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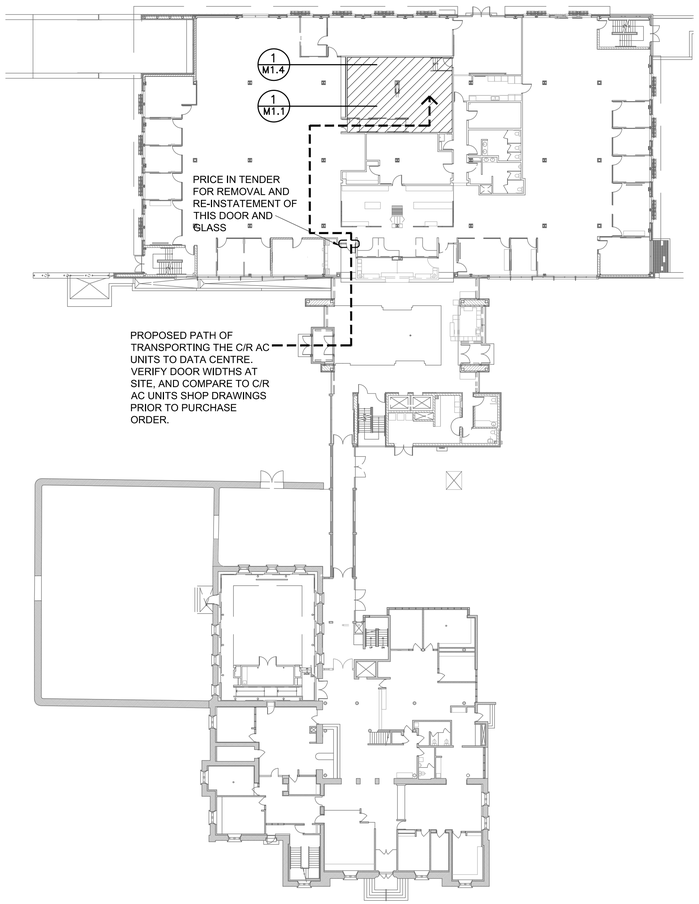
PROJECT:
HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:
MECHANICAL DETAILS AND SCHEMATICS

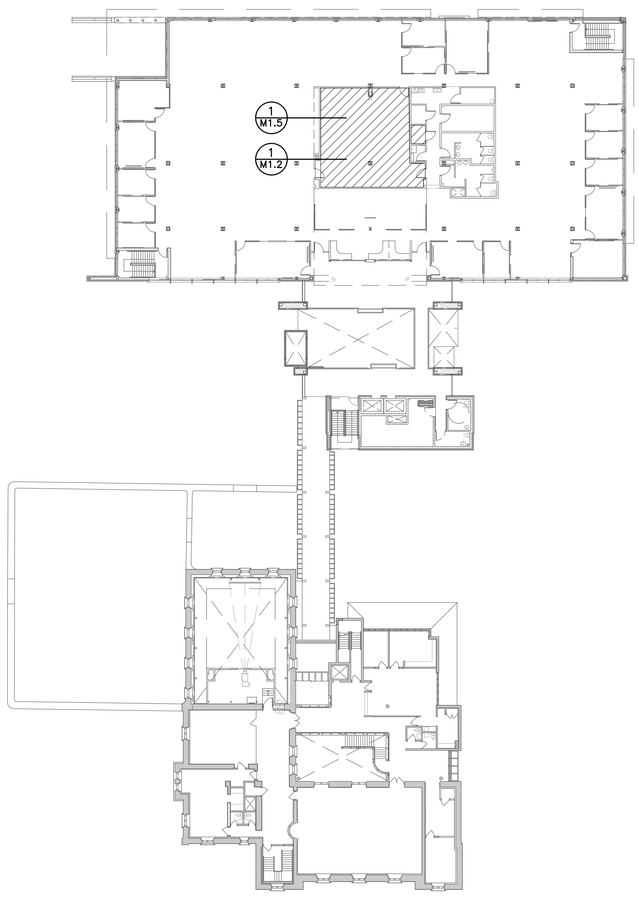
DRAWN BY:	SCALE:
VA	AS NOTED
CHECKED BY:	DATE:
BM	MAY 2024

PROJECT No.: 24034

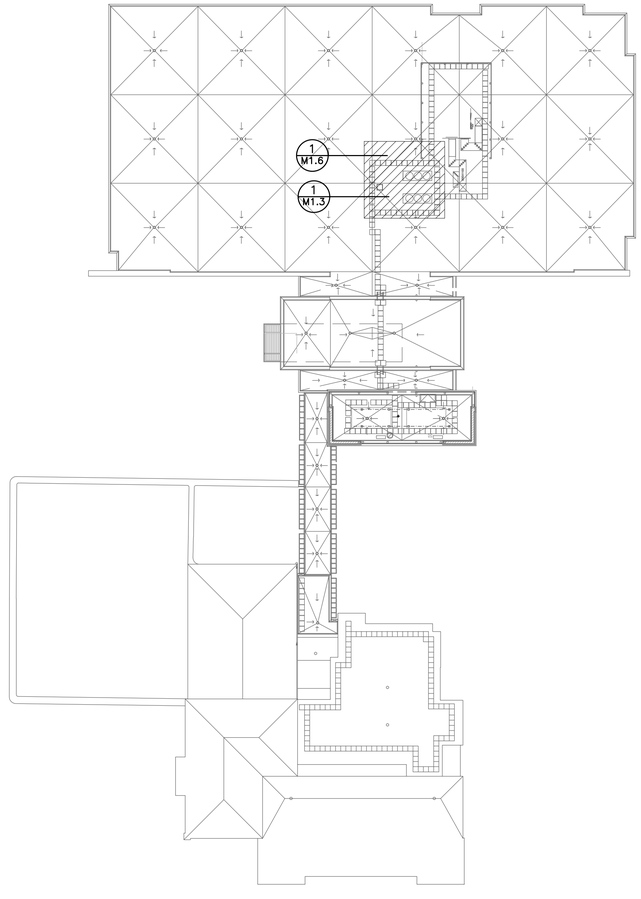
DRAWING No.: **M 0.5**



GROUND FLOOR KEY PLAN
N.T.S



SECOND FLOOR KEY PLAN
N.T.S



ROOF KEY PLAN
N.T.S

MILTON TOWN HALL KEY PLANS
N.T.S

REVISIONS

No.	ISSUE	DATE
A	ISSUED FOR CLIENT REVIEW	MAY 31, 2024
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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:

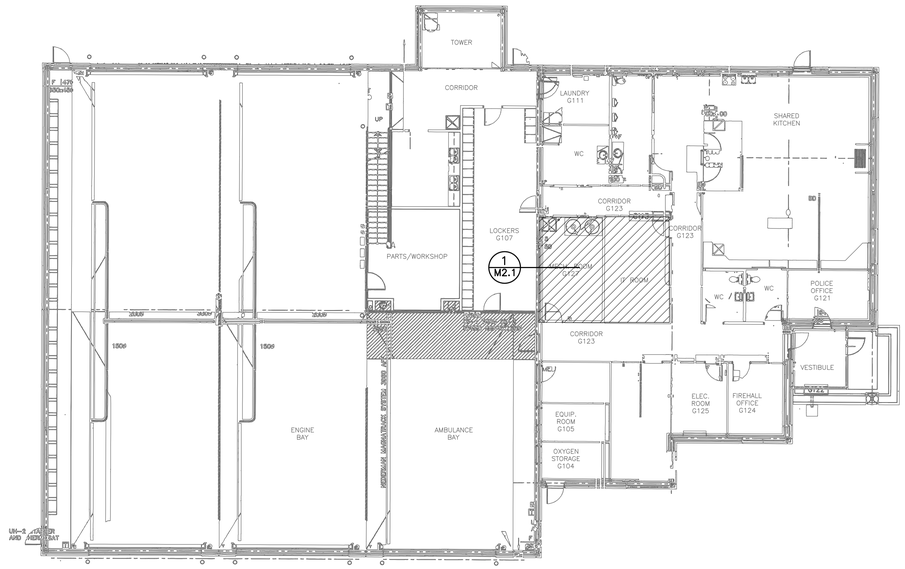
TOWN HALL KEY PLANS

DRAWN BY:	SCALE:
VA	AS NOTED
CHECKED BY:	DATE:
BM	MAY 2024

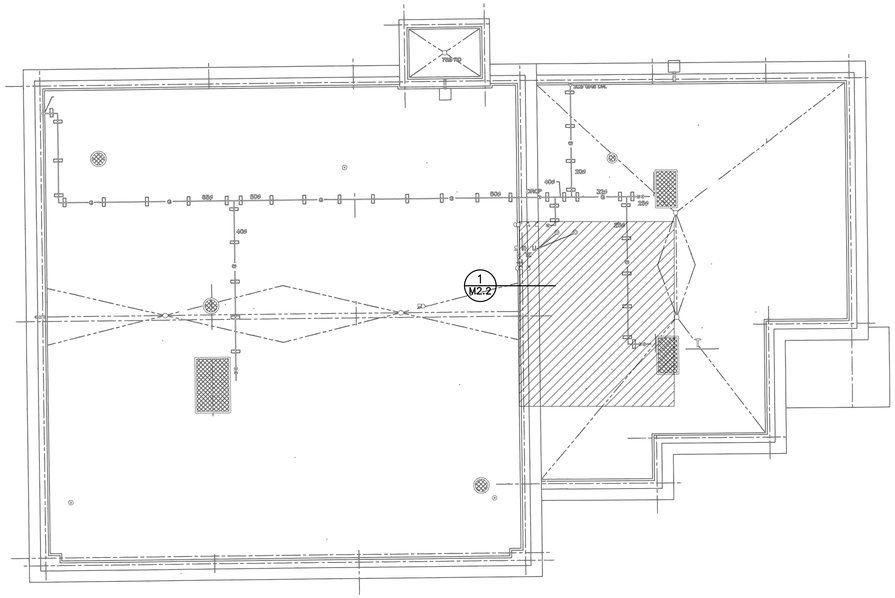
PROJECT No.: 24034

DRAWING No.:

M 0.6



GROUND FLOOR KEY PLAN
N.T.S



ROOF KEY PLAN
N.T.S

MILTON FIRE STATION #2 KEY PLANS
N.T.S

REVISIONS

No.	ISSUE	DATE
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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:

FIRE STATION #2 KEY PLANS

DRAWN BY:	SCALE:
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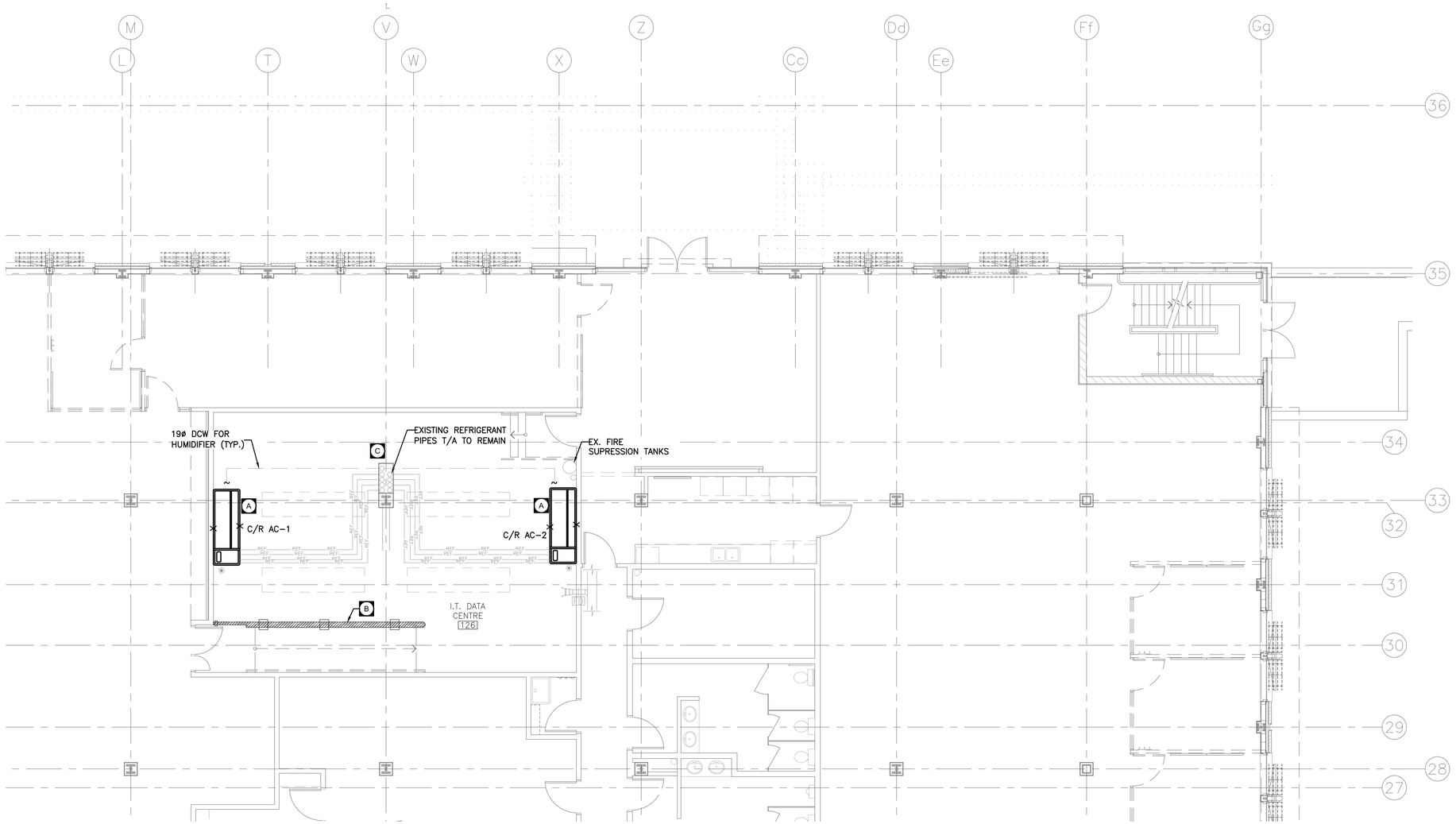
BM	MAY 2024

PROJECT No.: 24034

DRAWING No.:

M 0.7



1 M1.1 TOWN HALL GROUND FLOOR – MECHANICAL DEMOLITION PLAN
SCALE: 1:75

MECHANICAL NOTES

GENERAL NOTES:

1. MECHANICAL CONTRACTOR SHALL CARRYOUT A FULL SURVEY OF ALL EXISTING SERVICES AND STRUCTURE TO CONFIRM THE SIZE AND LOCATION OF THESE SERVICES, BEFORE THE COMMENCEMENT OF ANY WORK AND ADVISE CONSULTANT IF NEEDED.
2. THIS DRAWING DOES NOT SHOW ALL HIDDEN OR CONCEALED PIPING, DUCTS, PLUMBING AND EQUIPMENT. CONTRACTOR SHALL VISIT THE SITE AND MAKE THEIR OWN EVALUATION AND ESTIMATE OF THE EXTENT AND MAGNITUDE OF THE WORK INVOLVED PRIOR TO SUBMITTING PROPOSAL.
3. REMOVE ALL EQUIPMENT, PIPING, STEEL SUPPORTS, CONTROLS, PLUMBING MATERIAL, HOUSE KEEPING PAD, SHOWN APPROXIMATELY WITH 'X' THROUGHOUT (UNLESS OTHERWISE INDICATED).
4. FIRESTOP ALL RATED PENETRATIONS.

DEMOLITION DRAWING NOTES:

A. REMOVE EXISTING TWO LIEBERT CR A/C UNITS COMPLETE WITH ALL SUPPORTS, CONTROLS WIRING, DCW, REFRIGERANT PIPING AND DRAIN CONNECTIONS. REMOVAL OF OLD C/R AC UNIT AND INSTALLATION OF A NEW C/R AC UNIT SHALL BE PERFORMED IN TWO PHASES TO PREVENT INTERRUPTION IN COOLING OPERATION OF THE DATA CENTRE. ONE C/R AC UNIT SHALL BE READILY AVAILABLE FOR OPERATION AT ALL TIMES THROUGHOUT THE PROJECT.

B. TEMPORARILY DISMANTLE HAND RAILS, RAISED FLOOR TILES, CEILING TILES FOR TRANSPORT AND INSTALLATION OF NEW UNITS. RESTORE TO ORIGINAL CONDITION.

C. CONTRACTOR TO FIELD VERIFY THE REFRIGERANT PIPES SIZES ARE 1–1/8"ø FOR HOT GAS LINE AND 7/8"ø FOR LIQUID LINE FOR EACH CIRCUIT. EACH C/R AC UNIT HAS TWO CIRCUITS. IN CASE PIPE SIZES ARE DISCOVERED TO BE SMALLER, CONTRACTOR TO INFORM THE OWNER & CONSULTANT IMMEDIATELY.

REVISIONS

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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:

TOWN HALL GROUND FLOOR MECHANICAL DEMOLITION

DRAWN BY:	SCALE:
VA	AS NOTED
CHECKED BY:	DATE:
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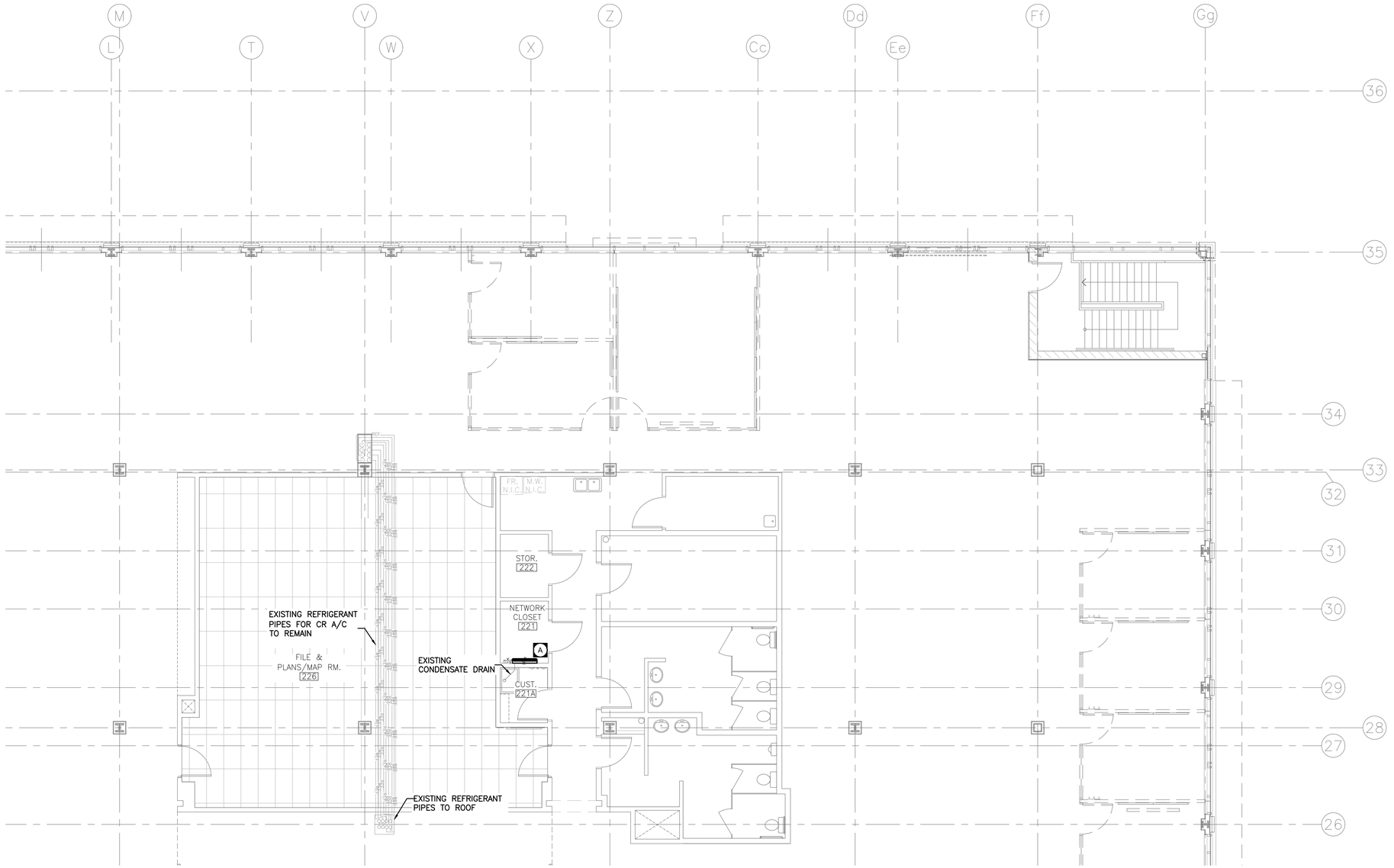
PROJECT No.: 24034

DRAWING No.: **M 1.1**



1 / M1.2 TOWN HALL SECOND FLOOR – MECHANICAL DEMOLITION PLAN
SCALE: 1:75

MECHANICAL NOTES

GENERAL NOTES:

1. MECHANICAL CONTRACTOR SHALL CARRYOUT A FULL SURVEY OF ALL EXISTING SERVICES AND STRUCTURE TO CONFIRM THE SIZE AND LOCATION OF THESE SERVICES, BEFORE THE COMMENCEMENT OF ANY WORK AND ADVISE CONSULTANT IF NEEDED.
2. THIS DRAWING DOES NOT SHOW ALL HIDDEN OR CONCEALED PIPING, DUCTS, PLUMBING AND EQUIPMENT. CONTRACTOR SHALL VISIT THE SITE AND MAKE THEIR OWN EVALUATION AND ESTIMATE OF THE EXTENT AND MAGNITUDE OF THE WORK INVOLVED PRIOR TO SUBMITTING PROPOSAL.
3. REMOVE ALL EQUIPMENT, PIPING, STEEL SUPPORTS, CONTROLS, PLUMBING MATERIAL, HOUSE KEEPING PAD, SHOWN APPROXIMATELY WITH 'X' THROUGHOUT (UNLESS OTHERWISE INDICATED)
4. FIRESTOP ALL RATED PENETRATIONS.

DEMOLITION DRAWING NOTES:

(A) REMOVE EXISTING WALL–MOUNTED SPLIT A/C UNIT COMPLETE WITH ALL SUPPORTS, REFRIGERANT PIPES UPTO ROOF CONDENSING UNIT, CONTROLS WIRING, DRAIN AND THERMOSTAT.

REVISIONS

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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:

TOWN HALL SECOND FLOOR MECHANICAL DEMOLITION

DRAWN BY:	SCALE:
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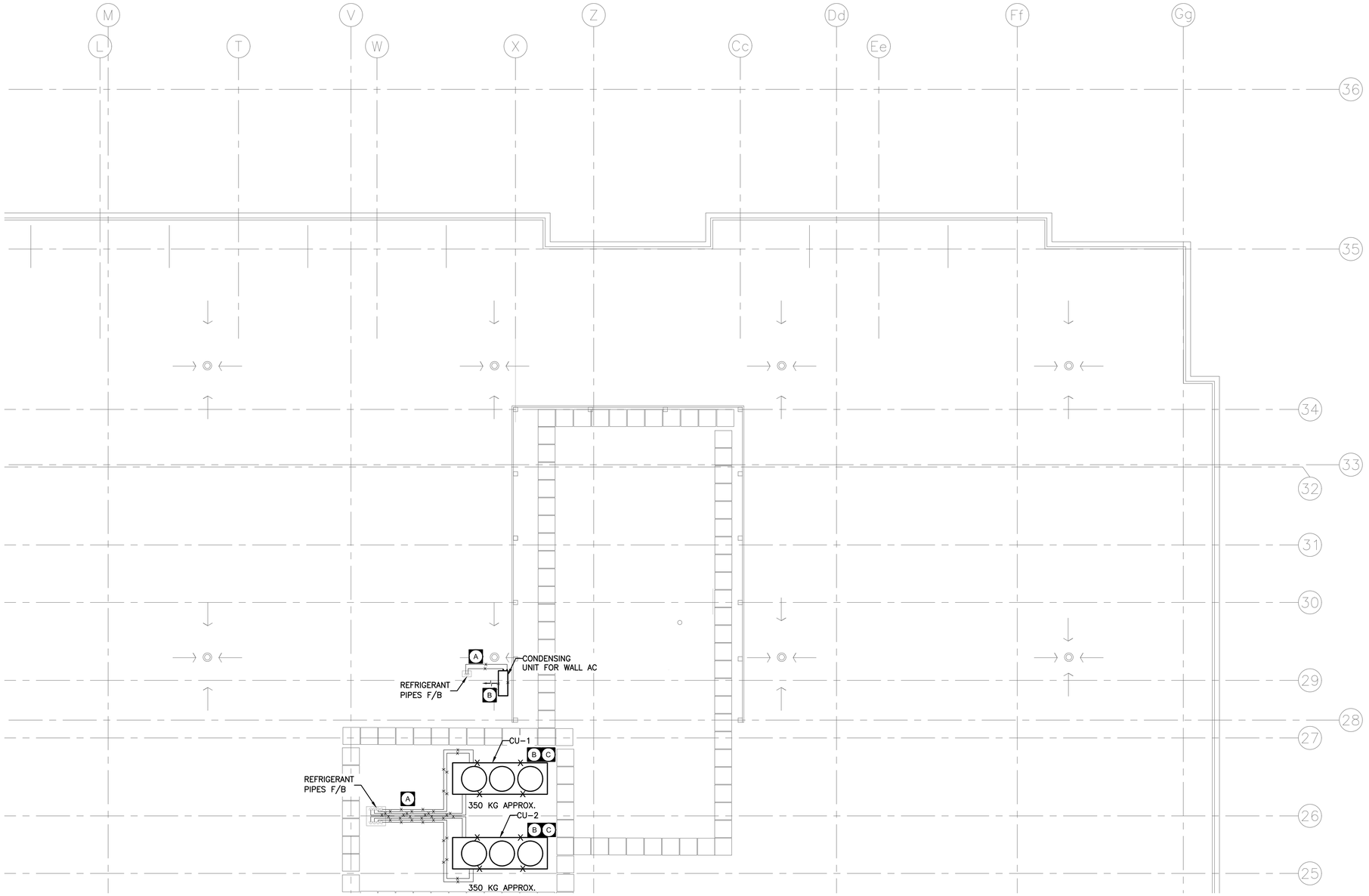
PROJECT No.: 24034

DRAWING No.: **M 1.2**



1 M1.3 TOWN HALL ROOF – MECHANICAL DEMOLITION PLAN
SCALE: 1:75

MECHANICAL NOTES

GENERAL NOTES:

1. MECHANICAL CONTRACTOR SHALL CARRYOUT A FULL SURVEY OF ALL EXISTING SERVICES AND STRUCTURE TO CONFIRM THE SIZE AND LOCATION OF THESE SERVICES, BEFORE THE COMMENCEMENT OF ANY WORK AND ADVISE CONSULTANT IF NEEDED.
2. THIS DRAWING DOES NOT SHOW ALL HIDDEN OR CONCEALED PIPING, DUCTS, PLUMBING AND EQUIPMENT. CONTRACTOR SHALL VISIT THE SITE AND MAKE THEIR OWN EVALUATION AND ESTIMATE OF THE EXTENT AND MAGNITUDE OF THE WORK INVOLVED PRIOR TO SUBMITTING PROPOSAL.
3. REMOVE ALL EQUIPMENT, PIPING, STEEL SUPPORTS, CONTROLS, PLUMBING MATERIAL, HOUSE KEEPING PAD, SHOWN APPROXIMATELY WITH 'X' THROUGHOUT (UNLESS OTHERWISE INDICATED)
4. FIRESTOP ALL RATED PENETRATIONS.

DEMOLITION DRAWING NOTES:

A REMOVE EXISTING INSULATED REFRIGERANT PIPING ON ROOF C/W VALVES, SUPPORTS AND ACCESSORIES AS INDICATED. TEMPORARILY CAP ALL PIPING CONNECTIONS AT ROOF DECK AND PROTECT FROM INTRUSION OF RAIN, SNOW & DEBRIS.

B REMOVE EXISTING CONDENSING UNITS ON ROOF COMPLETE WITH SUPPORTS AS INDICATED.

C REMOVAL OF OLD CONDENSERS AND INSTALLATION OF NEW CONDENSER UNITS SHALL BE PERFORMED IN TWO PHASES TO PREVENT INTERRUPTION IN COOLING OPERATION OF THE DATA CENTRE. ONE C/R AC UNIT SHALL BE AVAILABLE FOR OPERATION AT ALL TIMES THROUGHOUT THE PROJECT.

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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:

TOWN HALL ROOF MECHANICAL DEMOLITION

DRAWN BY:	SCALE:
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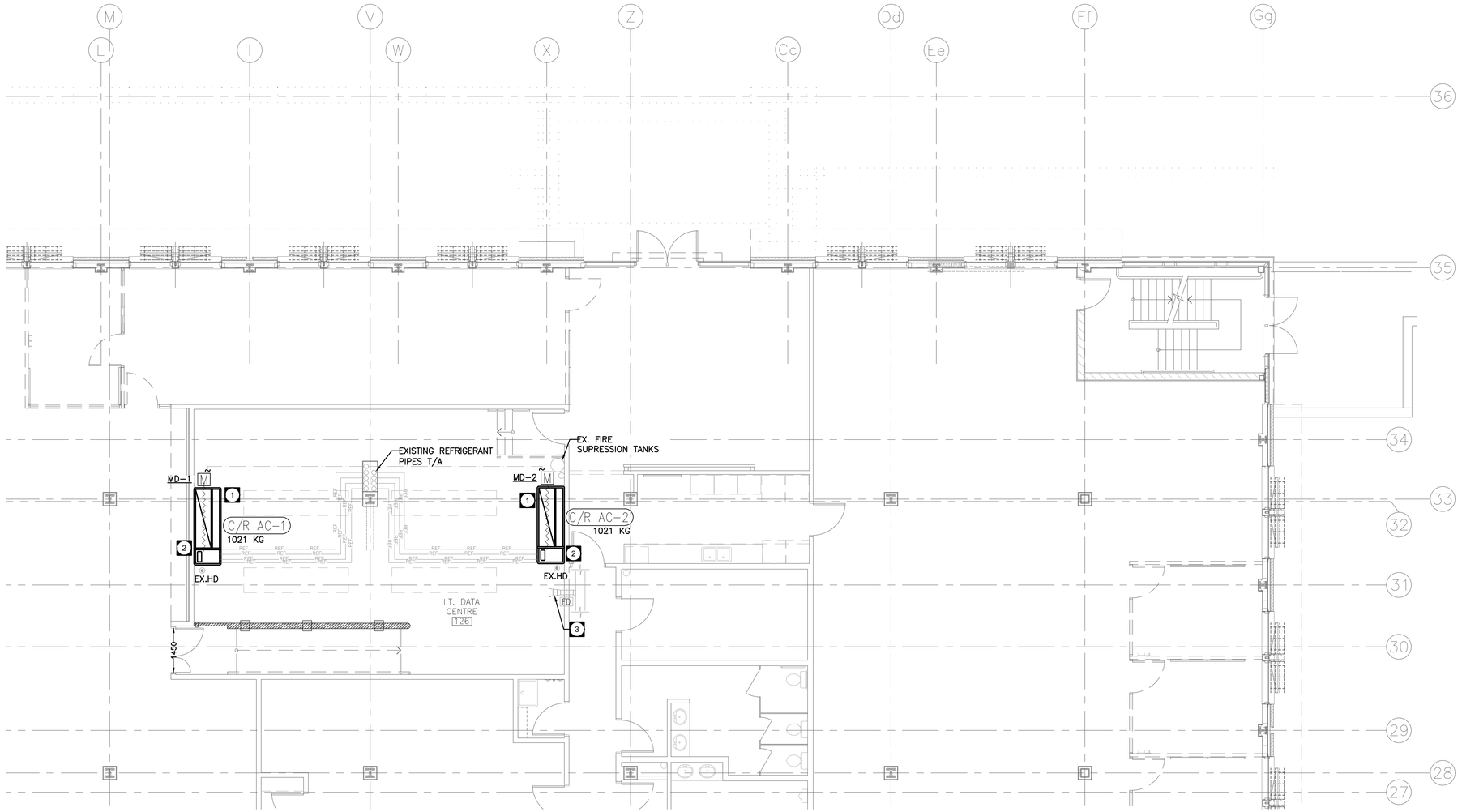
PROJECT No.: 24034

DRAWING No.: **M 1.3**



1 / M1.4 TOWN HALL GROUND FLOOR – MECHANICAL NEW PLAN
SCALE: 1:75

MECHANICAL NOTES

GENERAL NOTES:

1. MECHANICAL CONTRACTOR SHALL CARRYOUT A FULL SURVEY OF ALL EXISTING SERVICES AND STRUCTURE TO CONFIRM THE SIZE AND LOCATION OF THESE SERVICES, BEFORE THE COMMENCEMENT OF ANY WORK AND ADVISE CONSULTANT IF NEEDED.
2. THIS DRAWING DOES NOT SHOW ALL HIDDEN OR CONCEALED PIPING, DUCTS, PLUMBING AND EQUIPMENT. CONTRACTOR SHALL VISIT THE SITE AND MAKE THEIR OWN EVALUATION AND ESTIMATE OF THE EXTENT AND MAGNITUDE OF THE WORK INVOLVED PRIOR TO SUBMITTING PROPOSAL.
3. FIRESTOP ALL RATED PENETRATIONS.

NEW DRAWING NOTES:

1. PROVIDE NEW LIEBERT C/R AC UNITS COMPLETE WITH NEW SUPPORTS, CONTROLS WIRING, MOTORIZED DAMPER IN RETURN PLENUM, CONDENSATE DRAIN AND CONNECT THE UNITS TO EXISTING REFRIGERANT LINES, DCW HUMIDIFIER LINE, HUB–DRAIN.
2. C/R AC UNITS SHALL BE TRANSPORTED INTO THE DATA CENTRE AND SHALL BE NO WIDER THAN THE WIDTH OF THE DOOR. CONTRACTOR TO PERFORM INSPECTION OF UNIT SECTIONS PRIOR TO ASSEMBLY AND THEN PERFORM THE ASSEMBLY OF C/R AC UNITS INSIDE THE DATA CENTRE. ENGAGE SERVICES OF 'LIEBERT' FOR A POST–ASSEMBLY PRE–STARTUP INSPECTION, LIEBERT DO NOT PROVIDE ASSEMBLY SERVICES.
3. RE–BALANCE EX. ROOM VENTILATION GRILLE TO 47 L/s (100 CFM).

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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:

TOWN HALL GROUND FLOOR MECHANICAL NEW LAYOUT

DRAWN BY:	SCALE:
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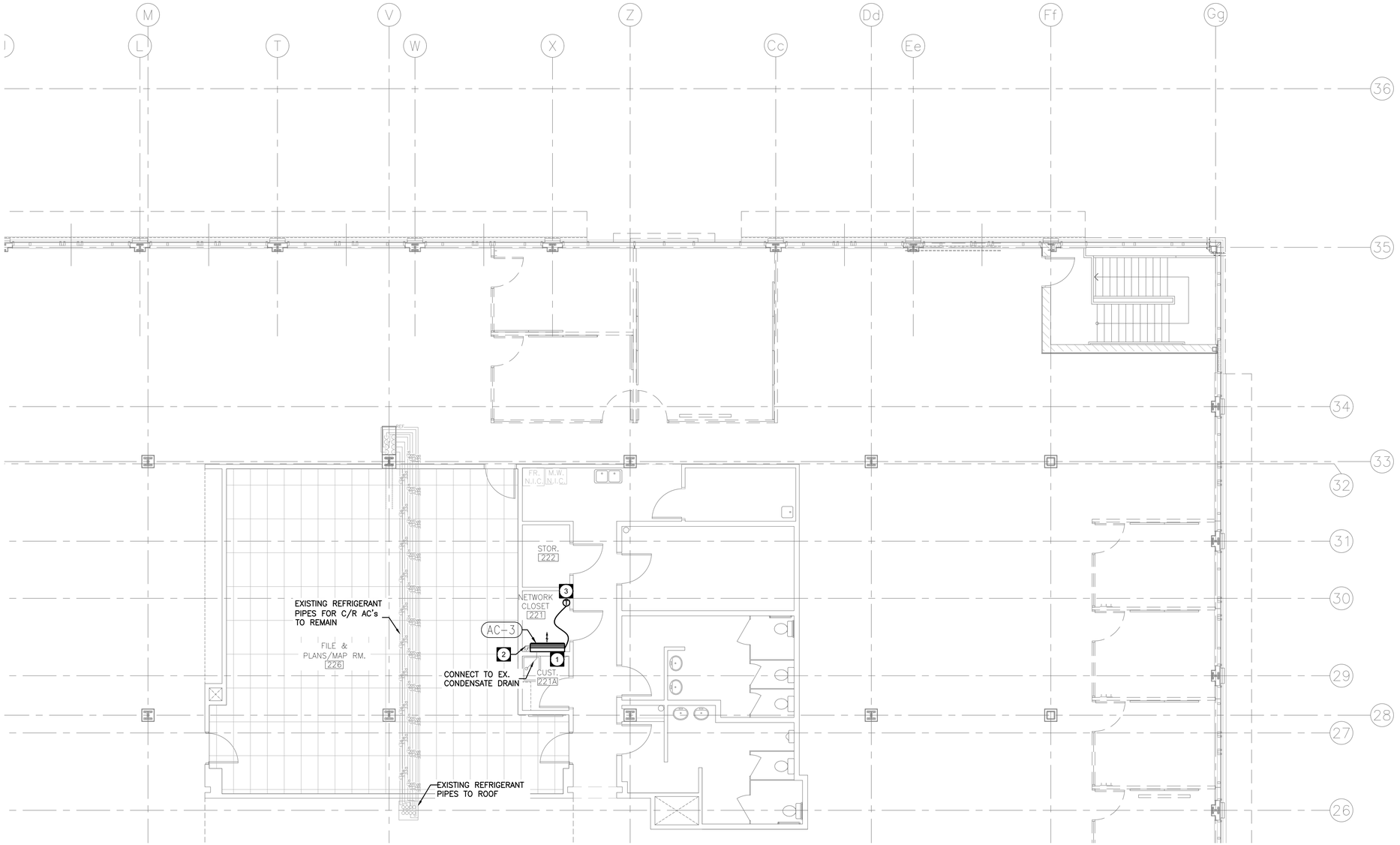
PROJECT No.: 24034

DRAWING No.: **M 1.4**



1 M1.5 TOWN HALL SECOND FLOOR – MECHANICAL NEW PLAN
SCALE: 1:75

MECHANICAL NOTES

GENERAL NOTES:

1. MECHANICAL CONTRACTOR SHALL CARRYOUT A FULL SURVEY OF ALL EXISTING SERVICES AND STRUCTURE TO CONFIRM THE SIZE AND LOCATION OF THESE SERVICES, BEFORE THE COMMENCEMENT OF ANY WORK AND ADVISE CONSULTANT IF NEEDED.
2. THIS DRAWING DOES NOT SHOW ALL HIDDEN OR CONCEALED PIPING, DUCTS, PLUMBING AND EQUIPMENT. CONTRACTOR SHALL VISIT THE SITE AND MAKE THEIR OWN EVALUATION AND ESTIMATE OF THE EXTENT AND MAGNITUDE OF THE WORK INVOLVED PRIOR TO SUBMITTING PROPOSAL.
3. FIRESTOP ALL RATED PENETRATIONS.

NEW DRAWING NOTES:

1. PROVIDE NEW WALL–MOUNTED SPLIT AC UNIT COMPLETE WITH NEW SUPPORTS, REFRIGERANT PIPES, CONTROLS WIRING, CONDENSATE DRAIN AND THERMOSTAT.
2. PROVIDE NEW INSULATED LIQUID AND SUCTION REFRIGERANT PIPING AS INDICATED, NEW REFRIGERANT PIPING SHALL FOLLOW SAME ROUTE AS EXISTING REFRIGERANT PIPING. REFER TO M3.3 FOR CONTINUATION.
3. PROVIDE NEW THERMOSTAT FOR NEW AC UNIT AT SAME LOCATION AS OLD THERMOSTAT.

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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:

TOWN HALL SECOND FLOOR MECHANICAL NEW LAYOUT

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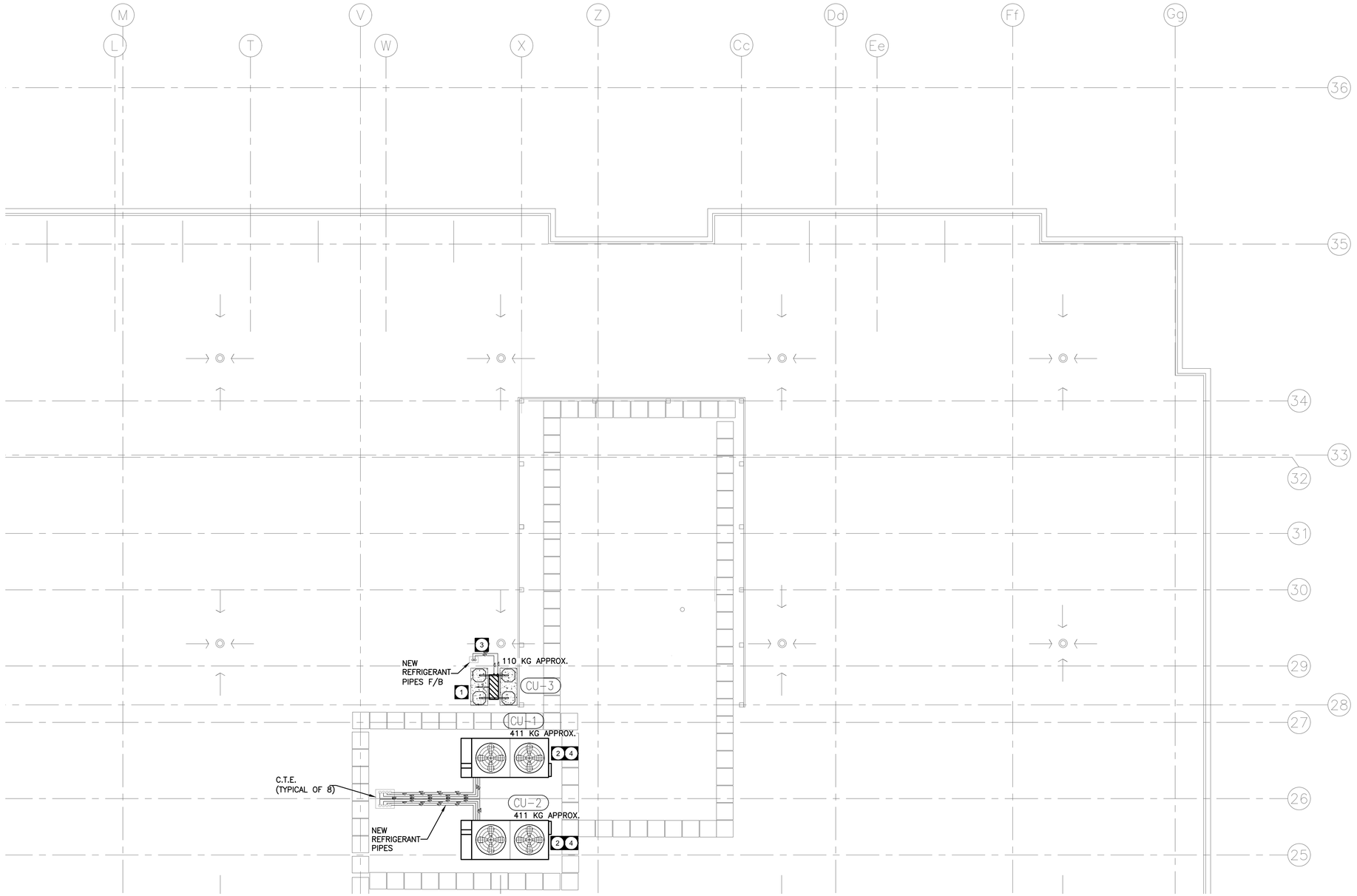

1 TOWN HALL ROOF – MECHANICAL NEW PLAN
M1.6 SCALE: 1:75

MECHANICAL NOTES

GENERAL NOTES:

1. MECHANICAL CONTRACTOR SHALL CARRYOUT A FULL SURVEY OF ALL EXISTING SERVICES AND STRUCTURE TO CONFIRM THE SIZE AND LOCATION OF THESE SERVICES, BEFORE THE COMMENCEMENT OF ANY WORK AND ADVISE CONSULTANT IF NEEDED.
2. THIS DRAWING DOES NOT SHOW ALL HIDDEN OR CONCEALED PIPING, DUCTS, PLUMBING AND EQUIPMENT. CONTRACTOR SHALL VISIT THE SITE AND MAKE THEIR OWN EVALUATION AND ESTIMATE OF THE EXTENT AND MAGNITUDE OF THE WORK INVOLVED PRIOR TO SUBMITTING PROPOSAL.
3. FIRESTOP ALL RATED PENETRATIONS.

NEW DRAWING NOTES:

1. PROVIDE NEW CONDENSING UNIT ON NEW CONCRETE PAVERS AND INSULATION, COMPLETE WITH 18" TALL ECOFOOT STAND. PROVIDE ALL REQUIRED MAINTENANCE CLEARANCES.
2. PROVIDE NEW C/R AC UNIT CONDENSERS C/W NEW SUPPORT LEGS AND FLASHED SLEEPERS, REFRIGERANT PIPING AND ACCESSORIES.
3. PROVIDE NEW INSULATED REFRIGERANT PIPES FROM NEW CONDENSING UNIT TO INDOOR UNIT IN FLOOR BELOW. REUSE EXISTING ROOF DOGHOUSE FOR NEW REFRIGERANT PIPING FROM FLOOR BELOW AND SEAL/WEATHERPROOF ANY NEW OPENINGS. ALL ROOFING WORK SHALL BE PERFORMED BY OWNER'S ROOFING CONTRACTOR ON RECORD.
4. THERE IS NO STAGING OR STORAGE AREA ON THE ROOF FOR NEW CONDENSERS. PRICE IN TENDER FOR HIRING CRANE & LIFTING EQUIPMENT AT LEAST TWICE TO PERFORM REPLACEMENT OF C/R AC CONDENSERS IN TWO PHASES.

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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:

TOWN HALL ROOF MECHANICAL NEW LAYOUT

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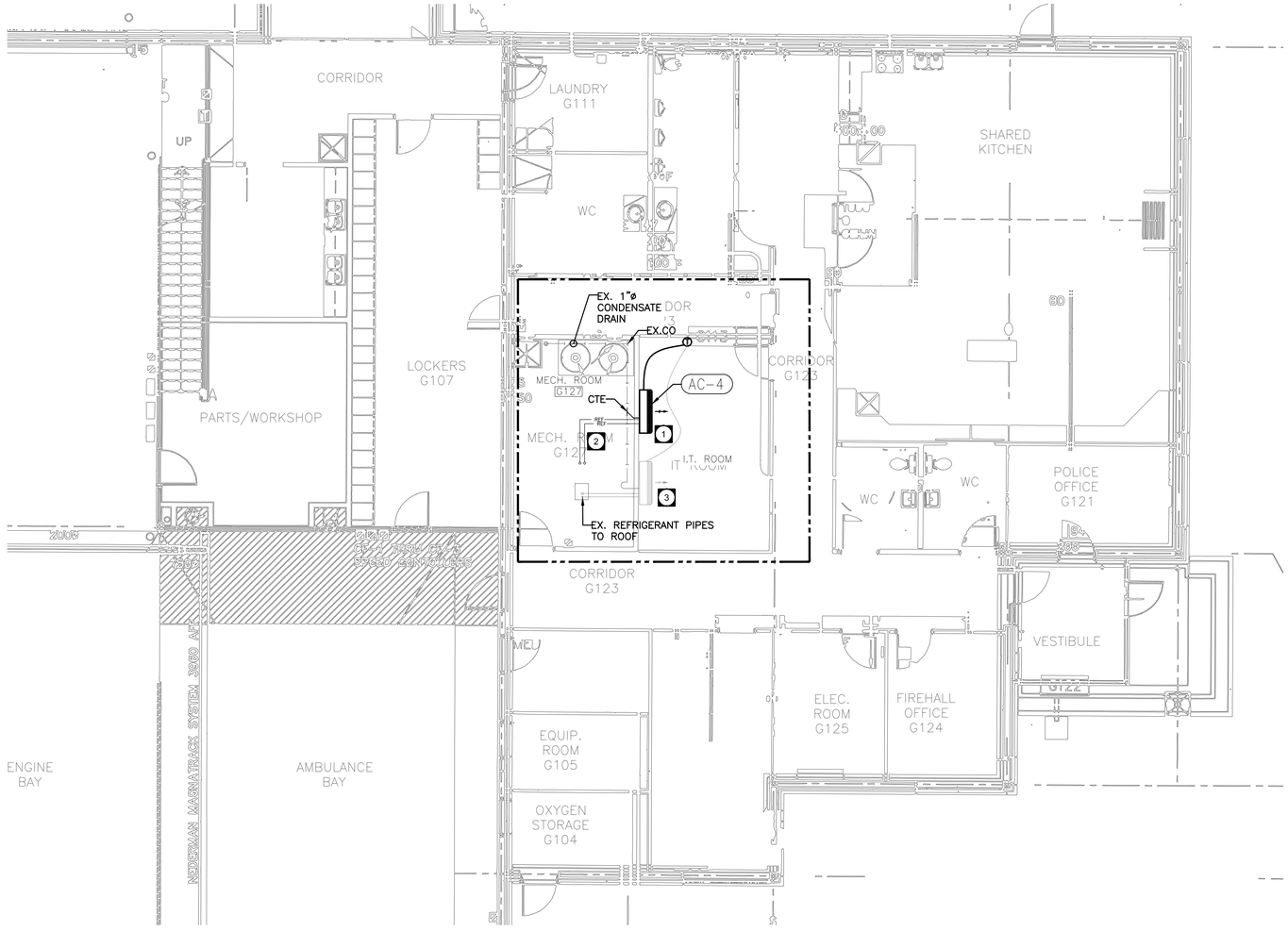
PROJECT No.: 24034

DRAWING No.: **M 1.6**



1 M1.7 FIRE STATION #2 GROUND FLOOR – M/E NEW PLAN
SCALE: 1:75

MECHANICAL NOTES

GENERAL NOTES:

1. MECHANICAL CONTRACTOR SHALL CARRYOUT A FULL SURVEY OF ALL EXISTING SERVICES AND STRUCTURE TO CONFIRM THE SIZE AND LOCATION OF THESE SERVICES, BEFORE THE COMMENCEMENT OF ANY WORK AND ADVISE CONSULTANT IF NEEDED.
2. THIS DRAWING DOES NOT SHOW ALL HIDDEN OR CONCEALED PIPING, DUCTS, PLUMBING AND EQUIPMENT. CONTRACTOR SHALL VISIT THE SITE AND MAKE THEIR OWN EVALUATION AND ESTIMATE OF THE EXTENT AND MAGNITUDE OF THE WORK INVOLVED PRIOR TO SUBMITTING PROPOSAL.
3. REFER TO ELECTRICAL NOTES ON THIS DRAWING FOR THE SCOPE OF DEMOLITION WORKS. REMOVE ALL MECHANICAL SYSTEMS, PIPING ETC. TO MEET THE INTENT OF THE NEW SCOPE OF WORK.
4. FIRESTOP ALL RATED PENETRATIONS.

NEW DRAWING NOTES:

1. PROVIDE NEW WALL–MOUNTED SPLIT AC UNIT COMPLETE WITH NEW SUPPORTS, REFRIGERANT PIPES, CONTROLS WIRING, CONDENSATE DRAIN. REMOVE EXISTING THERMOSTAT AND PROVIDE NEW THERMOSTAT AT SAME LOCATION. THE NEW AND EXISTING AC's SHALL WORK IN AUTOMATIC BACKUP AND ROTATE MODE.
2. PROVIDE NEW INSULATED LIQUID AND SUCTION REFRIGERANT PIPING AS INDICATED, NEW REFRIGERANT PIPING SHALL BE ROUTED THROUGH MECHANICAL ROOM AS INDICATED. INCLUDE IN TENDER PRICE FIRESTOPPING OF PIPE PENETRATIONS THROUGH FIRE RATED WALL. REFER TO DRAWING M3.3 FOR CONTINUATION.
3. EXISTING WALL–MOUNTED SPLIT AC UNIT TO REMAIN.

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HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:

FIRE STATION #2 GROUND FLOOR MECHANICAL LAYOUT

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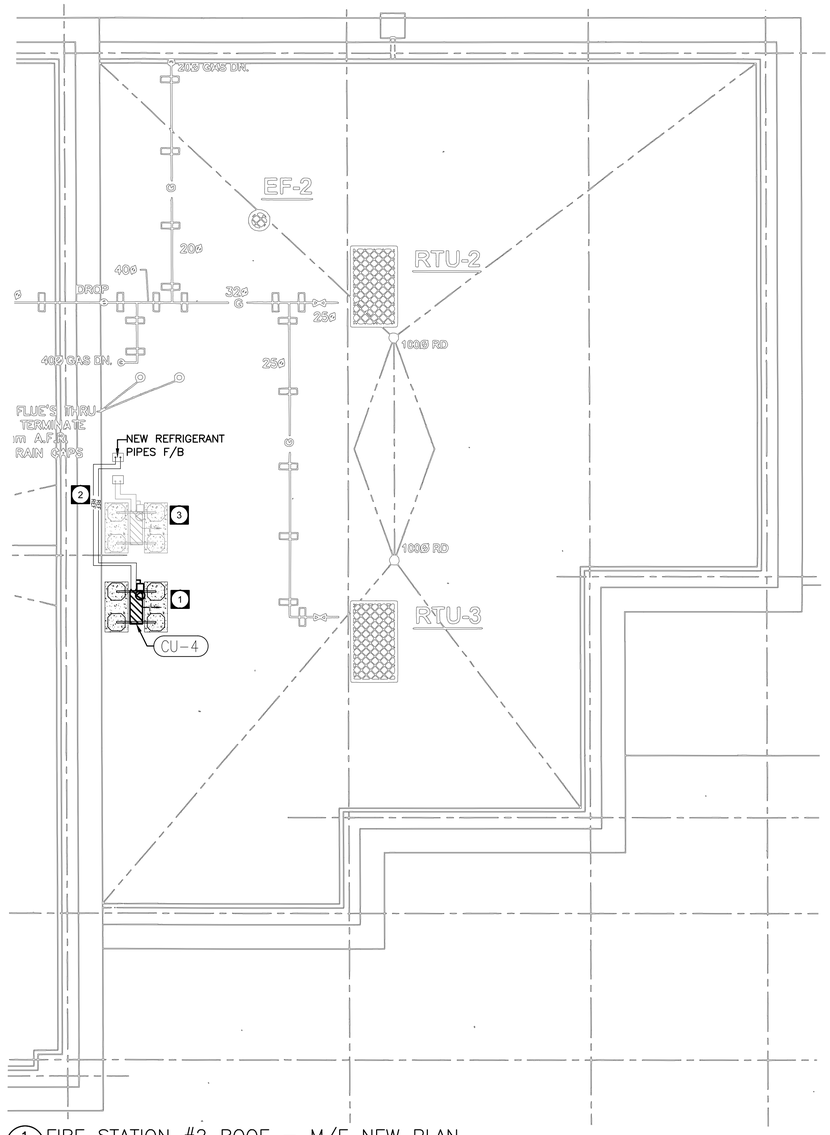

1 M1.8 FIRE STATION #2 ROOF – M/E NEW PLAN
SCALE: 1:75

MECHANICAL NOTES

GENERAL NOTES:

1. MECHANICAL CONTRACTOR SHALL CARRYOUT A FULL SURVEY OF ALL EXISTING SERVICES AND STRUCTURE TO CONFIRM THE SIZE AND LOCATION OF THESE SERVICES, BEFORE THE COMMENCEMENT OF ANY WORK AND ADVISE CONSULTANT IF NEEDED.
2. THIS DRAWING DOES NOT SHOW ALL HIDDEN OR CONCEALED PIPING, DUCTS, PLUMBING AND EQUIPMENT. CONTRACTOR SHALL VISIT THE SITE AND MAKE THEIR OWN EVALUATION AND ESTIMATE OF THE EXTENT AND MAGNITUDE OF THE WORK INVOLVED PRIOR TO SUBMITTING PROPOSAL.
3. REFER TO ELECTRICAL NOTES ON THIS DRAWING FOR THE SCOPE OF DEMOLITION WORKS. REMOVE ALL MECHANICAL SYSTEMS, PIPING ETC. TO MEET THE INTENT OF THE NEW SCOPE OF WORK.
4. FIRESTOP ALL RATED PENETRATIONS.

NEW DRAWING NOTES:

1. PROVIDE NEW CONDENSING UNIT ON NEW CONCRETE PAVERS AS REQUIRED, COMPLETE WITH 18" TALL ECOFOOT STAND. PROVIDE ALL REQUIRED MAINTENANCE CLEARANCES.
2. PROVIDE NEW INSULATED REFRIGERANT PIPES FROM NEW CONDENSING UNIT TO INDOOR UNIT IN FLOOR BELOW. PROVIDE NEW ROOF DOGHOUSE FOR NEW REFRIGERANT PIPING AND WIRING FROM FLOOR BELOW AND SEAL/WEATHERPROOF ANY NEW OPENINGS. ROOFING WORK SHALL BE PERFORMED BY OWNER'S ROOFING CONTRACTOR ON RECORD.
3. EXISTING CONDENSING UNIT TO REMAIN.

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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

DRAWING TITLE:

FIRE STATION #2 ROOF MECHANICAL LAYOUT

DRAWN BY:	SCALE:
VA	AS NOTED
CHECKED BY:	DATE:
BM	MAY 2024

PROJECT No.: 24034

DRAWING No.: **M 1.8**

ELECTRICAL SPECIFICATIONS

A. GENERAL CONDITIONS

1. CONFORM WITH LATEST EDITION OF THE ONTARIO BUILDING CODE (OBC), ONTARIO ELECTRICAL SAFETY CODE (OESC), CANADIAN STANDARDS ASSOCIATION (CSA), UNDERWRITERS LABORATORIES OF CANADA (ULC) AND LOCAL BY-LAWS AND AUTHORITIES HAVING JURISDICTION.
2. MATERIALS & EQUIPMENT SHALL CARRY APPROVAL AND CONFORM WITH CSA OR ULC STANDARDS. INSTALLATION SHALL COMPLY WITH ALL RULES AND REGULATIONS REGARDING MATERIALS AND WORKMANSHIP CONFORMING TO CSA, OESC, OBC AND LOCAL AUTHORITIES HAVING JURISDICTION.
3. VISIT JOB SITE PRIOR TO SUBMITTING TENDER AND EXAMINE ALL EXISTING CONDITIONS WHICH AFFECT THE WORK. NO EXTRAS WILL BE ALLOWED FOR FAILURE TO DO SO.
4. SUPPLY AND INSTALL COMPLETE ELECTRICAL SYSTEMS AS SHOWN AND/OR SPECIFIED HEREIN. DRAWINGS SHALL BE USED FOR ROUTING PURPOSES ONLY, DO NOT SCALE DRAWINGS. PROVIDE ALL NECESSARY MATERIAL AND LABOUR ETC. TO PROVIDE COMPLETE SYSTEMS.
5. FURNISH ALL REQUIRED LABOUR AND MATERIALS, MACHINERY, AND TOOLS, WITH ALL PROPER AND REQUIRED FACILITIES FOR MOVING AND TRANSPORTING SAME, SO THAT THE CONTRACT AND ALL WORK TO BE DONE UNDER IT, CAN AND WILL BE CARRIED OUT IN A PROFESSIONAL MANNER, PROPERLY, SATISFACTORILY, CONTINUOUSLY, AND EXPEDITIOUSLY, TO COMPLETION, IN ALL RESPECTS, TO THE SATISFACTION OF THE OWNER.
6. CO-ORDINATE ON SITE THE LOCATION OF EQUIPMENT, CONTROL DEVICES, SERVICE DISTRIBUTION SYSTEMS, ETC. COORDINATE WORK AND SCHEDULE WITH OTHER TRADES.
7. AT ALL TIMES KEEP THE OWNER'S PROPERTY CLEAN AND IN TIDY CONDITION. CLEAN AFFECTED WORK AREA AND REMOVE ALL DEBRIS FROM EQUIPMENT. FOLLOW MANUFACTURERS' INSTALLATION AND STARTUP INSTRUCTIONS.
8. PROVIDE WARNING SIGNS AND BARRIERS AS REQUIRED TO MEET INSPECTION DEPARTMENT'S REQUIREMENTS.
9. DRAWINGS SHOW GENERAL INTENT OF WORK AND NOT THE DETAILS OF THE INSTALLATION.
10. GUARANTEE IN WRITING ALL MATERIAL AND WORKMANSHIP INCLUDING THE MANUFACTURER'S GUARANTEE FOR THE MINIMUM PERIOD OF TWO (2) YEARS FROM THE DATE OF ACCEPTANCE UNLESS NOTED OTHERWISE IN MAIN FRONT END CONTRACT DOCUMENTS.
11. NO EXTRA CHARGES SHALL BE HONOURED EXCEPT WHERE THE CONTRACTOR RECEIVES A WRITTEN ORDER COUNTER-SIGNED OR OTHERWISE APPROVED BY THE OWNER.
12. AFTER THE APPROVAL OF DRAWINGS, THE RIGHT IS RESERVED TO MAKE REASONABLE CHANGES IN THE DESIGN OF THE WORK OR TO OMIT ANY SUCH PARTS AS THE OWNER MAY REQUIRE. IN THE CASE WHERE WORK OR MATERIAL IS ADDED TO OR DEDUCTED FOR THE WORK HEREIN SPECIFIED, A FAIR AND REASONABLE VALUATION OF THE SAME SHALL BE ADDED TO OR DEDUCTED FROM THE AMOUNT OF THIS CONTRACT.
13. THE CONSULTANT RESERVES THE RIGHT TO SELECT THE FINAL PRODUCT AND OR OPTIONS/ACCESSORIES DURING SHOP DRAWING REVIEW AT NO ADDITIONAL COST TO THE OWNER IN THE CASE OF ANY DISCREPANCIES LISTED BETWEEN CATALOGUE NUMBERS, WRITTEN PRODUCT DESCRIPTIONS AND/OR DETAILS SHOWN ON THE DRAWINGS. THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE CONSULTANT IN WRITING BEFORE TENDER CLOSES OF ANY DISCREPANCIES THAT MAY BE SHOWN ON THE DRAWINGS REGARDING LISTED PRODUCT SPECIFICATIONS AND CATALOGUE NUMBERS THAT MAY AFFECT PRICING AND GET CLARIFICATION ON THESE ITEMS BEFORE SUBMITTING FINAL TENDER PRICE. FAILURE OF THE ELECTRICAL CONTRACTOR TO REQUEST CLARIFICATIONS ON SUCH ITEMS DURING TENDER MAKES NULL AND VOID ANY FUTURE CLAIMS RELATING TO FINAL PRODUCT SELECTION BY THE CONSULTANT.
16. ALL INDOOR SWITCHBOARDS, PANELBOARDS, AND TRANSFORMERS TO BE SPRINKLER PROOF.

B. PERMITS, TEST, REGULATIONS, ETC.

1. CARRY OUT ALL CHANGES AND ALTERATIONS REQUIRED BY THE AUTHORIZED INSPECTOR OF ANY AUTHORITY HAVING JURISDICTION WITHOUT DELAY TO THE PROGRESS OF THE WORK AND WITHOUT EXTRA COST.
2. PROVIDE WARNING SIGNS AND ARC FLASH LABELS AS SPECIFIED OR TO MEET REQUIREMENTS OF O.E.S.C, INSPECTION DEPARTMENT AND THE CONSULTANT.
3. UPON COMPLETION OF THE CONTRACT, ISSUE TO THE OWNER A FORMAL CERTIFICATION OF COMPLETION OF WORK BEFORE FINAL PAYMENT FOR WORK MAY BE CONSIDERED DUE.
4. PAYMENTS FOR ALL PERMITS, DEPOSITS, INSPECTION, SERVICES, AND OTHER FEES NECESSARY FOR THE WORK SHALL BE INCLUDED IN THE TENDER.

C. SUBMITTALS

1. BEFORE FABRICATION OF ANY MATERIALS OR EQUIPMENT, SUBMIT ONE (1) ELECTRONIC COPY OF DETAILED MANUFACTURER'S SHOP DRAWINGS OF EQUIPMENT AND APPARATUS FOR REVIEW. DO NOT ORDER MATERIALS UNTIL APPROVAL HAS BEEN GIVEN. IF CORRECTIONS ARE REQUIRED, COPIES WILL BE RETURNED WITH CORRECTIONS NOTED. CORRECTED COPIES SHALL BE RESUBMITTED FOR REVIEW AND DISTRIBUTION. SUBMISSIONS SHALL BE MADE IN AMPLE TIME TO AVOID DELAYS IN THE WORK. THE REVIEW OF THE SHOP DRAWINGS SHALL BE, AND IS MUTUALLY UNDERSTOOD TO BE, IN REFERENCE TO GENERAL DESIGN ONLY. IF ERRORS IN THE DETAILED DIMENSIONS OR INTERFERENCE WITH THE WORKS ARE NOTICED, THE ATTENTION OF THE CONTRACTOR WILL BE CALLED TO SUCH ERRORS OR INTERFERENCE, BUT REVIEW OF THE DRAWINGS SHALL NOT IN ANY WAY RELIEVE THIS CONTRACTOR OF RESPONSIBILITY FOR ERRORS OR INTERFERENCE, OR FROM THE NECESSITY OF FURNISHING SUCH WORKS AND MATERIALS AS MAY BE REQUIRED FOR THE COMPLETION OF THE WORK AT ANY TIME UNTIL FORMAL ACCEPTANCE.
2. THE ELECTRICAL CONTRACTOR IS TO REVIEW, DATE AND SIGN ALL ELECTRICAL SHOP DRAWINGS PRIOR TO SUBMITTING TO THE CONSULTANT FOR REVIEW.
3. THE ELECTRICAL CONTRACTOR TO PREPARE RECORD DRAWINGS (IN AUTOCAD AND PDF FORMATS) INCLUDING ALL CHANGES AND DEVIATIONS FROM CONSTRUCTION SET AND SUBMIT THEM TO THE CONSULTANT AND THE OWNER UPON THE COMPLETION OF THE PROJECT. AUTOCAD FILES CAN BE SUPPLIED BY THE CONSULTANT UPON REQUEST. THE CONSULTANT CAN PREPARE AS BUILT AUTOCAD DRAWINGS FOR THE ELECTRICAL CONTRACTOR FOR A NOMINAL FEE.
4. THE FOLLOWING ITEMS ARE TO BE SUBMITTED TO THE CONSULTANT AND THE OWNER AT THE END OF THE PROJECT IN THE ELECTRONIC FORMAT INDICATING EACH SECTION:
   - 4.1. FINAL INSPECTION/VERIFICATION REPORTS FROM THE INSPECTION AUTHORITIES AND TESTING AGENCIES
   - 4.2. MANUFACTURER'S SPECIFICATION SHEETS
   - 4.3. A COPY OF ALL FINAL REVIEWED SHOP DRAWINGS
   - 4.4. AUTOCAD AND PDF RECORD DRAWINGS
   - 4.5. OPERATING INSTRUCTIONS FOR EACH SYSTEM INCLUDING CONTROL AND WIRING DIAGRAMS
   - 4.6. MANUFACTURER RECOMMENCED MAINTENANCE PROCEDURES AND SCHEDULES
   - 4.7. WARRANTY LETTER FOR ALL MATERIAL AND WORKMANSHIP
   - 4.8. ALL PANELBOARD TYPEWRITTEN DIRECTORIES
   - 4.9. USB DRIVE WITH ELECTRONIC COPY OF ITEMS 4.1 TO 4.8

D. MATERIALS

1. ALL MATERIALS AND EQUIPMENT (PRODUCTS) TO BE NEW AND FREE OF DEFECTS, CSA, ULC OR CANADIAN RECOGNIZED CERTIFICATION.
2. THIS IS A BASE BID SPECIFICATION. ITEMS ON THE DRAWINGS AND SUBSEQUENT DIVISIONS OF THESE SPECIFICATIONS ARE LISTED WITH THE NAMES OF A SPECIFIC MANUFACTURER, THE FIRST OF WHICH IS BASE BID AND HAS BEEN USED IN THE DESIGN AND IS THE EQUIPMENT SHOWN ON THE DRAWINGS. THE PRICE SUBMITTED FOR THIS CONTRACT SHALL BE BASED ON THE USE OF MATERIALS AND EQUIPMENT SPECIFIED AS THE BASE BID.
3. WHERE OTHER THAN A FIRST-NAMED PRODUCT IS PROPOSED, THE BIDDER WILL BE DEEMED TO REPRESENT THAT NAMED PRODUCT CONFORMS TO THE PERFORMANCE, QUALITY, SPACE AND WEIGHT CHARACTERISTICS OF THE BASE BID PRODUCT. THIS CONTRACTOR WILL BE RESPONSIBLE FOR ANY ADDITIONAL DESIGN OR CONSTRUCTION COSTS GENERATED BY THE USE OF THE NON-FIRST NAMED BID MATERIAL. ACCEPTANCE OF NON-BASE MANUFACTURERS WITH RESPECT TO THEIR EQUIVALENCY SHALL BE SUBJECT TO THE CONSULTANT'S REVIEW OF SHOP DRAWINGS.

E. WIRES AND CABLES

1. ALL WIRING SHALL BE MINIMUM COPPER NO. 12 AWG WITH 600V INSULATION FOR 120/208V WIRING AND 1000V FOR 600V WIRING OF CHEMICALLY CROSS-LINKED THERMOSETTING POLYETHYLENE (XLPE) MATERIAL SUITABLE FOR 90° OPERATION. CONDUCTORS NO. 10 AWG AND LARGER SHALL BE STRANDED. CONDUCTOR SIZES SHALL BE IN ACCORDANCE WITH THE OESC AND AS INDICATED ON THE DRAWINGS.
2. ALUMINUM WIRING IS NOT ACCEPTABLE UNLESS NOTED OTHERWISE.
3. WHERE CONDUCTOR SIZES ARE NOT INDICATED THEY SHALL BE SIZED TO ENSURE THE VOLTAGE DROP DOES NOT EXCEED 2% FOR BRANCH CIRCUIT AND 3% FOR MAIN FEEDER AND THE REQUIREMENTS OF THE OESC.
4. ALL WIRING TO BE INSTALLED IN CONDUIT OR RACEWAY AND SHALL BE EQUIPPED WITH A GREEN INSULATED BOND CONDUCTOR SIZED TO MEET THE REQUIREMENTS OF THE OESC.

F. CONDUIT

1. EMT AND RIGID GALVANIZED STEEL (RGS) CONDUIT TO BE CONCEALED IN FINISHED AREAS OF THE BUILDING.
2. FLEXIBLE METALLIC CONDUIT MAY BE USED FOR SHORT CONNECTIONS TO VIBRATING MECHANICAL EQUIPMENT.
3. MINIMUM CONDUIT SIZE SHALL BE 21mm (3/4") UNLESS NOTED OTHERWISE ON THE DRAWINGS.
4. WHERE SLEEVES OR OPENINGS ARE INSTALLED IN WALLS, FLOORS, ROOF OR PARTITIONS TO ACCOMMODATE RACEWAYS OR CABLES, PROVIDE ALL NECESSARY SEALS, FITTINGS, BARRIERS AND FIRE-RESISTANT MATERIALS TO RESTORE THE INSTALLATION TO ITS ORIGINAL FIRE RATING TO THE SATISFACTION OF THE GOVERNING AUTHORITIES.
5. ALL CONDUITS THAT PENETRATE EXTERIOR WALLS/ROOF ARE TO BE SEALED AIR/LIQUID TIGHT AFTER INSTALLATION AT BOTH ENDS OF THE CONDUIT.
6. ALL LOW VOLTAGE WIRING IS TO BE INSTALLED IN CONDUIT UNLESS NOTED OTHERWISE ON DRAWINGS

G. OUTLETS AND JUNCTION BOXES

1. PROVIDE STICK ON LABELS (BLACK LETTERING ON WHITE BACKGROUND) INDICATING THE PANEL AND CIRCUIT NUMBER FOR ALL RECEPTACLES AND CONTROL DEVICES. LABELS SHALL BE NEATLY PLUMB AND LEVEL ON THE COVER PLATE. POORLY POSITIONED LABELS WILL NOT BE ACCEPTED.
2. THE OWNER/CONSULTANT RESERVES THE RIGHT TO CHANGE LOCATIONS OF OUTLETS TO WITHIN 3660mm (12ft) OF LOCATION INDICATED ON THE DRAWINGS WITHOUT EXTRA CHARGE, PROVIDING CONTRACTOR IS ADVISED PRIOR TO INSTALLATION.
3. ALL JUNCTION BOXES SHALL BE SIZED TO ACCOMMODATE THE NUMBER OF RACEWAYS AND CONDUCTORS AND BE EASILY ACCESSIBLE AFTER INSTALLATION.
4. ALL PULL/JUNCTION BOXES MUST BE ACCESSIBLE AFTER THE BUILDING IS COMPLETE. INSTALL PULL ROPE IN ALL EMPTY CONDUITS.
5. ALL JUNCTION BOXES AND CONDUIT SUPPORT SYSTEM SHALL BE SECURED TIGHT TO THE UNDERSIDE OF THE BUILDING STRUCTURE. SUSPENDED JUNCTION BOXES AND CONDUITS WILL NOT BE ACCEPTED.

H. GROUNDING

1. GROUND THE SERVICE AND ALL NON-CURRENT CARRYING METAL PARTS IN ACCORDANCE WITH OESC.
2. PROVIDE COMPLETE GROUNDING AND BONDING SYSTEM AS REQUIRED BY OESC.

I. FIRE STOPPING

1. SEALS FOR CABLES AND CONDUIT:
   - PROVIDE SEALS FOR CONDUIT AT ALL FIRE RATED WALL/FLOOR PENETRATIONS.
   - APPLY ALL THROUGH-FLOOR FIRE PUTTY SEALS (3M OR EQUIVALENT) THAT SEAL HOLES IN WALL/FLOOR.

J. MECHANICAL EQUIPMENT

1. PROVIDE LINE VOLTAGE CONNECTIONS AS REQUIRED FOR ALL MECHANICAL EQUIPMENT. CONFIRM FINAL CONNECTIONS, LOADS AND LOCATIONS PRIOR TO INSTALLATION. NO EXTRAS WILL BE ALLOWED FOR ELECTRICAL CONTRACTOR NOT THOROUGHLY REVIEWING ALL MECHANICAL DRAWINGS DURING TENDER AND SHOP DRAWINGS DURING CONSTRUCTION.
2. FUSES PROTECTING MOTOR FEEDERS TO BE TIME-DELAY TYPE UNLESS NOTED OTHERWISE.
3. PROVIDE ALL NECESSARY LINE VOLTAGE CONTROL WIRING FOR MECHANICAL CONTROLS CONTRACTOR AS REQUIRED. PROVIDE CONTROL WIRING AS SHOWN ON THE ELECTRICAL AND MECHANICAL DRAWINGS.
4. ELECTRICAL CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL NECESSARY COMBINATION STARTERS FOR MECHANICAL EQUIPMENT UNLESS NOTED OTHERWISE ON MECHANICAL DRAWINGS.

K. DISCONNECT SWITCHES

1. INSTALL FUSED OR NON FUSED HORSE POWER RATED HEAVY DUTY DISCONNECT SWITCHES AS REQUIRED BY CODE OR AS SHOWN ON DRAWINGS. CSA TYPE RATINGS OF DISCONNECT SWITCHES TO BE AS INDICATED ON DRAWINGS.
2. ELECTRICAL CONTRACTOR TO SUPPLY AND INSTALL FUSES IN ANY FUSED DISCONNECT SWITCH.

L. FIELD QUALITY CONTROL

1. TEST ALL WORK. REMEDY AND MAKE GOOD ANY DEFECTS DISCLOSED BY SUCH TESTS AND TEST THE WORK AGAIN. TEST IN ACCORDANCE WITH APPROVED PROCEDURE.
2. TEST EACH POWER AND CONTROL CONDUCTOR FOR CONTINUITY AND GROUNDS. IMMEDIATELY FOLLOWING THIS TEST, CONNECT CONDUCTOR TO ITS PERMANENT TERMINAL.
3. INSPECT ALL CONNECTIONS, PROTECTIVE AND SAFETY DEVICES PRIOR TO ENERGIZING ANY EQUIPMENT AND MAKE NECESSARY ADJUSTMENTS, WHERE REQUIRED, TO ASSURE A PROPER AND SAFE OPERATION.
4. ALL EQUIPMENT SHALL BE WIPED CLEAN AND VACUUMED.

N. EXECUTION

RACEWAYS:

1. INSTALL CONDUIT AS A COMPLETE SYSTEM WITHOUT WIRES. CONTINUE CONDUIT FROM FITTING TO FITTING AND FASTEN SECURELY TO PLACE. CLEAN AND SEAL CONDUIT SYSTEM UNTIL WIRING IS INSTALLED.
2. CUT ALL CONDUITS SQUARE AND REAM TO REMOVE SHARP EDGES AND BURRS. FIT CONDUITS CLOSELY AND TIGHTLY IN COUPLINGS.
3. INSTALL A PULL WIRE IN EACH EMPTY CONDUIT PROVIDED FOR FUTURE USE BY OTHERS.
4. CAP ALL CONDUITS WITH METAL, CARDBOARD OR PLASTIC, DURING CONSTRUCTION.

WIRES AND CABLES:

1. DO NOT PULL THE WIRES BEFORE THE ENTIRE CONDUIT SYSTEM IS COMPLETED AND CLEANED.
2. ENSURE THAT WIRES INSTALLED IN THE INTERIOR OF EQUIPMENT ARE NEATLY LACED WITH PLASTIC TIES AND GRASPED AND SECURED IN PLACE.
3. RUN POWER CONDUCTORS FULL LENGTH WITHOUT SPLICES OR TAPS FROM ORIGIN TO DESTINATION, UNLESS SPECIFICALLY CALLED FOR ON THE DRAWINGS. NO CABLE SPLICING ALLOWED IN UNDERGROUND INSTALLATION.
4. IDENTIFY EACH CABLE AND WIRE AT BOTH ENDS WITH PROPER CABLE AND WIRE NUMBER AS SHOWN ON THE DRAWINGS AND CABLE SCHEDULES IN ALL CONTROL PANELS, CONTROL DEVICES, DISTRIBUTION PANELS, PULL AND JUNCTION BOXES, ETC., USING APPROVED CABLE AND WIRE MARKERS.
5. USE SUITABLE NON-HARDENING CABLE LUBRICANTS, WHERE REQUIRED, WHICH DO NOT CONTAIN ANY MATERIALS SUCH AS OIL, GREASE OR OTHER COMPOUNDS HARMFUL TO RUBBER, PVC OR POLYETHYLENE.
6. MAKE SPLICES AND TAPS FOR CONTROL CONDUCTORS AT APPROVED TERMINAL BLOCKS IN JUNCTION BOXES.

ELECTRICAL DRAWING LIST	
E0.1	SPECIFICATIONS, DRAWING LIST, LEGENDS AND ABBREVIATIONS
E1.1	TOWN HALL GROUND FLOOR ELECTRICAL DEMOLITION PLAN
E1.2	TOWN HALL SECOND FLOOR ELECTRICAL DEMOLITION PLAN
E1.3	TOWN HALL ROOF ELECTRICAL DEMOLITION PLAN
E1.4	TOWN HALL GROUND FLOOR NEW ELECTRICAL PLAN
E1.5	TOWN HALL SECOND FLOOR NEW ELECTRICAL PLAN
E1.6	TOWN HALL ROOF NEW ELECTRICAL PLAN
E1.7	FIRE STATION #2 GROUND NEW FLOOR ELECTRICAL PLAN
E1.8	FIRE STATION #2 ROOF NEW ELECTRICAL PLAN

ABBREVIATIONS	
c/w	DENOTES COMPLETE WITH
ED	DENOTES EXISTING DEVICE TO BE DEMOLISHED
EX	DENOTES EXISTING DEVICE TO REMAIN
NTS	DENOTES NOT TO SCALE
TYP	DENOTES TYPICAL

POWER AND SYSTEMS	
SYMBOL	DESCRIPTION
	HARD WIRED POWER CONNECTION RATED PER EQUIPMENT SPECIFICATION
	SURFACE MOUNTED ELECTRICAL PANEL BOARD
	NON-FUSED DISCONNECT SWITCH
GENERAL NOTE: 1. REFER TO POWER AND SYSTEMS SCHEDULE FOR DETAILED SPECIFICATION.	

LINE TYPES	
LINE TYPE	DESCRIPTION
----------	DENOTES DEVICE TO BE DEMOLISHED OR RELOCATED
————	DENOTES NEW OR RELOCATED DEVICE
————	DENOTES EXISTING DEVICE TO REMAIN

REVISIONS		
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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

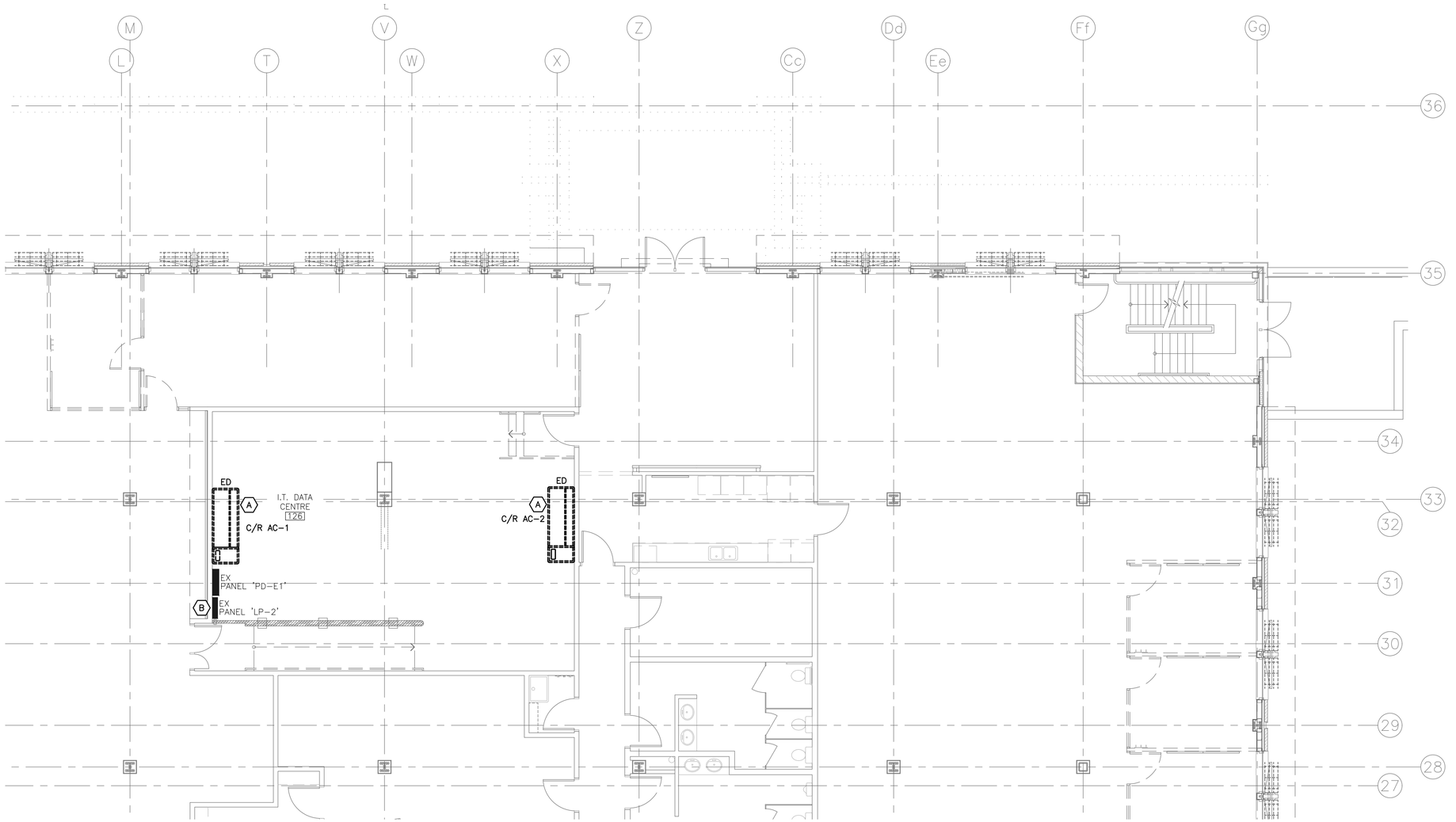
DRAWING TITLE:

SPECIFICATIONS, DRAWING LIST, LEGENDS AND ABBREVIATIONS

DRAWN BY:	SCALE:
LA	N.T.S
CHECKED BY:	DATE:
PI	SEPTEMBER 2024

PROJECT No.: 24034

DRAWING No.: **E 0.1**



1 / E1.1 TOWN HALL GROUND FLOOR DEMOLITION PLAN
SCALE: 1:75

GENERAL DEMOLITION NOTES:

1. THE ELECTRICAL CONTRACTOR IS FULLY RESPONSIBLE FOR VERIFYING ALL ELECTRICAL ITEMS ON SITE PRIOR TO COMMENCING WORK. IF THERE ARE ERRORS OR OMISSIONS ON THE DRAWINGS, THE CONTRACTOR WILL MODIFY THE DRAWINGS AND NOTIFY THE CONSULTANT OF ANY MAJOR DISCREPANCIES BETWEEN THE DRAWINGS AND SITE CONDITIONS.
2. THE ELECTRICAL CONTRACTOR IS FULLY RESPONSIBLE FOR REMOVING/RELOCATING ALL ELECTRICAL DEVICES/CABLES/CONDUITS ETC. IN AREAS BEING DEMOLISHED AS SHOWN ON ARCHITECTURAL AND ELECTRICAL DRAWINGS. NO ATTEMPT HAS BEEN MADE TO IDENTIFY EVERY SINGLE EXISTING ELECTRICAL DEVICE ON EXISTING DRAWINGS. THE CONTRACTOR IS TO VISIT THE SITE PRIOR TO SUBMITTING TENDER PRICE TO REVIEW WHAT IS REQUIRED WITH RESPECT TO DEMOLITION. NO EXTRAS WILL BE ALLOWED FOR NOT THOROUGHLY REVIEWING THE EXISTING SITE.
3. ELECTRICAL CONTRACTOR TO RE-ARRANGE AND RE-SUPPORT ALL EXISTING BOXES, CONDUITS AND WIRING ABOVE EXISTING CEILING TILES. USE NEW BOX, CONDUITS AND WIRING AS REQUIRED TO MAKE SAFE AND CLEAN INSTALLATION TO MEET CURRENT CODE AND ESA REQUIREMENTS.
4. UNUSED CONDUITS AND WIRING IN EXISTING CEILING SPACE TO BE REMOVED. PROVIDE THE REQUIRED TESTS TO ENSURE SAFE REMOVAL AS REQUIRED.
5. FOR EXISTING PULL BOXES AND JUNCTION BOXES WITH NO COVER PLATES ABOVE EXISTING CEILINGS, THE ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL NEW COVERS TO MAKE SAFE AS REQUIRED.
6. FOR INDICATED DEVICES SHOWN TO BE DEMOLISHED, THE ELECTRICAL CONTRACTOR SHALL REMOVE ALL WIRING AND CONDUITS BACK TO SOURCE AND REWORK OR PROVIDE NEW WIRING/CONDUIT TO DEVICES THAT MAY BE FED ON THE SAME CIRCUIT AS THE DEVICE TO BE DEMOLISHED.
7. ELECTRICAL CONTRACTOR SHALL COORDINATE AND VERIFY WITH THE OWNER ALL DEVICES TO BE SALVAGED, MOVED & STORED PRIOR TO DEMOLITION.

DEMOLITION KEYNOTES:

(A) DISCONNECT POWER TO EXISTING INDOOR A/C UNITS AND ASSOCIATED LOCAL DISCONNECT SWITCH. STRIP WIRING BACK TO SOURCE (PANEL 'PD-E1').

(B) DISCONNECT CIRCUIT BREAKERS 6 AND 8 FOR THE A/C RECEIVERS. STRIP WIRING BACK TO SOURCE (BREAKER PANEL 'LP-2').

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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

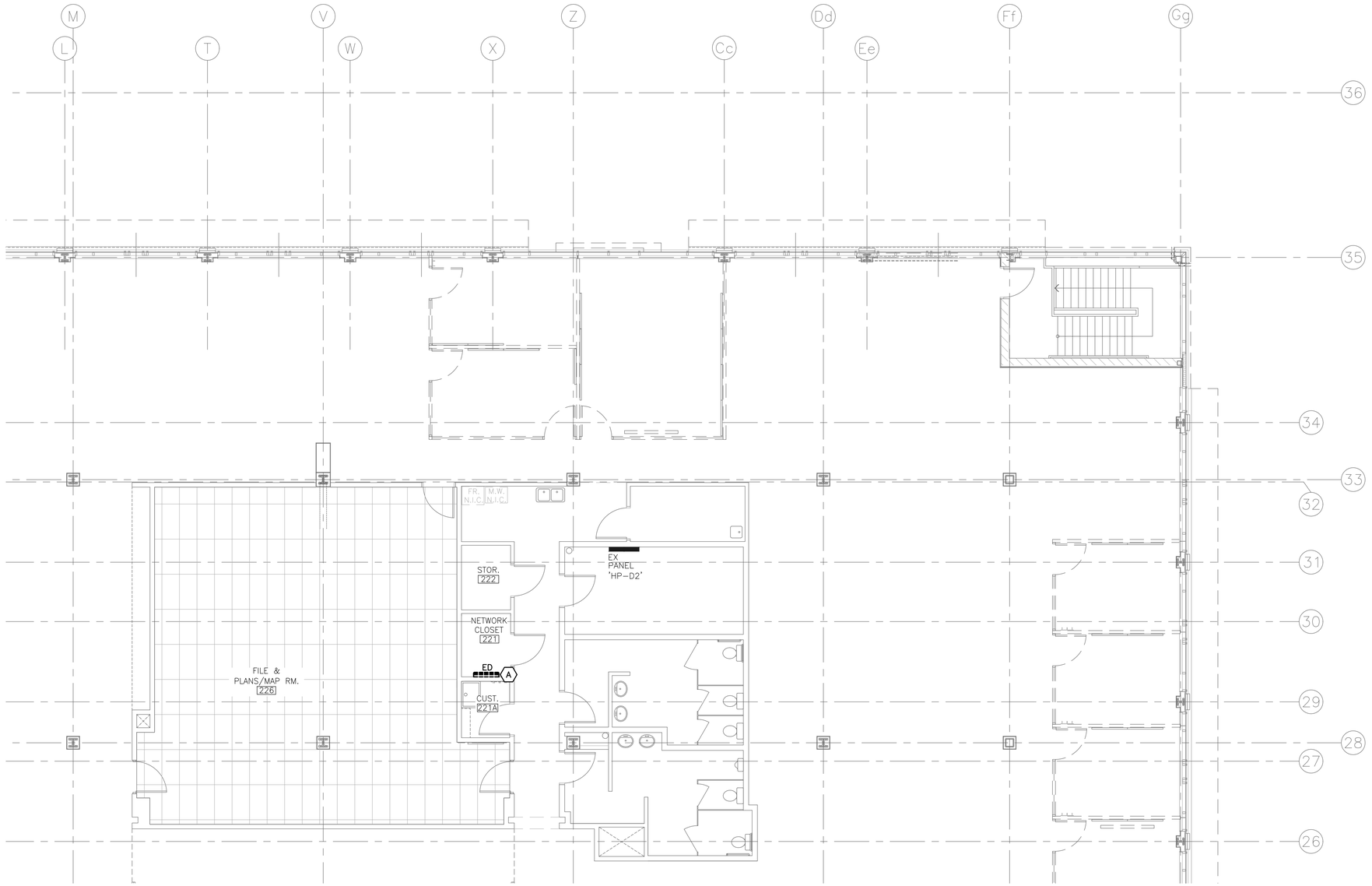
DRAWING TITLE:

TOWN HALL GROUND FLOOR ELECTRICAL DEMOLITION PLAN

DRAWN BY:	SCALE:
LA	AS NOTED
CHECKED BY:	DATE:
PI	SEPTEMBER 2024

PROJECT No.: 24034

DRAWING No.: **E 1.1**



1 / E1.2 TOWN HALL SECOND FLOOR DEMOLITION PLAN
SCALE: 1:75

GENERAL DEMOLITION NOTES:

1. THE ELECTRICAL CONTRACTOR IS FULLY RESPONSIBLE FOR VERIFYING ALL ELECTRICAL ITEMS ON SITE PRIOR TO COMMENCING WORK. IF THERE ARE ERRORS OR OMISSIONS ON THE DRAWINGS, THE CONTRACTOR WILL MODIFY THE DRAWINGS AND NOTIFY THE CONSULTANT OF ANY MAJOR DISCREPANCIES BETWEEN THE DRAWINGS AND SITE CONDITIONS.
2. THE ELECTRICAL CONTRACTOR IS FULLY RESPONSIBLE FOR REMOVING/RELOCATING ALL ELECTRICAL DEVICES/CABLES/CONDUITS ETC. IN AREAS BEING DEMOLISHED AS SHOWN ON ARCHITECTURAL AND ELECTRICAL DRAWINGS. NO ATTEMPT HAS BEEN MADE TO IDENTIFY EVERY SINGLE EXISTING ELECTRICAL DEVICE ON EXISTING DRAWINGS. THE CONTRACTOR IS TO VISIT THE SITE PRIOR TO SUBMITTING TENDER PRICE TO REVIEW WHAT IS REQUIRED WITH RESPECT TO DEMOLITION. NO EXTRAS WILL BE ALLOWED FOR NOT THOROUGHLY REVIEWING THE EXISTING SITE.
3. ELECTRICAL CONTRACTOR TO RE-ARRANGE AND RE-SUPPORT ALL EXISTING BOXES, CONDUITS AND WIRING ABOVE EXISTING CEILING TILES. USE NEW BOX, CONDUITS AND WIRING AS REQUIRED TO MAKE SAFE AND CLEAN INSTALLATION TO MEET CURRENT CODE AND ESA REQUIREMENTS.
4. UNUSED CONDUITS AND WIRING IN EXISTING CEILING SPACE TO BE REMOVED. PROVIDE THE REQUIRED TESTS TO ENSURE SAFE REMOVAL AS REQUIRED.
5. FOR EXISTING PULL BOXES AND JUNCTION BOXES WITH NO COVER PLATES ABOVE EXISTING CEILINGS, THE ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL NEW COVERS TO MAKE SAFE AS REQUIRED.
6. FOR INDICATED DEVICES SHOWN TO BE DEMOLISHED, THE ELECTRICAL CONTRACTOR SHALL REMOVE ALL WIRING AND CONDUITS BACK TO SOURCE AND REWORK OR PROVIDE NEW WIRING/CONDUIT TO DEVICES THAT MAY BE FED ON THE SAME CIRCUIT AS THE DEVICE TO BE DEMOLISHED.
7. ELECTRICAL CONTRACTOR SHALL COORDINATE AND VERIFY WITH THE OWNER ALL DEVICES TO BE SALVAGED, MOVED & STORED PRIOR TO DEMOLITION.

DEMOLITION KEYNOTES:

(A) DISCONNECT AND REMOVE WIRING FOR INDOOR A/C UNIT AND ASSOCIATED LOCAL DISCONNECT SWITCH. STRIP WIRING BACK TO SOURCE (BREAKER PANEL 'HP-D2')

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HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

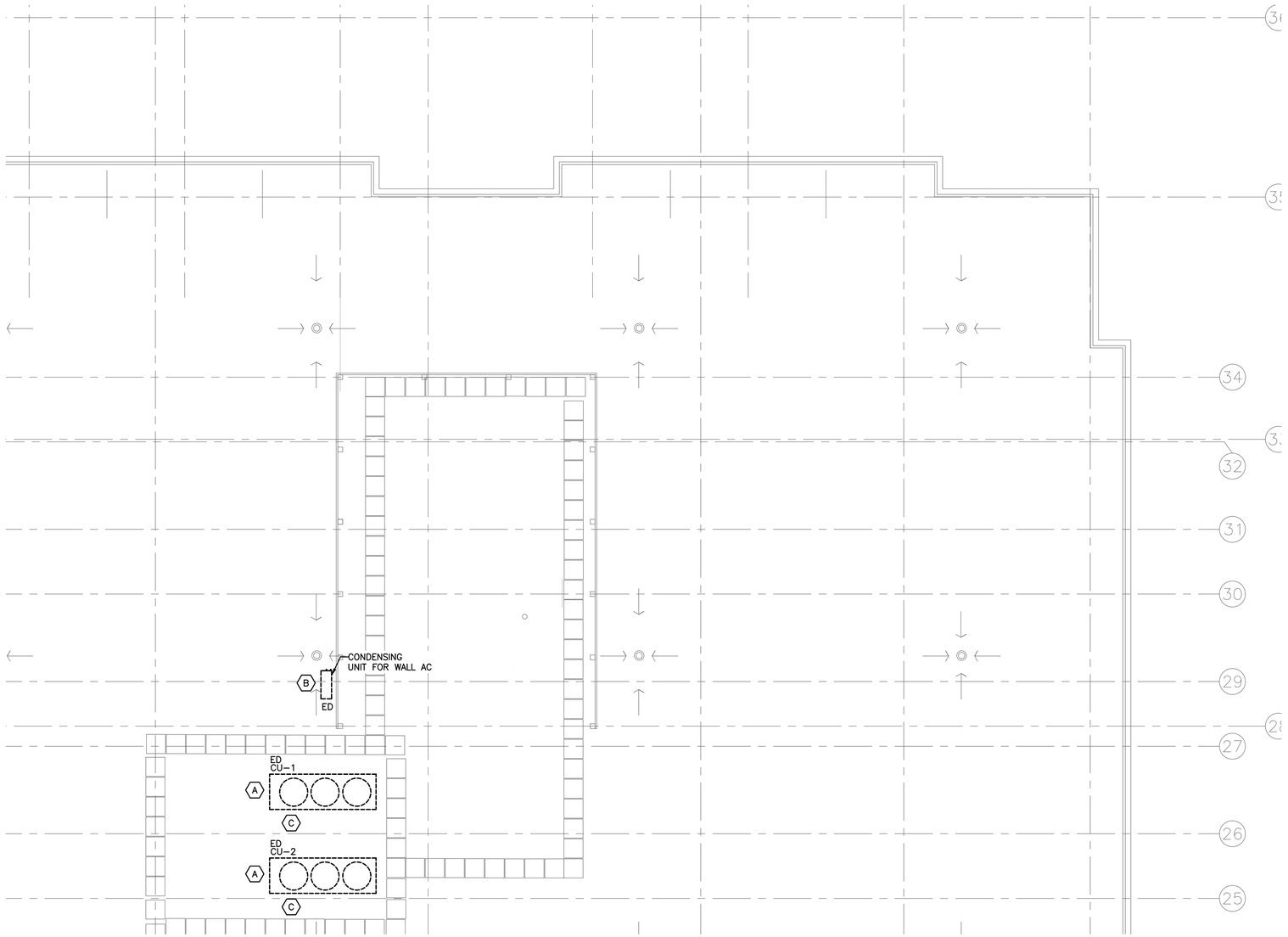
DRAWING TITLE:

TOWN HALL SECOND FLOOR ELECTRICAL DEMOLITION PLAN

DRAWN BY:	SCALE:
LA	AS NOTED
CHECKED BY:	DATE:
PI	SEPTEMBER 2024

PROJECT No.: 24034

DRAWING No.: **E 1.2**



1 TOWN HALL ROOF DEMOLITION PLAN
E1.3 SCALE: 1:75

GENERAL DEMOLITION NOTES:

1. THE ELECTRICAL CONTRACTOR IS FULLY RESPONSIBLE FOR VERIFYING ALL ELECTRICAL ITEMS ON SITE PRIOR TO COMMENCING WORK. IF THERE ARE ERRORS OR OMISSIONS ON THE DRAWINGS, THE CONTRACTOR WILL MODIFY THE DRAWINGS AND NOTIFY THE CONSULTANT OF ANY MAJOR DISCREPANCIES BETWEEN THE DRAWINGS AND SITE CONDITIONS.
2. THE ELECTRICAL CONTRACTOR IS FULLY RESPONSIBLE FOR REMOVING/RELOCATING ALL ELECTRICAL DEVICES/CABLES/CONDUITS ETC. IN AREAS BEING DEMOLISHED AS SHOWN ON ARCHITECTURAL AND ELECTRICAL DRAWINGS. NO ATTEMPT HAS BEEN MADE TO IDENTIFY EVERY SINGLE EXISTING ELECTRICAL DEVICE ON EXISTING DRAWINGS. THE CONTRACTOR IS TO VISIT THE SITE PRIOR TO SUBMITTING TENDER PRICE TO REVIEW WHAT IS REQUIRED WITH RESPECT TO DEMOLITION. NO EXTRAS WILL BE ALLOWED FOR NOT THOROUGHLY REVIEWING THE EXISTING SITE.
3. ELECTRICAL CONTRACTOR TO RE-ARRANGE AND RE-SUPPORT ALL EXISTING BOXES, CONDUITS AND WIRING ABOVE EXISTING CEILING TILES. USE NEW BOX, CONDUITS AND WIRING AS REQUIRED TO MAKE SAFE AND CLEAN INSTALLATION TO MEET CURRENT CODE AND ESA REQUIREMENTS.
4. UNUSED CONDUITS AND WIRING IN EXISTING CEILING SPACE TO BE REMOVED. PROVIDE THE REQUIRED TESTS TO ENSURE SAFE REMOVAL AS REQUIRED.
5. FOR EXISTING PULL BOXES AND JUNCTION BOXES WITH NO COVER PLATES ABOVE EXISTING CEILINGS, THE ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL NEW COVERS TO MAKE SAFE AS REQUIRED.
6. FOR INDICATED DEVICES SHOWN TO BE DEMOLISHED, THE ELECTRICAL CONTRACTOR SHALL REMOVE ALL WIRING AND CONDUITS BACK TO SOURCE AND REWORK OR PROVIDE NEW WIRING/CONDUIT TO DEVICES THAT MAY BE FED ON THE SAME CIRCUIT AS THE DEVICE TO BE DEMOLISHED.
7. ELECTRICAL CONTRACTOR SHALL COORDINATE AND VERIFY WITH THE OWNER ALL DEVICES TO BE SALVAGED, MOVED & STORED PRIOR TO DEMOLITION.

DEMOLITION KEYNOTES:

(A) DISCONNECT POWER TO EXISTING CONDENSING UNIT AND ASSOCIATED LOCAL DISCONNECT SWITCH. STRIP WIRING BACK TO SOURCE (PANEL 'PD-E1')

(B) DISCONNECT POWER TO EXISTING OUTDOOR CONDENSING UNIT AND ASSOCIATED LOCAL DISCONNECT SWITCH. STRIP WIRING BACK TO SOURCE (BREAKER PANEL 'HP-D2').

(C) DISCONNECT POWER TO EXISTING A/C RECEIVERS. STRIP WIRING BACK TO SOURCE (BREAKER PANEL 'LP-2').

REVISIONS

No.	ISSUE	DATE
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B	ISSUED FOR TENDER	SEPT. 5, 2024

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PROJECT:

HVAC REPLACEMENT AT TOWN HALL & FIRE STATION 2 MILTON

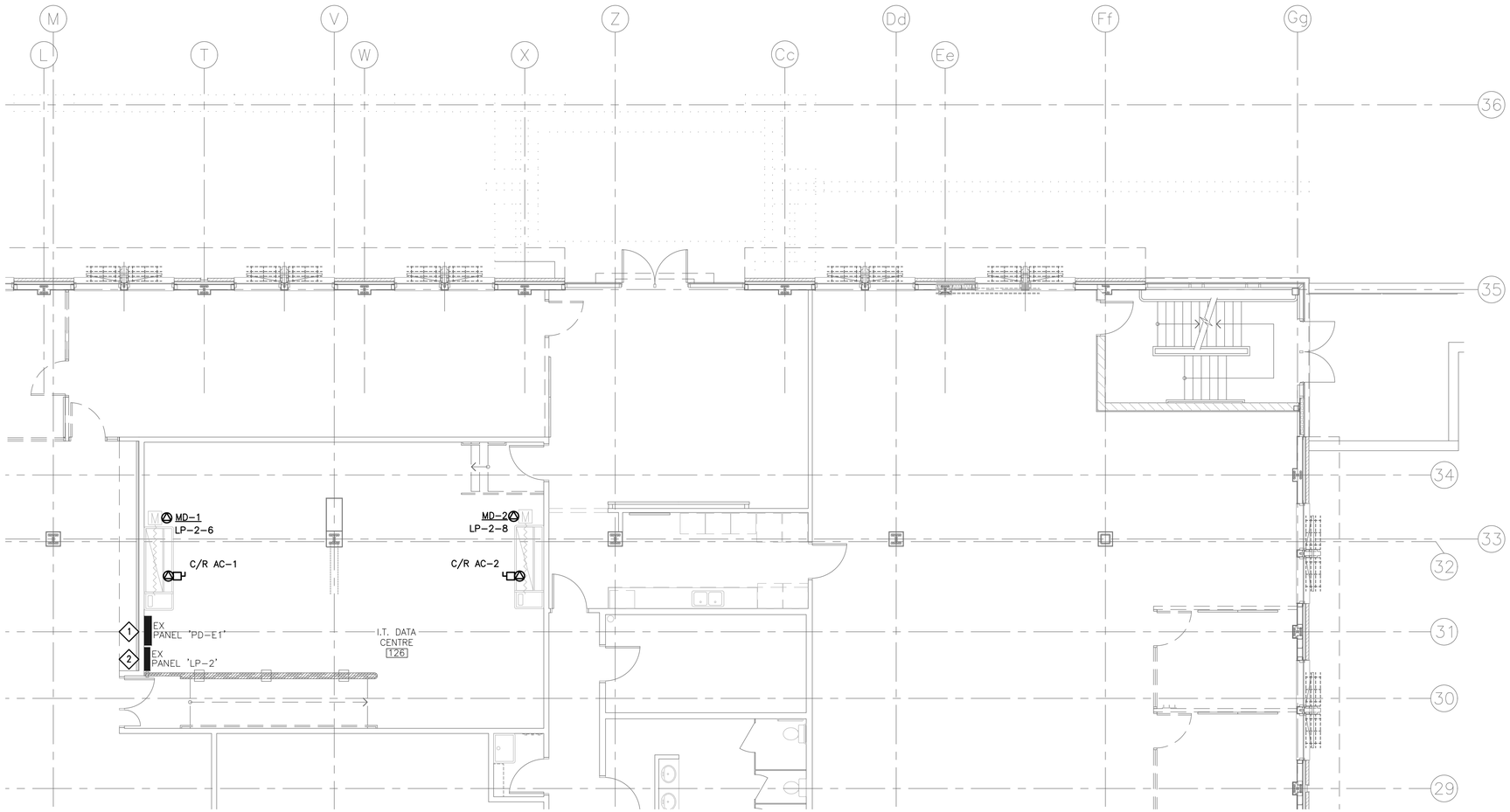
DRAWING TITLE:

TOWN HALL ROOF ELECTRICAL DEMOLITION PLAN

DRAWN BY:	SCALE:
LA	AS NOTED
CHECKED BY:	DATE:
PI	SEPTEMBER 2024

PROJECT No.: 24034

DRAWING No.: **E 1.3**



1 / E1.4 TOWN HALL GROUND FLOOR NEW ELECTRICAL PLAN
SCALE: 1:75

DRAWING KEYNOTES:

1. SUPPLY AND INSTALL NEW 60A FUSES FOR THE NEW LIEBERT A/C UNITS AND 15A FUSES FOR THE NEW CONDENSING UNITS ON THE ROOF.
NEW WIRING FROM PANEL 'PD-E1' TO NEW A/C UNITS:
CR AC-1 AND CR AC-2: 3-1/C #6 AWG R290 CU + GND.
CU-1 AND CU-2: 3-1/C #10 AWG RW90 CU. + GND.
REUSE EXISTING CONDUITS OR RACEWAYS.

2. WIRE EXISTING 15A CIRCUIT BREAKERS IN CCT 6 AND 8 TO NEW MOTORIZED DAMPERS LOW VOLTAGE TRANSFORMERS. LOW VOLTAGE TRANSFORMERS TO BE SUPPLIED AND INSTALLED BY MECHANICAL CONTRACTOR. COORDINATE WITH MECHANICAL CONTRACTOR.

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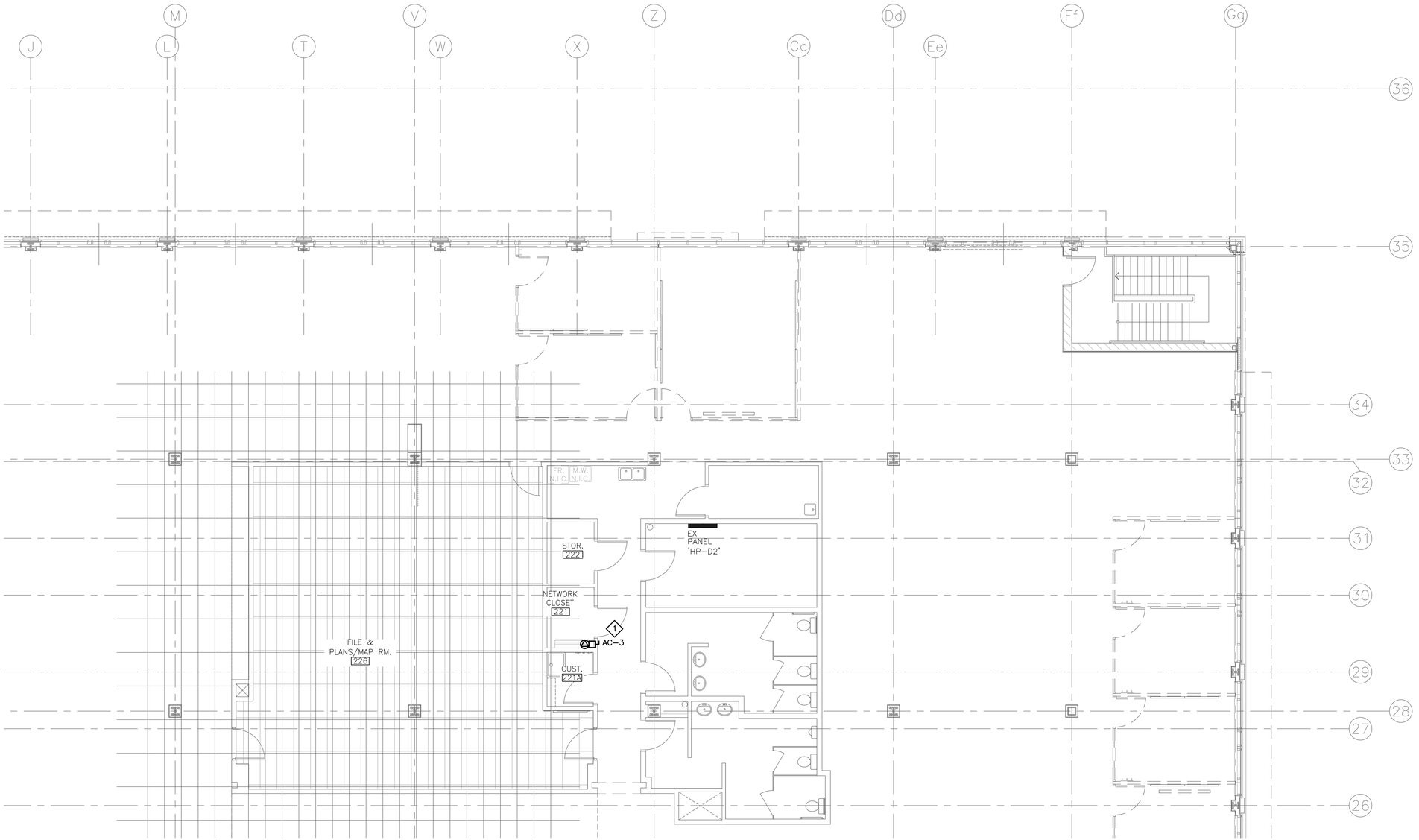
DRAWING No.:

E 1.4



1 / E1.5 TOWN HALL SECOND FLOOR NEW ELECTRICAL PLAN
SCALE: 1:75

DRAWING KEYNOTES:

1. AC-3 TO BE BACK FED FROM OUTDOOR CONDENSING UNIT CU-3. REUSE EXISTING CONDUIT OR RACEWAY. COORDINATE WITH MECHANICAL CONTRACTOR.

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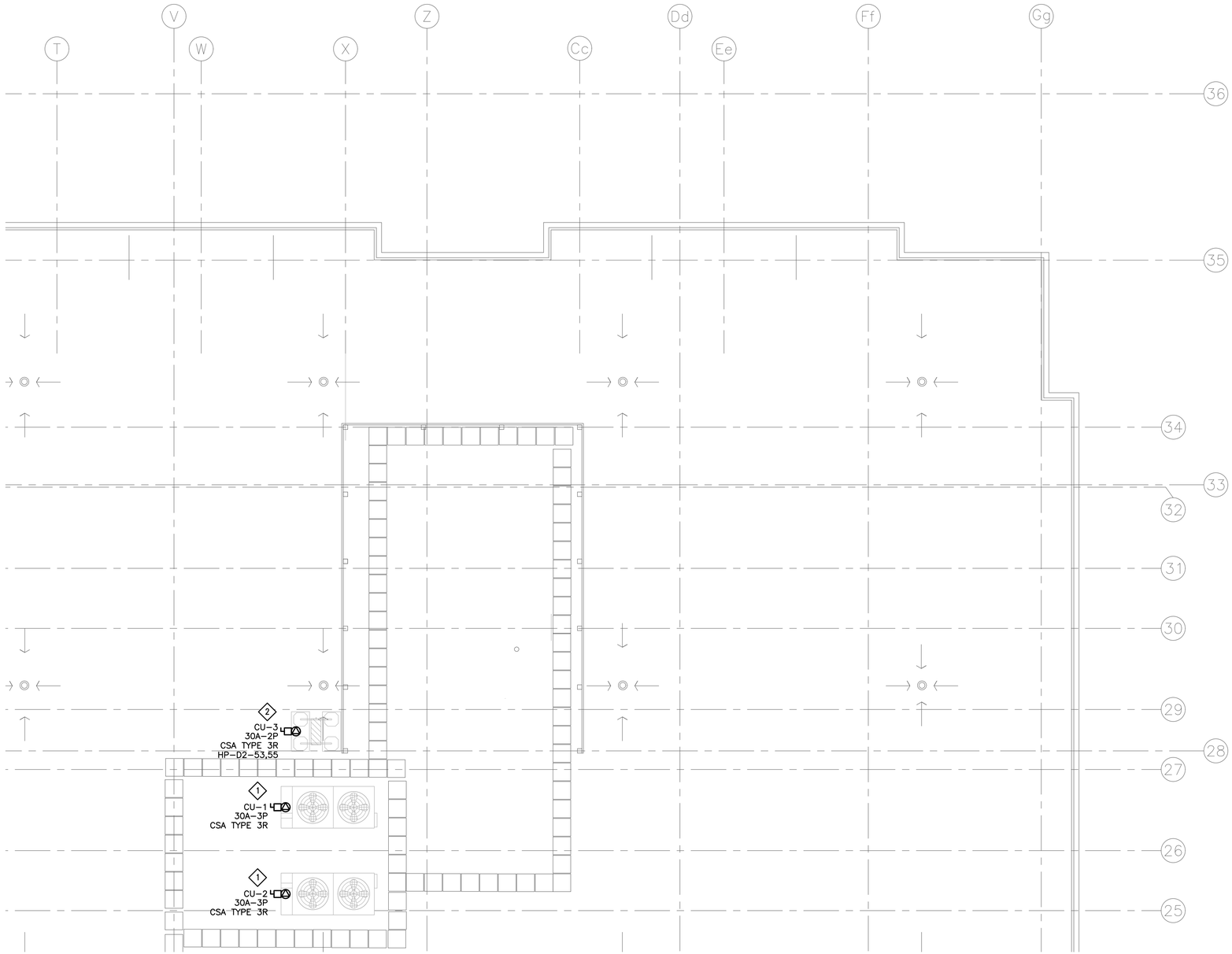
DRAWING No.: **E 1.5**



1 E1.6 TOWN HALL ROOF NEW ELECTRICAL PLAN
SCALE: 1:75

DRAWING KEYNOTES:

1. SUPPLY AND INSTALL NEW 30A, 3-POLE CSA TYPE 3R LOCAL DISCONNECT SWITCH AND WIRE NEW CONDENSING UNIT AS PER MANUFACTURER'S RECOMMENDATIONS.
2. SUPPLY AND INSTALL NEW 30A, 2-POLE CSA TYPE 3R LOCAL DISCONNECT SWITCH AND WIRE NEW CONDENSING UNIT AS PER MANUFACTURER'S RECOMMENDATIONS.

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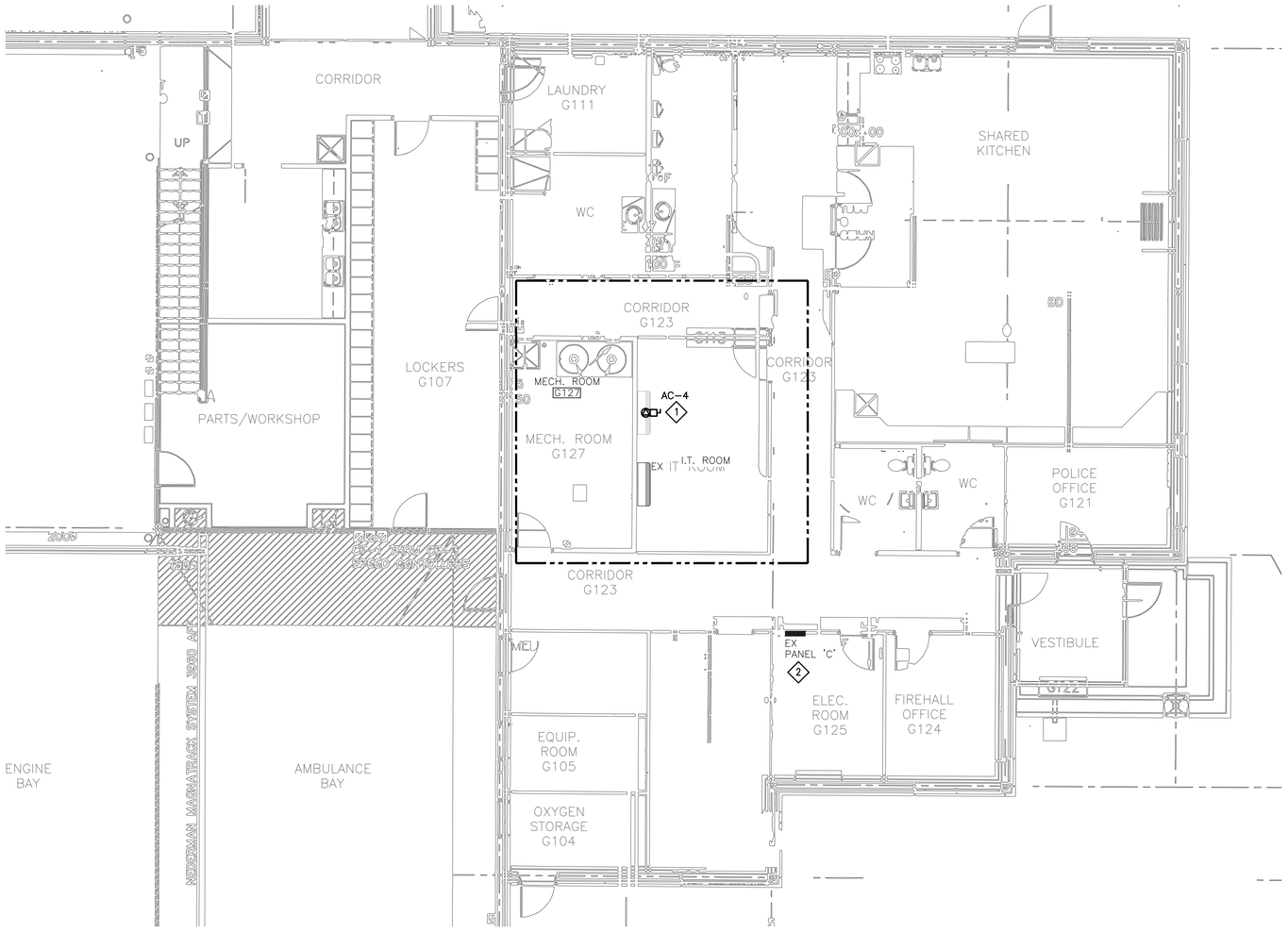
DRAWING No.:

E 1.6



1 FIRE STATION #2 GROUND FLOOR NEW PLAN
E1.7 SCALE: 1:75

REMOVE EXISTING BREAKERS IN CCT 1, 3, 5, AND 7. SUPPLY AND INSTALL 2 NEW 15A TANDEM CIRCUIT BREAKERS TO CCT 1 AND 3. WIRE EXISTING CCT 1 TO 1A, 3 TO 1B, 5 TO 3A, AND 7 TO 3B.

SUPPLY AND INSTALL NEW 30A, 2-POLE CIRCUIT BREAKER TO CCT 5 AND 7. WIRE NEW CONDENSING UNIT AS PER MANUFACTURERS RECOMMENDATIONS.

PHOTO - PANEL C
N.T.S

DRAWING KEYNOTES:

1. WIRE INDOOR UNIT AC-4 TO RESPECTIVE OUTDOOR CONDENSING UNIT CU-4. PROVIDE 3/4" EMT CONDUIT. COORDINATE WITH MECHANICAL CONTRACTOR.
2. SUPPLY AND INSTALL NEW 30A, 2-POLE CIRCUIT BREAKER FOR NEW CONDENSING UNIT CU-4 AND NEW WIRING FROM BREAKER PANEL 'C' TO CONDENSING UNIT. NEW WIRING SHALL BE 600V 2C 10 AWG TECK CABLE.

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DRAWING TITLE:

FIRE STATION #2 GROUND FLOOR NEW ELECTRICAL PLAN

DRAWN BY:	SCALE:
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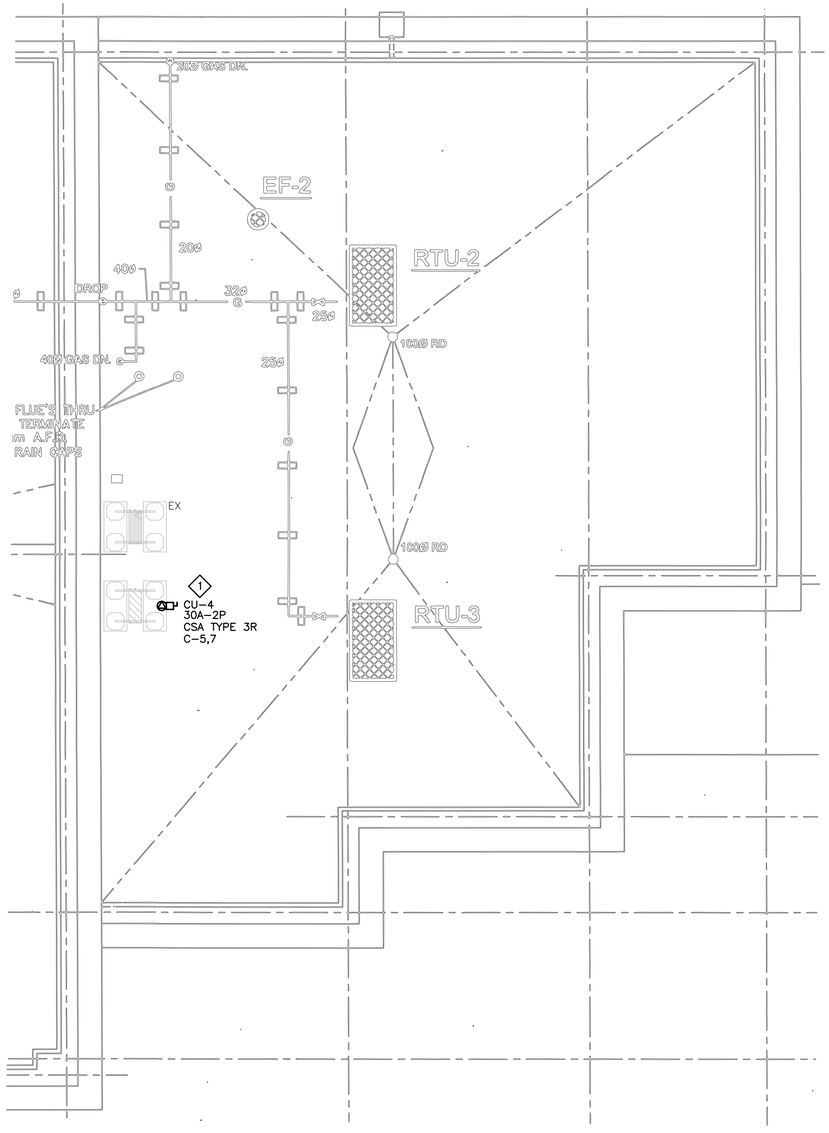
PROJECT No.: 24034

DRAWING No.:

E 1.7



1 E1.8 FIRE STATION #2 ROOF NEW PLAN
SCALE: 1:75

DRAWING KEYNOTES:

1. SUPPLY AND INSTALL NEW 30A, 2-POLE CSA TYPE 3R LOCAL DISCONNECT SWITCH AND WIRE NEW CONDENSING UNIT AS PER MANUFACTURER'S RECOMMENDATIONS.

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DRAWING No.: **E 1.8**