## GENERAL CONDITIONS / Division 1

1. GENERAL CONDITIONS: The latest edition of the Owner's site specific Facility Standards are hereby made a part of this specification and contract documents. Contractor shall provide and schedule all necessary state and local permits, tests and inspections. All work shall comply with the latest adopted edition of all governing local codes and standards.

2. BUILDING CODE: Design provisions and loads in accordance with 2015 Michigan Building Code, and latest adopted editions of ASCE-7, CFR Title 29 and Michigan OSHA.

3. GENERAL SCOPE: Contractor shall provide and install all items of equipment, materials or labor as shown on drawings or required or specified herein, to complete the work of the project. All equipment and materials shall be installed in strict accordance with the latest recommendations and specifications of the manufacturer or trade involved, Owner's standards and reference specifications.

4. SITE INSPECTION: Each Contractor shall visit the site and verify all dimensions and conditions, as they may affect their work or the project in total. Notify Owner's agent of all discrepancies prior to beginning work.

5. SAFETY: Comply with all OSHA and Owner's site specific safety standards. Additional fall protection devices shall be utilized as required by Owner's standards. Contractor shall provide and maintain shoring, sheeting and all other means required to protect and maintain the safety, integrity, and stability of all existing and new construction that may be affected by work.

6. WARRANTY: Contractor shall provide for a minimum (1) year written guarantee for all equipment, materials and workmanship, unless otherwise specified or indicated to be for a longer period, to start from date of Owner's acceptance of completed work.

7. CLEANUP: On a daily basis each trade shall remove and dispose of all excess materials and debris from the site, as directed by the Owner's agent. Contractor shall load and transport all material to disposal location.

8. BID DOCUMENT CONFLICTS / ERRORS / OMISSIONS: Should a bidder find any discrepancy in the drawings or specifications, or be in doubt as to their meaning, they shall notify the Owner's agent at once for direction.

9. DEFECTS / ERRORS / REPAIRS: Installation errors, defective work, and damage to new or existing construction, as determined by the Owner's agent, shall be repaired or replaced at the Contractor's expense. The extent and type of replacement or repairs shall be in accordance with methods approved by the Owner.

10. QUESTIONS: Response will ONLY be made to written or email requests for information. Direct all questions to the Engineer or Owner's Agent;
    OWNER: Mr. Matt Kulhanek MJKulhanek@A2gov.org
    ENGINEER: Mr. John Ritchie JRitchie@COREdg.net

## GENERAL STRUCTURAL STEEL NOTES / Division 5

1. STANDARDS: Fabrication, and erection of steel work shall conform to the latest edition AISC 'Specification for Structural Steel Buildings' (ANSI/AISC 360) – Allowable Stress Design 'Code of Standard Practice (AISC 303); RCSC 'Specification for Structural Joints Using High Strength Bolts (AISC 348)'; and 'Structural Welding Code –Steel' (AWS D1.1).

2. MATERIALS: Miscellaneous steel and framing angles shall conform to ASTM A36: Wide flange steel shapes ASTM A992 (Fy=50 ksi); High Strength Bolts ASTM F3125 Grade A325.

3. CONNECTIONS: Shop connections shall be welded, field connections bolted. Work point shall be at intersection of member centerlines unless noted otherwise. Connections to existing steel shall be field drilled and bolted, u.n.o. Beam connections shall support minimum 10,000 Lb. capacity. Minimum (2) 3/4" diameter high strength bolts in bearing type connection with threads included in shear plane (type N). All bolts shall have heavy hex nuts (ASTM A563) and hardened washers (ASTM F436) where required. Lock washers are NOT permitted. Provide minimum 3/8" thick material where single angle or plate connections are used.

4. BOLTS AND WELDS: Tighten bolts 'snug-tight', unless noted otherwise in bolt spec. Welding shall conform to AWS standards using certified operators, with E70xx electrode (u.n.o.). Minimum fillet weld size 3/16" for all strength welds. All welds shall be continuous unless noted otherwise. Obtain Owner approval and burn permit prior to field welding or cutting. Maintain continuous fire watch during all field welding and cutting operations.

5. PREPARATION: Clean steel of all mill scale, loose rust, spatter, slag, and foreign matter per SSPC SP-6 prior to painting. Coordinate with galvanizing applicator for additional requirements as required.

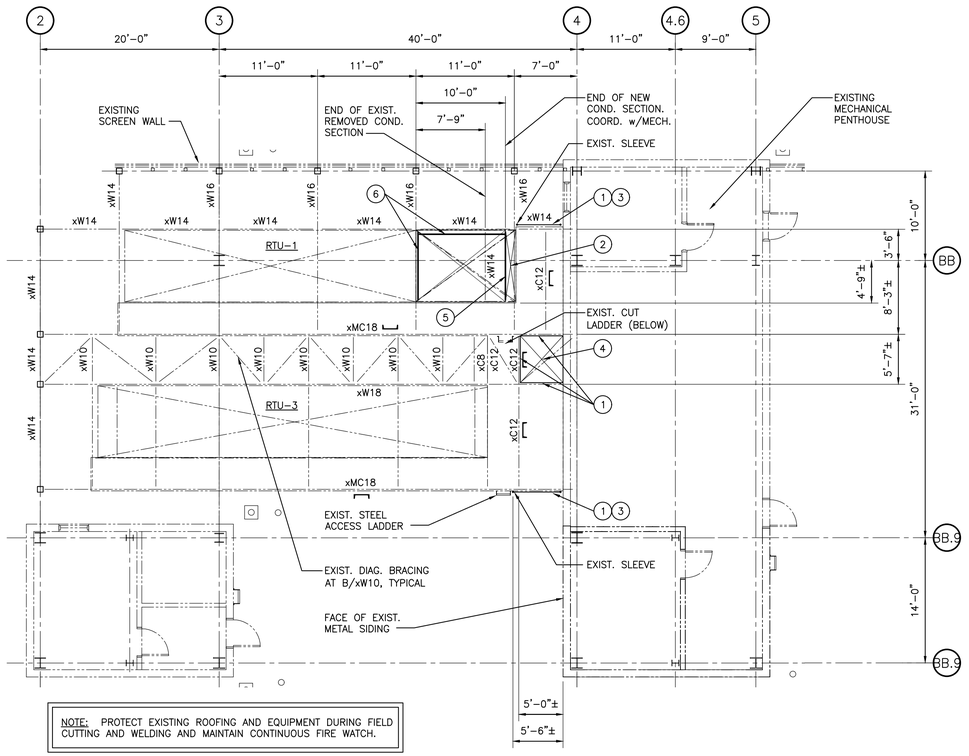
6. FABRICATION: Conform to tolerances of referenced specifications. All members shall be continuous for entire length between supports, u.n.o. Fabricate members with the natural camber up. Cut member ends square. Holes shall be cut, punched or drilled perpendicular to surface, burning is NOT permitted.

7. DETAILING: Unless indicated otherwise use standard hole size and spacing for all connections. Holes shall be 13/16" diameter for 3/4" bolts, 11/16" diameter for 5/8" bolts. Space adjacent fasteners 3" center-center, on standard member gage lines. End distance 1 1/4".

8. FIELD WORK: Members shall NOT be altered in the field from that shown on design and fabrication drawings without Engineer's written approval. Mismatched holes shall be reamed to a larger diameter.

9. GALVANIZED FINISHES: Hot dip galvanize members all members. ASTM A123 for fabricated steel products; ASTM A153 Class C hardware, ASTM B695 Class 50 for fasteners. Touch up damaged galvanized surfaces with hand applied galvanizing repair paint, SSPC Paint 20.

10. FINISHING: Erector shall apply touch up paint after erection to areas where shop coating has been damaged, to all field bolts, welds, and other unpainted areas using same paint as shop coat.




NOTE: PROTECT EXISTING ROOFING AND EQUIPMENT DURING FIELD CUTTING AND WELDING AND MAINTAIN CONTINUOUS FIRE WATCH.

## PARTIAL ROOF PLAN
SCALE: 1/8" = 1'-0"

Notes:
1. REFERENCE EXISTING BUILDING CONSTRUCTION DRAWINGS OF OWP/P Structures AND Quinn Evans Architects Job #05158.00 DATED (2009).
2. MATERIAL AND NOTE LEGEND: TOP OF STEEL NOTED (+ or –) FROM TOP OF EXISTING GRILLAGE (+5'-7"±) ABOVE TOP OF ROOF.
   xW10 = W10 x 15
   xW14 = W14 x 22
   xW16 = W16 x 31
   xW18 = W18 x 50
   xC12 = C12 x 20.7
   xMC18 = MC18 x 58

(1) REMOVE EXISTING REMOVABLE STEEL or TEMPORARY WOOD GUARDRAIL SECTIONS.

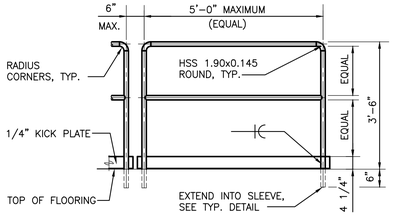
(2) TEMPORARILY REMOVE PLANKS AND CUT SHORTER FOR NEW ACU-1. RE-INSTALL AFTER FRAMING IS REWORKED.

(3) NEW REMOVABLE GUARDRAIL SECTIONS IN NEW OR EXISTING BRACKETS. SEE DETAIL

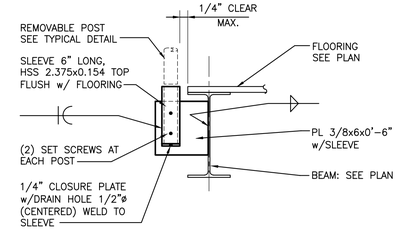
(4) NEW 1-1/2" 'Grip-Strut' PLANKS TO MATCH EXISTING. (GALVANIZED, MINIMUM 12 Ga.) BEAR ON EXISTING BEAMS EACH END (SPAN E-W).

(5) NEW W8 x 18 or RELOCATED xW14 BELOW EDGE OF NEW CONDENSER. FIELD DRILL AND BOLT OR FIELD WELD END CONNECTIONS.

(6) NEW W8 x18 IF REQUIRED IF NEW ACU-1 DOES NOT FULLY BEAR ON FLANGE OF xW14




## TYPICAL GUARDRAIL SECTION
SCALE: 1/2" = 1'-0"




## GUARDRAIL CONNECTION DETAIL
SCALE: 1 1/2" = 1'-0"

**LEGEND:**

EXISTING CONSTRUCTION
NEW CONSTRUCTION
HIDDEN

**ABBREVIATIONS**

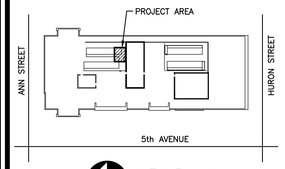
| | |
|---|---|
| AFF | ABOVE FINISH FLOOR |
| B/ | BOTTOM OF.... |
| b/b | BACK TO BACK |
| c/c | CENTER TO CENTER |
| EL | ELEVATION |
| FV | FIELD VERIFY |
| NTS | NOT TO SCALE |
| o/o | OUT TO OUT |
| T/ | TOP OF.... |
| TYP | TYPICAL |
| UNO | UNLESS NOTED OTHERWISE |
| x | PREFIX INDICATES EXISTING CONSTRUCTION |

**DRAWING INDEX**

| SHEET | SHEET TITLE |
|---|---|
| S-1 | GRILLAGE LAYOUT PLAN AND DETAILS |
| M-1 | OVERALL ROOF AND PENTHOUSE MECHANICAL PLAN |
| M-2 | PARTIAL ROOF PLANS MECHANICAL DEMOLITION AND NEW WORK |
| M-3 | MECHANICAL SCHEDULES AND SECTIONS |
| M-4 | MECHANICAL SPECIFICATIONS |
| M-5 | MECHANICAL SPECIFICATIONS |
| M-6 | TEMPERATURE CONTROLS |
| E-1 | POWER PLAN |
| | |

| ISSUED DATE: | ISSUED FOR: |
|---|---|
| 02/18/2022 | OWNER REVIEW 01 |
| 03/04/2022 | BIDS |

KEY PLAN:




KEY PLAN
SCALE: NONE

PROFESSIONAL SEAL:

DO NOT SCALE DRAWING

CORE Design Group
Architecture/ Engineering
37740 Hills Tech Drive
Farmington Hills, MI 48331
Tel: 248.491.3234 www.COREdg.net

CLIENT:

**City of Ann Arbor**
**301 East Huron Street**
**Ann Arbor, MI 48104**

PROJECT TITLE:

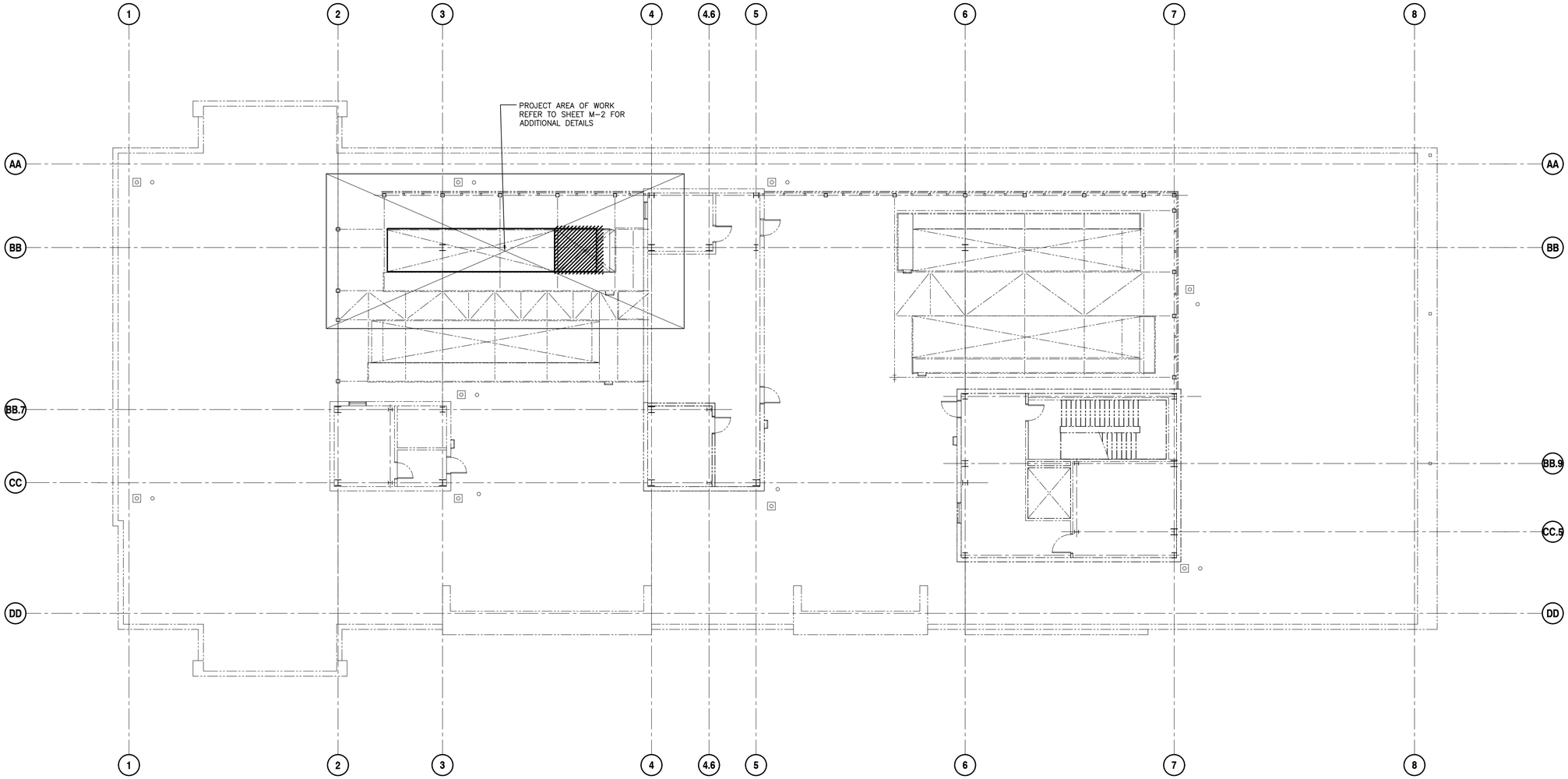
**Justice Center HVAC Condenser Replacement**
**Larcom Building / 301 East Huron Street**
**Ann Arbor, MI 48104**

SHEET TITLE:

**GRILLAGE LAYOUT PLAN AND DETAILS**

| | |
|---|---|
| DESIGNED BY: | F. Schwarzkopf |
| DRAWN BY: | CAD |
| CHECKED BY: | F. Schwarzkopf |
| JOB No.: | 21-127-AA |
| SHEET No.: | S-1 of 1 |

GRAPHIC SCALES

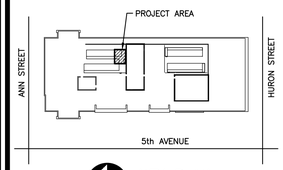



N OVERALL ROOF / PENTHOUSE MECHANICAL PLAN
SCALE: 3/32" = 1'-0"

GRAPHIC SCALES

| ISSUED DATE: | ISSUED FOR: |
|---|---|
| 02/18/2022 | OWNER REVIEW 01 |
| 03/04/2022 | BIDS |

KEY PLAN:




KEY PLAN
SCALE: NONE

PROFESSIONAL SEAL:

DO NOT SCALE DRAWING

CORE Design Group
Architecture/ Engineering
37740 Hills Tech Drive
Farmington Hills, MI 48331
Tel: 248.491.3234 www.COREdg.net

CLIENT:

**City of Ann Arbor**
**301 East Huron Street**
**Ann Arbor, MI 48104**

PROJECT TITLE:

# Justice Center HVAC Condenser Replacement

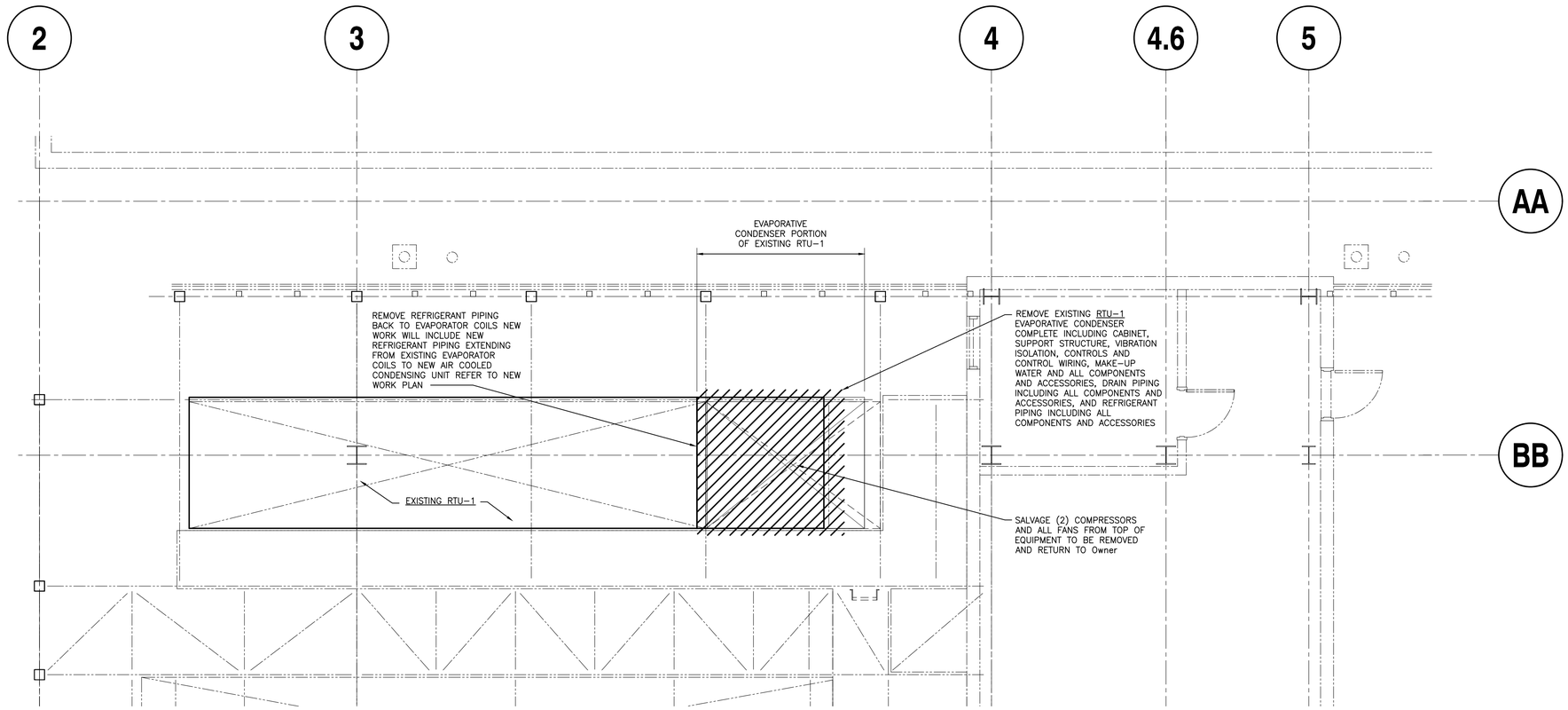
Larcom Building / 301 East Huron Street
Ann Arbor, MI 48104

SHEET TITLE:

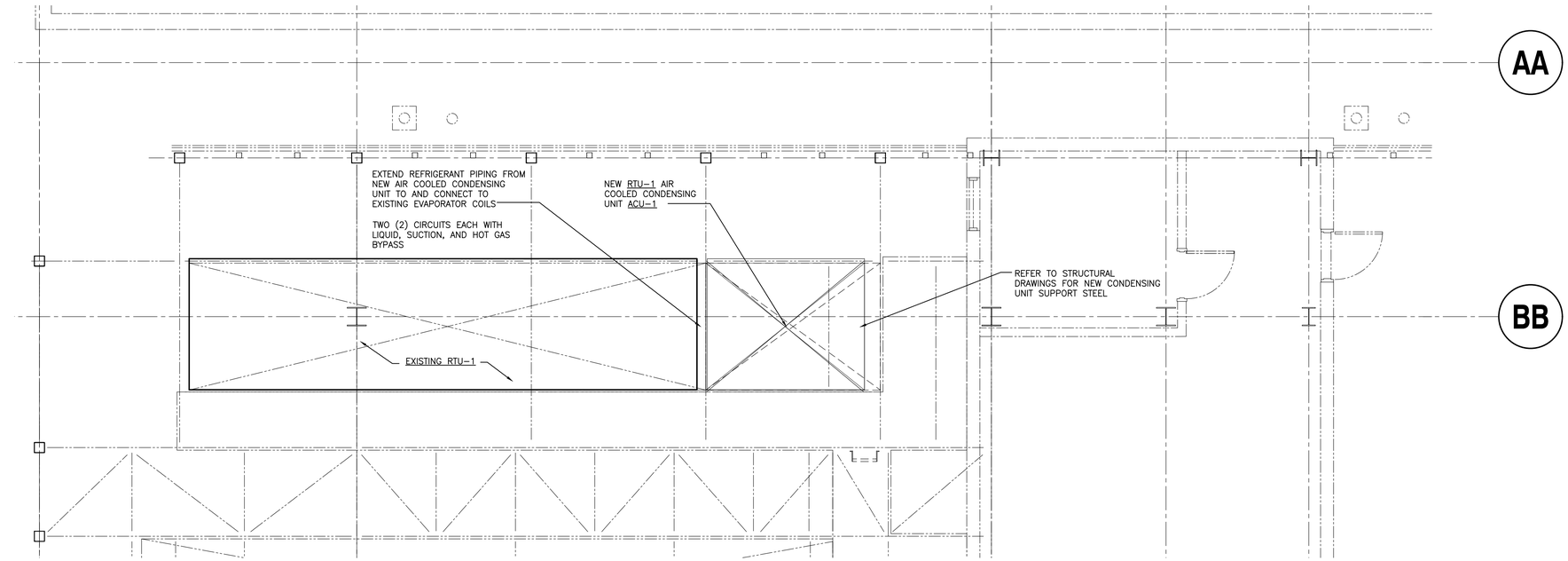
## OVERALL ROOF AND PENTHOUSE MECHANICAL PLAN

| | |
|---|---|
| DESIGNED BY: | R. Climie |
| DRAWN BY: | RC |
| CHECKED BY: | R. Climie |
| JOB No.: | 21-127-AA |
| SHEET No.: | M-1 of 6 |

3/4/2022 9:29:04 AM




PARTIAL ROOF PLAN – MECHANICAL DEMOLITION
SCALE: 1/4" = 1'-0"

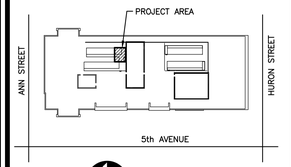



PARTIAL ROOF PLAN – MECHANICAL NEW WORK
SCALE: 1/4" = 1'-0"

GRAPHIC SCALES

| ISSUED DATE: | ISSUED FOR: |
|---|---|
| 02/18/2022 | OWNER REVIEW 01 |
| 03/04/2022 | BIDS |

KEY PLAN:




KEY PLAN
SCALE: NONE

PROFESSIONAL SEAL:

DO NOT SCALE DRAWING

CORE Design Group
Architecture/ Engineering
37740 Hills Tech Drive
Farmington Hills, MI 48331
Tel: 248.491.3234 www.COREdg.net

CLIENT:

**City of Ann Arbor**
**301 East Huron Street**
**Ann Arbor, MI 48104**

PROJECT TITLE:

**Justice Center HVAC Condenser Replacement**
**Larcom Building / 301 East Huron Street**
**Ann Arbor, MI 48104**

SHEET TITLE:

**PARTIAL ROOF PLANS MECHANICAL DEMOLITION AND NEW WORK**

| | |
|---|---|
| DESIGNED BY: | R. Climie |
| DRAWN BY: | RC |
| CHECKED BY: | R. Climie |
| JOB No.: | 21-127-AA |
| SHEET No.: | M-2 of 6 |

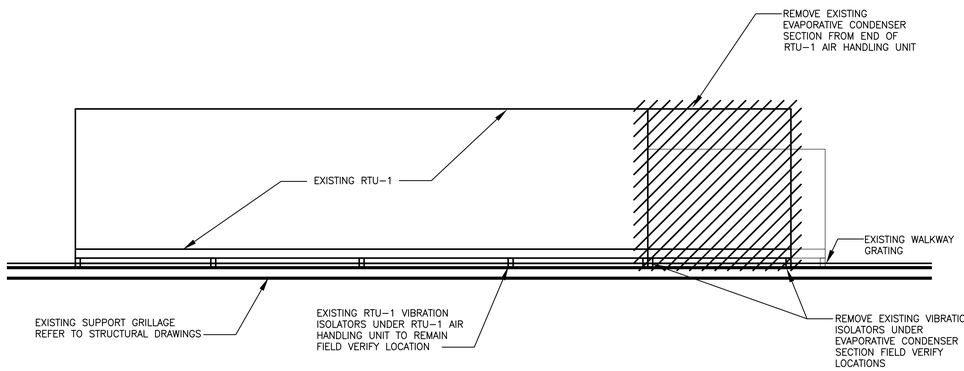
3/4/2022 9:29:36 AM

## AIR COOLED CONDENSING UNIT SCHEDULE

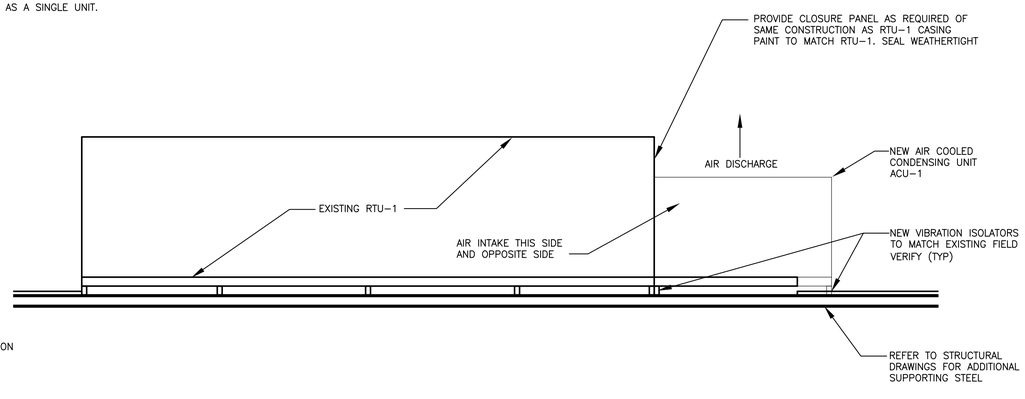
| TAG | UNIT SERVED | MANUFACTURER | MODEL NUMBER | REFRIGERANT | TOTAL CAPACITY BTUH | TOTAL CAPACITY NOMINAL TONS | AMBIENT AIR TEMPERATURE DEG. F. | SUCTION TEMPERATURE DEG. F. | CIRCUITS | COMPRESSORS | COMPRESSOR TYPE | STAGES | ELECTRICAL DATA | | | | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | VOLTS | PHASE | HERTZ | KW | MCA | MROPD | |
| ACU–1 | RTU–1 | DAIKIN | RCS075C | R407C | 903,440 | 75 | 95.0 | 45.0 | 2 | 6 | SCROLL | 6 | 460 | 3 | 60 | 92.6 | 169.9 | 175.0 | 1, 2, 3, 4, 5, 6, 7, 8, 9 |
| | | | | | | | | | | | | | | | | | | | |

NOTES AND ACCESSORIES DESIGNATION:

1. THIS EQUIPMENT IS PRE–PURCHASED BY OWNER AND IS ASSIGNED TO THE CONTRACTOR.
2. CONTRACTOR WILL RECEIVE, UNLOAD, STORE, TRANSPORT IF NECESSARY, HOIST AND INSTALL IN FINAL LOCATION.
3. INDEPENDENT ELECTRICAL POWER CONNECTION SEPARATE FROM PRESENT RTU–1 POWER SUPPLY BY ELECTRICAL TRADES.
4. FIELD INSTALLED VIBRATION ISOLATORS TO MATCH VIBRATION ISOLATION ON PRESENT RTU–1.
5. EQUIPMENT FURNISHED WITH ONLY FACTORY INSTALLED SAFETY CONTROLS.
6. EQUIPMENT FURNISHED WITHOUT DIGITAL CONTROL SYSTEM.
7. FIELD INSTALL AUTOMATED LOGIC DIGITAL CONTROL SYSTEM TO PROVIDE ALL OPERATING CONTROLS FOR UNIT.
8. ALL EXISTING RTU–1 CONTROLS WILL BE REMOVED AND REPLACED WITH NEW AUTOMATED LOGIC DDC CONTROLS. RTU–1 AND ACU–1 WILL BE INTEGRATED TO PERFORM AS A SINGLE UNIT.
9. PRESENT CONTROL SYSTEM IN RTU–1 IS McQUAY MICROTECH III.




SECTION LOOKING EAST AT RTU-1 - DEMOLITION
SCALE: 1/4" = 1'-0"

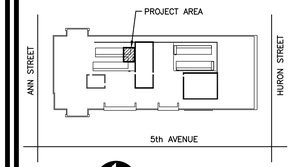



SECTION LOOKING EAST AT RTU-1 - NEW WORK
SCALE: 1/4" = 1'-0"

GRAPHIC SCALES

| ISSUED DATE: | ISSUED FOR: |
|---|---|
| 02/18/2022 | OWNER REVIEW 01 |
| 03/04/2022 | BIDS |

KEY PLAN:




KEY PLAN
SCALE: NONE

PROFESSIONAL SEAL:

DO NOT SCALE DRAWING

CORE Design Group
Architecture/ Engineering
37740 Hills Tech Drive
Farmington Hills, MI 48331
Tel: 248.491.3234 www.COREdg.net

CLIENT:

**City of Ann Arbor**
**301 East Huron Street**
**Ann Arbor, MI 48104**

PROJECT TITLE:

**Justice Center HVAC Condenser Replacement**
**Larcom Building / 301 East Huron Street**
**Ann Arbor, MI 48104**

SHEET TITLE:

**MECHANICAL SCHEDULES AND SECTIONS**

| | |
|---|---|
| DESIGNED BY: | R. Climie |
| DRAWN BY: | RC |
| CHECKED BY: | R. Climie |
| JOB No.: | 21-127-AA |
| SHEET No.: | M-3 of 6 |

1.1 GENERAL NOTES

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS, AND DIVISION –1 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SCOPE OF WORK

A. PROVIDE LABOR, INCLUDING FIELD ERECTION AND SUPERVISION, MATERIALS, EQUIPMENT AND ANCILLARIES, AND COORDINATE, PROCURE, FABRICATE, DELIVER, ERECT OR INSTALL, INTERFACE WITH EXISTING WORK, START, DEBUG AND TEST ALL SYSTEMS AS NECESSARY TO PROVIDE THE OWNER WITH A COMPLETE OPERATING FACILITY IN CONFORMANCE WITH THE CONTRACT DOCUMENTS.

B. THE WORK SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:

1.3 CODES, ORDINANCES, PERMITS AND FEES

A. ALL WORK SHALL BE IN FULL COMPLIANCE WITH THE APPLICABLE PROVISIONS OF FEDERAL, STATE AND LOCAL GOVERNMENT LAWS, ORDINANCES, REFERENCED CODES AND STANDARDS CURRENT AS OF THE ISSUE DATE OF THESE DRAWINGS, INCLUDING THE APPLICABLE PROVISIONS OF THE MICHIGAN STATE OCCUPATIONAL SAFETY AND HEALTH ACT (MIOSHA). SECURE AND PAY FOR ALL PERMITS, INSPECTIONS AND TESTS REQUIRED BY LOCAL, STATE AND NATIONAL REGULATING AGENCIES.

B. GOVERNING LAWS, ORDINANCES, CODES AND STANDARDS CONSTITUTE MINIMUM REQUIREMENTS. MORE STRINGENT REQUIREMENTS OF THE CONTRACT DOCUMENTS SHALL MODIFY, SUPPLEMENT AND SUPERSEDE APPLICABLE PORTIONS OF GOVERNING LAWS, ORDINANCES, CODES AND STANDARDS.

1.4 STANDARDS

A. ALL WORK SHALL CONFORM IN ALL RESPECTS TO THE LATEST APPROVED STANDARDS OF PDI, ASME, ASTM, ASHRAE, SMACNA, AND ANSI.

1.5 DAMAGE TO OTHER WORK

A. REPAIR AND PAY FOR ALL DAMAGE DONE TO EXISTING WORK OR OTHER NEW WORK DURING THE EXECUTION OF THE WORK DESCRIBED IN THE CONTRACT DOCUMENTS.

1.6 CUTTING AND PATCHING

A. PERFORM ALL CUTTING, PATCHING AND REPAIR THAT MAY BE NECESSARY FOR THE INSTALLATION OF THE WORK DESCRIBED IN THESE SPECIFICATIONS OR SHOWN ON THE DRAWINGS. NO CUTTING OF BUILDING STRUCTURAL SYSTEM SHALL BE DONE.

B. ROOF PATCHING NEEDED FOR DEMOLITION OF, OR INSTALLATION OF MECHANICAL WORK WILL BE BY OWNERS ROOFING CONTRACTOR, WORK WILL BE PAID FOR AND COORDINATED BY MECHANICAL TRADES.

1.7 RECORDS OF EXISTING AIR HANDLING SYSTEMS

A. PRIOR TO STARTING ANY NEW WORK, TAKE READINGS AND RECORD THE FOLLOWING DATA FOR EACH EXISTING AIR HANDLING SYSTEM TO BE MODIFIED:

1. FANS (SUPPLY, RETURN AND EXHAUST) CFM, RPM, STATIC PRESSURES, BOTH SUCTION AND DISCHARGE OF ALL FANS.

2. TOTAL FAN CFM FOR EACH SUPPLY, RETURN AND RELIEF FAN.

3. ALL FAN MOTOR HORSEPOWERS, FULL LOAD AMPERES, AND VOLTAGE.

4. HEATING AND COOLING ENTERING AIR TEMPERATURES (D.B.).

5. COOLING ENTERING AIR TEMPERATURE (W.B.).

6. HEATING AND COOLING LEAVING AIR TEMPERATURES (D.B.).

7. COOLING LEAVING AIR TEMPERATURES (W.B.).

8. IDENTIFY AND LIST SIZE, TYPE, AND MANUFACTURER OF ALL COILS, FILTERS, FANS, SHEAVE SIZES AND MOTORS.

B. ASSEMBLE THE COMPLETED RECORDS IN HARD–BACKED, LOOSE–LEAF BINDERS PROPERLY IDENTIFIED. SUPPLY THREE (3) COPIES OF EACH SYSTEM AND DELIVER TO THE OWNER'S PROJECT REPRESENTATIVE.

1.8 CONNECTIONS TO EXISTING SYSTEMS

A. MAKE ALL CONNECTIONS TO EXISTING SYSTEM PIPING AND EQUIPMENT SYSTEMS.

1.9 EXAMINATION OF SITE

A. A VISIT SHALL BE MADE TO THE JOB SITE BEFORE BIDS ARE SUBMITTED. DURING THIS VISIT ACTUAL JOB CONDITIONS SHALL BE EXAMINED AND A CHECK SHALL BE MADE FOR ANY INTERFERENCES BETWEEN THE WORK OF VARIOUS TRADES AND FOR ANY APPARENT VIOLATIONS OF LOCAL AND STATE CODES, LAWS, ORDINANCES AND REGULATIONS. IF ANY INTERFERENCES OR VIOLATIONS APPEAR AND DEPARTURE FROM THE DESIGN INTENT OF ANY CONTRACT DOCUMENTS IS REQUIRED, NOTIFY THE ARCHITECT/ENGINEER BEFORE ENTERING INTO THE CONTRACT WITH THE OWNER. FAILURE TO PROVIDE THE ARCHITECT/ENGINEER WITH THE AFOREMENTIONED NOTIFICATION WILL RESULT IN THE CONTRACTOR BEING HELD RESPONSIBLE TO COMPLETE ALL WORK TO MEET THE INTENT OF THE CONTRACT DRAWINGS WITH NO ADDITIONAL EXPENSE ("EXTRAS") BEING INCURRED BY THE OWNER.

1.10 CLEANING

A. MAINTAIN THE PREMISES NEAT AND ORDERLY AND THOROUGHLY CLEAN–UPON COMPLETION OF THE WORK.

1.11 SUBMITTALS

A. GENERAL:

1. SUBMIT EACH ITEM IN THIS ARTICLE ACCORDING TO THE CONDITIONS OF THE CONTRACT AND DIVISION 1 SPECIFICATION SECTIONS

B. SHOP DRAWINGS:
1. SUBMIT ONE (1) PDF COPY OF SHOP DRAWINGS FOR THE FOLLOWING:

2. ALL MECHANICAL EQUIPMENT WHICH REQUIRES AN ELECTRICAL CONNECTION.

3. THE USE OF "C" CLAMP STYLE BUILDING ATTACHMENTS IS PROHIBITED WHEN ATTACHING PIPING OF ANY SIZE TO STEEL JOISTS.

C. PROVIDE SHEET METAL OR THREADED ROD DUCT HANGERS IN ACCORDANCE WITH SMACNA.

1.12 WARRANTY

A. ALL NEW WORK, INCLUDING MATERIALS AND WORKMANSHIP, SHALL BE WARRANTED FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL INSPECTION AND ACCEPTANCE OF SYSTEMS BY OWNER, AND LOCAL AUTHORITIES.

1.13 PLUMBING SYSTEMS

A. GENERAL:

1. PLUMBING WORK INCLUDES DEMOLITION OF EXISTING EVAPORATIVE CONDENSER MAKE–UP WATER AND CAPPING OF EXISTING WATER SUPPLY AND DRAIN PIPING BELOW THE ROOF.

B. PIPING SHALL BE AS FOLLOWS:

1. DOMESTIC COLD WATER, AND NON–POTABLE COLD WATER:

SIZES 4" AND SMALLER:

PIPE – TYPE L DRAWN COPPER TUBE.

JOINTS – ASTM B32–95TA SOLDER.

FITTINGS – WROUGHT COPPER SOLDER FITTINGS, CONFORMING TO ANSI B16.22.

C. VALVES:

1. APPROVED MANUFACTURERS: NIBCO, CRANE AND POWELL.

2. BALL 4" & SMALLER – MSS SP–110, 150 LB. BRONZE BODY AND BONNET, 2–PIECE CONSTRUCTION WITH CHROME–PLATED BRASS BALL, STANDARD PORT FOR 1/2 INCH SIZE AND SMALLER; FULL PORT FOR 3/4 INCH AND LARGER SIZE. ASTM B584; SOLDER OR SCREWED CONNECTIONS.

1.14 REFRIGERANT PIPING

A. PERFORMANCE REQUIREMENTS
1. LINE TEST PRESSURE FOR REFRIGERANT R–407C:
a. SUCTION LINES FOR AIR–CONDITIONING APPLICATIONS: 230 PSIG (1586 KPA).

b. SUCTION LINES FOR HEAT–PUMP APPLICATIONS: 380 PSIG (2620 KPA).

c. HOT–GAS AND LIQUID LINES: 380 PSIG (2620 KPA).
2. MATERIALS
a. COPPER TUBE: [ASTM B 88, TYPE K OR L]; [ASTM B 280, TYPE ACR]; HARD–DRAWN STRAIGHT LENGTHS, AND SOFT–ANNEALED COILS, SEAMLESS COPPER TUBING. TUBING SHALL BE FACTORY CLEANED, READY FOR INSTALLATION, AND HAVE ENDS CAPPED TO PROTECT CLEANLINESS OF PIPE INTERIOR PRIOR TO SHIPPING.
b. WROUGHT–COPPER FITTINGS: ASME B16.22.
c. WROUGHT–COPPER UNIONS: ASME B16.22.
d. BRAZING FILLER METALS: AWS A5.8.
3. FLEXIBLE CONNECTORS:
a. BODY: TIN–BRONZE BELLOWS WITH WOVEN, FLEXIBLE, TINNED–BRONZE–WIRE–REINFORCED PROTECTIVE JACKET.

b. END CONNECTIONS: SOCKET ENDS.

c. OFFSET PERFORMANCE: CAPABLE OF MINIMUM 3/4–INCH (20–MM) MISALIGNMENT IN MINIMUM 7–INCH– (180–MM–) LONG ASSEMBLY.

d. PRESSURE RATING: FACTORY TEST AT MINIMUM 500 PSIG (3450 KPA).
MAXIMUM OPERATING TEMPERATURE: 250 DEG F (121 DEG C).
4. DIAPHRAGM PACKLESS VALVES:
a. BODY AND BONNET: FORGED BRASS OR CAST BRONZE; GLOBE DESIGN WITH STRAIGHT–THROUGH OR ANGLE PATTERN.

b. DIAPHRAGM: PHOSPHOR BRONZE AND STAINLESS STEEL WITH STAINLESS–STEEL SPRING.

c. OPERATOR: RISING STEM AND HAND WHEEL.

d. SEAT: NYLON.

e. END CONNECTIONS: SOCKET, UNION, OR FLANGED.

f. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

g. MAXIMUM OPERATING TEMPERATURE: 275 DEG F (135 DEG C).
5. PACKED–ANGLE VALVES:
a. BODY AND BONNET: FORGED BRASS OR CAST BRONZE.

b. PACKING: MOLDED STEM, BACK SEATING, AND REPLACEABLE UNDER PRESSURE.

c. OPERATOR: RISING STEM.

d. SEAT: NONROTATING, SELF–ALIGNING POLYTETRAFLUOROETHYLENE.

e. SEAL CAP: FORGED–BRASS OR VALOX HEX CAP.

f. END CONNECTIONS: SOCKET, UNION, THREADED, OR FLANGED.

g. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

h. MAXIMUM OPERATING TEMPERATURE: 275 DEG F (135 DEG C).
5. CHECK VALVES:
a. BODY: CAST BRONZE; GLOBE PATTERN.

b. BONNET: BOLTED DUCTILE IRON, FORGED BRASS, OR CAST BRONZE; OR BRASS HEX PLUG.

c. PISTON: REMOVABLE POLYTETRAFLUOROETHYLENE SEAT.

d. CLOSING SPRING: STAINLESS STEEL.

e. MANUAL OPENING STEM: SEAL CAP, PLATED–STEEL STEM, AND GRAPHITE SEAL.

f. END CONNECTIONS: SOCKET, UNION, THREADED, OR FLANGED.

g. MAXIMUM OPENING PRESSURE: 0.50 PSIG (3.4 KPA).

h. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

I. MAXIMUM OPERATING TEMPERATURE: 275 DEG F (135 DEG C).

6. SERVICE VALVES:
a. BODY: FORGED BRASS WITH BRASS CAP INCLUDING KEY END TO REMOVE CORE.

b. CORE: REMOVABLE BALL–TYPE CHECK VALVE WITH STAINLESS–STEEL SPRING.

c. SEAT: POLYTETRAFLUOROETHYLENE.

d. END CONNECTIONS: COPPER SPRING.

e. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

7. SOLENOID VALVES: COMPLY WITH ARI 760 AND UL 429; LISTED AND LABELED BY AN NRTL.
a. BODY AND BONNET: PLATED STEEL.

b. SOLENOID TUBE, PLUNGER, CLOSING SPRING, AND SEAT ORIFICE: STAINLESS STEEL.

c. SEAT: POLYTETRAFLUOROETHYLENE.

d. END CONNECTIONS: THREADED.

e. ELECTRICAL: MOLDED, WATERTIGHT COIL IN NEMA 250 ENCLOSURE OF TYPE REQUIRED BY LOCATION WITH 1/2–INCH (16–GRC) CONDUIT ADAPTER, AND 24–V AC COIL.

f. WORKING PRESSURE RATING: 400 psig (2760 kPa).

g. MAXIMUM OPERATING TEMPERATURE: 240 deg F (116 deg C).

h. MANUAL OPERATOR.

8. SAFETY RELIEF VALVES: COMPLY WITH ASME BOILER AND PRESSURE VESSEL CODE; LISTED AND LABELED BY AN NRTL.
a. BODY AND BONNET: DUCTILE IRON AND STEEL, WITH NEOPRENE O–RING SEAL.

b. PISTON, CLOSING SPRING, AND SEAT INSERT: STAINLESS STEEL.

c. SEAT DISC: POLYTETRAFLUOROETHYLENE.

d. END CONNECTIONS: THREADED.

e. WORKING PRESSURE RATING: 400 PSIG (2760 KPA).

f. MAXIMUM OPERATING TEMPERATURE: 240 DEG F (116 DEG C).

9. THERMOSTATIC EXPANSION VALVES: COMPLY WITH ARI 750.
a. BODY, BONNET, AND SEAL CAP: FORGED BRASS OR STEEL.

b. DIAPHRAGM, PISTON, CLOSING SPRING, AND SEAT INSERT: STAINLESS STEEL.

c. PACKING AND GASKETS: NON–ASBESTOS.

d. CAPILLARY AND BULB: COPPER TUBING FILLED WITH REFRIGERANT CHARGE.

e. SUCTION TEMPERATURE: 40 DEG F (4.4 DEG C).

f. SUPERHEAT: ADJUSTABLE.

g. REVERSE–FLOW OPTION (FOR HEAT–PUMP APPLICATIONS).

h. END CONNECTIONS: SOCKET, FLARE, OR THREADED UNION.

I. WORKING PRESSURE RATING: 700 PSIG (4820 KPA.

10. HOT–GAS BYPASS VALVES: COMPLY WITH UL 429; LISTED AND LABELED BY AN NRTL.
a. BODY, BONNET, AND SEAL CAP: DUCTILE IRON OR STEEL.

b. DIAPHRAGM, PISTON, CLOSING SPRING, AND SEAT INSERT: STAINLESS STEEL.

c. PACKING AND GASKETS: NON–ASBESTOS.

d. SOLENOID TUBE, PLUNGER, CLOSING SPRING, AND SEAT ORIFICE: STAINLESS STEEL.
e. SEAT: POLYTETRAFLUOROETHYLENE.

f. EQUALIZER: [INTERNAL] [EXTERNAL].

g. ELECTRICAL: MOLDED, WATERTIGHT COIL IN NEMA 250 ENCLOSURE OF TYPE REQUIRED BY LOCATION WITH 1/2–INCH (16–GRC) CONDUIT ADAPTER, AND [24] [115] [208]–V AC COIL AS DETERMINED BY CONTRACTOR.

h. END CONNECTIONS: SOCKET.

I. SET PRESSURE: DETERMINED BY INSTALLER.

j. THROTTLING RANGE: MAXIMUM 5 PSIG (34 KPA).

k. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

l. MAXIMUM OPERATING TEMPERATURE: 240 DEG F (116 DEG C).

11. STRAIGHT–TYPE STRAINERS:
a. BODY: WELDED STEEL WITH CORROSION–RESISTANT COATING.

b. SCREEN: 100–MESH STAINLESS STEEL.

c. END CONNECTIONS: SOCKET.

d. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

e. MAXIMUM OPERATING TEMPERATURE: 275 DEG F (135 DEG C).

12. ANGLE–TYPE STRAINERS:
a. BODY: FORGED BRASS OR CAST BRONZE.

b. DRAIN PLUG: BRASS HEX PLUG.

c. SCREEN: 100–MESH MONEL.

d. END CONNECTIONS: SOCKET.

e. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

f. MAXIMUM OPERATING TEMPERATURE: 275 DEG F (135 DEG C).

13. MOISTURE/LIQUID INDICATORS:
a. BODY: FORGED BRASS.

b. WINDOW: REPLACEABLE, CLEAR, FUSED GLASS WINDOW WITH INDICATING ELEMENT PROTECTED BY FILTER SCREEN.

c. INDICATOR: COLOR CODED TO SHOW MOISTURE CONTENT IN PPM.

d. MINIMUM MOISTURE INDICATOR SENSITIVITY: INDICATE MOISTURE ABOVE 60 PPM.

e. END CONNECTIONS: SOCKET.
f. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

g. MAXIMUM OPERATING TEMPERATURE: 240 DEG F (116 DEG C).

14. REPLACEABLE–CORE FILTER DRYERS: COMPLY WITH ARI 730.
a. BODY AND COVER: PAINTED–STEEL SHELL WITH DUCTILE–IRON COVER, STAINLESS–STEEL SCREWS, AND NEOPRENE GASKETS.

b. FILTER MEDIA: 10 MICRON, PLEATED WITH INTEGRAL END RINGS; STAINLESS–STEEL SUPPORT.

c. DESICCANT MEDIA: ACTIVATED [ALUMINA] [CHARCOAL].

d. FURNISH COMPLETE WITH REPLACEABLE FILTER–DRIER CORE KIT, INCLUDING GASKETS, AS FOLLOWS.
e. STANDARD CAPACITY DESICCANT SIEVES TO PROVIDE MICRONIC FILTRATION.

f. HIGH CAPACITY DESICCANT SIEVES TO PROVIDE MICONIC FILTRATION AND EXTRA DRYING CAPACITY.

g. DESIGNED FOR REVERSE FLOW (FOR HEAT–PUMP APPLICATIONS).

h. END CONNECTIONS: SOCKET.

I. ACCESS PORTS: NPS 1/4 (DN 8) CONNECTIONS AT ENTERING AND LEAVING SIDES FOR PRESSURE DIFFERENTIAL MEASUREMENT.

j. MAXIMUM PRESSURE LOSS: 2 PSIG (14 KPA).

k. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

l. MAXIMUM OPERATING TEMPERATURE: 240 DEG F (116 DEG C).

15. PERMANENT FILTER DRYERS: COMPLY WITH ARI 730.
a. BODY AND COVER: PAINTED–STEEL SHELL.

b. FILTER MEDIA: 10 MICRON, PLEATED WITH INTEGRAL END RINGS; STAINLESS–STEEL SUPPORT.

c. DESICCANT MEDIA: ACTIVATED ALUMINA OR CHARCOAL.

d. END CONNECTIONS: SOCKET.

e. ACCESS PORTS: NPS 1/4 (DN 8) CONNECTIONS AT ENTERING AND LEAVING SIDES FOR PRESSURE DIFFERENTIAL MEASUREMENT.

f. MAXIMUM PRESSURE LOSS: 2 PSIG (14 KPA).

g. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

h. STANDARD CAPACITY DESICCANT SIEVES TO PROVIDE MICONIC FILTRATION.

I. HIGH CAPACITY DESICCANT SIEVES TO PROVIDE MICRONIC FILTRATION AND EXTRA DRYING CAPACITY.

j. MAXIMUM OPERATING TEMPERATURE: 240 DEG F (116 DEG C).

16. MUFFLERS:
a. BODY: WELDED STEEL WITH CORROSION–RESISTANT COATING.

b. END CONNECTIONS: SOCKET OR FLARE.

c. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

d. MAXIMUM OPERATING TEMPERATURE: 275 DEG F (135 DEG C).

17. RECEIVERS: COMPLY WITH ARI 495.
a. COMPLY WITH ASME BOILER AND PRESSURE VESSEL CODE; LISTED AND LABELED BY AN NRTL.

b. COMPLY WITH UL 207; LISTED AND LABELED BY AN NRTL.

c. BODY: WELDED STEEL WITH CORROSION–RESISTANT COATING.

d. TAPPINGS: INLET, OUTLET, LIQUID LEVEL INDICATOR, AND SAFETY RELIEF VALVE.

e. END CONNECTIONS: SOCKET OR THREADED.

f. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

g. MAXIMUM OPERATING TEMPERATURE: 275 DEG F (135 DEG C).

18. LIQUID ACCUMULATORS: COMPLY WITH ARI 495.
a. BODY: WELDED STEEL WITH CORROSION–RESISTANT COATING.

b. END CONNECTIONS: SOCKET.

c. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

d. MAXIMUM OPERATING TEMPERATURE: 275 DEG F (135 DEG C).

19. FLANGES UNIONS:
a. BODY: FLANGES FOR 7/8 INCH THROUGH 1–5/8 INCH UNIONS SHALL BE FORGED STEEL; FLANGES FOR 2–1/8" THROUGH 3–1/8 FLANGES FOR 2–1/8" THROUGH 3–1/8 INCH UNIONS SHALL BE DUCTILE IRON.END CONNECTIONS: TWO BRASS BAILPIECE ADAPTERS FOR SOLDER END CONNECTIONS TO COPPER TUBING.

b. BOLTS: FOUR PLATED STEEL, WITH SILICON BRONZE NUTS AND FIBER GASKET.

c. MAXIMUM WORKING PRESSURE: 400 PSIG.

d. MAXIMUM OPERATING TEMPERATURE: 330 DEG. F.

e. FLANGES AND BOLTS SHALL HAVE FACTORY–APPLIED RUST–RESISTANT COATING.

1.15 REFRIGERANTS
A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. ATOFINA CHEMICALS, INC.

2. DUPONT COMPANY; FLUOROCHEMICALS DIV.

3. HONEYWELL, INC.; GENETRON REFRIGERANTS.

4. INEOS FLUOR AMERICAS LLC.

5. ASHRAE 34,R–407C
DIFLUOROMETHANE/PENTAFLUOROETHANE/1,1,1,2–TRAFLUOROETHANE

B. REFRIGERANT VALVES AND SPECIALTIES
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
a. ALCO CONTROLS DIV., EMERSON ELECTRIC.

b. DANFOSS ELECTRONICS, INC.

c. EATON CORPORATION, CONTROL DIV.

d. HENRY VALVE COMPANY.

e. PARKER–HANNIFIN CORPORATION, REFRIGERATION AND AIR CONDITIONING DIVISION.

f. SHORLAN VALVE COMPANY.

g. STANDARD REFRIGERATION PRODUCTS.

1.16 PAINTING AND IDENTIFICATION

A. ALL PIPING, WHETHER INSULATED OR UNINSULATED, SHALL BE LABLELED IN ACCORDANCE WITH THE OWNERS EXISTING COLOR CODE SYSTEM. PIPING BURIED IN CONSTRUCTION NEED NOT BE LABELED. FLOW ARROWS SHALL BE PLACED ON ALL PIPING AT VALVES, ELBOWS, AND NOT GREATER THAN 10 FT. ON CENTER ON STRAIGHT RUNS. ARROW MARKERS SHALL BE SEMI–RIGID PLASTIC WHICH SNAP COMPLETELY AROUND PIPE AND PROTECTED WITH A PLASTIC COATING. MARKERS SHALL BE EQUAL TO SETON NAME PLATE CORPORATION.

B. TAG AND LABEL ALL VALVES INDICATING FUNCTION AND EQUIPMENT SERVED.

1.17 INSULATION

A. APPROVED MANUFACTURERS: JOHNS–MANVILLE, OWENS–CORNING FIBERGLAS, CERTAINTEED, KNAUF.

B. INSULATION SHALL BE APPLIED BY EXPERIENCED PIPE COVERERS AS PER BEST TRADE PRACTICE, GUIDED BY MANUFACTURER'S PRINTED INSTALLATION DIRECTIONS.

C. INSULATION SHALL BE APPLIED TO PIPE LINES AND EQUIPMENT ONLY AFTER THEY HAVE BEEN TESTED, INSPECTED AND ALL SURFACES THOROUGHLY CLEANED OF ALL FOREIGN MATERIALS, GREASE AND RUST.

D. ALL INSULATION COVERING WHICH IS TO BE PAINTED SHALL HAVE A SATISFACTORY SURFACE CONDITION IN ORDER TO RECEIVE PAINT.

E. INSULATION SHALL BE FLEXIBLE ELASTOMERIC WITH AN AVERAGE THERMAL CONDUCTIVITY NOT EXCEEDING .11 BTU&/IN./SQ.FT./DEGREES F. PER HOUR AT MEAN TEMPERATURE OF 75 DEGREES F., (ASTM C335–69_. PIPING INSULATION AND COVERINGS SHALL HAVE A FLAME SPREAD RATING OF <25 AND A SMOKE DEVELOPED RATING OF <50.

F. PROVIDE A JACKET ON ALL INSULATION. PROVIDE VAPOR BARRIER JACKETS ON ALL PIPE AND DUCT INSULATION WHICH OPERATE BELOW AMBIENT TEMPERATURE; JACKETS SHALL OVERLAY A MINIMUM OF 3" AND SHALL BE PASTED DOWN WITH ADHESIVE. ADHESIVE SHALL BE VAPOR TYPE WITH VAPOR BARRIER JACKETS.

G. INSULATION THICKNESS SHALL BE EQUAL OR GREATER THAN THAT RECOMMENDED IN ASHRAE STANDARD 90.1.

H. INSULATE THE FOLLOWING SYSTEMS:

1. DOMESTIC COLD WATER.
2. NON–POTABLE DOMESTIC COLD WATER.
3. REFRIGERANT SUCTION PIPING.

1.18 HEATING, VENTILATING AND AIR CONDITIONING

A. INSTALL AIR COOLED CONDENSING UNIT PROVIDED BY OWNER COMPLETE INCLUDING PLACEMENT OF UNIT IN FINAL OPERATING LOCATION, CONTROLS, AND REFRIGERANT PIPING.

1.19 VIBRATION ISOLATION

A. PROVIDE VIBRATION ISOLATORS FOR AIR COOLED CONDENSING UNIT TO MATCH EXISITNG RTU–1 ISOLATORS. ISOLATORS FOR ROTATING MECHANICAL EQUIPMENT WITH 3/4 HP OR SMALLER MOTORS SHALL BE RUBBER–IN–SHEAR TYPE OR STEEL SPRING TYPE. ISOLATORS FOR ROTATING MECHANICAL EQUIPMENT WITH MOTORS LARGER THAN 3/4 HP SHALL BE STEEL SPRING TYPE.

B. PROVIDE FLEXIBLE CONNECTORS IN ALL PIPING AND DUCTWORK AT THE POINT OF CONNECTION TO ROTATING MECHANICAL EQUIPMENT.

1.20 HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

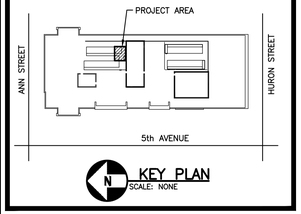
AIR COOLED CONDENSING UNIT:

A. PROVIDED BY OWNER INSTALLED BY CONTRACTOR. REFER TO SCHEDULE ON DRAWINGS FOR ADDITIONAL INFORMATION.

GRAPHIC SCALES

| ISSUED DATE: | ISSUED FOR: |
|---|---|
| 02/18/2022 | OWNER REVIEW 01 |
| 03/04/2022 | BIDS |

KEY PLAN:




KEY PLAN
SCALE: NONE

PROFESSIONAL SEAL:

DO NOT SCALE DRAWING

CORE Design Group
Architecture/ Engineering
37740 Hills Tech Drive
Farmington Hills, MI 48331
Tel: 248.491.3234 www.COREdg.net

CLIENT:

City of Ann Arbor
301 East Huron Street
Ann Arbor, MI 48104

PROJECT TITLE:

Justice Center
HVAC Condenser Replacement
Larcom Building / 301 East Huron Street
Ann Arbor, MI 48104

SHEET TITLE:

MECHANICAL SPECIFICATIONS

| | |
|---|---|
| DESIGNED BY: | R. Climie |
| DRAWN BY: | RC |
| CHECKED BY: | R. Climie |
| JOB No.: | 21-127-AA |
| SHEET No.: | M-4 of 6 |

3/4/2022 10:17:32 AM

GRAPHIC SCALES

1"=10'-0" 1"=20'-0" 1"=30'-0" 1"=40'-0" 1"=50'-0" 1"=60'-0" 1"=100'-0" 1"=200'-0"

1 1/2"=1'-0" 1"=1'-0" 3/4"=1'-0" 1/2"=1'-0" 3/8"=1'-0" 1/4"=1'-0" 3/16"=1'-0" 1/8"=1'-0" 3/32"=1'-0" 1/16"=1'-0" 1/32"=1'-0" 1/64"=1'-0"

1.21 DDC TEMPERATURE CONTROL SYSTEM

A. SCOPE OF WORK

1. PROVIDE ALL CONTROLS FOR NEW AIR COOLED CONDENSING UNIT.

2. REMOVE ALL EXISTING MCQUAY MICROTEC III CONTROLS FROM RTU–1 AND INSTALL ALL NEW CONTROLS

3. INTERFACE NEW RTU–1 AND NEW AIR COOLED CONDENSING UNIT ACU–1 CONTROLS TO SINGLE INTEGRATED CONTROL SYSTEM AND CONNECT TO EXISTING AUTOMATED LOGIC BAS SYSTEM. ALL CONTROL FEATURES, SETPOINTS AND OPERATING STATUS SHALL BE DISPLAYED AT THE EXISTING AUTOMATED LOGIC FRONT END.

B. TEMPERATURE CONTROLS FOR THIS PROJECT SHALL BE ENGINEERED, FURNISHED AND INSTALLED BY AUTOMATED LOGIC, AUTOMATED LOGIC CONTRACTING SERVICES GREAT LAKES DIVISION. SYSTEM SHALL BE DDC WITH ELECTRIC ACCESSORIES. NEW CONTROL EQUIPMENT SHALL, IN GENERAL, MATCH EXISTING CONTROLS.

B. SYSTEM ARCHITECTURE:

1. NEW CONTROLS SHALL CONNECT TO AND BE DISPLAYED AT THE EXISTING AUTOMATED LOGIC FRONT END. THE INSTRUMENTATION AND CONTROL SYSTEM SHALL CONSIST OF DIRECT DIGITAL CONTROL AND DATA COLLECTION PANELS LOCATED IN EQUIPMENT SPACES. THESE LOCAL CONTROL PANELS SHALL CONTAIN THE NECESSARY SOFTWARE AND HARDWARE TO PROVIDE STAND ALONE CAPABILITY. THE LOCAL CONTROL PANELS SHALL BE CONNECTED TO THE CENTRAL PROCESSOR THRU A DATA TRANSMISSION NETWORK. THE SYSTEM SHALL INCLUDE THE CAPABILITY OF ADDRESSING REMOTE OFF–SITE FACILITIES THRU AUTOMATIC DIAL–UP. FROM THE CENTRAL PROCESSOR THE OPERATOR SHALL BE ABLE TO ACCESS THE LOCAL CONTROL PANELS VIA MENU DRIVEN SELECTION PROCESS.

C. PROVIDE ALL TEMPERATURE CONTROL CONDUIT AND WIRING INCLUDING ELECTRICAL INTERLOCKS. PROVIDE CONTROL INTERCONNECTIONS BETWEEN INDOOR AND OUTDOOR EQUIPMENT. ALL WIRING SHALL BE IN STRICT ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.

D. SUBMIT SHOP DRAWINGS FOR THE COMPLETE CONTROL SYSTEM IN THE QUANTITY AS SPECIFIED HEREINBEFORE.

E. EACH SET SHALL INCLUDE DIAGRAMMATIC LAYOUT, WIRING, DIAGRAMS, SEQUENCE OF OPERATION, EQUIPMENT SCHEDULE, AND CATALOG SHEET FOR EACH DEVICE TO BE USED. FURNISH A COPY OF THE "REVIEWED" DRAWINGS TO EACH SUBCONTRACTOR HAVING RELATED WORK. A COPY SHALL ALSO BE POSTED AT THE JOB SITE. UPON COMPLETION OF JOB, PROVIDE "RECORD" DRAWINGS. THIS DRAWING SHALL BE ENCASED IN PLASTIC AND FURNISHED WITH GROMMETS FOR HANGING. A COMPLETE SUBMITTAL SHALL BE GIVEN TO THE OWNER. THIS SUBMITTAL SHALL INCLUDE MAINTENANCE REPAIR INSTRUCTIONS. PREPARE A TYPE–WRITTEN GENERAL DESCRIPTION OF THE OPERATION OF ALL PHASES OF THE HEATING AND VENTILATING SYSTEM FOR THE BENEFIT OF THE OWNER MAINTENANCE PERSONNEL.

F. AFTER COMPLETION OF THE INSTALLATION, ADJUST ALL CONTROLS AND OTHER EQUIPMENT PROVIDED UNDER THIS CONTRACT. PLACE ALL SYSTEM COMPONENTS IN COMPLETED OPERATING CONDITION.

1. THE CONTROL SYSTEM HEREIN SPECIFIED SHALL BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIAL NORMAL USE AND SERVICE. IF, WITHIN TWELVE (12) MONTHS FROM DATE OF THE ACCEPTANCE BY OWNER, ANY OF THE EQUIPMENT HEREIN DESCRIBED IS PROVED TO BE DEFECTIVE IN WORKMANSHIP OR MATERIAL, IT WILL BE ADJUSTED, REPAIRED OR REPLACED FREE OF CHARGE.

G. WIRING:

1. ALONG CABLE SPLICING:

A. LOW VOLTAGE/CURRENT SIGNAL WIRING SUCH AS 0–5VDC, 0–10VDC, 4–20MA, ETC., USED IN TEMPERATURE SENSING, PRESSURE SENSING, FLOW SENSING, ETC.,

SHALL NOT BE SPLICED. PROPER TERMINATIONS SHALL BE MADE IN TERMINAL CABINETS IF A CONTINUOUS CABLE RUN IS NOT POSSIBLE. MAXIMUM HEIGHT OF TERMINAL CABINET SHALL BE 6'–0" ABOVE FINISHED FLOOR.

2. CONDUCTOR IDENTIFICATION AND COLOR CODING:

A. 120 VAC WIRING WITHIN A CONTROL PANEL SHALL BE YELLOW. DC POWER WIRING SHALL BE BLUE. IDENTIFY PHASE AND VOLTAGE OF ALL OTHER WIRING WITH COLOR CODE OR WIRE LABEL ATTACHED TO INDIVIDUAL CONDUCTORS. MARK TERMINAL STRIPS TO MATCH WIRE LABEL.

H. WORKMANSHIP

1. INSTALLATION OF THE AUTOMATIC TEMPERATURE CONTROL WORK SHALL BE INSTALLED AND SUPERVISED BY MECHANICS WITH MORE THAN FIVE (5) YEARS EXPERIENCE. ALL INSTALLATION WORK SHALL BE SCHEDULED AND COORDINATED SO AS TO EXPEDITE JOB PROGRESS. ALL WORK SHALL BE INSTALLED IN ACCORDANCE WITH CURRENT TEMPERATURE CONTROL INDUSTRY PRACTICES. ANY WORK NOT PROPERLY EXECUTED SHALL BE REMOVED AND REPLACED AT NO EXPENSE TO THE OWNER. WHEN ALL DEVICES ARE INSTALLED, A FULLY QUALIFIED TEMPERATURE CONTROL SPECIALIST SHALL SET, ADJUST AND CALIBRATE ALL COMPONENTS.

I. INSTALLATION

1. ALL EXPOSED WIRING AND CONDUIT SHALL BE RUN PARALLEL TO OR AT RIGHT ANGLES TO THE BUILDING AND EQUIPMENT.

J. CONTROL COMPONENTS

1. ELECTRIC LOW LIMIT THERMOSTAT (FREEZESTAT):

A. DUCT TYPE, FIXED 5 DEGF DIFFERENTIAL, RANGE 30 TO 60 DEG.F. SENSING ELEMENT SHALL BE A 20 FOOT LONG CAPILLARY TUBE RESPONDING TO THE LOWEST TEMPERATURE SENSED ALONG ANY 12 INCHES OF BULB LENGTH. SWITCH SHALL BE

SPDT 120/240 VOLTS AC, RATED FOR 10 AMPS AT 120 VOLTS FULL LOAD. UNIT SHALL BE MANUALLY RESET. PROVIDE ONE LOW LIMIT THERMOSTAT FOR EACH 20 SQUARE FEET OR FRACTION THEREOF OF COIL SURFACE AREA.

2. TEMPERATURE SENSORS:

A. TEMPERATURE SENSORS SHALL BE RESISTANCE TYPE (RTD) WITH PLATINUM OR NICKEL ELEMENT. NO THERMISTORS OR THERMOCOUPLE WILL BE ACCEPTABLE. MINIMUM RTD ACCURACY SHALL BE +/–0.5 DEG.F, END TO END SYSTEM ACCURACY SHALL BE +/–1 DEGREE F OVER THE ENTIRE RANGE. RANGE SHALL BE APPROPRIATE TO THE APPLICATION.

B. ROOM SENSORS SHALL HAVE A TAMPERPROOF COVER. THE COVER SHALL INCLUDE SETPOINT ADJUST POTENTIOMETER AND OCCUPANCY PUSH BUTTON AS SHOWN ON THE POINT LIST OR DRAWINGS.

C. DUCT TEMPERATURE SENSORS SHALL BE AVERAGING TYPE FOR MIXED AIR AND COIL DISCHARGE TEMPERATURE SENSING. AVERAGING RTD'S SHALL BE AT LEAST 16 FEET LONG.

D. SINGLE POINT DUCT MOUNTED SENSORS SHALL HAVE A RIGID HOLDER EXTENDING AT LEAST 6 INCHES INTO THE DUCT.

E. LIQUID IMMERSION SENSORS SHALL BE INSTALLED IN BRASS OR STAINLESS STEEL THERMOWELLS. STEAM IMMERSION SENSORS SHALL BE INSTALLED IN STAINLESS STEEL THERMOWELLS. THERMOWELLS SHALL BE PACKED WITH THERMALLY CONDUCTIVE COMPOUND PRIOR TO SENSOR INSTALLATION. THERMOWELL PRESSURE RATING SHALL MEET OR EXCEED THE SYSTEM MAXIMUM PRESSURE RATING.

F. OUTSIDE AIR SENSORS SHALL BE PROVIDED WITH A SUNSHIELD WHEN MOUNTED ON AN OUTSIDE WALL AS INDICATED IN THE POINT LIST.

3. HUMIDITY SENSORS:

A. RELATIVE HUMIDITY SENSORS SHALL BE A THIN FILM CAPACITIVE TYPE ELEMENT WITH 10% TO 90% RANGE END +/–3% ACCURACY THROUGH THIS RANGE.

B. DUCT MOUNTED SENSORS SHALL BE PROVIDED WITH A SAMPLING CHAMBER. WALL MOUNTED SENSORS SHALL BE PROVIDED WITH TAMPERPROOF COVERS.

4. HIGH STATIC LIMIT:

A. HIGH STATIC LIMIT SHALL BE A TWO–POSITION FOUR–WIRE ELECTRIC TYPE DEVICE AND SHALL SHUT DOWN FAN UPON ACTIVATION. LIMIT SHALL REQUIRE MANUAL RESET.

5. CURRENT SENSORS:

A. CURRENT SENSORS SHALL CONSIST OF A DONUT TYPE CT SHALL INCLUDE A SAFETY SHUNT.

6. PRESSURE TRANSMITTERS:

A. PRESSURE TRANSMITTERS SHALL ACCEPT A PRESSURE INPUT AND PROVIDE A 4–20 MA DC OUTPUT WITH ACCURACY OF +/–1.0% OF FULL SCALE. MAXIMUM RESPONSE TIME SHALL BE 1 SECOND.

7. LINE VOLTAGE THERMOSTATS:

A. INTEGRAL MANUAL ON–OFF/AUTO SELECTOR SWITCH TYPE IF INDICATED, MAXIMUM DIFFERENTIAL OF 2 DEGF, CONCEALED TEMPERATURE ADJUSTMENT COVER DESIGN AS APPROVED. LINE VOLTAGE THERMOSTATS SHALL BE RATED FOR THE LOAD, SINGLE OR TWO POLE AS REQUIRED. THERMOSTAT COVERS AND FINISHES SHALL BE MANUFACTURER'S STANDARD WITH FINISH AS SELECTED BY THE ARCHITECT.

8. DIRECT DIGITAL CONTROLLERS:

A. GENERAL: DIRECT DIGITAL CONTROLLER (DDC) PANELS SHALL BE MICROPROCESSOR BASED, MULTI–TASKING, MULTI–USER, REAL–TIME DIGITAL CONTROL PROCESSORS. EACH STANDALONE DDC PANEL SHALL CONSIST OF MODULAR HARDWARE WITH PLUG–IN ENCLOSED PROCESSORS, COMMUNICATION CONTROLLERS, POWER SUPPLIES, AND INPUT/OUTPUT MODULES. A SUFFICIENT NUMBER OF CONTROLLERS SHALL BE SUPPLIED TO FULLY MEET THE REQUIREMENTS OF THIS SPECIFICATION AND THE ATTACHED POINT LIST.

B. MEMORY: EACH DDC PANEL SHALL HAVE SUFFICIENT MEMORY TO SUPPORT ITS OWN OPERATING SYSTEM AND DATABASES INCLUDING:

1 CONTROL PROCESSES

2 INTEGRAL PROGRAMMABLE TIME CLOCK

3 ALARM MANAGEMENT

4 HISTORICAL/TREND DATA FOR ALL POINTS

5 MAINTENANCE SUPPORT APPLICATIONS

6 CUSTOM PROCESSES

7 OPERATOR I/O

8 DIAL–UP COMMUNICATIONS

9 MANUAL OVERRIDE MONITORING

C. POINT TYPES: EACH DDC PANEL SHALL SUPPORT THE FOLLOWING TYPES OF POINT INPUTS AND OUTPUTS:

1 DIGITAL INPUTS FOR STATUS/ALARM CONTACTS

2 DIGITAL OUTPUTS FOR ON/OFF EQUIPMENT CONTROL.

3 ANALOG INPUTS FOR TEMPERATURE, PRESSURE, HUMIDITY, FLOW AND POSITION MEASUREMENTS.

4 ANALOG OUTPUTS FOR VALVE AND DAMPER POSITION CONTROL, AND CAPACITY CONTROL OF PRIMARY EQUIPMENT.

5 PULSE INPUTS FOR PULSED CONTACT MONITORING.

D. SERIAL COMMUNICATION PORTS: STANDALONE DDC PANELS SHALL PROVIDE AT LEAST TWO RS–232C SERIAL DATA COMMUNICATION PORTS FOR SIMULTANEOUS OPERATION OF MULTIPLE OPERATOR I/O DEVICES SUCH AS INDUSTRY STANDARD PRINTERS, LAPTOP WORKSTATIONS, PC WORKSTATIONS, AND PANEL MOUNTED OR PORTABLE DDC PANEL OPERATOR'S TERMINALS. STANDALONE DDC PANELS SHALL ALLOW TEMPORARY USE OF PORTABLE DEVICES WITHOUT INTERRUPTING THE NORMAL OPERATION OF PERMANENTLY CONNECTED MODEMS, PRINTERS, OR NETWORK TERMINALS.

E. SOFTWARE FEATURES:

1 ALL NECESSARY SOFTWARE TO FORM A COMPLETE OPERATING SYSTEM AS DESCRIBED IN THIS SPECIFICATION SHALL BE PROVIDED.

2 THE SOFTWARE PROGRAMS SPECIFIED IN THIS SECTION SHALL BE PROVIDED AS AN INTEGRAL PART OF THE DDC PANEL AND SHALL NOT BE DEPENDENT UPON ANY HIGHER LEVEL COMPUTER FOR EXECUTION.

3 PRE–TESTED CONTROL ALGORITHMS: THE DDC PANELS SHALL HAVE THE ABILITY TO PERFORM THE FOLLOWING PRETESTED CONTROL ALGORITHMS.

A TWO POSITION CONTROL.

B PROPORTIONAL CONTROL.

C PROPORTIONAL PLUS INTEGRAL CONTROL.

D PROPORTIONAL, INTEGRAL, PLUS DERIVATIVE CONTROL.

E AUTOMATIC CONTROL LOOP TUNING.

9. AIR FLOW CONTROL DAMPERS:

A. UTILIZE PRESENT AIRFLOW CONTROL DAMPERS.

10. CONTROL VALVES:

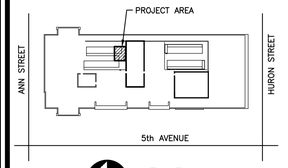
A. WHERE APPLICABLE UTILIZE PRESENT CONTROL VALVES.

11. LOCAL CONTROL PANELS:

A. ALL CONTROLLERS, TEMPERATURE INDICATORS, RELAYS, SWITCHES, ETC., SHALL BE PANEL MOUNTED. THE PANELS SHALL BE STEEL WITH HINGED DOORS. THE TEMPERATURE INDICATORS (OR THERMOMETERS) AND SWITCHES SHALL BE SURFACE MOUNTED ON THE DOOR AND TAGGED WITH PLASTIC LABELS.

| ISSUED DATE: | ISSUED FOR: |
|---|---|
| 02/18/2022 | OWNER REVIEW 01 |
| 03/04/2022 | BIDS |

KEY PLAN:




KEY PLAN
SCALE: NONE

PROFESSIONAL SEAL:

DO NOT SCALE DRAWING

CORE Design Group
Architecture/ Engineering
37740 Hills Tech Drive
Farmington Hills, MI 48331
Tel: 248.491.3234 www.COREdg.net

CLIENT:

City of Ann Arbor
301 East Huron Street
Ann Arbor, MI 48104

PROJECT TITLE:

Justice Center
HVAC Condenser
Replacement

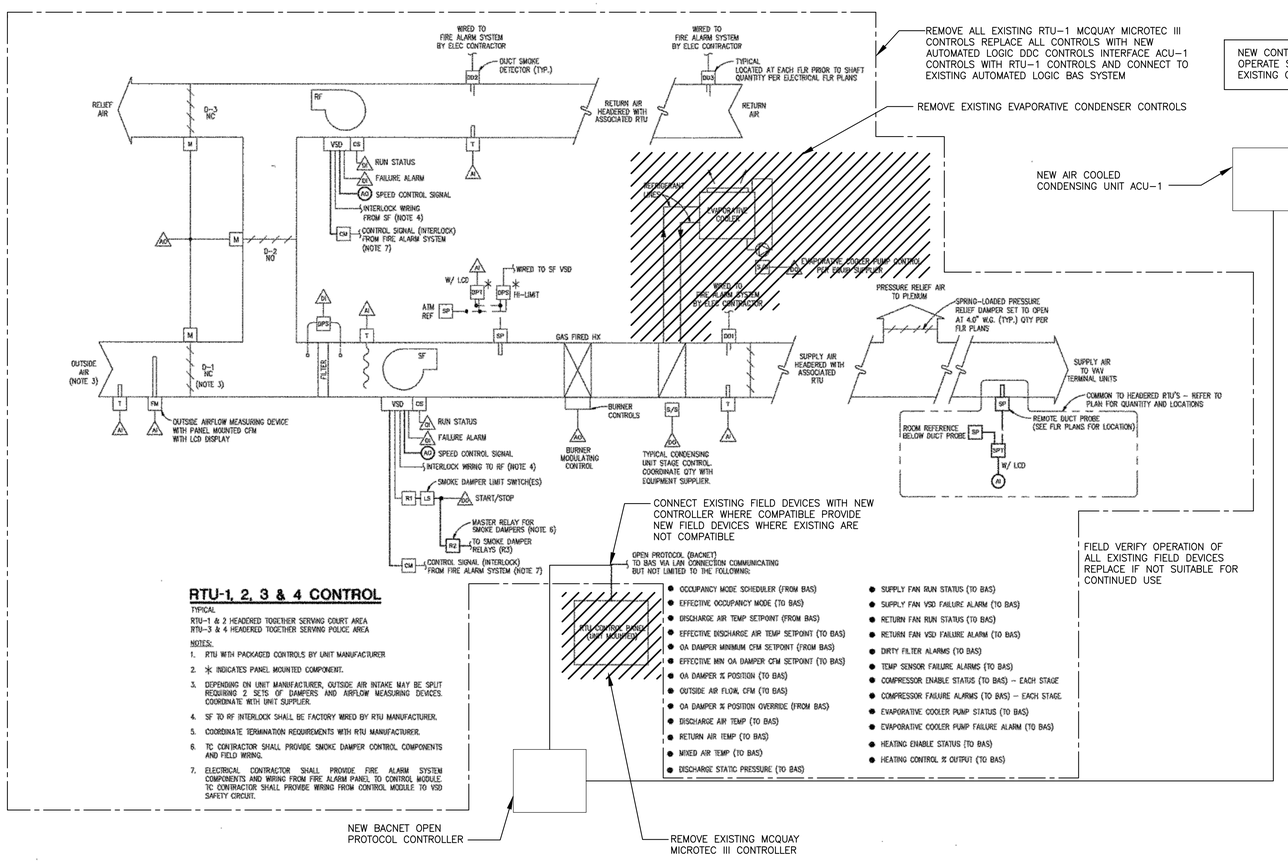
Larcom Building / 301 East Huron Street
Ann Arbor, MI 48104

SHEET TITLE:

MECHANICAL SPECIFICATIONS

| | |
|---|---|
| DESIGNED BY: | R. Climie |
| DRAWN BY: | RC |
| CHECKED BY: | R. Climie |
| JOB No.: | 21-127-AA |
| SHEET No.: | M-5 of 6 |

3/4/2022 10:17:13 AM




## RTU-1, 2, 3 & 4 CONTROL

TYPICAL

RTU-1 & 2 HEADERED TOGETHER SERVING COURT AREA
RTU-3 & 4 HEADERED TOGETHER SERVING POLICE AREA

NOTES:

1. RTU WITH PACKAGED CONTROLS BY UNIT MANUFACTURER
2. ✳ INDICATES PANEL MOUNTED COMPONENT.
3. DEPENDING ON UNIT MANUFACTURER, OUTSIDE AIR INTAKE MAY BE SPLIT REQUIRING 2 SETS OF DAMPERS AND AIRFLOW MEASURING DEVICES. COORDINATE WITH UNIT SUPPLIER.
4. SF TO RF INTERLOCK SHALL BE FACTORY WIRED BY RTU MANUFACTURER.
5. COORDINATE TERMINATION REQUIREMENTS WITH RTU MANUFACTURER.
6. TC CONTRACTOR SHALL PROVIDE SMOKE DAMPER CONTROL COMPONENTS AND FIELD WIRING.
7. ELECTRICAL CONTRACTOR SHALL PROVIDE FIRE ALARM SYSTEM COMPONENTS AND WIRING FROM FIRE ALARM PANEL TO CONTROL MODULE. TC CONTRACTOR SHALL PROVIDE WIRING FROM CONTROL MODULE TO VSD SAFETY CIRCUIT.

## TC GENERAL NOTES

TC GENERAL NOTES ON DRAWING M7.00 APPLY TO THIS DRAWING.

## EXISTING SEQUENCE OF OPERATION

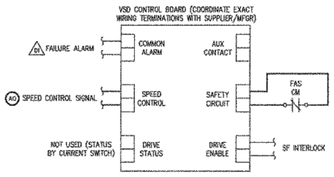
ROOFTOP UNIT RTU-1, 2, 3 & 4 (TYP. EXCEPT WHERE NOTED):

NOTE: RTU SHALL INCLUDE PACKAGED DDC AND THE BAS SHALL BE USED TO PROVIDE OCCUPIED MODE SIGNAL, UNOCCUPIED CYCLE MODE SIGNAL, MORNING WARM-UP SIGNAL, AND SF SPEED MODULATION FOR STATIC PRESSURE CONTROL. BAS SHALL COMMUNICATE WITH UNIT PACKAGED CONTROLS FOR OPERATING SCHEDULES, SETPOINT ADJUSTMENTS, SYSTEM OVERRIDES, AND SYSTEM MONITORING. THE FOLLOWING SEQUENCE DESCRIBES THE REQUIRED FUNCTIONS FOR BOTH SYSTEMS. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL SETPOINTS DESCRIBED SHALL BE ADJUSTABLE.

1. SUPPLY FAN AND INTERLOCKED RETURN FAN SHALL HAVE START/STOP CAPABILITY FROM THE PACKAGED CONTROL SYSTEM AND SHALL OPERATE BASED ON BAS INTERFACE.
2. BAS SHALL SIGNAL RTU TO OPERATE BASED ON TIME SCHEDULED OCCUPIED MODE (COMPENSATED BY OPTIMUM START PROGRAM) AND UNOCCUPIED CYCLE MODE. FOR MORNING WARM-UP PRIOR TO OCCUPIED MODE, BAS SHALL SIGNAL FOR UNOCCUPIED MODE CYCLE UNTIL OCCUPIED MODE SPACE TEMPERATURE IS REACHED IN ALL OF THE ASSOCIATED ZONES.
3. RTU'S HEADERED TOGETHER SHALL OPERATE SIMULTANEOUSLY. START OF EACH RTU SHALL BE STAGGERED BY 5 MINUTES. START ORDER SHALL BE ROTATED AT EACH START.
4. FOR HEATING OCCUPIED MODE, RTU SHALL OPERATE CONTINUOUSLY AND BE CONTROLLED BY RTU PACKAGED CONTROLS TO MAINTAIN DISCHARGE AIR TEMP SETPOINT. ZONE VAV, CAV & FPB TERMINAL UNITS WITH ASSOCIATED TEMPERING COILS (WHERE APPLICABLE) SHALL BE CONTROLLED BY UNITARY DDC CONTROLLERS TO MAINTAIN RESPECTIVE SPACE TEMP SETPOINTS (REFER TO TERMINAL UNIT SEQUENCE OF OPERATIONS).
5. FOR HEATING UNOCCUPIED MODE, RTU SHALL CYCLE ON & OFF TO MAINTAIN A SETBACK SPACE TEMP SETPOINT OF 62°F. BAS SHALL REFERENCE ASSOCIATED SPACE TEMPERATURE SENSORS USED TO CONTROL VAV TERMINAL UNITS AND PROVIDE AN UNOCCUPIED CYCLE MODE SIGNAL TO RTU PACKAGED CONTROLS BASED ON LOWEST SPACE TEMP READING.
6. FOR COOLING UNOCCUPIED MODE, RTU SHALL CYCLE ON & OFF TO MAINTAIN A SETUP SPACE TEMP SETPOINT OF 85°F. BAS SHALL REFERENCE ASSOCIATED SPACE TEMPERATURE SENSORS USED TO CONTROL VAV TERMINAL UNITS AND PROVIDE AN UNOCCUPIED CYCLE MODE SIGNAL TO RTU PACKAGED CONTROLS BASED ON HIGHEST SPACE TEMP READING.
7. SUPPLY FAN AND RETURN FAN STATUS SHALL BE MONITORED BY PACKAGED CONTROLS THRU RESPECTIVE CURRENT SWITCH. ABNORMAL STATUS CONDITION FOR SF SHALL ACTIVATE ALARM WITH INDICATION AT LOCAL CONTROL PANEL WITH COMMON ALARM TO BAS.
8. VSD COMMON FAILURE ALARM FOR EACH FAN SHALL BE MONITORED BY PACKAGED CONTROLS THRU RESPECTIVE CURRENT SWITCH. ALARM CONDITION SHALL BE INDICATED AT LOCAL CONTROL PANEL WITH COMMON ALARM TO BAS.
9. WHEN RTU IS ACTIVATED IN THE OCCUPIED MODE, RTU PACKAGED CONTROLS SHALL MODULATE OUTSIDE AIR & RETURN AIR DAMPERS AS DESCRIBED BELOW. WHEN RTU IS DEACTIVATED OR OPERATING IN UNOCCUPIED CYCLE MODE, OUTSIDE AIR & RETURN AIR DAMPERS SHALL REMAIN IN NORMAL POSITIONS.
10. PACKAGED CONTROLS SHALL MONITOR OUTDOOR AIRFLOW AND MODULATE MIXED AIR DAMPERS TO MAINTAIN MINIMUM OA CFM. REFER TO MECHANICAL SCHEDULES FOR MINIMUM OUTDOOR AIR INFORMATION. BAS SHALL MONITOR OUTDOOR AIRFLOW THRU INTERFACE WITH RTU PACKAGED CONTROLS AND PROVIDE AN ALARM FOR SYSTEM OPERATORS AT BAS USER INTERFACE IF OUTDOOR AIRFLOW VARIES BY 10% OR MORE FROM SETPOINT.
11. WHEN OA TEMP IS GREATER THAN RA TEMP; OUTSIDE AIR & RETURN AIR DAMPERS SHALL REMAIN AT MINIMUM OA POSITION AND EVAPORATIVE COOLER SHALL BE CONTROLLED TO MAINTAIN DA TEMP SETPOINT. THE COOLING SYSTEM SHALL HAVE THE CAPABILITY TO OPERATE (AT REDUCED CAPACITY) WITH THE EVAPORATIVE CONDENSING SPRAY WATER SUMP DRY.
12. WHEN OA TEMP IS LESS THAN OR EQUAL TO RA TEMP AND DA TEMP IS ABOVE SETPOINT; OUTSIDE AIR & RETURN AIR DAMPERS SHALL BE MODULATED ABOVE MINIMUM OA POSITION IN SEQUENCE WITH EVAPORATIVE COOLER CONTROL TO MAINTAIN DA TEMP SETPOINT. DAMPERS SHALL REMAIN IN MINIMUM OA POSITION IF OA TEMP IS ABOVE ECONOMIZER LOCKOUT TEMP OF 65°F. THE COOLING SYSTEM SHALL HAVE THE CAPABILITY TO OPERATE (AT REDUCED CAPACITY) WITH THE EVAPORATIVE CONDENSING SPRAY WATER SUMP DRY.
13. WHEN OA TEMP IS LESS THAN OR EQUAL TO RA TEMP AND DA TEMP IS BELOW SETPOINT; OUTSIDE AIR & RETURN AIR DAMPERS SHALL REMAIN AT MINIMUM OA POSITION AND GAS-FIRED BURNER SHALL BE MODULATED TO MAINTAIN DA TEMP SETPOINT.
14. DISCHARGE AIR TEMP SETPOINT SHALL BE BASED ON THE FOLLOWING OUTDOOR AIR TEMP RESET SCHEDULE:

| OAT | DAT |
|---|---|
| ≤30°F | 60°F |
| ≥55°F | 55°F |

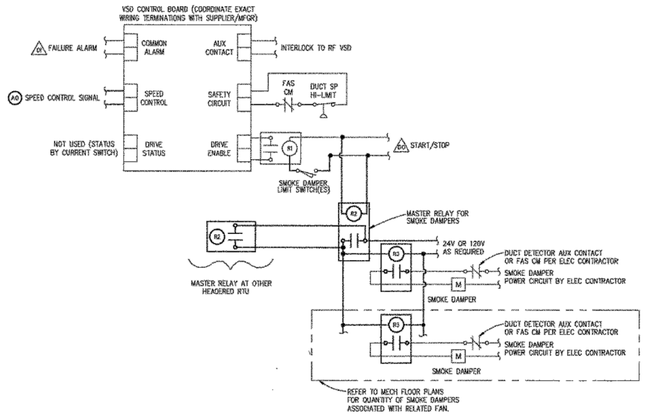
15. DAMPER CONTROL SHALL BE OVERRIDDEN TO PREVENT MIXED AIR TEMP FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F. IF DISCHARGE AIR TEMP DROPS BELOW LOW LIMIT SETPOINT OF 45°F, ALARM CONDITION SHALL BE INDICATED AT LOCAL CONTROL PANEL WITH COMMON ALARM TO BAS.
16. DURING MORNING WARM-UP BASED ON DDC SIGNAL, DAT SETPOINT SHALL BE 65°F UNTIL BUILDING OCCUPANCY TIME OR WHEN OCCUPIED MODE SPACE TEMPERATURE IS REACHED IN ONE OF THE ASSOCIATED ZONES.
17. SF VSD SHALL BE MODULATED BY BAS TO MAINTAIN REMOTE SYSTEM SUPPLY AIR STATIC PRESSURE SETPOINT SIGNAL FROM BAS THAT SHALL BE RESET BASED ON DAMPER POSITION FEEDBACK FROM ASSOCIATED VAV BOX CONTROLLERS AS FOLLOWS: SETPOINT SHALL BE ADJUSTED TO ALLOW 3 SA TERMINAL UNITS TO OPERATE ABOVE 90% OPEN DAMPER POSITION. LESS THAN 3 ABOVE 90% SETPOINT SHALL BE SLOWLY DECREASED BY 0.1" W.G. EVERY HALF-HOUR. MORE THAN 3 ABOVE 90% SETPOINT SHALL BE SLOWLY INCREASED BY 0.1" W.G. EVERY HALF-HOUR. SETPOINT RANGE SHALL BE MINIMUM 0.5" W.G. TO A MAXIMUM VALUE WHICH SHALL BE DETERMINED BY THE AIR BALANCE CONTRACTOR (DEFAULT=1.25"). THE MAXIMUM VALUE SHALL BE THE STARTING POINT.
18. FOR HEADERED UNITS, BAS SHALL SEND COMMON SF SPEED CONTROL SIGNAL TO BOTH SUPPLY FANS TO ACCOMMODATE SIMULTANEOUS SPEED CONTROL.
19. RF VSD SHALL BE PROPORTIONALLY MODULATED WITH SF VSD SPEED CONTROL. RF LOW SPEED SHALL CORRESPOND TO SF LOW SPEED AND RF HIGH SPEED SHALL CORRESPOND TO SF HIGH SPEED. REFER TO MECHANICAL SCHEDULES FOR SUPPLY AND RETURN AIRFLOW INFORMATION. RF LOW AND HIGH SPEED LIMITS SHALL BE CORRELATED WITH SF AIRFLOW AND SHALL BE DETERMINED BY AIR BALANCE CONTRACTOR. RF HIGH SPEED LIMIT SHALL BE THE SPEED AT WHICH THE RF AIRFLOW ACHIEVES SCHEDULED SUPPLY/RETURN AIRFLOW OFFSET WHEN SF IS OPERATING AT 100% SPEED. RF LOW SPEED LIMIT SHALL BE THE SPEED AT WHICH THE RF AIRFLOW ACHIEVES SCHEDULED SUPPLY/RETURN AIRFLOW OFFSET WHEN SF IS OPERATING AT MINIMUM SPEED.
20. DISCHARGE STATIC PRESSURE HIGH LIMIT AT RTU WITH SETPOINT OF 3.5" W.G. SHALL PROVIDE OVERRIDE CONTROL AND HIGH LIMIT SWITCH WITH SETPOINT OF 5.0" W.G. SHALL PROVIDE HARDWIRED SAFETY. PACKAGED CONTROLS SHALL ACTIVATE ALARM AT BAS IF OPERATING IN OVERRIDE CONDITION. PRESSURE RELIEF DAMPERS SHALL BE SET FOR 4.0" W.G.
21. FIRE ALARM SYSTEM CONTROL MODULE(S) SHALL DEACTIVATE SF & INTERLOCKED RF WHEN PRODUCTS OF COMBUSTION ARE DETECTED AT ANY ONE OF THE DUCT SMOKE DETECTOR(S) ASSOCIATED WITH RTU.
22. FILTER STATUS SHALL BE MONITORED BY PACKAGED CONTROLS THRU DIFFERENTIAL PRESSURE SWITCH. WHEN DP REACHES SETPOINT, DIRTY FILTER ALARM CONDITION SHALL BE INDICATED AT LOCAL CONTROL PANEL WITH COMMON ALARM TO BAS.
23. WHEN RTU IS DEACTIVATED, GAS-FIRED BURNER AND DX COOLING SHALL REMAIN OFF.
24. NEW AIR COOLED CONDENSING UNIT SHALL REPLACE EVAPORATIVE CONDENSER FOR COOLING OPERATION.




## RTU-1, 2, 3 & 4 RF VSD WIRING

NOTE:

1. WIRING DETAIL IDENTIFIES INTENT AND DOES NOT INDICATE ACTUAL WIRING REQUIREMENTS. CONSULT WITH VSD SUPPLIER FOR THE ACTUAL WIRING REQUIREMENTS.

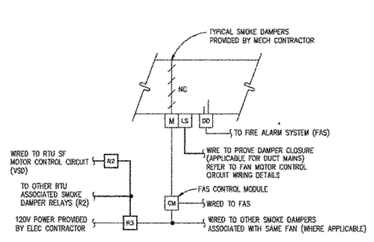



## RTU-1, 2, 3 & 4 SF VSD AND SMOKE DAMPER WIRING

TYPICAL

NOTES:

1. WIRING DETAIL IDENTIFIES INTENT AND DOES NOT INDICATE ACTUAL WIRING REQUIREMENTS. CONSULT WITH VSD SUPPLIER FOR THE ACTUAL WIRING REQUIREMENTS.




## RTU SYSTEM SMOKE DAMPER CONTROL

TYPICAL

NOTE:

1. REFER TO FLOOR PLANS FOR SMOKE DAMPER QUANTITY, LOCATION AND ASSOCIATED RTU.
2. ELECTRICAL CONTRACTOR SHALL PROVIDE 120V POWER REQUIREMENT FOR SMOKE DAMPER ACTUATOR.
3. TC CONTRACTOR SHALL PROVIDE CONTROL RELAYS FOR DAMPER CONTROL. PROVIDE ENCLOSURE.
4. SMOKE DAMPER CONTROL RELAYS ASSOCIATED WITH COMMON FAN SHALL BE WIRED IN PARALLEL.

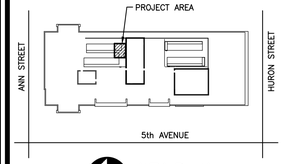
SEQUENCE OF OPERATION:

1. SMOKE DAMPER IS HARDWIRE INTERLOCKED WITH RELATED FAN AND SHALL OPEN WHENEVER RELATED FAN IS ACTIVATED AND SMOKE DAMPER SHALL CLOSE WHEN RELATED FAN IS DEACTIVATED.
2. WHEN PRODUCTS OF COMBUSTION IS DETECTED AT ASSOCIATED DUCT DETECTOR, SMOKE DAMPER SHALL CLOSE AND FIRE ALARM SYSTEM SHALL DEACTIVATE RELATED FANS THRU RESPECTIVE CONTROL MODULES (RTU-1 & 2 HEADERED TOGETHER AND RTU-3 & 4 HEADERED TOGETHER).
3. WHERE APPLICABLE, SMOKE DAMPER LIMIT SWITCH(ES) SHALL BE HARDWIRE INTERLOCKED TO RESPECTIVE FAN CONTROL CIRCUIT TO PREVENT FAN FROM OPERATING UNTIL DAMPER(S) ARE PROVEN OPEN.

EXISTING CONTROL DIAGRAM PROVIDED FOR REFERENCE ONLY CONTROLS CONTRACTOR TO FIELD VERIFY PRESENCE AND OPERATION OF ALL EXISTING CONTROLS AND PROVIDE COMPLETE NEW RTU-1/ACU-1 CONTROL SYSTEM GENERAL UNIT OPERATION TO REMAIN WITH THE EXCEPTION OF NEW ACU-1 WILL REPLACE FUNCTION OF EXISTING EVAPORATIVE CONDENSER

| ISSUED DATE: | ISSUED FOR: |
|---|---|
| 02/18/2022 | OWNER REVIEW 01 |
| 03/04/2022 | BIDS |

KEY PLAN:




PROFESSIONAL SEAL:

DO NOT SCALE DRAWING

CORE Design Group
Architecture/ Engineering
37740 Hills Tech Drive
Farmington Hills, MI 48331
Tel: 248.491.3234 www.COREdg.net

CLIENT:

**City of Ann Arbor**
**301 East Huron Street**
**Ann Arbor, MI 48104**

PROJECT TITLE:

**Justice Center HVAC Condenser Replacement**
**Larcom Building / 301 East Huron Street**
**Ann Arbor, MI 48104**

SHEET TITLE:

**TEMPERATURE CONTROLS**

| | |
|---|---|
| DESIGNED BY: | R. Climie |
| DRAWN BY: | RC |
| CHECKED BY: | R. Climie |
| JOB No.: | 21-127-AA |
| SHEET No.: | M-6 of 6 |

GRAPHIC SCALES

JOB No. 21-127.AA SHEET E-1

## 16030 – RULES, CODES, AND STANDARDS

A. ALL WORK SHALL BE PERFORMED IN STRICT CONFORMANCE WITH ALL APPLICABLE RULES, CODES AND REGULATIONS OF LOCAL, STATE AND FEDERAL GOVERNMENT AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION.
B. ALL ELECTRICAL WORK AND EQUIPMENT SHALL CONFORM TO THE FOLLOWING REGULATIONS AND CODES:
   1. NATIONAL ELECTRICAL CODE, LATEST ADOPTED EDITION.
   2. MICHIGAN ELECTRICAL CODE RULES, PART 8.
   3. ALL FEDERAL HEALTH AND SAFETY REGULATIONS.
   4. ALL MICHIGAN STATE SAFETY REGULATIONS AND M.I.O.S.H.A.
C. ALL INSTALLED EQUIPMENT SHALL BEAR THE UL SEAL OF APPROVAL FOR ITS INTENDED PURPOSE.
D. WHERE JURISDICTIONAL RULES REQUIRE THE ASSISTANCE OF WORKERS OF THE ELECTRICAL TRADE, IN THE HANDLING OF EQUIPMENT FURNISHED BY OTHERS OR IN THE WORK OF OTHER TRADES, THIS CONTRACTOR SHALL PROVIDE SUCH REQUIRED ASSISTANCE.
E. WHERE THE REQUIREMENTS OF THESE CONTRACT DOCUMENTS ARE IN CONFLICT WITH THE CODES AND REGULATIONS OF GOVERNING AGENCIES, THE MOST STRINGENT SHALL APPLY.

## 16110 – CONDUIT

A. ALL CONDUIT SHALL CONFORM TO THE FOLLOWING REGULATORY REQUIREMENTS:
   1. RIGID STEEL CONDUIT ANSI C80.1
   2. ELECTRICAL METALLIC TUBING ANSI C80.3
B. MINIMUM CONDUIT SIZE SHALL BE 3/4".
C. CONDUIT USES SHALL BE AS FOLLOWS:
   1. OUTDOOR EXPOSED: USE RIGID GALVANIZED STEEL CONDUIT.
   2. INDOOR AREAS: USE ELECTRICAL METALLIC TUBING.
   3. FINAL CONNECTIONS TO VIBRATING EQUIPMENT SHALL BE MADE USING FLEXIBLE STEEL CONDUIT (MAXIMUM 3 FT. LENGTH), USE LIQUID – TIGHT FLEXIBLE METAL ("SEALTITE") OR NON–METALLIC CONDUIT IN WET OR DAMP LOCATIONS.

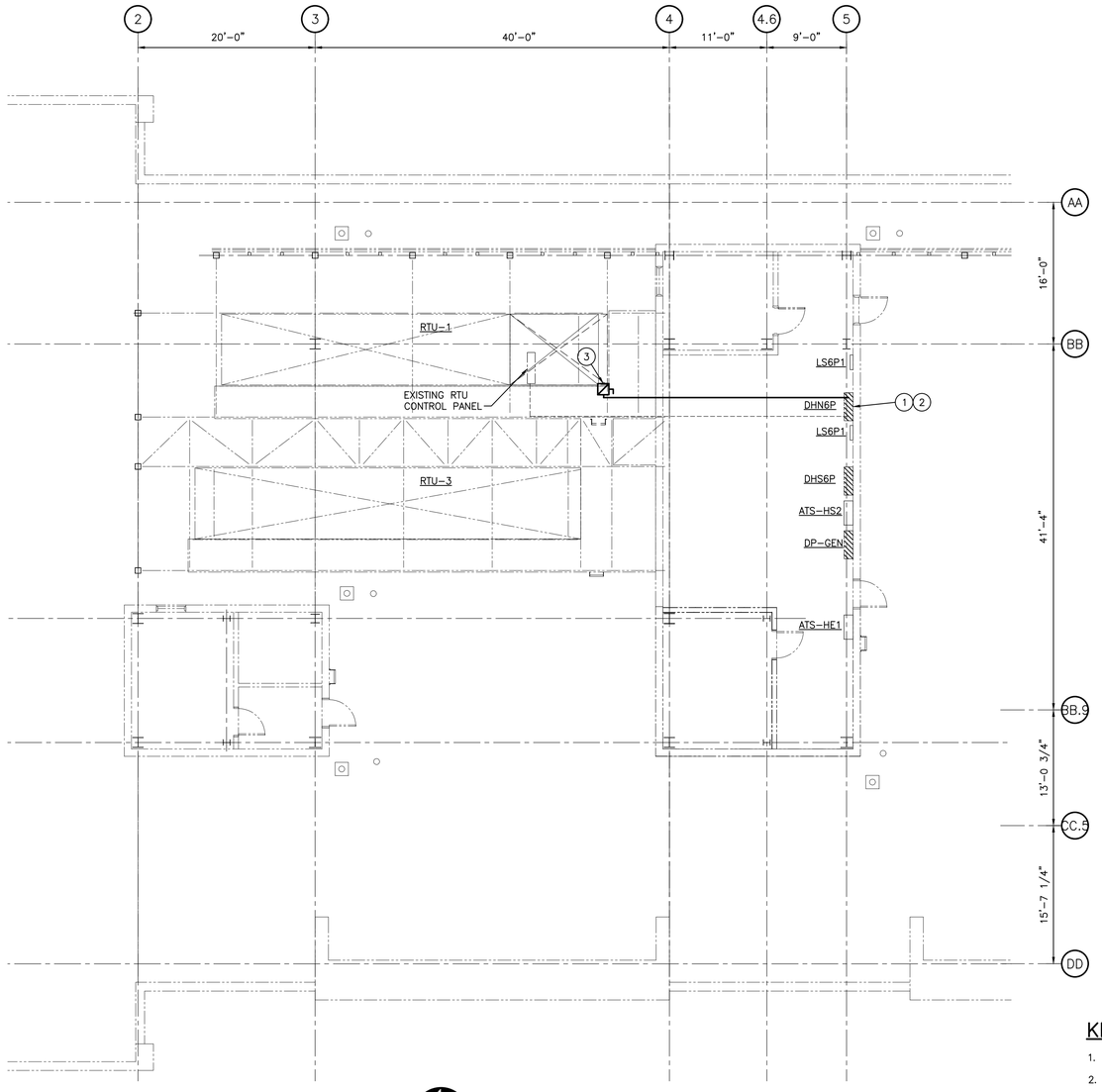
E. USE THREADED RIGID STEEL CONDUIT FITTINGS, UNLESS OTHERWISE INDICATED. FOR EMT USE SET SCREW TYPE, STEEL ONLY.
F. INSTALL EXPOSED RACEWAYS PARALLEL TO OR AT RIGHT ANGLES TO NEARBY SURFACES OR STRUCTURAL MEMBERS, AND FOLLOW THE SURFACE CONTOURS AS MUCH AS PRACTICAL.
G. PROVIDE EXPANSION FITTINGS BETWEEN BUILDINGS AND AT BUILDING EXPANSION JOINTS.
H. BOND ALL CONDUIT INSTALLATIONS PER N.E.C.

## 16120 – WIRE AND CABLE

A. BUILDING WIRE AND CABLE SHALL BE MINIMUM NO. 12 AWG COPPER CONDUCTOR FOR POWER AND LIGHTING CIRCUITS, CONTROL CIRCUITS MINIMUM NO. 14 AWG.
B. USE WIRE RATED 600V INSULATION TYPE FOR USE AS FOLLOWS:
   1. POWER AND LIGHTING (EXCEPT UNDERGROUND) – THHN/THWN
   2. CONTROL – THHN/THWN
   3. CONTROL PANELS – THHN/THWN/MTW
C. ACCEPTABLE MANUFACTURERS, WIRE LABEL:
   1. BRADY
   2. WESTLINE
D. ACCEPTABLE MANUFACTURER, TAPE:
   1. 3–M
E. INSTALL WIRES AND CABLES ACCORDING TO THE NECA'S "STANDARD OF INSTALLATION".
F. REMOVE EXISTING WIRE FROM EXISTING RACEWAY BEFORE PULLING IN NEW WIRE AND CABLE.
G. WHERE MULTIPLE CONDUCTORS ARE INSTALLED IN COMMON CONDUIT THEY SHALL BE INSTALLED IN A SINGLE PULL. USE CABLE PULLING LUBRICANTS AS NECESSARY AND DO NOT EXCEED MANUFACTURER'S PULLING TENSION TO AVOID DAMAGE TO INSULATION.
H. COLOR CODING OF CONDUCTOR INSULATION OR IDENTIFYING TAPE SHALL FOLLOW BUILDING STANDARD.
I. RUN SEPARATE GROUNDING CONDUCTOR WITH ALL CIRCUITS.

## 16200 – DISTRIBUTION PANELBOARDS

A. BRANCH DISTRIBUTION MOLDED CASE CIRCUIT BREAKERS SHALL BE 42KIAC.
B. PROVIDE BREAKER MOUNTED LOCKOUT DEVICE FOR EACH CIRCUIT BREAKER.
C. ACCEPTABLE MANUFACTURERS OF DISTRIBUTION PANELBOARDS ARE AS FOLLOWS:
   1. SIEMENS; P–4



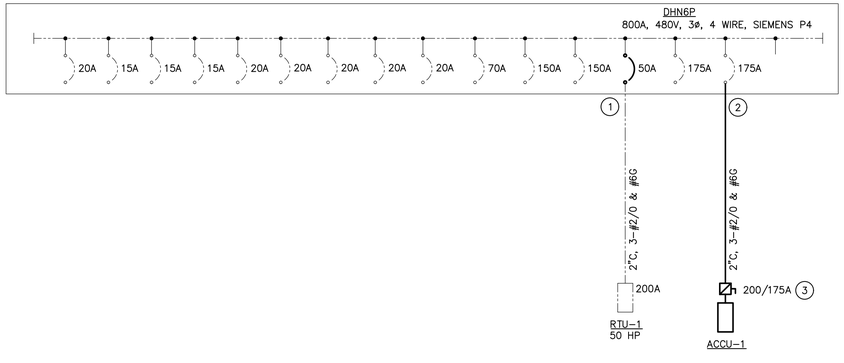

POWER PLAN
SCALE: 1/8" = 1'–0"

## ELECTRICAL LEGEND

- CONDUIT RUN
- NEW BUILDING CONSTRUCTION
- EXISTING CONSTRUCTION
- CIRCUIT BREAKER–FIXED
- SURFACE MOUNTED ELECTRICAL PANEL – NEW/EXISTING
- FUSED DISCONNECT SWITCH

## KEYED POWER NOTES:

1. PROVIDE NEW 50 AMP CIRCUIT BREAKER. RELOCATE EXISTING RTU–1 FEEDER TO NEW BREAKER.
2. PROVIDE NEW 175AMP FEEDER TO CONDENSING UNIT FOR RTU–1. FEED FROM EXISTING 175AMP CIRCUIT BREAKER. ROUTE THROUGH PENTHOUSE AND UNDER GRILLAGE TO UNIT. PROVIDE WEATHERPROOF WALL PENETRATION.
3. PROVIDE NEW 200AMP FUSED SAFETY SWITCH.
4. DISCONNECT EXISTING CONDENSER FROM RTU. ASSIST CONTROLS CONTRACTOR WITH INTERCONNECTIONS.



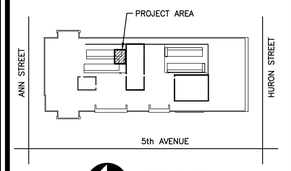

PARTIAL ONE–LINE DIAGRAM
SCALE: NONE

## GENERAL ELECTRICAL NOTES:

1. CODES / NEC: ALL WORK SHALL BE INSTALLED PER THE LATEST ADOPTED EDITION OF THE NEC AND ALL STATE, LOCAL, OWNER AND SITE SPECIFIC CODES HAVING JURISDICTION, INCLUDING MICHIGAN ELECTRICAL CODE RULES, PART 8.
2. COORDINATE IN THE FIELD WITH OTHER TRADES TO MAINTAIN REQUIRED CLEARANCES AROUND NEW AND EXISTING ELECTRICAL EQUIPMENT.
3. PANEL SCHEDULES: PROVIDE NEATLY TYPED PANEL DIRECTORIES TO THE OWNER FOR ALL PANELBOARDS MODIFIED. DESIGNATE LOAD SERVED BY EACH CIRCUIT. REQUIRED INFORMATION SHALL BE COMPLETED FOR EACH CIRCUIT IN EACH PANEL.
4. WIRE: REFER TO ONE–LINE DIAGRAM AND FEEDER SCHEDULE FOR CONDUIT AND WIRE SIZES.
5. CONDUIT ROUTING: EXPOSED WORK IN UNFINISHED AREA SHALL BE INSTALLED PERPENDICULAR OR PARALLEL TO WALLS, CEILINGS, OR STRUCTURAL MEMBERS. DO NOT RUN CONDUIT WITHIN THE FLUTES OF THE ROOF DECK.
6. DISCONNECTS: PROVIDE, MOUNT AND WIRE LOCKABLE, FUSED SAFETY SWITCHES, NEMA 12/3R OUTDOOR, FOR ALL MECHANICAL EQUIPMENT.
7. DISCONNECTS: PROVIDE , FUSED DISCONNECT FOR ALL MECHANICAL EQUIPMENT.
8. EQUIPMENT: PACKAGED EQUIPMENT SHIPPED WITH SEPARATE CONTROL PANELS, MOUNT AND WIRE PANELS TO EQUIPMENT AND SOURCE. PROVIDE ELECTRICAL CONNECTIONS FOR EQUIPMENT SHIPPED IN MULTIPLE SECTIONS.
9. GROUNDING: PROVIDE GROUNDING AND BONDING PER NEC 250.
10. FIRE STOP ALL OPENINGS IN FIRE RATED WALLS, FLOORS OR CEILINGS.
11. PROVIDE ARC FLASH LABELS PER NEC OR LOCAL REQUIREMENTS.
12. PROVIDE CIRCUIT BREAKERS TO MATCH THE EXISTING INTERRUPTING RATING OF THE PANEL. UNLESS OTHERWISE NOTED. 480 VOLT PANELBOARDS AND SWITCHBOARDS ARE 42KA.

| ISSUED DATE: | ISSUED FOR: |
|---|---|
| 02/18/2022 | OWNER REVIEW 01 |
| 03/04/2022 | BIDS |

KEY PLAN:




KEY PLAN
SCALE: NONE

PROFESSIONAL SEAL:

DO NOT SCALE DRAWING


CORE Design Group
Architecture/ Engineering
37740 Hills Tech Drive
Farmington Hills, MI 48331
Tel: 248.491.3234 www.COREdg.net


CLIENT:

**City of Ann Arbor**
**301 East Huron Street**
**Ann Arbor, MI 48104**

PROJECT TITLE:

**Justice Center HVAC Condenser Replacement**
**Larcom Building / 301 East Huron Street**
**Ann Arbor, MI 48104**

SHEET TITLE:

**POWER PLAN**

| | |
|---|---|
| DESIGNED BY: | C Adams |
| DRAWN BY: | CAD |
| CHECKED BY: | C Adams |
| JOB No.: | 21-127-AA |
| SHEET No.: | E-1 of 1 |

GRAPHIC SCALES

3/4/2022 9:28:02 AM