



# FLNA - LIBERTY QA LAB

89 MILL STREET  
LIBERTY, NY 12754

ISSUE FOR CONSTRUCTION

16 JULY 2021

## DRAWING LIST

SHEET NUMBER	SHEET NAME	SHEET ISSUE DATE
A1.00	FLOOR PLANS AND DETAILS	16 JULY 2021
A2.00	SCHEDULES, SECTIONS, DETAILS AND NOTES	16 JULY 2021
S0.00	STRUCTURAL ABBREVIATIONS AND LEGEND	16 JULY 2021
S1.01	GENERAL NOTES	16 JULY 2021
S1.02	SPECIAL INSPECTIONS	16 JULY 2021
S2.01	ENLARGED ROOF FRAMING PLAN	16 JULY 2021
MEP1.00	OVERALL FLOOR PLAN - AREAS OF WORK	16 JULY 2021
M0.00	GENERAL NOTES AND LEGENDS	16 JULY 2021
M0.01	MECHANICAL SPECIFICATIONS	16 JULY 2021
M1.01	MECHANICAL DEMO PLANS	16 JULY 2021
MP2.01	MECHANICAL & PLUMBING NEW PLANS	16 JULY 2021
MP4.01	MECHANICAL & PLUMBING DETAILS	16 JULY 2021
MP4.02	MECHANICAL & PLUMBING DETAILS	16 JULY 2021
MP5.01	MECHANICAL & PLUMBING SCHEDULES	16 JULY 2021
E0.00	GENERAL NOTES AND LEGENDS	16 JULY 2021
E0.01	ELECTRICAL SPECIFICATIONS	16 JULY 2021
E1.01	ELECTRICAL DEMO PLANS	16 JULY 2021
E2.01	ELECTRICAL FLOOR PLANS	16 JULY 2021
E5.01	ELECTRICAL SCHEDULES	16 JULY 2021



PROJECT VICINTIY MAP

BUILDING DATA :												
THE PROPOSED WORK HAS BEEN REVIEWED AS A LEVEL -II ALTERATION IN THE EXISTING BUILDING CODE OF NEW YORK STATE (EBCNYS) 2020 EDITION, CHAPTERS #7 & 8 EXISTING OCCUPANCY: "B" BUSINESS, "F-1" FACTORY & "S-1" STORAGE PROPOSED OCCUPANCY: "B" BUSINESS, "F-1" FACTORY & "S-1" STORAGE												
<b>CHAPTER #7 EBCNYS: (LEVEL - II ALTERATIONS)</b>												
THE FOLLOWING SECTIONS OF CHAPTER 7 OF EBCNYS, ARE APPLICABLE: <b>SECTION 702 - BUILDING ELEMENTS AND MATERIALS</b>												
<b>702.1 INTERIOR FINISHES :</b> NEWLY INSTALLED INTERIOR WALL AND CEILING FINISHES SHALL COMPLY WITH CHAPTER 8 OF THE BUILDING CODE OF NEW YORK STATE. "B" BUSINESS OCCUPANCY												
<table border="1"> <thead> <tr> <th></th> <th>REQUIRED</th> <th>PROVIDED</th> </tr> </thead> <tbody> <tr> <td>INTERIOR EXIT STAIRWAYS AND RAMP AND EXIT PASSAGEWAYS</td> <td>A</td> <td>A</td> </tr> <tr> <td>CORRIDORS AND ENCLOSURES FOR EXIT ACCESS STAIRWAYS AND RAMP</td> <td>B</td> <td>B</td> </tr> <tr> <td>ROOMS &amp; ENCLOSED SPACES</td> <td>C</td> <td>C</td> </tr> </tbody> </table>		REQUIRED	PROVIDED	INTERIOR EXIT STAIRWAYS AND RAMP AND EXIT PASSAGEWAYS	A	A	CORRIDORS AND ENCLOSURES FOR EXIT ACCESS STAIRWAYS AND RAMP	B	B	ROOMS & ENCLOSED SPACES	C	C
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CORRIDORS AND ENCLOSURES FOR EXIT ACCESS STAIRWAYS AND RAMP	B	B										
ROOMS & ENCLOSED SPACES	C	C										
<b>702.2 INTERIOR FLOOR FINISHES</b> SHALL COMPLY WITH B.C.N.Y.S. 804.4.2: MINIMUM CRITICAL RADIANT FLUX. "IN ALL OCCUPANCIES, INTERIOR FLOOR FINISH AND FLOOR COVERING MATERIALS IN ENCLOSURES FOR STAIRWAYS AND RAMP, EXIT PASSAGEWAYS, CORRIDORS AND ROOMS OR SPACES NOT SEPERATED FROM CORRIDORS BY PARTITIONS EXTENDING FROM THE FLOOR TO THE UNDERSIDE OF THE CEILING SHALL WITHSTAND A MINIMUM CRITICAL RADIANT FLUX. THE MINIMUM CRITICAL RADIANT FLUX SHALL BE NOT LESS THAN CLASS I IN GROUPS 1-1, 1-2, AND 1-3, AND NOT LESS THAN CLASS II IN GROUPS A, B, E, 1-4, M, R-1, R-2, AND S."												
<b>702.3 INTERIOR TRIM</b>												
<b>702.6 MATERIAL AND METHODS</b>												
<b>SECTION 703 - FIRE PROTECTION</b> 703.1 GENERAL												
<b>SECTION 704 - MEANS OF EGRESS</b> 704.1 GENERAL												
<b>CHAPTER #8 EBCNYS:</b>												
THE FOLLOWING SECTION OF CHAPTER 8 OF E.B.C.N.Y.S. ARE APPLICABLE:												
<b>SECTION 801 - GENERAL</b> 801.2 ALTERATION LEVEL 1 COMPLIANCE 801.3 COMPLIANCE												
<b>SECTION 807 - ELECTRICAL</b> 807.1 NEW INSTALLATIONS												
<b>SECTION 807 - ELECTRICAL</b> 808.3 LOCAL EXHAUST												

## BUILDING CODES

- 2018 INTERNATIONAL BUILDING CODE WITH NEW YORK STATE AMENDMENTS
- 2018 INTERNATIONAL EXISTING BUILDING CODE WITH NEW YORK STATE AMENDMENTS
- 2018 INTERNATIONAL MECHANICAL CODE WITH NEW YORK STATE AMENDMENTS
- 2018 INTERNATIONAL FUEL GAS CODE WITH NEW YORK STATE AMENDMENTS
- 2018 INTERNATIONAL ENERGY CONSERVATION CODE WITH NEW YORK STATE AMENDMENTS
- 2017 NATIONAL ELECTRICAL CODE



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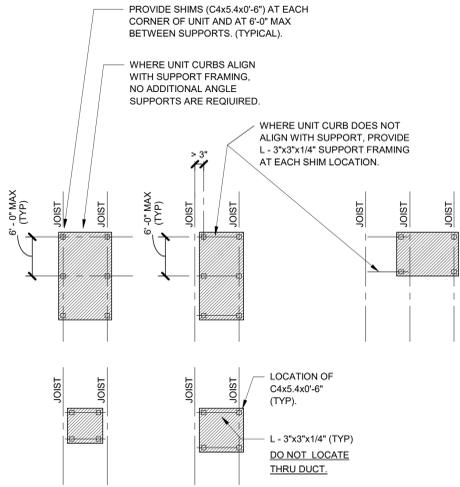






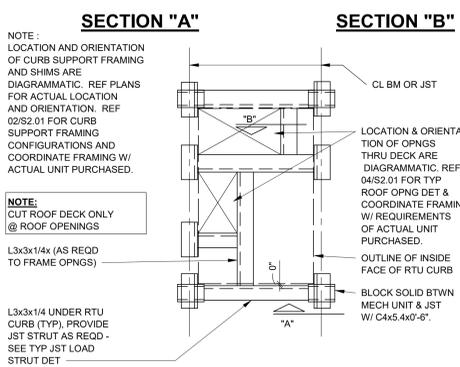
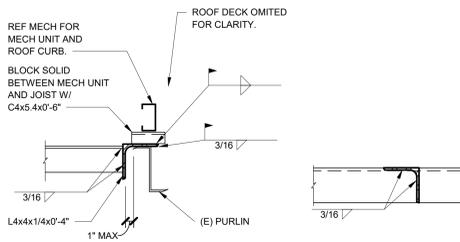




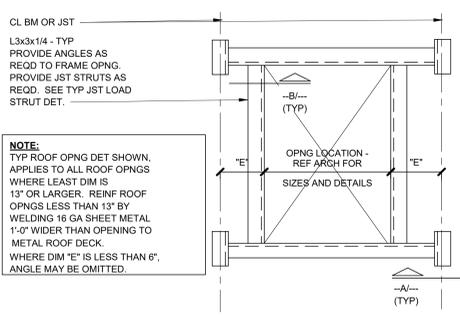


NOTE: REFER TO PLANS FOR LOCATION, ORIENTATION AND WEIGHT OF EACH UNIT. CURB SUPPORT FRAMING AND SHIMS SHOWN IN THESE DETAILS. REFER TO 04/S2.01 FOR FRAMING AROUND OPENINGS THRU THE ROOF DECK. REFER TO 03/S2.01 FOR DETAILS OF TYPICAL ROOF TOP UNIT SUPPORT. JOISTS SHOWN, BEAMS ARE SIMILAR.

**02 TYPICAL ROOF TOP UNIT CURB SUPPORT FRAMING CONFIGURATIONS.**

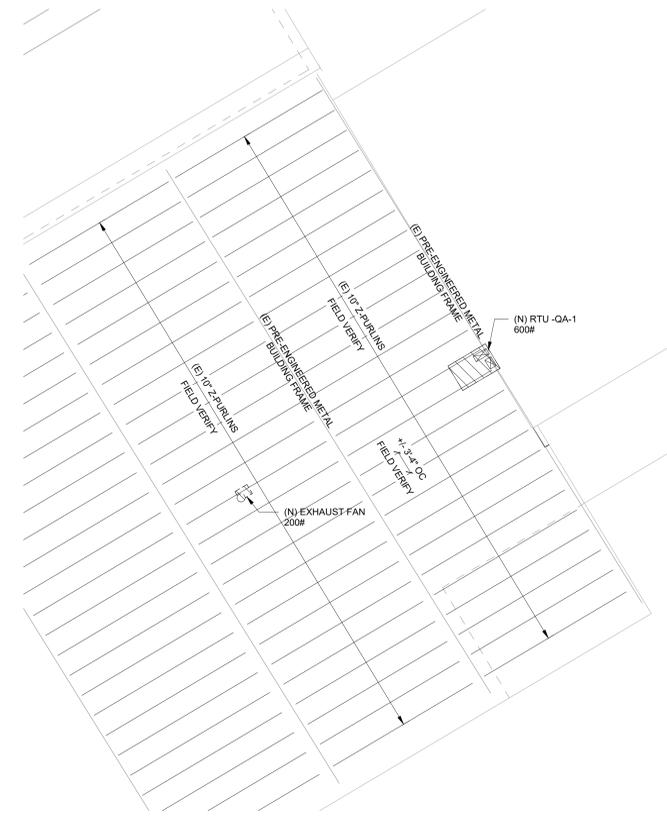


**03 TYPICAL ROOF TOP UNIT SUPPORT**



**04 TYPICAL ROOF OPENING DETAIL**

**01 AREA 2 PARTIAL ROOF FRAMING PLAN**  
1" = 10'-0"



- PLAN NOTES:**
- ALL ELEVATIONS ARE REFERENCED TO LEVEL 1 FINISHED FLOOR EL = 100'-0". REFERENCE SITE PLAN FOR ABSOLUTE ELEVATIONS.
  - SEE S0 SERIES FOR ABBREVIATIONS. SEE S1 SERIES FOR GENERAL NOTES AND SPECIAL INSPECTIONS
  - EXISTING STRUCTURAL ELEMENTS SHOWN FROM LIMITED SITE EXAMINATION BY OTHERS AND LIMITED ORIGINAL CONSTRUCTION DOCUMENTS. FIELD VERIFY SIZES AND LOCATIONS OF EXISTING FRAMING ELEMENTS. CONTACT STRUCTURAL ENGINEER IN THE EVENT OF CONFLICT AND DISCREPANCIES BETWEEN NEW AND EXISTING STRUCTURAL ELEMENTS.
  - COORDINATION ROOF TOP MECHANICAL EQUIPMENT WITH MECHANICAL PLANS.
  - UNLESS OTHERWISE NOTED, DO NOT DISTURB EXISTING STRUCTURAL ELEMENTS.
  - PRIOR TO DEMOLITION, FIELD VERIFY EXISTING ROOF ROD BRACING LOCATIONS.

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**FLNA - LIBERTY HVAC REPLACEMENT FOR QA LAB**  
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**REVISION HISTORY**

ISSUE	DESCRIPTION	DATE
0	ISSUE FOR CONSTRUCTION	16 JULY 2021



**ENLARGED ROOF FRAMING PLAN**

DRAWN BY JCG	CHECKED BY MW
PROJECT NUMBER 2115.053	PROJECT ABBREVIATION FLNA LIB QA LAB
ORIGINAL ISSUE 07/16/2021	CURRENT DOCUMENT STAGE IFC
FILE NAME	2115.053.rvt

**S2.01**  
SHEET NUMBER





MECHANICAL SPECIFICATIONS

PART 1 - GENERAL

- 1. CODES AND STANDARDS: THE LATEST EFFECTIVE PUBLICATIONS OF ALL APPLICABLE STANDARDS, CODES, ETC., AS THEY APPLY, FORM PART OF THESE SPECIFICATIONS AS IF WERE WRITTEN FULLY HEREIN AND CONTAINED WITHIN THESE SPECIFICATIONS. THE FOLLOWING WILL BE REFERRED TO THROUGHOUT IN ABBREVIATED FORMS.
  - A. NATIONAL ELECTRICAL CODE (NFPA 70) (NEC)
  - B. AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR CONDITIONING ENGINEERS (ASHRAE)
  - C. RULES AND REGULATIONS OF LOCAL GAS UTILITY COMPANY.
  - D. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
  - E. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
  - F. APPLICABLE LOCAL CODES.
  - G. AIR CONDITIONING ENGINEERS, INC. (UL)
  - H. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
  - I. INTERNATIONAL MECHANICAL CODE (IMC)
- 2. SCOPE OF WORK: WORK REQUIRED FOR THIS DIVISION INCLUDING LABOR, MATERIALS, EQUIPMENT, APPURTENANCES AND SERVICES TO PROVIDE COMPLETE MECHANICAL SYSTEMS AS SHOWN ON THE DRAWINGS AND SPECIFIED IN THIS DIVISION OF THE SPECIFICATIONS. THE WORD "PROVIDE" SHALL MEAN "FURNISH, TRANSPORT, INSTALL, CONNECT, WARRANT, START-UP, AND READY FOR USE, INCLUDING:
  - A. THE INSTALLATION OF ALL SYSTEMS SHALL BE MADE BY EXPERIENCED CRAFTSMEN IN A NEAT WORKMANLIKE MANNER. ALL MATERIALS, TOOLS, PERMITS AND INSPECTIONS AND ALL OTHER COSTS AND SERVICES NECESSARY TO PROVIDE ALL NEEDED MECHANICAL AND ELECTRICAL ITEMS SHALL BE FURNISHED AND PAID FOR IN FULL BY THE CONTRACTOR.
  - B. MATERIALS AND WORKMANSHIP SHALL COMPLY WITH THE CONTRACT DOCUMENTS AND ALL CURRENT APPLICABLE CODES AND STANDARDS. SHOULD THE CONTRACTOR PROVIDE ANY ITEM OR PERFORM ANY WORK THAT DOES NOT COMPLY WITH THE CURRENT APPLICABLE CODES AND STANDARDS, HE SHALL BEAR ALL COSTS ARISING FROM CORRECTING ANY DEFICIENCIES. CURRENT APPLICABLE AND ADOPTED CODES AND STANDARDS SHALL INCLUDE ALL ORDINANCES, UTILITY COMPANY REGULATIONS, OSHA REGULATIONS AND ALL APPLICABLE REQUIREMENTS OF CITY AND NATIONALLY ACCEPTED CODES AND STANDARDS.
  - C. IN THE CASES WHERE TWO OR MORE TRADES OR CONTRACTORS ARE INVOLVED IN THE INSTALLATION OF ANY ITEM, ALL SUCH PERSONS SHALL BE RESPONSIBLE FOR COORDINATING THEIR WORK AMONG THEMSELVES TO PROVIDE A FULLY COMPLETED, FUNCTIONING INSTALLATION.
  - D. WORK INCLUDES BUT IS NOT NECESSARILY LIMITED TO:
    - 1. HVAC
    - 2. DUCTWORK, GRILLES, AND ALL ACCESSORIES
    - 3. PIPING SYSTEMS, FITTINGS, AND ARRANGEMENTS
    - 4. PLUMBING FIXTURES, EQUIPMENT, AND PIPING
    - 5. INSULATION
    - 6. CONTROLS
- 3. SITE REVIEW: THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO BID TO DETERMINE THE EXTENT OF THE WORK AND COORDINATE WITH ALL EXISTING CONDITIONS. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS IN THE FIELD, INCLUDE ANY COSTS RELATED IN HIS BID, AND SHALL NOTE IN WRITING, ANY EXCEPTIONS TAKEN WHEN BIDDING THE WORK. THE CONTRACTOR'S EDGE OF EXISTING CONDITIONS WILL NOT BE CONSIDERED A BASIS FOR CHANGE ORDERS. PRIOR TO ORDERING EQUIPMENT, VERIFY THAT EQUIPMENT TO BE PROVIDED UNDER THIS CONTRACT IS AVAILABLE AND CAN FIT INTO BUILDING AREA PROPOSED. EXPENSE INCURRED BY THE CONTRACTOR, WHICH IN THE ENGINEER'S OPINION COULD HAVE BEEN AVOIDED BY THIS STEP, SHALL NOT BE A BASIS FOR CHANGE ORDERS.
- 4. DRAWINGS AND SPECIFICATIONS: THE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT AND ARRANGEMENT OF EQUIPMENT, FIXTURES AND PIPING SYSTEMS. THEIR DRAWINGS SHALL NOT BE SCALED AND THEIR ABSOLUTE ACCURACY IS NOT WARRANTED. BRANCH CIRCUITS, PIPING ARRANGEMENTS, MECHANICAL AND ELECTRICAL COMPONENT LOCATION, AND LIKE HAVE BEEN DESIGNED FOR ECONOMY CONSISTENT WITH GOOD PRACTICE AND OTHER CONSIDERATIONS. MAJOR REVISIONS SHALL BE FULLY DRAWN AS SHOWN ON THE DRAWINGS, IF ACCEPTED, MUST BE APPROVED IN WRITING BY THE ENGINEER, PRIOR TO PROCEEDING. ALL SUCH CHANGES SHALL BE CLEARLY IDENTIFIED AS "REVISED" DRAWINGS AS SPECIFIED. IT IS THE INTENTION OF THESE SPECIFICATIONS AND DRAWINGS TO FULLY COVER ALL WORK AND MATERIALS FOR A COMPLETE, FUNCTIONING INSTALLATION. ANY DEVICES USUALLY EMPLOYED IN THIS CLASS OF WORK NOT SPECIFICALLY MENTIONED OR SHOWN ON THE DRAWINGS OR IN THIS SPECIFICATION, BUT WHICH MAY BE NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK, SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR AS A PART OF HIS TOTAL WORK UNDER THIS DIVISION. CONSULT THE ARCHITECT'S DRAWINGS OF ALL OTHER TRADES AND PERFORM ALL MECHANICAL WORK REQUIRED THEREIN. COOPERATE WITH ALL OTHER CONTRACTORS OR SUBCONTRACTORS TO FURNISH THE BEST QUALITY WORK. PROVIDE A WRITTEN WARRANTY FOR A PERIOD OF NOT LESS THAN 12 MONTHS AGAINST DEFECTIVE WORKMANSHIP AND MATERIAL AFTER FINAL ACCEPTANCE AT NO ADDITIONAL COST TO THE OWNER.
  - A. FOR ALL EQUIPMENT HAVING AN EXTENDED WARRANTY AVAILABLE, THE CONTRACTOR SHALL INCLUDE THE FULL ADDITIONAL COST IN HIS BASE BID.
  - B. ALL WARRANTY CERTIFICATES AND EXTENDED WARRANTY CERTIFICATES ISSUED FOR EQUIPMENT SHALL BE TRANSMITTED TO THE OWNER.
  - C. ALL REFRIGERANT MOTOR-COMPRESSORS PROVIDED ON THIS PROJECT SHALL BE PROVIDED WITH A FIVE (5) YEAR COMPRESSOR WARRANTY.
- 6. AS-BUILTS: DURING CONSTRUCTION, CONTRACTOR SHALL KEEP AN ACCURATE RECORD OF ALL DEVIATIONS FROM THE WORK AS SHOWN ON THE CONTRACT DRAWINGS AND THAT WHICH IS ACTUALLY INSTALLED ON A SET OF PRINTS OF THE MECHANICAL DRAWINGS, AND NOTE CHANGES THEREON WITH RED MARKS, IN A NEAT AND ACCURATE MANNER, WHEN ALL REVISIONS HAVE BEEN SHOWN ON THESE PRINTS TO INDICATE THE WORK AS FINALLY INSTALLED. THE PRINTS SHALL BE DELIVERED TO THE ENGINEER BEFORE THE START-UP OF THE SYSTEM. TESTS: THE RIGHT IS RESERVED TO INSPECT AND TEST ANY PORTION OF THE INSTALLATION/EQUIPMENT DURING THE PROGRESS OF ITS ERECTION. THE CONTRACTOR SHALL TEST THE ENTIRE SYSTEM FOR A PERIOD OF 72 HOURS PRIOR TO OCCUPANCY. TEST, ADJUST AND BALANCE SYSTEMS AS REQUIRED AND RECOMMENDED BY MANUFACTURERS.
  - A. PROVIDE PERSONNEL AND EQUIPMENT, MAKE REQUIRED TESTS, AND SECURE REQUIRED APPROVALS FROM THE ARCHITECT AND GOVERNMENTAL AGENCIES HAVING JURISDICTION TO THE ARCHITECT/ENGINEERS
  - B. MAKE WRITTEN NOTICE TO THE ARCHITECT/ENGINEERS ADEQUATELY IN ADVANCE OF EACH OF THESE:
    - 1. WHEN ROUGH-INS ARE COMPLETE BUT NOT COVERED.
    - 2. AT COMPLETION OF THE WORK.
    - 3. WHEN MATERIAL AND/OR WORKMANSHIP IS FOUND TO NOT COMPLY WITH THE SPECIFIED REQUIREMENTS: WITHIN THREE DAYS AFTER RECEIPT OF NOTICE OF NON-COMPLIANCE, REMOVE THE NON-COMPLYING ITEMS FROM THE JOB SITE AND REPLACE THEM WITH ITEMS THAT COMPLY WITH THE SPECIFIED REQUIREMENTS, ALL AT NO ADDITIONAL COST TO THE OWNER.
    - D. IN THE ARCHITECT'S/ENGINEER'S PRESENCE, TEST ALL PARTS OF ALL SYSTEMS AND DEMONSTRATE THAT ALL SUCH ITEMS PROVIDED UNDER THIS SECTION FUNCTION IN THE REQUIRED MANNER.
  - 8. PERMITS AND INSPECTIONS: SECURE AND PAY FOR ALL REQUIRED PERMITS AND INSPECTIONS. INSPECTION CERTIFICATES FROM LOCAL AUTHORITIES HAVING JURISDICTION SHALL BE DELIVERED TO THE OWNER BEFORE FINAL PAYMENT.
  - 9. SUBMITTALS: SUBMIT CLEARLY MARKED SHOP DRAWINGS IN PDF FORMAT, INCLUDING PRODUCT DATA AND SAMPLES WITHIN THIRTY (30) DAYS OF AWARD OF CONTRACT AND IN ACCORDANCE WITH THE GENERAL CONDITIONS AND SUPPLEMENTARY CONDITIONS. SUBMITTALS ARE REQUIRED FOR ALL ITEMS PROVIDED UNDER THIS SPECIFICATION. REVIEW OF SUBMITTALS BY THE ENGINEER AND ANY ASSOCIATED ACTION TAKEN BY THE ENGINEER DOES NOT RELIEVE THE CONTRACTOR OF ANY REQUIREMENTS SET FORTH BY THE CONTRACT DOCUMENTS. INCOMPLETE SUBMITTALS SHALL NOT BE REVIEWED. SUBMITTALS DRAWING SUBMISSIONS IN EXCESS OF THREE (3) TRANSMISSIONS MAY BE CONSIDERED ADDITIONAL SERVICES.
    - A. SHOP DRAWINGS AND PRODUCT DATA: OBTAIN APPROVED SHOP DRAWINGS SHOWING EQUIPMENT ON THE FOLLOWING ITEMS AS REQUESTED BY THE ENGINEER, CAPACITY, MANUFACTURER'S RECOMMENDATIONS AND HOODUP DETAILS, FROM OTHER TRADES INVOLVED CONTRACTORS FOR ALL EQUIPMENT AND COMPLY THEREWITH.
      - 1. HVAC EQUIPMENT
      - 2. FANS
      - 3. AIR DEVICES
      - 4. PLUMBING EQUIPMENT, FIXTURES & TRIM
    - B. TESTS AND REPORTS: PRIOR TO SUBSTANTIAL COMPLETION, SUBMIT TESTING, ADJUSTING AND BALANCING REPORT TO ENGINEER FOR REVIEW. AN APPROVED TAB REPORT MUST BE RECEIVED BY THE ENGINEER PRIOR TO SUBSTANTIAL COMPLETION.
    - C. CONTRACTOR SHALL OBTAIN APPROVAL FROM THE ENGINEER OF ALL MAJOR ITEMS OF EQUIPMENT PRIOR TO PLACING ORDERS. SHOULD THE CONTRACTOR SUPPLY EQUIPMENT DIFFERING FROM THE SCHEDULED OR SPECIFIED ITEM ON THE CONTRACT DOCUMENTS WITHOUT NOTIFICATION TO THE ENGINEER, HE SHALL BEAR ALL COST TO REMEDY ANY DEFICIENCIES OR CONFLICTS ARISING FROM DEVIATION FROM BASIS OF DESIGN.

PART 2 - PRODUCTS

- 1. MANUFACTURING STANDARDS: MATERIALS SHALL BE NEW, APPROVED AND LABELED BY ASME, ASHRAE, UL, ETC., WHEREVER STANDARDS HAVE BEEN ESTABLISHED BY THAT AGENCY. DEFECTIVE EQUIPMENT OR EQUIPMENT DAMAGED IN THE COURSE OF INSTALLATION OR TEST SHALL BE REPLACED OR REPAIRED IN A MANNER MEETING THE APPROVAL OF THE OWNER. ALL ITEMS OF THE SAME TYPE SHALL BE IDENTICAL IN MAKE, MODEL, AND ACCESSORIES.
- 2. TRADE NAMES: UNLESS SPECIFICALLY IDENTIFIED OTHERWISE, MANUFACTURER'S NAMES AND CATALOG NUMBERS INDICATED HEREIN AND ON THE DRAWINGS ARE NOT INTENDED TO BE PROPRIETARY DESIGNATIONS. THEY ARE TO INDICATE GENERAL TYPE AND QUALITY OF MATERIALS AND EQUIPMENT REQUIRED. EQUIPMENT AND MATERIALS BY OTHER MANUFACTURERS WHICH IN THE OPINION OF THE ENGINEER ARE OF EQUAL QUALITY AND WHICH WILL PRODUCE THE SAME RESULTS WILL BE CONSIDERED ACCEPTABLE. INSTALL ALL EQUIPMENT AS RECOMMENDED BY EACH MANUFACTURER. INSTALL ALL PAD/GRADE MOUNTED EQUIPMENT LEVEL AND PLUMB, PARALLEL AND PERPENDICULAR TO OTHER BUILDING SYSTEMS AND COMPONENTS IN EXPOSED INTERIOR SPACES, UNLESS OTHERWISE NOTED OR INDICATED.
- 3. DUCT INSULATION: INSULATE ALL SUPPLY, RETURN, AND OUTSIDE AIR DUCTWORK WITH ITEMS BELOW.
  - A. FACED FLEXIBLE GLASS FIBER DUCT INSULATION SHALL HAVE A FIRE RETARDANT, REINFORCED FOLKRAFT VAPOR BARRIER FACING AND SHALL BE EQUAL TO OWENS-CORNING FIBERGLASS FACED DUCT WRAP SOFTR SYSTEMS-100. INSULATION SHALL HAVE A NOMINAL THICKNESS OF 2 INCHES AND A THERMAL CONDUCTIVITY OF APPROXIMATELY 0.27 AT 75° F.
  - B. FACED RIGID GLASS FIBER DUCT INSULATION SHALL HAVE A FIRE RETARDANT, REINFORCED FOLKRAFT VAPOR BARRIER FACING AND SHALL BE EQUAL TO JOHNS MANVILLE 800 SERIES SPIN-GLASS. INSULATION SHALL HAVE A NOMINAL THICKNESS OF 1-1/2 INCHES AND A THERMAL CONDUCTIVITY OF APPROXIMATELY 0.23 AT 75° F. AND A DENSITY OF 2 - 3 POUNDS PER CUBIC FOOT.
- 4. FLEXIBLE DUCTWORK: SHALL HAVE 1" THICK INSULATION WITH FOIL JACKET AND VAPOR BARRIER LINER. DUCT SHALL MEET CLASS UL-181, CLASS II AND NFPA 90A, FACTORY APPLIED INSULATION, VAPOR BARRIER AND END CONNECTIONS. FLAME SPREAD = 25. SMOKE DEVELOPED = 50. SECURE WITH ADHESIVE AND METAL CLAMP. INNER CORE SHALL BE HELICALLY CORRUGATED.
- 5. DUCTWORK: SUPPLY AND RETURN DUCTWORK SHALL BE GALVANIZED SHEET METAL CONSTRUCTED AND SEALED ACCORDING TO SMACNA STANDARDS FOR 4" W.C. POSITIVE AND 2" NEGATIVE PRESSURE. SHEET METAL GAUGES SHALL BE IN ACCORDANCE WITH LOCAL MECHANICAL CODE. PROVIDE FLEXIBLE GLASS FIBER DUCT INSULATION FOR CONCEALED LOCATIONS AND RIGID GLASS FIBER DUCT INSULATION FOR EXPOSED AREAS.
- 6. FLEXIBLE DUCT CONNECTORS: PROVIDE AIRTIGHT FLEXIBLE DUCT CONNECTORS AT DUCT CONNECTIONS TO EACH AIR-HANDLING UNIT, EXHAUST FAN, AND VENTILATING FAN. SUPPORT CONNECTORS AT EACH END WITH METAL FRAME BANDS AND SECURELY BOLT IN PLACE. PROVIDE NOT LESS THAN 20-OUNCE GLASS FABRIC DUCT CONNECTORS COATED ON BOTH SIDES WITH NEOPRENE.
- 7. TURNING VANES: PROVIDE FABRICATED TEES AND SQUARE ELBOWS IN ACCORDANCE WITH SMACNA DCS FOR VANE ELBOWS.
- 8. DAMPERS: PROVIDE OPPOSED BLADE ADJUSTABLE MANUAL DAMPERS WHERE INDICATED. PROVIDE DAMPER SHAFTS WITH 2-INCH STANDING TO CLEAR 2 INCHES OF DUCT INSULATION WITH BEARINGS AT BOTH ENDS OF THE SHAFTS. PROVIDE ADJUSTMENT QUADRANT WITH INDICATOR AND LOCKING DEVICES. PROVIDE GALVANIZED STEEL DAMPERS ONE GAGE HEAVIER THAN DUCT IN WHICH DAMPERS ARE INSTALLED.
- 9. DIFFUSERS, REGISTERS, AND GRILLES: PROVIDE FACTORY-FABRICATED METAL UNITS WITH EDGES ROUNDED OR ROUNDED WHERE EXPOSED TO VIEW, AND FACTORY PRIMED WITH WHITE ENAMEL FINISH. PROVIDE WITH FRAMES COMPATIBLE WITH EACH SYSTEM TYPE. PROVIDE EACH DIFFUSER AND REGISTER WITH FACTORY-FABRICATED, GROUP-OPERATED, ADJUSTABLE, OPPOSED-BLADE, AIR-VOLUME-CONTROL DAMPERS. KEY OR SCREWDRIVER OPERATED FROM THE FACE OF UNIT. PROVIDE EACH UNIT WITH RUBBER OR PLASTIC INSTALLATION GASKETS. CONTRACTOR SHALL COORDINATE ALL DIFFUSER LOCATIONS AND FRAMES TYPES WITH LOCAL APPROVED REFLECTED CEILING PLAN FOR LIGHT FIXTURES AND ALL OTHER CEILING MOUNTED DEVICE LOCATIONS. COORDINATE SIDEWALL GRILLES WITH FINAL APPROVED INTERIOR ELEVATION.
  - A. PROVIDE AIR DEVICES AS MANUFACTURED BY:
    - 1. TITUS
    - 2. KRUEGER
    - 3. METALAIR
    - 4. STOOCHAM
- 10. VALVES AND PIPING SPECIALTIES:
  - A. ACCEPTABLE MANUFACTURERS
    - 1. GATE, GLOBE, ANGLE, CHECK, DRAIN AND BALL VALVES
    - 2. STOOCHAM
    - 3. LUNKENHEIMER
    - 4. CRANE
    - 5. NIBCO
    - 6. MILWAUKEE VALVE CO., INC.
    - 7. HAMMOND CO.
  - B. BALANCING VALVES
    - 1. BELL & GOSSETT
    - 2. ARMSTRONG
    - 3. TACO
  - C. VALVE CONNECTIONS
    - 1. PROVIDE VALVES SUITABLE TO CONNECT TO ADJOINING PIPING AS SPECIFIED FOR PIPE JOINTS. USE PIPE SIZE VALVES.
    - 2. THREAD OR SWEAT PIPE SIZES 2 INCHES AND SMALLER.
    - 3. FLANGE PIPE SIZES 2 INCHES AND LARGER.
    - 4. PROVIDE BUTTERFLY VALVE WITH TAPPED LUG BODY WHEN USED FOR ISOLATING SERVICE.
  - D. GATE VALVES
    - 1. BRONZE, NON-RISING STEM, INSIDE SCREW, DOUBLE WEDGE OR DISC, SCREWED ENDS
    - 2. IRON BODY, BRONZE TRIM, RISING STEM, O.S. & Y., SOLID WEDGE FLANGED ENDS
  - E. GLOBE OR ANGLE VALVES
    - 1. BRONZE, RISING STEM, INSIDE SCREW, RENEWABLE COMPOSITION DISC, SCREWED ENDS
    - 2. IRON BODY, BRONZE TRIM, RISING STEM O.S. & Y., RENEWABLE COMPOSITION DISC, FLANGED ENDS.
  - F. CHECK VALVES
    - 1. BRONZE, SWING DISC, SCREWED ENDS
    - 2. IRON BODY, BRONZE TRIM, SWING DISC, RENEWABLE DISC AND SEAT, FLANGED ENDS
    - 3. IRON BODY, BRONZE TRIM, SPRING LOADED, RENEWABLE COMPOSITION DISC, FLANGED ENDS.
  - G. BUTTERFLY VALVES
    - 1. IRON BODY, BRONZE DISC, RESILIENT REPLACEABLE LINER SEAT, TAPPED LUG BODY.
    - 2. PROVIDE WITH MINIMUM SEVEN POSITION LEVER HANDLE FOR BALANCING SERVICE.
  - H. DRAIN VALVES
    - 1. BRONZE COMPRESSION STOP WITH HOSE THREAD CONNECTION.
  - I. BALL VALVES
    - 1. BRASS BODY, BRASS OR STAINLESS STEEL BALL AND STEM
    - 2. BALL VALVES COMBINED WITH STRAINERS, BALANCING, OR FLOW CONTROL VALVES TO HAVE UNIONS TO PERMIT REMOVAL OF ALL COMPONENTS WITHOUT REMOVING VALVE BODY.
- 11. EXHAUST FANS: ALL FANS SHALL CARRY THE CERTIFIED RATING SEAL AUTHORIZED BY AMCA. PROVIDE CENTRIFUGAL EXHAUST FANS WITH ALUMINUM HOUSING, FAN WHEEL, AND BIRD SCREEN. PROVIDE EXHAUST OPENING AND GRAVITY CLOSING TYPE AUTOMATIC BACKDRAFT DAMPERS.
- 12. HOT WATER, COLD WATER, AND CONDENSATE DRAIN PIPING: INSULATE ALL CONDENSATE PIPING, DOMESTIC HOT WATER AND COLD WATER PIPING WITH 1/2" THICK OWENS CORNING FIBERGLASS ASU SSL-II OR APPROVED EQUAL, SEALED TO PREVENT SWEATING AND CONTINUOUS THROUGH WALLS, FLOOR, CEILING AND AT HANGERS PROVIDE BLOCKS AND INSULATION SHIELDS TO PREVENT CRUSHING OF INSULATION AT HANGERS.
  - A. CLOSED CELL INSULATION RATED 25/50 MAY BE SUBSTITUTED IN EQUIVALENT THICKNESS FOR FIBERGLASS INSULATION, ARMAFLEX OR APPROVED EQUAL.
  - B. PROVIDE ALL INSULATION AND JACKET MATERIALS SPECIFICALLY APPROVED FOR AIR PLENUM USE WHERE EXPOSED TO PLENUM AIR.
  - C. PROVIDE ALUMINUM WEATHERPROOF JACKET AND SELF-REGULATING HEAT TAPE FOR ANY PIPING EXPOSED TO OUTDOOR CONDITIONS.

PART 3 - EXECUTION

- 1. FIELD INSPECTION AND TESTS
  - A. PRESSURE PIPING TESTS: TEST PRESSURE SHALL BE 1.5 TIMES DESIGN PRESSURE. TESTS SHALL BE MADE AT LEAST 24 HOURS BEFORE BACKFILLING. HOWEVER, PLACE SUFFICIENT BACKFILL MATERIAL BETWEEN FITTINGS TO HOLD PIPE IN PLACE DURING TESTS. TEST SYSTEM GAS-TIGHT PER ANSI B31. USE CLEAN DRY AIR OR INERT GAS (E.G. NITROGEN OR CARBON DIOXIDE) FOR TESTING. SYSTEMS WHICH MAY BE CONTAMINATED BY GAS SHALL FIRST BE PURGED AS SPECIFIED HEREIN. MAKE TESTS ON ENTIRE SYSTEM OR ON SECTIONS THAT CAN BE ISOLATED BY VALVES. AFTER PRESSURIZATION, ISOLATE ENTIRE PIPING SYSTEM FROM ALL SOURCES OF AIR DURING TEST PERIOD. MAINTAIN TEST PRESSURE FOR AT LEAST 8 HOURS BETWEEN TIMES OF FIRST AND LAST READING OF PRESSURE AND TEMPERATURE. TAKE FIRST READING AT LEAST ONE HOUR AFTER TEST PRESSURE HAS BEEN APPLIED. DO NOT TAKE TEST READINGS DURING RAPID WEATHER CHANGES. TEMPERATURE SHALL BE SAME AS ACTUAL TRENCH CONDITIONS. THERE SHALL BE NO REDUCTION IN THE APPLIED TEST PRESSURE OTHER THAN THAT DUE TO A CHANGE IN AMBIENT TEMPERATURE. ALLOW FOR AMBIENT TEMPERATURE CHANGE IN ACCORDANCE WITH THE RELATIONSHIP  $PF = 14.7 + (P1 + 14.7) (T2 + 460) / (T1 + 460)$ , IN WHICH T AND PF REPRESENT FAHRENHEIT TEMPERATURE AND GAUGE PRESSURE, RESPECTIVELY. SUBSCRIPTS 1 AND 2 DENOTE INITIAL AND FINAL READINGS, AND "PF" IS THE CALCULATED FINAL PRESSURE. IF "PF" EXCEEDS THE MEASURED FINAL PRESSURE (FINAL GAUGE READING), THE CONTRACTOR SHALL RECHECK THE SECTION OF THE PIPING SYSTEM, RETEST EACH SECTION INDIVIDUALLY, AND APPLY A SOLUTION OF WARM SOAPY WATER TO ALL JOINTS OF GAS. IF CORROSION OR RUST OCCURS, A TEST GAUGE CALIBRATED IN 1 PSI INCREMENTS AND READABLE TO 0.5 PSI SHALL BE USED IN PERFORMING THE TESTS.
  - B. PRESSURE TESTING: AFTER PRESSURE TESTS, AND BEFORE TESTING A GAS CONTAMINATED LINE, PURGE LINE WITH AIR OR NITROGEN AT JUNCTION WITH MAIN LINE TO REMOVE ALL AIR OR GAS. CLEANING AND TESTING SHALL BE DONE IN A MANNER APPROVED BY THE ARCHITECTURAL AND STRUCTURAL ENGINEER. CUTTING AND PATCHING SHALL NOT ENDANGER STRUCTURAL INTEGRITY IN ANY WAY. PATCHING SHALL EXACTLY MATCH CONTIGUOUS WORK. ACTUAL WORK OF CUTTING AND PATCHING OF CEILING SURFACES SHALL BE PERFORMED BY THE SUBCONTRACTOR WHO ORIGINALLY PREPARED THE SURFACES. E.G. CUTTING AND PATCHING OF MASONRY WALL WILL BE PERFORMED BY THE MASONRY SUBCONTRACTORS. COSTS FOR CUTTING AND PATCHING SHALL BE BORNE BY THE MECHANICAL SUBCONTRACTOR. CUTTING SHALL BE CAREFULLY DONE AND DAMAGE TO BUILDING, PIPING, WIRING OR EQUIPMENT TO BE AVOIDED. IF CUTTING SHALL BE REPAIRED BY SKILLED MECHANICS OF TRADE INVOLVED.
- 3. COORDINATION: COOPERATE AND COORDINATE EFFORTS WITH ALL CONTRACTORS ON THE PROJECT. THIS IS ESPECIALLY IMPORTANT IN DETERMINING EXACT LOCATIONS OF ALL DIFFUSERS, REGISTERS, GRILLES, DUCTWORK AND FANS, ARRANGE AIR INLETS AND OUTLETS IN ACCORDANCE WITH THE ARCHITECTURAL AND STRUCTURAL PLANS UNLESS OTHERWISE INDICATED. COORDINATE LIGHTING FIXTURE LOCATIONS WITH GRILLES, DIFFUSERS, ACCESS PANELS, ETC. VERIFY COORDINATION OF MECHANICAL AND ELECTRICAL WORK PRIOR TO ORDERING EQUIPMENT OR OTHER DEVICES TO ENSURE PROPER DEVICE IS FURNISHED TO MATCH CONSTRUCTION. THIS VERIFICATION MUST BE EVIDENCED REGARDLESS OF INFORMATION PLACED ON THE DRAWINGS. ANY COST INCURRED WHICH IN THE OPINION OF THE OWNER, COULD HAVE BEEN AVOIDED BY THIS STEP SHALL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR.
- 4. GUARANTEE OF WORK: CONTRACTOR GUARANTEES BY HIS ACCEPTANCE OF THE CONTRACT THAT ALL WORK INSTALLED IS FREE FROM ANY AND ALL DEFECTS IN WORKMANSHIP AND/OR MATERIALS, AND THAT THE APPARATUS WILL DEVELOP CAPACITIES AND CHARACTERISTICS SPECIFIED, AND THAT IF, DURING THE PERIOD OF ONE YEAR OR AS OTHERWISE SPECIFIED, FROM DATE OF CERTIFICATION OF COMPLETION AND ACCEPTANCE OF THE WORK ANY SUCH DEFECTS IN WORKMANSHIP MATERIAL OR PERFORMANCE APPEAR, HE WILL, WITHOUT COST TO THE OWNER, REMEDY SUCH DEFECTS WITHIN A REASONABLE TIME TO BE SPECIFIED IN NOTICE. IN DEFAULT THEREOF, THE OWNER MAY HAVE SUCH WORK DONE AND CHARGE COST TO CONTRACTOR. EQUIPMENT GUARANTEES FROM DATE OF "START-UP" WILL NOT BE RECOGNIZED.
- 5. INSULATION: INSTALL DUCT AND PIPE INSULATION AFTER TESTING IS COMPLETE.
- 6. FIELD COORDINATION: THE EXACT LOCATION OF PIPES WILL BE DETERMINED BY THE CONTRACTOR AFTER THE WORKING PLANS ARE MADE TO AVOID INTERFERENCE WITH DUCTS, LIGHTING FIXTURES AND PIPING.
- 7. PERFORMANCE TESTING: BEFORE FINAL ACCEPTANCE OF THE WORK, TEST EACH SYSTEM AS IN SERVICE TO DEMONSTRATE COMPLIANCE WITH THESE DRAWINGS AND TESTING AS SPECIFIED IN THE LOCAL MECHANICAL CODE.
- 8. TAB: BALANCE AIR SIDE SYSTEMS RELATED TO SCOPE OF WORK. CERTIFIED BALANCE REPORTS SHALL BE FURNISHED TO THE ENGINEER FOR REVIEW AND APPROVAL. REPORT FORMAT AND PROCEDURE SHALL BE IN ACCORDANCE WITH ASBC OR NEED REQUIREMENTS BY AN ASBC OR NEB CERTIFIED PROFESSIONAL AND SHALL BE PERFORMED BY A THIRD PARTY TESTING AGENCY.
- 9. CODE INSTALLATION: EQUIPMENT WHICH IS REQUIRED BY CODE OR IS SPECIFIED TO HAVE UL OR SIMILAR LISTING, SHALL BE INSTALLED AS REQUIRED TO MEET THAT LISTING.
- 10. PIPE SLEEVES: PROVIDE PIPE SLEEVES AT WALL PENETRATIONS. PIPE SLEEVE SHALL BE FIRE RATED WHERE REQUIRED.
- 11. ROOF PENETRATIONS AND EQUIPMENT INSTALLATIONS SHALL BE IN ACCORDANCE WITH ROOFING MANUFACTURER SO AS NOT TO VOID ROOF WARRANTY.
- 12. SMOKE DETECTORS: PROVIDE SMOKE DETECTORS AT AIR HANDLING UNITS AS REQUIRED BY LOCAL MECHANICAL CODES.
- 13. CONDENSATE TRAPS: PROVIDE TRAPPED CONDENSATE DRAINS ON AIR HANDLING UNITS.
- 14. CONCEALED INSTALLATIONS: RUN PIPES AND DUCTWORK ABOVE CEILINGS IN ROOMS WITH CEILINGS, RUN EXPOSED PIPES AS HIGH AS POSSIBLE, IN STRAIGHT LINES PARALLEL OR PERPENDICULAR TO STRUCTURE AND/OR WALLS.
- 15. VIBRATION ISOLATION: INSTALLATION OF ALL VIBRATION ISOLATION MATERIALS AND SUPPLEMENTAL EQUIPMENT BASES SPECIFIED IN THIS SPECIFICATION SHALL BE ACCOMPLISHED FOLLOWING THE MANUFACTURERS WRITTEN INSTRUCTIONS. ON COMPLETION OF INSTALLATION OF ALL ISOLATION MATERIALS AND BEFORE STARTUP OF ISOLATED EQUIPMENT ALL DEBRIS SHALL BE CLEARED FROM AREAS SURROUNDING AND FROM BENEATH ALL ISOLATED EQUIPMENT, LEAVING EQUIPMENT FREE TO MOVE ON THE ISOLATION SUPPORTS. NO RIGID CONNECTIONS BETWEEN EQUIPMENT AND BUILDING STRUCTURE SHALL BE MADE THAT DEGRADES THE NOISE AND VIBRATION ISOLATION SYSTEM HEREIN SPECIFIED. ELECTRICAL CONDUIT CONNECTIONS TO ISOLATED EQUIPMENT SHALL BE LOOPED TO ALLOW FREE MOTION OF ISOLATED EQUIPMENT.

PART 3 - EXECUTION

- 1. WIRING AND ELECTRICAL EQUIPMENT: FROM SOURCE UP TO AND INCLUDING JUNCTION BOX OR CIRCUIT BREAKER SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.
- 2. VIBRATION ISOLATOR: FOR ALL MOTOR DRIVEN MECHANICAL EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS AND AS SHOWN.
  - A. TYPE 1: SPRING TYPE MOUNT. SPRING TYPE ISOLATORS SHALL BE FREE STANDING, LATERALLY STIFF, STAY IN CONTACT WITH HOUSING AND COMPLETE WITH 1/4" NEOPRENE ACOUSTICAL FRICTION PADS BETWEEN THE BASEPLATE AND THE SUPPORT. ALL MOUNTING SHALL HAVE LEVELING BOLTS THAT MUST BE RIGIDLY BOLTED TO THE EQUIPMENT. SPRING DIAMETERS SHALL BE NO LESS THAN 0.8 OF THE COMPRESSED HEIGHT OF THE SPRING AT RATED LOAD. SPRINGS SHALL HAVE A MINIMUM ADDITIONAL TRAVEL TO SOLID EQUAL TO 50% OF THE RATED DEFLECTION. BASED ON MASON MODEL 5F.
- 3. DOMESTIC HOT AND COLD WATER, RELIEF VALVE AND CONDENSATE DRAINAGE PIPING SHALL BE TYPE "L" COPPER WITH WROUGHT COPPER FITTINGS. NO JOINT SHALL BE CONCEALED IN SLABS. JOIN ALL WATER PIPING WITH LEAD FREE SOLDER. SANITIZE POTABLE WATER SYSTEMS PER LOCAL HEALTH DEPARTMENT REQUIREMENTS.
- 4. SANITARY SEWER DRAIN WASTE AND VENT PIPING SHALL BE SERVICE WEIGHT CAST IRON WITH PROPER CAST IRON FITTINGS. PROVIDE PIPING ABOVE GRADE WHERE LOCAL CODES ALLOW ITS USE IN THE TYPE OF BUILDING WHERE WORK IS BEING DONE.
- 5. ALL WATER SERVICE VALVES SHALL BE BUTTERFLY TYPE OR BALL VALVE TYPE ONLY, RATED FOR 200 PSIG WOG.
- 6. PLUMBING FIXTURES AND EQUIPMENT SHALL BE FURNISHED AS SCHEDULED OR INDICATED AND INSTALLED COMPLETE WITH STOP KITS, ESCUTCHEONS, TRIM, AND ALL OTHER APPURTENANCES REQUIRED TO CONNECT ROUGH-IN PIPING AT FLOORS AND WALLS UNLESS SPECIFIED OTHERWISE.
  - A. PROVIDE PLUMBING EQUIPMENT AS MANUFACTURER BY:
    - 1. AMERICAN STANDARD
    - 2. KHOLER
    - 3. ELJER
    - 4. JOSIAH
    - 5. WADE
    - 6. ELKAY
- 7. FLOW BALANCING OF ALL SYSTEMS PROVIDED SHALL BE INCLUDED UNDER THIS CONTRACT BALANCE AIR FLOW AT ALL AIR DEVICES TO ± 10% OF VALUE SHOWN ON DRAWINGS, PROVIDE WRITTEN BALANCE REPORT.
- 8. PROVIDE ENGRAVED NAMEPLATE ATTACHED WITH SCREWS FOR ALL MAJOR EQUIPMENT PROVIDED. USE NOMECLATURE FROM EQUIPMENT SCHEDULES.
- 9. PROVIDE SNAP-ON TYPE PIPE MARKERS EACH 10'-0" THAT INDICATE BOTH DIRECTION AND PIPE CONTENT. ADHESIVE TYPE MARKERS ARE PROHIBITED FROM LABELING.
- 10. HVAC CONTROLS
  - A. FOR EACH HVAC SYSTEM, PROVIDE 7 DAY ELECTRONIC PROGRAMMABLE THERMOSTAT/HUMIDISTAT AS PROVIDED BY THE ROOFTOP UNIT MANUFACTURER. PROVIDE INITIAL PROGRAMMING BASED ON DESIRED OPERATING CONDITIONS OBTAINED FROM OWNER'S REPRESENTATIVE.
- 11. FIRE SPRINKLER SYSTEM REVISIONS SHALL BE PROVIDED IN ACCORDANCE WITH ALL APPLICABLE NFPA ARTICLES AND COORDINATED WITH THE SYSTEM FURNISHED UNDER THE BASE BUILDING CONSTRUCTION.

PART 3 - EXECUTION

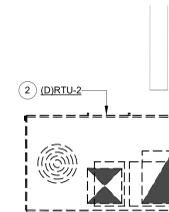
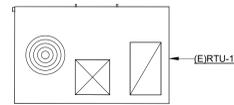
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- 12. SMOKE DETECTORS: PROVIDE SMOKE DETECTORS AT AIR HANDLING UNITS AS REQUIRED BY LOCAL MECHANICAL CODES.
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### ROOF WARRANTY NOTE

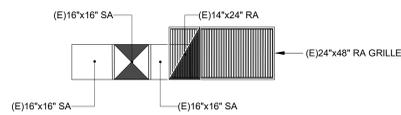
PROVIDE THE SERVICES OF AN INSTALLER AUTHORIZED BY THE MANUFACTURER OF THE EXISTING ROOFING SYSTEM. PROVIDE EXISTING ROOFING MANUFACTURER'S WRITTEN CERTIFICATION THAT MODIFICATIONS ARE COMPATIBLE WITH AND WILL MAINTAIN THE WARRANTY OF THE EXISTING ROOF AND THAT THE MODIFICATIONS ARE INCLUDED IN THE WARRANTY. CONTRACTOR TO CONTACT BUILDING OWNER FOR DETERMINING ROOF WARRANTY INFORMATION.

### KEYED NOTES

MARK	COMMENT
1	REMOVE EXISTING DUCTWORK, INSULATION, HANGERS AND SUPPORTS AS INDICATED. REMOVE CEILING AS REQUIRED FOR DUCTWORK DEMOLITION. CONTRACTOR SHALL TAKE THE NECESSARY PRECAUTIONS TO ENSURE NO CONTAMINANTS ENTER ADJACENT AREAS.
2	REMOVE EXISTING DIRECT EXPANSION ROOFTOP PACKAGED UNIT, EXISTING ROOF CURB AND ALL ASSOCIATED APPURTENANCES.



2 ROOF PLAN - MECHANICAL DEMO  
3/8" = 1'-0"



1 FIRST FLOOR PLAN - MECHANICAL DEMO  
3/8" = 1'-0"

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#### REVISION HISTORY

ISSUE	DESCRIPTION	DATE
0	ISSUE FOR CONSTRUCTION	16 JULY 2021

#### PROFESSIONAL SEALS

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#### MECHANICAL DEMO PLANS

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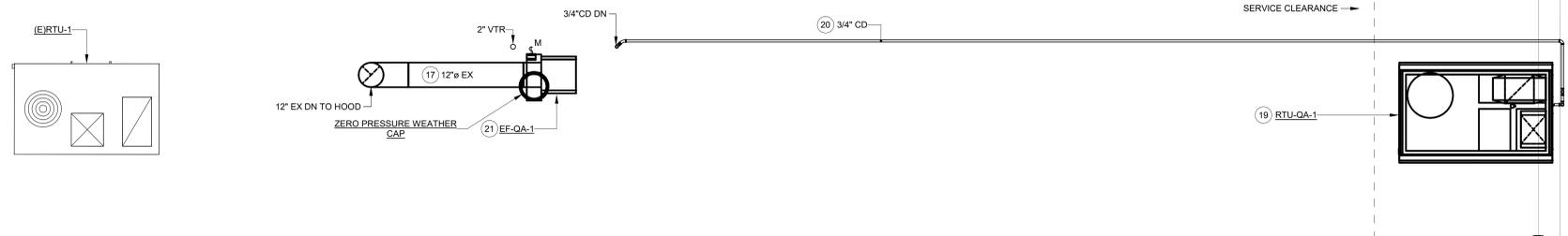
### KEYED NOTES

MARK	COMMENT
1	PROVIDE AND INSTALL DOMESTIC PLUMBING SERVICE TO CONTRACTOR PROVIDED LABORATORY SINK AND ASSOCIATED APPURTENANCES. SEE VWR FURNITURE DRAWINGS FOR FIXTURE DESIGN AND SPECIFICATIONS. REFERENCE PIPING ISOMETRIC FOR CONNECTIONS.
2	PROVIDE AND INSTALL DOMESTIC PLUMBING SERVICE TO CONTRACTOR PROVIDED EMERGENCY EYE WASH. SEE VWR FURNITURE DRAWINGS FOR FIXTURE DESIGN AND SPECIFICATIONS. PROVIDE THERMOSTATIC MIXING VALVE FOR EYE WASH ONLY. SET MIXED TEMPERATURE TO PROVIDE TEPID WATER FOR EMERGENCY EYE WASH. REFERENCE PIPING ISOMETRIC FOR CONNECTIONS.
3	EXTEND AND CONNECT NEW DOMESTIC COLD WATER LINE. SIZE AS NOTED. TO EXISTING LINE IN THIS AREA. PROVIDE SHUT-OFF VALVE AT CONNECTION. FIELD VERIFY EXACT LOCATION OF SERVICES PRIOR TO BID. PIPING IS SHOWN EXTENDED BEYOND EACH WALL, BUT SHOULD ONLY BE EXTENDED WHERE EXISTING SERVICE IS LOCATED. OTHER END SHALL BE CAPPED AFTER LAST PIPING TAKEOFF.
4	PROVIDE AND INSTALL VENT LINE UP THROUGH ROOF. SIZE AS NOTED.
5	PROVIDE AND INSTALL ALUMINUM COMPRESSED AIR PIPING AND FITTINGS COMPLETE WITH HANGERS, SUPPORTS AND ALL ASSOCIATED APPURTENANCES. TIE INTO EXISTING COMPRESSED AIR PIPING IN THIS AREA. VERIFY EXACT TIE-IN LOCATION IN FIELD. PROVIDE WITH ISOLATION VALVE AT NEW CONNECTION. ROUTE AS INDICATED. PIPING IS SHOWN EXTENDED BEYOND EACH WALL, BUT SHOULD ONLY BE EXTENDED WHERE EXISTING SERVICE IS LOCATED. OTHER END SHALL BE CAPPED AFTER LAST PIPING TAKEOFF.
6	PROVIDE AND INSTALL DOMESTIC COLD WATER LINE WITH LEAD FREE SHUT-OFF VALVES COMPLETE WITH INSULATION, HANGERS, SUPPORTS AND ALL ASSOCIATED APPURTENANCES. ROUTE AS INDICATED.
7	PROVIDE AND INSTALL DOMESTIC COLD WATER LINE COMPLETE WITH INSULATION, HANGERS, SUPPORTS AND ALL ASSOCIATED APPURTENANCES TO HOOD COLD WATER GOOSENECK. ROUTE COMPRESSED AIR LINE TO HOOD CONNECTION. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

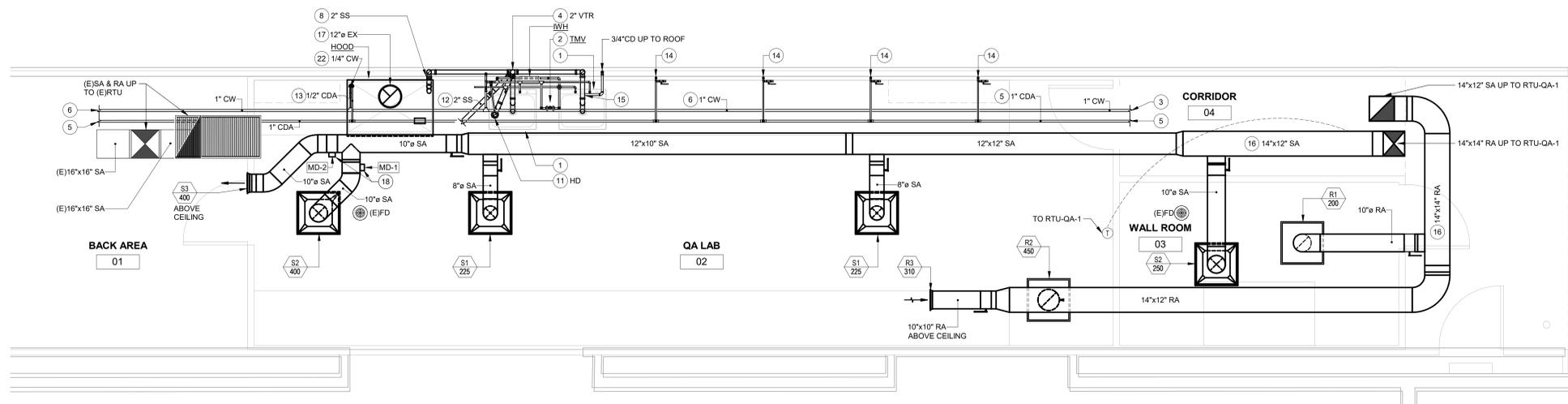
### KEYED NOTES

MARK	COMMENT
8	PROVIDE AND INSTALL PVC SCHEDULE 40 SANITARY LINE TO HOOD COMPLETE WITH SUPPORTS AND ALL ASSOCIATED APPURTENANCES. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
9	PROVIDE AND INSTALL DOMESTIC HOT WATER LINE COMPLETE WITH INSULATION, HANGERS, SUPPORTS AND ALL ASSOCIATED APPURTENANCES TO DISHWASHER. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
10	PROVIDE AND INSTALL ELECTRIC TANKLESS INSTANTANEOUS WATER HEATER BELOW COUNTER. INSTALL PER MANUFACTURER'S RECOMMENDATIONS. SEE MECHANICAL SCHEDULE/DETAIL SHEETS.
11	PROVIDE AND INSTALL PVC SCHEDULE 40 SANITARY LINE WITH P-TRAP AND TRAP PRIMER. UP. SIZE DRAIN AS NOTED.
12	EXTEND AND CONNECT NEW SANITARY SEWER LINE. SIZE AND SLOPE AS NOTED. TO EXISTING LINE. FIELD VERIFY EXACT LOCATION OF SERVICES PRIOR TO BID.
13	PROVIDE AND INSTALL ALUMINUM COMPRESSED AIR PIPING AND FITTINGS COMPLETE WITH HANGERS, SUPPORTS AND ALL ASSOCIATED APPURTENANCES. TIE INTO CONTRACTOR PROVIDED HOOD. SEE VWR FURNITURE DRAWINGS FOR FIXTURE DESIGN AND SPECIFICATION.
14	PROVIDE AND INSTALL 1/2" COMPRESSED AIR DROP COMPLETE WITH ISOLATION SHUT-OFF VALVE AND QUICK-CONNECT FITTING. TERMINATE APPROXIMATELY 6" ABOVE COUNTERTOP.
15	ROUTE CONDENSATE DRAIN TO TIE INTO TAILPIECE OF P-TRAP OF SINK.
16	PROVIDE AND INSTALL EXTERNALLY INSULATED, LOW PRESSURE, SUPPLY/RETURN DUCTWORK COMPLETE WITH SUPPORTS, HANGERS AND ALL ASSOCIATED APPURTENANCES.
17	PROVIDE AND INSTALL SCHEDULE 40 PVC CHEMICAL/FUME EXHAUST DUCTWORK COMPLETE WITH FITTINGS, HANGERS, SUPPORTS AND ALL ASSOCIATED APPURTENANCES. REFERENCE ROOF PLAN FOR CONTINUATION.
18	PROVIDE AND INSTALL LOW-LEAK MOTORIZED DAMPERS AS SHOWN. WHEN FUME HOOD AND ITS ASSOCIATED EXHAUST FAN ARE ENERGIZED, MD-2 SHALL CLOSE AND MD-1 SHALL OPEN. REFERENCE CONTROL SEQUENCES FOR OPERATION. WHEN FUME HOOD AND ITS ASSOCIATED EXHAUST FAN ARE DE-ENERGIZED, MD-1 SHALL CLOSE AND MD-2 SHALL OPEN. PROVIDE MOTORIZED DAMPERS AT 120-VOLT WITH CONTROL TRANSFORMER(S).
19	INSTALL GENERAL CONTRACTOR-PROVIDED DIRECT EXPANSION/ELECTRIC HEAT ROOFTOP PACKAGED UNIT COMPLETE WITH MANUFACTURER'S ROOF CURB AND ALL ASSOCIATED APPURTENANCES. SEE MECHANICAL SCHEDULE/DETAIL SHEETS.
20	PROVIDE AND INSTALL PVC CONDENSATE DRAIN PIPING AND ROOF SUPPORTS. ROUTE AS INDICATED. INTERIOR LOCATIONS SHALL BE INSULATED. PROVIDE CONDENSATE DRAIN TRAP. SEE MECHANICAL DETAIL SHEETS.
21	PROVIDE AND INSTALL EXHAUST FAN COMPLETE WITH MANUFACTURER'S EQUIPMENT RAILS, DISCHARGE DUCT FITTINGS, ZERO PRESSURE WEATHER CAP AND ALL ASSOCIATED APPURTENANCES. SEE MECHANICAL SCHEDULE/DETAIL SHEETS. EXHAUST FAN SHALL BE MATCHED WITH FUME HOOD PROVIDED IN QA LAB.
22	PROVIDE AND INSTALL DOMESTIC COLD WATER PIPING AND FITTINGS COMPLETE WITH HANGERS, SUPPORTS AND ALL ASSOCIATED APPURTENANCES. TIE INTO CONTRACTOR PROVIDED HOOD. SEE VWR FURNITURE DRAWINGS FOR FIXTURE DESIGN AND SPECIFICATION.

3 PIPING ISOMETRIC



2 ROOF PLAN - MECHANICAL  
3/8" = 1'-0"



1 FIRST FLOOR PLAN - MECHANICAL  
3/8" = 1'-0"

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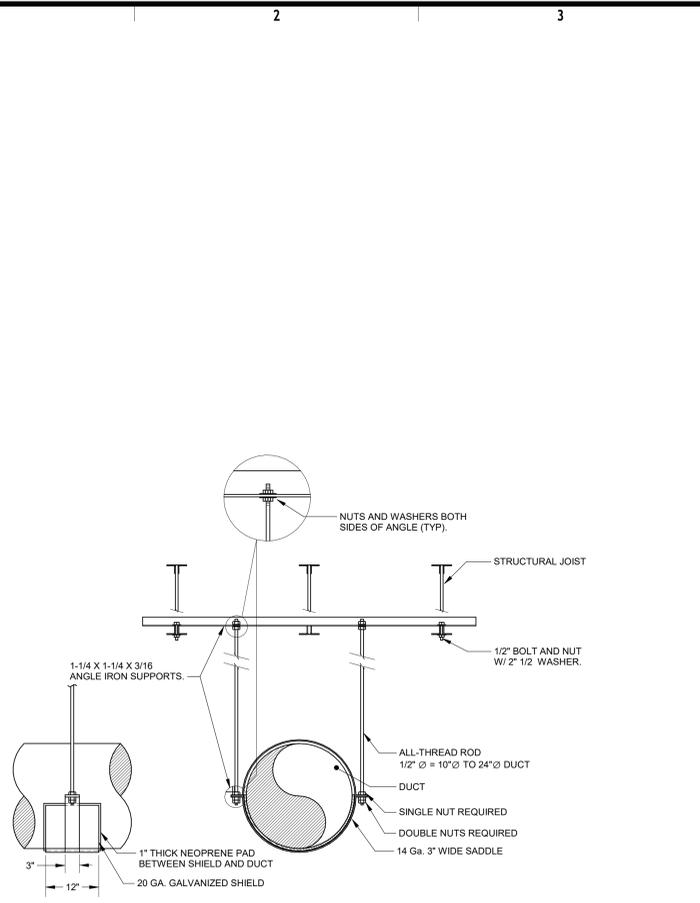
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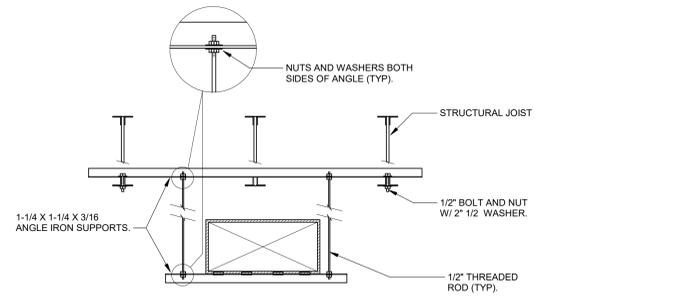
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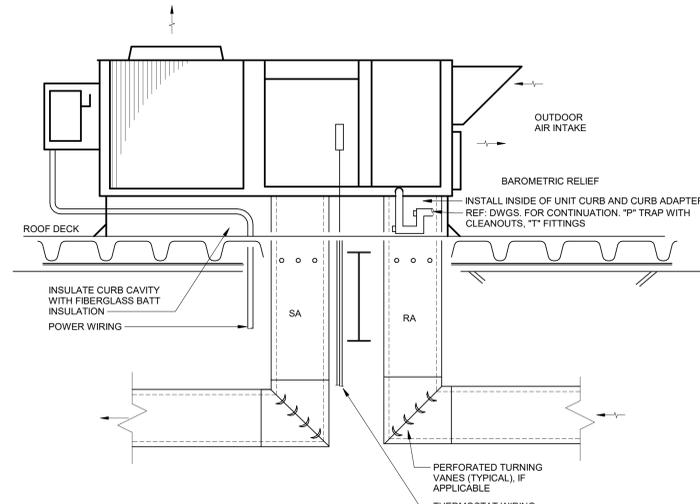


NOTE: MAXIMUM SPACING BETWEEN SUPPORTS SHALL BE ACCORDANCE WITH SMACNA.

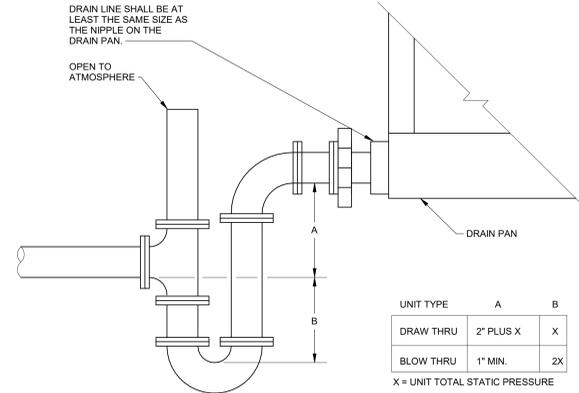
10 ROUND DUCT SUPPORT (STRUCTURAL JOIST) DETAIL NTS



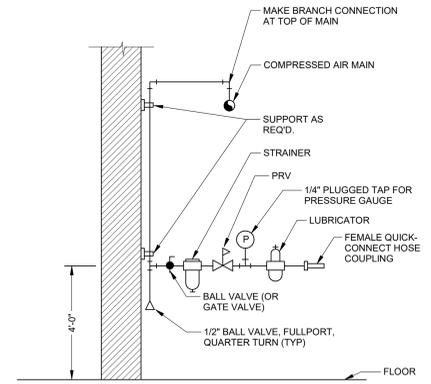
9 DUCT SUPPORT (STRUCTURAL JOIST) DETAIL NTS



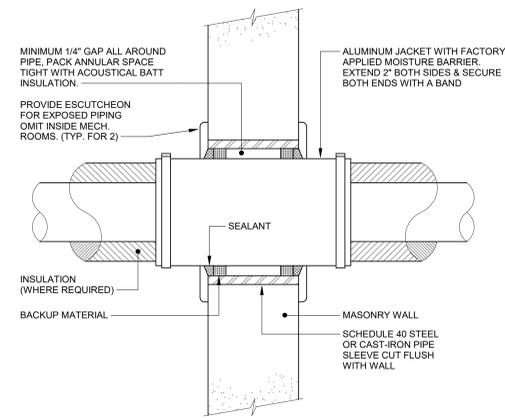
8 TYPICAL ROOFTOP UNIT DUCTED INSTALLATION DETAIL NTS



7 CONDENSATE DRAIN TRAP DETAIL NTS

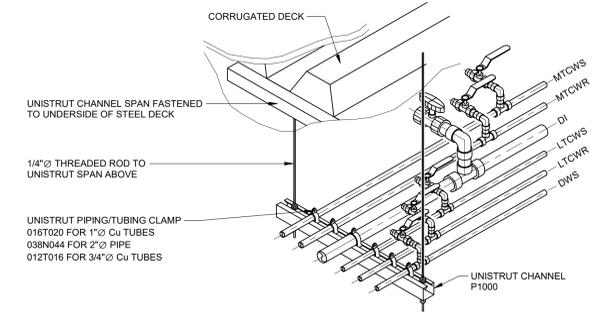


6 COMPRESSED AIR TOOL STATION NTS

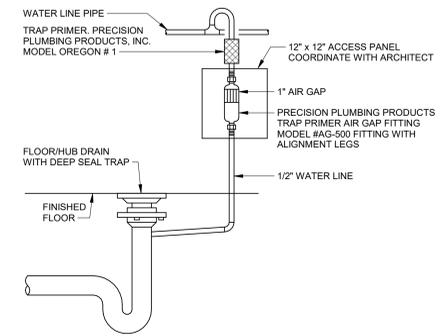


NOTES:  
 1. FOR GYP BOARD WALLS PROVIDE MIN. 16 GAUGE GALV. STEEL SLEEVE W/ LOCK-TYPE LONGITUDINAL SEAM.  
 2. OMIT ALUMINUM JACKET IF PIPING IS UNINSULATED.

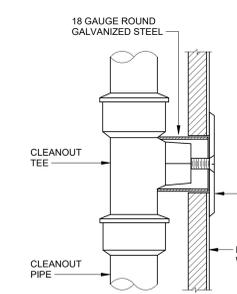
5 WALL PIPE PENETRATION DETAIL NTS



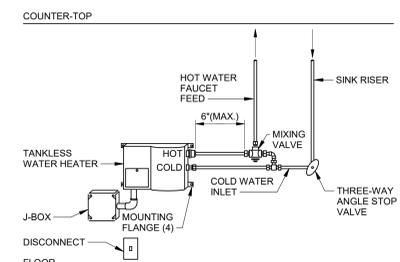
4 PIPING TRAPEZE MOUNTING DETAIL NTS



3 TRAP PRIMER DETAIL NTS



2 WALL CLEAN OUT DETAIL NTS



1 ELECTRIC TANKLESS WATER HEATER DETAIL NTS

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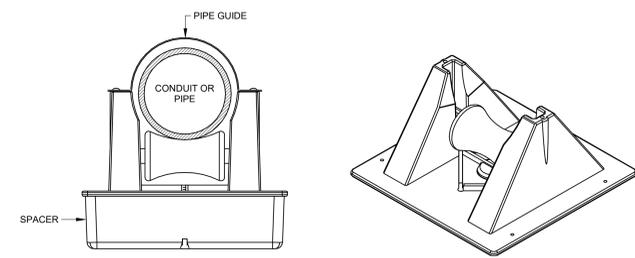
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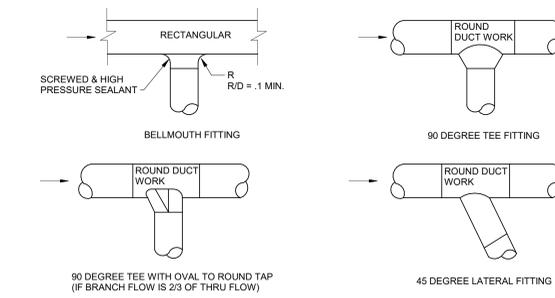
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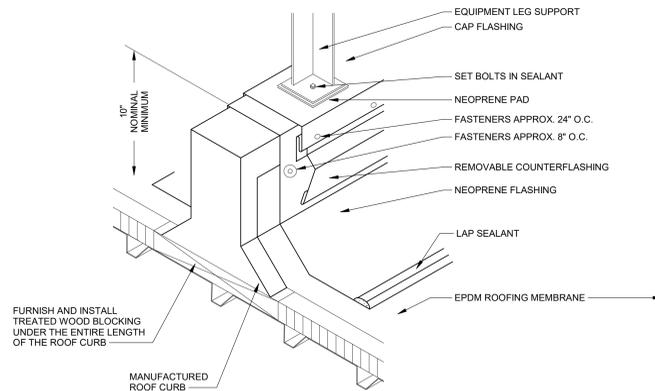
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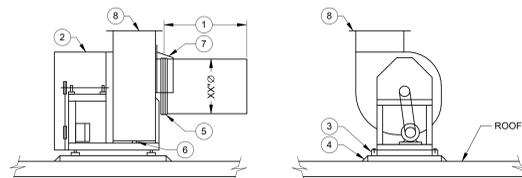
9 ROOF MOUNTED PIPE SUPPORT DETAIL  
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5 ROUND DUCTWORK FITTINGS DETAIL  
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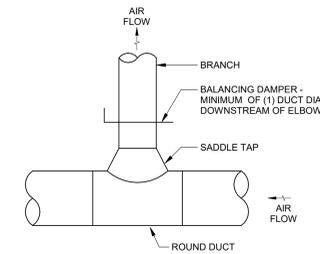
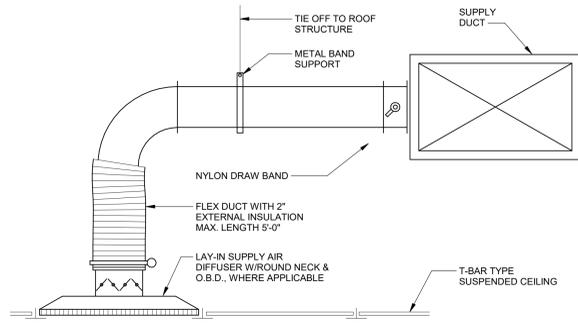
6 ROOF EQUIPMENT SUPPORT CURB DETAIL  
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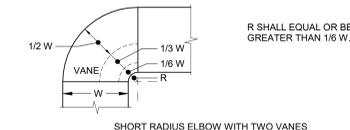
7 UTILITY SET FAN DETAIL  
NTS

- KEYED NOTES:
1. PROVIDE MINIMUM 3 DIAMETERS OF STRAIGHT DUCT RUN INTO FAN.
  2. WEATHER COVER.
  3. VIBRATION ISOLATOR.
  4. MANUFACTURER PROVIDED EQUIPMENT BASE.
  5. FLEXIBLE DUCT CONNECTION.
  6. SCROLL DRAIN.
  7. WEATHER SHIELD OVER FLEXIBLE DUCT CONNECTION FASTEN TO FAN HOUSING.
  8. FLANGED CONNECTION FOR DUCT CONNECTION.

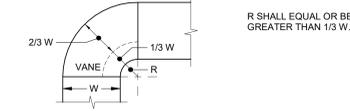
8 SUPPLY AIR DIFFUSER DETAIL  
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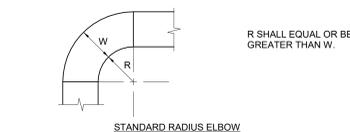
4 ROUND DUCT CONNECTION DETAIL  
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SHORT RADIUS ELBOW WITH TWO VANES



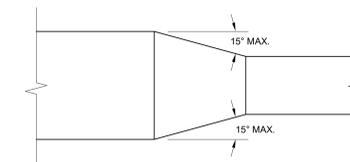
SHORT RADIUS ELBOW WITH ONE VANES



STANDARD RADIUS ELBOW

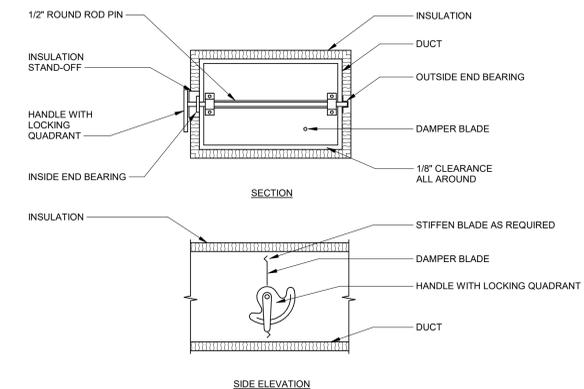
- NOTES:
1. THE INTERIOR SURFACE OF ALL RADIUS ELBOWS SHALL BE MADE ROUND.
  2. ALL STANDARD RADIUS ELBOWS SHOWN ON PLANS MAY BE MADE SHORT RADIUS ELBOWS. ALL SHORT RADIUS ELBOWS SHALL HAVE VANES. VANES SHALL BE CONSTRUCTED, SUPPORTED AND FASTENED AS RECOMMENDED BY SMACNA.

3 RADIUS ELBOWS DETAIL  
NTS



PLAN OR SIDE VIEW

2 DUCTWORK TRANSITION DETAIL  
NTS



- NOTE:
1. DELETE INSULATION STAND-OFF ON DUCTWORK WITHOUT EXTERIOR INSULATION.

1 VOLUME DAMPER DETAIL  
NTS



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SHEET NUMBER

**PACKAGED ROOFTOP UNIT SCHEDULE - DX COOLING/ELECTRIC HEAT**

TAG	SUPPLY FAN DATA				DX COIL DATA										ELECTRIC HEATING COIL DATA				DIMENSIONAL DATA				BASIS OF DESIGN		REMARKS		
	SUPPLY AIR (CFM)	OUTSIDE AIR (CFM)	ESP (IN WG)	HP	FAN DRIVE	VOLTS	PHASE	TOTAL CAPACITY (MBH)	SENS CAPACITY (MBH)	EDB (°F)	EWB (°F)	LDB (°F)	LWB (°F)	TONS	TOTAL CAPACITY (MBH)	EDB (°F)	LDB (°F)	ELEC HEAT (KW)	MCA	MOCP	UNIT HEIGHT (IN)	UNIT WIDTH (IN)	UNIT LENGTH (IN)	UNIT WEIGHT (LBS)		MANUFACTURER	MODEL NO
RTU-QA-1	1,100	140	1.0	2.4	BELT	460	3	32.9	24.1	78.6	64.5	56.1	53.6	3	39.2	57.5	90.5	11.5	23.2	25	33	49	74	568	JCI	ZQE042C1AA1B322A3	SEE NOTES

**NOTES:**

- UNIT PROVIDED BY GENERAL CONTRACTOR, INSTALLED BY MECHANICAL CONTRACTOR.
- SUMMER DESIGN CONDITIONS: 93°F DRY BULB/73°F WET BULB. WINTER DESIGN CONDITIONS: 6°F DRY BULB.
- PROVIDE UNIT WITH DRY-BULB ECONOMIZER WITH BAROMETRIC RELIEF AND HOODS WITH ECONOMIZER FAULT DETECTION AND DIAGNOSTIC. PROVIDE UNIT WITH RAIN HOOD AND WATER ELIMINATOR/FILTERS ON OUTDOOR AIR INTAKE. PROVIDE RAIN HOOD ON BAROMETRIC RELIEF OUTLET.
- PROVIDE UNIT WITH 2" PLEATED MERV-8 FILTERS AND SPARE FILTERS. UNIT SHALL BE EQUIPPED WITH A DIRTY FILTER SWITCH.
- PROVIDE UNIT WITH POWERED CONVENIENCE OUTLET (120-VOLT/15-AMP) AND HACR CIRCUIT BREAKER/DISCONNECT.
- PROVIDE UNIT WITH SAFETY MONITORING FOR HIGH AND LOW PRESSURE SWITCHES, FREEZE/STATS AND TEMPERATURE LIMIT SWITCH FOR ELECTRIC HEAT.
- PROVIDE UNIT WITH SMART EQUIPMENT CONTROLLER INCLUDING DISCHARGE AIR, RETURN AIR AND OUTDOOR AIR TEMPERATURE SENSORS.
- PROVIDE UNIT WITH ONE (1) YEAR LIMITED WARRANTY ON THE COMPLETE UNIT AND FIVE (5) YEAR WARRANTY ON COMPRESSORS AND ELECTRIC HEATER ELEMENTS.
- UNIT IS RATED AT 14.70 SEER/12.20 EER AND IS PROVIDED WITH R-410A REFRIGERANT.
- PROVIDE UNIT WITH PROGRAMMABLE THERMOSTAT FOR 24/7 OPERATION AND AUTOMATIC SWITCHOVER CAPABILITIES.
- PROVIDE UNIT WITH MANUFACTURER'S ROOF CURB.

**SEQUENCE OF OPERATION:**

THE UNIT SHALL BE LOCALLY CONTROLLED AND OPERATE IN CONSTANT VOLUME MODE FOR SUPPLY AND RETURN AIR.

COOLING MODE: UPON A RISE IN SPACE TEMPERATURE ABOVE 75°F (ADJ), THE COMPRESSOR SHALL ENERGIZE TO MAINTAIN A SPACE TEMPERATURE OF 75°F (ADJ). UPON A FALL IN SPACE TEMPERATURE BELOW THE COOLING SETPOINT, THE COMPRESSOR SHALL DE-ENERGIZE.

HEATING MODE: UPON A FALL IN SPACE TEMPERATURE BELOW 70°F (ADJ), THE ELECTRIC HEATING ELEMENT SHALL ENERGIZE TO MAINTAIN A SPACE TEMPERATURE OF 70°F (ADJ). UPON A RISE IN SPACE TEMPERATURE ABOVE THE HEATING SETPOINT, THE HEATING ELEMENT SHALL DE-ENERGIZE.

ECONOMIZER MODE: THE ECONOMIZER MODE SHALL BE INITIATED WHEN THE OUTDOOR AIR DRY-BULB TEMPERATURE RANGE IS BETWEEN 50°F AND 58°F (ADJ). CHANGEOVER FROM COMPRESSOR TO ECONOMIZER OPERATION SHALL BE PROVIDED BY AN INTEGRAL ELECTRONIC ENTHALPY CONTROL.

FUME HOOD CLOSED/MOTORIZED DAMPER FOR FUME HOOD OPERATION: WHILE THE FUME HOOD IS CLOSED AND IN THE FUME HOOD EXHAUST FAN IS DE-ENERGIZED, MD-1 SHALL BE CLOSED AND MD-2 SHALL BE OPEN TO PROVIDE SUPPLY AIR TO THE ADJACENT SPACE OF THE QA LAB.

FUME HOOD OPEN/MOTORIZED DAMPER FOR FUME HOOD OPERATION: WHILE THE FUME HOOD IS OPEN (18" MAX PER FLNA STANDARDS) AND THE FUME HOOD EXHAUST FAN IS ENERGIZED, MD-1 SHALL BE OPEN TO SUPPLY MAKE-UP AIR TO THE QA LAB AND MD-2 SHALL BE CLOSED.

**FUME HOOD EXHAUST FAN SCHEDULE (BY OTHERS-INFO ONLY)**

TAG	LOCATION	FAN TYPE	CFM	ESP (IN WG)	DRIVE	HP	VOLTS	PHASE	BASIS OF DESIGN		REMARKS
EF-QA-1	ROOF	UTILITY SET	450 / 725	0.88	BELT	3/4	120	1	MANUFACTURER	MODEL NO	SEE NOTES
									LABCONCO	82006-752	

**NOTES:**

- FUME HOOD EXHAUST FAN SHALL BE PROVIDED WITH THE FUME HOOD.
- PER FLNA STANDARDS, THE MAXIMUM SASH HEIGHT OF OPERATION SHALL BE 18", EQUATING TO 450 CFM AT 100 FPM FOR THE 4' FUME HOOD.
- EXHAUST FAN SHALL BE COATED STEEL BLOWER WITH IMPELLER AND HOUSING HAVING A PHENOLIC COATING.
- EXHAUST FAN SHALL HAVE ADJUSTABLE SHEAVES FOR PERFORMANCE ADJUSTMENTS AND A POWDER-COATED BASE AND WEATHER COVER.
- PROVIDE A POWDER-COATED STEEL BLOWER TRANSITION ADAPTER (30186-002) AND ZERO PRESSURE WEATHERCAP (30185-000) WITH FAN/BLOWER.

**SEQUENCE OF OPERATION:**

THE BLOWER SHALL OPERATE BASED ON THE HOOD POSITION OF OPEN (18" SASH OPENING) OR CLOSED (SASH FULLY CLOSED).

THE FUME HOOD SHALL SEND A SIGNAL TO THE BLOWER TO ENERGIZE UPON OPENING THE SASH AND DE-ENERGIZE UPON CLOSING THE SASH.

**GRILLE, REGISTER & DIFFUSER SCHEDULE**

TAG	TYPE	SERVICE	CFM RANGE	NECK SIZE (IN)	MAX PD	MANUFACTURER/ MODEL NO	DESCRIPTION	REMARKS
S1	CEILING	SUPPLY	225	8	0.1	PRICE / SCD	SQUARE CONE DIFFUSER WITH 360-DEGREE AIR PATTERN	SEE NOTES
S2	CEILING	SUPPLY	250 - 400	10	0.1	PRICE / SCD	SQUARE CONE DIFFUSER WITH 360-DEGREE AIR PATTERN	SEE NOTES
S3	SIDEWALL	SUPPLY	400	10 X 10	0.1	PRICE / 610Z	SIDEWALL SUPPLY GRILLE/0-DEGREE/3/4" BLADE SPACING	SEE NOTES
R1	CEILING	RETURN	200	10	0.1	PRICE / 610Z	SIDEWALL RETURN GRILLE/0-DEGREE/3/4" BLADE SPACING	SEE NOTES
R2	CEILING	RETURN	450	12	0.1	PRICE / 610Z	SIDEWALL RETURN GRILLE/0-DEGREE/3/4" BLADE SPACING	SEE NOTES
R3	SIDEWALL	RETURN	310	10 X 10	0.1	PRICE / 610Z	SIDEWALL RETURN GRILLE/0-DEGREE/3/4" BLADE SPACING	SEE NOTES

**NOTES:**

- PROVIDE ALUMINUM GRILLES AND DIFFUSERS WITH BAKED ENAMEL COATING.
- SIDEWALL GRILLES (SUPPLY AND RETURN) ARE DUCT-MOUNTED ONLY. GRILLES ARE NOT MOUNTED IN A WALL FACE.
- CEILING SUPPLY GRILLES (SCD) SHALL HAVE INSULATION OVER COVER.

**WATER HEATER SCHEDULE**

TAG	LOCATION	PRESET WATER TEMP (°F)	VOLTS / PHASE	HEATING ELEMENT KW	MANUFACTURER	MODEL	REMARKS
IWH	BELOW COUNTER	120	480 / 3	24	CHRONOMITE	ER-50L	SEE NOTES

**NOTES:**

- MOUNT WATER HEATER UNDER COUNTER.
- WATER HEATER TO HAVE A DEDICATED ANGLE VALVE.
- WATER HEATER SHALL BE HARD WIRED WITH CUTOFF SWITCH OR DISCONNECT.
- PROVIDE WATER HAMMER ARRESTOR.
- PROVIDE LEONARD MODEL 170-LF MIXING VALVE, OR APPROVED EQUAL, TO PROVIDE TEPID WATER FOR EMERGENCY EYE WASH.

  
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ELECTRICAL SYMBOLS (SEE NOTES BELOW)	
1.	ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.
2.	DEVICES SHALL BE RECESSED FLUSH WITH FINISHED SURFACE UNLESS NOTED OTHERWISE.
3.	ABBREVIATIONS (SUCH AS "GF", "WP", "42", "30A" ETC.) ASSOCIATED OR ADJACENT TO SYMBOL INDICATES THAT ATTRIBUTE OR REQUIREMENT SHALL BE PROVIDED FOR ITEM REPRESENTED BY SYMBOL. (E) - EXISTING TO REMAIN (D) - TO BE DEMOLISHED (R) - TO BE RELOCATED
LIGHTING	
• • •	DOWNLIGHT FIXTURE: FULL SHADING INDICATES EMERGENCY/ NIGHTLIGHT FIXTURE: HALF SHADING INDICATES WALL WASH. SUBSCRIPT INDICATES TYPE.
• •	PENDANT FIXTURE: SHADING INDICATES EMERGENCY/ NIGHTLIGHT FIXTURE: SUBSCRIPT INDICATES TYPE.
⊙	WALL MOUNTED FIXTURE: SHADING INDICATES EMERGENCY/ NIGHTLIGHT FIXTURE: SUBSCRIPT INDICATES TYPE.
⊙	SUSPENDED FIXTURE: SHADING INDICATES EMERGENCY/ NIGHTLIGHT FIXTURE: SUBSCRIPT INDICATES TYPE.
⊙	2X2 RECESSED FIXTURE: SHADING INDICATES EMERGENCY/ NIGHTLIGHT FIXTURE: SUBSCRIPT INDICATES TYPE.
⊙	2X4 RECESSED FIXTURE: SHADING INDICATES EMERGENCY/ NIGHTLIGHT FIXTURE: SUBSCRIPT INDICATES TYPE.
⊙	POLE MOUNTED AREA LIGHTING FIXTURE: SUBSCRIPT INDICATES TYPE.
⊙	WALL MOUNTED EMERGENCY FIXTURE: SUBSCRIPT INDICATES TYPE.
⊙	EXIT SIGN: SHADING INDICATES LIT FACE. ARROWS INDICATE DIRECTION. SUBSCRIPT INDICATES TYPE.
WIRING	
⊙	JUNCTION BOX - SIZE IN ACCORDANCE WITH NEC FOR SPECIFIC APPLICATIONS. D INDICATES DATA AND C INDICATES COMMUNICATION.
⊙	SINGLE RECEPTACLE: NEMA 5-20R.
⊙	DUPLEX RECEPTACLE: NEMA 5-20R. SHADING INDICATES ABOVE COUNTER.
⊙	DUPLEX RECEPTACLE - GFI: NEMA 5-20R. SHADING INDICATES ABOVE COUNTER.
⊙	QUADRUPLEX RECEPTACLE: NEMA 5-20R.
⊙	SPECIAL RECEPTACLE: NEMA RATING AS INDICATED.
⊙	FLUSH FLOOR MOUNT DUPLEX RECEPTACLE: NEMA 5-20R.
⊙	TELEPHONE OUTLET
⊙	DATA OUTLET
⊙	TELEPHONE / DATA OUTLET
⊙	FLUSH FLOOR MOUNT TELEPHONE / DATA OUTLET
⊙	CABLE OR CCTV OUTLET
⊙	OCCUPANCY SENSOR
⊙	SINGLE POLE SWITCH, 20A, 120/277V, LOWERCASE LETTER INDICATES SWITCH CONTROL.
⊙	DOUBLE POLE SWITCH, 20A, 120/277V
⊙	THREE WAY SWITCH, 20A, 120/277V
⊙	FOUR WAY SWITCH, 20A, 120/277V
⊙	KEY OPERATED SWITCH
⊙	MOTOR RATED SWITCH
⊙	OCCUPANCY SENSOR AND SWITCH COMBINATION (DUAL RELAY)
⊙	DIMMER SWITCH, LOWERCASE LETTER INDICATES SWITCH CONTROL.
⊙	CIRCUIT: ARROW INDICATES HOME RUN
EQUIPMENT	
⊙	MAGNETIC MOTOR CONTROLLER: SIZE PER N.E.M.A. STANDARDS; CONTROL DEVICE IN COVER, AUX CONTACT AND CONTROL TRANSFORMER
⊙	COMBINATION MOTOR STARTER AND DISCONNECT
⊙	DISCONNECT SWITCH: WHERE SHOWN, 60/40/3 INDICATES SWITCH SIZE/FUSE SIZE/NO. OF POLES - MOTOR RATED FOR MOTOR FEEDERS
⊙	NON-FUSED DISCONNECT SWITCH
⊙	MOTOR: WHERE SHOWN, NUMBER EQUALS HORSEPOWER RATING.
⊙	PANELBOARD
⊙	TELEPHONE BACKBOARD: 3/4" PLYWOOD FIRE RATED AND PAINTED
⊙	DRY-TYPE TRANSFORMER
⊙	METER
⊙	THERMOSTAT
SYSTEMS	
⊙	FIRE ALARM SPEAKER / HORN
⊙	FIRE ALARM VISUAL LIGHT ASSEMBLY
⊙	FIRE ALARM SPEAKER / HORN WITH VISUAL LIGHT ASSEMBLY
⊙	FIRE ALARM SPEAKER / HORN WITH VISUAL LIGHT ASSEMBLY - CEILING MOUNTED
⊙	FIRE ALARM MANUAL PULL STATION
⊙	SMOKE DETECTOR
⊙	HEAT DETECTOR
⊙	MAGNETIC DOOR LOCK
⊙	CARD READER
⊙	DOOR CONTACT
⊙	KEYPAD
⊙	PUSH BUTTON RELEASE
⊙	FIRE ALARM CONTROL PANEL
⊙	FIRE ALARM ANNUNCIATOR PANEL
⊙	CAMERA

**GENERAL NOTES FOR ELECTRICAL WORK**

**DEMOLITION**

- THE DEMOLITION DRAWING SHOWING EXISTING UTILITIES DOES NOT NECESSARILY REFLECT THE EXACT CONDITIONS. SUCH AS SIZES, ELEVATIONS AND ROUTING. THE PURPOSE OF THIS LAYOUT IS TO GIVE THE CONTRACTOR A GENERAL IDEA OF THE SCOPE OF THE DEMOLITION WORK. IF IN DOUBT AS TO EXTENT OR TO THE SPECIFIC WORK INVOLVED, CONTRACTOR SHALL CONSULT WITH THE ENGINEER FOR CLARIFICATION.
- WHEN THE WORK INVOLVES THE REMOVAL OF EQUIPMENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER DISMANTLING OR DISCONNECTION OF THE RESPECTIVE UTILITIES, SUCH AS ELECTRICAL POWER, CONTROLS AND OTHER RELATED CONNECTIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE INTEGRITY OF THE SYSTEMS BEING REUSED, THE COORDINATION OF THE PATCHING OF WALLS, CEILING AND ROOF THAT ARE AFFECTED BY THE DEMOLITION. WHEN THE EQUIPMENT CALLS FOR A REPLACEMENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE RECONNECTION OF ALL THE RESPECTIVE SYSTEMS.
- REMOVE ALL ABANDONED WIRING, CONDUIT AND ELECTRICAL EQUIPMENT. ALL REMOVED EQUIPMENT AND ASSOCIATED WIRING DEVICES, CONDUIT, AND CONDUCTORS SHALL BE RECYCLED TO EXTENT POSSIBLE U.N.O.
- ELECTRICAL EQUIPMENT SHALL BE REUSED AS INDICATED. REPLACE ANY PORTION OF FEEDERS OR BRANCH CIRCUIT THAT IS NOT IN GOOD CONDITION.
- WHERE REMOVAL OF AN EXISTING OUTLET OR EQUIPMENT FEED WILL RESULT IN LOSS OF CIRCUIT CONTINUITY, THE ISOLATED PORTIONS OF THE CIRCUIT OR FEED SHALL BE RECONNECTED TO PROVIDE SERVICE TO ALL OUTLETS AND EQUIPMENT.
- DISCONNECT ALL MECHANICAL EQUIPMENT BEING DEMOLISHED. REMOVE CIRCUITS BACK TO SOURCE U.N.O. SEE MECHANICAL DRAWINGS FOR EXTENT OF WORK.
- PROVIDE CIRCUIT MODIFICATIONS INDICATED OR AS OTHERWISE REQUIRED TO MAINTAIN THE CONTINUITY OF EXISTING CIRCUITS THAT REMAIN. BE SURE TO MAINTAIN THE EXISTING PHASE SEQUENCE.
- REGARDING EXISTING CIRCUITRY THAT IS NOT REUSED AT THE COMPLETION OF THE DEMOLITION WORK, THE FOLLOWING SHALL APPLY: (A) ALL EXISTING EXPOSED CIRCUITRY (WIRE AND CONDUIT) SHALL BE MAINTAINED IN SAME OR BETTER CONDITIONS AS WHEN REMOVED FROM SERVICE. (B) EXISTING CONDUITS CONCEALED IN WALLS SHALL BE ABANDONED AND THE WIRES SHALL BE REMOVED. (C) FOR CIRCUITS CONCEALED WITHIN THE FLOOR, REMOVE THE WIRES AND CUT OFF THE CONDUIT ONE INCH BELOW THE ROUGH FLOOR GROUT FLOOR. (D) FOR AFFECTED CIRCUITS THAT HAVE NO LOAD CONNECTIONS, DISCONNECT THE WIRES FROM THEIR POWER SOURCE AND REMOVE THEM IN THEIR ENTIRETY.
- DEMOLITION DRAWINGS ARE BASED ON EXISTING PLANS AND FIELD INVESTIGATION. CONTRACTOR SHALL VERIFY AND MAKE FINAL DETERMINATION OF ALL EXISTING CIRCUITS INDICATED FOR REMOVAL AND/OR TO REMAIN.
- ALL ITEMS SHOWN DASHED ON DEMOLITION PLANS ARE EXISTING AND SHALL BE REMOVED, UNLESS SPECIFICALLY INDICATED OTHERWISE. REMOVED ASSOCIATED WIRING, CONDUIT, SWITCHES, ETC.
- ALL ITEMS SHOWN SHADDED ON DEMOLITION PLANS ARE EXISTING TO REMAIN. MAINTAIN CIRCUIT CONTINUITY. PROVIDE CIRCUIT MODIFICATIONS AS REQUIRED TO ENSURE THE CONTINUITY OF EXISTING CIRCUITS THAT REMAIN.
- ALL CONDUIT REMOVED SHALL BE REMOVED IN ITS ENTIRETY, INCLUDING FITTINGS, MOUNTING DEVICES, MOUNTING HARDWARE, AND SO FORTH. PROVIDE CONDUIT PLUGS AND BLANKS FOR ALL OPENINGS CREATED BY THE REMOVAL OF CONDUIT. PROVIDE BLANK COVER PLATES FOR ALL OPENED OUTLET BOXES CREATED BY THE REMOVAL OF EQUIPMENT AND/OR DEVICES.
- PATCH ALL HOLES, OPENINGS, CREVICES, AND SIMILAR DEFACEMENTS WHICH ARE CREATED IN THE DEMOLITION PROCESS. PATCH WORK IN EXTERIOR WALLS SHALL BE WATERPROOF. PAINT THE PATCH WORK AS REQUIRED TO MATCH THE FINISH OF THE ADJACENT SURFACES.
- THE CONTRACTOR SHALL REMOVE ALL ELECTRICAL APPURTENANCES (DISCONNECTS SWITCHES, MOTOR STARTERS, WIRE, CONDUIT, ETC.) ASSOCIATED WITH ELECTRIFIED EQUIPMENT REMOVED BY THE OTHERS UNDER THE CONTRACT.
- UNLESS NOTED OTHERWISE, ALL MATERIALS REMOVED UNDER THE CONTRACT, AND THAT IS NOT REINSTALLED OR TURNED OVER TO THE OWNER, SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED COMPLETELY FROM THE SITE.
- THE CONTRACTOR SHALL EXERCISE CARE IN REMOVAL OF DEMOLISHED ITEMS. THE CONTRACTOR SHALL REPAIR, AT HIS COST, ANY DAMAGE CAUSED TO EXISTING CONSTRUCTION AND/OR EQUIPMENT TO REMAIN.

**GENERAL ITEMS**

- WORK SHALL COMPLY WITH APPLICABLE NATIONAL, STATE, AND LOCAL CODES, RULES, AND REGULATIONS.
- ALL WORK SHALL COMPLY WITH THE BUILDING OWNER CONSTRUCTION GUIDE. COORDINATE WITH BUILDING MANAGEMENT/TOWER FOR ACCESS TO ANY SPACES THAT MIGHT BE REQUIRED FOR THE INSTALLATION.
- EXISTING CONDITIONS ARE BASED ON INFORMATION PROVIDED BY SITE SURVEY, HOWEVER, IT IS NOT INTENDED TO BE EXACT REPRESENTATION OF ACTUAL CONDITIONS. VISIT JOB SITE BEFORE BIDDING TO ASCERTAIN EXISTING CONDITIONS AND NOTIFY ENGINEER OF DISCREPANCIES BEFORE BID.
- WHERE WIRE SIZES ARE NOTED ON DRAWINGS OR SCHEDULES, SIZE SHALL BE PROVIDED THROUGH ENTIRE RUN UNLESS NOTED OTHERWISE.
- WIRE SHALL BE COPPER.
- CONNECTIONS TO PANELBOARDS OR BUSWAY SHALL BE MADE ONLY WHEN PANELBOARD OR BUSWAY HAS BEEN DE-ENERGIZED. SCHEDULE DOWN-TIME WITH BUILDING OWNER BEFORE PERFORMING WORK.
- ALL 20A BRANCH CIRCUITS UNDER 150 FEET SHALL BE (2)#12, #12G, 3/4" U.N.O. ALL 20A BRANCH CIRCUITS 150 FEET AND OVER SHALL BE (2)#10, # 10G, 3/4" U.N.O.
- BRANCH CIRCUITS SHALL HAVE SEPARATE NEUTRAL AND GROUND WIRES.
- PROVIDE LABELS ON WIRING DEVICES, DISCONNECT SWITCHES, ETC., WITH CIRCUIT NUMBER FROM PANEL SERVING DEVICES.
- UNLESS SPECIFICALLY NOTED TO BE EXISTING, WORK AND MATERIAL SHOWN BOLD SHALL BE PROVIDED AS NEW. WHEREVER "NEW TO EXISTING" CONNECTION IS REQUIRED, PROVIDE ACCESSORIES, SPLICES, CONDUIT, FITTINGS, AND MISCELLANEOUS HARDWARE AND COMPONENTS AS NECESSARY TO EFFECT CONNECTIONS. PROVIDE CUTTING AND PATCHING AS NECESSARY. CONCEAL CONDUITS WHENEVER POSSIBLE.
- NEW CONDUIT PENETRATIONS THROUGH BLOCK, BRICK, AND/OR CONCRETE WALLS, FLOORS, AND OTHER SIMILAR CONSTRUCTION SHALL BE ACCOMPLISHED BY CORE DRILLING. REFER TO SPECIFICATIONS FOR CONDUIT SLEEVE REQUIREMENTS. SEAL AND CALK AROUND CONDUIT. PROVIDE PROPERLY RATED FIRE SEALS FOR CONDUITS THAT PENETRATE FIRE-RATED CONSTRUCTION. REFER TO ARCHITECTURAL DRAWING FOR FIRE-RATED CONSTRUCTION.

ALL WORK IN THE EXISTING BUILDING SHALL BE SCHEDULED AT TIMES THAT ARE CONVENIENT TO THE OWNER.

BEFORE BID CONTRACTOR SHALL VISIT SITE AND VERIFY ALL EXISTING EQUIPMENT, MATERIALS, SYSTEMS, AND EXACT REQUIREMENTS OF THE PROPOSED WORK. ANY DISCREPANCY OR CONFLICT THAT IS FOUND SHALL BE REPORTED TO THE ENGINEER OR OWNER'S REPRESENTATIVE.

UNDER NO CIRCUMSTANCE SHALL UTILITY SERVICES BE INTERRUPTED WITHOUT CAREFUL COORDINATION AND WRITTEN CONSENT FROM OWNER. INTERRUPTION IN UTILITY SERVICES SHALL BE PLANNED IN ADVANCE FOR ALL PARTIES INVOLVED.

COMPLY WITH REQUIREMENTS OF NFPA 70E WHEN WORKING WITH ENERGIZED ELECTRICAL EQUIPMENT.

CIRCUITRY SHALL BE CONCEALED IN FINISHED AREAS. EXISTING CIRCUITRY TO REMAIN THAT BECOMES EXPOSED IN A FINISHED AREA SHALL BE REROUTED AND RECONNECTED AS REQUIRED TO BECOME CONCEALED AND TO MAINTAIN CIRCUIT CONTINUITY. EXPOSED CONDUIT MAY BE PROVIDED IN UNFINISHED SPACES.

GENERAL NOTES ON THIS DRAWING ARE APPLICABLE TO EACH ELECTRICAL DRAWING OF THIS SET. REFER TO EACH DRAWING FOR SPECIFIC SCOPE AREAS.

VERIFY MEASUREMENTS. NO EXTRA COMPENSATION WILL BE ALLOWED BECAUSE OF DIFFERENCES BETWEEN WORK SHOWN ON DRAWINGS AND ACTUAL MEASUREMENTS AT SITE OF CONSTRUCTION. DRAWINGS ARE DIAGRAMMATIC REPRESENTATION AND INTENDED TO CONVEY INTENT.

UPON COMPLETION OF WORK, THOROUGHLY CLEAN EXPOSED PORTIONS OF ELECTRICAL EQUIPMENT. ONLY USE CLEANERS RECOMMENDED IF APPROVED BY MANUFACTURER.

DESIGNATE ONE PERSON TO SERVE AS PRIMARY POINT OF COMMUNICATION WITH PROJECT TEAM.

WORK AMONG TRADES SHALL BE FULLY COORDINATED AS REQUIRED IN FIELD TO AVOID CONFLICTS. CONFLICTS SHALL BE REPORTED IN WRITING TO ENGINEER AND OWNER.

EQUIPMENT SHALL BE NEW UNLESS NOTED OTHERWISE AND INSTALLED IN ACCORDANCE WITH MANUFACTURERS' PUBLISHED RECOMMENDATIONS. PRODUCTS SHALL BEAR UL LABELS.

REUSED EXISTING ITEMS SHALL BE REFINISHED, STORED, AND MAINTAINED IN SAME OR BETTER CONDITIONS AS WHEN REMOVED FROM SERVICE.

COORDINATE LOCATION AND INSTALLATION OF EQUIPMENT WITH OTHER TRADES.

COORDINATE EXACT LOCATIONS OF EQUIPMENT POWER CONNECTIONS WITH OWNER AND OEM EQUIPMENT VENDORS BEFORE FINAL ROUGH-IN.

WITHIN 30 DAYS AFTER DATE OF SYSTEM ACCEPTANCE, RECORD DRAWINGS OF INITIAL INSTALLATION SHALL BE PROVIDED TO BUILDING OWNER, INCLUDING SINGLE LINE DRAWING OF BUILDING ELECTRICAL DISTRIBUTION SYSTEM AND FLOOR PLANS INDICATING LOCATION AND AREA SERVED FOR DISTRIBUTION.

PROVIDE 3/4" WITH PULL STRING FROM TELEPHONE BACKBOARD TO EACH TELEPHONE/DATA OUTLET OR COMMUNICATIONS JUNCTION BOX IN FINISHED SPACES. PROVIDE 3/4" WITH PULL STRING FROM 15 FEET ABOVE FINISHED FLOOR TO EACH TELEPHONE/DATA OUTLET OR COMMUNICATIONS JUNCTION BOX IN UNFINISHED SPACES.

PROVIDE FIRE ALARM SYSTEM AS REQUIRED PER NFPA, ADA, TAS, AND LOCAL AUTHORITIES HAVING JURISDICTION. COORDINATE AND INTERFACE DEVICES WITH EXISTING BUILDING FIRE ALARM SYSTEM. FIRE ALARM CONTRACTOR SHALL INSTALL FIRE PROTECTION EQUIPMENT, DEVICES, ETC., PER DOCUMENTS PREPARED BY LICENSED FIRE PROTECTION ENGINEER AND APPROVED BY LOCAL AUTHORITIES HAVING JURISDICTION. INCLUDE IN BID NECESSARY COSTS FOR UPGRADING EXISTING FIRE ALARM SYSTEM TO ACCOMMODATE NEW DEVICE CAPACITY REQUIREMENTS.

OPERATING MANUAL AND MAINTENANCE MANUAL SHALL BE PROVIDED TO BUILDING OWNER. MANUALS SHALL INCLUDE, AT MINIMUM, (A) SUBMITTAL DATA STATING EQUIPMENT RATING AND SELECTED OPTIONS FOR EACH ITEM OF EQUIPMENT REQUIRING MAINTENANCE; (B) OPERATION MANUALS AND MAINTENANCE MANUALS FOR EACH ITEM OF EQUIPMENT REQUIRING MAINTENANCE; REQUIRED ROUTINE MAINTENANCE ACTIONS SHALL BE CLEARLY IDENTIFIED; (C) NAMES AND ADDRESSES OF AT LEAST ONE QUALIFIED SERVICE AGENCY; AND (D) COMPLETE NARRATIVE OF HOW EACH SYSTEM IS INTENDED TO OPERATE.

TIGHTEN ELECTRICAL CONNECTORS AND TERMINALS ACCORDING TO MANUFACTURERS' PUBLISHED TORQUE-TIGHTENING VALUES. IF MANUFACTURER'S TORQUE VALUES ARE NOT INDICATED, USE THOSE SPECIFIED IN UL 486A-486B.

PROVIDE ILSOO PIN TERMINATOR CONNECTED TO WIRES VIA COMPRESSION FITTING AS REQUIRED FOR CONNECTION TO VENDOR-FURNISHED EQUIPMENT.

CONDUIT ROUTED ALONG ROOF SHALL BE SUPPORTED BY BLOCKS MANUFACTURED FROM RECYCLED RUBBER OR POLYCARBONATE BASE WITH SUPPORT PAD. NO WOOD BLOCKING IS ALLOWED.

**ABBREVIATIONS**

A	AMPS, AMPERE
ABC	ABOVE COUNTER
ABV	ABOVE
AC	AIR CONDITIONER
AC	ALTERNATING CURRENT
AF	AMP FRAME
AFF	ABOVE FINISH FLOOR
AFG	ABOVE FINISH GRADE
AHU	AIR HANDLING UNIT
AIC	AMPERES INTERRUPTING CAPACITY
AT	AMP TRIP
AUX	AUXILIARY, AUXILIARIES
AV	AUDIO VISUAL
BLDG	BUILDING
C	CONDUIT
CB	CIRCUIT BREAKER
CKT	CIRCUIT
CLG	CEILING
COMM	COMMUNICATION
CONN	CONNECT
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CR	CARD READER
CT	COOLING TOWER
CT	CURRENT TRANSFORMER
CJ	CONDENSING UNIT
DC	DIRECT CURRENT
DIA	DIAMETER
DN	DOWN
DTL	DETAIL
DWG	DRAWING
EX	EXISTING
EA	EACH
EC	ELECTRICAL CONTRACTOR
EDH	ELECTRIC DUCT HEATER
ELEV	ELEVATION
ELEC	ELECTRICAL
ELEV	ELEVATOR
EMER	EMERGENCY
EQ	EQUAL
EQUIP	EQUIPMENT
EXIST	EXISTING
FA	FIRE ALARM
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FDR	FEEDER
FIXT	FIXTURE
FLUR	FLOOR
FN	FULL NEUTRAL
FPV	FAN POWERED VARIABLE VOLUME FERMAL UNIT
FS	FUSED SWITCH
FSD	FIRE SMOKE DAMPER
FT	FEET
G	GROUND
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
HP	HORSEPOWER
IG	ISOLATED GROUND
INC	INCANDESCENT
KA	KILOAMPERES
KVA	KILOVOLT AMPERES
KW	KILOWATT
KWH	KILOWATT - HOUR
LTG	LIGHTING
MA	MIL AMPS
MAX	MAXIMUM
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCM	THOUSAND CIRCULAR MILS
MECH	MECHANICAL
MIC	MICROPHONE
MIN	MINIMUM
MISC	MISCELLANEOUS
MTD	MOUNTED
MTG	MOUNTING
MTR	MOTOR
MVD	MANUAL VOLUME DAMPER
N	NEUTRAL
NA	NOT APPLICABLE
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
P	POLES
PE	PHOTO-ELECTRIC
PF	POWER FACTOR
PH	PHASE
PLB	PLUMBING
PNL	PANEL
PVC	POLYVINYL CHLORIDE
PWR	POWER
QTY	QUANTITY
(R)	REUSE
RCP	REFLECTED CEILING PLAN
REC	RECEPTACLE
REF	REFERENCE
REFR	REFRIGERATOR
REQD	REQUIRED
RLA	RUNNING LOAD AMPS
RM	ROOM
ROMT	REQUIREMENT
SPECS	SPECIFICATIONS
SPKR	SPEAKER
SQ	SQUARE
SQFT	SQUARE FEET
SC	SHORT CIRCUIT CURRENT
STD	STANDARD
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
TC	TIMELOCK
TELE	TELEPHONE
TTB	TELEPHONE TERMINAL BOARD
TYP	TYPICAL
UNON	UNLESS OTHERWISE NOTED
V	VOLT
VA	VOLT-AMPS
VAV	VARIABLE AIR VOLUME
VERT	VERTICAL
W	WATTS
WH	WATER HEATER
WP	WEATHERPROOF
XFMR	TRANSFORMER
Y	WYE

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**GENERAL NOTES AND LEGENDS**

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ELECTRICAL SPECIFICATIONS

PART 1 - ELECTRICAL INSTRUCTIONS

1. GENERAL REQUIREMENTS
A. SUPPLEMENTARY CONDITIONS UNDER THE GENERAL AND SUPPLEMENTARY CONDITIONS OF THESE SPECIFICATIONS APPLY TO THIS DIVISION. BECOME THOROUGHLY FAMILIAR WITH ALL THEIR CONTENTS AS TO REQUIREMENTS THAT AFFECT THIS DIVISION. SECTION OR BOTH, WORK EQUIPMENT, BECOME THOROUGHLY FAMILIAR WITH ALL THEIR CONTENTS AS TO REQUIREMENTS THAT AFFECT THIS DIVISION. SECTION OR BOTH, WORK EQUIPMENT, APPLIANCES, AND LABOR REQUIRED TO COMPLETE THE ENTIRE ELECTRICAL SYSTEM AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS. OR REASONABLY ANTICIPATED TO BE NECESSARY TO FACILITATE EACH SYSTEM'S FUNCTIONING AS IMPLIED BY THE DESIGN AND THE EQUIPMENT SPECIFIED ACCORDING TO THE DRAWINGS AND DRAWINGS FOR THE PROJECT ARE COMPLEMENTARY, AND PORTIONS OF THE WORK DESCRIBED IN ONE, SHALL BE PROVIDED AS IF DESCRIBED IN BOTH, IN THE EVENT OF DISCREPANCIES, NOTIFY THE ENGINEER AND REQUEST CLARIFICATION PRIOR TO PROCEEDING WITH THE WORK INVOLVED.
B. DRAWINGS AND GRAPHIC REPRESENTATIONS OF THE WORK UPON WHICH THE CONTRACT IS BASED, THEY SHOW THE MATERIALS AND THEIR RELATIONSHIP TO ONE ANOTHER INCLUDING: SHAPES, LOCATIONS, AND CONNECTIONS. THEY ALSO CONVEY THE SCOPE OF WORK, INDICATING THE INTENDED GENERAL ARRANGEMENT OF THE EQUIPMENT, CIRCUITS, OUTLETS AND CIRCUITS WITHOUT SHOWING ALL OF THE EXACT DETAILS AS TO ELEVATIONS, OFFSETS, CONTROL LINES, AND OTHER INSTALLATION REQUIREMENTS. THE DRAWINGS AS A GUIDE WHEN LAYING OUT THE WORK AND TO VERIFY THAT MATERIALS AND EQUIPMENT WILL FIT INTO THE DESIGNATED SPACES, AND WHICH, WHEN INSTALLED PER MANUFACTURERS' REQUIREMENTS, WILL ENSURE A COMPLETE, COORDINATED, SATISFACTORY AND PROPERLY OPERATING SYSTEM.
D. DRAWINGS ARE SCHEMATIC IN NATURE, SHOW THE VARIOUS COMPONENTS OF THE SYSTEMS APPROXIMATELY TO SCALE AND ATTEMPT TO INDICATE HOW THEY SHALL BE INTEGRATED WITH OTHER PARTS OF THE WORK. FIGURED DIMENSIONS TAKE PRECEDENCE TO SCALED DIMENSIONS. DETERMINE EXACT DIMENSIONS BY CHECKING THE DRAWINGS AND BY REVIEWING ALL CONTRACT DOCUMENTS. CORRECT ERRORS THAT COULD HAVE BEEN AVOIDED BY PROPER CHECKING AND INSPECTION. AT NO ADDITIONAL COST TO THE OWNER.
E. SPECIFICATIONS DEFINE THE QUALITATIVE REQUIREMENTS FOR PRODUCTS, MATERIALS, AND WORKMANSHIP UPON WHICH THE CONTRACT IS BASED.
F. ELECTRICAL SUB-CONTRACTOR SHALL MAINTAIN AT LEAST ONE (1) LICENSED JOURNEYPERMAN ELECTRICIAN ON-SITE AT ALL TIMES DURING ACTIVE CONSTRUCTION HOURS.
G. ELECTRICAL SUB-CONTRACTOR SHALL SCHEDULE AND COORDINATE ALL WORKING OPERATIONS WITH CITY AND AUTHORITIES HAVING JURISDICTION.
H. ALL CONTRACT PERSONNEL SHALL COMPLETE THE OWNER'S SAFETY TRAINING AND OPERATIONAL PROCEDURES WITH CITY AND AUTHORITIES HAVING JURISDICTION.
I. ALL CONTRACT PERSONNEL SHALL COMPLETE THE OWNER'S SAFETY TRAINING AND OPERATIONAL PROCEDURES WITH CITY AND AUTHORITIES HAVING JURISDICTION.
J. ALL EQUIPMENT SHALL BE NEW UNLESS NOTED OTHERWISE WHEN EXISTING ITEMS ARE REUSED, REFINISHED AS NOTED ON THE DRAWINGS OR SPECIFIED OTHERWISE. REPAIR AND MAINTAIN IN THE SAME CONDITION AS EXISTED WHEN THE WORK WAS PLACED UNDER CONTRACT. RE-INSTALL THE ITEMS IN A WORKMANSHIP MANNER.
K. PROVIDE LABELS ON ALL WIRING DEVICES, DISCONNECT SWITCHES, ETC. WITH CIRCUIT NUMBERS FROM POWER SOURCE SERVING DEVICE.
L. NOT ALL PARAGRAPHS OF SPECIFICATION MAY APPLY TO THIS PARTICULAR PROJECT.
2. DEFINITIONS
A. WHENEVER USED IN THESE SPECIFICATIONS OR DRAWINGS, THE FOLLOWING TERMS SHALL HAVE THE INDICATED MEANINGS:
1. FURNISH TO SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLING, INSTALLING, AND SIMILAR OPERATIONS.
2. INSTALL TO PERFORM ALL OPERATIONS ON THE PROJECT SITE, INCLUDING, BUT NOT LIMITED TO, AND AS REQUIRED: UNLOADING, UNPACKING, ASSEMBLING, DIRECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, TESTING, COMMISSIONING, STARTING UP AND SIMILAR OPERATIONS, COMPLETE, AND READY FOR THE INTENDED USE.
3. PROVIDE TO FURNISH AND INSTALL COMPLETE, AND READY FOR THE INTENDED USE.
4. FURNISHED BY OWNER (OR OWNER-FURNISHED) OR FURNISHED BY OTHERS: AN ITEM FURNISHED BY THE OWNER OR UNDER OTHER DIVISIONS OR CONTRACTS, AND INSTALLED UNDER THE REQUIREMENTS OF THIS DIVISION, COMPLETE, AND READY FOR THE INTENDED USE, INCLUDING ALL ITEMS AND SERVICES INCIDENTAL TO THE WORK NECESSARY FOR PROPER INSTALLATION AND OPERATION. INCLUDE THE INSTALLATION UNDER THE WARRANTY PROVIDED BY THIS DIVISION.
5. ENGINEER: WHERE REFERENCED IN THIS DIVISION, "ENGINEER" IS THE ENGINEER OF RECORD AND THE DESIGN PROFESSIONAL FOR THE WORK UNDER THIS DIVISION, AND IS A CONSULTANT TO, AND AN AUTHORIZED REPRESENTATIVE OF THE ARCHITECT, AS SAFETY ENGINEER IN THE GENERAL AND SUPPLEMENTARY CONDITIONS, WHEN USED IN THIS DIVISION, IT MEANS INCREASED INVOLVEMENT BY, AND OBLIGATIONS TO, THE ENGINEER, IN ADDITION TO INVOLVEMENT BY, AND OBLIGATIONS TO, THE "ARCHITECT".
6. AHJ: THE LOCAL, CODE AND/OR INSPECTION AGENCY HAVING JURISDICTION OVER THE WORK.
7. NRTL: NATIONALLY RECOGNIZED TESTING LABORATORY, AS DEFINED AND LISTED BY OSHA IN 29 CFR 1910.7 (E.G., UL, ETL, CSA, AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.
8. HOMERUN: THAT PORTION OF AN ELECTRICAL CIRCUIT ORIGINATING AT A JUNCTION BOX, TERMINATION BOX, RECEPTACLE OR SWITCH WITH TERMINATION AT AN ELECTRICAL PANELBOARD, MCC, SWITCHBOARD, OR OTHER POWER SOURCE.
9. THE TERMS "APPROVED EQUAL," "EQUIVALENT," OR "EQUAL" ARE USED SYNONYMOUSLY AND SHALL MEAN ACCEPTED BY OR ACCEPTABLE TO THE ENGINEER AS EQUIVALENT TO THE ITEM OR MANUFACTURER SPECIFIED. THE TERM "APPROVED" SHALL MEAN Labeled, LISTED, CERTIFIED, OR ALL OTHERS AS SPECIFIED ABOVE AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.
10. CONDUCTOR, CABLE, OR WIRE: ONLY APPLIES TO POWER CONDUCTORS UNLESS OTHERWISE NOTED IN THE DRAWINGS. CONTROL, INSTRUMENTATION AND ALL OTHER CONDUCTORS ARE PROVIDED/INSTALLED BY OWNER OR CONTRACTOR OTHER THAN ELECTRICAL.
11. UNLESS NOTED OTHERWISE ON DRAWINGS, ELECTRICAL CONTRACTOR ONLY INSTALLS EMPTY CONDUIT WITH FULL STRING FOR CONDUCTORS OTHER THAN POWER.
3. PRE-BID SITE VISIT
A. PERSONALLY INSPECT THE SITE OF THE PROPOSED WORK AND BECOME FULLY INFORMED OF CONDITIONS UNDER WHICH THE WORK IS TO BE DONE. FAILURE TO DO SO WILL NOT BE CONSIDERED SUFFICIENT JUSTIFICATION TO REQUEST OR OBTAIN EXTRA COMPENSATION OVER AND ABOVE THE CONTRACT PRICE.
4. MATERIAL AND WORKMANSHIP
A. PROVIDE ALL MATERIAL AND EQUIPMENT NEW AND IN FIRST CLASS CONDITION. PROVIDE MARKINGS OR A NAMEPLATE FOR ALL MATERIAL AND EQUIPMENT IDENTIFYING THE MANUFACTURER AND PROVIDING SUFFICIENT REFERENCE TO ESTABLISH QUALITY, SIZE AND CAPACITY. ALL WORKMANSHIP SHALL BE OF THE FINEST POSSIBLE AS EXPERIENCED BY THE MECHANICS OF THE PROPER TRADE. IN GENERAL, PROVIDE THE FOLLOWING QUALITY GRADE(S) FOR ALL MATERIALS AND EQUIPMENT:
1. COMMERCIAL SPECIFICATION GRADE
2. INDUSTRIAL SPECIFICATION GRADE
B. PROVIDE ALL HOISTS, SCAFFOLDS, STAGING, RUNWAYS, TOOLS, MACHINERY AND EQUIPMENT REQUIRED FOR THE PERFORMANCE OF THE ELECTRICAL WORK. STORE AND MAINTAIN MATERIAL AND EQUIPMENT IN CLEAN CONDITION, AND PROTECT FROM WEATHER, MOISTURE, AND PHYSICAL DAMAGE.
C. FURNISH ONLY MATERIAL AND EQUIPMENT THAT ARE LISTED, LABELED, CERTIFIED, OR ALL THREE, BY A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) WHENEVER ANY LISTING OR LABELING EXISTS FOR THE TYPES OF MATERIAL AND EQUIPMENT SPECIFIED.
D. AT A MINIMUM, GENERAL WORK PRACTICES FOR ELECTRICAL CONSTRUCTION SHALL BE IN ACCORDANCE WITH:
1. NETA (LATEST EDITION), "STANDARD PRACTICES FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION"
5. MANUFACTURERS
A. IN OTHER ARTICLES WHERE LISTS OF MANUFACTURERS ARE INTRODUCED, SUBJECT TO COMPLIANCE WITH REQUIREMENTS SPECIFIED, PROVIDE PRODUCTS BY ONE OF THE MANUFACTURERS LISTED.
B. WHERE A LIST IS PROVIDED, MANUFACTURERS ARE LISTED ALPHABETICALLY AND NOT IN ACCORDANCE WITH ANY RANKING OR PREFERENCE.
C. WHERE MANUFACTURERS ARE NOT LISTED, PROVIDE PRODUCTS SUBJECT TO COMPLIANCE WITH REQUIREMENTS FROM MANUFACTURERS THAT HAVE BEEN ACTIVELY INVOLVED IN MANUFACTURING THE SPECIFIED PRODUCT FOR NO LESS THAN 5 YEARS.

COORDINATION

COORDINATE ALL WORK WITH OTHER DIVISIONS AND TRADES SO THAT VARIOUS COMPONENTS OF THE ELECTRICAL SYSTEMS ARE INSTALLED AT THE PROPER TIME, FIT THE AVAILABLE SPACE, AND ALLOW PROPER SERVICE ACCESS TO THE EQUIPMENT. REFER TO ALL DRAWINGS, INCLUDING, BUT NOT LIMITED TO CONTROLS, INSTRUMENTATION, CIVIL, ARCHITECTURAL, STRUCTURAL, MECHANICAL, AND PLUMBING, AND TO ALL RELEVANT EQUIPMENT SUBMITTALS AND SHOP DRAWINGS TO DETERMINE THE EXTENT OF CLEAR SPACES. MAKE ALL OFFSETS REQUIRED TO CLEAR EQUIPMENT, BEAMS, AND OTHER STRUCTURAL MEMBERS, AND TO FACILITATE CONCEALING RACEWAYS IN THE MANNER ANTICIPATED IN THE DESIGN. PROVIDE MATERIALS WITH TRIM THAT WILL FIT PROPERLY AND WITHOUT GAPS. WALL, OR FLOOR FINISHES ACTUALLY INSTALLED.
B. THE BURDEN OF INITIATING THE COORDINATION REST WITH THE OTHER TRADES.
7. ORDINANCES, CODES, AND STANDARDS
A. COMPLY AT A MINIMUM, WITH NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) CODES AND ORDINANCES, STATE AND LOCAL BUILDING CODES, AND ALL OTHER APPLICABLE CODES AND ORDINANCES FOR PERFORMANCE, WORKMANSHIP, EQUIPMENT, AND DESIGNATION. CONTINUE TO REVIEW LOCAL, STATE, AND FEDERAL REGULATIONS OF PUBLIC UTILITIES AND MUNICIPAL DEPARTMENTS AFFECTED BY CONNECTION OF SERVICES. WHERE CONFLICTS BETWEEN VARIOUS CODES, ORDINANCES, RULES, AND REGULATIONS EXIST, COMPLY WITH THE MOST STRINGENT, WHEREVER REQUIREMENTS OF THESE REGULATIONS ARE MORE STRINGENT THAN THOSE OF THE ABOVE ITEMS, THE REQUIREMENTS OF THESE SPECIFICATIONS, DRAWINGS, OR BOTH. SHALL GOVERN. CODE COMPLIANCE, AT A MINIMUM, IS REQUIRED. NOTHING IN THESE CONSTRUCTION DOCUMENTS AS PERMITTING WORK NOT IN COMPLIANCE, AT A MINIMUM, WITH THE CODES.
C. PROMPTLY BRING ALL DISCREPANCIES OBSERVED BETWEEN CODES, ORDINANCES, RULES, REGULATIONS, REFERENCED STANDARDS, AND THESE DOCUMENTS TO THE ENGINEER'S ATTENTION FOR EARLY RESOLUTION. CONDUCTOR WILL BE HELD RESPONSIBLE FOR ANY VIOLATION OF THE LAW.
D. MINIMUM RACEWAY AND ALL NECESSARY SIGNAL LIGHTS AND GUARDS FOR THE SAFETY OF THE PUBLIC. OBTAIN AND PAY FOR ALL PERMITS FOR WORK IN THIS DIVISION.
8. PROTECTION OF EQUIPMENT AND MATERIALS
A. STORE AND PROTECT FROM DAMAGE EQUIPMENT AND MATERIALS DELIVERED TO JOB SITE, IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS AND EQUIPMENT SUSCEPTIBLE TO CHANGING WEATHER CONDITIONS, DAMPNESS, OR TEMPERATURE VARIATIONS. STORE INSIDE IN INDICATED AS DAMPER. PROTECT MATERIALS NOT SUSCEPTIBLE TO THESE CONDITIONS, COVER WITH WATERPROOF, TEAR-RESISTANT, HEAVY TARP OR POLYETHYLENE SHEETS, AS NECESSARY TO PROTECT FROM DIRT, WATER, OR PHYSICAL DAMAGE. EQUIPMENT AND MATERIAL THAT HAS BEEN DAMAGED BY CONSTRUCTION ACTIVITIES WILL BE REJECTED, AND REPLACEMENT SHALL FURNISH NEW EQUIPMENT AND MATERIAL OF A LIKE KIND.
B. PLUG OR CAP OPEN ENDS OF CONDUITS TO PREVENT THE ENTRANCE OF DEBRIS INTO THE SYSTEMS.
C. PHASE B - RED RACEWAYS BEFORE INSTALLATION, AND KEEP CLEAN AFTER INSTALLATION. PLUG OR COVER OPEN ENDS OF CONDUITS WITH PRODUCTS OF ANY RACEWAYS CLEAN DURING CONSTRUCTION AND SHORT CIRCuits CLEAR OF OBSTRUCTIONS PRIOR TO THE NEW EQUIPMENT.
D. PROTECT ALL RACEWAY INSTALLATIONS AGAINST DAMAGE DURING CONSTRUCTION. REPAIR ALL RACEWAYS DAMAGED PRIOR TO THE DATE FOR RECEIPT OF THE WORK. AFTER ROUGH-IN TO MEET ENGINEER'S APPROVAL WITHOUT ADDITIONAL COST TO THE OWNER.
E. ALIGN AND INSTALL TRUE AND PLUMB ALL RACEWAY TERMINATIONS AT PANELBOARDS, CABINETS, AND JUNCTION BOXES.
F. INSTALL A PULL LINE IN EACH EMPTY RACEWAY THAT IS LEFT FOR INSTALLATION OF EQUIPMENT. PROVIDE A POINT-TO-POINT CALCULATION FOR EACH EXTERIOR LIGHT FIXTURES (PHOTOMETRIC FILES SUPPLIED SO THE ENGINEER CAN GENERATE A POINT-TO-POINT CALCULATION FOR EACH POINT-BY-POINT CALCULATIONS). PROVIDE INTERIOR POINT-BY-POINT CALCULATIONS AT THE DISCRETION OF THE ENGINEER. SUBMIT A \$100.00 REVIEW FEE TO THE ENGINEER WITH EACH SUCH POINT-BY-POINT CALCULATION FOR USE OF ELECTRONIC BASE FILES.
G. AFTER THE BID DATE, PROPOSALS TO SUBSTITUTE LIGHT FIXTURES FOR THOSE SHOWN ON THE DRAWINGS OR SPECIFIED HEREIN, WILL ONLY BE CONSIDERED AS A DEDUCT, SUBMIT PROPOSED SUBSTITUTIONS SEPARATELY, IN SUBMITTAL FORM, WITH A LIST OF PROPOSED SUBSTITUTIONS TOGETHER WITH DEDUCT PRICE FOR EACH SUBSTITUTION. THE ENGINEER WILL THEN REVIEW THE PROPOSED SUBSTITUTIONS.
H. THE ENGINEER WILL HAVE THE FINAL AUTHORITY AS TO WHETHER THE LIGHT FIXTURE IS AN ACCEPTABLE REPLACEMENT TO THE SPECIFIED ITEM. THE PROPOSED SUBSTITUTION MAY ALSO BE REJECTED BY THE ARCHITECT, THE ENGINEER OR THE OWNER FOR AESTHETIC REASONS IF FELT NECESSARY OR DESIRABLE. IN THE EVENT THE PROPOSED SUBSTITUTIONS ARE REJECTED, FURNISH THE SPECIFIED ITEM.
9. SUBSTITUTIONS
A. INCLUDE IN THE BASE BID THE PRODUCTS SPECIFICALLY NAMED IN THESE SPECIFICATIONS OR ON THE DRAWINGS. SUBMIT, IN THE FORM OF ALTERATION, PROPOSALS FOR ANY OTHER MANUFACTURERS FOR SIMILAR USE, PROVIDED THE DIFFERENCES IN COST, IF ANY ARE INCLUDED FOR EACH PROPOSED ALTERNATE.
B. PRIOR TO THE BID DATE, SUBSTITUTIONS WILL NOT BE CONSIDERED UNLESS SUBMITTED FOR ENGINEER'S REVIEW, AT LEAST TEN BUSINESS DAYS PRIOR TO THE DATE FOR RECEIPT OF BIDS. INCLUDE THE NAME OF THE MATERIAL OR EQUIPMENT FOR WHICH IT IS TO BE SUBSTITUTED AND A COMPLETE DESCRIPTION OF THE PROPOSED SUBSTITUTE INCLUDING CUTSHEETS, PHOTOMETRIC DATA, AND ALL OTHER INFORMATION NECESSARY FOR AN EVALUATION FOR EACH SUCH SUBSTITUTION.
C. PROVIDE A POINT-TO-POINT CALCULATION FOR EACH SUCH SUBSTITUTION.
D. WHETHER THE LIGHT FIXTURE IS AN ACCEPTABLE REPLACEMENT TO THE SPECIFIED ITEM. THE PROPOSED SUBSTITUTION MAY ALSO BE REJECTED BY THE ARCHITECT, THE ENGINEER OR THE OWNER FOR AESTHETIC REASONS IF FELT NECESSARY OR DESIRABLE. IN THE EVENT THE PROPOSED SUBSTITUTIONS ARE REJECTED, FURNISH THE SPECIFIED ITEM.
10. SUBMITTALS
A. ASSEMBLE AND SUBMIT FOR ENGINEER'S REVIEW, MANUFACTURERS' PRODUCT LITERATURE FOR MATERIAL AND EQUIPMENT TO BE FURNISHED, INSTALLED, OR BOTH, UNDER THIS DIVISION. INCLUDE THE ACTUAL DRAWINGS, MANUFACTURERS' PRODUCT DATA AND PERFORMANCE SHEETS, AND OTHER SUBMITTALS REQUIRED BY THIS DIVISION. HIGHLIGHT, MARK, LIST AND INDEX THE MATERIALS, PERFORMANCE CRITERIA AND ACCESSORIES THAT ARE BEING PROPOSED, BEFORE SUBMITTING. VERIFY THAT ALL MATERIALS AND EQUIPMENT SUBMITTED ARE MUTUALLY COMPATIBLE AND SUITABLE FOR THE INTENDED USE, FIT THE AVAILABLE SPACES, AND ALLOW AMPLE AND CODE-REQUIRED ROOM FOR ACCESS AND MAINTENANCE. SUBMITTALS SHALL CONTAIN THE FOLLOWING INFORMATION:
1. SUBMITTALS NOT SO IDENTIFIED WILL BE RETURNED TO THE CONTRACTOR WITHOUT ACTION:
a. THE PROJECT NAME
b. THE APPLICABLE SPECIFICATION SECTION AND PARAGRAPH
c. THE SUBMITTAL DATE
2. THE CONTRACTOR'S STAMP, WHICH SHALL CERTIFY THAT THE STAMPED DRAWINGS HAVE BEEN CHECKED BY THE CONTRACTOR, COMPLY WITH THE DRAWINGS AND SPECIFICATIONS, AND HAVE BEEN COORDINATED WITH OTHER TRADES.
3. SUBMITTALS AND SHOP DRAWINGS SHALL NOT CONTAIN CIS GROUP FIRM NAME OR LOGO, NOR SHALL IT CONTAIN THE CIS GROUP ENGINEERS' SEAL AND SIGNATURE. THE SUBMITTALS SHALL NOT BE COPIES OF THE ENGINEERS WORK PRODUCT. TRANSMIT SUBMITTALS AS EARLY AS REQUIRED TO SUPPORT THE PROJECT SCHEDULE. ALLOW FOR TWO WEEKS ENGINEER REVIEW TIME, PLUS MAILING TIME, PLUS A DUPLICATION OF THIS TIME FOR RESUBMITTALS, IF REQUIRED. TRANSMIT SUBMITTALS AS SOON AS POSSIBLE AFTER NOTICE TO PROCEED AND BEFORE CONSTRUCTION STARTS. FOR THE ENGINEER'S SUBMITTALS WILL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN DIMENSIONS, DETAILS, SIZE OF MEMBERS, OR QUANTITIES, OR FOR OMITTING COMPONENTS OR FITTINGS, OR FOR NOT COORDINATING ITEMS WITH UNFORSEEN CONDITIONS.
B. ELECTRONIC SUBMITTALS ARE REQUIRED FOR THIS PROJECT. THE CONTRACTOR SHALL SUBMIT DOCUMENTS IN ACCORDANCE WITH THE OWNER'S PROCEDURES. CONTRACTOR SHALL NOTIFY THE ENGINEER THAT THE SHOP DRAWINGS HAVE BEEN POSTED TO THE PROJECT FTP SITE, IF ELECTRONIC SUBMITTAL PROCEDURES ARE NOT DEFINED. CONTRACTOR SHALL INCLUDE THE WEBSITE, USER NAME AND PASSWORD INFORMATION NEEDED TO ACCESS THE SUBMITTALS.
C. SUBMITTALS SENT BY E-MAIL, CONTRACTOR SHALL COPY THE ENGINEER'S DESIGNATED REPRESENTATIVES. CONTRACTOR SHALL ALLOW THE ENGINEER REVIEW TIME AS SPECIFIED ABOVE IN THE CONSTRUCTION SCHEDULE. CONTRACTOR SHALL SUBMIT ONLY THE DOCUMENTS REQUIRED TO PURCHASE THE PRODUCT CATALOG DATA NOT SPECIFICALLY NOTED TO BE PART OF THE SPECIFIED PRODUCT WILL BE REJECTED AND RETURNED WITHOUT REVIEW.
E. CONTRACTOR SHALL SUBMIT DOCUMENTS IN ACCORDANCE WITH THE OWNER'S PROCEDURES. CONTRACTOR SHALL NOTIFY THE ENGINEER THAT THE SHOP DRAWINGS HAVE BEEN POSTED TO THE PROJECT FTP SITE, IF ELECTRONIC SUBMITTAL PROCEDURES ARE NOT DEFINED. CONTRACTOR SHALL INCLUDE THE WEBSITE, USER NAME AND PASSWORD INFORMATION NEEDED TO ACCESS THE SUBMITTALS.
F. SUBMITTALS SENT BY E-MAIL, CONTRACTOR SHALL COPY THE ENGINEER'S DESIGNATED REPRESENTATIVES. CONTRACTOR SHALL ALLOW THE ENGINEER REVIEW TIME AS SPECIFIED ABOVE IN THE CONSTRUCTION SCHEDULE. CONTRACTOR SHALL SUBMIT ONLY THE DOCUMENTS REQUIRED TO PURCHASE THE PRODUCT CATALOG DATA NOT SPECIFICALLY NOTED TO BE PART OF THE SPECIFIED PRODUCT WILL BE REJECTED AND RETURNED WITHOUT REVIEW.

WARRANTIES

WARRANT EACH SYSTEM AND EACH ELEMENT THEREOF AGAINST ALL DEFECTS DUE TO FAULTY WORKMANSHIP, DESIGN OR MATERIAL, FOR A PERIOD OF 12 MONTHS FROM DATE OF SUBSTANTIAL COMPLETION, UNLESS SPECIFIC ITEMS ARE NOTED TO CARRY A LONGER WARRANTY IN THE CONSTRUCTION DOCUMENTS OR MANUFACTURERS STANDARD WARRANTY EXCEEDS 12 MONTHS. REMEDY ALL DEFECTS, OCCURRING WITHIN THE WARRANTY PERIOD(S), AS STATED IN THE GENERAL CONDITIONS.
ALSO WARRANT THE FOLLOWING ADDITIONAL ITEMS:
1. ALL RACEWAYS ARE FREE FROM OBSTRUCTIONS, HOLES, CRUSHING, OR BREAKS OF ANY NATURE.
2. ALL RACEWAYS SHALL BE EFFECTIVE.
3. THE ENTIRE ELECTRICAL SYSTEM IS FREE FROM ALL SHORT CIRCUITS AND UNWANTED OPEN CIRCUITS AND GROUNDING.
C. THE ABOVE WARRANTIES SHALL INCLUDE LABOR AND MATERIAL. MAKE REPAIRS OR REPLACEMENTS WITHOUT ANY ADDITIONAL COSTS TO THE CONTRACTOR.
D. PERFORM THE REMEDIAL WORK PROMPTLY, UPON WRITTEN NOTICE FROM THE ENGINEER OR OWNER.
E. AT THE TIME OF SUBSTANTIAL COMPLETION, DELIVER TO THE OWNER ALL WARRANTIES, IN WRITING AND PROPERLY RECORDED, INCLUDING TERM LIMITS FOR WARRANTIES. DESIGNATION CONTAINING SUCH HOME RUN WIRING INSTRUMENT BEING ADDRESSED TO THE OWNER AND STATING THE COMMENCEMENT DATE AND TERM.
PART 2 - ELECTRICAL MATERIALS AND METHODS
1. RACEWAYS
A. METALLIC CONDUIT AND TUBING
1. INTERMEDIATE METAL CONDUIT (IMC); HOT-DIP GALVANIZED RIGID STEEL CONDUIT (RSCG); UL 1242, UL 100 (RIGID) FLEXIBLE METAL CONDUIT (FLEXIBLE STEEL CONDUIT WITH PVC JACKET) UL 360
2. RIGID METAL CONDUIT (RMC); HOT-DIP GALVANIZED RIGID STEEL CONDUIT (RSCG); UL 1242, UL 100
B. RACEWAY INSTALLATION
1. GENERAL RACEWAY INSTALLATION REQUIREMENTS:
a. INSTALL RACEWAYS SET IN FORMS FOR CONCRETE STRUCTURE IN SUCH A MANNER THAT INSTALLATION WILL NOT AFFECT THE STRENGTH OF THE STRUCTURE.
b. INSTALL RACEWAYS CONTINUOUS BETWEEN CONNECTIONS TO OUTLETS, BOXES AND CABINETS WITH A MINIMUM POSSIBLE NUMBER OF BENDS AND NOT MORE THAN THE EQUIVALENT OF FOUR 90-DEGREE BENDS IN ANY ONE RACEWAY. CONNECTIONS, USE MANUFACTURED ELBOWS FOR ALL 45- AND 90-DEGREE BENDS, UNLESS APPROVED BY THE ENGINEER IN ADVANCE. MAKE OTHER BENDS AND MORE THAN EVEN AND WITHOUT FLATTENING RACEWAY OR FLANKING GALVANIZING OR ENAMEL. RADIUS OF BENDS SHALL BE AS LOW AS POSSIBLE AND NEVER SHORTER THAN THE CORRESPONDING TRADE ELBOW.
c. REAM RACEWAY GENDS, THOROUGHLY CLEAN RACEWAYS BEFORE INSTALLATION, AND KEEP CLEAN AFTER INSTALLATION. PLUG OR COVER OPEN ENDS OF CONDUITS WITH PRODUCTS OF ANY RACEWAYS CLEAN DURING CONSTRUCTION AND SHORT CIRCUITS CLEAR OF OBSTRUCTIONS PRIOR TO THE NEW EQUIPMENT.
d. PROTECT ALL RACEWAY INSTALLATIONS AGAINST DAMAGE DURING CONSTRUCTION. REPAIR ALL RACEWAYS DAMAGED PRIOR TO THE DATE FOR RECEIPT OF THE WORK. AFTER ROUGH-IN TO MEET ENGINEER'S APPROVAL WITHOUT ADDITIONAL COST TO THE OWNER.
e. ALIGN AND INSTALL TRUE AND PLUMB ALL RACEWAY TERMINATIONS AT PANELBOARDS, CABINETS, AND JUNCTION BOXES.
f. INSTALL A PULL LINE IN EACH EMPTY RACEWAY THAT IS LEFT FOR INSTALLATION OF EQUIPMENT. PROVIDE A POINT-TO-POINT CALCULATION FOR EACH EXTERIOR LIGHT FIXTURES (PHOTOMETRIC FILES SUPPLIED SO THE ENGINEER CAN GENERATE A POINT-TO-POINT CALCULATION FOR EACH POINT-BY-POINT CALCULATIONS). PROVIDE INTERIOR POINT-BY-POINT CALCULATIONS AT THE DISCRETION OF THE ENGINEER. SUBMIT A \$100.00 REVIEW FEE TO THE ENGINEER WITH EACH SUCH POINT-BY-POINT CALCULATION FOR USE OF ELECTRONIC BASE FILES.
g. AFTER THE BID DATE, PROPOSALS TO SUBSTITUTE LIGHT FIXTURES FOR THOSE SHOWN ON THE DRAWINGS OR SPECIFIED HEREIN, WILL ONLY BE CONSIDERED AS A DEDUCT, SUBMIT PROPOSED SUBSTITUTIONS SEPARATELY, IN SUBMITTAL FORM, WITH A LIST OF PROPOSED SUBSTITUTIONS TOGETHER WITH DEDUCT PRICE FOR EACH SUBSTITUTION. THE ENGINEER WILL THEN REVIEW THE PROPOSED SUBSTITUTIONS.
h. THE ENGINEER WILL HAVE THE FINAL AUTHORITY AS TO WHETHER THE LIGHT FIXTURE IS AN ACCEPTABLE REPLACEMENT TO THE SPECIFIED ITEM. THE PROPOSED SUBSTITUTION MAY ALSO BE REJECTED BY THE ARCHITECT, THE ENGINEER OR THE OWNER FOR AESTHETIC REASONS IF FELT NECESSARY OR DESIRABLE. IN THE EVENT THE PROPOSED SUBSTITUTIONS ARE REJECTED, FURNISH THE SPECIFIED ITEM.
2. BUSHINGS AND LOCKNUTS
A. ALL RIGIDLY TERMINATE CONDUITS ENTERING SHEET METAL ENCLOSURES TO THE ENCLASURE WITH A BUSHING AND LOCKNUT ON THE INSIDE AND A LOCKNUT OR AN APPROVED HUB ON THE OUTSIDE. CONDUIT SHALL ENTER THE ENCLOSURE SQUARELY.
B. PROVIDE BUSHINGS AND LOCKNUTS MADE OF GALVANIZED MALLEABLE IRON WITH SHARP, CLEAN-CUT THREADS.
C. USE INSULATED, GROUNDING, OR COMBINATION, BUSHINGS WHEREVER CONNECTION IS SUBJECT TO VIBRATION OR MOISTURE, WHEN REQUIRED BY NFPA 70, OR BOTH.
3. CONDUCTORS AND CABLES
A. CONDUCTOR MATERIAL:
1. ANNEALED (SOFT) COPPER COMPLYING WITH ICEA S-95-658/NEMA WC70.
a. TERMINATIONS TRIMMED, MECHANICAL TYPE ONLY; UL LISTED FOR COPPER CONDUCTORS AT 75 DEGREES C MINIMUM.
2. CONDUCTOR INSULATION TYPES: 90-DEGREE C-RATED, TYPE THHN/THWN-2 OR XHHW-2 COMPLYING WITH ICEA S-95-658/NEMA WC70.
3. SIZES OF CONDUCTORS INDICATED OR SPECIFIED ARE IN AMERICAN WIRE GAGE (AWG - BROWN AND SHIELDED) OR ALL FEEDER AND BRANCH CIRCUIT CONDUCTORS NO. 8 AWG AND LARGER STRANDED.
4. ALL CONDUCTORS NO. 10 & 12 AWG: SOLID OR STRANDED COPPER.
5. ALL BRANCH CIRCUIT WIRING: NOT SMALLER THAN NO. 12AWG. IF NO CONDUCTOR SIZE IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE CONDUCTORS AND CONDUIT SIZED PER NFPA 70 AND BASED ON THE INDICATED BRANCH CIRCUIT OVERCURRENT PROTECTIVE DEVICE (OCPD) RATING AND NUMBER OF POLES, WHERE NO CIRCUIT SIZE (I.E., CONDUCTORS AND OCPD) IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE THREE NO. 12 AWG CONDUCTORS, IN 3/4-INCH RACEWAY, AND A 20A CIRCUIT BREAKER.
6. NEW INSTRUMENTATION AND CONTROLS (I&C) WIRING SHALL BE SIMILAR TO EXISTING.
B. LIGHT FIXTURES, LAMPS AND BALLASTS
1. LIGHT FIXTURES SHOW ON THE ELECTRICAL DRAWINGS SHALL BE INSTALLED AND WIRING SHALL BE COORDINATED WITH ALL OTHER TRADES BEFORE INSTALLATION TO AVOID CONFLICTS.
2. LIGHT FIXTURES
1. PROVIDE LIGHT FIXTURES AS SCHEDULED ON DRAWINGS, INCLUDING ALL LAMPS, ALL NECESSARY ACCESSORIES, MATERIAL, AND LABOR TO MAKE LIGHT FIXTURES COMPLETELY READY FOR USE. LIGHT FIXTURE MODEL NUMBERS SCHEDULED ON THE DRAWINGS SHOW ONLY THE MANUFACTURER, GRADE AND STYLE OF LIGHT FIXTURES REQUIRED.
3. POWER SYSTEM STUDY
A. A POWER SYSTEM STUDY INCLUDES COMPUTER BASED SHORT CIRCUIT, OVERCURRENT COORDINATION, AND ARC FLASH STUDIES.
B. THE CONTRACTOR SHALL PERFORM THE STUDY AND SUBMIT FOR APPROVAL BEFORE ENERGIZING THE INSTALLED EQUIPMENT.
C. THE STUDY SHALL INCLUDE THE UTILITY INPUT; INFINITY UTILITY BUS IS NOT ACCEPTABLE.
D. THE CONTRACTOR IS RESPONSIBLE FOR COLLECTING OWN INFORMATION WHICH SHALL INCLUDE THE CONTRIBUTIONS OF NEW/EXISTING MOTORS 50 HP AND LARGER.
E. THE STUDY SHALL COORDINATE FROM THE SERVICE CIRCUIT BREAKER TO THE LARGEST CIRCUIT BREAKER AFTER THE NEW EQUIPMENT.
F. THE AMP INTERRUPTING CAPACITY (AIC) OF THE NEW EQUIPMENT SHALL BE GREATER THAN THE AIC OF THE STUDY. CONTRACTOR SHALL PRINT AND INSTALL ARC FLASH LABELS FOR THE NEW EQUIPMENT.

INSTALLATION OF CONDUCTORS AND CABLES

INSTALL ALL WIRING IN APPROVED RACEWAY AND ENCLOSURES.
1. INSTALL ALL CONDUCTORS AND CABLE IN RACEWAYS CONTINUOUS WITHOUT TAPS OR SPLICES. SPLICE OR TAP ONLY IN APPROVED BOXES AND ENCLOSURES WITH APPROVED SOLDERLESS CONNECTIONS WITH A METAL CONNECTORS AND TERMINAL BLOCKS FOR CONTROL WIRING, AND KEEP TO THE MINIMUM REQUIRED.
2. ALL SPLICES, TAPS, AND JOINTS AS REQUIRED BY CODES.
3. ALL MATERIALS USED TO TERMINATE, SPLICE OR TAP CONDUCTORS SHALL BE THE TYPES OF RACEWAY, AND UL LISTED FOR THE SPECIFIC APPLICATION AND CONDUCTORS INVOLVED, AND INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, USING THE MANUFACTURER'S RECOMMENDED TOOLS.
4. THE DIRECTION OF BRANCH CIRCUIT "HOME RUN" ROUTING IS INDICATED ON THE DRAWINGS, COMPLETE WITH CIRCUIT NUMBERS AND POWER SOURCE. DESIGNATION CONTAINING SUCH HOME RUN WIRING TO THE DESIGNATED PANELBOARD, AS THOUGH "CIRCUIT RUNS" WERE INDICATED IN THEIR ENTIRETY.
5. BRANCH CIRCUIT WIRING (I.E., SHARED NEUTRAL) ARE NOT ALLOWED FOR THIS INSTALLATION. ALL BRANCH CIRCUITS SHALL HAVE DEDICATED NEUTRAL CONDUCTORS.
6. WHEN MULTIPLE HOME RUNS ARE COMBINED INTO A SINGLE RACEWAY SUCH THAT THE NUMBER OF CONDUCTORS EXCEEDS THE RACEWAY COUNT IS MADE UP OF ANY COMBINATION OF PHASE AND NEUTRAL CONDUCTORS, THE FOLLOWING RESTRICTIONS APPLY, WHICH APPLY TO ALL RACEWAYS:
a. MAXIMUM OF 16 CONDUCTORS IN A SINGLE RACEWAY, OR UP TO 20 CONDUCTORS IN A RACEWAY, MINIMUM RACEWAY SIZE: 3/4-INCH, FOR GREATER THAN EIGHT CONDUCTORS.
b. THE MINIMUM SIZE FOR ALL CONDUCTORS IN THIS RACEWAY: NO. 10AWG.
c. BRANCH CIRCUIT HOMERUNS MAY BE COMBINED INTO ONE RACEWAY.
7. PROVIDE AN EQUIPMENT-GROUNDING CONDUCTOR, OR EQUIPMENT-GROUNDING CONDUCTOR, AND BRANCH CIRCUITS, SIZED IN ACCORDANCE WITH NFPA 70 TABLES 250.86 OR 250.122, AS APPLICABLE, UNLESS INDICATED OTHERWISE.
8. WIRING SHALL HAVE INSULATION OF THE PROPER COLOR TO MATCH COLOR CODE SYSTEM IN THE TABLE BELOW. IN LARGER SIZES, WHERE INSULATION IS NOT AVAILABLE, USE VINYL PLASTIC INSULATION IS NOT AVAILABLE. USE VINYL PLASTIC ELECTRICAL TAPE OF THE APPROPRIATE COLOR AROUND EACH CONDUIT AT TERMINATION POINTS, JUNCTION AND PULL BOXES.
a. 208/120V, THREE PHASE SYSTEM AND SINGLE PHASE:
• PHASE A - BLACK
• PHASE B - RED
• PHASE C - BLUE
• EQUIPMENT GROUND - GREEN
b. 480/277V, THREE PHASE SYSTEM AND SINGLE PHASE:
• PHASE A - BROWN
• PHASE B - ORANGE
• PHASE C - YELLOW
• EQUIPMENT GROUND - GREEN
9. USE OF MC CABLE; MC CABLE SHALL NOT BE USED FOR NEW EQUIPMENT AND EXISTING EQUIPMENT SHALL BE KEPT TO A MINIMUM AND SHALL NOT BE LONGER THAN 6 FEET.
10. WIRING SHALL BE TESTED FOR CONTINUITY AND LABELLED AT BOTH ENDS BEFORE TERMINATION. OWNER OR OWNER'S CONTRACTOR WILL TERMINATE WIRES AT CABINET AND CONTROLLER UNLESS NOTED OTHERWISE.
4. JUNCTION BOXES, PULL BOXES, CABINETS AND WIREWAYS
A. PROVIDE JUNCTION BOXES, PULL BOXES, CABINETS AND WIREWAYS WHEREVER NECESSARY FOR PROPER INSTALLATION OF VARIOUS ELECTRICAL SYSTEMS ACCORDING TO NFPA 70 AND WHERE INDICATED ON THE DRAWINGS. SIZE AS REQUIRED FOR THE SPECIFIC FUNCTION OR AS REQUIRED BY NFPA 70, WHICHEVER IS LARGER. CONSTRUCTION SHALL BE OF A NEMA DESIGN SUITABLE FOR THE ENVIRONMENT INSTALLED.
B. OUTLET BOXES
A. ALL OUTLETS INCLUDING LIGHT FIXTURE, SWITCH, RECEPTACLE, AND SIMILAR OUTLETS: NATIONAL ELECTRIC APPLIANCE STEEL CITY, RACO, OR APPROVED EQUAL GALVANIZED STEEL KNOCKOUT BOXES, SUITABLE IN DESIGN TO THE PURPOSE THEY SERVE AND THE SPACE THEY OCCUPY. SIZE AS REQUIRED FOR THE SPECIFIC FUNCTION OR AS REQUIRED BY NFPA 70, WHICHEVER IS LARGER. SET ALL OUTLET BOXES SO THEY ARE FLUSH WITH THE FINISHED SURFACE, ACCURATELY SET, AND RIGIDLY SECURED IN POSITION. PROVIDE EXTENSION RINGS AND/OR MASONRY RINGS AS REQUIRED FOR FLUSH MOUNTING. PROVIDE APPROVED CAST OUTLET BOXES WITH WEATHER-PROOF COVERS, IN ALL AREAS SUBJECT TO DAMP, WET, OR HARSH CONDITIONS.
6. OUTLET LOCATIONS
A. COORDINATE LOCATIONS OF OUTLET BOXES. OUTLETS ARE ONLY APPROXIMATELY LOCATED ON THE SMALL SCALE DRAWINGS. USE GREAT CARE IN THE ACTUAL LOCATION BY CONSULTING THE VARIOUS LARGE SCALE DETAILED DRAWINGS USED BY OTHER DIVISION TRADES, AND BY SECURING DEFINITE LOCATIONS FROM THE ENGINEER.
B. RECEPTABLES: INSTALL WHERE LOCATED ON PLANS.
C. SWITCHES: INSTALL WHERE LOCATED ON PLANS.
7. WIRING DEVICES
A. WIRING DEVICES SHALL BE 20A RATED DEVICES OR AS IDENTIFIED ON PLANS OR SCHEDULES.
B. PROVIDE WIRING DEVICES WHERE SHOWN ON DRAWINGS OR REQUIRED, MINOR CHANGES RELATIVE TO THE LOCATION OF ELECTRICAL EQUIPMENT MAY BE MADE TO COMPLY WITH REQUIREMENTS AS DETERMINED IN THE CONSTRUCTION. WIRING DEVICES SHALL BE PROVIDED BY THE SAME MANUFACTURER AND NOT MIXED ON THE PROJECT.
8. SWITCH AND OUTLET COVER PLATES
A. SWITCH AND OUTLET PLATES:
1. BY THE SAME MANUFACTURER AS THE WIRING DEVICES, WHEREVER POSSIBLE. VERIFY DESIRED MATERIALS AND COLORS WITH ENGINEER BEFORE INSTALLATION.
9. DISTRIBUTION EQUIPMENT
A. LIGHTING AND APPLIANCE PANELBOARDS
1. PANELBOARDS: EXISTING TO REMAIN, EXISTING CIRCUIT BREAKERS SHALL BE REUSED WHERE THE REQUIREMENTS FOR THE EQUIPMENT, PROVIDE NEW CIRCUIT BREAKERS AS REQUIRED FOR INSTALLATION IN EXISTING PANELBOARDS. NEW CIRCUIT BREAKERS SHALL BE OF THE SAME MANUFACTURER, TYPE AND SHORT CIRCUIT CURRENT INTERRUPTING RATINGS AS THE EXISTING PANELBOARD AND CIRCUIT BREAKER.
2. PANELBOARDS: NEW, THE PANEL BOARD MAIN TYPE (MCB OR MLO), BUS AMPS, NEUTRAL SIZE, VOLTAGE (208/120, 240/120, 480/277, 480/277, 3 PHASES, WIRING (3 OR 4 WIRE), AIC SHALL AS BE SHOWN ON DRAWINGS.
10. DISCONNECT SWITCHES
A. DISCONNECT (SAFETY) SWITCHES
1. PROVIDE DISCONNECT SWITCHES BY ONE OF THE FOLLOWING MANUFACTURERS: SQUARE D, SIEMENS, OUTLET HAMMER, OR GENERAL ELECTRIC.
2. FUSED OR NON-FUSED (AS INDICATED ON DRAWINGS OR REQUIRED) NEMA K31, HEAVY DUTY, EXTERNALLY OPERATED, VISIBLY OPERATED, TYPE, AND TO BE USED IN AN ENCLOSURE TYPE INDICATED ON THE DRAWINGS OR SUITABLE FOR THE ENVIRONMENT IN WHICH INSTALLED.
3. MATERIALS AND ACCESSORIES TO BE INSTALLED SHALL INCLUDE CLASS R, J, OR L FUSE PROVISIONS AS APPLICABLE.
B. LIGHT FIXTURES, LAMPS AND BALLASTS
1. LIGHT FIXTURES SHOW ON THE ELECTRICAL DRAWINGS SHALL BE INSTALLED AND WIRING SHALL BE COORDINATED WITH ALL OTHER TRADES BEFORE INSTALLATION TO AVOID CONFLICTS.
2. LIGHT FIXTURES
1. PROVIDE LIGHT FIXTURES AS SCHEDULED ON DRAWINGS, INCLUDING ALL LAMPS, ALL NECESSARY ACCESSORIES, MATERIAL, AND LABOR TO MAKE LIGHT FIXTURES COMPLETELY READY FOR USE. LIGHT FIXTURE MODEL NUMBERS SCHEDULED ON THE DRAWINGS SHOW ONLY THE MANUFACTURER, GRADE AND STYLE OF LIGHT FIXTURES REQUIRED.
12. POWER SYSTEM STUDY
A. A POWER SYSTEM STUDY INCLUDES COMPUTER BASED SHORT CIRCUIT, OVERCURRENT COORDINATION, AND ARC FLASH STUDIES.
B. THE CONTRACTOR SHALL PERFORM THE STUDY AND SUBMIT FOR APPROVAL BEFORE ENERGIZING THE INSTALLED EQUIPMENT.
C. THE STUDY SHALL INCLUDE THE UTILITY INPUT; INFINITY UTILITY BUS IS NOT ACCEPTABLE.
D. THE CONTRACTOR IS RESPONSIBLE FOR COLLECTING OWN INFORMATION WHICH SHALL INCLUDE THE CONTRIBUTIONS OF NEW/EXISTING MOTORS 50 HP AND LARGER.
E. THE STUDY SHALL COORDINATE FROM THE SERVICE CIRCUIT BREAKER TO THE LARGEST CIRCUIT BREAKER AFTER THE NEW EQUIPMENT.
F. THE AMP INTERRUPTING CAPACITY (AIC) OF THE NEW EQUIPMENT SHALL BE GREATER THAN THE AIC OF THE STUDY. CONTRACTOR SHALL PRINT AND INSTALL ARC FLASH LABELS FOR THE NEW EQUIPMENT.

IDENTIFICATION

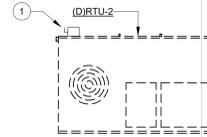
THE EQUIPMENT ID SHALL INCLUDE OWNER ID FOR EQUIPMENT AND POWER SOURCE.
EQUIPMENT WITH MULTIPLE POWER SOURCES SHALL HAVE A LABEL, SAYING "ELECTRICAL SHOCK HAZARD" EQUIPMENT HAS MULTIPLE POWER SOURCES.
UNDERGROUND CONDUCTOR INSTALLATIONS SHALL HAVE A WARNING TAPE WITH A METAL TRACER WIRE OR EQUIPMENT MINIMUM ABOVE CONDUCTORS.
LAMINATED EQUIPMENT TAGS SHALL BE SIMILAR TO EXISTING TAGS.
POWER CONDUCTORS SHALL BE LABELED AT ENTRY TO BOXES, HAND HOLES, PANEL BOARDS, AND OTHER ELECTRICAL EQUIPMENT.
USE INDUSTRY STANDARD CONDUCTOR TAPES FOR ENDS OF POWER, NEUTRAL, AND GROUND CONDUCTORS.
1. WIRING OF MECHANICAL EQUIPMENT
1. PROVIDE ALL RACEWAYS AND POWER WIRING FOR ALL MECHANICAL EQUIPMENT. MECHANICAL ELECTRICAL CONNECTIONS, CONNECT PER MANUFACTURERS' WIRING DIAGRAMS. COORDINATE WITH MECHANICAL PLANS FOR DISCONNECTS FURNISHED WITH EQUIPMENT, AND PROVIDE ALL DISCONNECT SWITCHES AS REQUIRED. AFTER INSTALLING WIRING, VERIFY THAT EACH MOTOR AVAILABILITY IS CORRECT.
2. VERIFY THE ACTUAL "MAXIMUM OVERCURRENT PROTECTION" (MOCP) DEVICE RATINGS AND "MINIMUM CIRCUIT AMPTACITY" (MCA) CONDUCTOR SIZES OR MECHANICAL EQUIPMENT FROM THE EQUIPMENT NAMEPLATE. BASE ELECTRICAL INSTALLATION DUE TO ACTUAL REQUIRED AMPERAGES, WHICH MAY VARY SOMEWHAT FROM THE CONDUCTOR AND EQUIPMENT SIZES SHOWN ON THE DRAWINGS, HOWEVER, IN NO CASE, REDUCE THE SIZE OF THE CONDUCTOR OR EQUIPMENT FROM THE DRAWINGS WITHOUT AUTHORIZATION FROM THE OWNER. PROVIDE PROPERLY SIZED LABELS FOR WIRING AND EQUIPMENT WITHOUT EXTRA COST TO THE OWNER. NOTIFY THE ENGINEER OF ALL CHANGES TO THE NEW EQUIPMENT AND INSTALLED EQUIPMENT. THE ARC FLASH LEVELS CHANGED. SUBMIT THE POWER STUDY FOR APPROVAL BEFORE ADJUSTING CIRCUIT BREAKER SETTINGS OR REPLACING ARC FLASH LABELS.
2. GROUNDING
A. PERMANENTLY AND EFFECTIVELY GROUND AND BOND THE ELECTRICAL SYSTEM IN A THEORETICAL AND PRACTICAL MANNER, AND IN CONFORMANCE, AT A MINIMUM, WITH NFPA 70, OR THESE DOCUMENTS, WHERE THEY EXCEED CODE REQUIREMENTS. VERIFY THE ACTUAL CONDUCTORS, AS SPECIFIED HEREIN, AND OTHER MATERIALS INDICATED ON THE DRAWINGS.
A. REPAIR ALL WALLS, FINISHES, AND OTHER FACILITIES DAMAGED IN THE COURSE OF THIS WORK. REPAIR MATERIALS SHALL BE OF THE SAME TYPE AND QUALITY AS THE ORIGINAL. REPAIR WORK SHALL MEET OR EXCEED THE STANDARD LEVEL OF CARE FOR THE TRADES INVOLVED WITH THE REPAIR.
4. SUPPORT SYSTEMS
A. STEEL SLOTTED SUPPORT SYSTEMS (SLOTTED CHANNEL): COMPLY WITH NFPA-3, FACTORY-FABRICATED COMPONENTS FOR USE ASSEMBLY; 12-GAUGE, 1-3/8" DEEP, 1-1/2" WIDE, COOPER B-LINE, ERICO INTERNATIONAL CORPORATION, HILTI, INC., POWER-STRUT, THOMAS & BETTS CORPORATION.
B. FINISHES:
1. METALLIC COATINGS: HOT-DIP GALVANIZED AFTER FABRICATION AND APPLICATION TO NFPA-3.
C. FIELD FABRICATION:
1. WHERE FIELD CUTTING OF STANDARD LENGTHS OF CHANNELS IS REQUIRED, MAKE STRAIGHT AND PERPENDICULAR TO MANUFACTURED SURFACES.
2. FOR FIELD-CUT OR DAMAGED SURFACES OF COATED CHANNELS, DRESS SURFACES WITH AN ABRASIVE SURFACE OR BOTH, WITH AN ABRASIVE MATERIAL (E.G., FILE, GRINDING STONE, OR SIMILAR) AND CLEANER TO REMOVE OILS, GREASE, AND SURFACE IMPURITIES.
3. FOR CHANNEL WITH A FACTORY-APPLIED COATING, RE-FINISH CUT EDGES WITH A COATING COMPATIBLE WITH THE FACTORY FINISH AND AS RECOMMENDED BY THE MANUFACTURER (E.G., MANUFACTURER'S TOUCH-UP PAINT OR ZINC-RICH COLD-GALVANIZING COMPOUND, AS APPLICABLE).
5. CLEANING
A. REMOVE FROM THE PREMISES DIRT AND REFUSE RESULTING FROM THE PERFORMANCE OF THE ELECTRICAL WORK, AS REQUIRED, TO PREVENT ACCUMULATION. COOPERATE IN MAINTAINING REASONABLY CLEAN PREMISES AT ALL TIMES. IMMEDIATELY PRIOR TO FINAL INSPECTION, MAKE A FINAL CLEANUP OF DIRT AND REFUSE RESULTING FROM THE WORK. CLEAN ALL MATERIAL AND EQUIPMENT INSTALLED UNDER THIS DIVISION. REMOVE DIRT, DUST, STAINS AND FOREIGN MATTER FROM ALL SURFACES. TOUCH UP AND RESTORE ALL DAMAGED FINISHES TO THEIR ORIGINAL CONDITION.
6. ADJUSTING, ALIGNING AND TESTING
A. ADJUST, ALIGN, AND TEST ALL ELECTRICAL EQUIPMENT ON THIS PROJECT PROVIDED UNDER THIS DIVISION AND ALL ELECTRICAL EQUIPMENT FURNISHED BY OTHERS FOR INSTALLATION OR WIRING UNDER THIS DIVISION, FOR PROPER OPERATION.
B. TEST ALL SYSTEMS AND EQUIPMENT ACCORDING TO THE REQUIREMENTS IN NETA 3 (LATEST EDITION).
C. MAINTAIN THE FOLLOWING ON THE PROJECT PREMISES AT ALL TIMES: A TRUE RMS READING VOLTMETER, A TRUE RMS READING AMPMETER, AND AN INSULATION RESISTANCE TESTER. PROVIDE TEST DATA READINGS AS REQUESTED OR AS REQUIRED BY THE ENGINEER.
D. WITH NORMAL POWER OFF, OPERATE EMERGENCY AND EXIT LIGHTS FOR A MINIMUM OF 90 MINUTES TO SHOW PROOF OF MEETING THE LIFE SAFETY CODES FOR PATHS OF EGRESS.
7. EQUIPMENT IDENTIFICATION NAMEPLATES ON ALL EQUIPMENT NOT CURRENTLY LABELED
1. ON ALL SWITCHGEAR, SWITCHBOARDS, MCCS, PANELBOARDS, SWITCHES, AND CABINETS.
B. NAMEPLATES:
1. PROGRAMMED, CONTRASTING COLOR, TWO-LAYER, LAMINATED PLASTIC INDICATING THE NAME OF THE EQUIPMENT, LOAD, OR CIRCUIT AS DESIGNATED ON THE ELECTRICAL DRAWINGS.
2. SELF-ADHERING, WITH A PERMANENT, WEATHERPROOF ADHESIVE. ATTACHMENT METHOD SHALL BE AS SPECIFIED BY THE MANUFACTURER.
3. EQUIPMENT TO WHICH THE NAMEPLATES ARE BEING APPLIED:
a. BLACK BACKGROUND WITH WHITE LETTERS FOR NORMAL POWER. LETTER HEIGHT: 1/2-INCH MINIMUM.

SYSTEMS START UP

PRIOR TO ENERGIZING SYSTEMS:
1. CHECK ALL COMPONENTS AND DEVICES.
2. TIGHTEN SCREWS AND BOLTS FOR CONNECTORS AND TERMINALS ACCORDING TO MANUFACTURERS' PUBLISHED TORQUE-TIGHTENING VALUES. IF MANUFACTURERS TORQUE VALUES ARE NOT INDICATED, USE THOSE SPECIFIED IN UL 486A OR UL 486B.
3. ADJUST CIRCUIT BREAKER SETTINGS TO MATCH THE APPROVED COORDINATION REPORT SETTINGS.
4. APPLY ARC FLASH LABELS TO ELECTRICAL EQUIPMENT.
5. CHECK GROUNDING CONNECTIONS, GROUNDING RESISTANCE, AND PROPER PHASING.
6. AFTER ALL SYSTEMS HAVE BEEN INSPECTED AND ADJUSTED, CONFIRM ALL OPERATING FEATURES REQUIRED BY THE DRAWINGS AND SPECIFICATIONS AND MAKE FINAL ADJUSTMENTS AS NECESSARY.
1. ELECTRICAL SWITCHGEAR, SWITCHBOARDS, MCCS, PANELBOARDS
A. EXISTING TO REMAIN - USE AVAILABLE SPARE CIRCUITS AND LABEL DISCONNECTED POWER, CONTROL, AND INSTRUMENTATION CONDUCTORS FOR RE-USE OR REPLACEMENT IN KIND.
B. EXISTING TO BE REPLACED - LABEL DISCONNECTED POWER, CONTROL, AND INSTRUMENTATION CONDUCTORS FOR RE-USE OR REPLACEMENT IN KIND.
C. PERFORM A POWER SYSTEM STUDY WHICH INCLUDES SHORT CIRCUIT, OVERCURRENT PROTECTION COORDINATION, AND ARC FLASH. THE STUDY SHALL INCLUDE POWER SOURCES SUCH AS UTILITY, GENERATORS, AND MOTORS 50 HP OR LARGER. THE STUDY SHALL INCLUDE THE CONTRIBUTIONS OF NEW/EXISTING MOTORS 50 HP AND LARGER. THE STUDY SHALL COORDINATE FROM THE SERVICE CIRCUIT BREAKER TO THE LARGEST CIRCUIT BREAKER AFTER THE NEW EQUIPMENT. THE AMP INTERRUPTING CAPACITY (AIC) OF THE NEW EQUIPMENT SHALL BE GREATER THAN THE AIC OF THE STUDY. CONTRACTOR SHALL PRINT AND INSTALL ARC FLASH LABELS FOR THE NEW EQUIPMENT.
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a. BLACK BACKGROUND WITH WHITE LETTERS FOR NORMAL POWER. LETTER HEIGHT: 1/2-INCH MINIMUM.

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WWW.M

KEYED NOTES	
MARK	COMMENT
1	REMOVE AND DEMOLISH EXISTING RTU DISCONNECT, ASSOCIATED CONDUIT, WIRE, HANGERS, SUPPORTS AND APPURTENANCES BACK TO SOURCE. TURN BREAKER OFF AND LABEL AS SPARE.



1 ROOF PLAN - ELECTRICAL DEMO  
3/8" = 1'-0"



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REVISION HISTORY

ISSUE	DESCRIPTION	DATE
0	ISSUE FOR CONSTRUCTION	16 JULY 2021

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ELECTRICAL DEMO PLANS

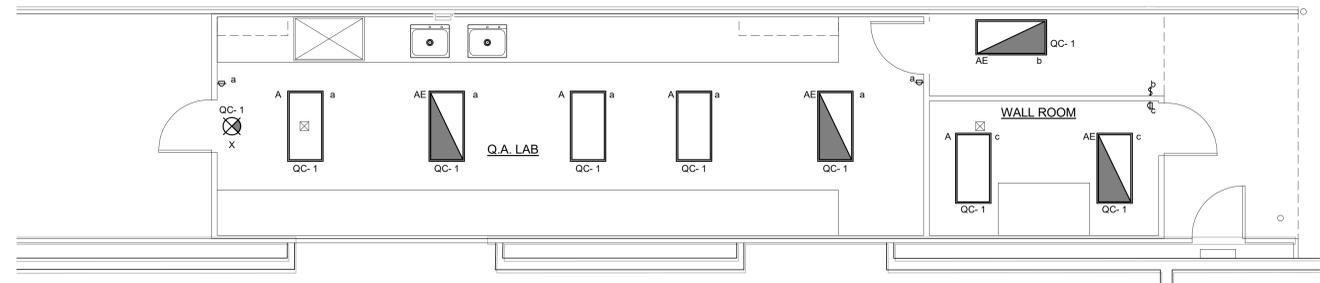
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PROJECT NUMBER 21045	PROJECT ABBREVIATION FLNA LIB QA LAB
ORIGINAL ISSUE 15 JULY 2021	CURRENT DOCUMENT STAGE IFC
FILE NAME	21045.rvt

**E1.01**  
SHEET NUMBER

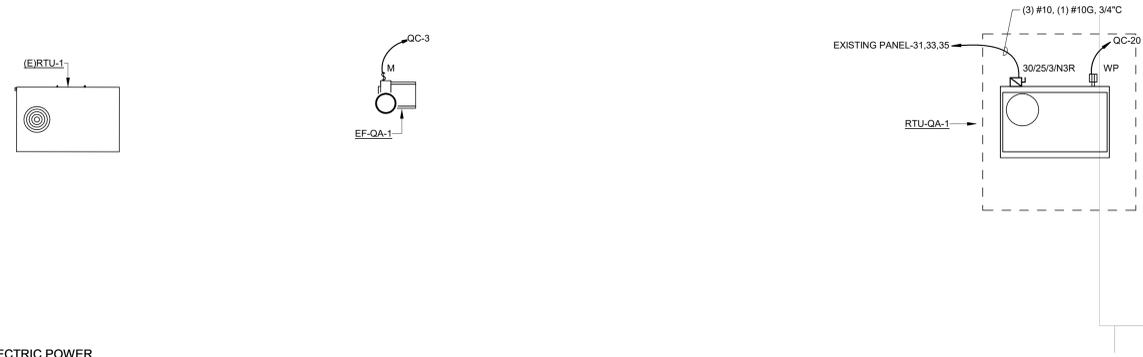
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LIGHTING FIXTURE SCHEDULE							
Type	DESCRIPTION	MANUFACTURER	MODEL	LAMP	LOAD	VOLTAGE	NOTES
A	2X4 LED TROFFER, 7200 LUMENS, 4000 KELVIN COLOR TEMP.	LITHONIA	2GTL-4-72L-FW-EZ1-LP840-EL14L	LED	53 VA	120 V	
AE	2X4 LED TROFFER, 7200 LUMENS, 4000 KELVIN COLOR TEMP. W/ EMERGENCY BATTERY	LITHONIA	2GTL-4-72L-FW-EZ1-LP840-EL14L	LED	53 VA	120 V	
X	EDGE-LIT LED EXIT SIGN	LITHONIA	EDGR-1-R-EL	LED	10 VA	120 V	

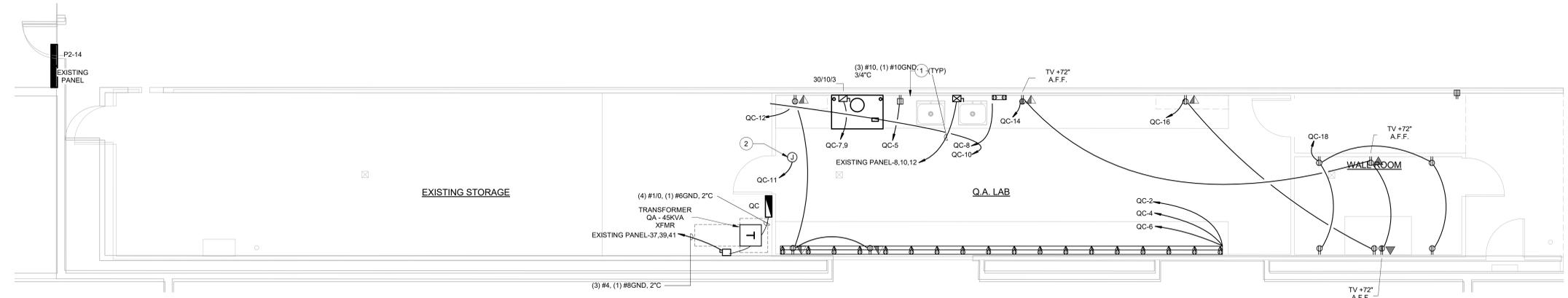
KEYED NOTES	
MARK	COMMENT
1	PROVIDE AND INSTALL (2) CHANNEL WIRE MOLD. (1) FOR POWER (1) FOR DATA, LOCATE DEVICES 24" ON CENTER, ALTERNATE CIRCUITS.
2	PROVIDE JUNCTION BOX ABOVE CEILING CONNECT TO 120V AS INDICATED TO SERVE MECHANICAL DAMPERS.



3 FIRST FLOOR PLAN - ELECTRICAL LIGHTING  
1/4" = 1'-0"



2 ROOF PLAN - ELECTRIC POWER  
1/4" = 1'-0"



1 FIRST FLOOR PLAN - ELECTRICAL POWER OVERALL  
1/4" = 1'-0"

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ELECTRICAL FLOOR PLANS

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**E2.01**  
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**Branch Panel: QC**

Location: BACK AREA 01  
 Supply From: TRANSFORMER QA - 45KVA...  
 Mounting: Enclosure:  
 Volts: 120/208 Wye  
 Phases: 3  
 Wires: 4  
 A.I.C. Rating: 10000  
 Mains Type: MCB  
 Mains Rating: 225 A  
 MCB Rating: 150 A

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT	
1	ROOM 02, 03, 04	20 A	1	437	1200			1	20 A RECEPTACLE QA LAB 02	2	
3	EF-QA-1	25 A	1		1656	1200		1	20 A RECEPTACLE QA LAB 02	4	
5	RECEPTACLE QA LAB 02	20 A	1			1440	1200	1	20 A RECEPTACLE QA LAB 02	6	
7	KITCHEN EQUIPMENT - NON-DWELLING UNIT	20 A	2	520	200			1	20 A RECEPTACLE QA LAB 02	8	
9		--	--		520	200		1	20 A RECEPTACLE QA LAB 02	10	
11	MOTORIZED DAMPERS	20 A	1			500	540	1	20 A RECEPTACLE QA LAB 02	12	
13	SPARE	20 A	1	0	540			1	20 A RECEPTACLE ROOM 02, 03	14	
15	SPARE	20 A	1		0	360		1	20 A RECEPTACLE ROOM 02, 03	16	
17	SPARE	20 A	1			0	720	1	20 A RECEPTACLE WALL ROOM 03	18	
19	SPARE	20 A	1	0	180			1	20 A RECEPTACLE RTU-QC-1	20	
21	SPARE	20 A	1		0	0		1	20 A SPARE	22	
23	SPARE	20 A	1			0	0	1	20 A SPARE	24	
25	SPARE	20 A	1	0	0			1	20 A SPARE	26	
27	SPACE	--	--		0	0		--	SPACE	28	
29	SPACE	--	--			0	0	--	SPACE	30	
31	SPACE	--	--	0	0			--	SPACE	32	
33	SPACE	--	--		0	0		--	SPACE	34	
35	SPACE	--	--			0	0	--	SPACE	36	
37	SPACE	--	--	0	0			--	SPACE	38	
39	SPACE	--	--		0	0		--	SPACE	40	
41	SPACE	--	--			0	0	--	SPACE	42	
<b>Total Load:</b>				3077 VA	3936 VA	4400 VA					
<b>Total Amps:</b>				26 A	34 A	38 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
Other	2156 VA	100.00%	2156 VA	
Receptacle	7780 VA	100.00%	7780 VA	<b>Total Conn. Load:</b> 11413 VA
Lighting	437 VA	100.00%	437 VA	<b>Total Est. Demand:</b> 11413 VA
				<b>Total Conn.:</b> 32 A
				<b>Total Est. Demand:</b> 32 A

Notes:

**Branch Panel: EXISTING PANEL**

Location:  
 Supply From:  
 Mounting:  
 Enclosure:  
 Volts: 480/277 Wye  
 Phases: 3  
 Wires: 4  
 A.I.C. Rating: 10000  
 Mains Type: MCB  
 Mains Rating: 400 A  
 MCB Rating: 0 A

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT	
1	FAN #1	20 A	3	0	0			3	20 A EXISTING FAN	2	
3		--	--		0	0		--	--	4	
5		--	--			0	0	--	--	6	
7	FAN #2	20 A	3	0	2667			3	20 A HEATING QA LAB 02	8	
9		--	--		0	2667		--	--	10	
11		--	--			0	2667	--	--	12	
13	EXISTING	80 A	3	0	0			3	30 A SPARE	14	
15		--	--		0	0		--	--	16	
17		--	--			0	0	--	--	18	
19	EXISTING	30 A	1	0	0			3	30 A GERBS GRAIN RM	20	
21	EXISTING	20 A	1		0	0		--	--	22	
23	EXISTING	20 A	1			0	0	--	--	24	
25	EXISTING	80 A	3	0	0			3	20 A BAGGER 17	26	
27		--	--		0	0		--	--	28	
29		--	--			0	0	--	--	30	
31	RTU-QA-1	25 A	3	480	0			3	20 A BAGGER 16	32	
33		--	--		480	0		--	--	34	
35		--	--			480	0	--	--	36	
37	TRANSFORMER QA	70 A	3	3077	0			3	60 A EXISTING	38	
39		--	--		3936	0		--	--	40	
41		--	--			4400	0	--	--	42	
<b>Total Load:</b>				6223 VA	7083 VA	7547 VA					
<b>Total Amps:</b>				22 A	26 A	28 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
HVAC	1440 VA	100.00%	1440 VA	
Heating	8000 VA	100.00%	8000 VA	<b>Total Conn. Load:</b> 20853 VA
Other	2156 VA	100.00%	2156 VA	<b>Total Est. Demand:</b> 20853 VA
Receptacle	7780 VA	100.00%	7780 VA	<b>Total Conn.:</b> 25 A
Lighting	437 VA	100.00%	437 VA	<b>Total Est. Demand:</b> 25 A

Notes:

PANEL IS EXISTING. CHANGES SHOWN BOLD. ONLY NEW LOADS SHOWN.

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REVISION HISTORY

ISSUE	DESCRIPTION	DATE
0	ISSUE FOR CONSTRUCTION	16 JULY 2021

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