

# WAYNE STATE UNIVERSITY

MATTHAEI CENTER - ADDITION OF AIR CONDITIONING

5101 JOHN C. LODGE FWY DETROIT, MI 48202

ISSUED FOR: CONSTRUCTION 8/8/2022

DRAWING INDEX

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MATTHAEI ADDITION OF AIF

**OSBORN** 

ENGINEERING

**WAYNE STATE** UNIVERSITY

**VICINITY MAP** 

PROJECT SUMMARY



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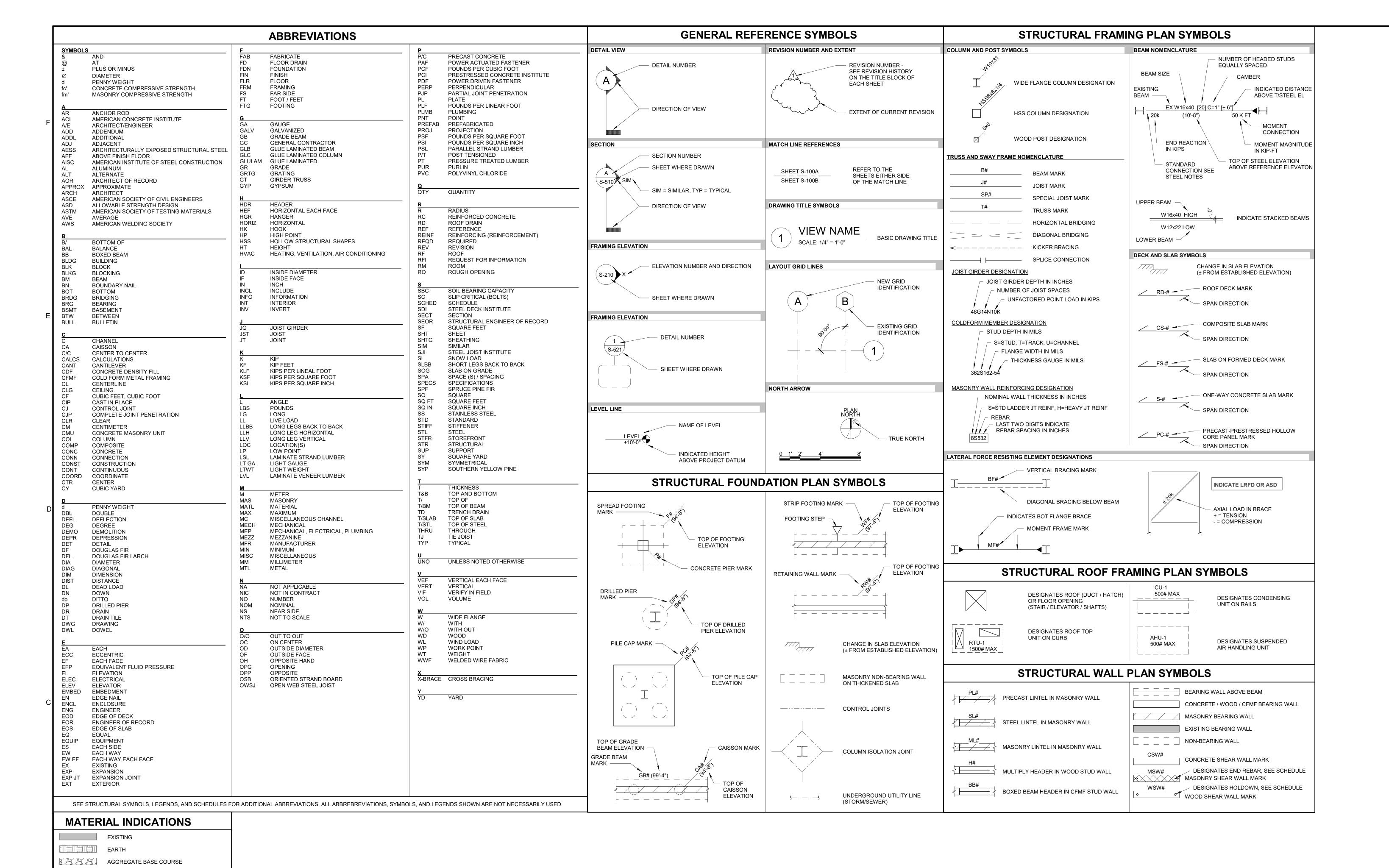
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HVAC MAIN LEVEI **FLOOR PLAN** 

DRAWING NO.

G-001



CONCRETE

CONCRETE MASONRY UNIT

PRECAST CONCRETE

WOOD FRAMING

CONCRETE MASONRY UNIT GROUTED SOLID





MATTHAEI HVAC STUDY & SCHEMATIC

WAYNE STATE UNIVERSITY

DETROIT MI 48208

TAG ISSUED DATE

1 FOR BIDDING 08/08/2

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ABBREVIATIONS & SYMBOLS

S-000

DRAWING NO.

#### **BUILDING DESIGN CRITERIA**

RISK CATEGORY: ROOF LIVE LOAD SNOW LOAD: 20 PSF GROUND SNOW LOAD, Pg: FLAT ROOF SNOW LOAD, Pf. 20 PSF SNOW EXPOSURE FACTOR, Ce: SNOW IMPORTANCE FACTOR: 1.0 THERMAL FACTOR, Ct: SNOW DRIFT: PER ASCE-7 WIND LOAD: ULTIMATE DESIGN WIND SPEED (Vult): 115 MPH

GOVERNING CODE: 2015 MICHIGAN BUILDING CODE IN CONJUNCTION WITH ASCE 7-10

WIND EXPOSURE: INTERNAL PRESSURE COEFFICIENT: ±0.18 SEISMIC LOAD: SEISMIC IMPORTANCE FACTOR

NOMINAL DESIGN WIND SPEED (Vasd):

SITE SPECTRAL RESPONSE ACCELERATION (Ss): 0.096 SITE SPECTRAL RESPONSE ACCELERATION (S1): 0.047 SEISMIC SITE CLASS: D (ASSUMED) DESIGN SPECTRAL RESPONSE ACCELERATION (Sds): DESIGN SPECTRAL RESPONSE ACCELERATION (Sd1): 0.053 SEISMIC DESIGN CATEGORY:

STRUCTURAL MODIFICATION DO NOT ALTER THE EXISTING LATERAL SYSTEMS AND ANY NEW LATERAL LOADS DO NOT EXCEED CODE ALLOWABLE 10% INCREASE

90 MPH

#### **GENERAL CONDITIONS:**

- SEE SPECIFICATIONS FOR QUALITY OF CONSTRUCTION REQUIRED, QUALITY OF WORK, MANUFACTURING AND INDUSTRY STANDARDS, PHYSICAL PROPERTIES OF MATERIALS, CONFORMANCE TO CODES AND REGULATIONS GUARANTEE AND WARRANTY REQUIREMENTS.
- 2. SEE ARCHITECTURAL, HVAC, PLUMBING, ELEVATOR, FIRE PROTECTION & ELECTRICAL DRAWINGS FOR OTHER PERTINENT INFORMATION RELATED TO STRUCTURAL WORK AND COORDINATE AS REQUIRED. CONTRACTOR SHALL COORDINATE STRUCTURAL DRAWINGS WITH ALL OTHER DRAWINGS WITHIN THE CONTRACT DOCUMENTS.
- 3. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS AND CONDITIONS RELATED TO EXISTING CONSTRUCTION, EXISTING SERVICES, AND THE SITE BEFORE BEGINNING WORK.
- 4. CONSTRUCTION LOADS SHALL NOT EXCEED DESIGN LIVE LOADS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DESIGN REQUIRED TO SUPPORT CONSTRUCTION EQUIPMENT USED IN CONSTRUCTING THIS PROJECT. ALL EQUIPMENT SUPPORT DESIGN SHALL BE PERFORMED BY AN ENGINEER LICENSED IN THE STATE OF THE PROJECT. SHORING AND RESHORING IS THE RESPONSIBILITY OF THE CONTRACTOR.
- 5. IF MATERIALS, QUANTITIES, STRENGTHS OR SIZES INDICATED BY THE DRAWINGS OR SPECIFICATIONS ARE NOT IN AGREEMENT WITH THESE NOTES, THE BETTER QUALITY AND/OR QUANTITY, STRENGTH OR SIZE INDICATED, SPECIFIED OR NOTED SHALL BE PROVIDED.
- 6. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE FOLLOWING ITEMS THAT WILL NOT BE REVIEWED BY THE OWNER, ARCHITECT OR ENGINEER:
- DEVIATIONS FROM CONTRACT DOCUMENTS. DIMENSIONS, ELEVATIONS AND CONDITIONS TO BE CONFIRMED AND CORRELATED AT THE
- FABRICATION PROCESS INFORMATION. MEANS, METHODS, TECHNIQUES, PROCEDURES OF CONSTRUCTION AND CONSTRUCTION
- COORDINATION OF THE WORK OF ALL TRADES.
- THE EXISTING CONDITIONS INDICATED ON THE DRAWINGS ARE BASED ON EXISTING DRAWINGS BY ALDEN B DOW ASSOC. INC., HYDE & BOBBIO, AND ROB'T J DAVIS, DATED FEBRUARY 19, 1965. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR FIELD VERIFYING ALL EXISTING CONDITIONS AND DIMENSIONS. CONTRACTOR IS TO REPORT ANY DISCREPANCIES TO THE A/E PRIOR TO
- PROCEEDING. 8. THE INFORMATION SHOWN ON THE ARCHITECTURAL AND STRUCTURAL CONSTRUCTION DOCUMENTS IS BASED ON ASSUMPTIONS OF THE EXISTING BUILDING CONSTRUCTION. ORIGINAL CONSTRUCTION DOCUMENTS WERE NOT AVAILABLE FOR THE PREPARATION OF THESE DOCUMENTS. THE CONTRACTOR IS TO NOTIFY THE A/E IF CONDITIONS DIFFERING FROM THOSE STATED ARE UNCOVERED IN THE DEMOLITION PROCESS.
- 9. ANY CHANGES TO THE STRUCTURAL SYSTEMS SHALL BE REDESIGNED BY A PROFESSIONAL ENGINEER AT NO COST TO THE OWNER OR THE A/E AND SUBMITTED TO THE A/E FOR REVIEW. SUBMITTAL SHALL BE ACKNOWLEDGED IN WRITING BEFORE BEGINNING CONSTRUCTION. IF CHANGES ARE MADE WITHOUT WRITTEN APPROVAL SUCH CHANGES SHALL BE THE LEGAL AND FINANCIAL RESPONSIBILITY OF THE PARTY MAKING THE CHANGE TO REPLACE OR REPAIR THE CONDITION AS DIRECTED BY THE A/E.
- 10. CONTRACTOR IS RESPONSIBLE TO UNCOVER AND VISUALLY FIELD VERIFY THE EXISTING CONSTRUCTION PRIOR TO THE START OF ANY WORK AFFECTING THE EXISTING STRUCTURE. CONTRACTOR IS TO REPORT ANY CHANGES OR DISCREPANCIES FROM THOSE SHOWN TO THE A/E.

## **DEMOLITION:**

- 1. IT IS SOLELY THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE DEMOLITION PROCEDURE AND SEQUENCE TO ENSURE THE SAFETY OF THE EXISTING BUILDING AND ITS COMPONENT PARTS DURING DEMOLITION AND FUTURE ERECTION. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF ANY OR ALL TEMPORARY BRACING, GUYS OR TIE-DOWNS WHICH MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER COMPLETION OF THE PROJECT.
- THE CONTRACTOR SHALL SUPPORT, BRACE AND SECURE EXISTING STRUCTURE AS REQUIRED. CONTRACTOR IS SOLELY RESPONSIBLE FOR THE SAFETY OF THE EXISTING BUILDING DURING DEMOLITION AND CONSTRUCTION. FIELD VERIFY ALL EXISTING DIMENSIONS, ELEVATIONS AND CONDITIONS WHICH AFFECT THE DEMOLITION AND NEW CONSTRUCTION.
- THE EXTENT OF THE WORK SHOWN SHALL INCLUDE REMOVAL AND DISPOSAL, OFF SITE, OF THE ELEMENTS INDICATED WITHIN THESE DEMOLITION DRAWINGS UNO
- THE EXISTING STRUCTURE SHALL BE DISASSEMBLED IN A MANNER WHICH DOES NOT DAMAGE OR DEFORM ANY EXISTING STRUCTURE TO REMAIN. EXISTING SLABS SHALL BE SAWCUT IN A MANNER WHICH DOES NOT CAUSE THE SLAB SUPPORTING MEMBER TO BE CUT OR DAMAGED.
- 5. CONFORM TO ALL APPLICABLE CODES FOR DEMOLITION OF STRUCTURES, SAFETY OF EXISTING AND ADJACENT STRUCTURES, DUST CONTROL, AND DISPOSAL.
- 6. USE OF EXPLOSIVES SHALL NOT BE PERMITTED.
- 7. EXISTING SLABS SHALL BE CORE DRILLED AT RE-ENTRANT CORNERS OF NEW FLOOR OPENINGS TO PREVENT OVER CUTTING.
- THE DEMOLISHED STRUCTURE SHALL BE REDUCED TO A WEIGHT AND TRANSPORTED ACROSS THE EXISTING STRUCTURE IN A MANNER WHICH DOES NOT OVERSTRESS THE EXISTING BUILDING
- FRAMING SHALL BE REMOVED ONLY AFTER THE LOAD SUPPORTED BY THAT FRAMING IS REMOVED. THE FRAMING REMOVAL PROCESS SHALL NOT DEFORM OR INDUCE STRESS TO EXISTING FRAMING TO REMAIN.

## **STRUCTURAL STEEL:**

- 1. DETAIL, FABRICATE AND ERECT STRUCTURAL STEEL IN ACCORDANCE WITH THE LATEST AISC AND OTHER RELATED CODES, STANDARDS AND SPECIFICATIONS LISTED IN THE PROJECT SPECIFICATIONS, EXCEPT AS MODIFIED THEREIN OR ON THE DRAWINGS.
- 2. THE CONTRACTOR IS RESPONSIBLE FOR ALL MISCELLANEOUS/ORNAMENTAL STEEL NOT SHOWN ON THE STRUCTURAL DRAWINGS. 3. STRUCTURAL STEEL:
- ASTM A36 Fv = 36 KSI FOR CHANNELS, ANGLES, PLATES, BARS, RODS, UNO ASTM A53 TYPE E OR S, GRADE B FOR STEEL PIPE Fy = 35 KSI

ASTM A992 Fy = 50 KSI FOR ROLLED STEEL WIDE FLANGE SHAPES

- ASTM A500 GRADE C FOR HSS TUBING Fy = 50 KSI FÓR RECTANGULAR AND Fy = 46 KSI
- 4. HIGH STRENGTH BOLTS: ASTM A325 OR A490, 3/4" DIAMETER MINIMUM UNO
- 5. WORK STRUCTURAL DRAWINGS WITH ARCHITECTURAL, HVAC, PLUMBING, FIRE PROTECTION & ELECTRICAL DRAWINGS FOR CLEARANCES, ATTACHMENTS, ETC.
- 6. ALL FABRICATION AND ERECTION WORK SHALL BE PERFORMED BY AISC CERTIFIED FABRICATORS AND ERECTORS.
- 7. WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY, AWS D1.1 AND SHALL BE PERFORMED BY CERTIFIED WELDERS IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY STANDARDS. PROVIDE MINIMUM 1/4" FILLET WELD, UNO.
- CONTRACTOR SHALL ASSUME THAT ANY MODIFICATIONS TO EXISTING STEEL FRAMING SHALL REQUIRE AN ABATEMENT OF EXISTING LEAD PAINT IN CONFORMANCE WITH LOCAL
- PROVIDE ANGLE WALL ANCHORS, PER PART 4, AISC MANUAL OF STEEL CONSTRUCTION, FOR BEAMS BEARING ON MASONRY WALLS. ANGLE ANCHORS SHALL BE WELDED TO

#### **STRUCTURAL STEEL (CON'T):**

TWO (2) BOLTS.

- 10. CONNECTIONS: WELD OR BOLT CONNECTIONS, AS INDICATED:
  - A. CONNECTIONS NOT DETAILED ON THE DRAWINGS SHALL CONFORM TO THE REQUIREMENTS OF THE CITED AISC SPECIFICATION. BEEN PERMITTED UNDER THE BASE BUILDING APPLICATION.
- WHERE THE REACTION VALUES OF BEAMS ARE NOT SHOWN ON THE DRAWINGS, EACH END CONNECTION SHALL BE DESIGNED TO SUPPORT 55% OF THE TOTAL UNIFORM LOAD CAPACITY DERIVED FROM THE ASD VALUE OF THE TABLES AND FORMULA OF THE MAXIMUM TOTAL UNIFORM LOAD IN PART 3, FOURTEENTH EDITION, OF THE AISC MANUAL OF STEEL CONSTRUCTION FOR THE GIVEN MEMBER SIZE, SPAN, AND YIELD STRENGTH, COMPOSITE BEAM CONNECTIONS MUST DEVELOP 75% OF THE TOTAL BEAM ALLOWABLE UNIFORM LOAD CAPACITY, AS GIVEN IN THE AISC TABLES BASED ON SIZE, SPAN, & YIELD STRENGTH.
- C. THE MINIMUM LENGTH OF CONNECTION ANGLES SHALL BE EQUAL TO ONE HALF THE DEPTH OF THE MEMBER TO BE SUPPORTED.
- D. ONE SIDED CONNECTIONS WILL NOT BE PERMITTED UNLESS SPECIFICALLY DETAILED ON THE DRAWINGS OR SEALED DESIGN
- CALCULATIONS ARE SUBMITTED WITH THE SHOP DRAWINGS. E. THE MINIMUM NUMBER OF BOLTS IN BOLTED CONNECTIONS SHALL BE
- MINIMUM 1/4" FILLET WELD SHALL APPLY UNLESS NOTED OTHERWISE. G. MINIMUM SIZE OF CLIP ANGLE SHALL BE L3x3x5/16" UNLESS NOTED
- OTHERWISE. 11. TRUSS AND BRACING MEMBER CONNECTIONS SHALL BE DESIGNED FOR

THE FORCES INDICATED ON THE DRAWINGS.

- 12. TYPICAL CONNECTION DETAILS INDICATED ON THE STRUCTURAL DESIGN DRAWINGS SHALL DICTATE THE FORM AND GEOMETRY OF THE CONNECTIONS. THE FABRICATOR SHALL DETERMINE OR VERIFY TYPE, SIZE AND NUMBER OF BOLTS, PLATE THICKNESS AND SIZES, WELD SIZES AND LENGTHS, AND ALL REQUIRED INFORMATION NOT SPECIFIED ON THE TYPICAL CONNECTION DETAILS.
- 13. THE DESIGN OF ALL STEEL CONNECTIONS (EXCEPT PREDESIGNED CONNECTIONS THAT HAVE BEEN ENGINEERED ON THESE DRAWINGS) SHALL BE PERFORMED UNDER THE DIRECT SUPERVISION OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF THE PROJECT EMPLOYED BY THE FABRICATOR. THE FABRICATOR'S REGISTERED PROFESSIONAL ENGINEER SHALL SUBMIT COMPLETE DESIGN CALCULATIONS FOR EACH CONNECTION. SUCH CALCULATIONS SHALL SHOW DETAILS OF THE ASSEMBLED JOINT WITH ALL BOLTS AND WELDS REQUIRED.
- 14. ALL DESIGN CALCULATIONS SHALL BE SEALED BY THE FABRICATOR'S PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF [OHIO]. SHOP DRAWINGS SUBMITTED WITHOUT COMPLETE DESIGN CALCULATIONS WILL NOT BE REVIEWED.
- 15. WELDING ELECTRODES SHALL BE E 70XX OR BETTER. FOR WELDING SYMBOLS WITH NO LENGTH DIMENSION GIVEN, THE WELDING SHALL BE
- CONTINUOUS BETWEEN ABRUPT CHANGES IN DIRECTION. 16. UTILIZE SLIP CRITICAL BOLTS AT ALL MOMENT CONNECTIONS, HANGING

CONNECTIONS, BRACING CONNECTIONS, AND COLUMN SPLICES.

- 17. ALL STRUCTURAL STEEL MEMBERS EXPOSED TO THE EXTERIOR SHALL BE GALVANIZED UNLESS NOTED OTHERWISE. THIS INCLUDES BUT IS NOT LIMITED TO MASONRY LINTELS AND SHELF ANGLES, INCLUDING BEARING PLATES AND ANCHOR BOLTS, AND ANY OTHER ITEM LISTED ON THE ARCHITECTURAL OR STRUCTURAL DRAWINGS.
- 18. THE FRAMING SHALL BE ERECTED TRUE AND PLUMB. TEMPORARY BRACING SHALL BE PROVIDED AND SHALL REMAIN IN PLACE UNTIL THE LATERAL BRACING SYSTEM IS IN PLACE AND CONNECTIONS OF ALL MEMBERS ARE FINAL AND ALL DECK IS COMPLETELY ERECTED, WELDED AND SCREWED IN
- 19. NON-METALLIC, NON-SHRINK, NON-STAINING GROUT UNDER ALL COLUMN BASE PLATES AND BEAM BEARING PLATES SHALL CONSIST OF A PREMIXED PRODUCT COMPLYING WITH ALL REQUIREMENTS OF CRD-C621, ASTM C827,
- 20. STUD TYPE EXPANSION ANCHORS SHALL BE CARBON STEEL (UNLESS NOTED OTHERWISE ON DRAWINGS) CONFORMING TO THE REQUIREMENTS OF THE MANUFACTURER'S RECOMMENDATIONS. SEE DRAWINGS FOR LOCATIONS AND TYPE.
- 21. ALL STRUCTURAL STEEL MEMBERS (BEAMS AND COLUMNS) ADJACENT TO OR BUILT INTO MASONRY CONSTRUCTION SHALL BE PROVIDED WITH 12 GAUGE GALVANIZED WELD-ON CHANNEL SLOTS AND 3/16" x 1 1/4" HOOKED GALVANIZED ANCHORS, SPACED 16" ON CENTER VERTICALLY AND 24" ON CENTER HORIZONTALLY, MAXIMUM.
- 22. ALL DISSIMILAR METALS TO BE SEPARATED BY ELECTROLYTIC SEPARATORS.
- 23. DO NOT PAINT:
- A. SURFACES OF CONNECTIONS INDICATED AS SLIP CRITICAL.
- B. SURFACES OF CONNECTIONS TO BE FIELD WELDED.
- C. SURFACES TO RECEIVE HEADED SHEAR CONNECTIONS.
- D. MEMBERS TO BE EMBEDDED IN CONCRETE OR MASONRY. E. SURFACES TO RECEIVE SPRAYED ON INSULATION,
- F. MEMBERS TO BE GALVANIZED.

## STEEL DECK:

- 1. DETAIL, FABRICATE AND ERECT STEEL DECK IN ACCORDANCE WITH THE LATEST STEEL DECK INSTITUTE SPECIFICATIONS, AWS AND CONTRACT DOCUMENTS. DECK SHALL CONFORM TO "BASIC DESIGN SPECIFICATIONS" AS ADOPTED BY THE STEEL DECK INSTITUTE.
- ROOF DECK PROFILE SHALL CONFORM TO FACTORY MUTUAL REQUIREMENTS.
- 3. ROOF DECK SHALL BE MANUFACTURED FROM STEEL CONFORMING TO ASTM A611 GRADE C, D OR E, GR 33 OR HIGHER.
- 4. COMPOSITE FLOOR DECK SHALL BE MANUFACTURED FROM STEEL
- CONFORMING TO ASTM A653-94, GR 33 OR HIGHER. 5. COMPOSITE FLOOR DECK SHALL GALVANIZED & CONFORM TO ASTM
- A924-94, CLASS G-90. ROOF DECK SHALL BE [GALVANIZED AND SHOP PRIMED][GALVANIZED]
- 7. ROOF DECK SHALL BE CONNECTED TO SUPPORTING STRUCTURAL STEEL MEMBERS WITH A [36/4] PATTERN WITH [HILT] X-HSN24 POWDER ACTUATED FASTENERS] WITH THE FIRST AND LAST RIBS OF EACH SHEET ATTACHED TO THE SUPPORTS. SIDELAPS SHALL BE SCREWED WITH (3) #10 SELF TAPPING SCREWS.
- DECK SHALL INCLUDE ANY MISCELLANEOUS CLOSURE PIECES, POUR STOPS, DRAIN SUMP PANS, REINFORCING AROUND OPENINGS, ETC., REQUIRED TO MAKE A COMPLETE JOB. MISCELLANEOUS ITEMS SHALL BE GALVANIZED G90.
- 9. NO LOADS SHALL BE HUNG FROM THE ROOF DECK.
- 10. ALL DECK LIGHTER THAN 22 GA SHALL USE WELDING WASHERS FOR CONNECTION OF DECK TO STEEL SUPPORT.
- 11. PLACE DECK UNITS ON SUPPORTING STEEL FRAMEWORK IN LENGTHS TO SPAN 4 OR MORE SUPPORTS (3 SPANS), LAP ENDS OF DECK NOT LESS THAN 2". SIDE LAP INTERLOCKS SHALL NOT BE STRETCHED OR
- CONTRACTED. DECK SHALL BEAR A MINIMUM OF 3" ON SUPPORTS. 12. MAXIMUM SIZE OF OPENINGS IN DECK WITHOUT STRUCTURAL FRAMING SUPPORT SHALL NOT EXCEED 10". OPENINGS GREATER THAN 10" MUST HAVE STRUCTURAL SUPPORT ON ALL SIDES OF THE OPENING.
- 13. FOR SLOPING DECK PROVIDE CONTINUOUS SHIMS, AS REQUIRED TO ACHIEVE FULL DECK BEARING ON SUPPORTING MEMBERS.

#### **DEFERRED STRUCTURAL SUBMITTALS:**

- SOME STRUCTURAL SYSTEMS ARE DEFINED AS VENDOR-DESIGNED COMPONENTS PER THE STRUCTURAL DOCUMENTS. THESE ELEMENTS OF THE DESIGN ARE DEFERRED SUBMITTAL COMPONENTS AND HAVE NOT
- DOCUMENTS FOR DEFERRED SUBMITTAL ITEMS SHALL BE SUBMITTED TO THE ARCHITECT, WHO SHALL REVIEW THEM FOR GENERAL CONFORMANCE TO THE DESIGN OF THE BUILDING. THE CONTRACTOR SHALL SUBMIT THESE REVIEWED DEFERRED SUBMITTAL DOCUMENTS TO THE BUILDING OFFICIAL. THE DEFERRED SUBMITTAL ITEMS SHALL NOT BE INSTALLED UNTIL THE DESIGN AND SUBMITTAL DOCUMENTS HAVE BEEN APPROVED BY THE BUILDING OFFICIAL. DOCUMENTS FOR DEFERRED SUBMITTAL ITEMS SHALL BE SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
- THE FOLLOWING LIST INCLUDES THE ITEMS THAT DEFINED AS DEFERRED STRUCTURAL SUBMITTAL COMPONENTS. REFER TO THE ARCHITECTURAL MECHANICAL, ELECTRICAL AND CIVIL DRAWINGS FOR ADDITIONAL SUBMITTAL COMPONENTS.
- A. EXTERIOR CLADDING B. METAL STAIRS

IBC SECTION 1704.

#### SPECIAL INSPECTIONS:

- 1. THE FOLLOWING ITEMS REQUIRE SPECIAL INSPECTION AND TESTING PER
- THIS WORK SHALL BE PERFORMED BY A SPECIAL INSPECTOR CERTIFIED BY THE GOVERNING MUNICIPALITY WHERE THE PROJECT IS LOCATED TO PERFORM THE TYPES OF INSPECTIONS AND TESTS SPECIFIED.
- THE FREQUENCY OF INSPECTIONS AND TESTING SHALL BE AS OUTLINED IN THE IBC TABLE ITEMS LISTED BELOW.
- A. DEFICIENCIES SHALL BE REPORTED DAILY TO THE CONTRACTOR.
- B. SUMMARY REPORTS SHALL BE DISTRIBUTED WEEKLY TO THE OWNER, ARCHITECT, CONTRACTOR, BUILDING OFFICIAL AND STRUCTURAL
- 4. SEE THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS FOR SPECIAL INSPECTION AND TESTING.

STRUCTURA	L TESTS AND SP	ECIAL INSPECTIONS
	(PER IBC CHAPTE	ER 17)
CONSTRUCTION MATERIAL	APPLICABLE OBC SECTION /TABLE	ITEMS REQUIRING VERIFICATI AND INSPECTION

STRUCTURAL STEEL SECTION 1705.2.1 PER ASCI 360 - CHAPTER N





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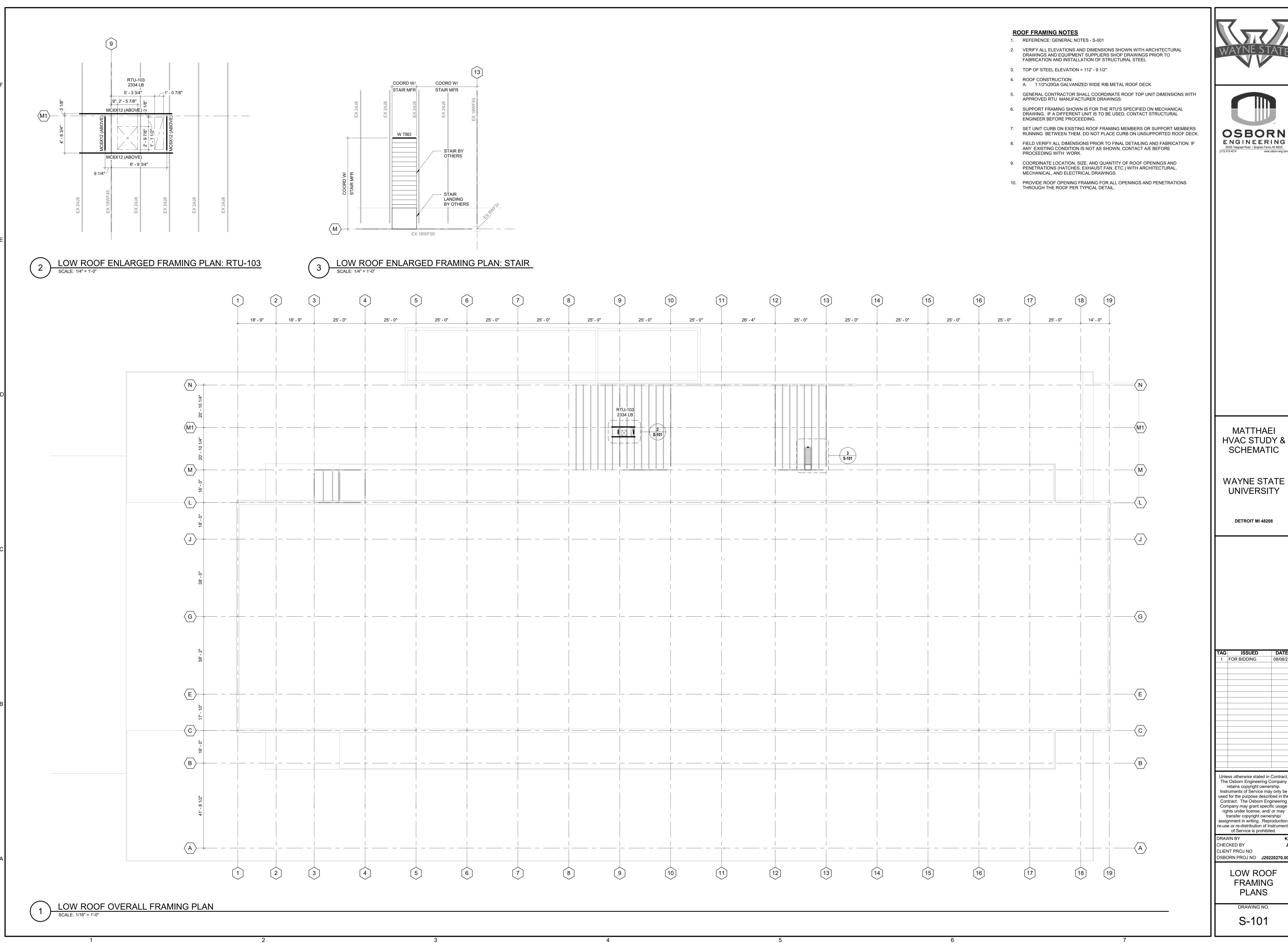
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GENERAL

NOTES

S-001







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LOW ROOF **FRAMING PLANS** 

# **ROOF FRAMING NOTES** 1. REFERENCE: GENERAL NOTES - S-001 2. VERIFY ALL ELEVATIONS AND DIMENSIONS SHOWN WITH ARCHITECTURAL DRAWINGS AND EQUIPMENT SUPPLIERS SHOP DRAWINGS PRIOR TO FABRICATION AND INSTALLATION OF STRUCTURAL STEEL 3. TOP OF STEEL ELEVATION = 124' - 10 1/2" ROOF CONSTRUCTION: A. 1 1/2"x20GA GALVANIZED WIDE RIB METAL ROOF DECK 5. GENERAL CONTRACTOR SHALL COORDINATE ROOF TOP UNIT DIMENSIONS WITH APPROVED RTU MANUFACTURER DRAWINGS. 6. SUPPORT FRAMING SHOWN IS FOR THE RTU'S SPECIFIED ON MECHANICAL DRAWING. IF A DIFFERENT UNIT IS TO BE USED, CONTACT STRUCTURAL ENGINEER BEFORE PROCEEDING. 7. SET UNIT CURB ON EXISTING ROOF FRAMING MEMBERS OR SUPPORT MEMBERS RUNNING BETWEEN THEM. DO NOT PLACE CURB ON UNSUPPORTED ROOF DECK. 8. FIELD VERIFY ALL DIMENSIONS PRIOR TO FINAL DETAILING AND FABRICATION. IF ANY EXISTING CONDITION IS NOT AS SHOWN, CONTACT A/E BEFORE PROCEEDING WITH WORK. 9. COORDINATE LOCATION, SIZE, AND QUANTITY OF ROOF OPENINGS AND PENETRATIONS (HATCHES, EXHAUST FAN, ETC.) WITH ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS. 10. PROVIDE ROOF OPENING FRAMING FOR ALL OPENINGS AND PENETRATIONS THROUGH THE ROOF PER TYPICAL DETAIL. 25' - 0" 14' - 0" 18' - 9" 18' - 9" 25' - 0" 25' - 0" 25' - 0" 25' - 0" 25' - 0" 25' - 0" 26' - 4" 25' - 0" 25' - 0" 25' - 0" 25' - 0" 25' - 0" 25' - 0" RTU-101 RTU-106 2171 LB 4000 LB RTU-107 RTU-104 2171 LB 2334 LB 4000 LB re-use or re-distribution of Instruments DRAWN BY CHECKED BY INTERMEDIATE ROOF T/STL





MATTHAEI HVAC STUDY & SCHEMATIC

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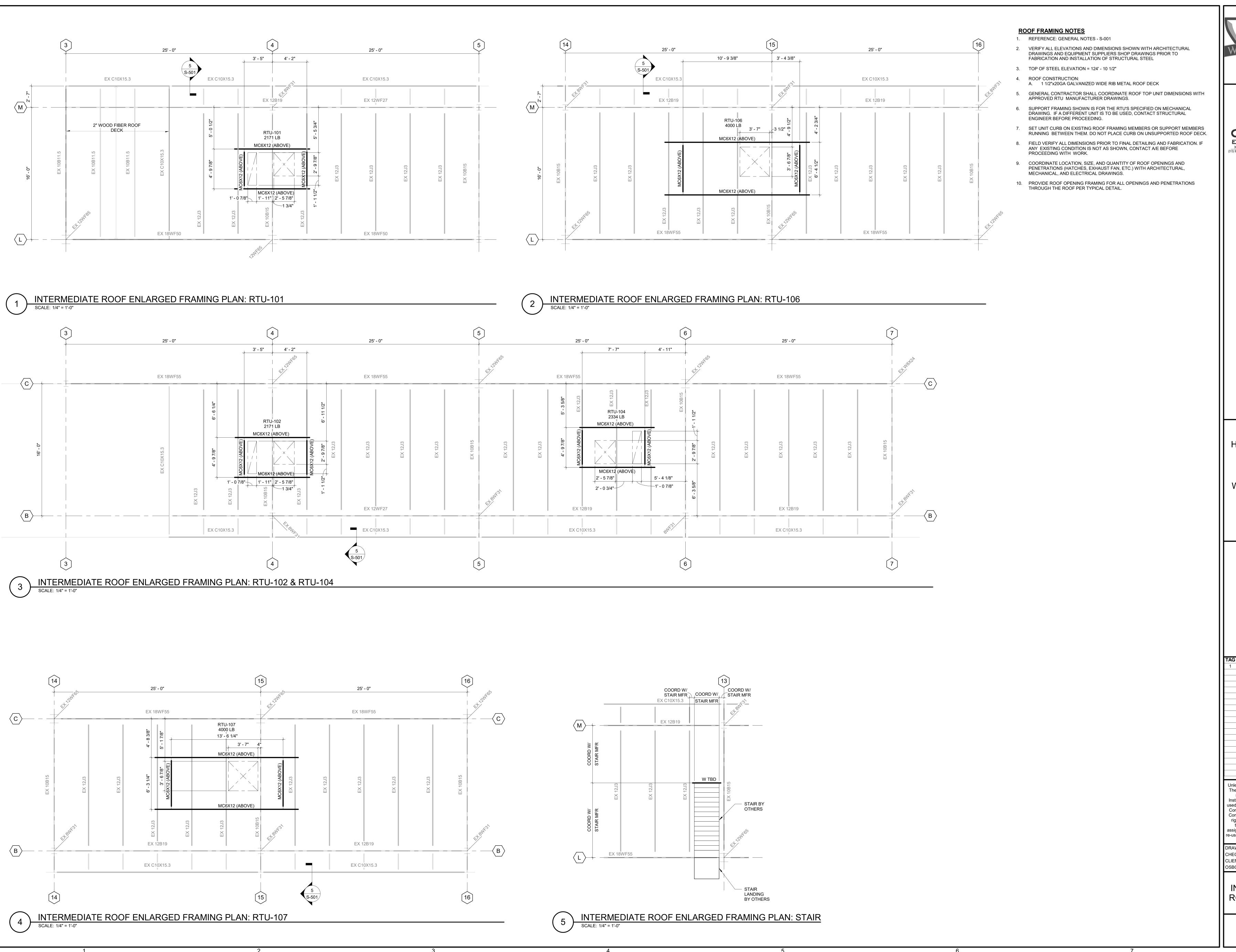
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INTERMEDIATE **ROOF FRAMING** PLAN

> DRAWING NO. S-102







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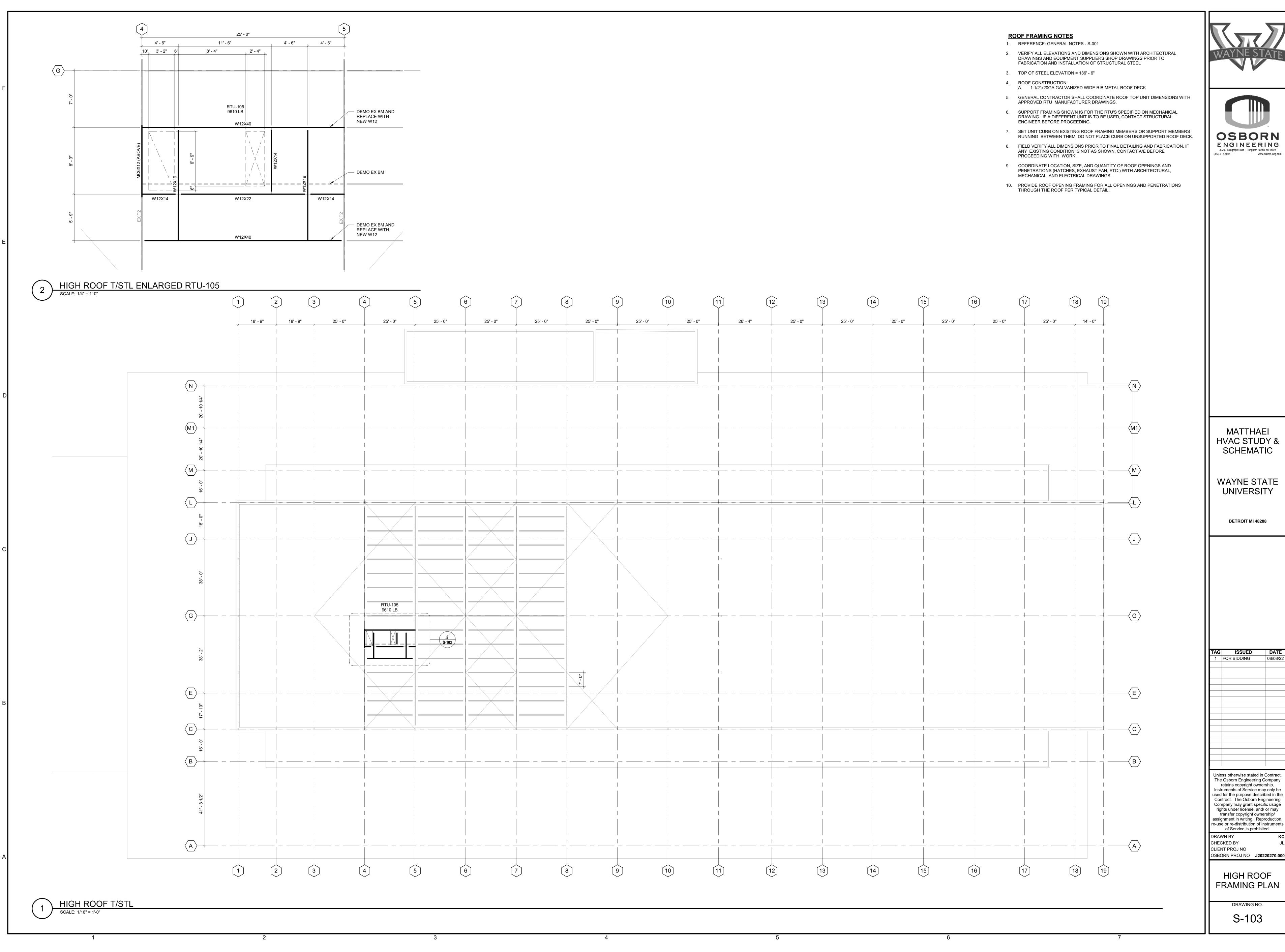
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**ENLARGED** INTERMEDIATE ROOF FRAMING **PLANS** 

DRAWING NO.

S-102.1



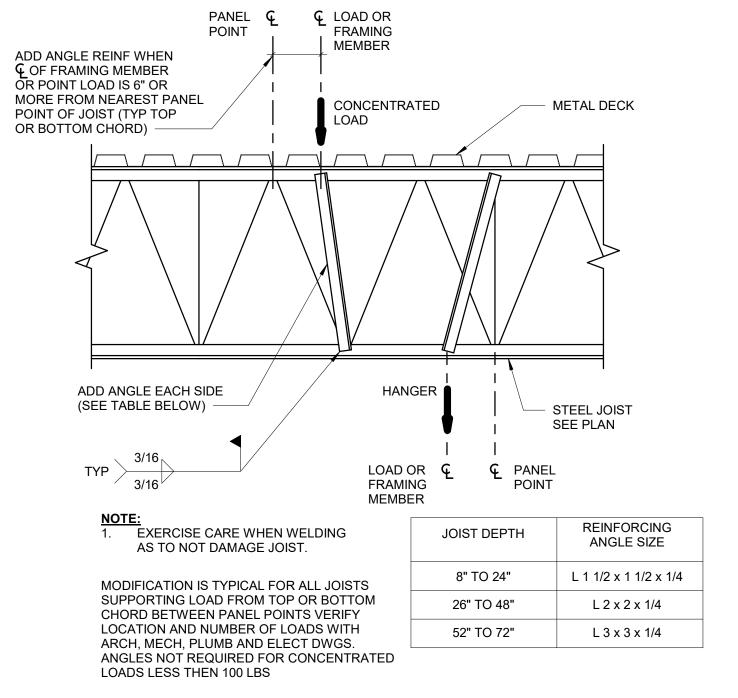




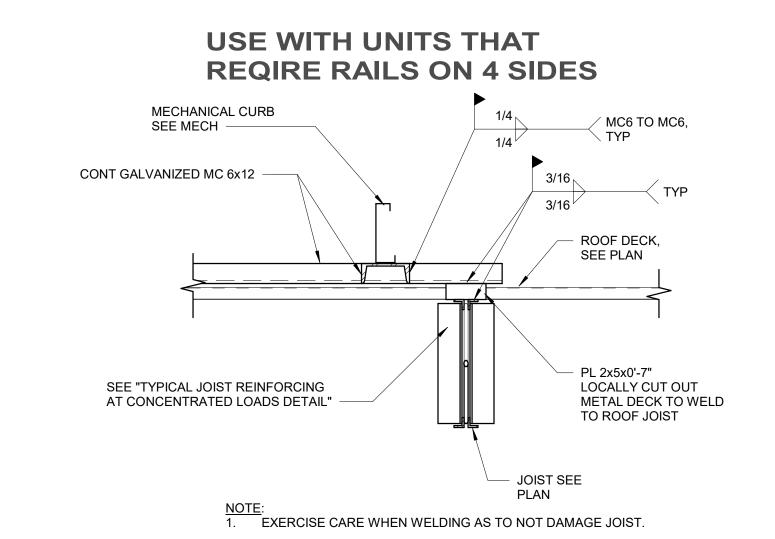
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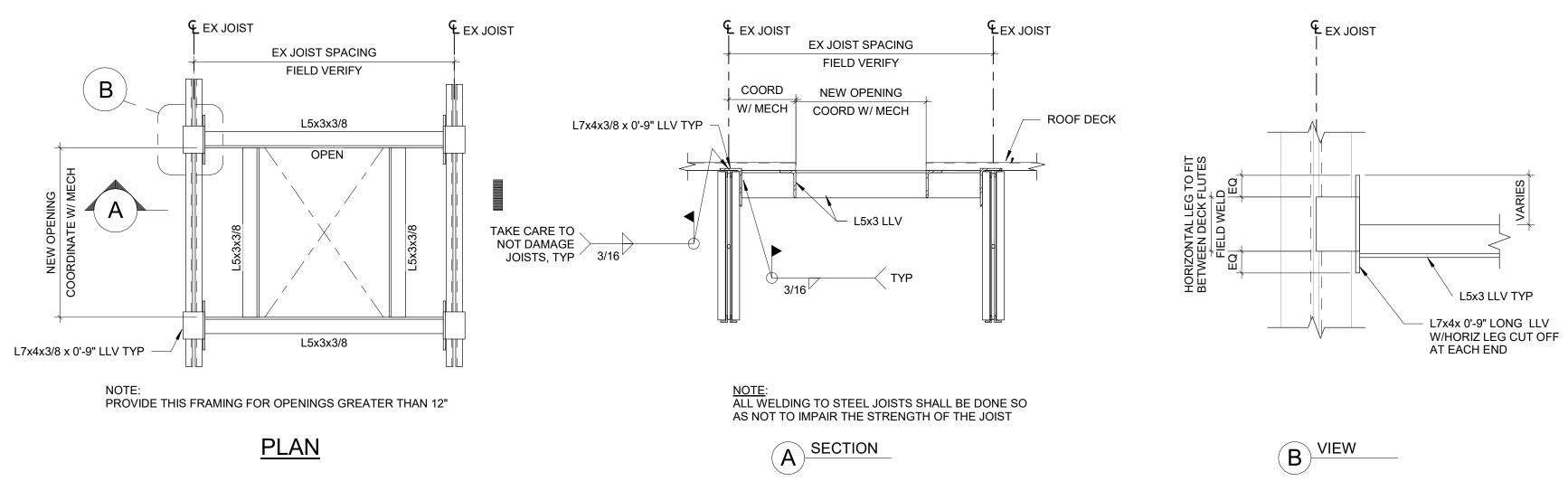
FRAMING PLAN



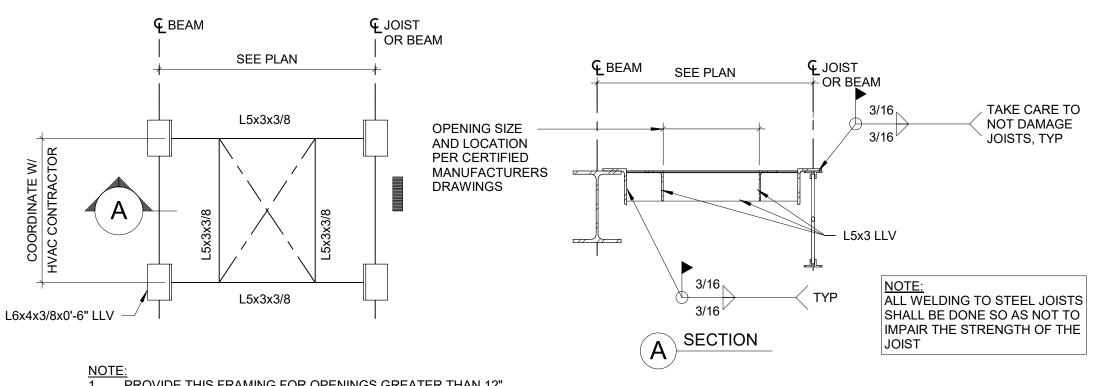




TYPICAL ROOFTOP EQUIPMENT SUPPORT DETAIL

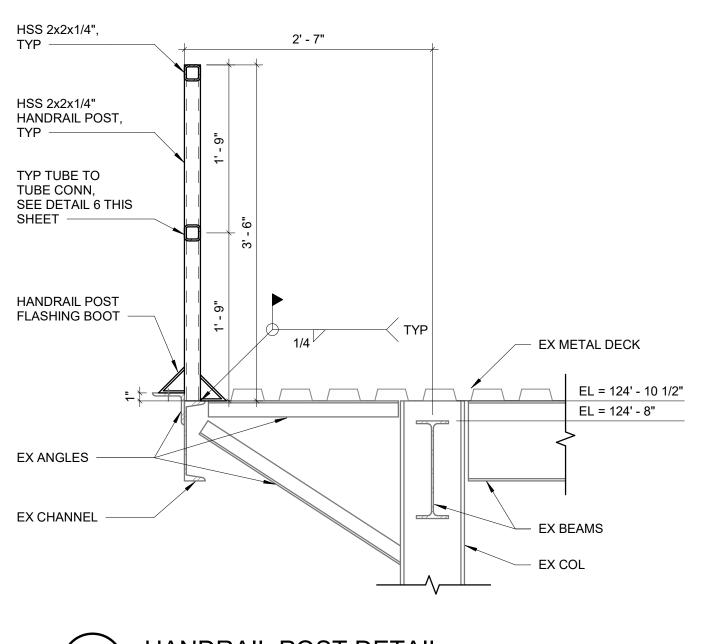


TYPICAL METAL DECK SUPPORT AT STEEL JOISTS

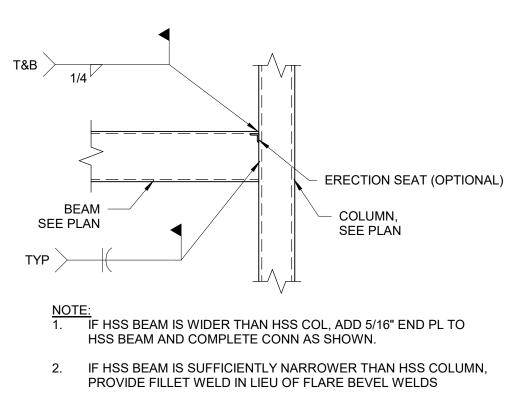


NOTE:
1. PROVIDE THIS FRAMING FOR OPENINGS GREATER THAN 12"

TYPICAL METAL DECK SUPPORT AT STEEL BEAMS



HANDRAIL POST DETAIL



TYPICAL HSS TO HSS CONNECTION DETAIL

MATTHAEI HVAC STUDY & SCHEMATIC

**OSBORN** 

ENGINEERING

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**WAYNE STATE** UNIVERSITY

**DETROIT MI 48208** 

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re-use or re-distribution of Instrument

STRUCTURAL **DETAILS** 

> DRAWING NO. S-501

#### SCOPE OF WORK:

PART OF THIS PROJECT.

PROJECT SCOPE OF WORK FOR ADDITION OF AIR CONDITIONING

- ADD PACKAGED ROOFTOP (COOLING ONLY) CONNECTED INTO THE EXISTING SUPPLY AND RETURN AIR FROM EXISITING HV UNITS DUCT.
   A NEW BUILDING AUTOMATION SHALL BE PROVIDE TO CONTROL ALL EQUIPMENT
- THE GYM WILL BE PROVIDED WITH A DEDICATED COOLING ONLY UNIT. RTU-105
   THE MENS AND WOMENS LOCKER ROOM (HV -11,12) WILL BE PROVIDED WITH A
- DEDICATED OUTSIDE AIR UNIT. RTU-106 AND 107

  5. A VARIABLE VOLUME SYSTEM FOR THE FITNESS, CONFERENCE ROOM WILL BE
- PROVIDED WITH ELECTRIC HEAT (RTU-108).

  6. ADD VRF SYSTEM FOR RACQUETBALL, SQUASH, AND HAND BALL COURTS.
- 7. ROOF TOP UNIT SERVING THE ATHLETIC ADMINISTRATION AREA WILL BE REPLACED IN KIND.
- 8. ELECTRICAL SWITCHGEAR WILL BE UPGRADED TO HANDLE NEW LOAD IN THE BUILDING.

### GENERAL MECHANICAL NOTES:

- 1. REFRIGERANT LINES SHOWN ARE DIAGRAMMATIC AND FOR SUGGESTED ROUTING ONLY. THE MECHANICAL CONTRACTOR SHALL PROVIDE REFRIGERANT LINE SIZES, FINAL LAYOUT, AND REQUIRED ACCESSORIES (SUCH AS SIGHT GLASS, EXPANSION VALVES, FILTER-DRIER, LIQUID LINE TRAPS, SUCTION ACCUMULATOR, ETC.) IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- 2. FOR NATURAL GAS PIPING, SEE PLUMBING DRAWINGS.
- 3. FOR EXACT LOCATION OF DIFFUSERS AND GRILLES, SEE ARCHITECTURAL REFLECTED CEILING PLANS.
- 4. FOR ROOF PENETRATION DETAILS SEE ARCHITECTURAL AND STRUCTURAL DWGS.
- 5. FLEX DUCTWORK TO DIFFUSERS SHALL MATCH NECK SIZE OF DIFFUSER WHERE INDICATED.
- 6. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE HVAC SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED, AND AS REQUIRED BY STATE AND LOCAL CODES.
- 7. INSTALL ALL NEW WORK IN ACCORDANCE WITH MANUFACTURERS'
  RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND
  REGULATIONS.
- 8. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE BEST APPROXIMATES ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.
- 9. COORDINATE CONSTRUCTION OF ALL HVAC WORK WITH ARCHITECTURAL, STRUCTURAL, PLUMBING, CIVIL, ELECTRICAL, TECHNOLOGY, ETC., SHOWN ON OTHER CONTRACT DOCUMENT DRAWINGS.
- 10. ALL HVAC WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN PIPING AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO OWNER.
- 11. MAINTAIN A MINIMUM OF 6'-8" CLEARANCE TO UNDERSIDE OF PIPES AND SUSPENDED EQUIPMENT THROUGHOUT ACCESS ROUTES IN MECHANICAL ROOMS.
- 12. WHERE TWO OR MORE ITEMS OF THE SAME TYPE OF EQUIPMENT ARE REQUIRED, THE PRODUCT OF ONE MANUFACTURER SHALL BE USED.
- 13. ALL MISCELLANEOUS STEEL REQUIRED TO ENSURE PROPER INSTALLATION SHALL BE FURNISHED AND INSTALLED BY THE HVAC CONTRACTOR.

AND OTHER CONCEALED HVAC EQUIPMENT.

- 14. COORDINATE ACCESS PANEL LOCATIONS FOR INSTALLATION IN WALLS AND CEILINGS, WHERE REQUIRED, TO SERVICE VALVES, FIRE DAMPERS, VAV BOXES,
- 15. ALL EQUIPMENT, PIPING, ETC. SHALL BE SUPPORTED AS REQUIRED TO PROVIDE A VIBRATION FREE INSTALLATION.
- 16. PROVIDE FLEXIBLE CONNECTIONS IN ALL PIPING SYSTEMS CONNECTED TO PUMPS AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AS CLOSE TO THE EQUIPMENT AS POSSIBLE OR AS INDICATED ON THE DRAWINGS.
- 17. ALL PIPING AND EQUIPMENT SUPPORTED FROM STRUCTURAL STEEL SHALL BE COORDINATED WITH GENERAL CONTRACTOR. ALL ATTACHMENTS TO STEEL BAR JOISTS, TRUSSES, OR JOIST GIRDERS SHALL BE AT PANEL POINTS. SEE STRUCTURAL NOTES ON SHEET SF-001 AND SPECIFICATION SECTION 22 05 29 FOR REQUIRED PRODUCTS AND INSTALLATION OF HANGERS AND SUPPORTS. HVAC EQUIPMENT AND PIPING SHALL NOT BE SUPPORTED FROM METAL DECK.
- 18. CONTRACTOR TO INFORM THE STRUCTURAL ENGINEER IN WRITING OF ANY SUSPENDED LOAD IN EXCESS OF 400 POUNDS.
- 19. IF THERE IS ANY DEVIATION BETWEEN THE SPECIFICATIONS AND DRAWINGS THE CONTRACTOR SHALL ADHERE TO THE MORE STRINGENT CONDITION.
- 20. CONCRETE HOUSEKEEPING PADS TO SUIT MECHANICAL EQUIPMENT SHALL BE SIZED AND LOCATED BY THE CONTRACTOR. MINIMUM CONCRETE PAD THICKNESS SHALL BE 4 INCHES. PAD SHALL EXTEND BEYOND THE EQUIPMENT A MINIMUM OF 4 INCHES ON EACH SIDE. CONCRETE HOUSEKEEPING PADS SHALL BE PROVIDED BY THE CONTRACTOR. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE SIZE AND LOCATION OF CONCRETE HOUSEKEEPING PADS.
- 21. EXHAUST ONLY ROOMS SUCH AS JANITORS CLOSETS, ELECTRICAL CLOSETS, AND STORAGE ROOMS SHALL HAVE DOOR UNDERCUTS OF 5/8" FOR MAKEUP AIR INDICATED WITH FLOW ARROW ON PLANS. COORDINATE WITH ARCHITECTURAL DRAWINGS.
- 22. WHERE MULTIPLE MANUFACTURERS ARE NAMED THE DRAWINGS AND SPECIFICATIONS ARE BASED ON THE REQUIREMENTS AND LAYOUTS FOR THE EQUIPMENT OF THE FIRST NAMED MANUFACTURER. ANY CHANGE REQUIRED BY THE USE OF OTHER NAMED MANUFACTURERS SUCH AS REVISIONS TO FOUNDATIONS, BASES, PIPING, CONTROLS, WIRING, OPENINGS, AND APPURTENANCES SHALL BE MADE BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

# HVAC DUCTWORK LEGEND

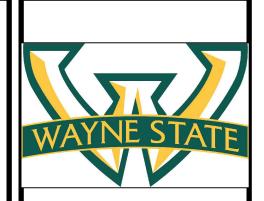
RETURN OR OUTSIDE AIR DUCT  EXHAUST AIR DUCT  4-WAY CEILING DIFFUSER  DUCT TRANSITION  BALANCING DAMPER  FIRE DAMPER  MOTORIZED DAMPER  DUCT SENSOR  DIFFERENTIAL PRESSURE SWITCH
EXHAUST AIR DUCT  4-WAY CEILING DIFFUSER  DUCT TRANSITION  BALANCING DAMPER  FIRE DAMPER  MOTORIZED DAMPER  DUCT SENSOR
4-WAY CEILING DIFFUSER  DUCT TRANSITION  BALANCING DAMPER  FIRE DAMPER  MOTORIZED DAMPER  DUCT SENSOR
DUCT TRANSITION  BALANCING DAMPER  FIRE DAMPER  MOTORIZED DAMPER  DUCT SENSOR
BALANCING DAMPER  FIRE DAMPER  MOTORIZED DAMPER  DUCT SENSOR
FIRE DAMPER  MOTORIZED DAMPER  DUCT SENSOR
MOTORIZED DAMPER  DUCT SENSOR
DUCT SENSOR
DIFFERENTIAL PRESSURE SWITCH
SMOKE DETECTOR (BY ELECTRICAL)
STATIC PRESSURE SENSOR
MANUAL TIMER ON/OFF SWITCH
CO2 SENSOR
TEMPERATURE SENSOR
THERMOSTAT
ROOM TEMPERATURE SENSOR (ADJUSTABLE "XXX" = VAV BOX SERVED
ROOM TEMPERATURE & CO2 SENSOR (ADJ.) "XXX" = VAV BOX SERVED
ROOM TEMP. & HUMIDITY SENSOR (ADJ.) "XXX" = VAV BOX SERVED
ROOM TEMP, CO2, & HUMIDITY SENSOR (ADJ. "XXX" = VAV BOX SERVED
ROOM NON-ADJUSTABLE TEMPERATURE SENSOR "XXX" = VAV BOX SERVED
AIRFLOW
RECTANGULAR DUCT BREAK
EXISTING TO REMAIN
EXISTING TO BE REMOVED
NEW
CONNECT TO EXISTING
LIMIT OF DEMOLITION

\* CERTAIN ABBREVIATIONS LISTED ABOVE MAY NOT APPLY TO THIS

	H	HVAC	ABBREVIATION	S	
AAV	AUTOMATIC AIR VENT	F	FAHRENHEIT	PSI	POUNDS PER SQUARE INCH
AC	ALTERNATING CURRENT	FCU	FAN COIL UNIT	PSIG	POUNDS PER SQUARE INCH GAUGE
ACB	ACTIVE CHILLED BEAM	FD	FIRE DAMPER	PVC	POLYVINYL CHLORIDE
ACC	AIR COOLED CHILLER	FDA	U.S. FOOD AND DRUG	R	RELOCATED
ACD	AUTOMATIC CONTROL DAMPER	IDA	ADMINISTRATION	RA	RETURN AIR
ACCU	AIR COOLED CONDENSING UNIT	FF	FINISHED FLOOR	REQ'D	REQUIRED
ACU	AIR CONDITIONING UNIT	FG	FINISHED GRADE	RF	RETURN FAN
AD	ACCESS DOOR	FLA	FULL LOAD AMPS	RG	RETURN GRILLE
ADJ	ADJUSTABLE	FLEX	FLEXIBLE	RH	RELATIVE HUMIDITY
AFF	ABOVE FINISHED FLOOR	FPB	FAN POWERED BOX	RHC	REHEAT COIL
AFG	ABOVE FINISHED GRADE	FPM	FEET PER MINUTE	RHG	REFRIGERANT HOT GAS
	AIR-CONDITIONING, HEATING, AND	FT	FLASH TANK	RL	REFRIGERANT LIQUID
AHRI	REFRIGERATION INSTITUTE	F&T	FLOAT AND THERMOSTATIC	RM	ROOM
AHU	AIR HANDLING UNIT	FTR	FIN TUBE RADIATION	RPM	REVOLUTIONS PER MINUTE
7		G	GAS	RR	RETURN REGISTER
AMCA	AIR MOVEMENT AND CONTROL ASSOCIATION	GA	GAUGE	R&R	REMOVE AND RELOCATE
	AMERICAN NATIONAL OTANDARDO	GAL	GALLON	RS	REFRIGERANT SUCTION
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	GALV	GALVANIZED	TKO	
				RTD	RESISTANCE TEMPERATURE DETECTOR
AP	ACCESS PANEL	GPH	GALLONS PER HOUR	DTU	
APD	AIR PRESSURE DROP	GPM	GALLONS PER MINUTE	RTU	ROOF TOP UNIT
ASJ	ALL SERVICE JACKET	HB	HOSE BIB (CONNECTION)	SA	SUPPLY AIR
ASME	AMERICAN SOCIETY OF	HX	HEAT EXCHANGER	SD	SMOKE DAMPER
	MECHANICAL ENGINEERS	HP	HORSEPOWER	SEN	SENSIBLE
ASTM	AMERICAN SOCIETY FOR TESTING	HPS	HIGH PRESSURE STEAM	SF	SUPPLY FAN
	AND MATERIALS	HUM	HUMIDIFIER	SFD	COMBINATION SMOKE AND FIRE
BAS	BUILDING AUTOMATION SYSTEM	HVAC	HEATING VENTILATION AND AIR		
BD	BACK-DRAFT DAMPER	11770	CONDITIONING		SHEET METAL AND AIR
BFF	BELOW FINISHED FLOOR	HWR	HOT WATER RETURN	SMACNA	CONDITIONING CONTRACTORS
BFG	BELOW FINISHED GRADE	HWS	HOT WATER SUPPLY		NATIONAL ASSOCIATION
BHP	BRAKE HORSE POWER	HZ	HERTZ	SP	STATIC PRESSURE
BOD	BOTTOM OF DUCT	IAQ	INDOOR AIR QUALITY	SR	SUPPLY REGISTER
BTU	BRITISH THERMAL UNIT	ID	INSIDE DIAMETER	SQ	SQUARE
BTUH	BTU PER HOUR	IFB	INTEGRAL FACE AND BYPASS	SQ FT	SQUARE FEET
С	CELSIUS	IN	INCHES	STD	STANDARD
CD	CEILING DIFFUSER	1/0	INPUT/OUTPUT	STM	STEAM
CF	CUBIC FEET	KW	KILOWATT	T	THERMOSTAT
CFM	CUBIC FEET PER MINUTE	LAT	LEAVING AIR TEMPERATURE	1	
CH	CHILLER (WATER-COOLED)	LBS	POUNDS	TCP/IP	TRANSMISSION CONTROL PROTOCOL/INTERNET PROTOCOL
CHW	CHILLED WATER	LD	LINEAR DIFFUSER	TD	TRANSFER AIR DUCT
CHWP	CHILLED WATER PUMP	LPS	LOW PRESSURE STEAM	TEAO	TOTALLY ENCLOSED AIR OVER
CHWR	CHILLED WATER RETURN	LVR	LOUVER	TEFC	TOTALLY ENCLOSED FAN COOLED
CHWS	CHILLED WATER SUPPLY	LWT	LEAVING WATER TEMPERATURE	TEMP	TEMPERATURE
CM	CENTIMETERS	MA	MAKE-UP AIR OR MILLIAMPS	TG	TRANSFER GRILLE
СО	CARBON MONOXIDE	MAU	MAKE-UP AIR UNIT	TON	12,000 BTU (COOLING CAPACITY)
CONN	CONNECTION	MAX	MAXIMUM	TYP	TYPICAL
СТ	COOLING TOWER	MBH	1000 BTUH	UC	UNDERCUT
CUH	CABINET UNIT HEATER	MC	MECHANICAL CONTRACTOR	UH	UNIT HEATER
CWP	CONDENSER WATER PUMP	MERV	MINIMUM EFFICIENCY REPORTING	UL	UNDERWRITERS LABRATORIES
CWR	CONDENSER WATER RETURN	IVILIXV	VALUE	V	VOLTS
CWS	CONDENSER WATER SUPPLY	MIN	MINIMUM	VA	VOLT AMPS
D	DRAIN	MM	MILLIMETERS	VAV	VARIABLE AIR VOLUME
DB	DRY BULB	MPH	MILES PER HOUR	VFD	VARIABLE FREQUENCY DRIVE
DC	DIRECT CURRENT	N	NEW WORK	VTR	VENT THRU ROOF
DDC	DIRECT DIGITAL CONTROL	NC	NORMALLY CLOSED		VARIABLE VOLUME AND
DEG	DEGREE	NEC	NATIONAL ELECTRIC CODE	VVT	TEMPERATURE
DIA	DIAMETER	1120		WB	WET BULB
DIM	DIMENSION	NEMA	NATIONAL ELECTRIC MANUFACTURERS ASSOCIATION	WC	WATER COLUMN
		1			WATER COLUMN WATER FLOW SWITCH
DN	DOWN DESCRIBE	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION	WFS	
DP	DIFFERENTIAL PRESSURE			WG	WATER GAUGE
D&R	DISCONNECT AND REMOVE	NIC	NOT IN CONTRACT	WPD	WATER PRESSURE DROP
DWG(S)	DRAWING(S)	NO	NORMALLY OPEN		
DWH	DOMESTIC WATER HEATER	NPS	NOMINAL PIPE SIZE		
Ε	EXISTING	NPT	NATIONAL PIPE THREAD		
	EXHAUST AIR	OA	OUTSIDE AIR		
EA		OD	OUTSIDE DIAMETER		
	ENTERING AIR TEMPERATURE			<del>i</del>	
EA	ENTERING AIR TEMPERATURE ELECTRICAL CONTRACTOR	ODP	OPEN DRIP PROOF		
EA EAT		ODP	OPEN DRIP PROOF  OCCUPATIONAL SAFETY AND		
EA EAT EC EF	ELECTRICAL CONTRACTOR EXHAUST FAN				
EA EAT EC	ELECTRICAL CONTRACTOR	ODP	OCCUPATIONAL SAFETY AND		
EA EAT EC EF EPDM	ELECTRICAL CONTRACTOR  EXHAUST FAN  ETHYLENE PROPYLENE DIENE	ODP OSHA OS&Y	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION		
EA EAT EC EF EPDM ER	ELECTRICAL CONTRACTOR  EXHAUST FAN  ETHYLENE PROPYLENE DIENE MONOMER  EXHAUST REGISTER	ODP OSHA OS&Y PCB	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION OUTSIDE SCREW AND YOKE PASSIVE CHILLED BEAM		
EA EAT EC EF EPDM ER ERU	ELECTRICAL CONTRACTOR  EXHAUST FAN  ETHYLENE PROPYLENE DIENE MONOMER  EXHAUST REGISTER  ENERGY RECOVERY UNIT	ODP OSHA OS&Y PCB PCF	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION  OUTSIDE SCREW AND YOKE PASSIVE CHILLED BEAM POUNDS PER CUBIC FOOT		
EA EAT EC EF EPDM ER ERU EUH	ELECTRICAL CONTRACTOR  EXHAUST FAN  ETHYLENE PROPYLENE DIENE MONOMER  EXHAUST REGISTER  ENERGY RECOVERY UNIT  ELECTRONIC UNIT HEATER	ODP OSHA OS&Y PCB PCF PD	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION  OUTSIDE SCREW AND YOKE  PASSIVE CHILLED BEAM  POUNDS PER CUBIC FOOT  PRESSURE DROP		
EA EAT EC EF EPDM ER ERU	ELECTRICAL CONTRACTOR  EXHAUST FAN  ETHYLENE PROPYLENE DIENE MONOMER  EXHAUST REGISTER  ENERGY RECOVERY UNIT	ODP OSHA OS&Y PCB PCF	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION  OUTSIDE SCREW AND YOKE PASSIVE CHILLED BEAM POUNDS PER CUBIC FOOT		

PRV PRESSURE REDUCING VALVE

EXH EXHAUST





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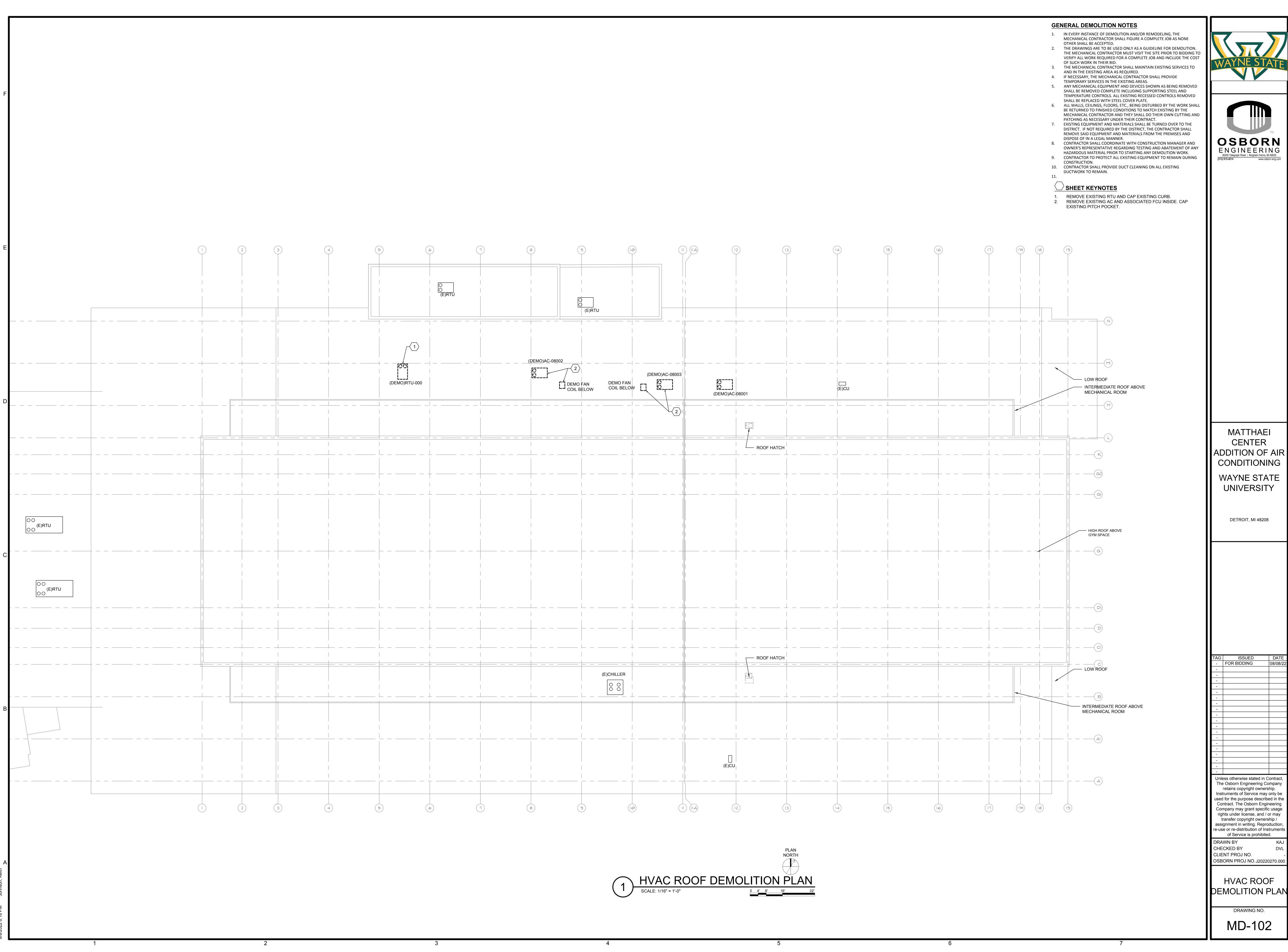
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HVAC NOTES & LEGENDS

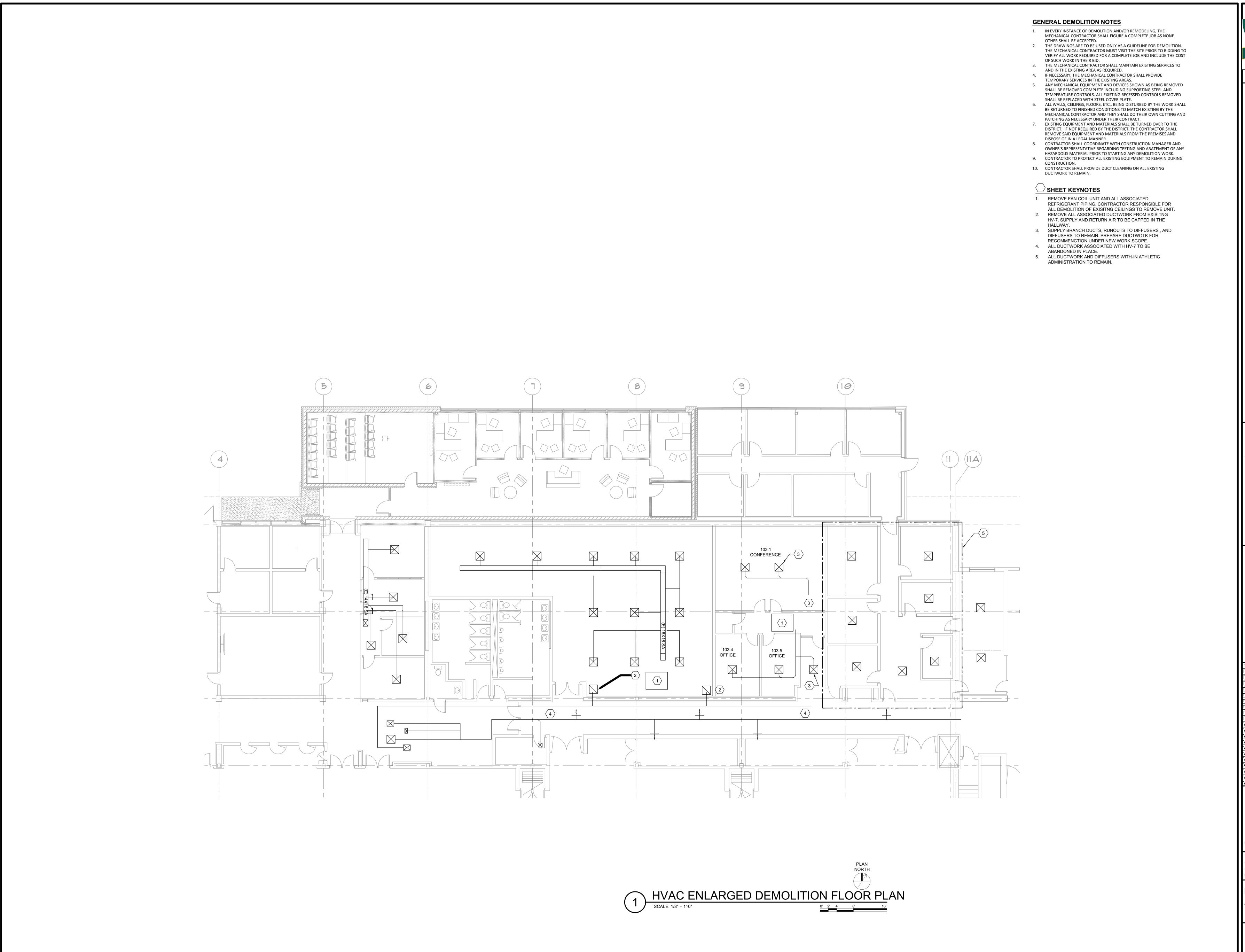
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M-001

<sup>\*</sup> CERTAIN ABBREVIATIONS LISTED ABOVE MAY NOT APPLY TO THIS PROJECT.











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TAG ISSUED DATE
FAG1 FOR BIDDING 08/08/22
FAG2
FAG3
FAG4
FAG5
FAG6
FAG7
FAG8
FAG9
FAG10
FAG11
FAG12
FAG13
FAG14
FAG15
FAG15
FAG16

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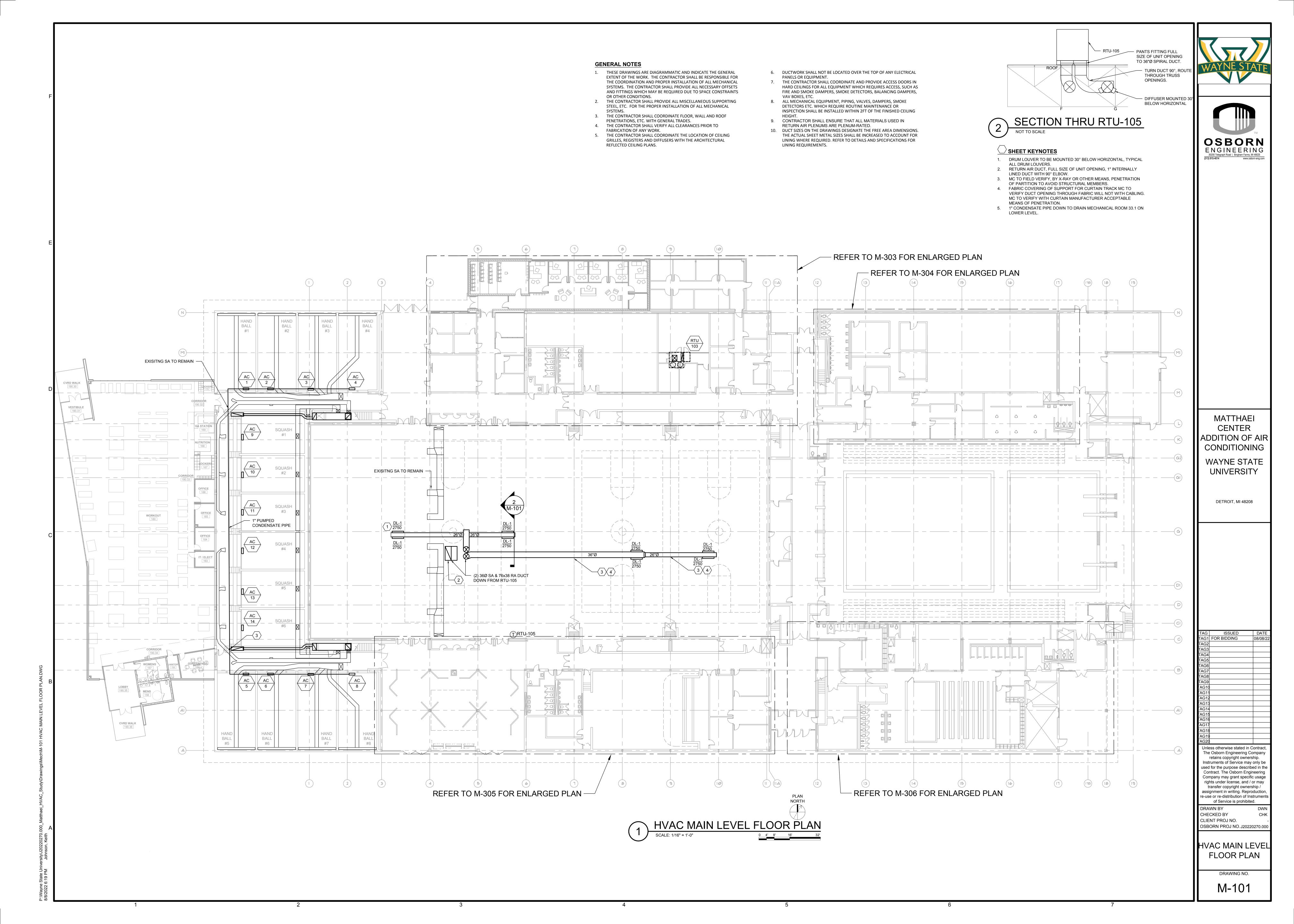
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CLIENT PROJ NO. -

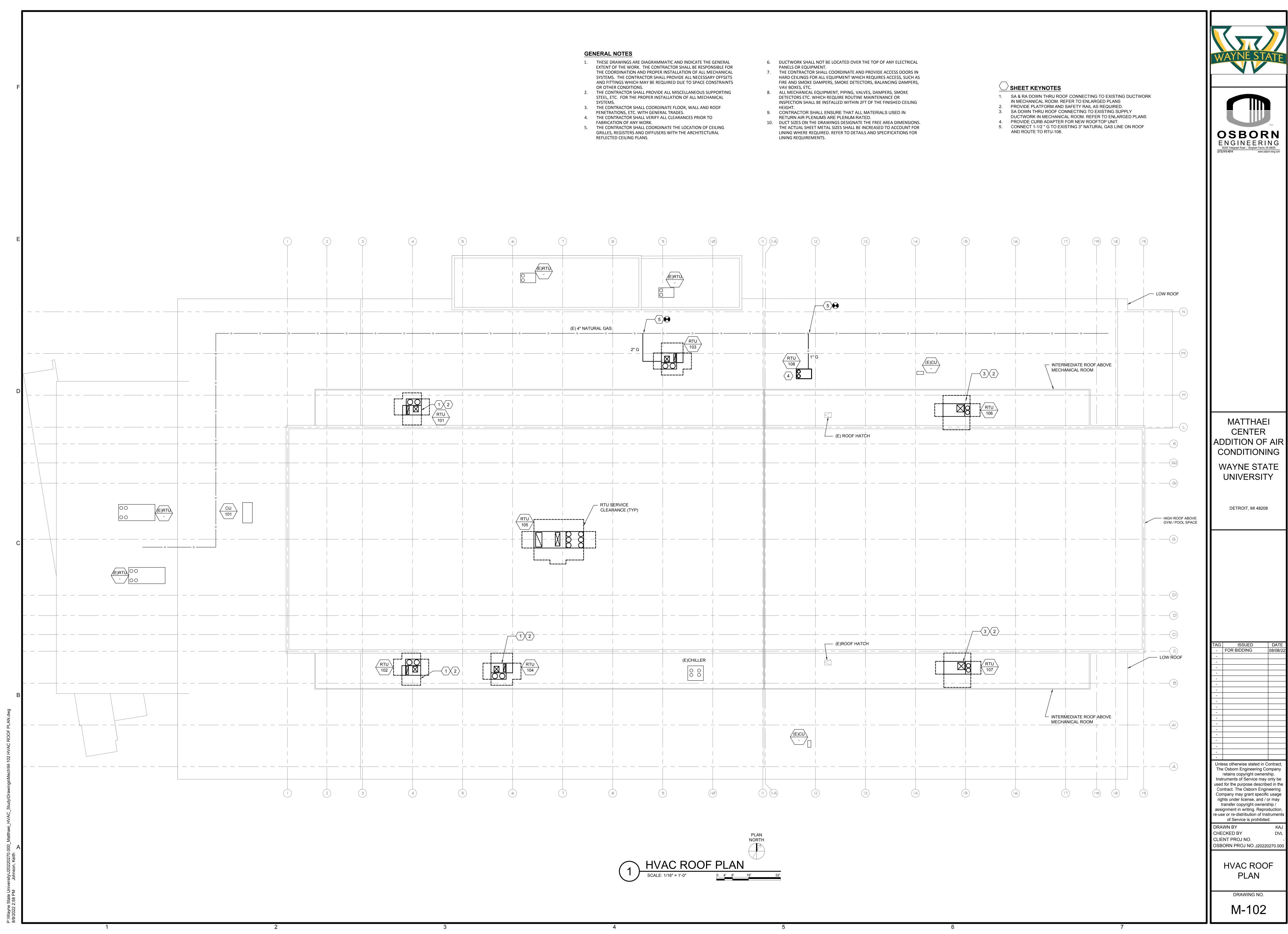
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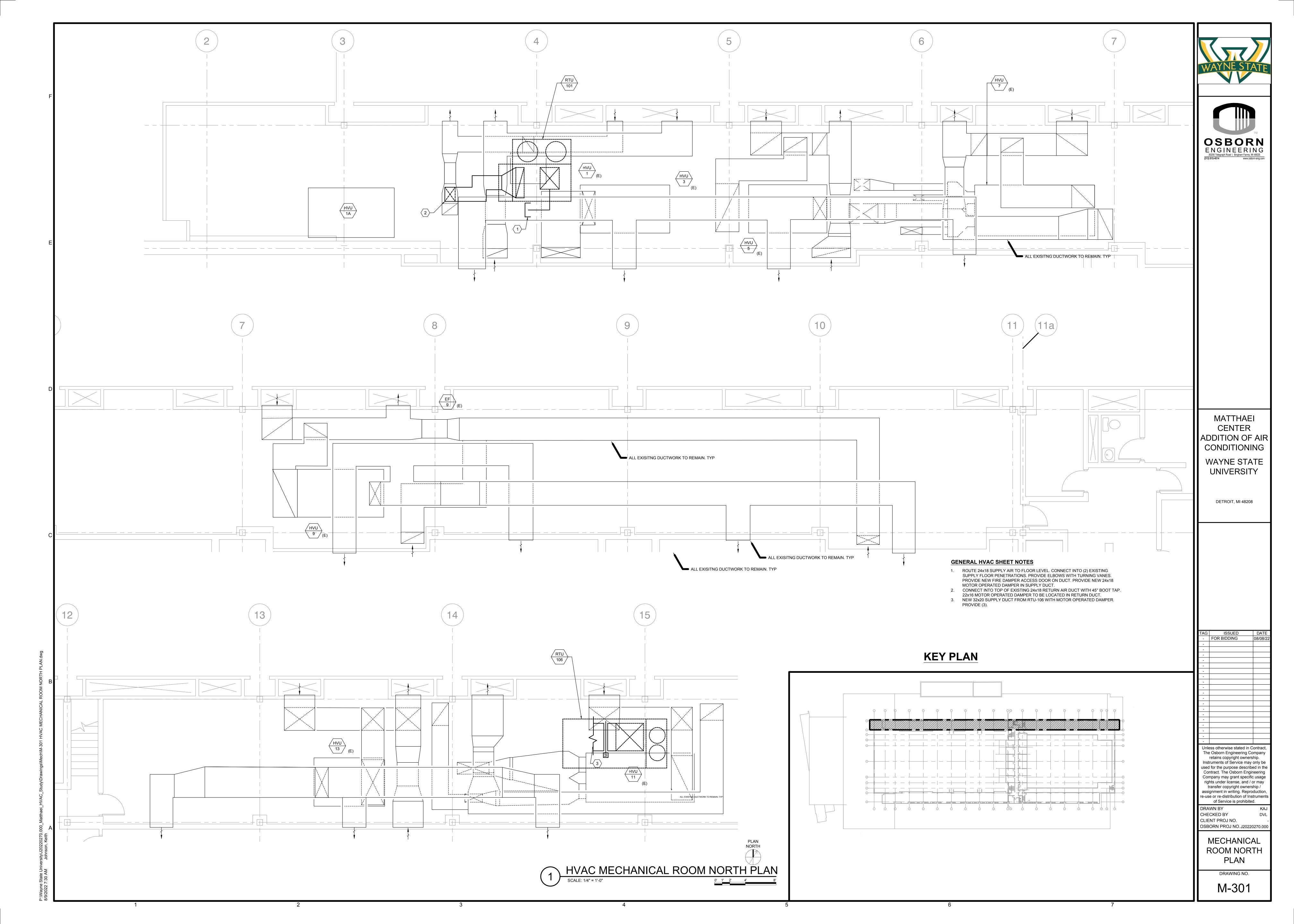
HVAC ENLARGED ADDITION FLOOR PLAN

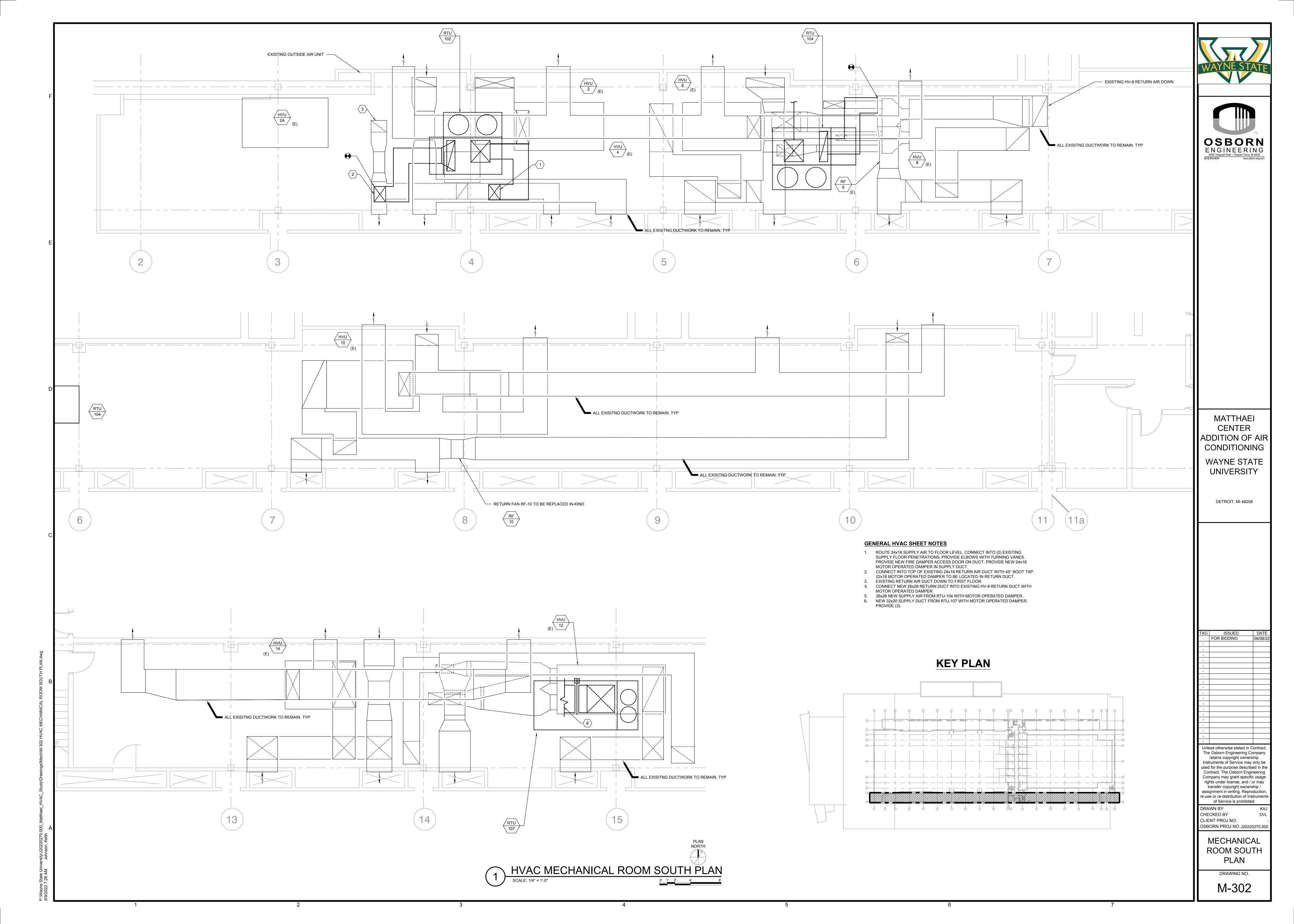
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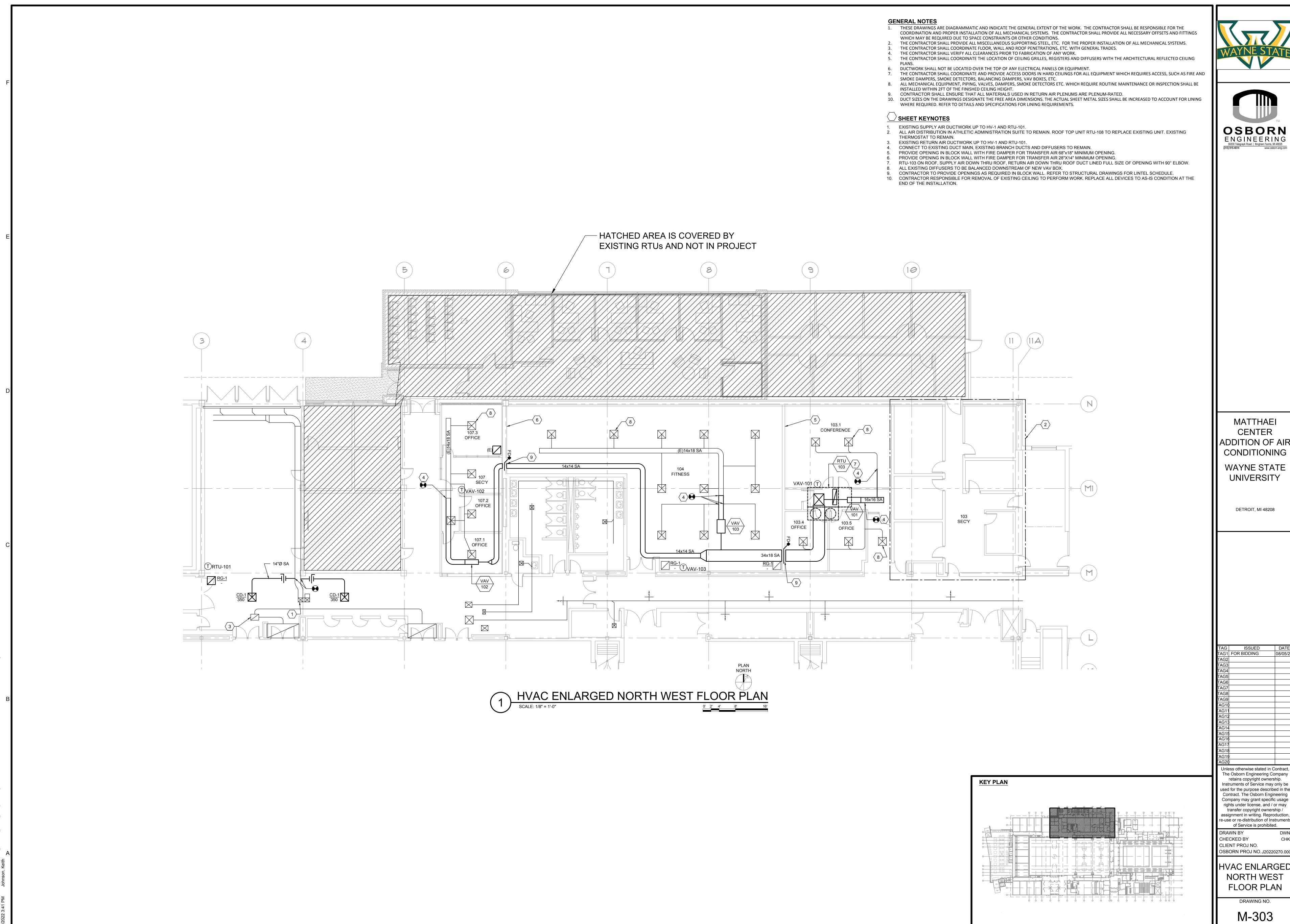
MD-103















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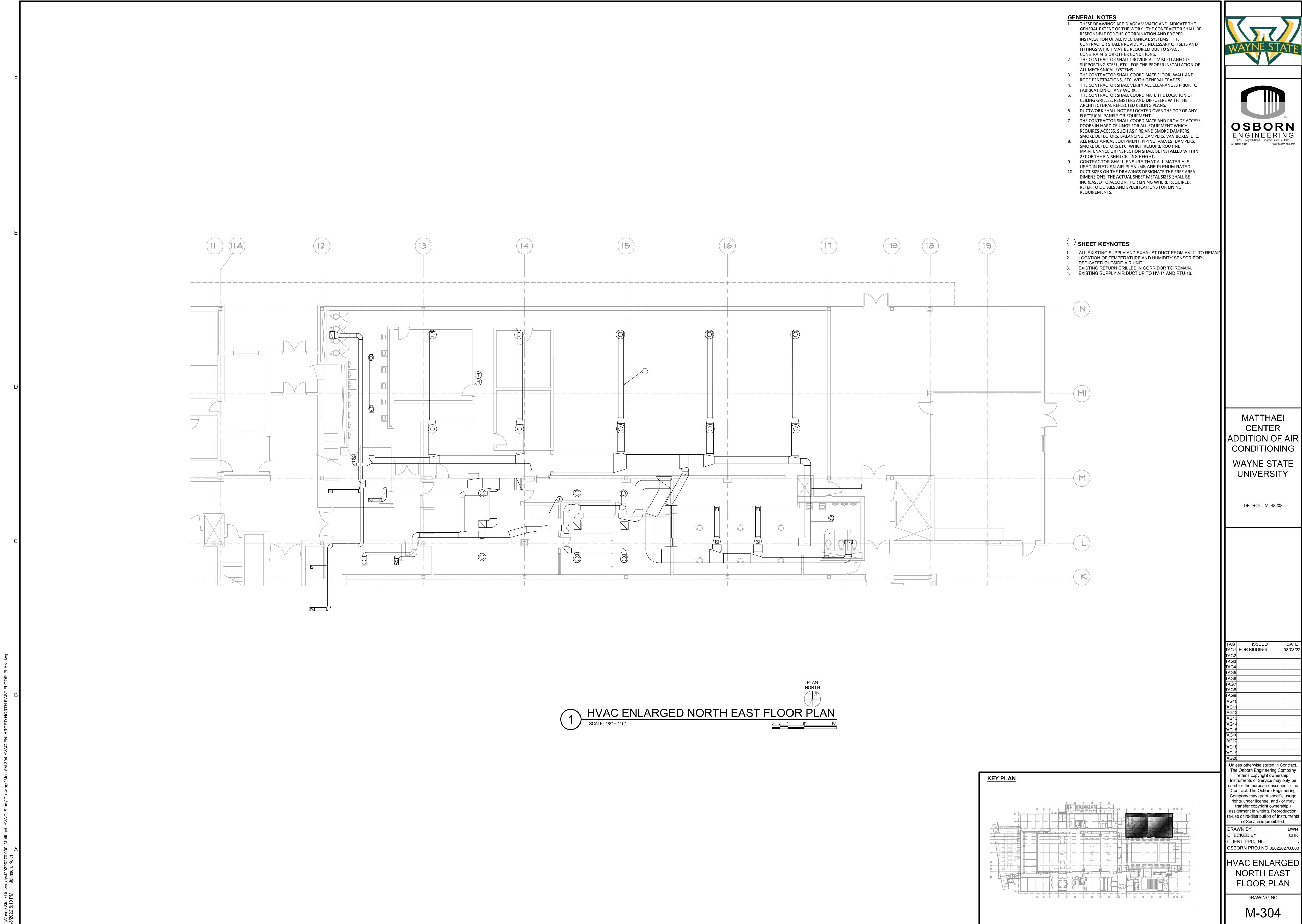
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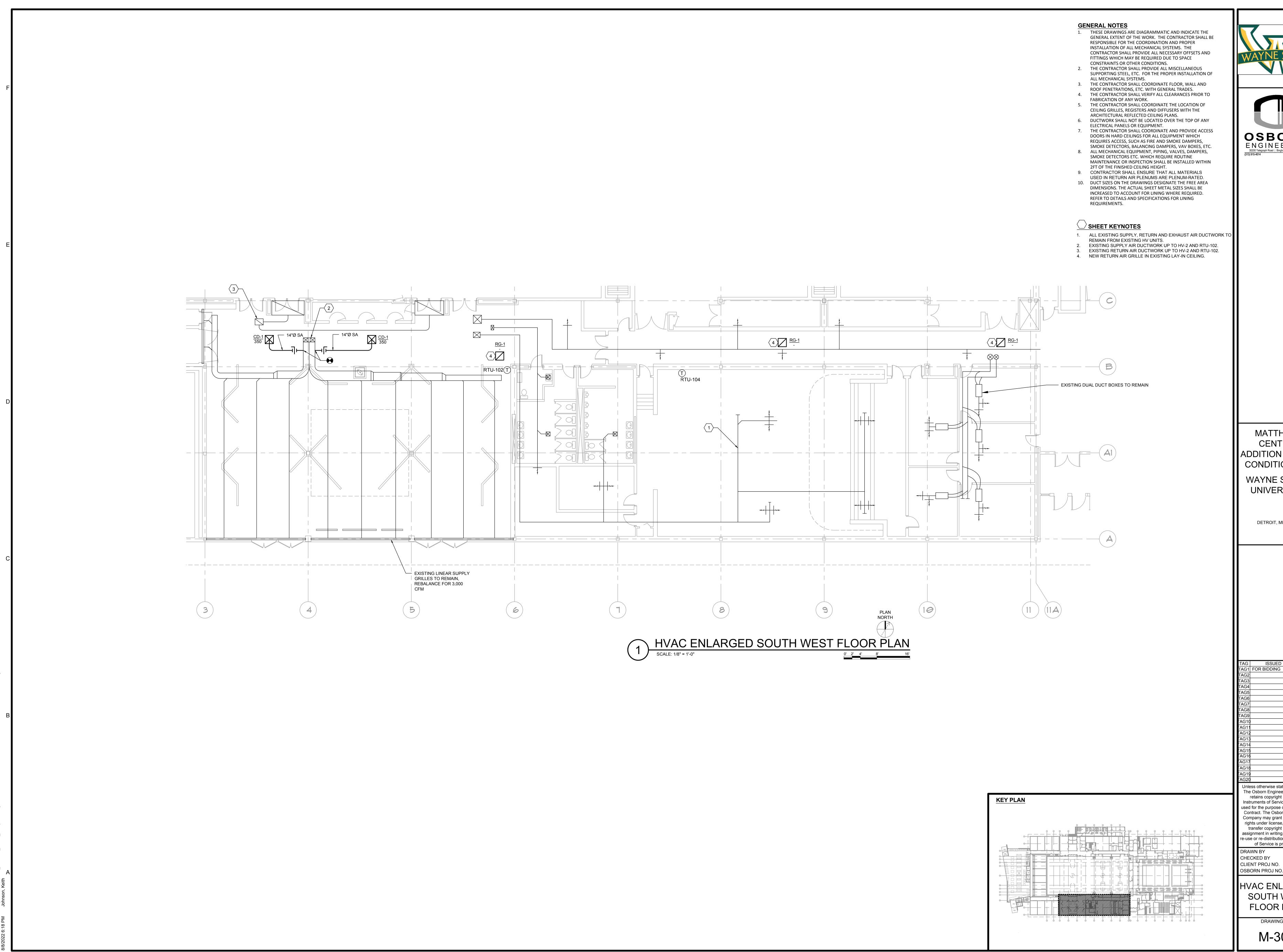
NORTH WEST FLOOR PLAN

DRAWING NO.





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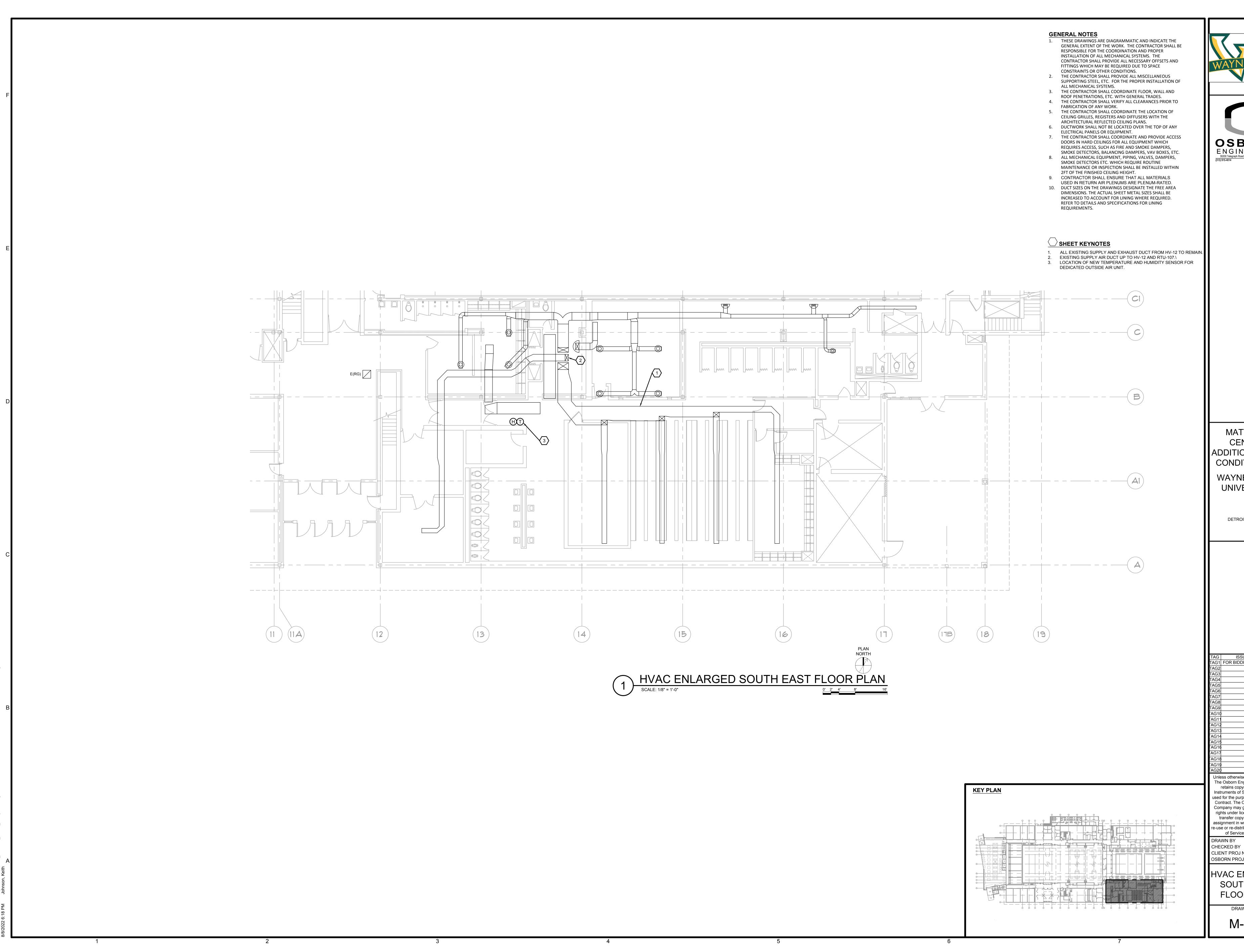
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**HVAC ENLARGED** SOUTH WEST FLOOR PLAN

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**HVAC ENLARGED** SOUTH EAST FLOOR PLAN

DRAWING NO.

- 1. FOR UNITS NOT SUPPLIED WITH SMOKE DETECTORS INSTALL SMOKE DETECTORS, PROVIDED BY THE ELECTRICAL CONTRACTOR, IN DUCTWORK WHERE INDICATED ON
- 2. PROVIDE 1" ACOUSTICAL DUCT LINING IN SUPPLY AND RETURN DUCTS FROM UNIT CONNECTION TO POINTS INDICATED ON PLANS.
- 3. TRANSITION SUPPLY AND RETURN UNIT CONNECTION TO SIZES INDICATED ON PLANS.



BRANCH DUCT —

ROUND HARD DUCT,

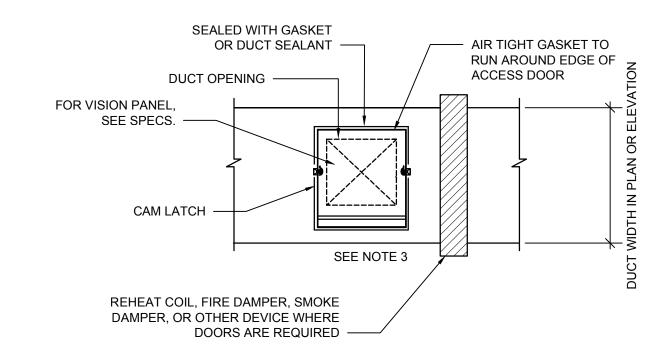
MINIMUM 3X INLET

GASKETED ROUND TAP —

DIAMETER

— CONTROL BOX

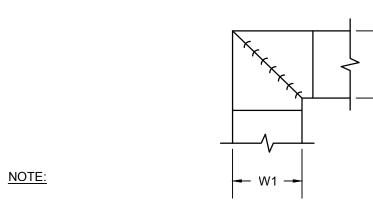
TERMINAL BOX INSTALLATION AND CLEARANCE



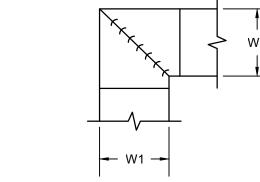
ACCES	S DOOR SIZE SCHEDULE
DUCT WIDTH	ACCESS DOOR SIZE
6" TO 1O"	6" x 6" MINIMUM
10" TO 12"	8" x 8" MINIMUM
12" TO 21"	12" x 12" MINIMUM, SEE NOTE 1
21" & ABOVE	18" x 18" MINIMUM, SEE NOTE 2

- 1. ACCESS DOORS TO 16"x16" WHERE DUCT SIZE AND SPACES ALLOWS
- 2. FOUR CAM LATCHES ARE REQUIRED
- 3. DOORS TO BE INSTALLED ON SIDE OR BOTTOM OF DUCT WITH BEST ACCESS

# DUCT ACCESS DOOR AND SCHEDULE

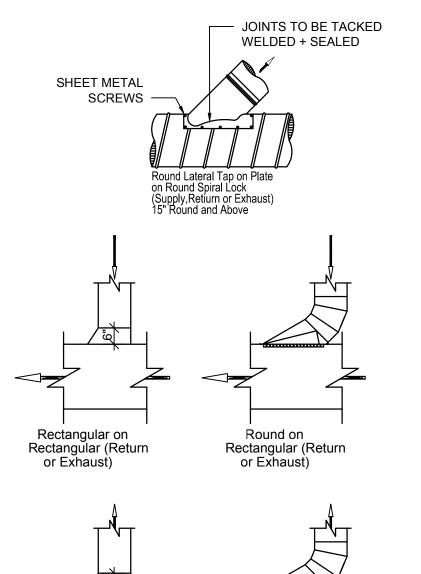


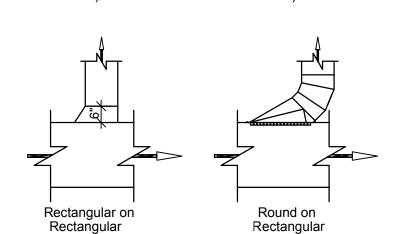
- 1. ALL VANE ELBOWS SHALL BE CONSTRUCTED AND INSTALLED AS DETAILED BY SMACNA.
- 2. WHEN W1 DOES NOT EQUAL W2, VANE SHALL BE SINGLE THICKNESS VANE TYPE
- 3. ALL SINGLE THICKNESS VANES SHALL HAVE A 2" RADIUS, 1 1/2" MAXIMUM SPACE
- 4. WHEN W EQUALS W2 AND W1 IS GREATER THAN 20" VANES SHALL BE DOUBLE VANE



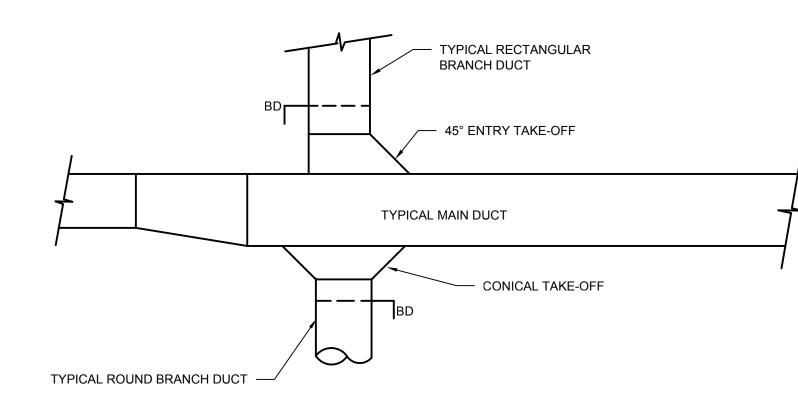
- REGARDLESS OF W DIMENSION.
- BETWEEN VANES AND A 3/4" TRAILING EDGE.



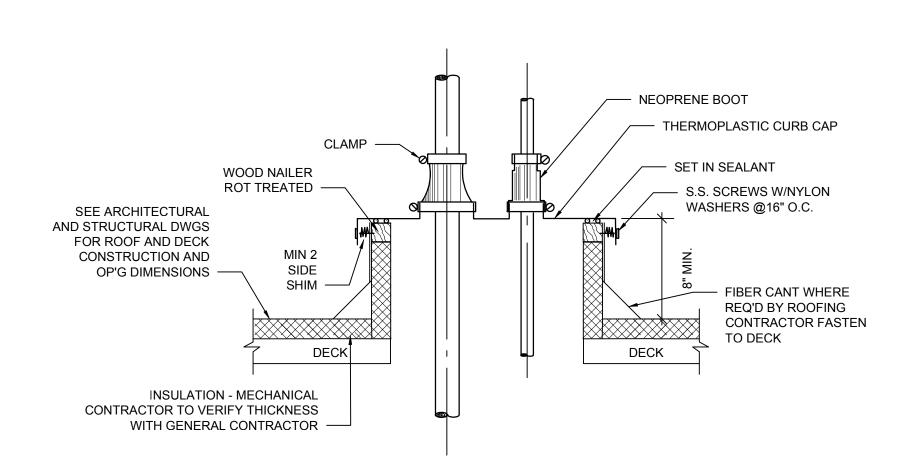




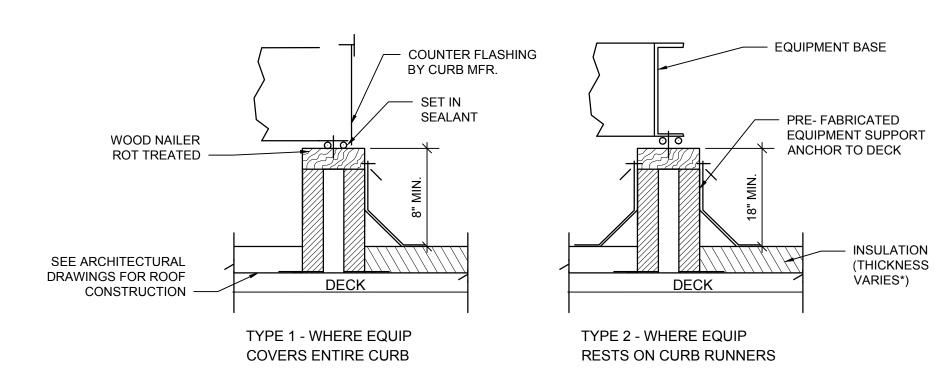
BRANCH CONNECTIONS



TYPICAL BRANCH DUCT TAKE-OFF

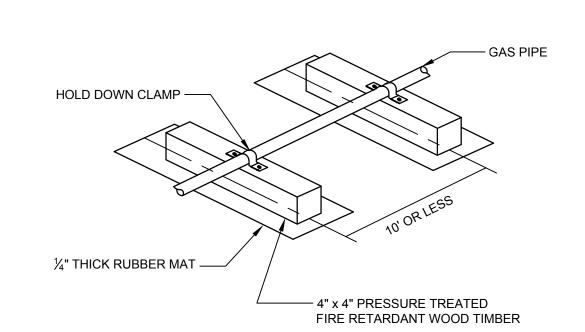


# **ROOF CURB WITH** PIPE PENETRATIONS



\* MECH CONTRACTOR TO VERIFY INSULATION THICKNESS W/ GENERAL CONTRACTOR

# ROOF MOUNTED EQUIPMENT



ROOFTOP GAS PIPING SUPPORT

ELECTRIC HEATING COIL—

BOTTOM ACCESS, MAINTAIN -

DO NOT INSTALL DIRECTLY

ABOVE LIGHT FIXTURE OR

SPRINKLER HEAD

FULL BOX CLEARANCE BELOW.

FOR BIDDING

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**OSBORN** 

MATTHAEI

CENTER

**ADDITION OF AIR** 

CONDITIONING

WAYNE STATE

UNIVERSITY

DETROIT, MI 48208

ISSUED

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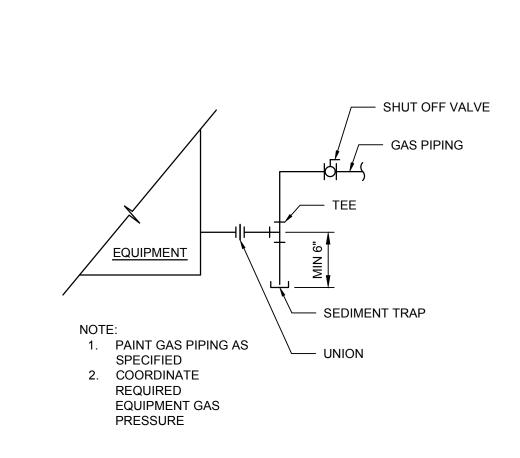
OSBORN PROJ NO. J20220270.00

**HVAC DETAILS** 

CLIENT PROJ NO.

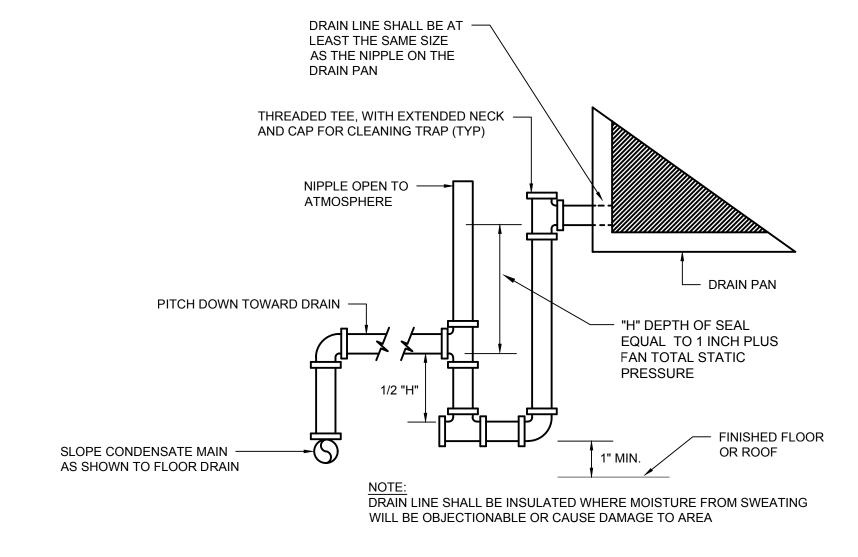
M-501

DRAWING NO.



GAS EQUIPMENT CONNECTION

NOT TO SCALE



DRAW-THRU CONFIGURATION 2 CONDENSATE TRAP

WHEN BRANCH DUCT TO AIR TERMINAL

UNIT EXCEEDS 15' OR HAS TWO OR MORE

ELBOWS, THEN DB = DI +2", OTHERWISE

2. DI = THE INLET SIZE CONNECTION OF THE

PROVIDE A MINIMUM OF 3 DUCT

AIR TERMINAL UNIT - TYPICALLY ROUND.

DIAMETERS (DI) OF STRAIGHT DUCT AT

4. OFFSETS WITH FLEX DUCT SHALL NOT

EXCEED 30° AND SHALL BE GRADUAL.

5. FLEX DUCT SHALL NOT HAVE MORE THAN

6. IF INDICATED STRAIGHT RUN CANNOT BE

7. SHUT-OFF BOX LOCATIONS SHALL BE COORDINATED SO THAT THEY ARE NOT

PIPING, SPRINKLERS, SPEAKERS,

IMPEDES ACCESS TO THE UNIT

INSTALLED DIRECTLY ABOVE LIGHTS,

DUCTWORK, OR ANYTHING ELSE THAT

BE PROVIDED AT BOX.

OFFSETS IN EXCESS OF 30° AND SHALL BE

OBTAINED, A FLOW STRAIGHTENER SHALL

DB = DI.

	PACKAGE	ROO	FTOF	P UNIT	SYST	EM
ITEM	DESCRIPTION	POINT TYPE	ADJ	ALARM	HOA POSITION	REMARKS
1	SUPPLY FAN START/STOP	ВО				
2	TEMPERATURE SETPOINT	Al				
3	SUPPLY AIR TEMPERATURE	AO				
4	RETURN AIR TEMPERATURE	BI		Х		
5	MOTOR OPERATED DAMPER	BI		Х		INTERLOCK WITH EXISITNG HV UNIT

# 5 PACKAGED RTU COIL CONTROL DIAGRAM (RTU-101,102,104)

#### ROOFTOP UNIT 101,102,104

ROOFTOP UNIT SHALL BE SCHEDULED FOR AUTOMATIC OPERATION WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 60 DEGREES (ADJUSTABLE) CONTRACTOR SHALL PROVIDE AN E-P SWITCH TO DISABLE THE EXSITNG PNEUMATIC SYSTEM AND THE HV UNITS SHALL BE TURNED OFF AND ALL DAMPERS CLOSED TO AIRFLOW. THE EXISTING HEATING AND VENTILATING UNITS SHALL OPERATION IN THE HEATING MODE WHEN THE OUTSIDE

AIR TEMPERATURE IS BELOW 60 DEG F.

ON A TIME OF DAY BASIS FOR OCCUPIED AND UNOCCUPIED MODES. WITHIN THE UNOCCUPIED MODE, THE SYSTEM CAN ENTER THE WARM-UP MODE WHEN THE SPACE TEMPERATURE IS BELOW SET POINT OR THE COOL-DOWN MODE WHEN THE SPACE TEMPERATURE IS ABOVE SET POINT. THE SYSTEM STAYS IN WARM-UP OR COOL-DOWN MODE UNTIL THE MODE SET POINT IS SATISFIED. ALL SYSTEM COMMUNICATIONS SHALL BE. THE CONTROLS SHALL BE DDC USING ELECTRIC ACTUATION AND PID CONTROL LOGIC. ALL CONTROL, MONITORING AND ALARM POINTS SHALL BE AVAILABLE AT CONTROL PANEL LOCATED IN THE JANITORS CLOSET.AND ALL SET POINTS AND SETTINGS ARE ADJUSTABLE.

#### OCCUPIED MODE

THE SUPPLY FAN SHALL START OR CONTINUE TO RUN, THE OUTSIDE AIR DAMPER IS MODULATED TO MAINTAIN VENTILATION SET POINT WHILE THE HEATING AND COOLING SECTIONS MODULATE WITHOUT OVERLAP TO MAINTAIN DISCHARGE AIR TEMPERATURE SET POINT. THE SUPPLY AIR FAN SPEED SHALL MODULATE TO MAINTAIN SUPPLY AIR DUCT STATIC PRESSURE SET POINT.

VENTILATION CONTROL. THE MINIMUM OUTSIDE AIR SHALL BE THE SET POINT ON THE AIR HANDLER UNIT SCHEDULE DURING OCCUPIED HOURS.

ECONOMIZER CONTROL. WHEN THE OUTDOOR AIR DRY BULB TEMPERATURE IS BELOW THE ECONOMIZER CHANGEOVER VALUE OF 60°F, THE HEATING SECTION AND THE MIXED AIR DAMPERS SHALL MODULATE IN SEQUENCE WITHOUT OVERLAP TO MAINTAIN THE SUPPLY AIR TEMPERATURE SET POINT WITH A LOW LIMIT OF 42°F AT THE MIXED AIR SENSOR. THE MIXING DAMPERS SHALL RAMP OPEN SLOWLY TO AVOID OVERSHOOTING. WHEN THE OUTSIDE DRY BULB TEMPERATURE IS ABOVE THE ECONOMIZER CHANGEOVER VALUE, THE MIXING DAMPERS ARE PLACED, IN MINIMUM OUTDOOR AIR POSITION AS DETERMINED BY THE VENTILATION SET POINT AND THE COOLING SECTION MODULATES TO

SUPPLY AIR TEMPERATURE RESET. THE SUPPLY AIR TEMPERATURE SET POINT SHALL BE RESET BASED ON OUTSIDE AIR TEMPERATURE. THE SUPPLY AIR TEMPERATURE SET POINT SHALL BE  $60^{\circ}$ F AT  $45^{\circ}$ F AND LOWER OUTSIDE AIR TEMPERATURE AND RESET PROPORTIONALLY TO  $55^{\circ}$ F AT  $55^{\circ}$ F AND HIGHER OUTSIDE AIR TEMPERATURE.

## UNOCCUPIED MODE

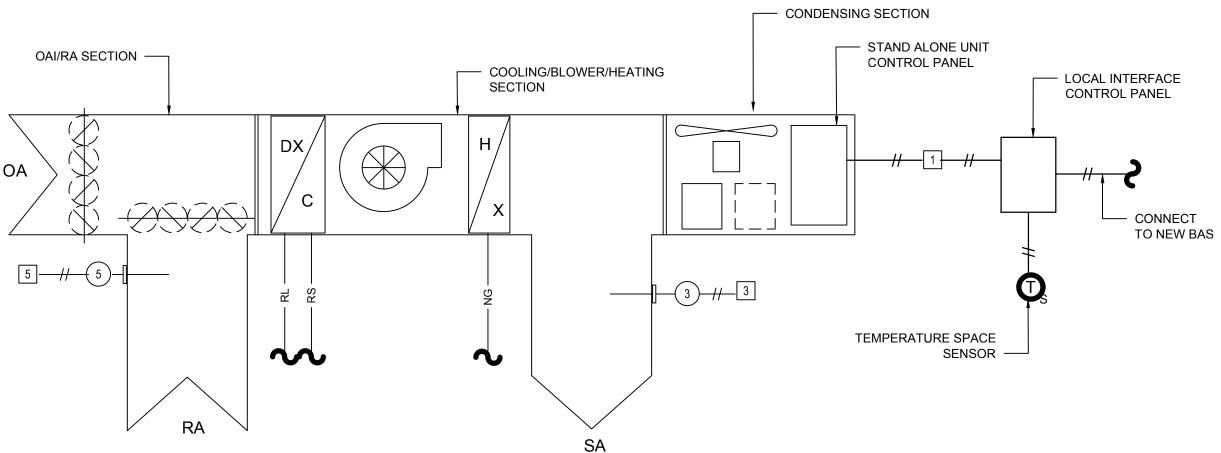
MAINTAIN THE SUPPLY AIR TEMPERATURE SET POINT.

THE SUPPLY FAN IS OFF AND THE MIXED AIR DAMPERS CLOSE TO THE OUTDOOR AIR.

SAFETY:

END SWITCHES. END SWITCHES INSTALLED ON DAMPERS SHALL ENSURE THE DAMPERS ARE FULLY OPENED BEFORE THE FANS ARE ALLOWED TO START

CURRENT SWITCHES. CURRENT SWITCHES ARE INSTALLED AT THE SUPPLY FAN. THE CONTROL SYSTEM USES THE SWITCH TO CONFIRM THE FAN IS IN THE DESIRED STATE AND GENERATES AN ALARM SIGNAL IF STATUS DEVIATES FROM THE START/STOP CONTROL





	PACKAGE	ROO	FTOF	P UNIT	SYST	EM
ITEM	DESCRIPTION	POINT TYPE	ADJ	ALARM	HOA POSITION	REMARKS
1	SUPPLY FAN START/STOP	во				
2	TEMPERATURE SETPOINT	Al				
3	SUPPLY AIR TEMPERATURE	AO				
4	STATIC PRESSURE SENSOR	Al		Х		
5	RETURN AIR TEMPERATURE	Al		Х		

# PACKAGED RTU (RTU-103) CONTROL DIAGRAM

#### ROOFTOP UNIT

ROOFTOP UNIT SHALL BE SCHEDULED FOR AUTOMATIC OPERATION WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 60 DEGREES (ADJUSTABLE) CONTRACTOR SHALL PROVIDE AN E-P SWITCH TO DISABLE THE EXSITNG PNEUMATIC SYSTEM AND THE HV UNITS SHALL BE TURNED OFF AND ALL DAMPERS CLOSED TO AIRFLOW. THE EXISITNG HEATING AND VENTILATING UNITS SHALL OPERATION IN THE HEATING MODE WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 60 DEG F.

ON A TIME OF DAY BASIS FOR OCCUPIED AND UNOCCUPIED MODES. WITHIN THE UNOCCUPIED MODE, THE SYSTEM CAN ENTER THE WARM-UP MODE WHEN THE SPACE TEMPERATURE IS BELOW SET POINT OR THE COOL-DOWN MODE WHEN THE SPACE TEMPERATURE IS ABOVE SET POINT. THE SYSTEM STAYS IN WARM-UP OR COOL-DOWN MODE UNTIL THE MODE SET POINT IS SATISFIED. ALL SYSTEM COMMUNICATIONS SHALL BE. THE CONTROLS SHALL BE DDC USING ELECTRIC ACTUATION AND PID CONTROL LOGIC. ALL CONTROL, MONITORING AND ALARM POINTS SHALL BE AVAILABLE AT CONTROL PANEL LOCATED IN THE JANITORS CLOSET.AND ALL SET POINTS AND SETTINGS ARE ADJUSTABLE.

#### OCCUPIED MODE

THE SUPPLY FAN SHALL START OR CONTINUE TO RUN, THE OUTSIDE AIR DAMPER IS MODULATED TO MAINTAIN VENTILATION SET POINT WHILE THE HEATING AND COOLING SECTIONS MODULATE WITHOUT OVERLAP TO MAINTAIN DISCHARGE AIR TEMPERATURE SET POINT. THE SUPPLY AIR FAN SPEED SHALL MODULATE TO MAINTAIN SUPPLY AIR DUCT STATIC PRESSURE SET POINT.

VENTILATION CONTROL. THE MINIMUM OUTSIDE AIR SHALL BE THE SET POINT ON THE AIR HANDLER UNIT SCHEDULE DURING OCCUPIED HOURS.

ECONOMIZER CONTROL. WHEN THE OUTDOOR AIR DRY BULB TEMPERATURE IS BELOW THE ECONOMIZER CHANGEOVER VALUE OF 60°F, THE HEATING SECTION AND THE MIXED AIR DAMPERS SHALL MODULATE IN SEQUENCE WITHOUT OVERLAP TO MAINTAIN THE SUPPLY AIR TEMPERATURE SET POINT WITH A LOW LIMIT OF 42°F AT THE MIXED AIR SENSOR. THE MIXING DAMPERS SHALL RAMP OPEN SLOWLY TO AVOID OVERSHOOTING. WHEN THE OUTSIDE DRY BULB TEMPERATURE IS ABOVE THE ECONOMIZER CHANGEOVER VALUE, THE MIXING DAMPERS ARE PLACED, IN MINIMUM OUTDOOR AIR POSITION AS DETERMINED BY THE VENTILATION SET POINT AND THE COOLING SECTION MODULATES TO

SUPPLY AIR TEMPERATURE RESET. THE SUPPLY AIR TEMPERATURE SET POINT SHALL BE RESET BASED ON OUTSIDE AIR TEMPERATURE. THE SUPPLY AIR TEMPERATURE SET POINT SHALL BE 60°F AT 45°F AND LOWER OUTSIDE AIR TEMPERATURE AND RESET PROPORTIONALLY TO 55°F AT 55°F AND HIGHER OUTSIDE AIR TEMPERATURE.

## <u>UNOCCUPIED MODE</u> THE SUPPLY FAN IS OFF AND THE MIXED AIR DAMPERS CLOSE TO THE OUTDOOR AIR.

MAINTAIN THE SUPPLY AIR TEMPERATURE SET POINT.

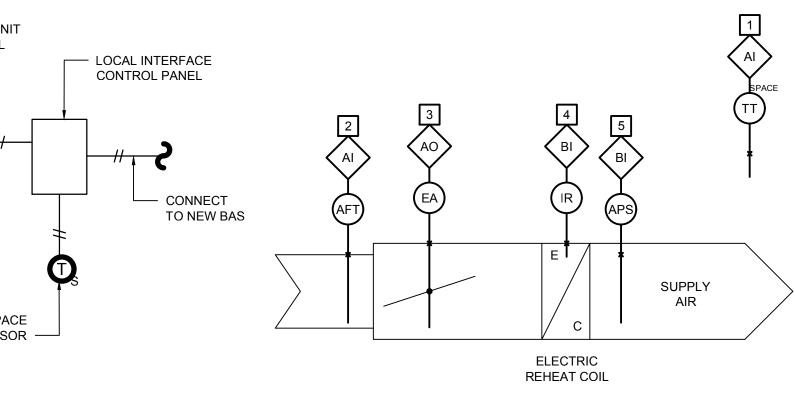
## SAFETY:

SAFETY:

SMOKE DETECTORS. SMOKE DETECTORS INSTALLED IN THE RETURN AIR STREAMS SHALL DE-ENERGIZE THE SUPPLY FAN UPON ACTIVATION. ALL DAMPERS AND VALVES SHALL RETURN TO THEIR NORMAL POSITIONS AFTER THE FAN IS COMPLETELY DE-ENERGIZED.

END SWITCHES. END SWITCHES INSTALLED ON DAMPERS SHALL ENSURE THE DAMPERS ARE FULLY OPENED BEFORE THE FANS ARE ALLOWED TO START.

CURRENT SWITCHES. CURRENT SWITCHES ARE INSTALLED AT THE SUPPLY FAN. THE CONTROL SYSTEM USES THE SWITCH TO CONFIRM THE FAN IS IN THE DESIRED STATE AND GENERATES AN ALARM SIGNAL IF STATUS DEVIATES FROM THE START/STOP CONTROL



# 1 VAV BOX WITH REHEAT CONTROL DIAGRAM TERMINAL UNIT SCALE: NONE

#### SINGLE DUCT TERMINAL UNIT WITH ELECTRIC REHEAT (VAV)

THE SINGLE DUCT VARIABLE AIR VOLUME TERMINAL UNIT W/ REHEAT IS CONTROLLED INDEPENDENT OF SYSTEM PRESSURE FLUCTUATIONS BY AN APPLICATION SPECIFIC DDC CONTROLLER USING ELECTRIC ACTUATION. THE SPACE SERVED BY THE VAV TERMINAL UNIT IS CONTROLLED IN OCCUPIED AND UNOCCUPIED MODES AS FOLLOWS:

OCCUPIED: THE VAV TERMINAL UNIT IS CONTROLLED WITHIN USER DEFINED MAXIMUM AND MINIMUM SUPPLY AIR VOLUME SETTINGS. THE CONTROLLER MONITORS THE ROOM TEMPERATURE SENSOR AND AIR VELOCITY SENSOR AND MODULATES THE SUPPLY AIR DAMPER BETWEEN THE MINIMUM AND MAXIMUM CFM SETTINGS TO MAINTAIN THE ROOM TEMPERATURE AT SET POINT. AS THE ROOM TEMPERATURE DECREASES, THE CONTROLLER CLOSES THE DAMPER UNTIL IT REACHES MINIMUM POSITION. UPON FURTHER DECREASE IN ROOM TEMPERATURE, THE ELECTRIC HEATING CONTROL COIL OPENS TO MAINTAIN TEMPERATURE SET POINT.

IF THE SPACE IS UNOCCUPIED DURING NORMAL BUILDING OCCUPIED HOURS AS DETERMINED BY THE SPACE OCCUPANCY SENSOR THEN THE PRIMARY AIR SETTING IS ZERO. IF THE SPACE TEMPERATURE SET POINT IS MET, THEN THE DAMPER IS ALLOWED TO CLOSE. SPACE TEMPERATURE SET POINT DURING THIS MODE SHALL BE ADJUSTABLE WITH AN INITIAL DEFAULT VALUE EQUAL TO THE NORMAL OCCUPIED MODE SET POINT +/- 3°F. REFER TO HVAC EQUIPMENT SCHEDULE FOR ZONES TO HAVE OCCUPANCY SENSOR SET BACK.

UNOCCUPIED: THE VAV TERMINAL UNIT IS CONTROLLED USING THE NIGHT SET POINT TEMPERATURE. THE CONTROLLER MAY RESET TO THE OCCUPIED MODE FOR A PREDETERMINED TIME PERIOD UPON A SIGNAL FROM THE CONTROL SYSTEM OR MANUALLY AT THE ROOM SENSOR.

NIGHT HEATING: THE VAV DAMPER IS MODULATED TO ITS MAXIMUM AIR FLOW VALUE AND THE ELECTRIC REHEAT CONTROL IS CLOSED. ONCE ZONE SPACE TEMPERATURE SET POINT IS SATISFIED THE PRIMARY AIR DAMPER IS ALLOWED TO MODULATE CLOSED.

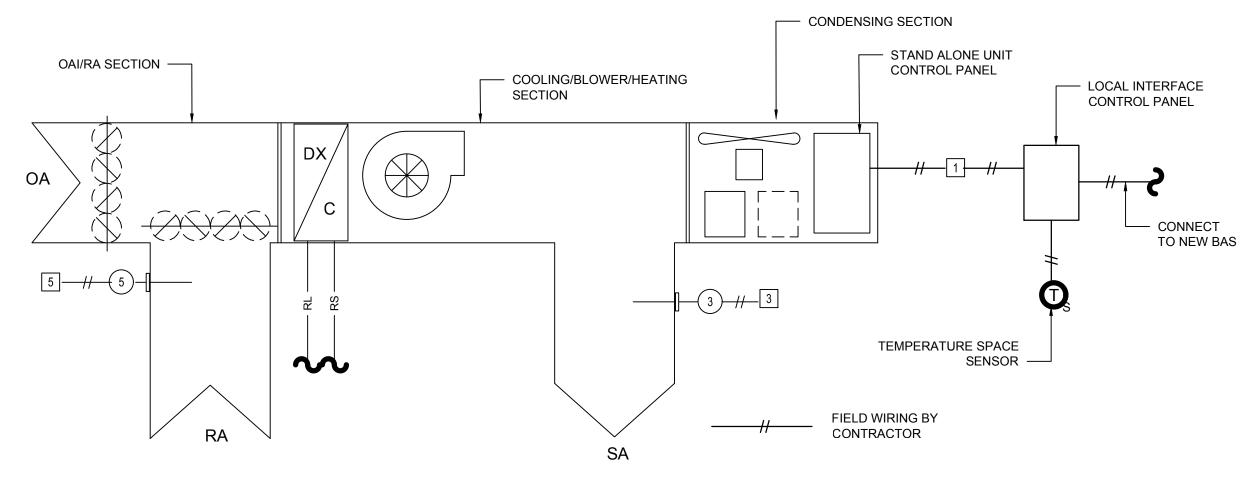
NIGHT COOLING: THE VAV DAMPER IS MODULATED TO MAXIMUM AIR FLOW VALUE TO PROVIDE COOL AIR TO THE SPACE AND THE ELECTRIC REHEAT CONTROL IS CLOSED. ONCE ZONE SPACE TEMPERATURE SET POINT IS SATISFIED THE PRIMARY AIR DAMPER IS ALLOWED TO MODULATE

WARM-UP MODE: THE VAV TERMINAL IS MODULATED TO MAXIMUM AIR FLOW VALUE TO PROVIDE WARM AIR TO THE SPACE AND THE ELECTRIC REHEAT CONTROL IS CLOSED. ONCE ZONE SPACE TEMPERATURE SET POINT IS SATISFIED THE VAV DAMPER IS ALLOWED TO MODULATE CLOSED. IF THE TIME REACHES THE LATEST START TIME DURING THE WARM-UP MODE, THE TERMINAL UNIT GOES TO ITS NORMAL OCCUPIED MODE OF OPERATION.

COOL-DOWN MODE: THE VAV DAMPER IS MODULATED TO MAXIMUM AIR FLOW VALUE TO PROVIDE COOL AIR TO THE SPACE AND THE ELECTRIC REHEAT CONTROL IS CLOSED. ONCE ZONE SPACE TEMPERATURE SET POINT IS SATISFIED THE VAV DAMPER IS ALLOWED TO MODULATE CLOSED. IF THE TIME REACHES THE LATEST START TIME DURING THE COOL-DOWN MODE, THE TERMINAL UNIT GOES TO ITS NORMAL OCCUPIED MODE OF OPERATION.

NOTE: ALL SET POINTS AND SETTINGS ARE ADJUSTABLE. ALL CONTROL AND MONITORING POINTS SHALL BE AVAILABLE AT BAS OPERATOR WORKSTATION.

	VAV BOX WITH REHEA	AT C	ON	ΓRO	LP	STAIC
TAG	DESCRIPTION	AI	AO	BI	во	UNITS
1	SPACE TEMPERATURE	Х				°F
2	SUPPLY AIR FLOW MEASURING STATION	Х				CFM
3	TERMINAL UNIT DAMPER		Х			%OPEN
4	ELECTRIC REHEAT COIL STATUS			Х		ON / OFF
5	AIRFLOW PROVING SWITCH			Х		NORMAL / ALARM



	PACKAGE	ROO	FTOF	P UNIT	SYST	EM
ITEM	DESCRIPTION	POINT TYPE	ADJ	ALARM	HOA POSITION	REMARKS
1	SUPPLY FAN START/STOP	ВО				
2	TEMPERATURE SETPOINT	Al				
3	SUPPLY AIR TEMPERATURE	AO				
4	RETURN AIR TEMPERATURE	Al		Х		
4	RETURN AIR TEMPERATURE	Al		Х		

# PACKAGED RTU (RTU-105) CONTROL DIAGRAM 5 NOT TO SCALE

## ROOFTOP UNIT 105 GYMNASIUM

ROOFTOP UNIT SHALL BE SCHEDULED FOR AUTOMATIC OPERATION WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 60 DEGREES (ADJUSTABLE) CONTRACTOR SHALL PROVIDE AN E-P SWITCH TO DISABLE THE EXSITNG PNEUMATIC SYSTEM FOR UNITS HV 3,4,5,6,9,10 AND THE HV UNITS SHALL BE TURNED OFF AND ALL DAMPERS CLOSED TO AIRFLOW. THE EXISITNG HEATING AND VENTILATING UNITS SHALL OPERATION IN THE HEATING MODE WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 60 DEG F.

THE SUPPLY FAN SHALL START OR CONTINUE TO RUN, THE OUTSIDE AIR DAMPER IS MODULATED TO MAINTAIN VENTILATION SET POINT WHILE THE HEATING AND COOLING SECTIONS MODULATE WITHOUT OVERLAP TO MAINTAIN DISCHARGE AIR TEMPERATURE SET POINT. THE SUPPLY AIR FAN SPEED SHALL MODULATE TO MAINTAIN SUPPLY AIR DUICT STATIC PRESSURE SET POINT.

SPEED SHALL MODULATE TO MAINTAIN SUPPLY AIR DUCT STATIC PRESSURE SET POINT.

VENTILATION CONTROL. THE MINIMUM OUTSIDE AIR SHALL BE THE SET POINT ON THE AIR HANDLER UNIT SCHEDULE DURING OCCUPIED HOURS.

ECONOMIZER CONTROL. WHEN THE OUTDOOR AIR DRY BULB TEMPERATURE IS BELOW THE ECONOMIZER CHANGEOVER VALUE OF 60°F, THE THE MIXED AIR DAMPERS SHALL MODULATE IN SEQUENCE WITHOUT OVERLAP TO MAINTAIN THE SUPPLY AIR TEMPERATURE SET POINT WITH A LOW LIMIT OF 42°F AT THE MIXED AIR SENSOR. THE MIXING DAMPERS SHALL RAMP OPEN SLOWLY TO AVOID OVERSHOOTING. WHEN THE OUTSIDE DRY BULB TEMPERATURE IS ABOVE THE ECONOMIZER CHANGEOVER VALUE, THE MIXING DAMPERS ARE PLACED, IN MINIMUM OUTDOOR AIR POSITION AS DETERMINED BY THE VENTILATION SET POINT AND THE COOLING SECTION MODULATES TO MAINTAIN THE SUPPLY AIR TEMPERATURE SET POINT.

SUPPLY AIR TEMPERATURE RESET. THE SUPPLY AIR TEMPERATURE SET POINT SHALL BE RESET BASED ON OUTSIDE AIR TEMPERATURE. THE SUPPLY AIR TEMPERATURE SET POINT SHALL BE  $\underline{60^{\circ}F}$  AT  $\underline{45^{\circ}F}$  AND LOWER OUTSIDE AIR TEMPERATURE AND RESET PROPORTIONALLY TO  $\underline{55^{\circ}F}$  AT  $\underline{55^{\circ}F}$  AND HIGHER OUTSIDE AIR TEMPERATURE.

## UNOCCUPIED MODE

THE SUPPLY FAN IS OFF AND THE MIXED AIR DAMPERS CLOSE TO THE OUTDOOR AIR.

SMOKE DETECTORS. SMOKE DETECTORS FURNISHED BY THE FIRE ALARM CONTRACTOR (INSTALLED BY MC) IN THE RETURN AIR STREAMS SHALL DE-ENERGIZE THE SUPPLY FAN UPON ACTIVATION. ALL DAMPERS AND VALVES SHALL RETURN TO THEIR NORMAL POSITIONS AFTER THE FAN IS COMPLETELY DE-ENERGIZED.

END SWITCHES. END SWITCHES INSTALLED ON DAMPERS SHALL ENSURE THE DAMPERS ARE FULLY OPENED BEFORE THE FANS ARE ALLOWED TO START.

CURRENT SWITCHES. CURRENT SWITCHES ARE INSTALLED AT THE SUPPLY FAN. THE CONTROL SYSTEM USES THE SWITCH TO CONFIRM THE FAN IS IN THE DESIRED STATE AND GENERATES AN ALARM SIGNAL IF STATUS DEVIATES FROM THE START/STOP CONTROL

WAYNE STATE



MATTHAEI CENTER ADDITION OF AIR CONDITIONING

WAYNE STATE UNIVERSITY

DETROIT, MI 48208

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CHECKED BY DVI
CLIENT PROJ NO.
OSBORN PROJ NO.J20220270.00

HVAC CONTROL

HVAC CONTROL DIAGRAMS

DRAWING NO.

200

460 / 3 | 143.8 | 150 | 9610

460 / 3 | 58.3 | 80 | 4000

460 / 3 | 58.3 | 80 | 4000

| MODULATING | 460 / 3 | 20.8 | 25 | 1500

DAIKIN RDT063D

DAIKIN DPS025A

DAIKIN DPS025A

DAIKEN DRG090

1-10

1-10,11

1-10,11

1-10

**OSBORN** 

MATTHAEI

CENTER

ADDITION OF AIR

CONDITIONING

**WAYNE STATE** 

UNIVERSITY

DETROIT, MI 48208

FOR BIDDING

1. PROVIDE UNIT WITH 100% COMPARATIVE DRYBULB ECONOMIZER, MAXIMUM TEMERATURE OF 65 DEGREES F.

1,000 CONSTANT

CONSTANT

CONSTANT

CONSTANT

DOAS

1,000

1,500

2. PROVIDE UNIT HAIL GUARD

GENERAL

10 HV-1 12.4

10 HV-2 12.4

15 AC-0802,3 11.1

15 | HV-8 | 11.1 | 1,500

60 | HV-3,4,5,6 | 10.4 | 5,500

25 | HV-11 | 11.3 | 5,500

25 HV-12 11.3 5,500

7.5 AC-8001 12.2 3000 CONSTANT

3. PROVIDE ROOF CURB WITH 16" HEIGHT ABOVE ROOF.

NOMINAL SERVES EER OA CFM UNIT TYPE QTY

- 4. FACTORY NON-FUSED DISCONNECT. 5. 2" MERV 8 PREFILTER.
- 6. CLOGGED FILTER SWITCH.
- 7. 115V GFI OUTLET.
- 8. DOUBLE WALL CONSTRUCTION.
- BACNET CARD
- 10. PHASE FAILURE AND GROUND FAULT.
- 11. PROVIDE UNIT WITH HOT GAS REHEAT COIL. 12. PROVIDE FACTORY INSTALLED VFD

									VRF OU	TDOOR UNIT	SCHEDULE										
					GE1	NERAL				COOLING	G DATA	HEATING	G DATA		ELEC	TRICAL DATA					
MARK	TYPE	NOMINAL TONS	REFRIGERANT TYPE	СОМ	IPRESSOR DATA	REFRIGER	ANT PIPING	EFFICIENCY	AMBIENT TEMP (°F)	CAPACITY @ AMBIENT	TOTAL CONNECTED	CAPACITY @ AMBIENT		CONNECTED INDOOR UNITS	V / DU / UZ		моср	OPER. WEIGHT (LB)	MANUFACTURER	MODEL	REMARKS
	ITPE	NOMINAL TONS	REFRIGERANT TIPE	QTY	TYPE	MAX LENGTH (FT)	MAX VERTICAL LENGTH (FT)	EER / IEER / COP@17F (ALL NON DUCTED)	COOLING ( DB°F) / HEATING ( DB°F)	(MBH)	(MBH) / %	(MBH)	(MBH) / %		V / PH / HZ	(AMPS)	AMPS)	,			
CU-101	HEAT PUMP	14 - TONS	R410A	1	INVERTER	540	295	10.6/22.6/2.34	95 / 32	133	168 / 107.7	176	189 / 107.4	AC-1 THRU 14	460 / 3 / 60	25.9	35	794	DAIKIN	REYQ168TYDN	ALL

MODULATING

MODULATING

MODULATING

2

MODULATING

- BACNET DEVICE DCM601A71
- 2. DCM601A71 INTELLIGENT TOUCH MANAGER, COORDINATE LOCATION WITH OWNER.
- MANUFACTURER MUST BE CERTIFIED, LISTED, AND LABELED PER AHRI 1230.
- 4. CONDENSING UNITS MUST HAVE FULLY MODULATING COMPRESSORS.
- 5. CONDENSING UNITS MUST HAVE AUTO CHANGEOVER FUNCTIONS.
- 6. EEV ACTUATORS MUST BE REMOVABLE FROM VALVE BODY WITHOUT DISTURBING THE REFRIGERANT SYSTEM.
- 7. MANUFACTURERS SUBMITTAL MUST INCLUDE REFRIGERANT PIPING DIAGRAM WITH PIPE DIAMETERS, LENGTHS, AND REFRIGERANT VOLUME.

SUPPLY FAN DATA

3,750 1.5

6,000

22,000

2.00

1.5

1.5

500 1.0

1.5 8

TOTAL ESP, MOTOR DISCHARGE REFRIGERANT CFM IN. W.G. HP POSITION TYPE

DOWN

DOWN

DOWN

DOWN

DOWN

R410A

95 / 75 | 80 / 67 | 55.8 / 55.0 | 580.72 | 698.33 | 4

95 / 75 | 95 / 75 | 56.5/56.5 | 318.2 | 219.3 | 2

95 / 75 | 95 / 75 | 56.5/56.5 | 318.2 | 219.3 | 2

95 / 75 | 80 / 67 | 59.8 / 57.6 | 90.0 | 66.9 | 2

8

8. REFNET BRANCH PIPING KIT.

					VRI	F INDOOR	UNIT SC	HEC	ULE							
		GENERAL			COOLIN	IG DATA	HEAT	ING DAT	A	ELEC	TRICAL DA	ATA				
MARK	ASSOCIATED	TVDE	FAN	N DATA	TOTAL CAPACITY	SENSIBLE	CAPACITY	AU	X. HEAT	V / DU / UZ	MCA	МОСР	OPER. WEIGHT (LB)	MANUFACTURER	MODEL	REMARKS
	OUTDOOR UNIT	TYPE	FLOW (CFM)	MAX ESP ("wg)	(MBH)	CAPACITY (MBH)	(MBH)	kW	MODEL	V / PH / HZ	(AMPS)	(AMPS)	()			
AC-1	CU-101	WALL MOUNT	180	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	15	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4
AC-2	CU-101	WALL MOUNT	181	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	16	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4
AC-3	CU-101	WALL MOUNT	182	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	17	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4
AC-4	CU-101	WALL MOUNT	183	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	18	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4
AC-5	CU-101	WALL MOUNT	184	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	19	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4
AC-6	CU-101	WALL MOUNT	185	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	20	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4
AC-7	CU-101	WALL MOUNT	186	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	21	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4
AC-8	CU-101	WALL MOUNT	187	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	22	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4
AC-9	CU-101	WALL MOUNT	188	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	23	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4
AC-10	CU-101	WALL MOUNT	189	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	24	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4
AC-11	CU-101	WALL MOUNT	190	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	25	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4
AC-12	CU-101	WALL MOUNT	191	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	26	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4
AC-13	CU-101	WALL MOUNT	192	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	27	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4
AC-14	CU-101	WALL MOUNT	193	-	12.0	8.9	13.5	-	-	208 / 1 / 60	0.4	28	26	DAIKIN	FXAQ12PVJU	1, 2, 3, 4

- 1. UNITS REQUIRE SEPARATE POWER SUPPLY, THEY ARE NOT POWERED BY CU.
- 2. DISCONNECT BY EC. PROVIDE WITH LONG LIFE FILTER AND BRC1E73 NAVIGATOR REMOTE CONTROL
- 3. PROVIDE CONDENSATE PUMP EQUAL TO LITTLE GIANT VCMA-20ULS, 115 VOLT/60HZ, 1.5 AMPS, 20' SHUT-OFF HEAD, OVERFLOW DETECTION SWITCH, MC TO PROVIDE %" I.D. VINYL DISCHARGE TUBING ROUTED TO CONDENSATE DRAIN LINE-SEE PLAN.
- 4. MC TO PROVIDE 3/8" I.D. VINYL DISCHARGE TUBING ROUTED TO CONDENSATE DRAIN LINE-SEE PLAN.

MARK S	SERVE	COOLING	HEATING				AXIMUM UEATING ELECTRIC REHEAT COIL						
		CFM	CFM	INLET SIZE	KW	EAT °F	LAT °F	V/PH/HZ	MCA	МОР	UNIT SELECTION BASED ON:	NOTES:	
VAV-1	OFFICE	1375	450	12	2	55	69.0	208/1/60	12.0	15	TITUS DESV	1, 2, 3, 4, 5	
VAV-2	OFFICE	1025	300	10	2	55	71.0	208/3/60	5.2	15	TITUS DESV	1, 2, 3, 4, 5	
VAV-3 F	FITNESS	3600	1200	24X16	6	55	71.0	208/3/60	20.8	25	TITUS DESV	1, 2, 3, 4, 5	
NOTES:													
7 1		SINGLE-DUCT ON WITH, AND							ROOM THE	ERMOSTAT	AND CONTROLS NECESSARY FOR		

4. PROVIDE SCR CONTROL ON HEATING COIL. PROVIDE 24 V TRANSFORMER FOR CONTROLS.

5. PROVIDE DOOR INTERLOCK DISCONNECT SWITCH AND FUSE BLOCK. COORDINATE FUSING WITH ELECTRICAL CONTRACTOR.

MARK	TYPE	FRAME TYPE	DAMPER TYPE	NOMINAL SIZE IN.	UNIT SELECTION BASED ON:	NOTES					
CD-1	SUPPLY DIFFUSER	LAY-IN	NONE	24x24	PRICE SPD	1, 3, 4, 5					
DL-1	DRUM	SURFACE-MOUNT	NONE	SEE PLANS	PRICE	2, 3, 4					
RG-1	RETURN GRILLE	SURFACE-MOUNT	NONE	SEE PLANS	PRICE 630						
RG-2	RETURN GRILLE	SURFACE-MOUNT	NONE	SEE PLANS	PRICE 530						
NOTES:											
	DIFFUSERS SHALL BE WHITE WITH STEEL CONSTRUCTION. FACE SIZE IS 24x24, UNLESS OTHERWISE NOTED. SEE PLANS FOR NECK SIZE. BRANCH RUNOUT TO BE SAME SIZE AS DIFFUSER CONNECTION, UNLESS OTHERWISE NOTED.										
1.						LANS FOR					
2.	NECK SIZE. BRANCH	RUNOUT TO BE SAM	E SIZE AS DIFFUSER C	ONNECTION, UNLE							
	NECK SIZE. BRANCH	RUNOUT TO BE SAM E WITH STEEL BORDI	E SIZE AS DIFFUSER C ER AND CORE. SEE PL	ONNECTION, UNLE	ESS OTHERWISE NOTED.						
	NECK SIZE. BRANCH GRILLES TO BE WHIT ALL DAMPERS TO BE	RUNOUT TO BE SAM E WITH STEEL BORDI COMPATIBLE WITH S	E SIZE AS DIFFUSER C ER AND CORE. SEE PL SPECIFIED AIR DEVICE.	ONNECTION, UNLE	ESS OTHERWISE NOTED.	ZE.					
3.	NECK SIZE. BRANCH GRILLES TO BE WHIT ALL DAMPERS TO BE FRAME TYPE TO BE C DRAWINGS.	RUNOUT TO BE SAM E WITH STEEL BORDI COMPATIBLE WITH S COMPATIBLE WITH CE	E SIZE AS DIFFUSER C ER AND CORE. SEE PL SPECIFIED AIR DEVICE. EILING TYPE, WHERE AI	ONNECTION, UNLE	ESS OTHERWISE NOTED.  DINNECTION AND DUCT BRANCH SIZE	ZE.					

	FAN SCHEDULE											
	REFERENCE				ESP, IN.		MOTOR DATA		UNIT SELECTION BASED ON:	NOTES		
MARK	DRAWING	SERVICE	TYPE	CFM	W.G.	DRIVE	MIN. MOTOR HP	VOLTAGE/PH				
RF-10	M-1.1	HV-10	MIXED FLOW	9400	1.8	BELT	5	480-3	GREENHECK-QEI-24	1		
NOTES:					•							
1.	PROVIDE DISCO	ONNECT										

HVAC SCHEDULES

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	ELECTRICAL SYMBOL LEGEND
SYMBOL	DESCRIPTION
HALF TONE LINE (40%)	DENOTES BACKGROUND.
THIN SOLID LINES	DENOTES DEVICES, EQUIPMENT, ETC. EXISTING TO REMAIN (E).
HEAVY SOLID LINES	DENOTES NEW (N) OR RELOCATED (R) DEVICES, EQUIPMENT, ETC.
DASHED LINES	DENOTES DEVICES, EQUIPMENT, ETC. TO BE DISCONNECTED AND REMOVED (D&R).
HEAVY PHANTOM LINES	DENOTES NEW (N) OR RELOCATED (R) CONDUIT, EQUIPMENT, ETC. UNDERGROUNG OR BELOW GRADE.
HALF TONE LINE (60%)	DENOTES POWERED EQUIPMENT FURNISHED OR PROVIDED BY OTHER DIVISIONS OR OWNER.
<b>-∘ -•</b>	BRANCH CIRCUIT TURNING UP. BRANCH CIRCUIT TURNING DOWN. BRANCH CIRCUIT TURNING UP & DOWN.
UE	UNDERGROUND, UNDER FLOOR/SLAB DUCTBANK, DIRECT BURIED CABLE, CONDUIT/CONDUCTOR: UE=ELECTRICAL UT=TELECOM
HOT — GROUND NEUTRAL #	HOME RUN. HASH MARKS INDICATE CONDUCTOR QUANTITY. HASH MARKS DEFINED AS SHOWN. "#" INDICATES SIZE OF CONDUCTORS OTHER THAN #12 AWG. ALL UNMARKED HOMERUNS SHALL CONTAIN (2)#12 AWG & (1) #12 AWG GND IN 3/4" CONDUIT, UNLESS OTHERWISE NOTED.
ZZZ / #,#,#	BRANCH CIRCUITING. "ZZZ" INDICATES PANEL DESIGNATION. "#,#,#" INDICATES CIRCUIT NUMBER(S).
ZZZ / #,#,#	ROOM CIRCUIT TAG. ALL FIXTURES/DEVICES IN ROOM/SPACE TO BE CIRCUITED TO PANEL "ZZZ" / CIRCUIT NUMBER(S) "#,#,#" AS INDICATED, UNLESS OTHERWISE NOTED.

	POWER & EQUIPMENT SYMBOL LEGEND										
SYMBOL	DESCRIPTION										
	480Y/277 VOLT, 3-PHASE, 4-WIRE ELECTRICAL DISTRIBUTION TYPE PANELBOARD.										
	208Y/120 VOLT, 3-PHASE, 4-WIRE ELECTRICAL DISTRIBUTION TYPE PANELBOARD.										
	480Y/277 VOLT, 3-PHASE, 4-WIRE, SURFACE MOUNTED ELECTRICAL PANELBOARD.										
	208Y/120 VOLT, 3-PHASE, 4-WIRE, SURFACE MOUNTED ELECTRICAL PANELBOARD.										
	DRY-TYPE DISTRIBUTION TRANSFORMER.										
<b>\$</b> m	FRACTIONAL HORSEPOWER MOTOR STARTER - 120 VOLT, 20 AMP, 1 POLE, PILOT LIGHT, UNLESS OTHERWINOTED.										
ASWP	NON-FUSED DISCONNECT SWITCH. "X" INDICATES SWITCH SIZE. "WP" INDICATES WEATHERPROOF (NEMA 3 ENCLOSURE										
AF AS WP	FUSED DISCONNECT SWITCH. "AF" INDICATES FUSE SIZE. "AS" INDICATES SWITCH SIZE. "WP" INDICAT WEATHERPROOF (NEMA 3R) ENCLOSURE										

	ONE LINE DIA ODA	4 0 / 4 P O L L E O E N P	
SYMBOL	ONE-LINE DIAGRAM  DESCRIPTION	SYMBOL LEGEND	DESCRIPTION
HEAVY SOLID LINES	DENOTES NEW (N) OR RELOCATED (R) BUSSING, FEEDER, ETC.	G	
00	AUTOMATIC TRANSFER SWITCH. NUMBER OF POLES AND AMPERAGE RATING AS NOTED OR SCHEDULED.	N N	NEUTRAL BUS TO GROUND BUS BONDING.
	DRY TYPE TRANSFORMER. kVA, PHASE, PRIMARY AND SECONDARY RATING AS NOTED OR SCHEDULED.	<del> </del>	
<u> </u>	NOTED ON CONTEDUED.	FUSE #	MEDIUM VOLTAGE FUSE. SIZE AS NOTED.
NAME	PANELBOARD. DESIGNATION AS NOTED. SEE PANELBOARD SCHEDULES FOR ADDITIONAL INFORMATION.	-	CURRENT TRANSFORMER. SIZE AS REQUIRED.
TRIP	MOLDED CASE CIRCUIT BREAKER. FRAME	Ĭ	WYE CONNECTED WIRING.
FRAME	AND TRIP SIZES AS NOTED.	SPACE	SPACE IN CIRCUIT BREAKER OR FUSED SWITCH DISTRIBUTION PANELBOARD. FRAME SIZE AS NOTED.
TRIP FRAME ST	MOLDED CASE CIRCUIT BREAKER WITH SHUNT TRIP OPERATOR. FRAME AND TRIP SIZES AS NOTED.	Δ	DELTA CONNECTED WIRING.
SWITCH SWITCH	LOW VOLTAGE FUSED DISCONNECT SWITCH. FUSE AND DISCONNECT SWITCH	SPD	SURGE SUPPRESSION DEVICE.
FUSE P	SIZES AS NOTED.	GFP	GROUND FAULT PROTECTION.
SWITCH	LOW VOLTAGE NON-FUSED DISCONNECT SWITCH. DISCONNECT SWITCH SIZE AS NOTED.	М	METERING.
FUSE	LOW VOLTAGE FUSE. SIZE AS NOTED.		

SYMBOL	DESCRIPTION
STWIBOL	
φ +"H" ZZ/##	SINGLE RECEPTACLE, 20 AMPERE, 125 VOLT, 2 POLE, 3 WIRE GROUNDING TYPE, NEMA 5-20R, MOUNTED 18"A.I UNLESS OTHERWISE NOTED. "+H" INDICATES MOUNTING HEIGHT OTHER THAN 18". "ZZ / ##" INDICATES BRAN CIRCUITING.
<b>ዋ</b> <sup>+"H"</sup>	DUPLEX RECEPTACLE, 20 AMPERE, 125 VOLT, 2 POLE, 3 WIRE GROUNDING TYPE, NEMA 5-20R, MOUNTED 18"A.I UNLESS OTHERWISE NOTED. REFER TO ABOVE FOR MOUNTING HEIGHT AND CIRCUITING INFORMATION.
<b>┿</b> +"H" ZZ/##	DOUBLE DUPLEX (QUAD) RECEPTACLE, 20 AMPERE, 125 VOLT, 2 POLE, 3 WIRE GROUNDING TYPE, NEMA 5-2 MOUNTED 18"A.F.F. UNLESS OTHERWISE NOTED. REFER TO ABOVE FOR MOUNTING HEIGHT AND CIRCUITI INFORMATION.
G <b>⊕</b> +"H" ZZ/##	GROUND FAULT INTERRUPTER TYPE DUPLEX RECEPTACLE, 20 AMPERE, 125 VOLT, 2 POLE, 3 WIRE GROUNDI TYPE, NEMA 5-20R, MOUNTED 18"A.F.F. UNLESS OTHERWISE NOTED. REFER TO ABOVE FOR MOUNTING HEIGHT A CIRCUITING INFORMATION.
x <b>Φ</b> <sup>+"H"</sup> zz/##	SPECIAL PURPOSE RECEPTACLE. REFER TO ABOVE FOR MOUNTING HEIGHT AND CIRCUITING INFORMATION. "X" INDICATES THE FOLLOWING:
	A 125 VOLT, 2 POLE, 3 WIRE, 30 AMP (NEMA 5-30R) B 125 VOLT, 2 POLE, 3 WIRE, 50 AMP (NEMA 5-50R) C 250 VOLT, 2 POLE, 3 WIRE, 15 AMP (NEMA 6-15R) D 250 VOLT, 2 POLE, 3 WIRE, 20 AMP (NEMA 6-20R) E 250 VOLT, 2 POLE, 3 WIRE, 30 AMP (NEMA 6-30R) F 250 VOLT, 2 POLE, 3 WIRE, 50 AMP (NEMA 6-50R) G 125/250 VOLT, 3 POLE, 4 WIRE, 15 AMP (NEMA 14-15R) H 125/250 VOLT, 3 POLE, 4 WIRE, 20 AMP (NEMA 14-20R) J 125/250 VOLT, 3 POLE, 4 WIRE, 30 AMP (NEMA 14-30R) K 125/250 VOLT, 3 POLE, 4 WIRE, 50 AMP (NEMA 14-50R) L 125/250 VOLT, 3 POLE, 4 WIRE, 60 AMP (NEMA 14-60R) M 250 VOLT, 3 POLE, 4 WIRE, 15 AMP (NEMA 15-15R) N 250 VOLT, 3 POLE, 4 WIRE, 20 AMP (NEMA 15-30R) Q 250 VOLT, 3 POLE, 4 WIRE, 30 AMP (NEMA 15-30R) Q 250 VOLT, 3 POLE, 4 WIRE, 50 AMP (NEMA 15-50R) R 250 VOLT, 3 POLE, 4 WIRE, 50 AMP (NEMA 15-50R) R 250 VOLT, 3 POLE, 4 WIRE, 50 AMP (NEMA 15-50R) R 250 VOLT, 3 POLE, 4 WIRE, 60 AMP (NEMA 15-60R)
<b>T</b> ZZ/## <b>T</b>	CEILING MOUNTED DUPLEX OR DOUBLE DUPLEX (QUAD) RECEPTACLE, 20 AMPERE, 125 VOLT, 2 POLE, 3 W
A A	GROUNDING TYPE, NEMA 5-20R. REFER TO ABOVE FOR MOUNTING HEIGHT AND CIRCUITING INFORMATION.
	RECEPTACLES WITH ADDITIONAL SUBSCRIPT DESIGNATES TYPE OR SPECIFIC REQUIREMENTS AS FOLLOWS:
	G GROUND FAULT CIRCUIT INTERRUPTER TYPE E EMERGENCY RED IN COLOR H HOSPITAL GRADE TYPE IG ISOLATED GROUND TR TAMPER RESISTANT TYPE WP WEATHERPROOF "WHILE-IN-USE" (HUBBELL #WP26E) COVER
<u> </u>	JUNCTION BOX (SIZED AS REQUIRED PER N.E.C. ARTICLE 314).
РВ / ТВ	PULL BOX OR TAP BOX (SIZED AS REQUIRED PER N.E.C. ARTICLE 314).
$\nabla$	TELECOM ROUGH-IN. REFER TO DETAILS FOR ADDITIONAL INFORMATION.
$\nabla_{\!$	AUDIO/VIDEO ROUGH-IN. REFER TO DETAILS FOR ADDITIONAL INFORMATION.
$ abla_{ m CR}$	SECURITY ROUGH-IN. REFER TO DETAILS E5.01 FOR ADDITIONAL INFORMATION.
Ô	PUSHBUTTON STATION. "X" INDICATES THE FOLLOWING:  DO AUTOMATIC DOOR OPERATOR.  EPO EMERGENCY POWER OFF.
▼	DATA/VOICE OUTLET BOX AT 18" AFF, UON. FURNISH WITH (2) 8 PIN RJ-45 CONNECTOR FACEPLATE AND 3-4 PAIR # CAT. 6 CABLES (PLENUM RATED), PROPERLY SUPPORTED WITH J-HOOKS, ROUTED BACK TO DATA/COMMUNICATIONS RACK. TERMINATE CABLES AT BOTH ENDS AS REQUIRED.
FACP	FIRE ALARM CONTROL PANEL.
<u></u>	DUCT DETECTOR.

	LIGHTING SYMBOL LEGEND						
SYMBOL	DESCRIPTION						
×#	RECESSED LUMINAIRE. "X" INDICATES TYPE; "y" INDICATES SWITCHING; "#" BRANCH CIRCUITING. SEE LUMINAIRE SCHEDULE.						
X y #	SURFACE MOUNTED LUMINAIRE. "X" INDICATES TYPE; "y" INDICATES SWITCHING; "#" BRANCH CIRCUITING. SEE LUMINAIRE SCHEDULE.						
Allh NL	LUMINAIRE WITH INTEGRAL EMERGENCY BATTERY PACK OR WIRED TO EMERGENCY CIRCUIT (LIFE SAFETY). "NL" DENOTES NIGHT LIGHT WITH 24/7 OPERATION. SEE LUMINAIRE SCHEDULE.						
<b>/////////////////////////////////////</b>	LUMINAIRE WITH INTEGRAL EMERGENCY BATTERY PACK OR WIRED TO EMERGENCY CIRCUIT (CRITICAL BRANCH). "NL" DENOTES NIGHT LIGHT WITH 24/7 OPERATION. SEE LUMINAIRE SCHEDULE.						
·/·	LINEAR PENDANT MOUNTED LUMINAIRE. SEE LUMINAIRE SCHEDULE.						
Z/# <b>\$</b> X,y	SINGLE POLE, 120/277V, 20A TOGGLE SWITCH. "X" INDICATES THE FOLLOWING:						
<b>\$</b> ^,y	3 THREE WAY;						
	Z/# INDICATES CIRCUIT BEING CONTROLLED (VIA LOW VOLTAGE, RELAY CONTROL TYPE SWITCH) y LOWERCASE LETTER INDICATES CONTROL OF SPECIFIC LUMINAIRES.						
⊚ <sub>x</sub>	CEILING MOUNTED OCCUPANCY SENSOR WITH 20 AMP RATED POWER PACK. "X" DENOTES THE FOLLOWING:  DT DUAL TECHNOLOGY. PI PASSIVE INFRARED. US ULTRASONIC.						

#### GENERAL ELECTRICAL NOTES **ABBREVIATIONS**

- 1. ANY AND ALL "BUILDING STANDARDS" AND/OR "BUILDING" SPECIFICATIONS" SHALL BE CONSIDERED AN INTEGRAL PART OF THESE DOCUMENTS AND THE CONTRACTOR SHALL BE RESPONSIBLE TO OBTAIN A COPY OF THESE DOCUMENTS AND COMPLY WITH ALL REQUIREMENTS AND STANDARDS CONTAINED WITHIN.
- 2. REFER TO THE FOLLOWING: SYMBOL LEGEND(S) AND NOTES: DWG. E-001; ELECTRICAL SPECIFICATIONS: DWG's E-002 THRU E-00XX; ELECTRICAL DETAILS: DWG. SERIES E-500's; ELECTRICAL ONE LINE DIAGRAM(S): DWG. SERIES E-600's; AND ELECTRICAL SCHEDULES: DWG. SERIES E-700's FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
- ELECTRICAL DRAWINGS ARE GENERALLY DIAGRAMMATIC, ARE INTENDED TO CONVEY THE SCOPE OF WORK, AND INDICATE GENERAL ARRANGEMENT OF LIGHTING FIXTURES, DEVICES, CONTROLS, ELECTRICAL FIXTURES, MOTORS, PANELBOARDS, EQUIPMENT, ETC. THE LOCATIONS OF ALL ITEMS SHOWN ON ELECTRICAL DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT EXPLICITLY FIXED BY DIMENSIONS ARE APPROXIMATE. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED AT THE PROJECT. ALL LOCATIONS OF WORK EXPOSE TO VIEW ARE SUBJECT TO APPROVAL OF THE ARCHITECT PRIOR TO ROUGH-INS.
- 4. THE ELECTRICAL CONTRACTOR SHALL LAYOUT ALL EQUIPMENT ROOMS TO MAKE SURE THE EQUIPMENT, AS PURCHASED, FITS IN THE ROOM OR SPACE SHOWN. EXACT LOCATION OF ALL EQUIPMENT SHALL BE VERIFIED IN THE FIELD AND ROUTING OF CONDUITS SHALL SUITE FIELD CONDITIONS.
- 5. THE CONTRACTOR SHALL VISIT THE SITE OF THE WORK TO FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS AND HIS PROPOSAL SHALL INCLUDE ALL CONTINGENCIES NECESSARY FOR THE COMPLETION OF HIS WORK REGARDING SUCH EXISTING CONDITIONS. THE ELECTRICAL CONTRACTOR SHALL VERIFY EXISTING CONDITIONS TO INSURE THAT ALL NEW WORK WILL FIT INTO THE EXISTING STRUCTURE AND CONDITIONS IN THE MANNER INTENDED AND AS SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/OWNERS REPRESENTATIVE PRIOR TO ANY ROUGH-INS, FABRICATIONS, OR PERFORMING ANY WORK IN THE AREA INVOLVING DIFFERENCES. NOTIFICATION SHALL BE IN THE FORM OF A DRAWING OR SKETCH INDICATING FIELD MEASUREMENTS AND NOTES RELATED TO THE AREA.
- ANY DISCREPANCIES BETWEEN DRAWINGS AND SPECIFICATIONS SHALL BE PROMPTLY BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION DURING THE BIDDING PERIOD. NO ALLOWANCE SHALL SUBSEQUENTLY BE MADE TO THE CONTRACTOR BY REASON OF HIS FAILURE TO HAVE BROUGHT SAID DISCREPANCIES TO THE ATTENTION OF THE ENGINEER DURING THE BIDDING PERIOD OR OF ANY ERROR ON THE CONTRACTOR'S PART.
- THERE SHALL BE NO SUBSTITUTIONS UNLESS THE CONTRACTOR HAS OBTAINED WRITTEN APPROVAL FROM THE OWNER AFTER HAVING SUBMITTE AN ALTERNATIVE PROPOSAL COMPLETE WITH A DESCRIPTION OF DEVIATION FROM THE SPECIFICATIONS AND A STATEMENT OF BENEFITS TO BE DERIVED SHOULD SUCH A PROPOSED SUBSTITUTE BE ACCEPTED.
- 8. ALL EQUIPMENT SHALL BE INSTALLED IN A NEAT, PROFESSIONAL AND WORKMANLIKE MANNER, RECTILINEAR TO FINISHES AND BUILDING
- 9. ALL WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST NATIONAL ELECTRICAL CODE, OSHA REQUIREMENTS, AND LOCAL REQUIREMENTS, ALL AS INTERPRETED BY THOSE HAVING JURISDICTION.
- 10. REFER TO ARCHITECTURAL ELEVATIONS TO DERIVE EXACT LOCATIONS OF ALL RECEPTACLES, OUTLETS/JACKS, SWITCHES, WALL AND PENDANT/CABLE MOUNTED LUMINAIRES, ETC. LUMINAIRES AND CEILING MOUNTED EQUIPMENT SHALL BE COORDINATED WITH THE ARCHITECTURAL REFLECTED CEILING PLANS.
- 11. BEFORE DOING ANY WORK WHICH MIGHT ENTAIL A FULL OR PARTIAL SHUTDOWN, THE ELECTRICAL CONTRACTOR SHALL INFORM THE OWNER SO THAT A SCHEDULED SHUTDOWN ARRANGEMENT CAN BE MADE, TAKING EVERY PRECAUTION THAT THE ELECTRICAL SYSTEM IS OPERATING SATISFACTORILY.
- 12. THE ELECTRICAL CONTRACTOR SHALL SECURE ALL PERMITS AND PAY ALL FEES THAT ARE REQUIRED BY THE APPLICABLE LOCAL AND STATE LAWS.
- 13. CONDUIT HOME RUNS SHOWN ON THE DRAWING WITH MORE THAN THREE (3) CURRENT CARRYING CONDUCTORS ARE SHOWN DIAGRAMMATICALLY. THIS CONTRACTOR SHALL NOT INSTALL MORE THAN THREE (3) CURRENT CARRYING CONDUCTORS IN A RACEWAY UNLESS NATIONAL ELECTRIC CODE (N.E.C), ARTICLE 310.15 DERATING FACTORS ARE APPLIED.
- 14. A CONTINUOUS CONDUIT SHALL NOT BE CONSTRUED TO SATISFY THE REQUIREMENTS FOR AN EQUIPMENT GROUNDING SYSTEM. A SEPARATE EQUIPMENT GROUND WIRE SHALL BE PROVIDED INTERCONNECTING ALL EXPOSED CONDUCTIVE EQUIPMENT, TO THE COMMON GROUND BUS USING APPROPRIATE GROUND FITTINGS. EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED IN ACCORDANCE WITH NEC TABLE 250.122. THE EQUIPMENT GROUNDING CONDUCTOR MUST BE RUN WITHIN THE SAME RACEWAY AS THE PHASE CONDUCTOR.
- 15. THE ELECTRICAL CONTRACTOR SHALL REFER TO THE ELECTRICAL SPECIFICATIONS FOR ACCEPTABLE CONDUIT TYPES/LOCATIONS. ALL CONDUIT SIZES ON THE DRAWINGS ARE BASED ON THE LATEST EDITION OF THE N.E.C. CONDUIT FILL TABLES FOR ELECTRICAL METALLIC TUBING (E.M.T) CONDUIT SIZES SHALL BE REVISED TO THE SIZE REQUIRED, RELATIVE TO THE ACTUAL CONDUIT TYPE TO BE INSTALLED.
- 16. ALL COMPONENTS SHOWN ON THE RISER/ONE-LINE DIAGRAMS, BUT NOT ON THE PLAN OR VICE VERSA, SHALL BE INCLUDED AS IF SHOWN ON BOTH.
- 17. IT IS NOT INTENDED THAT THE PLANS INDICATE ALL OBSTRUCTIONS, NECESSARY BENDS, OFFSETS, AND PULL BOXES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL HIS WORK TO CONFORM TO N.E.C. REQUIREMENTS, THE STRUCTURE, MAINTAIN HEADROOM AND KEEP OPENINGS AND PASSAGEWAYS CLEAR. REFER TO THE ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS AS REQUIRED.
- 18. IT IS NOT INTENDED THAT THE PLANS INDICATE ALL CONDUIT ROUTES, PULL BOXES, JUNCTION BOXES, ETC. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING ACTUAL CONDUIT ROUTING, QUANTITY AND LOCATION OF PULL BOXES WITHIN ACCESSIBLE LOCATIONS.
- 19. PROVIDE SCREW-COVER PULL BOXES IN CONDUIT RUNS AS REQUIRED TO LIMIT THE NUMBER OF BENDS TO NO MORE THAN FOUR (4) 90° OR 360° TOTAL. SIZE PULL BOXES IN ACCORDANCE WITH NEC, ARTICLE 314.28. DOCUMENT ON RECORD DRAWINGS, SIZE AND LOCATION OF PULL BOXES USED IN FEEDER CONDUIT RUNS.
- 20. WHERE MULTIPLE DEVICES OF THE SAME TYPE/STYLE ARE SHOWN NEXT TO
- EACH OTHER, GANG INTO A SINGLE COVER PLATE. 21. ALL RACEWAYS RUNNING THROUGH BUILDING EXPANSION JOINTS SHALL BE
- 22. IDENTIFY WITH LEGIBLE AND DURABLE MARKING, EACH DISCONNECTING MEANS INDICATING ITS PURPOSE.
- 23. ALL RECEPTACLES, SWITCHES AND DEVICES SHALL HAVE PANEL AND CIRCUIT NUMBER IDENTIFY WITH LEGIBLE AND DURABLE MARKING ON COVE PLATE. OWNER WILL INDICATE IF MARKINGS ARE ON THE FRONT OR BACK OF

EQUIPPED WITH APPROPRIATE EXPANSION FITTINGS.

- 24. ALL LABOR AND MATERIAL FURNISHED BY THE CONTRACTOR AS PART OF THIS CONTRACT SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM DATE OF ACCEPTANCE BY THE OWNER. ANY DEFECTS WHICH APPEAR WITHIN THE GUARANTEE PERIOD SHALL BE PROMPTLY REPAIRED OR REPLACED AT THE OWNER'S DISCRETION, WITHOUT ADDITIONAL COST TO THE OWNER.
- 25. ALL EQUIPMENT GROUNDS SHALL BE TERMINATED WITH COMPRESSION FITTINGS AND STAINLESS STEEL BOLTS OR IN PANEL GROUND BAR.
- 26. BEFORE DRILLING ANY HOLES IN WALLS OR FLOORS THE AREA MUST BE CHECKED FOR EXISTING EMBEDDED CONDUITS AND WIRE. IF ANY EXISTING CONDUITS OR WIRING ARE DAMAGED BY THIS CONTRACTOR IT IS THIS CONTRACTORS RESPONSIBILITY TO MAKE ALL REPAIRS TO CONDUITS, WIRE, FLOORS AND BUILDING FINISHES IN KIND AT NO COST TO OWNER.
- 27. PROVIDE UL LISTED FIRE STOP ASSEMBLY AT ALL NEW AND EXISTING PENETRATIONS IN FIRE RATED STRUCTURES.
- 28. ALL 120 VOLT, SINGLE PHASE 15 AND 20 AMPERE RECEPTACLE OUTLETS USED BY THE WORKMEN SHALL BE PROTECTED BY A "GROUND FAULT INTERRUPTER".

**OSBORN** 

MATTHAEI CENTER **ADDITION OF AIF** CONDITIONING **WAYNE STATE** 

DETROIT, MI 48208

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CHECKED BY CLIENT PROJ NO. OSBORN PROJ NO. J20220270.00 ELECTRICAL SYMBOLS,

LEGENDS, AND NOTES DRAWING NO.

E-001

(R&R) DENOTES EXISTING DEVICE/EQUIPMENT TO BE REMOVED AND RELOCATED IN ITS ENTIRETY. MAINTAIN ALL BRANCH CIRCUIT WIRING, CONDUIT, ETC. AS REQUIRED FOR RELOCATION TO NEW

(R) DENOTES NEW LOCATION OF REMOVED AND RELOCATED (R&R) DEVICE/EQUIPMENT. DEVICE SHALL BE CLEANED PRIOR TO REINSTALLATION. EXTEND/REWORK ALL BRANCH CIRCUITING TO NEW LOCATION AS REQUIRED FOR PROPER OPERATION. NEW BRANCH CIRCUITING SHALL

(N) DENOTES NEW DEVICE/EQUIPMENT TO BE PROVIDED IN ITS ENTIRETY, INCLUDING ALL FEEDER/BRANCH CIRCUIT WIRING, CONDUIT, ETC. AS REQUIRED FOR COMPLETE AND OPERATIONAL INSTALLATION.

RTU ROOFTOP UNIT

RACEWAY TYPES

MECHANICAL EQUIPMENT

AC ARMORED CABLE

PVC POLYVINYL CHLORIDE

RGS RIGID GALVANIZED STEEL

AC AIR CONDITIONING UNIT

BAS BUILDING AUTOMATION SYSTEM

ACC AIR-COOLED CHILLER

AHU AIR HANDLING UNIT

CU CONDENSING UNIT

EF EXHAUST FAN

F FURNACE

FCU FAN COIL UNIT

HP HEAT PUMP

P PUMP

MAU MAKE-UP AIR UNIT

TP TECHNOLOGY PANEL

CUH CABINET UNIT HEATER

EUH ELECTRIC UNIT HEATER

EWC ELECTRIC WATER COOLER

EWH ELECTRIC WATER HEATER

FPVAV FAN-POWERED VARIABLE AIR VOLUME

B BOILER

CH CHILLER

EMT ELECTRIC METALLIC TUBING

C CONDUIT

MC METAL CLAD

MLO MAIN LUG ONLY SAHU SPLIT SYSTEM AIR HANDLING UNIT UH UNIT HEATER MTGB MAIN TECHNOLOGY GROUND BUS MTS MANUAL TRANSFER SWITCH UST UNDERGROUND STORAGE TANK VAV VARIABLE AIR VOLUME

NL NIGHT LIGHT OS OCCUPANCY SENSOR PNL PANELBOARD SCOPE OF WORK / TRADES REC RECEPTACLE (N.I.C.) NOT IN CONTRACT

GFCI GROUND FAULT CIRCUIT INTERRUPTER | DDC DIGITAL DIRECT CONTROL

AC ABOVE COUNTER

CB CIRCUIT BREAKER

CP CONTROL PANEL

CR CRITICAL BRANCH

CT CURRENT TRANSFORMER

GAP GENERATOR ANNUNCIATOR PANEL

GFP GROUND FAULT PROTECTION

EG EQUIPMENT GROUND

AL ALUMINUM

CKT CIRCUIT

CU COPPER

ELEV ELEVATOR

EM EMERGENCY

GEN GENERATOR

GND GROUND

LS LIFE SAFETY

LTG LIGHTING

IG ISOLATED GROUND

IPP ISOLATED POWER PANEL

MCB MAIN CIRCUIT BREAKER

MCC MOTOR CONTROL CENTER

MDP MAIN DISTRIBUTION PANEL

MEGB MAIN ELECTRICAL GROUND BUS

LCP LIGHTING CONTROL PANEL

AFF ABOVE FINISHED FLOOR

AFG ABOVE FINISHED GRADE

ATS AUTOMATIC TRANSFER SWITCH

SB OPTIONAL STAND-BY EC ELECTRICAL CONTRACTOR SE SERVICE ENTRANCE GC GENERAL CONTRACTOR SW SWITCH MC MECHANICAL CONTRACTOR SWBD SWITCHBOARD TC TECHNOLOGY CONTRACTOR UC UNDER COUNTER

UG UNDERGROUND PANELBOARD NAMING UPS UNINTERRUPTIBLE POWER SUPPLY DP DISTRIBUTION PANEL VFD VARIABLE FREQUENCY DRIVE HP HVAC PANEL HSP HOUSE SERVICE PANEL IP INVERTER PANEL

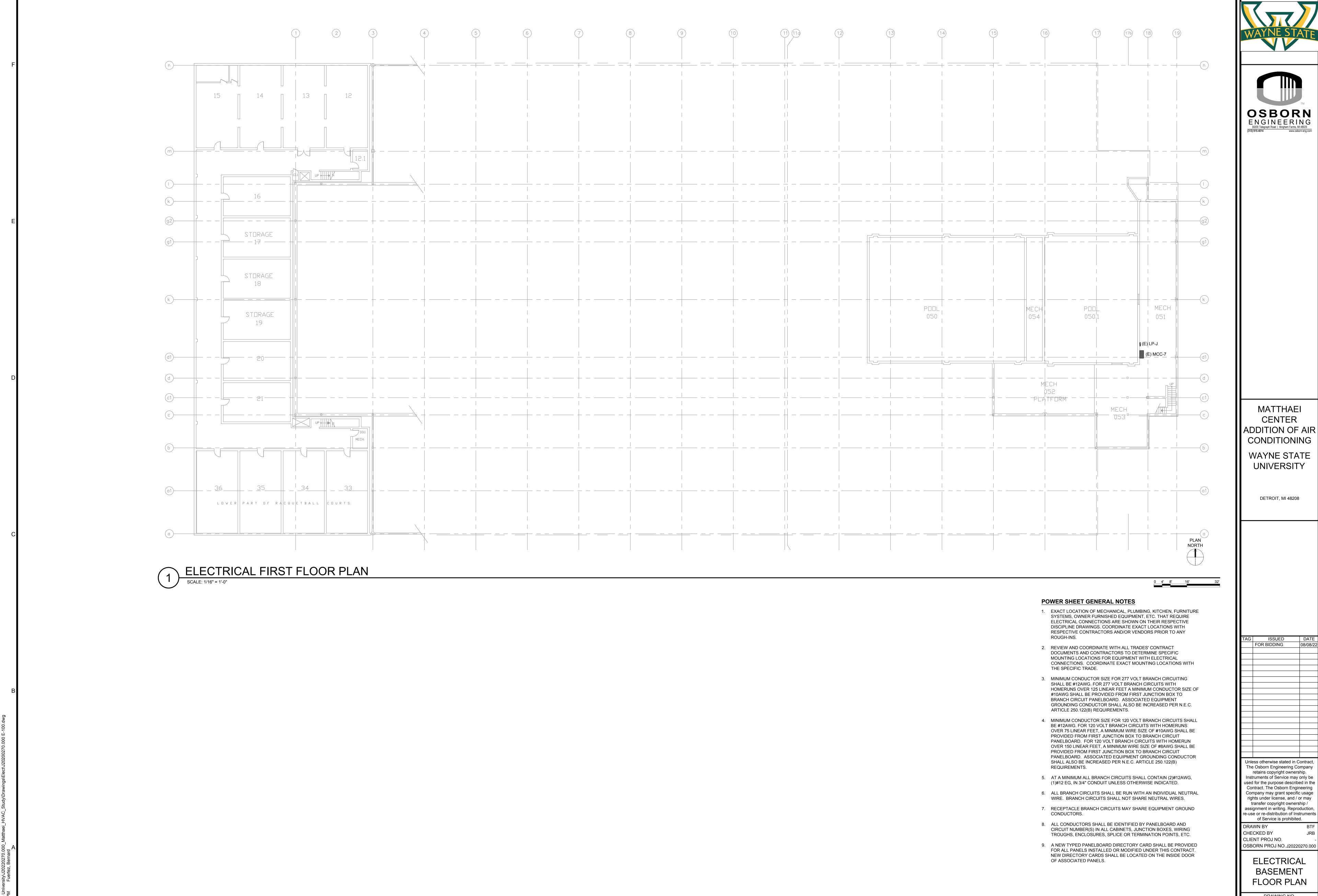
VP VANDAL PROOF VT VOLTAGE TRANSFORMER WIU WHILE IN USE LP LIGHTING PANEL WP WEATHERPROOF MP MECHANICAL PANEL PP POWER PANEL RP RECEPTACLE PANEL

DEMO/NEW WORK ANNOTATION LEGEND:

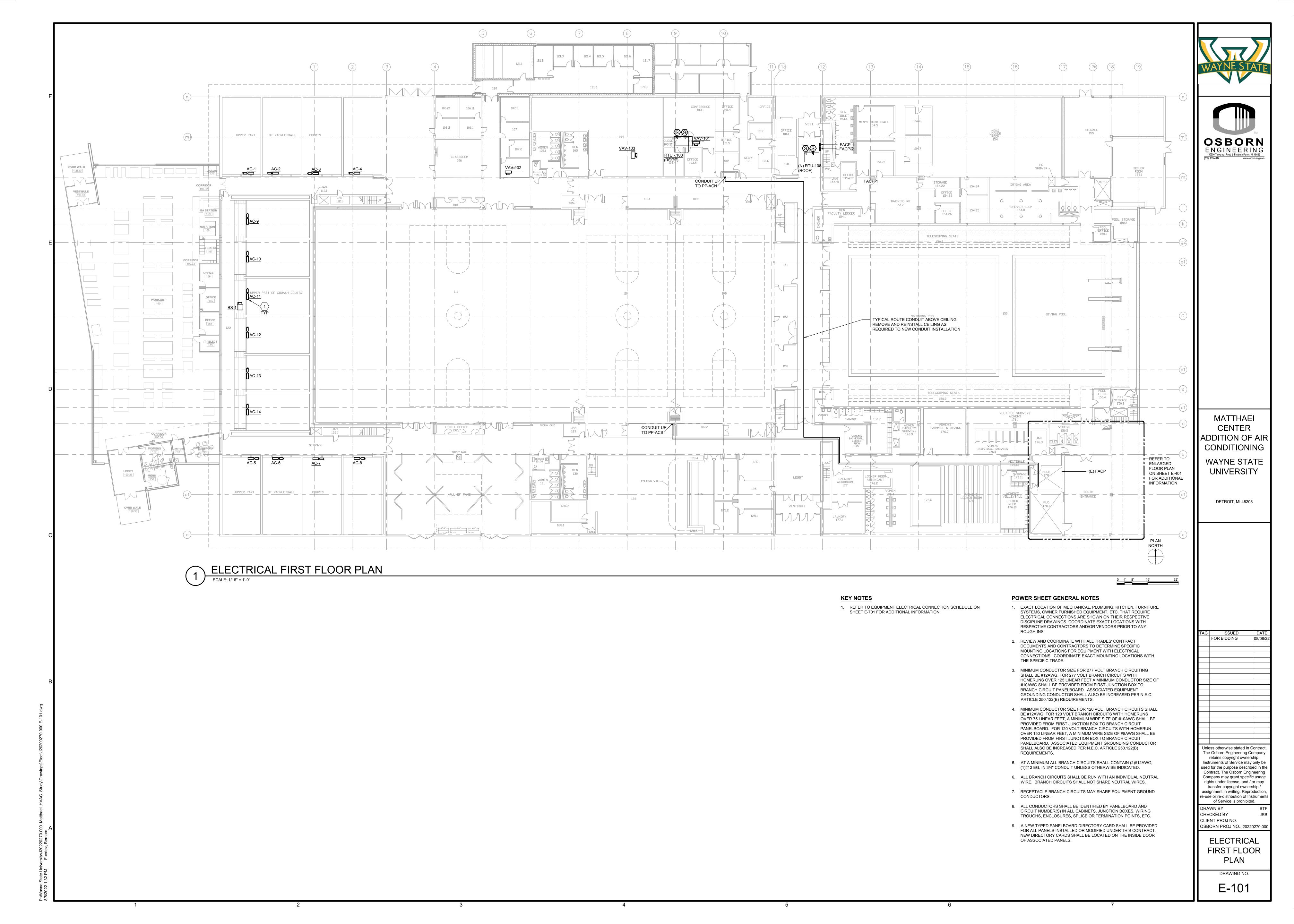
(E) DENOTES EXISTING DEVICE/EQUIPMENT TO BE MAINTAINED.

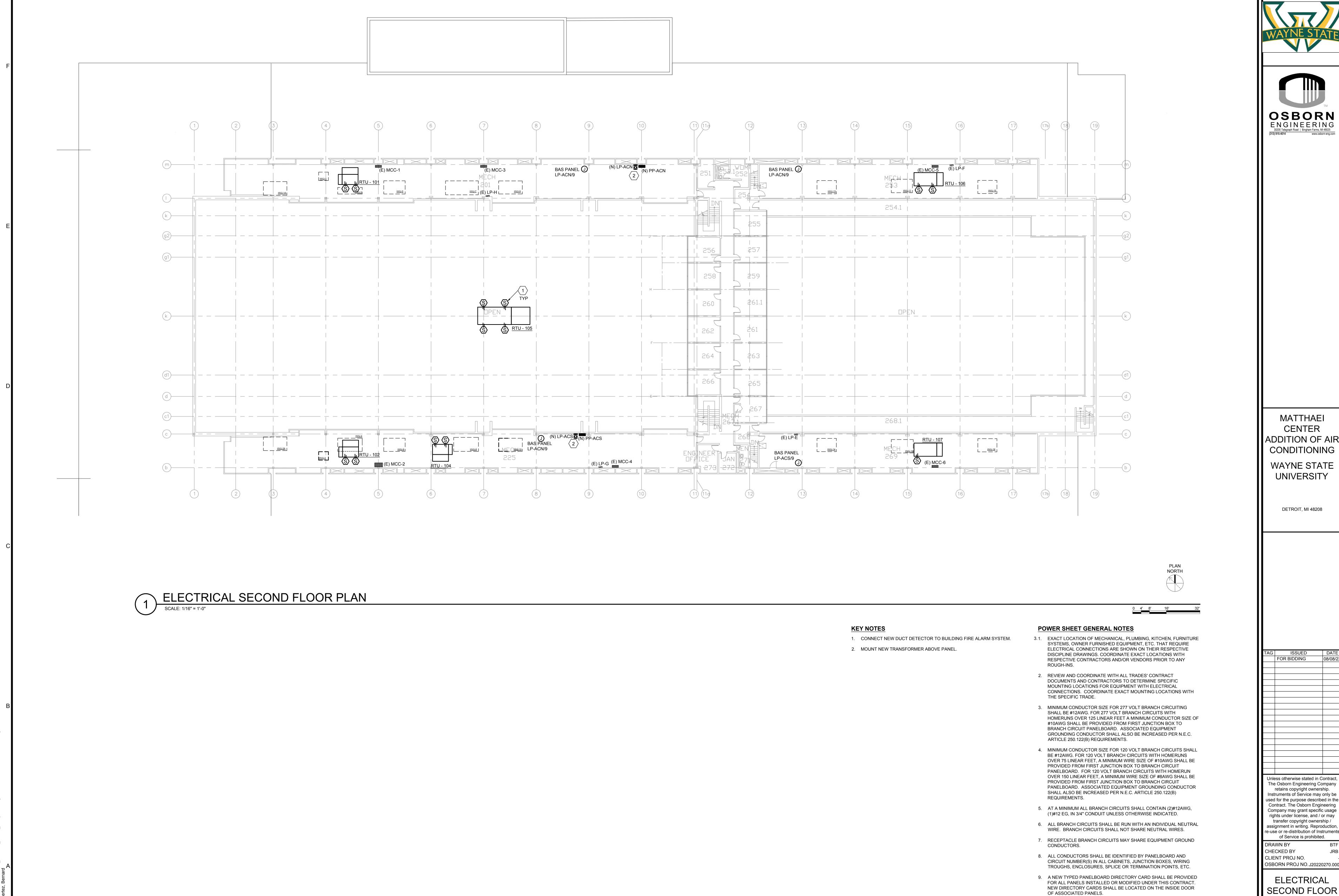
LOCATION (R) INDICATED ON "NEW WORK" DRAWINGS.

MATCH EXISTING IN SIZE, TYPE, AND/OR MATERIAL.



DRAWING NO.



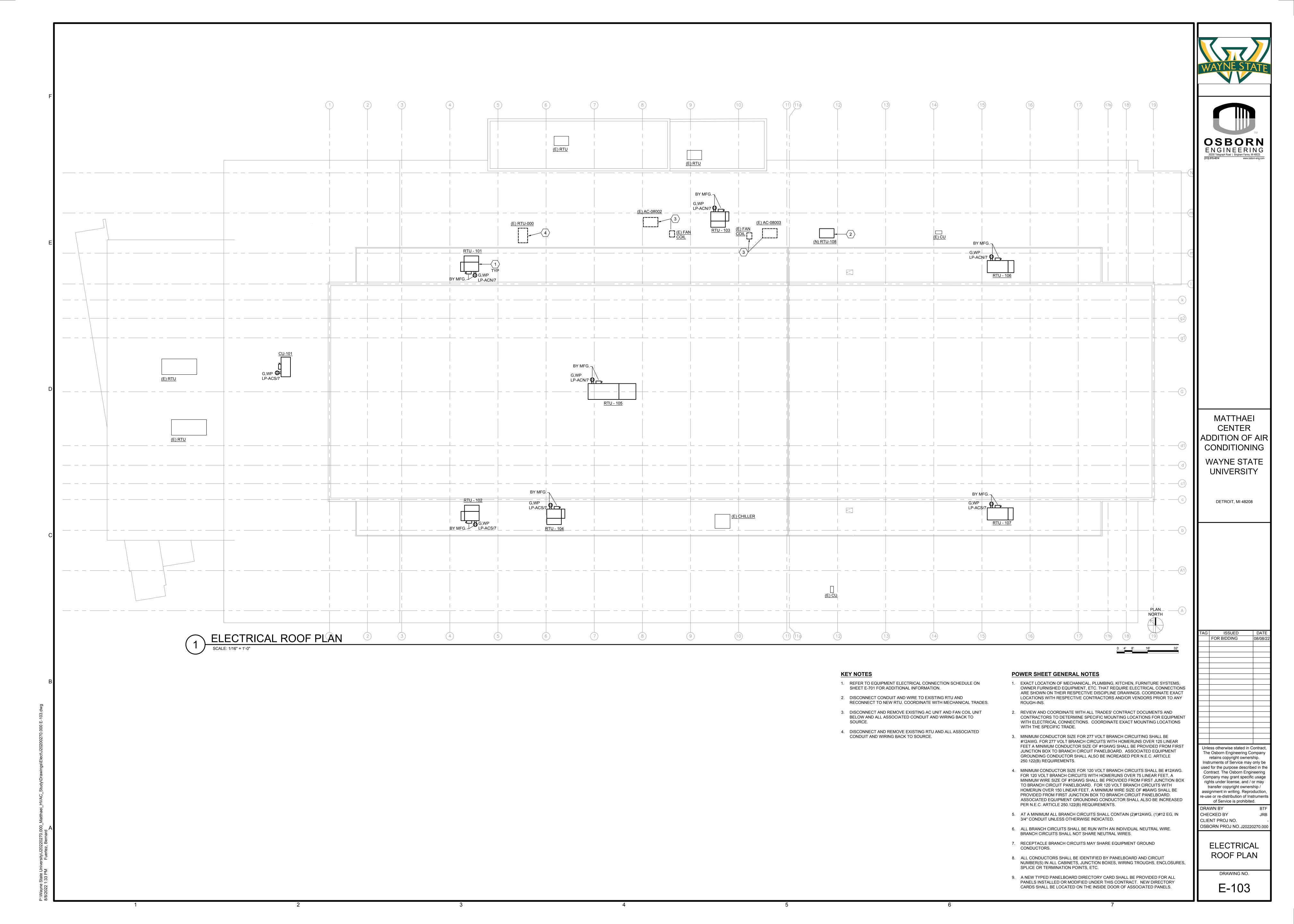


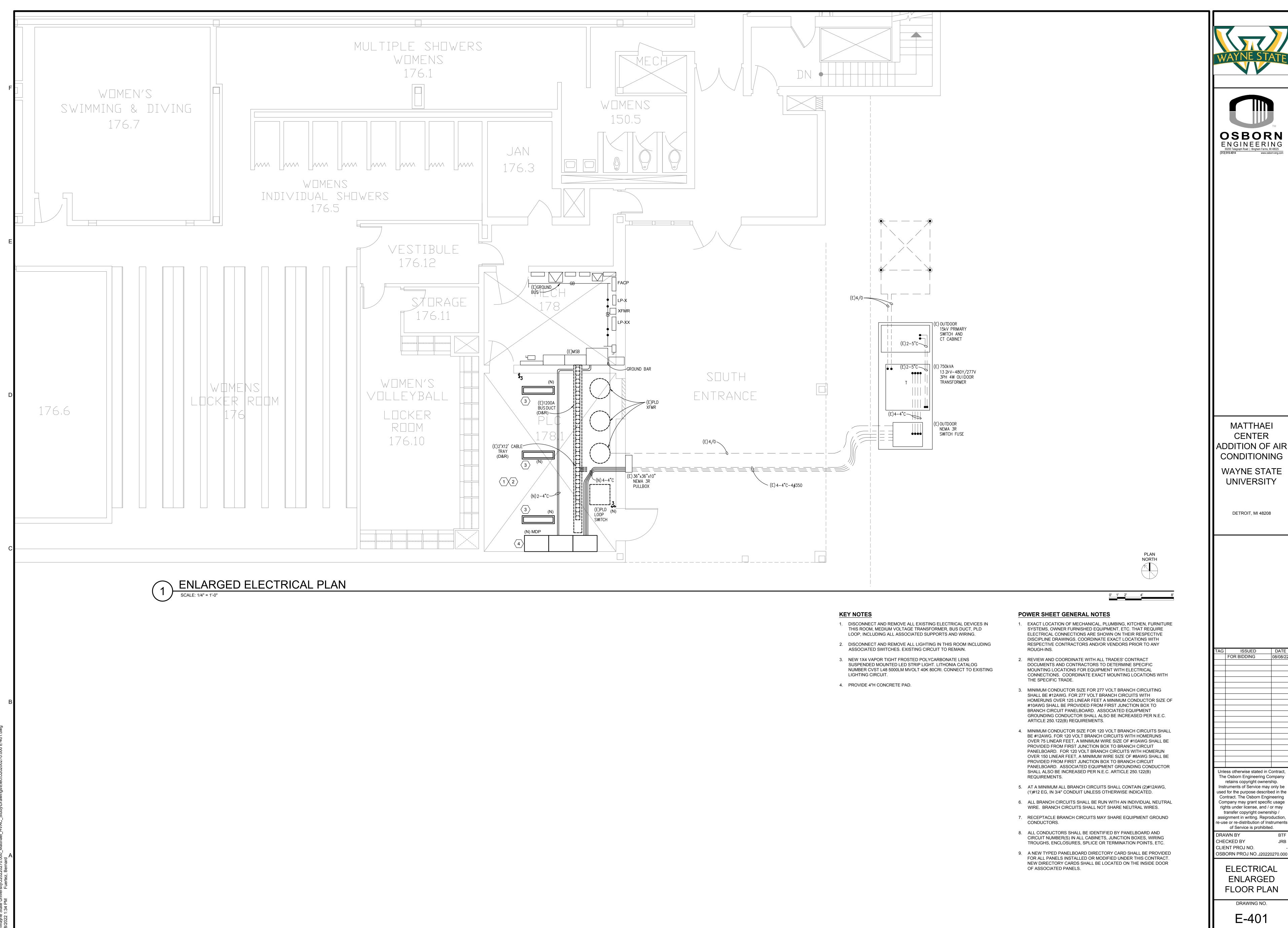


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ELECTRICAL PLAN

DRAWING NO.



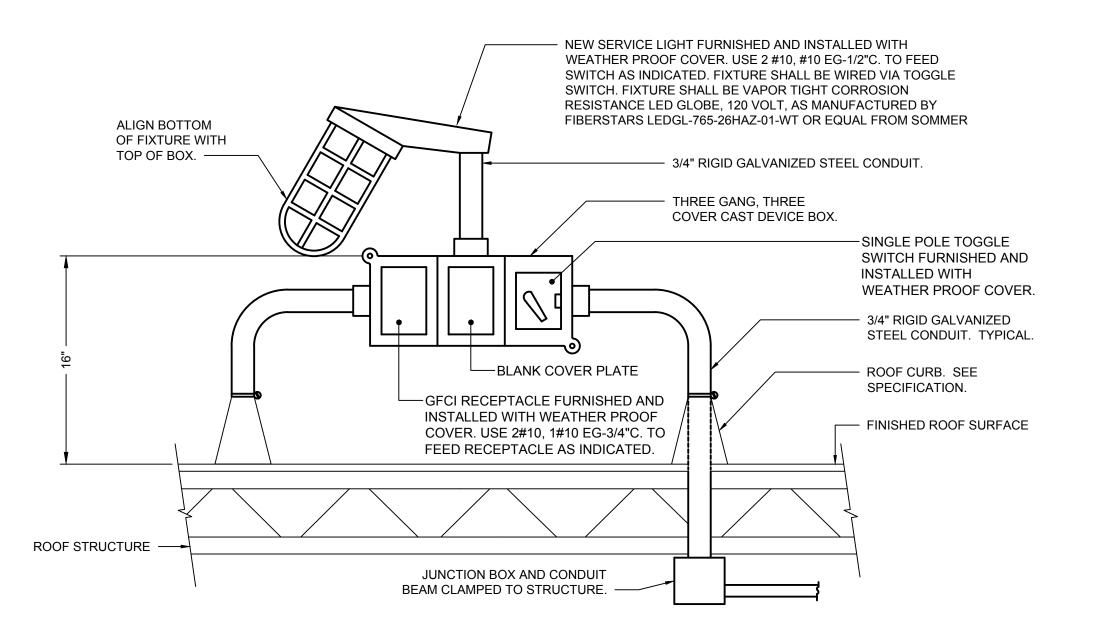


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NORMAL SYSTEM -— SYSTEM DESCRIPTION: 1/8" LETTERING. - EQUIPMENT NAME: 1/2" LETTERING. VOLTAGE: **480Y/277V, 3Ø, 4W** → — SYSTEM VOLTAGE: 1/8" LETTERING. FED FROM: "EQUIPMENT NAME" IN ROOM "####" - EQUIPMENT "FED FROM": 1/8" LETTERING. OVERCURRENT SIZE: 225 AMPS -OCPD SIZE: 1/8" LETTERING. BUS RATING: 225 AMPS → — BUS AMPERAGE: 1/8" LETTERING. INTERRUPTING CURRENT RATING: 10 KAIC — kAIC RATING: 1/8" LETTERING. 5" (MINIMUM) REFER TO EQUIPMENT NAMEPLATE DETAIL NOTES AND ELECTRICAL SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

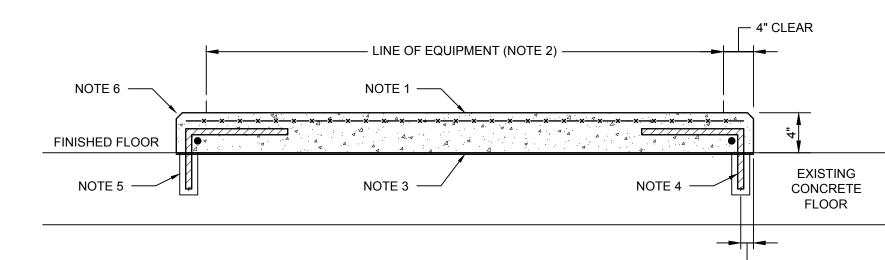
TYPICAL PANEL NAMEPLATE DETAIL

NOT TO SCALE



WEATHERPROOF ROOFTOP LIGHT/RECEPTACLE DETAIL

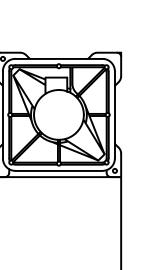
NOT TO SCALE

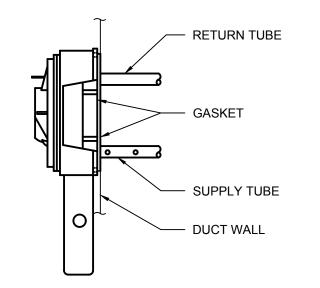


NOTES:

- 1. PROVIDE CONCRETE WORK PAD REINFORCED WITH 6 X 6 W2.9 X W2.9 WELDED WIRE FABRIC. CONCRETE SHALL BE 4000 PSI AT 28 DAYS.
- VERIFY ALL PAD CONSTRUCTION DIMENSIONS WITH EQUIPMENT SHOP DRAWINGS PRIOR TO INSTALLATION. PAD SHALL EXTEND 4" BEYOND EQUIPMENT / ENCLOSURE ON ALL SIDES. VERIFY WORK PAD HEIGHT WITH EQUIPMENT REQUIREMENTS.
- 3. EXISTING FLOOR IN AREA OF NEW WORK PAD SHALL BE CLEANED OF EXISTING SOLVENTS AND PAINT. ROUGHEN EXISTING FLOOR AT LOCATION OF WORK PAD. APPLY BONDING AGENT PRIOR TO PLACING CONCRETE.
- 4. DRILL INTO EXISTING CONCRETE FLOOR SLAB A MINIMUM OF 2" BEYON TOPPING. USE #4 BENT BAR @ 12" O.C., HOLD A MINIMUM OF 1" BELOW TOP OF SLAB.
- 5. PROVIDE HILTI ADHESIVE INJECTION SYSTEM OR APPROVED EQUAL.
- 6. CHAMFER ALL EXPOSED EDGES WITH 1" CHAMFER AT 45-DEGREES.

INTERIOR CONCRETE PAD DETAIL





TYPICAL DUCT DETECTOR

MOUNTING DETAIL





MATTHAEI
CENTER
ADDITION OF AIR
CONDITIONING

WAYNE STATE UNIVERSITY

DETROIT, MI 48208

\_\_\_\_\_, ....

AG ISSUED DAT
FOR BIDDING 08/08/

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CLIENT PROJ NO.

OSBORN PROJ NO. J20220270.00

ELECTRICAL

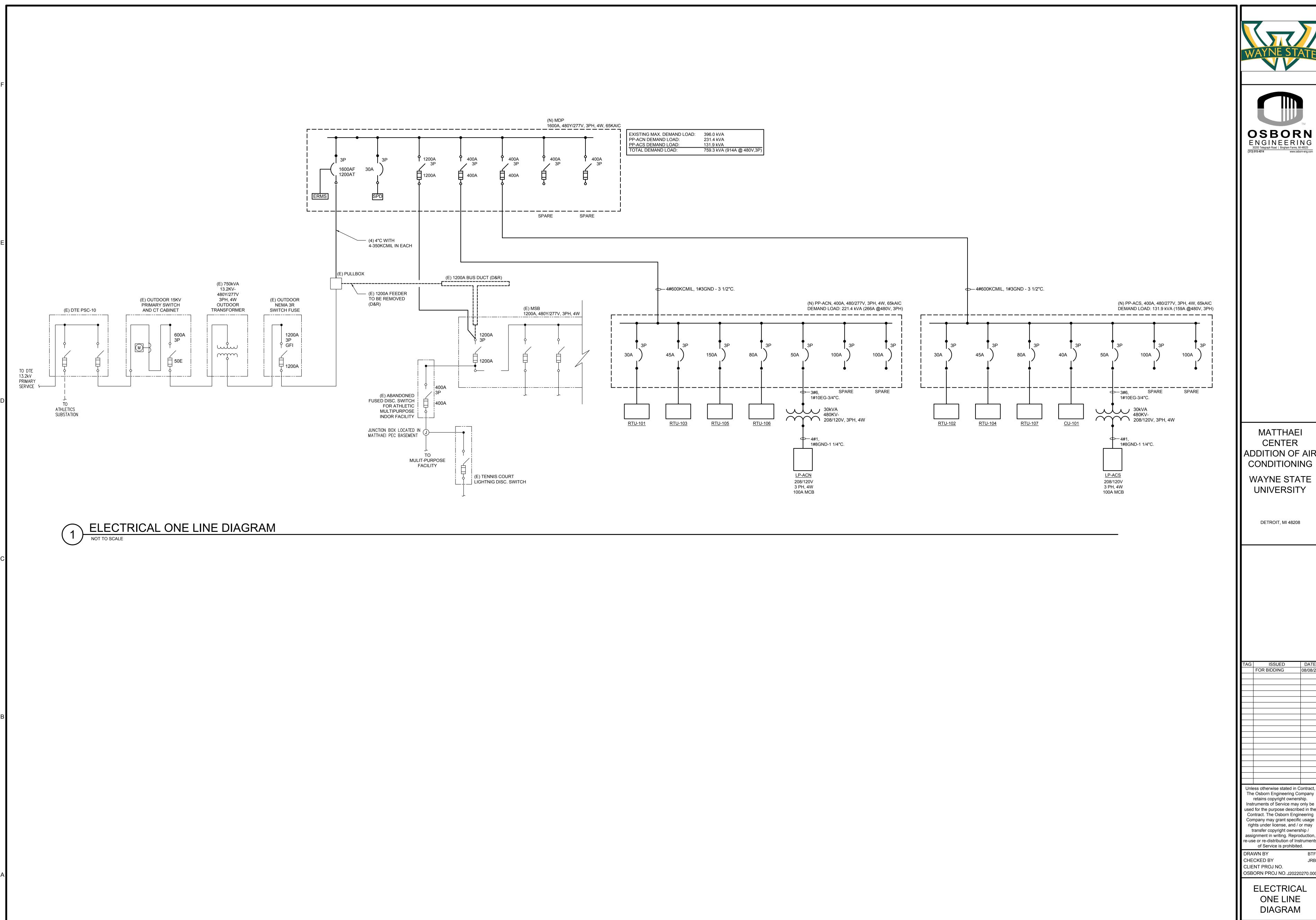
DETAILS

E-501

DRAWING NO.

P:\Wayne State University\J20220270.000\_Matthaei\_HVAC\_Study\Drawings\Elect\J202 8/8/2022 1:34 PM Fuertez, Bernard

A





MATTHAEI CENTER ADDITION OF AIR CONDITIONING **WAYNE STATE** 

DETROIT, MI 48208

ISSUED FOR BIDDING

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> ELECTRICAL ONE LINE DIAGRAM

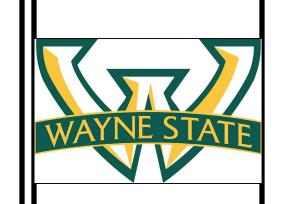
DRAWING NO.

E-601

	MFR_ TYPE_ BUS	SQUARI		-		IEL ID:		<b>LP</b>	-AC		120		MOL	ATION INTING G. NO.	5	H RM NORTH SURFACE	
NOTES	CIRCUIT DESCRIPTION	LOAD		AKER TRIP	KILO'	VOLT-	AMPS C			KILO'	VOLT-/		BRE.	AKER	LOAD AMPS	DESCRIPTION	NOTES
	AC-1,2,3,4	1.6	2	20	0.17		Ť	1	2	0.12			2	20	1.2	AC-9,10,11	†
	-	1.6	-	-		0.17		3	4		0.12		-	-	1.2	-	
	AC-1,2,3,4 PUMPS	6.0	1	20			0.72	5	6			0.72	1	20	6.0	AC-9,10,11 PUMPS	
	RTU RECEPTS	6.0	1	20	0.72			7	8	0.14			1	20	1.2	BS-1	
	BAS PANELS	3.0	1	20		0.36		9	10		0.50		3	20	4.2	VAV-102	
	VAV-101	9.6	2	20			1.00	11	12			0.50	-	-	4.2	-	
	-	9.6	-	-	1.00			13	14	0.50			-	-	4.2	-	
	SPARE	0.0	1	20		0.00		15	16		2.00		3	25	16.7	VAV-103	
	SPARE	0.0	1	20			0.00	17	18			2.00	-	-	16.7	-	
	SPARE	0.0	1	20	0.00			19	20	2.00			-	-	16.7	-	
	SPARE	0.0	1	20		0.00		21	22		0.00		1	20	0.0	SPARE	
	SPARE	0.0	1	20			0.00	23	24			0.00	1	20	0.0	SPARE	
	SPARE	0.0	1	20	0.00			25	26	0.00			1	20	0.0	SPARE	
	SPARE	0.0	1	20		0.00		27	28		0.00		1	20	0.0	SPARE	
	SPARE	0.0	1	20			0.00	29	30			0.00	1	20	0.0	SPARE	
	SPACE	0.0	1	20	0.00			31	32	0.00			1	20	0.0	SPACE	
	SPACE	0.0	1	20		0.00		33	34		0.00		1	20	0.0	SPACE	
	SPACE	0.0	1	20			0.00	35	36			0.00	1	20	0.0	SPACE	
	SPACE	0.0	1	20	0.00			37	38	0.00			1	20	0.0	SPACE	
	SPACE	0.0	1	20		0.00		39	40		0.00		1	20	0.0	SPACE	
	SPACE	0.0	1	20			0.00	41	42			0.00	1	20	0.0	SPACE	
NOTES:	TOTAL: AMPS BUS A 38.8 BUS B 26.3 BUS C 41.2	<u>k\</u> 4.6 3.1 4.9	50 50	- - -		C	ONDUI	EAKER T SIZE R SIZE DURCE	ļ	100A 1 1/4" 1 PP-CAN		Esti	mated	A.I. nnecte	RATING C. SYM. ed Load nd Load	10,000 35.4 A 12.740 kVA	

		MFR_ TYPE	SQUARE D PANEL ID:							P-ACS  LOCATION MECH RM SOUTH MOUNTING SURFACE									
		BUS	COPPE	R	SERVICE: L-L 208						L-N	120	DWG. NO.						
NOTES	CIRCUIT DESCRIF	SCRIPTION	LOAD		AKER	KILO	VOLT-	AMPS			KILO'	VOLT-	OLT-AMPS		AKER	LOAD		DESCRIPTION	NOTE
			AMPS	POLE		Α	В	С			Α	В	С	POLE	TRIP	AMPS			
	AC-5,6,7,8		1.6	2	20	0.17			1	2	0.12			2	20		AC-12,13	3,14	
	1		1.6	-	-		0.17		3	4		0.12		-	-	1.2	-		
	AC-5,6,7,8 PUMF	PS	6.0	1	20			0.72	5	6			0.72	1	20			3,14 PUMPS	
	RTU RECEPTS		4.5	1	20	0.54			7	8	0.00			1	20	0.0	SPARE		
	BAS PANELS		3.0	1	20		0.36		9	10		0.00		1	20	0.0	SPARE		
	SPARE		0.0	1	20			0.00	11	12			0.00	1	20	0.0	SPARE		
	SPARE		0.0	1	20	0.00			13	14	0.00			1	20	0.0	SPARE		
	SPARE		0.0	1	20		0.00		15	16		0.00		1	20	0.0	SPARE		
	SPARE		0.0	1	20			0.00	17	18			0.00	1	20	0.0	SPARE		
	SPARE		0.0	1	20	0.00			19	20	0.00			1	20	0.0	SPARE		
	SPARE		0.0	1	20		0.00		21	22		0.00		1	20	0.0	SPARE		
	SPARE		0.0	1	20			0.00	23	24			0.00	1	20	0.0	SPARE		
	SPARE		0.0	1	20	0.00			25	26	0.00			1	20	0.0	SPARE		
	SPARE		0.0	1	20		0.00		27	28		0.00		1	20	0.0	SPARE		
	SPARE		0.0	1	20			0.00	29	30			0.00	1	20	0.0	SPARE		
	SPACE		0.0	1	20	0.00			31	32	0.00			1	20	0.0	SPACE		
	SPACE		0.0	1	20		0.00		33	34		0.00		1	20	0.0	SPACE		
	SPACE		0.0	1	20			0.00	35	36			0.00	1	20	0.0	SPACE		
	SPACE		0.0	1	20	0.00			37	38	0.00			1	20	0.0	SPACE		
	SPACE		0.0	1	20		0.00		39	40		0.00		1	20	0.0	SPACE		
	SPACE		0.0	1	20			0.00	41	42			0.00	1	20	0.0	SPACE		
•	TOTAL:	AMPS	kV	<u>——</u> А			MA	IN BRE	AKER		100A				BUS I	RATING	100/	4	
	BUS A	6.9	0.8	30			C	ONDUI	T SIZE	-	1 1/4"		-		A.I.0	C. SYM.	10,00	00	
	BUS B	5.4	0.6	50	•		F	EEDE	R SIZE		1		To	otal Co	nnecte	d Load			/A
	BUS C	12.0	1.4	40	•			SC	URCE		PP-ACS	3	Estir	nated	Deman	d Load	8.1		/A
IOTES:										ADDI	ΓΙΟΝΑL	. REQL	JIREME	NTS:				<del>_</del>	
- · <del> ·</del>														·					

EQUIPMENT ELECTRICAL CONNECTION SCHEDULE												
EQUIPMENT	EQUIPMENT DESCRIPTION			MOTOR / E	EQUIPMENT			BRANCH CIRCUIT	REMARKS			
DESIGNATION		HP	kVA	VOLTAGE	PHASE	LOCATION	OCPD SIZE	CONDUCTORS / CONDUIT	PANEL / CKT. #			
RTU-101	ROOF TOP UNIT	-	19.5 kVA	460V	3Ø	ROOF	30A	3#10, 1#10 EG - 3/4"C.	PP-ACN	FACTORY NON-FUSED DISCONNECT, 115V GFI OUTLET		
RTU-102	ROOF TOP UNIT	-	19.5 kVA	460V	3Ø	ROOF	30A	3#10, 1#10 EG - 3/4"C.	PP-ACS	FACTORY NON-FUSED DISCONNECT, 115V GFI OUTLET		
RTU-103	ROOF TOP UNIT	-	27.4 kVA	460V	3Ø	ROOF	45A	3#8, 1#10 EG - 3/4"C.	PP-ACN	FACTORY NON-FUSED DISCONNECT, 115V GFI OUTLET		
RTU-104	ROOF TOP UNIT	-	27.4 kVA	460V	3Ø	ROOF	45A	3#8, 1#10 EG - 3/4"C.	PP-ACS	FACTORY NON-FUSED DISCONNECT, 115V GFI OUTLET		
RTU-105	ROOF TOP UNIT	-	119.4 kVA	460V	3Ø	ROOF	150A	3#1/0, 1#6 EG - 1 1/2"C.	PP-ACN	FACTORY NON-FUSED DISCONNECT, 115V GFI OUTLET		
RTU-106	ROOF TOP UNIT	-	48.4 kVA	460V	3Ø	ROOF	100A	3#6, 1#10 EG - 3/4"C.	PP-ACN	FACTORY NON-FUSED DISCONNECT, 115V GFI OUTLET		
RTU-107	ROOF TOP UNIT	-	48.4 kVA	460V	3Ø	ROOF	80A	3#6, 1#10 EG - 3/4"C.	PP-ACS	FACTORY NON-FUSED DISCONNECT, 115V GFI OUTLET		
RTU-108	ROOF TOP UNIT	-	17.3kVA	460V	3Ø	ROOF	-	-	-	CONNECT NEW RTU TO EXISTING CIRCUIT.		
CU-101	VRF OUTDOOR UNIT	-	30 kVA	460V	3Ø	ROOF	60A	3#8, 1#10 EG - 3/4"C.	PP-ACS	DISCONNECT BY EC		
AC-1	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR NORTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/1,3	DISCONNECT BY EC		
AC-2	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR NORTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/1,3	DISCONNECT BY EC		
AC-3	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR NORTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/1,3	DISCONNECT BY EC		
AC-4	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR NORTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/1,3	DISCONNECT BY EC		
AC-5	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR SOUTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/1,3	DISCONNECT BY EC		
AC-6	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR SOUTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/1,3	DISCONNECT BY EC		
AC-7	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR SOUTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/1,3	DISCONNECT BY EC		
AC-8	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR SOUTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/1,3	DISCONNECT BY EC		
AC-9	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR WEST	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/2,4	DISCONNECT BY EC		
AC-10	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR WEST	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/2,4	DISCONNECT BY EC		
AC-11	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR WEST	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/2,4	DISCONNECT BY EC		
AC-12	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR EAST	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/2,4	DISCONNECT BY EC		
AC-13	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR EAST	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/2,4	DISCONNECT BY EC		
AC-14	VRF INDOOR UNIT	-	0.144 kVA	208V	1Ø	FIRST FLOOR EAST	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/2,4	DISCONNECT BY EC		
AC-1 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR NORTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/5	DISCONNECT BY EC		
AC-2 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR NORTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/5	DISCONNECT BY EC		
AC-3 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR NORTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/5	DISCONNECT BY EC		
AC-4 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR NORTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/5	DISCONNECT BY EC		
AC-5 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR SOUTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/5	DISCONNECT BY EC		
AC-6 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR SOUTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/5	DISCONNECT BY EC		
AC-7 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR SOUTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/5	DISCONNECT BY EC		
AC-8 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR SOUTH	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/5	DISCONNECT BY EC		
AC-9 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR WEST	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/6	DISCONNECT BY EC		
AC-10 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR WEST	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/6	DISCONNECT BY EC		
AC-11 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR WEST	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/6	DISCONNECT BY EC		
AC-12 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR EAST	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/6	DISCONNECT BY EC		
AC-13 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR EAST	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/6	DISCONNECT BY EC		
AC-14 PUMP	VRF INDOOR UNIT PUMP	-	0.18 kVA	115V	1Ø	FIRST FLOOR EAST	15A	2#12, 1#12 EG - 3/4"C.	LP-ACS/6	DISCONNECT BY EC		
BS-1	BRANCH SELECTOR BOX	-	0.14 kVA	208V	1Ø	FIRST FLOOR EAST	15A	2#12, 1#12 EG - 3/4"C.	LP-ACN/8	DISCONNECT BY EC		
VAV-101	SINGLE DUCT TERMINAL UNIT	-	2KW	208V	1Ø	FIRST FLOOR WEST	20A	2#12, 1#12 EG - 3/4"C.	LP-ACN/11,13	DISCONNECT BY MFG		
VAV-102	SINGLE DUCT TERMINAL UNIT	-	1.5KW	208V	3Ø	FIRST FLOOR WEST	20A	3#12, 1#12 EG - 3/4"C.	LP-ACN/10,12,14	DISCONNECT BY MFG		
VAV-103		_	6KW				25A	3#10, 1#10 EG - 3/4"C.	LP-ACN/16,18,20	DISCONNECT BY MFG		
VAV-103	SINGLE DUCT TERMINAL UNIT	-	6KW	208V	3Ø	FIRST FLOOR WEST	25A	3#10, 1#10 EG - 3/4"C.	LP-ACN/16,18,20	DISCONNECT BY MFG		





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