

22. ALL DUCTWORK, PIPING, AND EQUIPMENT SUPPORTED FROM STRUCTURAL STEEL SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR. ALL ATTACHMENTS TO STEEL BAR JOISTS, TRUSSES, OR JOIST GIRDERS SHALL BE AT PANEL POINTS. PROVIDE BEAM CLAMPS MEETING MSS STANDARDS. WELDING TO STRUCTURAL MEMBERS SHALL NOT BE PERMITTED. THE USE OF C-CLAMPS SHALL NOT BE PERMITTED.

23. ALL ROOF-MOUNTED EQUIPMENT CURBS FOR EQUIPMENT PROVIDED BY THE MECHANICAL CONTRACTOR SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE GENERAL CONTRACTOR.

24. LOCATIONS AND SIZES OF ALL FLOOR, WALL, AND ROOF OPENINGS SHALL BE COORDINATED WITH ALL OTHER TRADES INVOLVED.

25. ALL OPENINGS IN FIRE WALLS DUE TO DUCTWORK, PIPING, CONDUIT, ETC., SHALL BE FIRE STOPPED WITH A PRODUCT SIMILAR TO 3M OR APPROVED EQUAL.

26. ALL AIR CONDITIONING CONDENSATE DRAIN LINES FROM EACH AIR HANDLING UNIT AND ROOFTOP UNIT SHALL BE PIPED FULL SIZE OF THE UNIT DRAIN OUTLET, WITH "P" TRAP, AND PIPED TO THE NEAREST DRAIN. SEE THE DETAILS SHOWN IN THE DRAWINGS OR THE CONTRACT SPECIFICATIONS FOR THE DEPTH OF THE AIR CONDITIONING CONDENSATE TRAP.

27. REFER TO TYPICAL DETAILS FOR DUCTWORK, PIPING, AND EQUIPMENT INSTALLATION.

28. REINFORCEMENT, DETAILING, AND PLACEMENT OF CONCRETE SHALL CONFORM TO ASTM 315 AND ACI 318. CONCRETE SHALL CONFORM TO ASTM C94. CONCRETE WORK SHALL CONFORM TO ACI 318 PART ENTITLED "CONSTRUCTION REQUIREMENTS". COMPRESSIVE STRENGTH IN 28 DAYS SHALL BE 3,000 PSI. TOTAL AIR CONTENT OR EXTERIOR CONCRETE SHALL BE BETWEEN 5 AND 7 PERCENT BY VOLUME. SLUMP SHALL BE BETWEEN 3 AND 4 IN. CONCRETE SHALL BE CURED FOR 7 DAY AFTER PLACEMENT.

29. CONCRETE HOUSEKEEPING PADS TO SUIT MECHANICAL EQUIPMENT SHALL BE SIZED AND LOCATED BY THE MECHANICAL CONTRACTOR. MINIMUM CONCRETE PAD THICKNESS SHALL BE 6 IN. PAD SHALL EXTEND BEYOND THE EQUIPMENT A MINIMUM OF 6 IN. ON EACH SIDE. CONCRETE HOUSEKEEPING PADS SHALL BE PROVIDED BY THE GENERAL CONTRACTOR. IT SHALL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR TO COORDINATE THE SIZE AND LOCATION OF CONCRETE HOUSEKEEPING PADS WITH THE GENERAL CONTRACTOR.

30. ALL TESTS SHALL BE COMPLETED BEFORE ANY MECHANICAL EQUIPMENT OR PIPING INSULATION IS APPLIED.

31. TESTING, ADJUSTING, AND BALANCING AGENCY SHALL BE A MEMBER OF THE ASSOCIATED AIR BALANCE COUNCIL (AABC) OR THE NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB). TESTING, ADJUSTING, AND BALANCING SHALL BE PERFORMED IN ACCORDANCE WITH THE AABC STANDARDS.

SECTION 233113 - METAL DUCTS

- 1.1 CONSTRUCTION
A. EACH DUCT SYSTEM SHALL BE CONSTRUCTED FOR THE SPECIFIC SMACNA DUCT PRESSURE CLASSIFICATIONS SHOWN ON THE CONTRACT DRAWINGS. WHERE NO PRESSURE CLASSES ARE SPECIFIED BY THE DESIGNER, THE SMACNA 1 INCH WG PRESSURE, SEAL CLASS "A".
B. ALL DUCTWORK SHALL BE CONSTRUCTED TO SMACNA 1" WG DESIGN AND NOT LESS THAN THE FOLLOWING STANDARDS:

- 1. CONSTRUCT SO THAT ALL INTERIOR SURFACES ARE SMOOTH. USE SLIP AND DRIVE OR FLANGED AND BOLTED CONSTRUCTION WHEN FABRICATING RECTANGULAR DUCTWORK. USE SPIRAL LOCK SEAM CONSTRUCTION WHEN FABRICATING ROUND SPIRAL DUCTWORK. SHEET METAL SCREWS MAY BE USED ON DUCT HANGERS, TRANSVERSE JOINTS AND OTHER SMACNA APPROVED LOCATIONS IF THE SCREW DOES NOT EXTEND MORE THAN 1/2 INCH INTO THE DUCT.

- 2. SHEET STEEL SHALL COMPLY WITH ASTM A653 STANDARD SPECIFICATION FOR STEEL SHEET METAL, ZINC COATED (GALVANIZED) OR ZINC IRON ALLOY-COATED (GALVANNEALED) BY HOT DIP PROCESS, AND A924 STANDARD SPECIFICATION FOR GENERAL REQUIREMENT FOR SHEET METALLIC-COATED BY HOT DIP PROCESS. ALL ANGLE IRON USED FOR SUPPORT SHALL BE GALVANIZED. CONNECTIONS TO WALLS OR FLOOR SHALL BE AIR TIGHT WITH ANGLE IRON AND CAULKING. SEAL ALL DUCT SEAMS, TRANSVERSE AND LONGITUDINAL, AIR TIGHT. PROVIDE TURNING VANES ALL 90° ELBOWS.

- 3. USE ELBOWS AND TEES WITH A CENTER LINE RADIUS TO WIDTH OR DIAMETER RATIO OF 1.5 WHEREVER SPACE PERMITS. WHEN A SHORTER RADIUS MUST BE USED DUE TO LIMITED SPACE, INSTALL SINGLE WALL SHEET METAL SPLITTER VANES IN ACCORDANCE WITH SMACNA PUBLICATIONS, TYPE RE 3. WHERE SPACE WILL NOT ALLOW AND THE C VALUE OF THE RADIUS ELBOW, AS GIVEN IN SMACNA PUBLICATIONS, EXCEEDS 0.31, USE RECTANGULAR ELBOWS WITH TURNING VANES AS SPECIFIED IN SECTION 23 33 00. SQUARE THROAT-RADIUS HEEL ELBOWS WILL NOT BE ACCEPTABLE. STRAIGHT TAPS OR BULLHEAD TEES ARE NOT ACCEPTABLE.

4. WHERE RECTANGULAR ELBOWS ARE USED, PROVIDE TURNING VANES IN ACCORDANCE WITH SECTION 23 33 00.

5. PROVIDE EXPANDED TAKE-OFFS OR 45 DEGREE ENTRY FITTINGS FOR BRANCH DUCT CONNECTIONS WITH BRANCH DUCTWORK AIRFLOW VELOCITIES GREATER THAN 700 FPM. SQUARE EDGE 90-DEGREE TAKE-OFF FITTINGS OR TRIGHT TAPS WILL NOT BE ACCEPTED.

6. BUTTON PUNCH SNAP-LOCK CONSTRUCTION WILL NOT BE ACCEPTED ON ALUMINUM DUCTWORK.

7. ROUND DUCTS MAY BE SUBSTITUTED FOR RECTANGULAR DUCTS IF SIZED IN ACCORDANCE WITH ASHRAE TABLE OF EQUIVALENT RECTANGULAR AND ROUND DUCTS. NO VARIATION OF DUCT CONFIGURATION OR SIZES PERMITTED EXCEPT BY WRITTEN PERMISSION OF THE ENGINEER.

C. WHERE LATEST EDITION OF SMACNA DOES NOT CLEARLY STATE GAUGES AND/OR STIFFENERS TO BE USED OR, WHERE SMACNA STANDARDS REQUIRE INTERPRETATION, THE FOLLOWING MINIMUM METAL GAUGES AND BRACING SHALL BE USED:

Table with 4 columns: USG, MAX. SIDE INCHES, TRANSVERSE JOINTS AND BRACING, CENTERS. Rows include specifications for slip, drive slip, and angles on 4 foot centers.

D. PROVIDE TAPPING IN DUCTS FOR THERMOMETERS WHERE SPECIFIED. IN ADDITION, PROVIDE AN AIRTIGHT PLUGGED TAPPING LOCATED AS FOLLOWS:

- 1. UPSTREAM OF EACH REHEAT COIL AND VAV BOX.
2. DOWNSTREAM OF EACH REHEAT COIL AND VAV BOX.

E. FLAT OVAL OR ROUND DUCTWORK MAY BE PROVIDED IN LIEU RECTANGULAR DUCTWORK WITH THE REINFORCEMENT FOR FLAT SIDES SAME AS SPECIFIED FOR THE RECTANGULAR DUCTWORK, AND AS PER SMACNA FLAT OVAL DUCT CONSTRUCTION STANDARDS SHOWN IN FIG. 3-6 AND AS SHOWN IN FIG. 3-1 AND 3-2 FOR ROUND DUCTWORK.

F. ALL DUCTWORK SHALL BE SEALED TO CLASS "A" AND LEAK TESTED TO MEAT SMACNA CLASS 6 FOR RECTANGULAR AND CLASS 3 FOR ROUND DUCTS.

- 1.2 MATERIALS
A. SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS.
B. SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS.
C. SHEET METAL MATERIALS:

- 1. GALVANIZED SHEET STEEL.
2. STAINLESS-STEEL SHEETS.
3. ALUMINUM SHEETS.
4. FACTORY-APPLIED ANTI-MICROBIAL COATING.

D. DUCT LINER:
1. FIBROUS GLASS, TYPE I, FLEXIBLE.
a. WITH ANTI-MICROBIAL EROSION-RESISTANT COATING.
2. FLEXIBLE ELASTOMERIC.
3. NATURAL FIBER.

E. SEALANT MATERIALS:
1. TWO-PART TAPE SEALING SYSTEM.
2. WATER-BASED JOINT AND SEAM SEALANT.
3. SOLVENT-BASED JOINT AND SEAM SEALANT.
4. FLANGED JOINT SEALANT.
5. FLANGE GASKETS.
6. ROUND DUCT JOINT O-RING SEALS.

1.3 DUCT CLEANING
A. CLEAN EXISTING DUCT SYSTEM(S) BEFORE TESTING, ADJUSTING, AND BALANCING.
B. CLEAN THE FOLLOWING ITEMS:

- 1. AIR OUTLETS AND INLETS.
2. SUPPLY, RETURN, AND EXHAUST FANS.
3. AIR-HANDLING UNITS.
4. COILS AND RELATED COMPONENTS.
5. RETURN-AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES.
6. SUPPLY-AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES.
7. DEDICATED EXHAUST AND VENTILATION COMPONENTS AND MAKEUP AIR SYSTEMS.

1.4 DUCT SCHEDULE
A. ALL DUCTS SHALL BE GALVANIZED STEEL EXCEPT AS FOLLOWS:

- 8. MOIST ENVIRONMENT DUCT MATERIAL: ALUMINUM.

END OF SECTION 233113

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

- 1.1 PRODUCTS
A. DIFFUSERS, REGISTERS AND GRILLES SHALL BE FURNISHED AND INSTALLED FOR CAPACITIES AND IN LOCATIONS INDICATED ON DRAWINGS. ALL REGISTERS AND DIFFUSERS SHALL BE PRIME COATED STEEL OR EXTRUDED ALUMINUM FINISHED UNLESS OTHERWISE NOTED IN BAKED WHITE ENAMEL.
B. MANUFACTURERS: TITUS

1. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCT BY ONE OF THE FOLLOWING:

- a. CARNES.
b. HART & COOLEY INC.
c. KRUEGER.
d. METALAIRE, INC.
e. NAILOR INDUSTRIES INC.
f. RUSKIN

C. ALL DIFFUSERS SHALL HAVE CONTROLLING/EQUALIZING GRID AND OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.
D. ALL DUCTED RETURN REGISTERS SHALL HAVE AN OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.

END OF SECTION 233713

HVAC SPECIFICATIONS

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

1.1 SUMMARY
A. TESTING, ADJUSTING, AND BALANCING FOR THE FOLLOWING:

- 1. AIR SYSTEMS: CONSTANT

1.2 QUALITY ASSURANCE
A. THE CONTRACTOR SHALL PROCURE THE SERVICES OF A TESTING, ADJUSTING AND BALANCING (TAB) SPECIALIST WHO SPECIALIZES IN HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS. THE TAB AGENT SHALL HAVE THE FOLLOWING QUALIFICATIONS: AABC, NEBB OR TABB CERTIFIED.

1.3 EXECUTION
A. THE TAB SPECIALIST SHALL PERFORM FLOW MEASUREMENTS OF ALL EXISTING AIR AND HYDRONIC SYSTEMS THAT ARE TO REMAIN OR TO BE INCORPORATED INTO NEW WORK PRIOR TO THE STARTING OF WORK IN THE PROJECT SCOPE. A REPORT OF THESE MEASUREMENTS, INDICATING ANY AND ALL DEFICIENCIES SHALL BE SUBMITTED FOR OWNER REVIEW.

B. THE TAB SPECIALIST SHALL PERFORM FLOW MEASUREMENTS OF ALL NEW AIR AND HYDRONIC SYSTEMS AS LISTED ABOVE IN THE PROJECT SCOPE. A REPORT OF THESE MEASUREMENTS, INDICATING ANY AND ALL DEFICIENCIES SHALL BE SUBMITTED FOR OWNER REVIEW.

C. THE REPORT SHALL INDICATE A SCHEMATIC DIAGRAM INDICATING LOCATIONS OF ALL EQUIPMENT TESTED AND MEASUREMENT LOCATIONS.

D. PRIOR TO FINAL INSPECTION OF THE WORK, THE TAB SPECIALIST SHALL BALANCE ALL SYSTEMS AS INDICATED ABOVE TO THE REQUIREMENTS OF THE DESIGN.

E. THE CONTRACTOR SHALL HAVE FURNISH AND INSTALL ALL ADDITIONAL BALANCING EQUIPMENT, PRESSURE TAPS, GAUGES AND OTHER EQUIPMENT AS REQUIRED FOR A PROPERLY BALANCED SYSTEM AT NO ADDITIONAL COST TO THE OWNER. SUCH ADDITIONAL EQUIPMENT SHALL ADHERE IN STRICT ACCORDANCE WITH THE RESPECTIVE EQUIPMENT MANUFACTURER'S RECOMMENDATIONS.

F. THE CONTRACTOR SHALL HAVE THE TESTING AND BALANCING SPECIALIST COORDINATE ALL WORK OF THIS SECTION WITH THE BUILDING MANAGER. BALANCING WORK SHALL NOT CONFLICT WITH OTHER WORK SO AS TO MAINTAIN COMPLETION WITHIN THE SPECIFIED TIME.

G. ALL INSTRUMENTS USED FOR TAB SHALL BE MAINTAINED IN GOOD WORKING CONDITION AND ACCURATELY CALIBRATED.

H. TOLERANCES: PLUS OR MINUS 5 PERCENT OF DESIGN VALUES.

I. INSPECTIONS: RANDOM CHECKS BY OWNER OR ARCHITECT TO VERIFY FINAL TESTING, ADJUSTING, AND BALANCING REPORT.

J. ADDITIONAL TESTS: RANDOM TESTS WITHIN 90 DAYS OF COMPLETING TAB TO VERIFY BALANCE CONDITIONS AND SEASONAL TESTS.

END OF SECTION 230593

SECTION 230713 - DUCT INSULATION

1.1 QUALITY ASSURANCE

SURFACE-BURNING CHARACTERISTICS: ALL INSULATION SHALL HAVE COMPOSITE (INSULATION JACKET OR FACING AND ADHESIVE USED TO ADHERE THE FACING OR JACKET TO THE INSULATION) A FLAME-SPREAD INDEX OF 25, AND SMOKE-DEVELOPED INDEX OF 50 FOR INSULATION INSTALLED INDOOR, 75, AND SMOKE-DEVELOPED INDEX OF 150 FOR INSULATION INSTALLED OUTDOORS; ACCORDING TO ASTM E 84.

1.2 FIELD QUALITY CONTROL
A. FIELD INSPECTIONS: BY OWNER-ENGAGED AGENCY.

1.3 INDOOR DUCT AND PLENUM INSULATION SCHEDULE;
A. CONCEALED, RECTANGULAR, ROUND AND FLAT-OVAL, SUPPLY-RETURN, OUTDOOR-AND EXHAUST-AIR DUCT AND AIR PLENUM INSULATION:

B. FLEXIBLE ELASTOMERIC, MINERAL-FIBER BLANKET, MINERAL-FIBER BOARD OR POLYOLEFIN WITH MINIMUM INSTALLED THERMAL RESISTANCE AS FOLLOWS:

UNCONDITIONED SPACES WITHIN BUILDING: R-4.2
WITHIN BUILDING ENVELOPE ASSEMBLY: R-8
OUTSIDE OF BUILDING: R-8

- 1.4 ITEMS NOT INSULATED:
1. FIBROUS-GLASS DUCTS.
2. METAL DUCTS WITH DUCT LINER OR SUFFICIENT THICKNESS TO COMPLY WITH ENERGY CODE ANDASHRAE/IESNA 90.1.
3. FACTORY-INSULATED FLEXIBLE DUCTS.
4. FACTORY-INSULATED PLENUMS AND CASINGS.
5. FLEXIBLE CONNECTORS.
6. VIBRATION-CONTROL DEVICES.
7. FACTORY-INSULATED ACCESS PANELS AND DOORS.
8. DUCTS THAT HAVE INTERNAL ACOUSTICAL LINING.

1.5 PRODUCTS
A. THE FOLLOWING INSULATION MANUFACTURERS WILL BE ACCEPTABLE:

- 1. JOHNS-MANVILLE
2. OWENS-CORNING

1.6 ACOUSTICAL TREATMENT

1. WHERE SHOWN ON THE DRAWINGS, LOW PRESSURE DUCTWORK SHALL BE LINED WITH 1.5" THICK R-6 AS MANUFACTURED BY DUCTMATE, 1-1/2 POUND MINIMUM DENSITY, NEOPRENE COATED, FLEXIBLE FIBERGLASS DUCT LINER. LINING SHALL COMPLY WITH NFPA 90A AND SHALL HAVE A FLAME SPREAD CLASSIFICATION OF NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING NOT MORE THAN 50. DUCT SIZES WHERE LINING IS INDICATED ON PLANS ARE MINIMUM INSIDE CLEAR DIMENSIONS REQUIRED,
END OF SECTION 230713

1.3 DUCT CLEANING
A. CLEAN EXISTING DUCT SYSTEM(S) BEFORE TESTING, ADJUSTING, AND BALANCING.
B. CLEAN THE FOLLOWING ITEMS:

- 1. AIR OUTLETS AND INLETS.
2. SUPPLY, RETURN, AND EXHAUST FANS.
3. AIR-HANDLING UNITS.
4. COILS AND RELATED COMPONENTS.
5. RETURN-AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES.
6. SUPPLY-AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES.
7. DEDICATED EXHAUST AND VENTILATION COMPONENTS AND MAKEUP AIR SYSTEMS.

1.4 DUCT SCHEDULE
A. ALL DUCTS SHALL BE GALVANIZED STEEL EXCEPT AS FOLLOWS:
8. MOIST ENVIRONMENT DUCT MATERIAL: ALUMINUM.

END OF SECTION 233113

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

- 1.1 PRODUCTS
A. DIFFUSERS, REGISTERS AND GRILLES SHALL BE FURNISHED AND INSTALLED FOR CAPACITIES AND IN LOCATIONS INDICATED ON DRAWINGS. ALL REGISTERS AND DIFFUSERS SHALL BE PRIME COATED STEEL OR EXTRUDED ALUMINUM FINISHED UNLESS OTHERWISE NOTED IN BAKED WHITE ENAMEL.
B. MANUFACTURERS: TITUS

1. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCT BY ONE OF THE FOLLOWING:

- a. CARNES.
b. HART & COOLEY INC.
c. KRUEGER.
d. METALAIRE, INC.
e. NAILOR INDUSTRIES INC.
f. RUSKIN

C. ALL DIFFUSERS SHALL HAVE CONTROLLING/EQUALIZING GRID AND OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.

D. ALL DUCTED RETURN REGISTERS SHALL HAVE AN OPPOSED BLADE DAMPER UNLESS OTHERWISE NOTED.

END OF SECTION 233713

THERMOSTATIC CONTROLS:

(a) THERMOSTATIC CONTROLS FOR EACH ZONE. THE SUPPLY OF HEATING AND COOLING ENERGY TO EACH SPACE-CONDITIONING ZONE OR DWELLING UNIT SHALL BE CONTROLLED BY AN INDIVIDUAL THERMOSTATIC CONTROL THAT RESPONDS TO TEMPERATURE WITHIN THE ZONE AND THAT MEETS THE APPLICABLE REQUIREMENTS OF SECTION 120.2(b). AN ENERGY MANAGEMENT CONTROL SYSTEM (EMCS) MAY BE INSTALLED TO COMPLY WITH THE REQUIREMENTS OF ONE OR MORE THERMOSTATIC CONTROLS IF IT COMPLIES WITH ALL APPLICABLE REQUIREMENTS FOR EACH THERMOSTATIC CONTROL.

EXCEPTION TO SECTION 120.2(a): AN INDEPENDENT PERIMETER HEATING OR COOLING SYSTEM MAY SERVE MORE THAN ONE ZONE WITHOUT INDIVIDUAL THERMOSTATIC CONTROLS IF:

- 1. ALL ZONES ARE ALSO SERVED BY AN INTERIOR COOLING SYSTEM; AND
2. THE PERIMETER SYSTEM IS DESIGNED SOLELY TO OFFSET ENVELOPE HEAT LOSSES OR GAINS; AND
3. THE PERIMETER SYSTEM HAS AT LEAST ONE THERMOSTATIC CONTROL FOR EACH BUILDING ORIENTATION OF 50FEET OR MORE; AND
4. THE PERIMETER SYSTEM IS CONTROLLED BY AT LEAST ONE THERMOSTAT LOCATED IN ONE OF THE ZONES SERVED BY THE SYSTEM.

(d) HEAT PUMP CONTROLS. ALL HEAT PUMPS WITH SUPPLEMENTARY ELECTRIC RESISTANCE HEATERS SHALL BE INSTALLED WITH CONTROLS THAT COMPLY WITH SECTION 110.2(b).

(e) SHUT-OFF AND RESET CONTROLS FOR SPACE-CONDITIONING SYSTEMS. EACH SPACE-CONDITIONING SYSTEM SHALL BE INSTALLED WITH CONTROLS THAT COMPLY WITH THE FOLLOWING:

- 1. THE CONTROL SHALL BE CAPABLE OF AUTOMATICALLY SHUTTING OFF THE SYSTEM DURING PERIODS OF NON-USE AND SHALL HAVE:
A. AN AUTOMATIC TIME SWITCH CONTROL DEVICE COMPLYING WITH SECTION 110.9(c), WITH AN ACCESSIBLE MANUAL OVERRIDE THAT ALLOWS OPERATION OF THE SYSTEM FOR UP TO 4 HOURS; OR
B. AN OCCUPANCY SENSOR; OR
C. 4-HOUR TIMER THAT CAN BE MANUALLY OPERATED.

EXCEPTION TO SECTION 120.2(e)1: MECHANICAL SYSTEMS SERVING RETAIL STORES AND ASSOCIATED MALLS, RESTAURANTS, GROCERY STORES, CHURCHES AND THEATERS EQUIPPED WITH 7-DAY PROGRAMMABLE TIMERS.

2. THE CONTROL SHALL AUTOMATICALLY RESTART AND TEMPORARILY OPERATE THE SYSTEM AS REQUIRED TO MAINTAIN:

- A. A SETBACK HEATING THERMOSTAT SETPOINT IF THE SYSTEM PROVIDES MECHANICAL HEATING ;AND
EXCEPTION TO SECTION 120.2(e)2a: THERMOSTAT SETBACK CONTROLS ARE NOT REQUIRED IN NONRESIDENTIAL BUILDINGS IN AREAS WHERE THE WINTER MEDIAN OF EXTREMES OUTDOOR AIR TEMPERATURE DETERMINED IN ACCORDANCE WITH SECTION 140.4(b)3 IS GREATER THAN 32°F.

B. A SETUP COOLING THERMOSTAT SETPOINT IF THE SYSTEM PROVIDES MECHANICAL COOLING.
EXCEPTION TO SECTION 120.2(e)2b: THERMOSTAT SETUP CONTROLS ARE NOT REQUIRED IN NON-RESIDENTIAL BUILDINGS IN AREAS WHERE THE SUMMER DESIGN DRY BULB 0.5 PERCENT TEMPERATURE DETERMINED IN ACCORDANCE WITH SECTION 140.4(b)3 IS LESS THAN 100°F.

(a) DAMPERS FOR AIR SUPPLY AND EXHAUST EQUIPMENT. OUTDOOR AIR SUPPLY AND EXHAUST EQUIPMENT SHALL BE INSTALLED WITH DAMPERS THAT AUTOMATICALLY CLOSE UPON FAN SHUTDOWN.

EXCEPTION 1 TO SECTION 120.2(f): EQUIPMENT THAT SERVES AN AREA THAT MUST OPERATE CONTINUOUSLY.

EXCEPTION 2 TO SECTION 120.2(f): GRAVITY AND OTHER NON-ELECTRICAL EQUIPMENT THAT HAS READILY ACCESSIBLE MANUAL DAMPER CONTROLS.

EXCEPTION 3 TO SECTION 120.2(f): AT COMBUSTION AIR INTAKES AND SHAFT VENTS.

EXCEPTION 4 TO SECTION 120.2(f): WHERE PROHIBITED BY OTHER PROVISIONS OF LAW.

CONSULTANTS (ENGINEER):

NY ENGINEERS

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Table with 3 columns: NO., DESCRIPTION, DATE. Row 1: 1 REVISION 1 09/27/23. Row 2: 0 ISSUE FOR PERMIT 06/16/23.

NO. DESCRIPTION DATE

SHEET NO.

MECHANICAL NOTES & SPECIFICATIONS

M-1.1

REFRIGERANT PIPING:

TYPE ACR HARD DRAWN COPPER TUBING MEETING REQUIREMENTS OF ASTM B280, WITH WROUGHT COPPER FITTINGS MEETING REQUIREMENTS OF ANSI B16.22, WITH BRAZED JOINTS MEETING REQUIREMENTS OF AWS A 5.8, USING BAG-1 (SILVER) FILLER MATERIAL. INSULATE SUCTION LINE PIPING WITH 1" THICK ARMAFLEX TYPE AP. PAINT INSULATION LOCATED OUTDOORS WITH ARMAFLEX WB FINISH.

PIPING INSULATION

A. INSULATE ALL PIPING IN ACCORDANCE WITH INSULATION SCHEDULE EXCEPT AS OTHERWISE NOTED.

B. PIPING, VALVES AND FITTINGS TO BE INSULATED:

- 1) LOW TEMPERATURE PIPING SYSTEMS – 0 TO 60 DEG F INCLUDING:
 - a. CONDENSATE DRAIN PIPING.

INSULATION SCHEDULE -- PIPING

SERVICE	SIZE	THICKNESS	MATERIAL FINISH
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REFRIGERANT PIPING	1.5"		P-6
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CONDENSER DRAIN PIPING (IF RUNNING THROUGH EXTERIOR WALL)	1.0"		P-6
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2) PROTECTIVE COVERINGS SHALL BE INSTALLED ON AREAS OF INSULATION THAT ARE EXPOSED TO WEATHER OR SUBJECT TO MECHANICAL DAMAGE. THE PROTECTIVE COVERING SHALL BE:

a. ARMA-CHEK SILVER MULTI-LAYER LAMINATE OF ALUMINUM, COATED WITH A UV PROTECTIVE FILM AND BACKED WITH A FLEXIBLE PVC FILM. THE MATERIAL SHOULD BE ADHERED WITH ARMAFLEX 520 ADHESIVE OR EQUIVALENT, AND ALL JOINTS AND SEAMS SECURED WITH ARMA-CHEK SILVER TAPE. INSTALLATION SHALL BE IN ALL CASES TO THE MANUFACTURER'S RECOMMENDATIONS.

OR

b. HIGH DENSITY RUBBER CLADDING OF THE ARMA-CHECK R TYPE BONDED USING AN APPROPRIATE FULL CONTACT ADHESIVE WITH A MINIMUM 50 MM OVERLAP AT ALL BUTT JOINTS AND LONGITUDINAL SEAMS. A WEATHER-PROOF MASTIC SEALANT SHALL BE APPLIED OVER ALL SEAMS AND JOINTS. ALL MATERIAL SHALL BE OVERLAPPED AND STAGGERED IN SUCH A WAY AS TO ENSURE A WATERSHED IS ALWAYS PROVIDED. INSTALLATION SHALL BE IN ALL CASES TO THE MANUFACTURER'S RECOMMENDATIONS. ALL EXCESS ADHESIVE VISIBLE ON THE SURFACE OF THE COMPLETED ASSEMBLY SHALL BE REMOVED USING AN APPROPRIATE CLEANING MATERIAL.

OR

c. METAL CLADDING, COMPRISED OF COATED SHEET METAL, WITH ALL EXTERNAL JOINTS AND FIXING MADE WEATHER-PROOF WITH SILICONE SEALANT.

C. MATERIAL:

- 1) TYPE P-1: MINIMUM 4 LB DENSITY MOLDED FIBERGLASS, MAXIMUM 0.24 K-FACTOR AT 75 DEG F MEAN TEMPERATURE WITH FACTORY-APPLIED FIRE-RETARDANT FOIL-SKRIM-KRAFT FACING. ALL SERVICE JACKET. SIMILAR TO OWENS-CORNING 650 ASJ.
- 2) TYPE P-3: MINIMUM 4 LB DENSITY MOLDED FIBERGLASS FITTING, MAXIMUM 0.23 K-FACTOR AT 75 DEG F MEAN TEMPERATURE SIMILAR TO EPOLUX HAMFAB MOLDED FITTINGS.
- 3) TYPE P-4: MINIMUM 1 LB DENSITY FIBERGLASS FITTING INSERTS, MAXIMUM 0.27 K-FACTOR AT 75 DEG F MEAN TEMPERATURE SIMILAR TO MANVILLE HI-LO TEMP INSULATION INSERTS.
- 4) TYPE P-6: MINIMUM 6 LB MOLDED FOAMED PLASTIC, MAXIMUM 0.27 K-FACTOR AT 75 DEG F MEAN TEMPERATURE. MAXIMUM 0.17 PERMEANCE. SIMILAR TO ARMSTRONG ARMAFLEX II.

D. FINISH:

- 1) TYPE F-1: FITTING COVER, MOLDED WHITE PVC JACKET, UL CLASS 1, MAXIMUM PERMEANCE 0.05 SIMILAR TO MANVILLE ZESTRON.
- 2) TYPE F-2: WHITE VAPOR BARRIER COATING WITH 10X10 OR 20X20 MESH WHITE GLASS, POLYESTER OR NYLON CLOTH REINFORCING MEMBRANE, MINIMUM 31 MIL DRY FILM THICKNESS, SIMILAR TO FOSTER TITE-FIT, UL LABEL.
- 3) TYPE F-4: ALUMINUM JACKETING WITH MINIMUM 0.016 IN. WALL THICKNESS AND LONGITUDINAL JOINTS WITH LOCK SEAMS.
- 4) TYPE F-6: WHITE FINISHING AND INSULATING CEMENT APPLIED OVER HEXAGONAL WIRE MESH. CEMENT SIMILAR TO KEENE SUPERSLICK.

E. INSTALLATION:

- 1) BEFORE APPLYING INSULATION ALL PRESSURE AND LEAK TESTS SHALL BE COMPLETED AND APPROVED.
- 2) ALL INSULATION SHALL BE BUTTED FIRMLY TOGETHER. PROVIDE 2 IN. LAMP STRIPS AT ALL SEAMS SECURED WITH ADHESIVE. USE VAPOR BARRIER TAPE AND VAPORSEAL ADHESIVE WHERE REQUIRED. STAPLES NOT PERMITTED. REFRIGERANT PIPING INSULATION SHALL HAVE MITERED FITTINGS.
- 3) ALL INSULATION AND VAPOR BARRIERS SHALL BE CONTINUOUS PASSING THROUGH SLEEVES, HANGERS, ETC., OR OTHER OPENINGS. PROVIDE SADDLES OR SHIELDS FOR PROTECTION AT ALL HANGINGS.
- 4) INSULATION FOR STRAINERS OR OTHER FITTINGS OR ACCESSORIES REQUIRING SERVICING OR INSPECTION SHALL HAVE INSULATION REMOVABLE AND REPLACEABLE WITHOUT DAMAGE.

HVAC PIPING INSULATION NOTES

1. ALL INSULATION MATERIALS, INCLUDING JACKETS, FACING, ADHESIVE, COATINGS, AND ACCESSORIES ARE TO BE FIRE HAZARD RATED AND LISTED BY UNDERWRITERS LABORATORIES, INC. USING STEINER TUNNEL TEST METHOD FOR FIRE HAZARD CLASSIFICATION OF BUILDING MATERIALS, STANDARD UL 723 (ASTM E-84), (ASA A2.5-1963). FLAMESPREAD: MAXIMUM 25. FUEL CONTRIBUTED AND SMOKE DEVELOPED: MAXIMUM 50. FLAMEPROOFING TREATMENTS SUBJECT TO DETERIORATION FROM MOISTURE OR HUMIDITY ARE NOT ACCEPTABLE.
2. EXPOSED: INDOOR DUCTS, PIPING OR EQUIPMENT LOCATED IN MECHANICAL EQUIPMENT ROOMS AND IN AREAS WHICH WILL BE VISIBLE WITHOUT REMOVING CEILINGS OR OPENING ACCESS PANELS.
3. CONCEALED: INDOOR DUCTS, PIPING OR EQUIPMENT WHICH IS NOT EXPOSED.
4. OUTDOOR: DUCTS, PIPING OR EQUIPMENT WHICH IS EXPOSED TO THE WEATHER.

MINIMUM REFRIGERANT PIPE INSULATION THICKNESS (IN.)

FLUID OPERATING TEMP. RANGE & USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (IN.)			
	CONDUCTIVITY BTU.IN./ (H.FT².F)	MEAN RATING TEMP., °F	<1	1 TO <1-1/2	1-1/2 TO <4	
40 — 60	0.21 — 0.27	75	0.5	0.5	1.0	
< 40	0.20 — 0.26	50	0.5	1.0	1.0	

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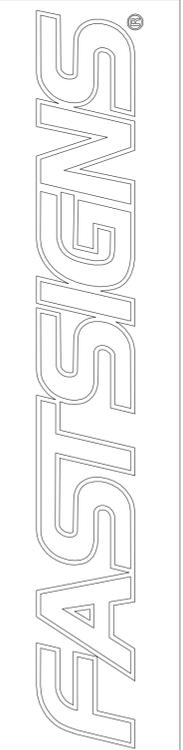
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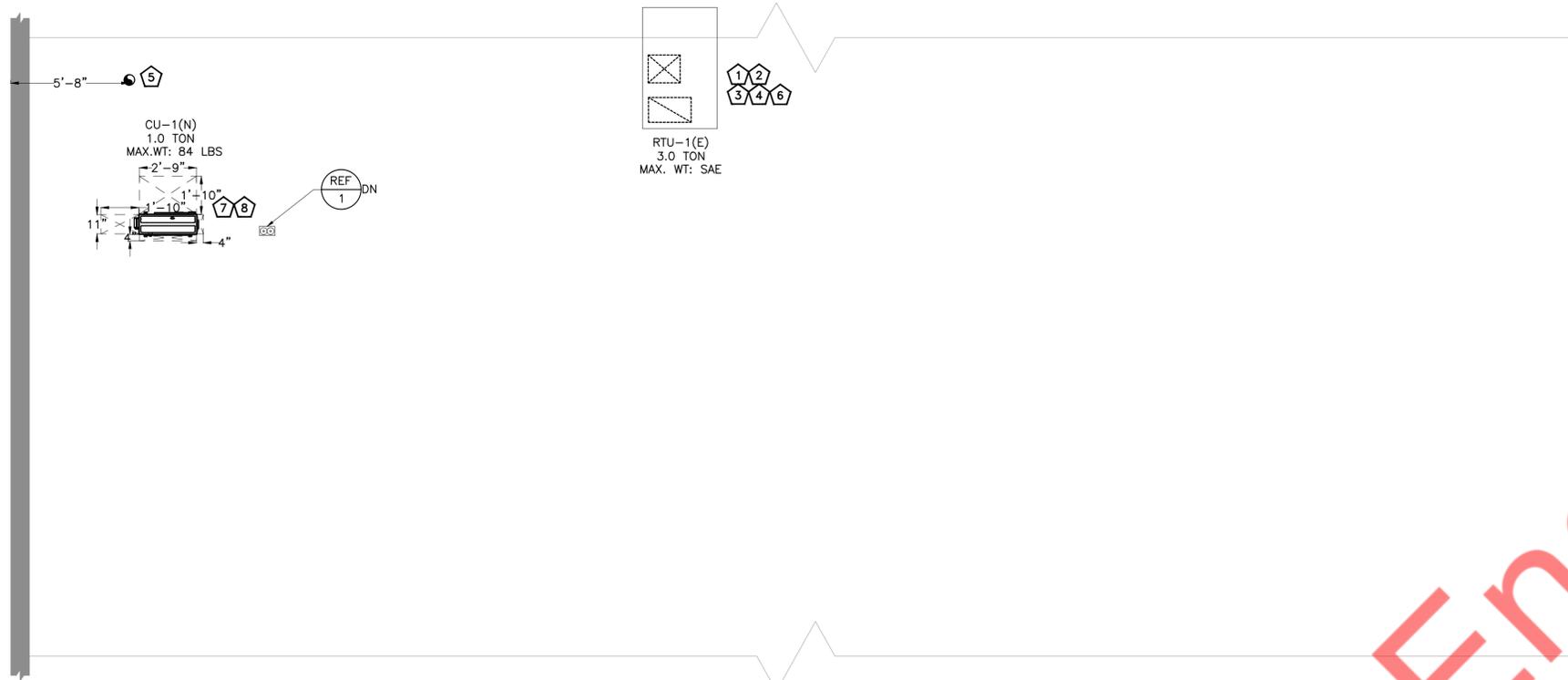
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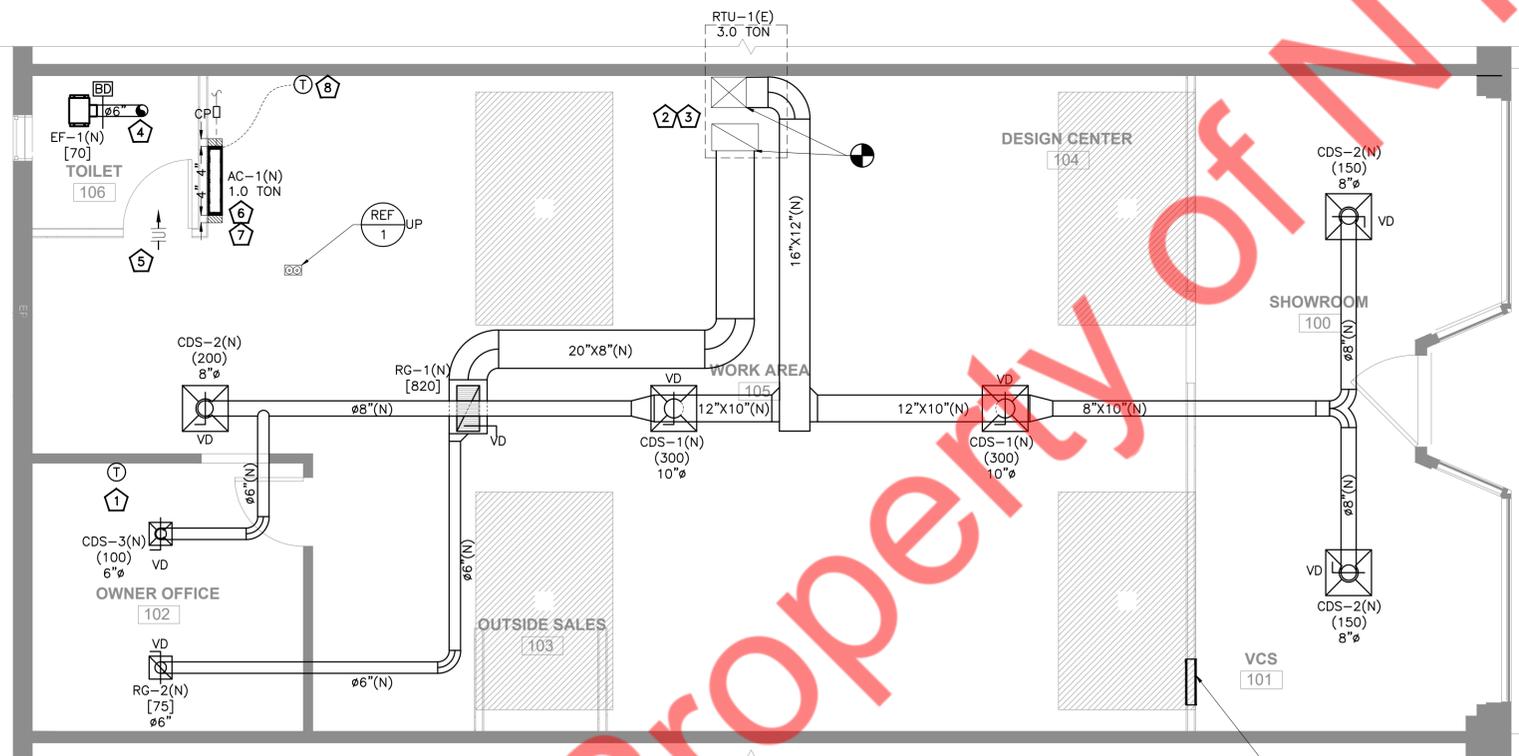
SHEET NO: MECHANICAL SPECIFICATIONS

M-1.2



2 MECHANICAL ROOF PLAN

SCALE: 1/4" = 1'-0"



1 MECHANICAL FLOOR PLAN

SCALE: 1/4" = 1'-0"

GENERAL NOTES:

- A. ALL ITEMS TO BE RE-USED OR RELOCATED SHALL BE CLEANED, REPAIRED, AND RESTORED TO LIKE NEW CONDITION PRIOR TO RE-USE.
- B. PROVIDE NECESSARY PROTECTIVE DEVICES WHERE REQUIRED AND IN STRICT ACCORDANCE WITH OSHA AND ICRA REGULATIONS.
- C. AVOID FREE DUST MOVEMENT AND DIRT MIGRATING TO OCCUPIED AREAS OF THE BUILDING. BLANK OFF ANY RETURN AIR GRILLES/ DUCTS IN THE WORK AREA. PROVIDE TEMPORARY EXHAUST FANS, DUCTED DIRECTLY TO OUTDOORS, TO MAINTAIN NEGATIVE PRESSURE WITHIN THE WORK AREA.
- D. KEEP ALL ADJOINING AREAS ADJACENT TO THE WORK AREAS CLEAN AND FREE OF DEBRIS.
- E. MATERIAL FROM EXISTING SYSTEM WHICH IS RENDERED USELESS SHALL BE REMOVED AND DISPOSED OF OFF SITE.
- F. REPAIR/ REPLACE EXISTING EQUIPMENT/ MATERIALS NOT SCHEDULED OR NOTED TO BE DEMOLISHED BUT BECOME DAMAGED DURING THE PROGRESS OF THE WORK. MAKE ANY AND ALL SUCH REPAIRS, REPLACEMENTS, MODIFICATIONS TO RESTORE THE DAMAGED ITEMS TO THEIR ORIGINAL CONDITIONS AT THE TIME OF DAMAGE, TO THE SATISFACTION OF AND AT NO ADDITIONAL COST TO THE OWNER.
- G. COORDINATE CUTTING, PATCHING OF EXISTING ROOF, WALLS, CEILINGS, AND FLOORS AFFECTED BY MECHANICAL DEMOLITION WITH G.C.

ROOF PLAN KEY NOTES

- 1 FRESH AIR INTAKES SHALL BE LOCATED A MINIMUM OF 10' FROM ANY SANITARY VENT, EXHAUST FAN DISCHARGE AND FLUE OF OTHER GAS FIRED EQUIPMENT. WHEN NECESSARY, EXTEND VENT OR PROVIDE ADDITIONAL FRESH AIR INTAKE DUCTWORK AS DIRECTED BY THE ENGINEER.
- 2 CONDENSATE DRAIN FROM RTU-1(E) TO REMAIN IF EXISTING DRAIN IS IN GOOD CONDITION, FLUSH THE DRAIN LINE.
- 3 PROVIDE FLEXIBLE CONNECTORS ON SUPPLY AND RETURN DUCT CONNECTIONS. SET OUTSIDE AIR AS INDICATED ON ROOFTOP UNIT SCHEDULES. MECHANICAL CONTRACTOR SHALL SCRIBE INTO UNIT POSITION OF OUTSIDE AIR DAMPER AND LABEL OUTSIDE AIR VOLUME AND PERCENT OF OUTSIDE AIR. TRANSITION AND CONNECT SUPPLY AND RETURN DUCTWORK FROM BELOW. COORDINATE ROUTING THROUGH STRUCTURAL TRUSSES AND OFFSET AS REQUIRED IN CURB SPACE.
- 4 EXISTING EQUIPMENT TO REMAIN SAME AND TO BE REUSED WITH ALL ITS EXISTING ACCESSORIES. CONTRACTOR TO FIELD VERIFY LOCATION OF THE EQUIPMENT ON SITE & INFORM TO ARCHITECT IF ANY ACCESSORIES NOT WORKING OR NOT IN GOOD CONDITION.
- 5 6"Ø TOILET EXHAUST DUCT THROUGH ROOF, TERMINATE ON ROOF WITH MUSHROOM CAP AIR RELIEF VENT WITH INSECT SCREEN. MAINTAIN A MINIMUM OF 10'-0" FROM ALL OUTSIDE AIR INTAKES.
- 6 PROVIDE NEW MERV-8 FILTER FOR EXISTING RTU.
- 7 OUTDOOR UNIT TO BE LOCATED ON THE ROOF. FINAL LOCATION OF OUTDOOR UNIT TO BE COORDINATED WITH ARCHITECT/LANDLORD.
- 8 OUTDOOR UNIT SHALL BE PROVIDED WITH STAND. REFER MOUNTING DETAIL ON SHEET M-3.1.

GENERAL NOTES

- A. CONTRACTOR SHALL BALANCE EACH DEVICE WITH THE CFM SHOWN ON PLAN.
- B. NEW DUCTWORK SHOWN ON PLAN ARE SCHEMATIC ONLY. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES FOR PIPING AND DUCTWORK ROUTING. OFFSET AND RUN PIPING, DUCTWORK INSIDE THE STRUCTURE IF REQUIRED. PROVIDE ANY EXTRA PIPING, DUCTWORK, FITTINGS, INSULATIONS AND OTHER ACCESSORIES IN ORDER TO COMPLETE THE INSTALLATION.
- C. COORDINATE LOCATIONS AND SIZES OF ROOF OPENINGS WITH OWNER AND STRUCTURAL ENGINEERS.
- D. EQUIPMENT SIZES, DIMENSIONS AND REQUIRED CONNECTIONS SHALL BE VERIFIED WITH THE ACTUAL EQUIPMENT SELECTED. PROVIDOR DRAWINGS BEFORE FABRICATION OF DUCTWORK, PIPING ETC.
- E. DUCT SIZES SHOWN ON PLANS ARE CLEAR INSIDE AIR STREAM DIMENSIONS.
- F. CONTRACTOR SHALL COORDINATE ALL ELECTRICAL REQUIREMENTS FOR ALL HVAC BASED ON ACTUAL EQUIPMENT SELECTED PRIOR TO INSTALLATION.
- G. CONTRACTOR SHALL COORDINATE EQUIPMENT WEIGHTS AND SUPPORTS BASED ON ACTUAL EQUIPMENT SELECTED.
- H. ALL SOURCE OF MECHANICAL INTAKE SHALL MAINTAIN 10 LINEAR FEET SEPARATION BETWEEN ANY SOURCE OF EXHAUST. CONTRACTOR IS RESPONSIBLE TO ADJUST DUCT LENGTH AS NEEDED.
- I. MOUNT DUCTWORK AS HIGH AS POSSIBLE.
- J. TEST AND BALANCE AIR SYSTEMS. PROVIDE REPORT TO G.C AND OWNER.
- K. NEW DUCTWORK IN CONCEALED AREAS MAY BE RECTANGULAR WITH EQUIVALENT CROSS SECTIONAL FLOW AREA.
- L. PROVIDE FIRE OR FIRE+SMOKE DAMPER WHEREVER DUCTS ARE CROSSING FIRE/SMOKE RATED WALLS/BARRIERS. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR FIRE RATINGS OF THE WALLS.
- M. PROVIDE MINIMUM R-6 INSULATION (INTERNAL FOR EXPOSED DUCTS AND EXTERNAL FOR CONCEALED DUCTS) FOR SUPPLY & RETURN AIR DUCTS. PROVIDE ACOUSTIC INSULATION ON MAIN SUPPLY AND RETURN DUCTS UP TO 10 FT. FROM HVAC UNIT.

FLOOR PLAN KEY NOTES

- 1 CONTRACTOR TO CONFIRM WORKING CONDITION OF AN EXISTING THERMOSTAT TIED TO RTU-1(E). IF IT IS IN GOOD OPERATING CONDITION, RELOCATE AS SHOWN ON THE PLAN. IF EXISTING T-STAT IS DAMAGED OR NOT IN OPERATING CONDITION, REPLACE WITH THE SIMILAR KIND. CONFIRM THE FINAL LOCATION OF THERMOSTAT WITH THE TENANT.
- 2 CONTRACTOR TO FIELD VERIFY RTU'S TEMPERATURE SENSOR IN RETURN AIR DUCT. PROVIDE NEW IF EXISTING TEMPERATURE SENSOR IS DAMAGED OR NOT WORKING. FINAL LOCATION OF TEMP. SENSOR TO BE CONFIRMED WITH ARCHITECT/OWNER.
- 3 EXTEND FULL SIZE SUPPLY & RETURN DUCTWORK FROM ROOFTOP UNITS TO SPACE. EXTEND AS SHOWN. ACOUSTICALLY LINE THE FIRST 10'-0" OF BOTH SUPPLY AND RETURN MAIN DUCTS.
- 4 6"Ø TOILET EXHAUST AIR DUCT GOING UP THROUGH ROOF.
- 5 PROVIDE DOOR UNDERCUT 1" FOR TRANSFER AIR.
- 6 CD TO NEAREST PLUMBING DRAIN W/ AIR GAP FITTING. COORDINATE W/PLUMBING CONTRACTOR. PROVIDE CONDENSATE PUMP IF REQUIRED.
- 7 PROVIDE HORIZONTAL SLOPE IN THE DIRECTION OF DISCHARGE OF NOT LESS THAN 1/8 UNIT VERTICAL IN 12 UNITS HORIZONTAL.
- 8 INSTALL AND WIRE NEW 7-DAY PROGRAMMABLE THERMOSTAT TO AC-1(N). COORDINATE FINAL LOCATION WITH ARCHITECT AND OWNER PRIOR TO ROUGH-IN. PROVIDE LOCKABLE COVER.

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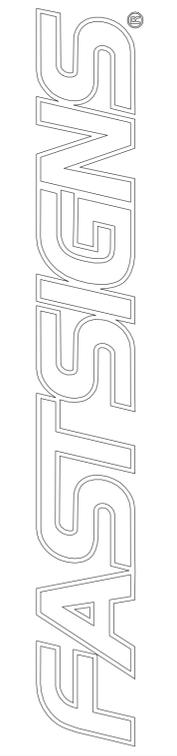
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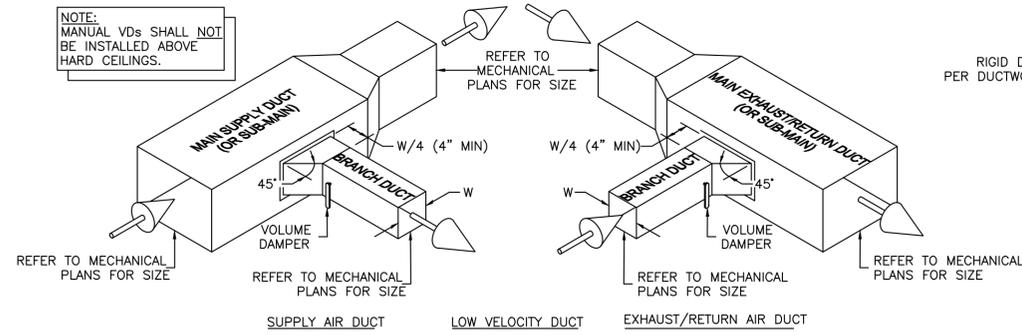
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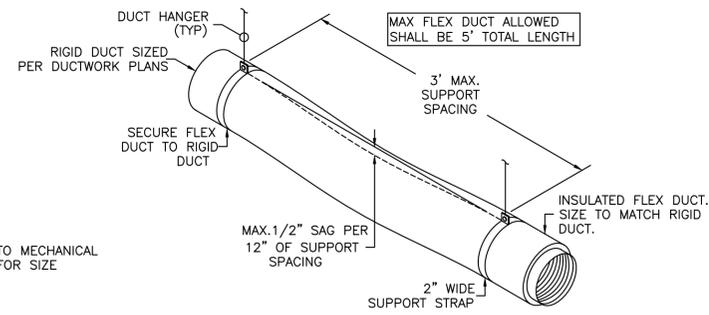
MECHANICAL FLOOR & ROOF PLANS

M-2



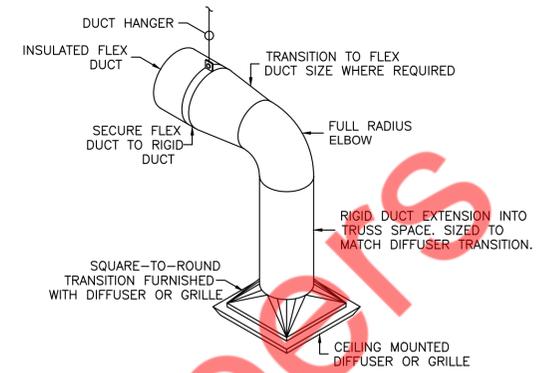
BRANCH DUCT CONNECTIONS

N.T.S.



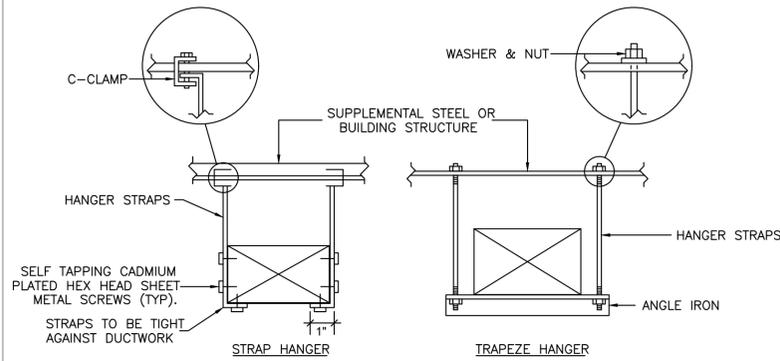
FLEX DUCT SUPPORT DETAIL

N.T.S.



DIFFUSER CONNECTION DETAIL

N.T.S.



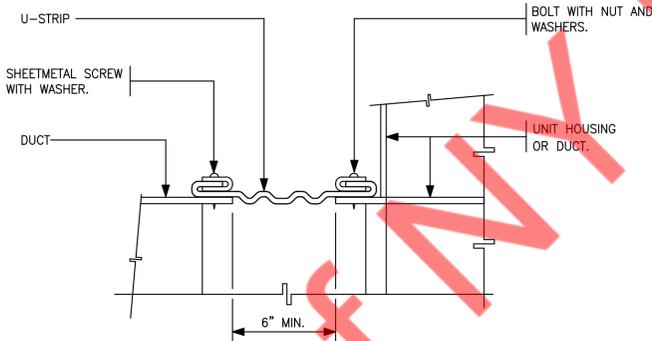
NOTE:
NO POP RIVETS ALLOWED, USE SELF-TAPPING SHEETMETAL SCREWS ONLY.

HANGER SIZES*			
MAX. SIDE	HANGER	HORIZONTAL SUPPORT ANGLE	MAXIMUM SPACING
30"	1"x18" GAUGE STRAP	NONE REQUIRED	10'-0"
36"	1/4" ROD	1-1/2"x1-1/2"x1/8"	8'-0"
48"	1/4" ROD	2"x2"x1/8"	8'-0"
60"	5/16" ROD	2"x2"x1/8"	8'-0"
84"	3/8" ROD	2"x2"x1/8"	8'-0"

* FOR RECTANGULAR DUCTS

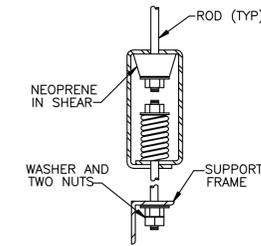
DUCT HANGER DETAIL

N.T.S.



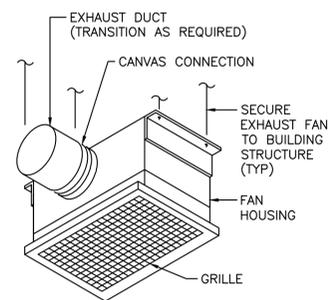
FLEXIBLE CONNECTION DETAIL

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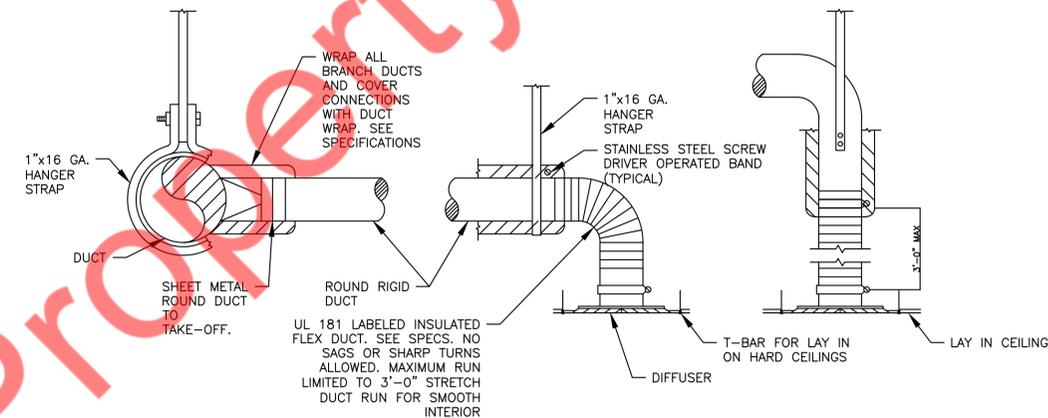
VIBRATION ISOLATOR

N.T.S.



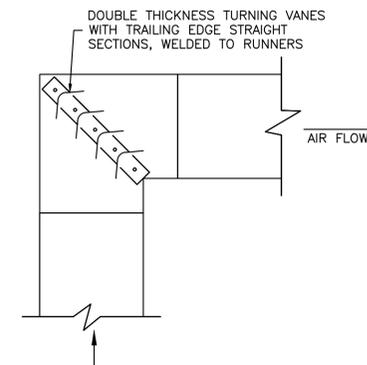
CEILING EXHAUST FAN DETAIL

N.T.S.



TYPICAL DIFFUSER CONNECTION DETAIL

N.T.S.



TYPICAL SQUARE ELBOW

N.T.S.

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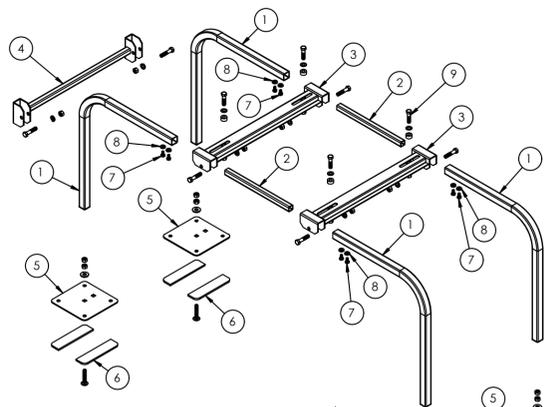
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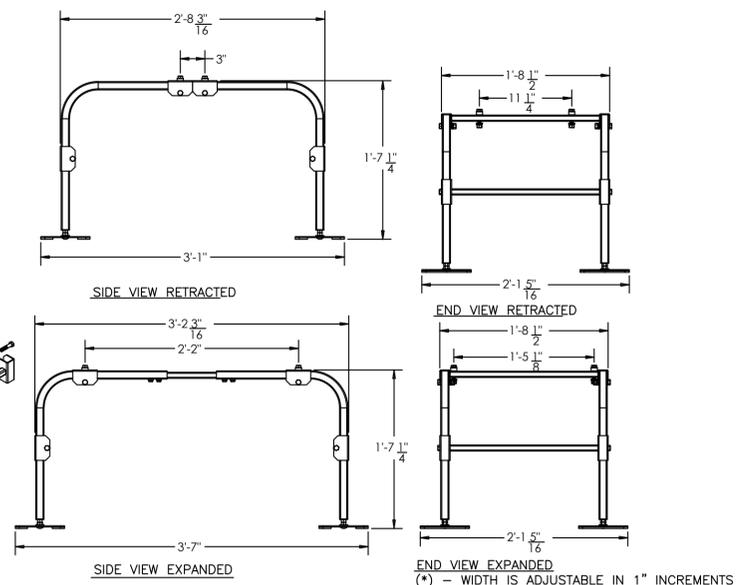
SHEET NO.
**MECHANICAL
DETAILS
(1 OF 2)**

M-3



ITEM NO.	PART NUMBER	DESCRIPTION	Default/ QTY.
1	MS110	Mini Split 18in J-Bar	4
2	MS106	Mini Split Extension Bar	2
3	MS119	Mini Split Long Saddle Arm	2
4	MS114	Mini Split Wide Stability Arm	2
5	MS105	Mini Split 6x6 Feet	4
6	QSR042	Mini Split Rubber Foot	8
7	QSR008	1/4-20x1/2in Zinc Hex Bolt	8
8	QSR015	1/4in Bonded Washers	8
9	HDKMS05	Hardware kit for QSMS1802, 2402	1

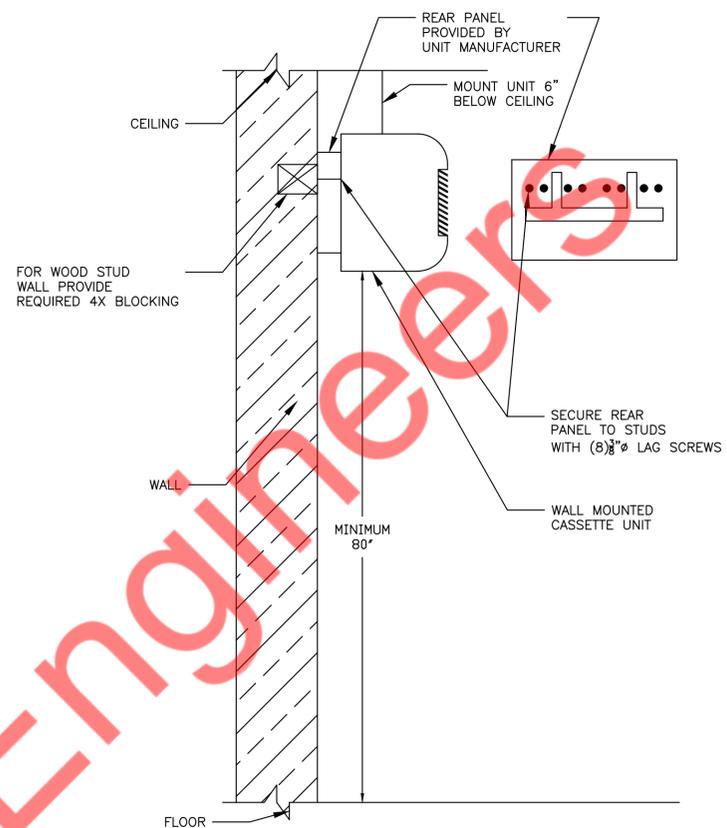
NOTE - ALL ASSEMBLY HARDWARE IS INCLUDED UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [MILLIMETERS]



(*) - WIDTH IS ADJUSTABLE IN 1" INCREMENTS

CONDENSING UNIT MOUNTING STAND DETAIL

N.T.S.



WALL MOUNTED UNIT DETAIL

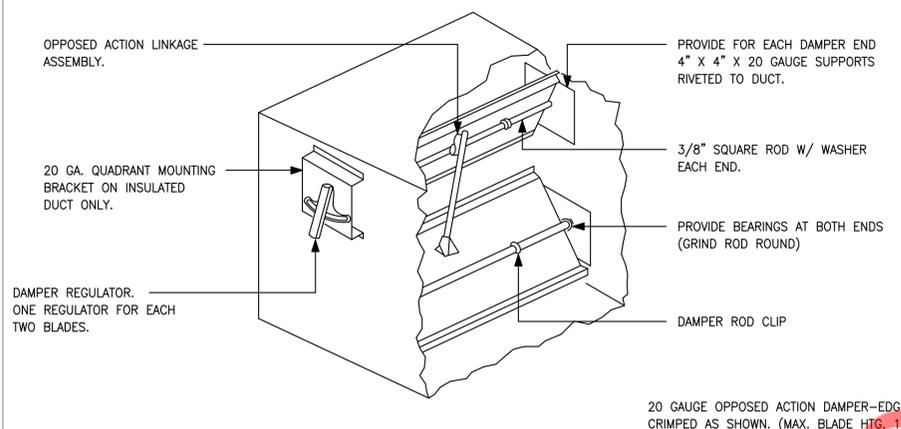
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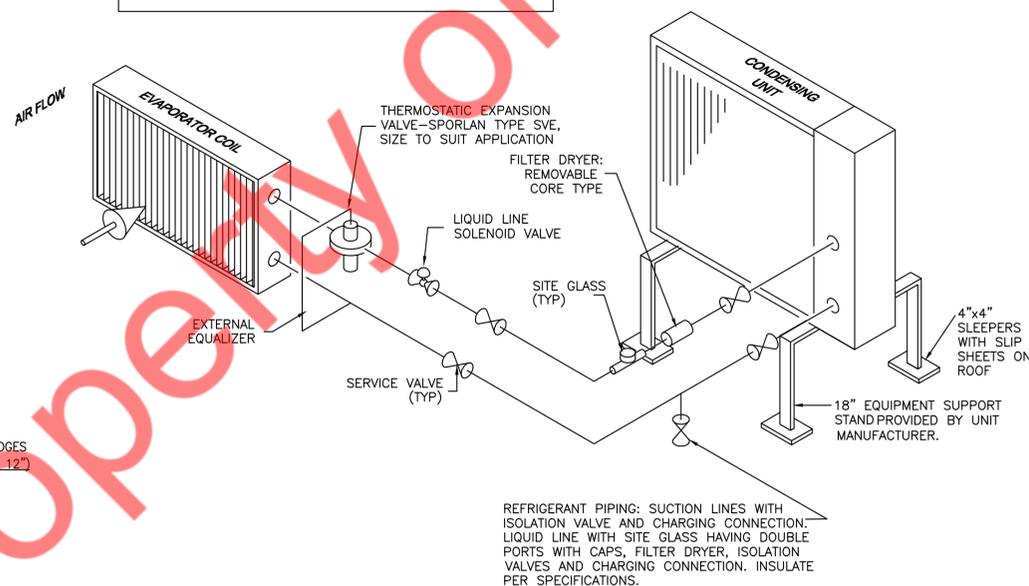


NOTE : 1. FOR DUCTS OVER 29" WIDE AND/OR OVER 12" HIGH.

LOW PRESSURE CONTROL DAMPER

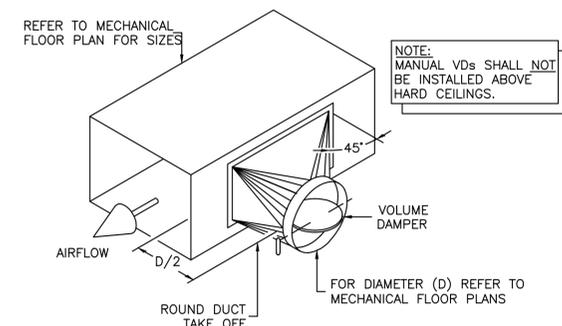
N.T.S.

NOTE:
 ACTUAL PIPING ACCESSORIES AND ARRANGEMENT MAY VARY
 ACCORDING TO MANUFACTURER AND SYSTEM TYPE.
 FINAL CONFIGURATION SHALL BE VERIFIED WITH MANUFACTURER
 INSTALLATION INSTRUCTIONS PRIOR TO BID AND INSTALLATION.



REFRIGERANT PIPING DIAGRAM

N.T.S.



ROUND DUCT TAKE OFF DETAIL

N.T.S.

SHEET NO.
**MECHANICAL
 DETAILS
 (2 OF 2)**
M-3.1

EXISTING ROOF TOP UNIT SCHEDULE																							
UNIT ID	MANUFACTURER	EFFICIENCY	MODEL	NOMINAL TONS	SUPPLY FAN DATA			GAS HEAT		COOLING DATA					ELECTRICAL DATA				EER	IEER	THERMAL EFFICIENCY (%)	OPERATING WEIGHT (LBS)	REMARK
					TOTAL	OUTSIDE	EXTERNAL STATIC	INPUT	OUTPUT	TOTAL	SENSIBLE	AMBIENT TEMP.	ENTERING TEMP.	STAGES	VOLTS	PHASE	MCA(A)	MOC(P(A))					
					CFM	AIR CFM	PRESSURE (IN. W.G.)	MBH	MBH	MBH	MBH	DB (°F)	DB / WB(°F)										
RTU-1(E)	S.A.E.	S.A.E.	S.A.E.	3	1200 (V.I.F)	305	S.A.E.	S.A.E.	S.A.E.	S.A.E.	S.A.E.	S.A.E.	S.A.E.	S.A.E.	S.A.E.	S.A.E.	S.A.E.	S.A.E.	S.A.E.	S.A.E.	EXISTING		

NOTES FOR EXISTING RTU :
1. S.A.E :- SAME AS EXISTING. V.I.F:- VERIFY IN FIELD
2. EXISTING RTU WITH ALL ACCESSORIES TO REMAIN SAME AND TO BE REUSED.
3. CONTRACTOR TO CONFIRM IF EXISTING RTU IS WORKING IS AT ITS 100% RATED CAPACITY.
4. CONTRACTOR TO FIELD VERIFY EXACT LOCATION AND CONFIGURATION OF RTU ON SITE.
5. IF REQUIRED PROVIDE NEW THERMOSTAT AND TEMPERATURE SENSOR COMPATIBLE WITH EXISTING RTU. PROVIDE T-SENSOR IN RETURN AIR DUCT, CONFIRM WITH ARCHITECT/OWNER BEFORE ROUGH IN.
6. CONTRACTOR TO REBALANCE OUTSIDE AIR & RETURN AIR DAMPERS ON EXISTING RTU TO MATCH VALUES MENTIONED IN ABOVE TABLE.
7. REPLACE OLD FILTERS WITH NEW MERV 8 FILTERS.

VENTILATION CALCULATION AS PER CALIFORNIA ENERGY CODE - TABLE 120.1-A						
SR.NO	ROOM NAME	AREA (SQ.FT.)	CFM/SQ.FT AS PER CEC 2022	REQ. OA	PROVIDED OA	EXHAUST AIRFLOW RATE (CFM)
1	SHOWROOM	355	0.25	89	90	-
2	WORK AREA	1242	0.15	186	190	-
3	OWNER OFFICE	139	0.15	21	25	-
4	TOILET	49	0	0	0	70
-	TOTAL	1785	-	296	305	70

AIR CONDITIONER SCHEDULES (INDOOR UNIT)													MAKE: MITSUBISHI		
UNIT TAG	AREA SERVED	TYPE	CAP. (TON)	COOLING MBH	HEATING MBH	CFM	MAX. SOUND PRESS.(DBA)	ELECTRICAL DATA		DIMENSIONS (HXWXD) (IN.)	PIPE SIZE			WEIGHT (LBS.)	MODEL NO.
								PH/VOLT/Hz			LIQ. (IN.)	SUCTION (IN.)	DRAIN (ID) (IN.)		
AC-1 (N)	SEE PLAN	HI WALL	1.0	12	12.3	424	44	1/208-230/60		12X37X10	1/4"	3/8"	5/8"	20	NTXWPH12B112AA (EQUIVALENT)

NOTES :
1) SUPPLY AIR CFM BASED ON HIGH SPEED.
2) REFRIGERANT R410A SHALL BE PROVIDED.
3) PROVIDE MOUNTING BRACKETS, MANUFACTURER RECOMMENDED VIBRATION ISOLATORS AND ALL ASSOCIATED ACCESSORIES.
4) ALL REFRIGERANT PIPING TO BE SIZED PER MANUFACTURERS RECOMMENDATIONS.
5) INDOOR UNIT IS POWERED BY OUTDOOR UNIT .
6) PROVIDE CONDENSATE PUMP IF REQUIRED.
7) CONTRACTOR SHALL PROVIDE A LONG LINE SET FOR REFRIGERANT PIPING IN THE EVENT THAT TOTAL REFRIGERANT LENGTH EXCEEDS THE MANUFACTURER'S STANDARD RECOMMENDED LENGTH.

OUTDOOR HEAT PUMP CONDENSING UNITS															MAKE: MITSUBISHI					
UNIT TAG	LOCATION	INDOOR UNITS SERVED	CAP.TR	COOLING MBH	HEATING MBH	COMPRESSOR TYPE	UNIT DIMENSIONS IN.(HXWXD)	WEIGHT (LBS)	PIPING DIMENSIONS			ELECTRICAL			SOUND LEVEL (Dba)	EER	SEER	COP	HSPF	MODEL NO.
									LIQUID-HI PRESSURE	GAS-LO PRESSURE	(V/Hz/Ph)	MCA (A)	MOP (A)							
CU-1(N)	SEE PLAN	AC-1(N)	1	12	12.3	INVERTER TWIN ROTARY	22"X32"X12"	84	1/4"	3/8"	208-230/60/1	10	15	51	13.8	26.3	4.24	11.1	NTXSPB12B112AA (OR EQUIVALENT)	

NOTES FOR OUTDOOR UNIT
1. UNIT SHALL HAVE TEN YEAR EXTENDED WARRANTY FOR COMPRESSORS/PARTS.
2. PROVIDE LOW AMBIENT CONTROL FOR CONDENSING UNIT OPERATION DOWN TO -4°F.
3. PROVIDE COMPRESSOR CYCLE PROTECTOR.
4. STEEL SUPPORT STAND AND VIBRATION ISOLATORS TO BE PROVIDED BY MECH. CONTRACTOR.
5. OUTDOOR REFRIGERANT LINESET TO BE WRAPPED IN UV RESISTANT, FIRE RATED, AND ANTI-MICROBIAL INSULATION PROTECTION BASED ON AIREX-FLEX GUARD OR EQUAL.
6. CONTRACTOR SHALL PROVIDE A LONG LINE SET FOR REFRIGERANT PIPING IN THE EVENT THAT TOTAL REFRIGERANT LENGTH EXCEED THE MANUFACTURER'S STANDARD RECOMMENDED LENGTH.
7. OUTDOOR CONDENSING UNITS TO BE LOCATED WITH PROPER CLEARANCES AND MUST PREVENT RE-CIRCULATION OF AIR. COORDINATE WITH MANUFACTURER AND ARCHITECT.

MECHANICAL FAN SCHEDULE												
TAG	QUANTITY	FLOW RATE	STATIC PRESSURE		ELECTRIC DATA			MAXIMUM LOUDNESS	BASIS OF DESIGN		WEIGHT LBS.	REMARK
			EXTERNAL	INTERNAL	SPEED	HP/WATT	V/PH/Hz		MANUFACTURER	MODEL		
EF-1(N)	1	70	0.7	1000	83W	115/60/1	50	GREENHECK	SP-A250	24	1,2,3,4	

NOTES:
1. PROVIDE VIBRATION ISOLATORS, THERMAL OVERLOAD PROTECTION, UL AND AMCA SEAL.
2. PROVIDE FACTORY MOUNTED AND INSTALLED DISCONNECT.
3. INSTALL AS PER MANUFACTURERS RECOMMENDATION.
4. EXHAUST FAN TO BE INTERLOCKED WITH RTU-1(E).

AIR BALANCE						
UNIT	AREA SERVED	SUPPLY AIR	OUTSIDE AIR	RETURN AIR	EXHAUST AIR	
RTU-1 (E)	SEE PLAN	1200 CFM	305 CFM	895 CFM	-	
AC-1 (N)	SEE PLAN	424 CFM	0 CFM	424 CFM	-	
EF-1 (N)	RESTROOM	-	-	-	70 CFM	
TOTAL:		1624 CFM	305 CFM	1319 CFM	70 CFM	
BUILDING PRESSURE:	-		-	235 CFM	POSITIVE	

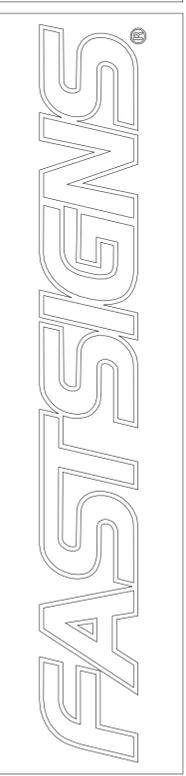
Notes:-
1) CONTRACTOR TO REBALANCE OUTSIDE AIR & RETURN AIR DAMPERS ON RTU TO MATCH VALUES MENTIONED IN ABOVE TABLE.

MECHANICAL AIR TERMINAL DEVICES SCHEDULE						
TAG	SIZE	NECK SIZE	CFM	DESCRIPTION	BASIS OF DESIGN	
					MANUFACTURER	MODEL
CDS-1	24X24	10"Ø	201-400	SQUARE CEILING SUPPLY AIR DIFFUSER-CONE	TITUS	TMS
CDS-2	24X24	8"Ø	101-200	SQUARE CEILING SUPPLY AIR DIFFUSER-CONE	TITUS	TMS
CDS-3	12X12	6"Ø	0-100	SQUARE CEILING SUPPLY AIR DIFFUSER-CONE	TITUS	TMS
RG-1	24X12	-	800-1000	EGGCRATE RETURN AIR GRILLE	TITUS	50F
RG-2	12X12	-	0-100	EGGCRATE RETURN AIR GRILLE	TITUS	50F

NOTES:
1. COORDINATE FINAL COLOR/FINISH WITH ARCHITECT/OWNER.
2. PROVIDE FRAME FOR MOUNTING AIR DEVICE IN LAY-IN GRID CEILING UNLESS REFLECTED CEILING PLAN INDICATES HARD CEILING. IN AREAS WITH HARD CEILINGS, PROVIDE FRAMES FOR SURFACE MOUNTING.
3. UNLESS OTHERWISE NOTED, BRANCH DUCTS SERVING AIR DEVICES SHALL BE SAME SIZE AS NECK OF AIR DEVICE.
4. PROVIDE CORD OPERATED DAMPERS IN INACCESSIBLE CEILINGS.

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ELECTRICAL SYMBOLS LIST

GENERAL NOTES

LIGHTING

	LIGHTING FIXTURE AND OUTLET BOX. HALF SHADED FIXTURE OR "EM" INDICATES FIXTURES WITH INTEGRAL BATTERY PACK FOR EMERGENCY SERVICE, U.O.N.
	LUMINAIRE TYPE : INDICATE BY LIPPERCASE LETTER SEE LIGHTING EXTURE SCHEDULE.
	CIRCUIT NUMBER : INDICATED BY NUMBER
	SWITCHING INDICATED BY LOWER CASE LETTERS.
	EM DENOTES LUMINAIRE ON EMERGENCY CIRCUIT.
	NL DENOTES FIXTURES DESIGNATED AS NIGHTLIGHT, WIRED TO 24 HOURS UNSWITCHED CIRCUIT.
	CEILING/WALL MOUNTED SELF POWERED EXIT LIGHT FIXTURE WITH DIRECTIONAL ARROWS AS INDICATED. SHADED AREA DENOTES FACE(S). ISOLITE ELITE SERIES LED EXIT SIGN

SWITCHES AND CONTROLS

	20A SPST TOGGLE SWITCH U.O.N. "o" DENOTES LIGHTING FIXTURE/SWITCHED RECEPTACLE CONTROLLED.
	20A 3-WAY TOGGLE SWITCH U.O.N. "o" DENOTES LIGHTING FIXTURE CONTROLLED
	CEILING OCCUPANCY SENSOR, NUMBER INDICATES TYPE; SEE OCCUPANCY SENSOR SCHEDULE. "A" LETTER REFERES TO WIRING DIAGRAM.

WIRING SYSTEMS

	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF 2#12 Ø, 2#12 N. & 2#12 G. IN 3/4"Ø, UNLESS OTHERWISE NOTED.
	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF 3#12 Ø, 3#12 N. & 3#12 G. IN 3/4"Ø, UNLESS OTHERWISE NOTED.
	CONDUIT AND WIRE TO BUILDING GROUND.
	UNDERGROUND
	EXISTING
	NEW

ELECTRICAL DRAWING LIST

E-0.1	ELECTRICAL SYMBOLS AND GENERAL NOTES
E-0.2	ELECTRICAL SPECIFICATIONS SHEET 1 OF 2
E-0.3	ELECTRICAL SPECIFICATIONS SHEET 2 OF 2
E-1.0	ELECTRICAL LIGHTING PLAN
E-2.0	ELECTRICAL POWER PLAN
E-3.0	ELECTRICAL RISER DIAGRAM & PANEL SCHEDULE
E-4.1	TITLE 24 SHEET (1 OF 2)
E-4.2	TITLE 24 SHEET (2 OF 2)

POWER AND TELECOMMUNICATION

	JUNCTION BOX WITH BLANK COVER PLATE, FLUSH IN FLOOR.
	SIMPLEX RECEPTACLE, +18" AFF OR AS NOTED. SUFFIX DENOTES FOLLOWING: A- NEMA 5-15R B- NEMA 6-15R C- NEMA 14-30R D- NEMA 14-50R
	DUPLEX GFI RECEPTACLE
	DUPLEX CONVENIENCE RECEPTACLE, +18" AFF OR AS NOTED.
	DEDICATED DUPLEX CONVENIENCE RECEPTACLE, +18" AFF OR AS NOTED.
	TELEPHONE/DATA OUTLET, 4" SQUARE OUTLET BOX WITH SINGLE GANG COLLAR AND BLANK PLATE. PROVIDE 3/4" E.C., U.O.N., UP TO HUNG CEILING AND TERMINATE WITH 90° ELBOW, BUSHING AND DRAG WIRE.
	QUAD RECEPTACLE
	DATA OUTLET

MOTORS AND CONTROLS

	AC INDOOR UNIT MOTOR AS NOTED WITH LIQUID TIGHT FLEXIBLE CONNECTION WITH JUNCTION BOX AND MOTOR SWITCH.
	AC OUTDOOR UNIT MOTOR AS NOTED WITH CONTROLLER AND DISCONNECT SWITCH WITH WEATHER PROOF.
	NON FUSED DISCONNECT SWITCH AMPERAGE, AND NUMBER OF POLES AS NOTED.
	30A/240V NON FUSED DISCONNECT SWITCH
	60A/240V NON FUSED DISCONNECT SWITCH
	100A/240V NON FUSED DISCONNECT SWITCH
	200A/240V NON FUSED DISCONNECT SWITCH
	COMBINATION MAGNETIC STARTER AND DISCONNECT SWITCH, FURNISHED BY HVAC/CONTRACTOR, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.
	FUSED DISCONNECT SWITCH AND FUSE AMPERAGE AS INDICATED. TOP NUMBER DENOTS SWITCH SIZE AND BOTTOM NUMBER DENOTES FUSE.
	DUPLEX PUMP. NUMBER INDICATES HP RATING OF PUMP.
	ELECTRICAL HEATER, NUMBER DENOTES HEATER RATING
	WALL MOUNT OCCUPANCY SENSOR SWITCH
	THERMAL OVERLOAD SWITCH AT MOTOR. PROVIDE THERMAL ELEMENTS AS PER MOTOR RATING.
	MANUAL MOTOR SWITCH

ANNOTATION

	KEYED NOTE REFERENCE
	INDICATES MOUNTING HEIGHT, CENTER LINE TO FINISHED FLOOR.
	DETAIL REFERENCE: DETAIL NUMBER INDICATED ON TOP; DRAWING NUMBER INDICATED ON BOTTOM

POWER DISTRIBUTION

	MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.
	DISTRIBUTION PANELBOARD, 120/208V-SURFACE OR FLUSH MOUNTED.

ELECTRICAL ABBREVIATIONS

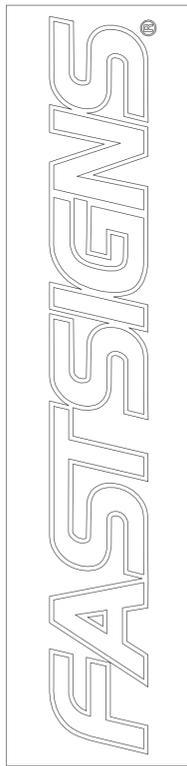
A	AMPERES	EA	EACH
A/C, AC	AIR CONDITIONING UNIT	EM	EMERGENCY
AF	AMPERE FRAME/AMP FUSE	EMT	ELECTRICAL METALLIC TUBING
AFF	ABOVE FINISHED FLOOR	EQUIP	EQUIPMENT
AS	AMP SWITCH	ER	EXISTING TO BE RELOCATED
AIC	AMPS INTERRUPTING CAPACITY	FA	FIRE ALARM
AT	AMP TRIP	E	EXISTING
ATS	AUTOMATIC TRANSFER SWITCH	FL	FLOOR
AUTO	AUTOMATIC	G	GROUND
AWG	AMERICAN WIRE GAUGE	GFI	GROUND FAULT INTERRUPTER
C	CONDUIT	GP	GENERAL PURPOSE
C/B,CB	CIRCUIT BREAKER	HP	HORSEPOWER
CKT	CIRCUIT	HWH	HOW WATER HEATER
CLG	CEILING	HZ	HERTZ
COMM	COMMUNICATION	IC	INTERRUPTING CAPACITY
CT	CURRENT TRANSFORMER	PP	POWER PANEL
CU	COPPER	PWR	POWER
DIA	DIAMETER	R	REMOVE
DISC	DISCONNECT	RE	RELOCATED EXISTING
DN	DOWN	REC	RECEPTACLE
DP	DISTRIBUTION PANEL	RGS	RIGID GALVANIZED STEEL
DWG	DRAWING	RR	REMOVE & RELOCATE
JB	JUNCTION BOX	SECT	SECTION
KCMIL	ONE THOUSAND CIRCULAR MILS	SPDT	SINGLE POLE DOUBLE THROW
KV	KILOVOLT	SPST	SINGLE POLE SINGLE THROW
KVA	KILOVOLT-AMPERES	SPEC	SPECIFICATION
KW	KILOWATTS	SW	SWITCH
LTG	LIGHTING	SWBD	SWITCHBOARD
MAX	MAXIMUM	SYM	SYMMETRICAL
MC	MOTOR CONTROLLER	SYS	SYSTEMS
MCB	MAIN CIRCUIT BREAKER	TELE	TELEPHONE
MLO	MAIN LUGS ONLY	TEMP	TEMPERATURE
MTD	MOUNTED	TXF	TOILET EXHAUST FAN
MTS	MANUAL TRANSFER SWITCH	TYP	TYPICAL
N	NEUTRAL	UON	UNLESS OTHERWISE NOTED
NIC	NOT IN CONTRACT	V	VOLT/VOLTAGE
NTS	NOT TO SCALE	VA	VOLT AMPERE
PNL	PANEL	WP	WEATHER PROOF
W	WATT	Ø	PHASE

- ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE CURRENT VERSION OF THE NEC, LOCAL JURISDICTION REQUIREMENTS, AND ALL GOVERNING LOCAL CODES, LAWS, AND REGULATIONS.
- CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH ALL EXISTING CONDITIONS THAT MAY AFFECT THE WORK. NO ADDITIONAL COMPENSATION WILL BE CONSIDERED FOR FAILURE TO DO SO.
- CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, TEST REPORTS, AND CERTIFICATIONS FOR TEMPORARY AND FINAL CERTIFICATE OF OCCUPANCY.
- FIRE STOP ALL PENETRATIONS OF FIRE RATED CONSTRUCTION IN A CODE APPROVED MANNER IN ORDER TO MAINTAIN FIRE RATINGS. ALL PENETRATIONS SHALL BE SLEEVED AND SEALED WATERTIGHT.
- SECURE ALL SUPPORTS TO BUILDING STRUCTURE UTILIZING TOGGLE BOLTS (HOLLOW MASONRY), EXPANSION SHIELDS OR INSERTS (CONCRETE AND BRICK), MACHINE SCREWS (METAL), BEAM CLAMPS (FRAMEWORK), WOOD SCREWS (WOOD) OR PAN THRU STRAPS (METAL DECK), NAILS, RAWL PLUGS AND WOOD PLUGS ARE NOT PERMITTED. WHERE REQUIRED BY STRUCTURE, PROVIDE THRU BOLTS AND FISH PLATES. SUPPORT HORIZONTAL RUNS OF METALLIC RACEWAYS NOT MORE THAN 10 FT APART. SUPPORT RACEWAY RISERS AT EACH FLOOR LEVEL. RUN EXPOSED RACEWAYS PARALLEL WITH OR AT RIGHT ANGLES TO WALLS.
- LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS. RACEWAYS OVER 10 FT LONG IN WHICH WIRING IS NOT INSTALLED; FURNISH FISH WIRE.
- VERIFY LOCATIONS OF OUTLETS AND SWITCHES IN FINISHED ROOMS WITH ARCHITECTURAL DRAWINGS OF INTERIOR DETAILS AND FINISH. IN CENTERING OUTLETS AND LOCATING BOXES AND OUTLETS, ALLOW FOR OVERHEAD PIPES, DUCTS AND MECHANICAL EQUIPMENT. EQUIPMENT, VARIATIONS IN FIREPROOFING AND PLASTERING, WINDOW AND DOOR TRIM, PANELING, HUNG CEILINGS AND THE LIKE. CORRECT ANY INACCURACY RESULTING FROM FAILURE TO DO SO WITHOUT EXPENSE TO OWNER.
- CONTRACTOR SHALL PROVIDE A WARRANTY ON ALL MATERIALS, EQUIPMENT, AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE.
- ALL UNUSED MATERIALS AND DEBRIS SHALL BE LEGALLY REMOVED AND DISPOSED OF AWAY FROM THE PREMISES ON A DAILY BASIS.
- CONTRACTOR SHALL PATCH, PAINT, AND RESTORE EXISTING SURFACES DAMAGED DURING THE COURSE OF THIS CONSTRUCTION TO PRE-EXISTING CONDITIONS OR BETTER.
- MINIMUM SIZE OF CONDUIT SHALL BE 3/4", AND TYPE SHALL BE ELECTRICAL METALLIC TUBING (EMT), UNLESS OTHERWISE NOTED. PROVIDE NYLON DRAG LINE AND CONDUIT CAP FOR ALL EMPTY CONDUITS.
- CONNECT CONDUIT TO MOTOR CONDUIT TERMINAL BOXES WITH FLEXIBLE CONDUIT (MINIMUM 18 IN. LENGTH AND 50% SLACK). DO NOT TERMINATE IN OR FASTEN RACEWAYS TO MOTOR FOUNDATION.
- PULL AND JUNCTION BOXES WHERE INDICATED ON THE DRAWINGS, SHALL BE CONSIDERED SHOWN AT THEIR APPROXIMATE LOCATION. THE CONTRACTOR SHALL LOCATE THEM AS FIELD CONDITIONS DICTATE. ADDITIONAL PULL AND JUNCTION BOXES NOT SHOWN ON DRAWINGS SHALL BE PROVIDED WHERE REQUIRED BY APPLICABLE CODE PROVISIONS OR WHERE CALLED FOR BY FIELD CONDITIONS. PULL AND JUNCTION BOXES SHALL BE SURFACE TYPE IN UNFINISHED AREAS AND INSTALLED CONCEALED IN FINISHED AREAS, AND ALL COVERS TO PULL & JUNCTION BOXES SHALL BE READILY ACCESSIBLE.
- SUPPORT PANEL, JUNCTION AND PULLBOXES INDEPENDENTLY TO BUILDING STRUCTURE WITH NO WEIGHT BEARING ON RACEWAYS.
- FOR EXACT LOCATION AND MOUNTING HEIGHT OF LIGHTING FIXTURES AND SWITCH/RECEPTACLE OUTLETS, REFER TO ARCHITECTURAL REFLECTED CEILING AND POWER PLANS.
- ALL ELECTRICAL ACCESSORIES AND EQUIPMENT INSTALLED OUTSIDE OR EXPOSED TO WEATHER SHALL HAVE NEMA 3R ENCLOSURES AND SHALL BE TIGHTLY GASKETED FOR A COMPLETE RAINIGHT INSTALLATION. ALL BUILDING EXTERIOR MOUNTED RECEPTACLES SHALL BE GFCI RATED AND MOUNTED IN WEATHERPROOF ENCLOSURE.
- ALL ACCESS PANEL LOCATIONS SHALL BE REVIEWED BY ARCHITECT PRIOR TO INSTALLATION.
- ELECTRICAL CONTRACTOR SHALL COORDINATE THE LOCATION AND INSTALLATION OF NEW WORK WITH THE GENERAL CONTRACTOR AND OTHER ASSOCIATED TRADES IN A TIMELY MANNER. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL DIMENSIONS AND CONDITIONS PRIOR TO CONSTRUCTION. REFER TO ALL GENERAL, MECHANICAL, AND ELECTRICAL, DRAWINGS AND SPECIFICATIONS FOR THIS PROJECT.
- ALL CONDUITS AND EQUIPMENT TO BE CONCEALED IN FINISHED SPACES UNLESS OTHERWISE NOTED. CONDUITS SHALL BE ENCASED IN THE CONCRETE FLOOR SLAB.
- ALL EQUIPMENT AND MATERIALS INSTALLED IN PLENUM CEILINGS SHALL BE APPROVED FOR THAT APPLICATION.
- OUTLET BOXES AND JUNCTION BOXES ON OPPOSITE SIDES OF FIRE-RATED WALLS SHALL BE SEPARATED BY A COMPLETE HORIZONTAL DISTANCE OF NOT LESS THAN 24 INCHES, UNLESS FIRE-RATED BOXES OR PUTTY PADS ARE UTILIZED.
- COORDINATE ALL FLOOR PENETRATIONS WITH THE STRUCTURAL AND ARCHITECTURAL DRAWINGS. CONFIRM PENETRATION LOCATIONS WITH THE ENGINEER AND OWNER BEFORE INSTALLATION.
- COORDINATE THE MOUNTING HEIGHT AND LOCATION OF RACEWAYS, COMMUNICATIONS OUTLETS, AND RECEPTACLES WITH THE ARCHITECTURAL CASEWORK DRAWINGS AND DETAILS. COORDINATE LOCATIONS OF LIGHT FIXTURES, SWITCHES, AND RELATED DEVICES WITH THE ARCHITECTURAL DRAWINGS AND DETAILS.
- REFER TO ARCHITECTURAL PLANS FOR FINAL LOCATIONS OF ALL LUMINARIES AND SWITCHES, AND FOR ALL FINISHED CEILING HEIGHTS.
- REFER TO ARCHITECTURAL PLANS FOR FINAL LOCATIONS OF ALL ELECTRICAL DEVICES, AND FOR FINAL CEILING AND WALL HEIGHTS AND LAYOUTS.
- LIGHTING FIXTURES PROVIDED WITH EMERGENCY BATTERY PACKS AND INDICATED WITH SWITCH CONTROL SHALL BE WIRED WITH BATTERY CHARGING/SENSING CIRCUIT WIRED AHEAD OF SWITCH CONTROL.
- NUMBER(S) SHOWN AT RECEPTACLES, JUNCTION BOXES AND EQUIPMENT INDICATES CIRCUIT NUMBERS IN PANELBOARD. PROVIDE WIRE AND CONDUIT TO INTERCONNECT EQUIPMENT AND DEVICES WITH SAME CIRCUIT NUMBERS AND RUN TO PANELBOARD.

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SHEET NO.:
ELECTRICAL SYMBOLS & GENERAL NOTES

E-0.1

ELECTRICAL SPECIFICATIONS

1. GENERAL:

- A. THE "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," AIA DOCUMENT A201, LATEST EDITION, AND THESE SPECIFICATIONS AS APPLICABLE ARE PART OF THIS CONTRACT.
- B. DRAWING ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK. CONDUIT ROUTING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF CONDUIT TO AVOID OBSTRUCTIONS. COORDINATION WITH EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES, IS REQUIRED. MAINTAIN HEADROOM AND SPACE CONDITIONS.
- C. BIDDERS, BEFORE SUBMITTING PROPOSALS, SHALL VISIT AND CAREFULLY EXAMINE THE AREA AFFECTED BY THIS WORK TO FAMILIARIZE THEMSELVES WITH THE EXISTING CONDITIONS AND THE DIFFICULTIES THAT WILL ATTEND THE EXECUTION OF THIS WORK. SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE, AND LATER CLAIMS WILL NOT BE RECOGNIZED FOR EXTRA LABOR, EQUIPMENT, OR MATERIALS, REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN HAD SUCH AN EXAMINATION BEEN MADE.
- D. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW WORK.
- E. THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS, RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR.
- F. SEAL OPENINGS THROUGH PARTITIONS, WALLS AND FLOORS WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL, UNLESS OTHERWISE NOTED.
- G. PROVIDE ALL NECESSARY FLASHING AND COUNTER FLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THE BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF CONDUIT AND EQUIPMENT, PROVIDE EQUIPMENT CURBS AS REQUIRED.
- H. ALL EXISTING MATERIAL, EQUIPMENT AND CONSTRUCTION DEBRIS TO BE REMOVED UNDER THIS CONTRACT SHALL BECOME THE PROPERTY OF THE CONTRACTOR WITH THE EXCEPTION OF SPECIFIC EQUIPMENT AND APPARATUS REQUESTED BY THE BUILDING REPRESENTATIVE, ARCHITECT OR AS NOTED TO BE RELOCATED ON THE DRAWINGS. REMOVED EQUIPMENT SHALL BE PROPERLY DISPOSED OF BY THIS CONTRACTOR.
- I. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK DURING OVERTIME HOURS AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.
- J. UNLESS OTHERWISE SPECIFICALLY NOTED OR SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.
- K. ALL MATERIAL AND EQUIPMENT SHALL BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- L. INSURANCE: PROVIDE IN ACCORDANCE WITH OWNER/BUILDING REQUIREMENTS AND SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.
- M. THE FINAL ACCEPTANCE SHALL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, TESTED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND HAS FURNISHED ALL THE REQUIRED CERTIFICATED OF INSPECTION AND APPROVAL.

2. GENERAL PROVISIONS FOR ELECTRICAL WORK:

A. DEFINITIONS:

- 1) "PROVIDE": TO FURNISH, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.
- 2) "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.
- 3) "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE, AND DELIVER COMPLETE WITH RELATED ACCESSORIES.
- 4) "WORK": LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.
- 5) "WIRING": RACEWAY, FITTINGS, WIRE, BOXES, AND RELATED ITEMS.
- 6) "CONCEALED": EMBEDDED IN MASONRY OR OTHER CONSTRUCTION, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS, IN TRENCHES, IN CRAWL SPACES, OR IN ENCLOSURES.
- 7) "EXPOSED": NOT INSTALLED UNDERGROUND OR "CONCEALED" AS DEFINED ABOVE.
- 8) "SIMILAR" OR "EQUAL": EQUAL IN MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT.

- B. TEMPORARY LIGHT AND POWER: PROVIDE TEMPORARY LIGHT AND POWER SYSTEMS AT EARLIEST POSSIBLE DATE WITHIN THE CONSTRUCTION AREAS FOR THE REQUIREMENTS OF ALL TRADES AS HEREIN DESCRIBED. EXTEND SYSTEMS TO NEW CONSTRUCTION AS SOON AS PHYSICALLY POSSIBLE. MAINTAIN SYSTEM DURING WORKING OWNER. PROVIDE ALL REQUIRED MAINTENANCE, INCLUDING LAMPS AND SOCKETS.

C. QUALITY ASSURANCE

- 1) QUALITY OF MATERIALS: ALL EQUIPMENT SHALL BE NEW SPECIFICATION GRADE, FREE FROM DEFECTS AND LISTED BY APPROVED TESTING AGENCY AND BEARING THEIR LABEL MATERIALS AND EQUIPMENT OF SIMILAR APPLICATION SHALL BE OF SAME MANUFACTURER, EXCEPT AS NOTED.
- 2) GUARANTEE: ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED AS DEFINED IN PARAGRAPH 2.C.
- 3) CURRENT CHARACTERISTICS:
 - a. SERVICE: 120/208 VOLT, 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDED NEUTRAL.
 - b. DISTRIBUTION: 120/208 VOLT, 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDED NEUTRAL.

4) HEIGHTS OF OUTLETS:

- a. FROM FINISHED FLOOR TO CENTERLINE OF OUTLETS FOR:
 - RECEPTACLES AND TELEPHONES: 1 FT-6 IN.
 - WALL SWITCHES: 4 FT-0 IN.
 - WALL FIXTURES: 7 FT-0 IN.
 - MOTOR CONTROLLERS: 5 FT-0 IN.
 - CLOCKS: 7 FT 6 IN

- b. EXCEPTIONS: AT JUNCTION OF DIFFERENT WALL FINISH MATERIALS, ON MOLDING OR BREAK IN WALL SURFACE, IN VIOLATION OF CODE, OR AS NOTED OR DIRECTED.

D. PRODUCT DELIVERY, STORAGE AND HANDLING

- 1) MOVING OF EQUIPMENT: WHERE NECESSARY, SHIP IN CARTED SECTIONS OF SIZE TO PERMIT PASSING THROUGH AVAILABLE SPACES.
- 2) ACCESSIBILITY: FOR OPERATION, MAINTENANCE AND REPAIR, MINOR DEVIATIONS SHALL BE PERMITTED, CHANGES OF MAGNITUDE OR INVOLVING EXTRA COST ARE NOT PERMISSIBLE WITHOUT REVIEW. GROUP CONCEALED ELECTRICAL EQUIPMENT REQUIRING ACCESS WITH EQUIPMENT FREELY ACCESSIBLE THROUGH ACCESS DOORS.

E. MATERIALS

- 1) NAMEPLATES: PROVIDE BLACK LAMICOID SHEET WITH 3/4 IN. WHITE LETTERING, FASTENED WITH EPOXY CEMENT FOR EACH DISCONNECT SWITCH, CIRCUIT BREAKER, PANEL, CABINET, TRANSFORMER, ENCLOSURE, MOTOR CONTROLLER AND THE LIKE. NAMEPLATES SHALL DESCRIBE THE NAME AND NUMBER OF EACH COMPONENT.
- 2) CABLE TAGS: TAG EACH CONDUCTOR PASSING THROUGH SPLICE OR PULLBOX WITH A WHITE LINEN TAG, INDICATING POINT OF ORIGIN AND TERMINATION OF THE CIRCUIT.
- 3) INSERTS AND SUPPORTS:
 - a. INSERTS: STEEL, SLOTTED TYPE, FACTORY PAINTED.
 - SINGLE ROD: SIMILAR TO GRINNELL FIG. 281.
 - MULTI-ROD: SIMILAR TO FEE AND MASON SERIES 9000 WITH END CAPS AND CLOSURE STRIPS.
 - CLIP FORM NAILS FLUSH WITH INSERTS.
 - MAXIMUM LOADING 75 PERCENT OF RATING.
 - b. SUPPORTS FROM BUILDING CONSTRUCTION: INSERTS, BEAM CLAMPS, STEEL FISHPLATES (IN CONCRETE FILL ONLY), CANTILEVER BRACKETS OR OTHER MEANS. SUBMIT FOR REVIEW.
 - c. GROUPED LINES AND SERVICES: TRAPEZE HANGERS OF BOLTED ANGLES OR CHANNELS.
 - d. WHERE BUILDING CONSTRUCTION IS INADEQUATE: PROVIDE ADDITIONAL FRAMING. SUBMIT FOR REVIEW.

- F. PAINT SHALL BE THE BEST GRADE FOR ITS PURPOSE. DELIVER IN ORIGINAL SEALED CONTAINERS AND APPLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. COLORS SHALL BE AS SELECTED BY ARCHITECT OR ENGINEER. UTILIZE GALVANIZED IRON PRIMER ON PANEL AND PULL BOXES, AFTER FABRICATION, UTILIZE HOT DIPPED GALVANIZED OR DIPPED IN ZINC BASED PRIMER FOR: OUTLET BOXES, JUNCTION BOXES, CONDUIT HANGERS, RODS, INSERTS AND SUPPORTS. ZINC BASED PRIMER WITH FINISH TO MATCH SURROUNDINGS SHALL BE USED FOR MARRED SURFACES OF STEEL EQUIPMENT AND RACEWAYS; A FIELD-APPLIED ZINC BASED PRIME COAT SHALL BE UTILIZED FOR STEEL OR IRONWORK.

- G. BRUSH AND CLEAN WORK PRIOR TO CONCEALING, PAINTING AND ACCEPTANCE. PAINTED EXPOSED WORK SOILED OR DAMAGED; CLEAN AND REPAIR TO MATCH ADJOINING WORK BEFORE FINAL ACCEPTANCE. REMOVE DEBRIS FROM INSIDE AND OUTSIDE OF MATERIAL AND EQUIPMENT.

- H. FINAL LOCATIONS AND MOUNTING ORIENTATIONS OF ALL SWITCHES, RECEPTACLES AND LIGHT FIXTURES SHALL BE VERIFIED WITH ARCHITECT.

- I. ALL ACCESS DOOR LOCATIONS SHALL BE REVIEWED BY ARCHITECT PRIOR TO INSTALLATION.

3. SCOPE OF WORK:

- A. SCOPE OF WORK SHALL CONSIST OF PROVIDING LABOR, MATERIALS, EQUIPMENT, SERVICES AND FEES NECESSARY FOR COMPLETE AND SAFE INSTALLATION IN CONFORMING WITH NATIONAL AND LOCAL CODES AND AUTHORITIES HAVING JURISDICTION, AS INDICATED ON DRAWINGS AND HEREIN SPECIFIED.
- B. ALL DRAWINGS, PLANS, DETAILS, SPECIFICATIONS AND SPECIFICATION ADDENDA ARE MADE PART OF THIS CONTRACT AND SHALL APPLY TO ALL WORK UNDER THE CONTRACT UNLESS OTHERWISE AMENDED, MODIFIED, SUPPLIED OR SPECIFIED HEREIN.
- C. THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OR ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES BY OWNER INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDED THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.
- D. THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH ALL DEPARTMENTS HAVING JURISDICTION, WORK AND PAY ALL FEES THEREFORE. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION AND TESTS OF ANY OR ALL PARTS OF THE WORK IF SO REQUIRED BY AUTHORITIES AND PAY ALL CHARGES FOR SAME. THE CONTRACTOR SHALL PAY ALL COSTS FOR, AND FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH ALL REGULATIONS WHERE THEY APPLY TO THIS WORK.
- E. CONTRACTOR SHALL PERFORM ALL CONTROLLED INSPECTIONS IN ACCORDANCE WITH THE FLORIDA BUILDING CODE. SECURE ALL REQUIRED PERMITS AND APPROVALS AND TRANSMIT SAME TO OWNER. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FEES.
- F. AREAS WITH NO ELECTRICAL WORK SHALL REMAIN AS IS. CONTRACTOR SHALL MAINTAIN CONTINUITY OF ALL ELECTRICAL SYSTEMS TO ALL AREAS NOT COVERED BY THIS RENOVATION AND SHALL PROVIDE 48 HOUR NOTICE TO LANDLORD OF ANY PLANNED POWER INTERRUPTIONS OR SIGNAL SYSTEM OUTAGES.

4. SHOP DRAWINGS

- A. PRIOR TO THE INSTALLATION OF ANY WORK AND PROCUREMENT OF EQUIPMENT, CONTRACTOR SHALL FORWARD COMPLETE SETS OF COORDINATED SHOP DRAWINGS OF ALL NEW AND EXISTING EQUIPMENT, INDICATING CAPACITY, DIMENSIONS AND SEQUENCE OF OPERATION FOR WRITTEN APPROVAL BY THE ARCHITECT AND ENGINEER.

B. INDICATE ON EACH SHOP DRAWINGS SUBMITTED:

- 1) PROJECT NAME AND LOCATION
- 2) NAME OF ARCHITECT AND ENGINEER
- 3) ITEM IDENTIFICATION
- 4) APPROVAL STAMP OF PRIME CONTRACTOR

C. SUBMISSIONS:

- 1) SUBMISSIONS 11 IN. X 17 IN. OR SMALLER: IF THE SUBMISSION IS A CATALOG CUT, THEN THE CONTRACTOR SHALL SUBMIT ONE ORIGINAL AND TWO COPIES. OTHERWISE, HE SHALL SUBMIT THREE COPIES. THE ARCHITECT WILL FORWARD THE ORIGINAL AND ONE COPY (TWO COPIES WHEN NO ORIGINAL IS RECEIVED) TO THE ENGINEER. ALL CATALOG CUTS SHALL BE COMPLETE.
- 2) SUBMISSIONS LARGER THAN 11 IN. X 17 IN.: SUBMIT TWO PRINTS AND ONE PAPER SEPIA TO THE ARCHITECT. THE ARCHITECT WILL FORWARD ONE PRINT AND THE PAPER SEPIA TO THE ENGINEER.

D. SUBMIT SHOP DRAWINGS FOR THE FOLLOWING:

- 1) SAFETY/DISCONNECT SWITCHES
- 2) FUSES
- 3) CIRCUIT BREAKERS
- 4) PANELBOARDS/LOADCENTER (INCLUDING DIMENSIONS, SCHEDULES, AND CATALOG CUTS).
- 5) RACEWAYS
- 6) WIRE AND CABLE
- 7) WALL SWITCHES
- 8) INSERTION RECEPTACLES
- 9) MOMENTARY CONTACT SWITCHES
- 10) TIME SWITCHES
- 11) LIGHTING FIXTURES.

- E. ASSIST AND PROVIDE ALL NECESSARY INFORMATION, DIAGRAMS, SKETCHES, ETC. TO THE HVAC CONTRACTOR, FOR THE PREPARATION OF COORDINATED SHOP DRAWINGS INDICATING ROUTING OF FEEDERS, CONTROL CONDUITS, RECESSED FIXTURES AND ADJACENT NEARBY PIPING AND DUCTWORK WHERE APPLICABLE, CERTIFIED BY ALL TRADES THAT COORDINATION HAS BEEN ESTABLISHED. SUBMIT FOUR(4) BOOKBOUND OPERATING AND SERVICE MANUALS WHICH SHALL INCLUDE COPIES OF ALL SHOP DRAWING. PROVIDE SHOP DRAWINGS FOR PANELS, FIXTURES, WIRING DEVICES, CONDUIT, CABLE, DISCONNECT SWITCHES, RELAYS, CONTRACTORS, AND OTHER SYSTEMS AS DIRECTED BY THE ENGINEER.

5. AS-BUILT DRAWINGS AND EQUIPMENT OPERATIONAL INSTRUCTIONS

- A. UPON COMPLETION AND ACCEPTANCE OF WORK, CONTRACTOR SHALL FURNISH WRITTEN INSTRUCTIONS AND EQUIPMENT MANUALS AND DEMONSTRATE TO THE OWNER THE PROPER OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND APPARATUS FURNISHED UNDER THIS CONTRACT.

- B. THESE INSTRUCTIONS SHALL BE TYPED ON 8-1/2 IN. X 11 IN. PAPER AND BOUND IN THREE RING BINDERS WITH CLEAR ACETATE COVERS. CONTRACTOR SHALL GIVE THREE COPIES OF THE INSTRUCTIONS TO THE OWNER AND ONE COPY TO THE ENGINEER.

- C. THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE PROJECT, ARCHITECT AND ENGINEER.

- D. REPRODUCIBLE "AS-BUILT" DRAWINGS SHALL BE PROVIDED INDICATING THE AS INSTALLED CONDITIONS OF THE WORK. "AS-BUILT" DRAWINGS SHALL BE PROVIDED TO THE ARCHITECT AFTER COMPLETION OF THE INSTALLATION.

6. LOW-VOLTAGE DISTRIBUTION EQUIPMENT:

- A. PROVIDE COMPLETE EQUIPMENT INCLUDING: SWITCHES, FUSES, CIRCUIT BREAKERS, PANELS AND TRANSFORMERS.
- B. ALL EQUIPMENT SHALL CONFORM TO NEMA, ANSI AND IEEE STANDARDS.
- C. DISCONNECT SWITCHES SHALL BE FUSED OR NONFUSED AS NOTED. VOLTAGE SHALL BE AS REQUIRED. SWITCHES SHALL BE HEAVY DUTY, EXCEPT AS NOTED, AND HORSEPOWER RATED FOR MOTOR LOADS. TOGGLE TYPE SWITCHES SHALL BE NONFUSED, LOAD BREAK, HAVING MAXIMUM RATINGS OF 20 AMP AT 600 VOLTS AND 30 AMP AT 240 VOLTS. TWO-POLE SWITCHES SHALL BE SIMILAR TO HART AND HEGEMAN NO. 6808F. THREE-POLE SWITCHES SHALL BE SIMILAR TO HART AND HEGEMAN NO. 7810F. KNIFE-BLADE TYPE SWITCHES SHALL BE LOAD BREAK, QUICK-MAKE- QUICK-BREAK, UL CLASS R UP TO 600 AMP. MAXIMUM RATING EXCEPT AS NOTED SHALL BE 800 AMP. ARC QUENCHERS SHALL BE PROVIDED. SWITCHES SHALL BE SIMILAR TO GENERAL ELECTRIC QMR. ALL SWITCH ENCLOSURES SHALL BE DEAD FRONT, NEMA TYPE 1, EXCEPT AS NOTED.

7. FUSES:

- A. CIRCUITS 0 TO 600 AMPERES SHALL BE PROTECTED BY FUSES SIMILAR TO CURRENT LIMITING BUSSMAN LOW-PEAK DUAL-ELEMENT TIME-DELAY LPN-RK (AMP)SP (250V) /LPS-RK (AMP)SP (600V) OR LPJ (AMP)SP (600V) (UL CLASS RK1 OR CLASS J), AND BE LISTED BY UL WITH AN INTERRUPTING RATING OF 300,000 AMPERES RMS SYMMETRICAL.
- B. MOTOR CIRCUITS - ALL INDIVIDUAL MOTOR CIRCUITS WITH FULL LOAD AMPERE RATINGS (FLA) OF 480 AMPERES OR LESS SHALL BE PROTECTED BY FUSES SIMILAR TO CURRENT LIMITING BUSSMAN LOW-PEAK DUAL-ELEMENT TIME-DELAY LPN-RK (AMP)SP (250V) /LPS-RK (AMP)SP (600V) OR LPJ (AMP)SP (600V) (UL CLASS RK1 OR CLASS J), AND BE LISTED BY UL WITH AN INTERRUPTING RATING OF 300,000 AMPERES RMS SYMMETRICAL.
- C. ALL FUSES SHALL BE PROVIDED BY SAME MANUFACTURER.
- D. PROVIDE 1 SPACE MATCHING FUSE FOR EACH SET OF 3.

- E. CIRCUIT BREAKERS: MOLDED CASE BREAKERS SHALL BE THERMAL-MAGNETIC, QUICK-MAKE-QUICK-BREAK, BOLT-ON TYPE, MANUALLY OPERATED WITH INSULATED TRIP-FREE HANDLE. MULTI-POLE TYPE BREAKERS SHALL CONTAIN INTERNAL TRIP BAR. TERMINALS SHALL BE SUITABLE FOR COPPER OR ALUMINUM CABLE. FURNISH AUXILIARY DEVICES WHERE REQUIRED FOR SHUNT-TRIPPING, OPEN A NO CLOSE MOTOR OPERATOR AND ALARM INDICATION. ENCLOSURES SHALL BE DEAD FRONT, NEMA TYPE 1, EXCEPT AS NOTED. FRAMES, IC AND INTERCHANGEABLE TRIPS SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED:
 - 1) 120 VOLTS, 100-AMP FRAME: 10,000 AMPS, 1 POLE.
 - 2) 120/240 VOLTS, 225-AMP FRAME: 22,000 AMPS MINIMUM

8. DISTRIBUTION PANEL BOARDS, CIRCUIT BREAKER TYPE:

- A. DISTRIBUTION PANEL BOARDS SHALL BE FULLY RATED WITH COPPER PHASE, NEUTRAL, AND GROUND BUS, BRACED AT 65000 AIC FOR 480/277 VOLT SYSTEM AND 42000 AIC FOR 208Y/120 VOLT SYSTEM, OR MORE TO BE GREATER THAN THE AVAILABLE SHORT CIRCUIT CURRENT. ISOLATED GROUND BUS SHALL BE AS REQUIRED. MANUFACTURERS SHALL BE EATON, SIEMENS OR SQUARE D.
- B. BRANCH PANEL BOARDS SHALL BE FULLY RATED WITH COPPER PHASE, NEUTRAL AND GROUND BUS, BRACED AT 14000 AIC FOR 480/277 VOLT SYSTEM AND 10000 AIC FOR 208Y/120 VOLT SYSTEM, OR MORE TO BE GREATER THAN THE AVAILABLE SHORT CIRCUIT CURRENT. NEUTRAL BUS SHALL BE RATED AT 200 PERCENT WITHIN PANELS SERVING NON-LINEAR LOADS. ISOLATED GROUND BUS SHALL BE AS REQUIRED. MANUFACTURER SHALL BE EATON, SIEMENS, OR SQUARE D.

9. DISTRIBUTION PANEL BOARDS, WITCH AND FUSE:

- A. THREE PHASE, 3 OR 4 WIRE WITH COPPER BUS BARS. ALL THROUGH BUS SHALL BE INSULATED.
- B. NEMA CLASS 1 CONSTRUCTION TO ACCOMMODATE FUSIBLE, INDIVIDUALLY ENCLOSED SWITCHES, FRONT REMOVABLE, SWITCH AND DOOR INTERLOCKS. COVERS TO BE PAD-LOCKABLE.
- C. PANEL BOARD SHALL BE CONSTRUCTED OF CODE-GAUGE STEEL, GRAY FINISH OVER RUST INHIBITOR, FOR SURFACE MOUNTING. BOX AND PANEL FRAME SHALL BE FLANGED AND REINFORCED FOR RIGID SUPPORT OF INTERIOR AND ACCURATE ALIGNMENT OF INTERIOR WITH FRONT. TRIMS TO BE FASTENED TO BACK BOX WITH SCREWS.
- D. ALL BRANCH SWITCHES SHALL HAVE INDIVIDUAL ENGRAVED LAMICOID NAMEPLATES (BLACK WITH WHITE CORE).
- E. DISTRIBUTION PANEL BOARD CONSTRUCTION MINIMUM SHORT CIRCUIT RATING 25,000 AMPERES, REMS SYMMETRICAL FOR ALL 120/208V APPLICATIONS. APPLICATIONS.
- F. DISCONNECTS
 - 1) DISCONNECT SWITCHES SHALL CONFORM TO NEMA AND UL STANDARDS, AND SHALL BE HORSEPOWER RATED.
 - 2) SWITCHING MECHANISM SHALL BE QUICK-MAKE, QUICK-BREAK, SINGLE THROW WITH EXTERNAL OPERATING HANDLE MECHANICALLY INTERLOCKED WITH ENCLOSURE COVER TO PROVIDE ACCESS TO INTERIOR WHEN DISCONNECT IS IN OFF POSITION ONLY. PROVIDE MEANS TO LOCK OPERATING HANDLE IN THE OPEN AND CLOSED POSITION. DESIGNATE ON THE ENCLOSURE THE OPEN AND CLOSED POSITION OF THE OPERATING HANDLE.
 - 3) SWITCHES SHALL BE OF THE DOUBLE STATIONARY CONTACT TYPE.
 - 4) SWITCHES SHALL BE EQUIPPED WITH REJECTION TYPE FUSE HOLDERS AS SHOWN ON THE DRAWINGS; PROVIDE COMPLETE WITH FUSES AS SCHEDULED.

G. INSTALLATION

- 1) DISTRIBUTION PANELBOARD SHALL BE MOUNTED TO STRUCTURAL STEEL CHANNEL (KINDORF) WHICH SHALL BE BOLTED TO THE WALL USING EXPANSION ANCHORS FOR LARGE PANELS.

H. IDENTIFICATION

- 1) PROVIDE NAMEPLATE AT EACH SWITCH IDENTIFYING THE LOAD SERVED.
- 2) NAMEPLATES SHALL BE MOUNTED ON THE FRONT COVER SECURED WITH SELF-TAPPING SCREWS OR NUTS AND BOLTS. NAMEPLATES SHALL BE LAMINATED PHENOLIC, BLACK WITH A MINIMUM OF 1/4" HIGH WHITE LETTERING.

- I. DISTRIBUTION AND SUB-DISTRIBUTION PANELBOARDS SHALL BE A MINIMUM OF 30" WIDE AND 10" DEEP.

- J. POWER PANELBOARDS SHALL BE SIMILAR TO GENERAL ELECTRIC TYPE "OMR", AS MANUFACTURED BY ATLAS SWITCH COMPANY, ELECTRIC SWITCHBOARD COMPANY OR APPROVED EQUAL.

- K. PANELBOARD SHALL HAVE MAIN CIRCUIT BREAKER OR MAIN LUGS AS INDICATED ON THE DRAWINGS. QUANTITY, POLS AND TRIP RATINGS OF BRANCH CIRCUIT BREAKERS TO BE AS INDICATED ON DRAWINGS.

- L. PANELBOARD SHALL HAVE ENGRAVED WHITE CORE, BLACK LAMACOID NAMEPLATE SCREWED ONTO PANE TRIM WITH DESIGNATION LISTED (PANELBOARD NAME, VOLTAGE, RATING OR MAINS IN AMPS).

M. MATERIALS

- 1) RACEWAYS:
 - a. RIGID STEEL CONDUIT: FULL-WEIGHT PIPE, GALVANIZED, THREADED.
 - b. ELECTROMETALLIC TUBING (EMT): THIN WALL PIPE, GALVANIZED, THREADLESS.
 - c. FLEXIBLE STEEL CONDUIT: CONTINUOUS SINGLE STRIP, GALVANIZED.
 - d. WIREWAYS: WIRE SHALL BE AS NOTED, MINIMUM NO. 16 GAUGE. STEEL WITH GROUND CONTINUITY. FINISH SHALL BE BAKED ENAMEL. COVERS SHALL BE SCREW-ON.
 - e. SURFACE METAL RACEWAY: SIZE AS NOTED. BASE 0.04 IN., COVER 0.25 IN. MATERIAL SHALL BE STEEL. FINISH SHALL BE BAKED ENAMEL. COVERS SHALL BE SCREW-ON.
- 2) FITTINGS AND ACCESSORIES:
 - a. RIGID STEEL: NONSPILT, THREADED, STEEL OR MALLEABLE IRON. ZINC DIE CAST NOT PERMITTED.
 - b. ELECTROMETALLIC TUBING: COMPRESSION TYPE. GALVANIZED RIGID STEEL ELBOWS, 2 IN. OR LARGER.
 - c. FLEXIBLE METALLIC CONDUIT: ANGLE WEDGE TYPE WITH INSULATED THROAT.

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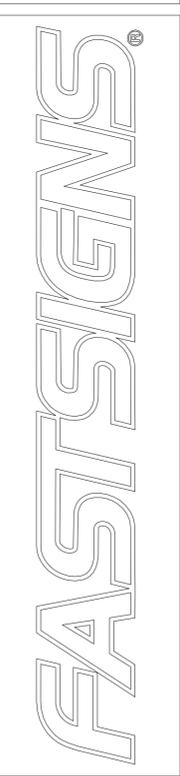
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SHEET NO. ELECTRICAL SPECIFICATIONS SHEET 1 OF 2

E-0.2

ELECTRICAL SPECIFICATIONS (CONT.)

- 3) BOXES:
- a. OUTLET BOXES: EXCEPT AS OTHERWISE REQUIRED BY CONSTRUCTION, DEVICES OR WIRING, BOXES SHALL BE STAMPED STEEL, 4 IN. SQUARE OR OCTAGON FOR FIXTURES. BOXES ABOVE CEILING SHALL BE 1-1/2 IN. DEEP. BOXES IN CEILING OR SLAB SHALL BE 3 IN. DEEP. BOXES IN WALL FOR FIXTURES SHALL BE 2-3/4 IN. DEEP. BOXES IN WALL FOR RECEPTACLES AND SWITCHES SHALL BE 1-1/2 IN. DEEP. FURNISH WITH RAISED COVERS AND FIXTURE STUDS WHERE REQUIRED. WITHOUT FIXTURE OR DEVICE: FURNISH BLANK COVER, OFFSET BACK-TO-BACK OUTLETS WITH MINIMUM 6 IN. SEPARATION.
 - b. JUNCTION AND PULL BOXES: GALVANIZED SHEET STEEL WITH SCREW-ON COVERS, EXCEPT AS NOTED. FURNISH WITH INSULATED SUPPORTS FOR CABLES. LOCATIONS SHALL BE AS NOTED OR REQUIRED AND ACCESSIBLE. PROVIDE BARRIERS IN NEW AND RENOVATED BOXES BETWEEN 120/208 VOLT AND 265/460 VOLT WIRING AND BETWEEN EMERGENCY AND NORMAL WIRING. FLOOR BOXES SHALL BE SUITABLE FOR CONDUIT AND DEVICES NOTED. RAISED OUTLETS SHALL BE HUBBELL #B2414 SERIES WITH ABOVE FLOOR FITTING. TELEPHONE: BUSHED HOLE. POWER: DUPLEX RECEPTACLE OR OTHER AS NOTED. INCREASE SIZE TO SUIT AS NECESSARY. FLUSH OUTLETS SHALL BE HUBBELL #B2414 SERIES WITH FLUSH FLOOR FITTING FOR TELEPHONE AND FLUSH DUAL FLAP COVER WITH DUPLEX RECEPTACLE FOR POWER AS NOTED. INCREASE SIZE TO SUIT AS NECESSARY.
- N. PROVIDE RACEWAYS ONLY AS HEREIN SPECIFIED, EXCEPT AS NOTED. RACEWAYS SHALL BE RUN CONCEALED, EXCEPT AS NOTED.
- PROVIDE RACEWAY SUPPORT UTILIZING CEILING TRAPEZE, STRAP HANGERS, OR WALL BRACKETS. PROVIDE U-BOLTS AT EACH FLOOR LEVEL OF RISER RACEWAYS AND CONNECTED TO ACCEPTABLE SUPPORTS. PROVIDE RISER CLAMPS AT EACH FLOOR LEVEL OF RISER RACEWAYS AND RESTING ON SLAB. FOR THROUGH-THE-FLOOR SYSTEMS, UTILIZE AN ASSEMBLY SIMILAR TO HUBBELL FIRE RATED POKE-THROUGH-FLOOR BOX SYSTEM. FOR ABOVE FLOOR FITTINGS, HUNG CEILING SHALL BE BUSHED HOLE AND POWER SHALL BE DUPLEX RECEPTACLE OR OTHER AS NOTED. PROVIDE SEPARATION BARRIER BETWEEN POWER AND TELEPHONE COMPARTMENTS. PROVIDE JUNCTION BOX ON UNDERSIDE OF FLOOR. PACK FITTING TO RESTORE FIRE RATING OF FLOOR.
- SECURE ALL RACEWAYS TO SUPPORTS WITH PIPE STRAPS OR U-BOLTS. SPACING OF SUPPORTS SHALL BE A MINIMUM OF 10 FT ON CENTER FOR METALLIC RACEWAY AND AS REQUIRED FOR NONMETALLIC RACEWAY. SPACING SHALL BE 5 FT ON CENTER FOR WIREWAYS AND PER CODE AND AS NOTED FOR OTHERS. MOUNT SUPPORTS TO STRUCTURE MASONRY WITH TOGGLE BOLTS ON HOLLOW MASONRY, EXPANSION SHIELDS OR INSERTS IN CONCRETE AND BRICK, MACHINE SCREWS ON METAL, BEAM CLAMPS ON FRAMEWORK, WOOD SCREWS ON WOOD, AND PAN THROUGH STRAPS IN METAL DECK, NAILS, RAWL PLUGS OR WOOD PLUGS SHALL NOT BE PERMITTED. WHERE REQUIRED BY STRUCTURE, FURNISH THROUGH BOLTS AND FISHPLATES.
- EXPPOSED RACEWAYS SHALL BE RUN PARALLEL WITH OR AT RIGHT ANGLES TO WALLS. PROVIDE CLEARANCE WITH WATER, STEAM OR OTHER PIPING (MINIMUM 3 IN. SEPARATION FROM STEAM AND HOT WATER PIPES, EXCEPT 1 IN. FROM PIPE COVER AT CROSSINGS AND 18 IN. FOR PARALLEL RUNS). FOR HUNG CEILING OUTLETS, RUN IN HUNG CEILING AND CONNECT TO CEILING SUPPORT CHANNELS. IN MASONRY AND POURED CONCRETE, RUN VERTICALLY ONLY.
- MAINTAIN GROUNDING CONTINUITY OF INTERRUPTED METALLIC RACEWAYS WITH GROUND CONDUCTOR AND IN FLEXIBLE CONDUIT FOR FEEDERS AND MOTOR TERMINAL CONNECTIONS.
- EMPTY RACEWAYS OVER 10 FT LONG: PROVIDE FISH OR PULL WIRE, GALVANIZED OR NYLON ROPE.
- RIGID STEEL CONDUIT SHALL BE PERMITTED FOR FEEDERS AND BRANCH CIRCUITS. PAINT MALE THREADS OF FIELD-THREADED CONDUIT WITH GRAPHITE-BASE PASTE COMPOUND AND BUTT CONDUIT ENDS. TOUCH UP MARRED SURFACES AND FIELD-CUT THREADS, CRC-COLD GALVANIZED. EMT SHALL BE PERMITTED FOR BRANCH CIRCUITS ONLY, IN DRY LOCATIONS, DRY WALLS, HUNG CEILINGS, HOLLOW BLOCK WALLS AND FURRED SPACES. EMT SHALL NOT BE PERMITTED IN RAISED FLOORS. FLEXIBLE STEEL CONDUIT SHALL BE UTILIZED FOR SHORT CONNECTIONS WHERE RIGID CONDUIT IS IMPRACTICAL. FROM OUTLET BOX TO RECESSED LIGHTING FIXTURE: PROVIDE MINIMUM 4 FT AND MAXIMUM 6 FT LENGTHS. FOR FINAL CONNECTION TO MOTOR TERMINAL BOX, TRANSFORMER AND OTHER VIBRATING EQUIPMENT, PROVIDE WITH POLYVINYL SHEATHING AND GROUND CONDUCTOR. MINIMUM LENGTH: 18 IN. WITH SLACK. CONNECT GROUND CONDUCTOR TO ENCLOSURE OR RACEWAY AT EACH END. FOR EXPANSION JOINT CROSSINGS, CROSS AT RIGHT ANGLES AND ANCHOR ENDS.
- CUT CONDUIT ENDS SQUARE. REAM SMOOTH. PAINT MALE THREADS OF FIELD THREADED RACEWAYS WITH GRAPHITE BASE PASTE COMPOUND. DRAW UP TIGHT WITH RACEWAY COUPLING.
- ALL COUPLINGS SHALL BE COMPRESSION TYPE. NO SET SCREW FITTINGS.
- EXPANSION FITTINGS SHALL BE INSTALLED AT RIGHT ANGLES WITH CLIP JOINT CENTERED IN EXPANSION JOINT. PROVIDE A LENGTH OF RUN IN ACCORDANCE MANUFACTURER'S RECOMMENDATIONS. PRESET FITTINGS SHALL ALLOW FOR TEMPERATURE VARIATION.
- RACEWAYS PASSING THROUGH FIRE-RATED CONSTRUCTION: SEAL OPENING WITH FIRE SEALANT.
- O. PROVIDE CABLE SUPPORTS IN ACCORDANCE WITH NATIONAL ELECTRIC CODE ARTICLE 300.19. CABLE SUPPORTS SHALL UTILIZE A ONE-PIECE PLUG WITH POZI-GRIP WEDGING PLUG AS MANUFACTURED BY OZ-GEDNEY. TYPE SF SHALL BE USED FOR ARMORED CABLE.
- INSTALL CABLE SUPPORTS AT THE TOP OF A VERTICAL RISE AND PROVIDE INTERMEDIATE ADDITIONAL SUPPORTS AS REQUIRED TO LIMIT SUPPORTED CONDUCTOR LENGTHS TO NOT GREATER THAN THOSE SPECIFIED IN TABLE 300.19(A).

- P. ERECT WALL AND SWITCH OUTLETS IN ADVANCE OF FURRING AND FIREPROOFING. OUTLET BOXES SHALL BE SET SQUARE AND TRIVE WITH BUILDING FINISH. SECURE TO BUILDING STRUCTURE BY ADJUSTABLE STRAP IRON OR GROUT IN WITH MASONRY. VERIFY OUTLET LOCATIONS IN FINISHED SPACES WITH ARCHITECTURAL DRAWINGS OF INTERIOR DETAILS AND FINISHES. PROVIDE BARRIERS BETWEEN SWITCHES CONNECTED TO DIFFERENT PHASES FOR VOLTAGES EXCEEDING 150 VOLTS TO GROUND.
 - Q. PANEL, JUNCTION AND PULL BOXES SHALL BE LOCATED CLEAR OF OTHER TRADES. CONCEAL JUNCTION AND PULL BOXES IN FINISHED SPACES. WHERE NECESSARY, REROUTE RACEWAYS OR MAKE OTHER ARRANGEMENTS FOR CONCEALMENT. BOXES SHALL BE ACCESSIBLE. SUPPORT BOXES FROM BUILDING STRUCTURE, INDEPENDENT OF CONDUIT. PROVIDE FLOOR-TO-CEILING CHANNELS FOR MOUNTING ON DRYWALL AND LIGHTWEIGHT CONSTRUCTION. OUTLET BOXES FOR FIXTURES RECESSED IN HUNG CEILINGS SHALL BE ACCESSIBLE THROUGH OPENING CREATED BY REMOVAL OF FIXTURE. SECURE TO BLACK IRON SUPPORT. MOTOR TERMINAL BOXES: COORDINATE WITH MOTOR BRANCH CIRCUIT CONDUIT AND WIRING; ADD BOX VOLUME WHERE REQUIRED.
 - R. FIRE SEALANTS: PROVIDE FOR RACEWAYS AND WIRE PASSING THROUGH FLOOR SLOTS, SLEEVES OR OPENINGS IN FIRE-PARTITIONS ROOMS.
 - S. PERFORM CONTINUITY TESTS OF RESISTANCE OF FEEDER CONDUITS FROM SERVICE TO POINT OF FINAL DISTRIBUTION USING 1 CONDUCTOR RETURN. MAXIMUM RESISTANCE SHALL BE 25 OHMS.
10. WIRE AND CABLE:
- A. PROVIDE WIRE AND CABLE COMPLETE WITH ACCESSORIES. SIZE REFERENCE SHALL BE AWG EXCEPT AS NOTED.
 - B. CONDUCTORS SHALL BE COPPER, ASTM STANDARD SOLID (NO. 10 AND SMALLER) OR STRANDED (NO. 8 AND LARGER). GENERAL USE CABLING SHALL BE NO. 12 MINIMUM. AT 120 VOLTS AND OVER 100 FT CIRCUIT LENGTH PROVIDE NO. 10 MINIMUM. AT 265 VOLTS AND OVER 200 FT CIRCUIT LENGTH PROVIDE NO. 10 MINIMUM.
 - C. CONTROL AND ALARM CABLING, EXCEPT AS NOTED, SHALL BE NO. 14 MINIMUM. AT 120 VOLTS AND OVER 200 FT CIRCUIT LENGTH PROVIDE NO. 12 MINIMUM. OTHER VOLTAGES AND PHASES: ADJUST CABLE SIZING AS REQUIRED TO MAINTAIN VOLTAGE DROP. INCREASE RACEWAY SIZES FOR LARGER WIRE AS REQUIRED.
 - D. INSULATION SHALL BE RUBBER AND THERMOPLASTIC MEETING ASTM AND INDICATED. TYPE THW OR THHN SHALL BE UTILIZED FOR FEEDERS AND BRANCH CIRCUITS EXCEPT AS NOTED. TYPE SFF-2 SHALL BE UTILIZED FOR BRANCH CIRCUITS LOCATED IN WIRING CHANNELS OF CONTINUOUS FLUORESCENT FIXTURES AND IN AMBIENT TEMPERATURES OVER 90 DEG C. FOR UNGROUNDED ISOLATED BRANCH CIRCUITS PROVIDE CROSS-LINKED POLYETHYLENE INSULATION (TYPE XHHW).
 - E. ARMORED CABLE (BX) SHALL BE UTILIZED FOR BRANCH CIRCUITS IN DRY HOLLOW LOCATIONS, HUNG CEILINGS, AND BLOCK WALLS. WHEN USED IN LIEU OF WIRING IN CONDUIT, STATE IN PROPOSAL THAT PRICE IS BASED UPON THE USE OF HOSPITAL GRADE "BX".
 - F. METAL-CLAD CABLE, NFPA 70 ARTICLE 330 TYPE MC:
 - 1) INTERLOCKED FLEXIBLE GALVANIZED STEEL ARMOR SHEATH, CONFORMING TO UL REQUIREMENTS FOR TYPE MC METAL CLAD CABLE.
 - 2) INSULATED COPPER CONDUCTORS, SUITABLE FOR 600 VOLTS, RATED 90°C, ONE OF THE TYPES LISTED IN NFPA 70 TABLE 310.13(A) OR OF A TYPE IDENTIFIED FOR USE IN TYPE MC CABLE.
 - 3) INTERNAL FULL SIZE COPPER GROUND CONDUCTOR WITH GREEN INSULATION.
 - 4) ACCEPTABLE COMPANIES: AFC CABLE SYSTEMS INC., SOUTHWIRE, GENERAL CABLE.
 - 5) CONNECTORS FOR MC CABLE: AFC FITTING INC.'S AFC SERIES, ARLINGTON INDUSTRIES INC.'S SADDLE GRIP, OR THOMAS & BETTS CO.'S TIE-BITE WITH ANTI-SHORT BUSHINGS.
 - G. COLOR CODING SHALL BE AS FOLLOWS:
 - 120/208 VOLT SYSTEM:
 - BLACK FOR A PHASE
 - RED FOR B PHASE
 - BLUE FOR C PHASE
 - 1) NEUTRAL WIRE SHALL UTILIZE WHITE OUTER COVERING THROUGHOUT. EQUIPMENT GROUND WIRE SHALL UTILIZE GREEN OUTER COVERING THROUGHOUT.
 - WHERE COLOR-CODED CABLE IS NOT AVAILABLE, CERTIFY IN WRITING AND REQUEST PERMISSION TO OVERLAP CONDUCTORS WITH 6 IN. OF COLOR TAPING IN ACCESSIBLE LOCATIONS.
 - H. PROVIDE FLAMEPROOF LINEN OR FIBER TAGS IN ACCESSIBLE LOCATIONS. FOR FEEDERS INDICATE FEEDER NUMBER, SIZE, PHASE AND POINTS OF ORIGIN AND TERMINATIONS. FOR CONTROL AND ALARM WIRING INDICATE TYPE (CONTROL OR ALARM), SIZE OF WIRE, AND POINTS OF ORIGIN AND TERMINATIONS.
 - I. TERMINATIONS, SPLICES AND TAPS UNDER 600 VOLTS: COPPER CONDUCTORS NO. 10 AND SMALLER SHALL UTILIZE COMPRESSION-TYPE OF TWIST-ON SPRING-LOADED CONNECTORS AND CLEAR NYLON-INSULATED COVERING. COPPER CONDUCTORS NO. 8 AND LARGER SHALL UTILIZE MECHANICAL BOLTED PRESSURE OR HYDRAULIC COMPRESSION TYPE USING MANUFACTURER'S RECOMMENDED TOOLING. CABLE LUGS AND CONNECTORS SHALL UTILIZE COMPRESSION TYPE OF SAME METAL AS CONDUCTOR. PROVIDE TO MATCH CABLE, WITH MARKING INDICATING SIZE AND TYPE. COPPER LUG CONNECTIONS TO BUS BARS: USE ANTISEIZE COMPOUND ON TANG.
 - J. NOT MORE THAN 3 LIGHTING OR CONVENIENCE OUTLET CIRCUITS SHALL BE INSTALLED IN ONE CONDUIT UNLESS OTHERWISE INDICATED. PULL NO THERMOPLASTIC WIRES AT TEMPERATURES LOWER THAN 32 DEG F. PROVIDE SEPARATE RACEWAYS FOR CONDUCTORS OF 120/208 AND 265/460 VOLT

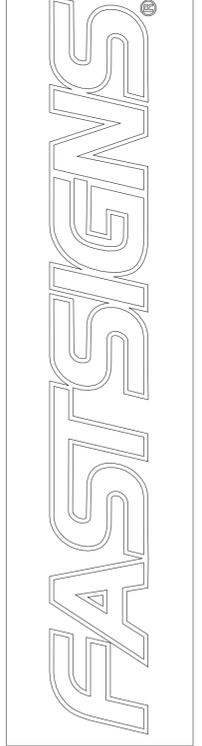
- K. LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS.
 - L. PERFORM CONTINUITY AND INSULATION TESTS. MEGGER TEST 100 PERCENT OF FEEDERS, 10 PERCENT OF BRANCH CIRCUITS AND ALL MOTOR BRANCH CIRCUITS OVER 25 HP.
- PERFORM TESTS PRIOR TO CONNECTING EQUIPMENT AND IN PRESENCE OF AUTHORIZED REPRESENTATIVES. SUBMIT WRITTEN REPORT OF RESULTS. CORRECT OR REPLACE CABLE TESTING BELOW MANUFACTURER'S STANDARDS.
11. WIRING DEVICES:
- A. WIRING DEVICES SHALL BE SPECIFICATION GRADE UNLESS OTHERWISE SPECIFIED. ALL DEVICES SHALL BE FLUSH MOUNTED, UNLESS OTHERWISE NOTED. PROVIDE COMPLETE MATERIAL AND ACCESSORIES AS NOTED.
 - B. LOCAL WALL SWITCHES SHALL BE ROCKER TYPE, QUIET OPERATING, RATED 20 AMP, 120/208 VOLT, AC. SIMILAR TO LEVITON DECORA SERIES A5621 (SINGLE POLE), A5623 (3-WAY) AND A5624 (4-WAY).
 - C. STRAIGHT BLADE RECEPTACLES SHALL BE COMMERCIAL SPECIFICATION GRADE DUPLEX CONVENIENCE 125 VOLTS, 2 POLE, 3 WIRE, UL GROUND SLOTT, DECORA SERIES BY LEVITON. GROUNDED, EXCEPT AS NOTED.
 - 1) SINGLE GANG, RECESSED, DUPLEX RECEPTACLE: TAMPER RESISTANT, 2-POLE, 3-WIRE GROUNDING, 15A, 125V, NEMA 5-20R; LEVITON 689 SERIES (COLOR AS SPECIFIED BY ARCHITECT).
 - 2) USB CHARGER/ DUPLEX TAMPER-RESISTANT RECEPTACLE: TAMPER RESISTANT.
 - D. DEVICE PLATES: SEE ARCHITECT FOR TYPE. FOR RECEPTACLES WITH OTHER THAN 120 VOLT, INSCRIBED VOLTAGE AVAILABLE.
 - E. COLORS: COORDINATE COLORS WITH ARCHITECT.
 - F. MOUNTING ORIENTATION OF RECEPTACLES (HORIZONTAL OR VERTICAL): COORDINATE WITH ARCHITECT.
12. LIGHTING FIXTURES:
- A. FIXTURES TO BE AS SPECIFIED BY ARCHITECT AND SHALL BE COMPLETELY FACTORY ASSEMBLED, WIRED AND EQUIPPED WITH ALL NECESSARY SOCKETS, BALLASTS, SUPPORTING HARDWARE AND ACCESSORIES. REFER TO DRAWINGS FOR INDIVIDUAL FIXTURE DESCRIPTIONS.
 - B. FIXTURE CATALOG NUMBERS USED TO ILLUSTRATE EQUIPMENT TYPE DO NOT NECESSARILY DENOTE REQUIRED MOUNTING EQUIPMENT OR ACCESSORIES. PROVIDE ACCESSORIES TO SUIT.
 - C. BALLAST: CLASS P, HIGH POWER FACTOR, LOWEST AVAILABLE NEMA RATED NOISE LEVEL, ET1 AND CBM APPROVED, ENERGY SAVING TYPE. TRIGGER START FOR 24-INCH LAMPS AND RAPID START FOR 48-INCH. TWO LAMP BALLASTS; NO THREE LAMP BALLASTS. BALLASTS SHALL BE ADVANCE MAGNETEK, UNIVERSAL OR EQUAL.
 - D. LED DRIVERS SHALL BE ELECTRONIC TYPE, LABELED AS COMPLIANT WITH RADIO FREQUENCY INTERFERENCE (RFI) REQUIREMENTS OF FCC TITLE 47, PART 15 AND COMPLY WITH NEMA SSL 1 "ELECTRONIC DRIVERS FOR LED DEVICES, ARRAYS OR SYSTEMS". LED DRIVERS SHALL HAVE A SOUND RATING OF "A", HAVE A MINIMUM EFFICIENCY OF 85% AND BE RATED FOR A THD OF LESS THAN 20% AT ALL INPUT VOLTAGES.
 - E. DIMMABLE LED DRIVERS SHALL BE CAPABLE OF DIMMING WITHOUT LED STROBING OR FLICKER ACROSS THEIR FULL DIMMING RANGE. PROVIDE TYPE OF LED DRIVER AS PER LIGHTING FIXTURE SCHEDULE. DIMMABLE LED DRIVERS SHALL BE 0-10V WHERE NOT INDICATED.
 - F. CONTINUOUS ROW, TWO LAMP STRIP FIXTURES SHALL BE STAGGERED TYPE.
 - G. FLUORESCENT LIGHTING FIXTURES, INCLUDING GENERAL CONSTRUCTION, LAMPS AND BALLASTS SHALL CONFORM TO THE ENERGY EFFICIENCY REQUIREMENTS OF CONSOLIDATED EDISON CO. AND QUALITY FOR A UTILITY REBATE TO OWNER UNDER CON EDISON'S ENLIGHTENED ENERGY LIGHTING REBATE PROGRAM. CONTRACTOR SHALL COORDINATE REBATE PROGRAM WITH CON EDISON AND ARRANGE FOR CON EDISON TO PERFORM A SURVEY TO INVENTORY ALL EXISTING FIXTURES PRIOR TO DEMOLITION.
 - H. EXIT SIGNS SHALL BE PRECISION DIE-CAST ALUMINUM HOUSING WITH LASER-FORMED ACRYLIC LEGEND. EXIT SIGNS SHALL COMPLY WITH UL 924 AND BE MEA APPROVED. AC POWERED WITH PREMIUM LONG-LIFE NICKEL CADMIUM BATTERY WITH STANDARD UL LISTED 3-HOUR RUN TIME. PROVIDE WITH INTEGRAL AUTOMATIC CHARGER IN A SELF CONTAINED POWER PACK. LED INDICATOR WITH PUSH TO TEST SWITCH.
13. TELEPHONE CONDUIT SYSTEM:
- A. PROVIDE COMPLETE SYSTEM OF: RACEWAYS AND ACCESSORIES, OUTLET BOXES, SLEEVES AND FISHWIRES.
 - B. EQUIPMENT SHALL CONFORM TO REQUIREMENTS OF TELEPHONE COMPANY.
 - C. OUTLETS SHALL BE:
 - 1) WALL: 4 IN. SQUARE WITH BUSHED COVER PLATE.
 - D. PROVIDE FISHWIRES, IN RACEWAYS OVER 10 FT LONG.
 - E. CONDUIT SHALL BE 3/4 IN. MINIMUM. FURNISH EMPTY CONDUIT FROM OUTLET BOX TO BUSHED END THRU WALL 6" BELOW THE PLASTER CEILING.
 - F. FACE RACEWAYS IN ROOMS SHALL HUBBELL HBL500, HBL750 OR HBL2000 SERIES OR AS ACCEPTABLE.
14. GROUNDING AND BONDING:

- A. PROVIDE GROUNDING SYSTEM IN ACCORDANCE WITH (2017) NATIONAL ELECTRICAL CODE), AND THESE SPECIFICATIONS. THE WIRING SYSTEM SHALL BE INSTALLED AS REQUIRED TO PROVIDE A CONTINUOUSLY GROUNDED SYSTEM, WHERE FLEXIBLE CONDUIT IS USED FOR PART OF A CONDUIT RUN, EXCEPT LIGHTING BRANCH CIRCUITS, AN INSULATED GROUNDING CONDUCTOR SHALL BE PROVIDED IN THE CONDUIT AND CONNECTED TO GROUNDING BUSHINGS AT EACH END OF THE RUN.
 - B. USE EXOTHERMIC WELDING PROCESS FOR INACCESSIBLE CONNECTIONS.
 - C. EXTEND EXISTING SYSTEM GROUND TO INCLUDE ALL THE ELECTRICAL EQUIPMENT IN THE SCOPE OF WORK.
 - D. WHERE FLEXIBLE METALLIC CONDUIT IS USED AN INTERNAL BONDING CONDUCTOR SHALL BE INSTALLED.
 - E. IN ADDITION, FURNISH A SEPARATE INSULATED GREEN EQUIPMENT CONDUIT CONDUCTOR WHERE INDICATED ON DRAWINGS AND FOR THE FOLLOWING BRANCH CIRCUITS:
 - 1) CIRCUITS SERVING ANY WALL BOX DIMMER.
 - 2) CIRCUITS SERVING ANY ISOLATED GROUND RECEPTACLES. TERMINATE GROUND DIRECTLY AT AN EQUIPMENT GROUNDING CONDUCTOR TERMINAL OF THE SOURCE, AT THE SOURCE, OR AS OTHER WISE NOTED ON DRAWINGS.
 - 3) CIRCUITS SERVING ANY DUPLEX OR SIMPLEX COMPUTER RECEPTACLES
 - 4) ANY CIRCUIT SERVED VIA AN ISOLATION TRANSFORMER OR COMPUTER POWER DISTRIBUTION UNIT.
15. PANEL BOARDS:
- A. PANEL BOARDS SHALL BE OF THE DEAD FRONT TYPE MANUFACTURED IN CODE GAUGE AND SIZE BOXES FOR MOUNTING AS INDICATED ON PLANS COMPLETE WITH TRIM, DOORS AND LOCKS. ALL LOCKS SHALL BE KEYPED ALIKE.
 - B. CIRCUIT BREAKERS SHALL BE OF THE BOLT-ON THERMAL MAGNETIC MOLDED CASE TYPE, AND SHALL HAVE THE TRIP RATINGS AND NUMBER OF POLES SHOWN IN SCHEDULES ON THE CONTRACT DRAWINGS. FOR BLANK (SPACE) COMPARTMENTS, PROVIDE FULL RATED BUS. MINIMUM GUTTER SPACES SHALL BE 5-3/4". SIDES, TOP AND BOTTOM, INCREASE FOR THROUGH FEEDERS. PROVIDE 25% COPPER GROUND BUS AND 100% COPPER NEUTRAL BUS AND INCREASE NEUTRAL BUS INDICATED.
 - C. LOCKING TABS SHALL BE PROVIDED ON ALL CIRCUIT BREAKERS SERVING EMERGENCY LIGHTING, FIRE ALARM SYSTEM, SECURITY SYSTEMS AND OTHER EMERGENCY OR CRITICAL EQUIPMENT AND AS NOTED ON THE CONTRACT DRAWINGS. A TOTAL OF 5 SPARE LOCKING TABS SHALL BE FURNISHED TO THE OWNER.
 - D. BUSES SHALL BE HARD DRAWN COPPER OF 98 PERCENT CONDUCTIVITY AND SHALL HAVE CROSS SECTIONAL AREAS LARGE ENOUGH TO LIMIT THE TEMPERATURE RISE, WHEN CARRYING FULL LOAD, TO 35 DEGREES C. ABOVE AN AMBIENT INSIDE THE ENCLOSURE OF 55 DEGREES C. AS DEFINED IN IEEE STANDARD RULES. MAIN BUS CAPACITY SHALL BE AS SHOWN ON THE CONTRACT DRAWINGS.
 - E. ENCLOSURES SHALL BE SURFACE OR FLUSH AS INDICATED. TRIMS SHALL BE SECURED TO PANEL WITH MACHINE SCREWS. COVERS SHALL BE HINGED DOOR-IN-DOOR CONSTRUCTION WITH CYLINDER LOCKS AND CATCHES. LOCKS MUST BE COMPATIBLE WITH BUILDING STANDARD KEY SYSTEM AND WHEN NONE EXISTS, THEY SHALL BE SIMILAR TO A YALE NO. 911 KEY.
 - F. DISTRIBUTION AND SUB-DISTRIBUTION PANELBOARD SHALL BE A MINIMUM OF 30" WIDE AND 10" DEEP.
 - G. ALL STANDARD PANELBOARDS SHALL BE A MINIMUM OF 20" WIDE AND 5 3/4" DEEP.
 - H. FURNISH ALL PANELBOARDS WITH FEED-THRU LUGS UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
 - I. ALL NEW PANELBOARDS SHALL BE PROVIDED WITH AN ENGRAVED WHITE CORE LAMACOID NAMEPLATE, WITH 3/4 IN. WHITE LETTERING ON A BLACK BACKGROUND, WITH DESIGNATION LISTED (PANELBOARD NAME), FASTENED WITH EPOXY CEMENT OR OVAL HEAD CHROME PLATED MACHINE SCREWS.
 - J. THE CIRCUIT DIRECTORY SHALL BE TYPEWRITTEN AND PROVIDED INSIDE EACH PANEL DOOR TO INDICATE EQUIPMENT AND/OR AREA SERVED. DIRECTORY HOLDER SHALL BE METAL FRAME WITH CLEAR PLASTIC, TRANSPARENT COVER. THE TYPEWRITTEN LIST INDICATING CIRCUIT NUMBERS, OUTLETS SUPPLIED AND THEIR LOCATIONS SHALL BE PROVIDED.
 - K. TIE-BARS SHALL NOT BE USED TO CREATE MULTI-POLE CIRCUITS. MAXIMUM 42 CIRCUITS ALLOWED.
 - L. ONLY ONE WIRE SHALL BE INSTALLED UNDER EACH CIRCUIT BREAKER LUG.
 - M. SHORT CIRCUIT RATING OF PANELBOARDS SHALL NOT BE LESS THAN AS INDICATED ON THE CONTRACT DRAWINGS OR SPECIFIED HEREIN. WHERE NOT INDICATED OR SPECIFIED THE MINIMUM SHORT CIRCUIT RATING SHALL BE EQUAL TO THE INTERRUPTING CAPACITY OF THE LOWEST RATED CIRCUIT BREAKER IN THE PANELBOARD, BUT IN NO CASE LESS THAN 10,000 AMPERES R.M.S. SYMMETRICAL FOR 208Y/120 VOLT SYSTEM. SERIES RATED PANELBOARDS SHALL BE USED TO ACHIEVE REQUIRED SHORT CIRCUIT RATINGS.
- N. FOR ALL EXISTING PANELBOARDS, CONTRACTOR SHALL PROVIDE NEW CIRCUIT BREAKERS TO REPLACE EXISTING AS REQUIRED AS INDICATED ON DRAWINGS.

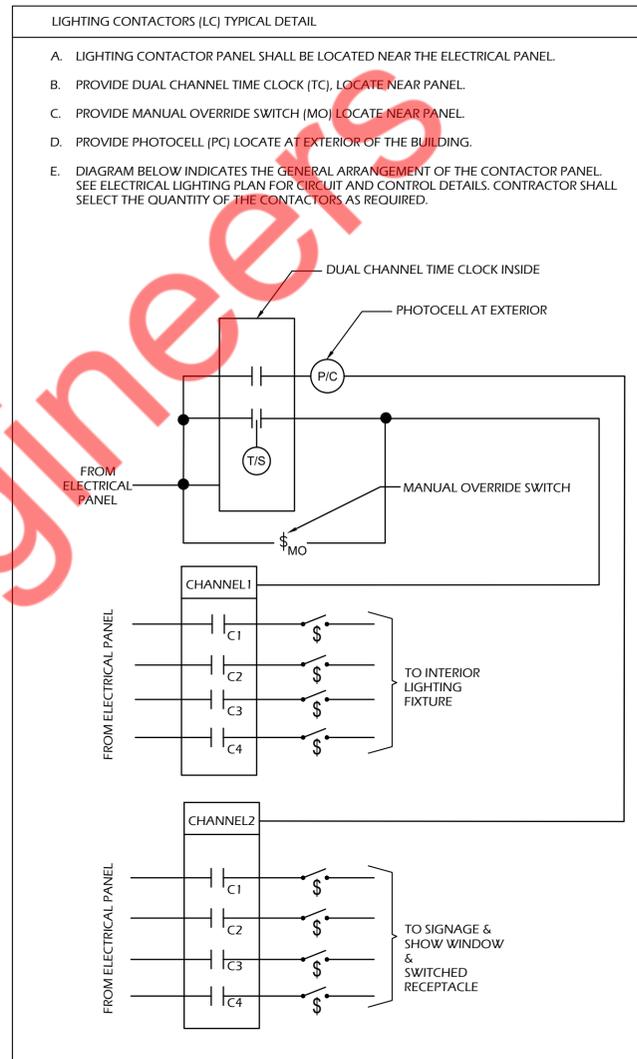
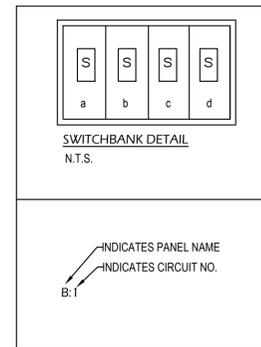
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FIXTURE SCHEDULE					
SYMBOL	LAMPS AND/OR BALLASTS	DESCRIPTION	VOLTAGE	APPROVED FIXTURES	REMARKS
	41 WATTS, 3300 LUMENS, 4000 K	2 X 2 SWITCHABLE FLAT PANEL FIXTURE	120 V.	LITHONIA - "CPANL" SERIES OR ARCHITECT / ENGINEER ACCEPTED SUBSTITUTE	MODEL - CPANL2X2AL01SWW7M433001080120V41
	20 WATTS	WALL SCONCE	120 V.	-	MODEL - -
	52 WATTS, 4000 LUMENS, 4000 K	PENDANT MOUNTED 4 FOOT LINEAR FIXTURE	120 V.	PEERLESS - "CERRA 10" SERIES OR ARCHITECT/ENGINEER ACCEPTED SUBSTITUTE	MODEL - 10CRM4LLP4FTMSL480CRISBL40K1000LMF120SCT1EC
	LONG LIFE LED	THERMOPLASTIC EXIT SIGN WITH 90 MINUTE NI-CAD BATTERY AND SELF DIAGNOSTICS; UNIVERSAL MOUNT; WHITE, STENCIL FACE HOUSING; RED LETTERS, FIXTURE WIRED TO LOCAL AREA LIGHTING CIRCUIT AHEAD OF ANY SWITCHING	120 V.	LITHONIA - "LHOM" SERIES OR ENGINEER ACCEPTED SUBSTITUTE	MODEL - #LHOM-LED-RHO-SD
	LED 1W	2-HEAD EMERGENCY HEADS (WHITE)	9.6 V.	EXITRONIX ENGINEER ACCEPTED SUBSTITUTE	MODEL - #EBU-W-LED-51-52

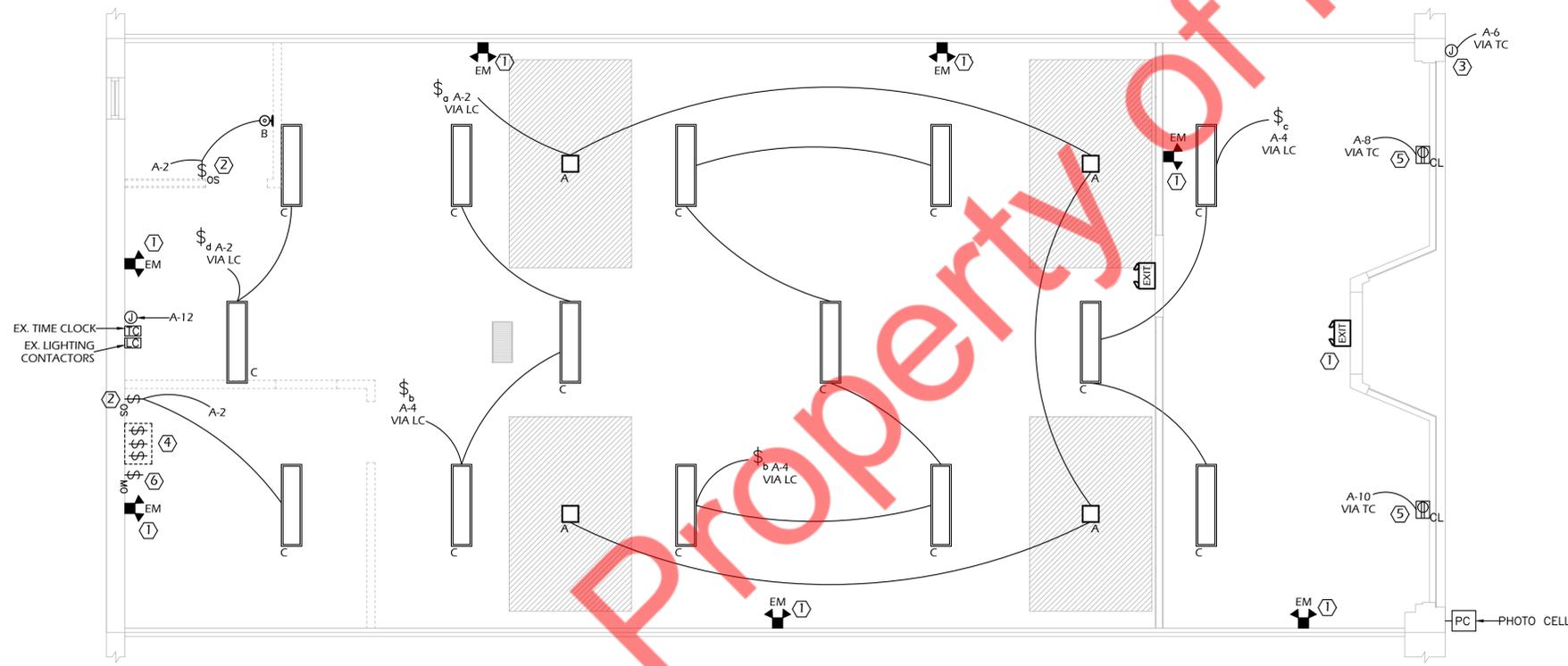
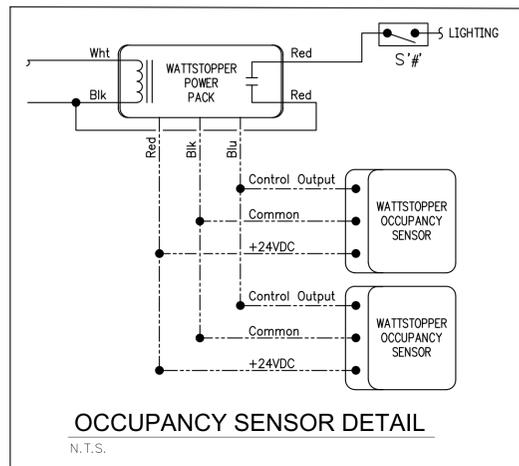


LIGHT FIXTURE SCHEDULE NOTES:

- A. VERIFY FINAL SELECTION OF LIGHT FIXTURES WITH THE ARCHITECT PRIOR TO BID.
- B. EMERGENCY FIXTURES SHALL HAVE MIN 90. MIN BATTERY BACKUP.

LIGHTING GENERAL NOTES:

- A. VERIFY ALL LUMINAIRE COLORS, TRIMS, LENGTHS, ETC. WITH THE ARCHITECT PRIOR TO PLACING FINAL PURCHASE ORDERS. SUBMISSION PF SHOP DRAWINGS WILL BE INTERPRETED AS HAVING BEEN COORDINATED WITH THE ARCHITECTURAL DRAWINGS.
- B. PROVIDE ALL LENGTHS, FEEDS, ACCESSORIES, CONNECTORS, WIRING, POWER SUPPLIES, DRIVERS ETC. FOR A COMPLETE INSTALLATION. THE E.C. SHALL VERIFY THE COMPLETE BILL OF MATERIAL WITH MANUFACTURER'S REPRESENTATIVE AND ENSURE ALL EQUIPMENT ARE INCLUDED IN BID PRICE. COORDINATE INSTALLATION WITH ARCHITECTURAL DETAILS.
- C. VERIFY FINAL LUMINAIRE LOCATIONS WITH OTHER CEILING MOUNTED EQUIPMENTS SUCH AS DIFFUSER WITH ARCHITECTURAL REFLECTED CEILING PLANS.
- D. VERIFY EXACT MOUNTING HEIGHT AND LOCATIONS OF ALL WALL MOUNTED LUMINAIRE WITH ARCHITECTURAL PLANS AND ELEVATIONS PRIOR TO ROUGH-IN
- E. ANY PROPOSED ALTERNATE LUMINAIRES SHALL BE APPROVED BY THE ARCHITECT PRIOR TO FINAL BID PRICING.
- F. SHOULD THE CONTRACTOR PROPOSE TO FURNISH MATERIALS, EQUIPMENT AND DEVICES OTHER THAN THOSE SPECIFIED AND LISTED, THE CONTRACTOR SHALL SUBMIT A WRITTEN REQUEST FOR SUBSTITUTIONS, TO THE ENGINEERS AT LEAST TEN (10) BUSINESS DAYS PRIOR TO BID OPENING. THE REQUEST SHALL BE AN ALTERNATE TO THE ORIGINAL BID AND SHALL INCLUDE A COMPLETE SPECIFICATIONS CUTSHEET SUBMITTAL AS OUTLINED IN THE SPECIFICATIONS, COMPLETE WITH DESCRIPTIVE (MANUFACTURER, BRAND NAME, CATALOG NUMBER, ETC.) AND TECHNICAL DATA FOR ALL ITEMS. INDICATE ANY ADDITIONS OR DEDUCTIONS TO THE CONTRACT PRICE WITH THE SUBSTITUTION SUBMITTAL AND ON THE BID FORM.
- G. ALL FIXTURES INDICATED AS EMERGENCY SHALL BE PROVIDED WITH 90-MINUTE BATTERY PACK AND ALL FLORECENT FIXTURES INDICATED AS EMERGENCY SHALL BE PROVIDED WITH 1300LUMENS, 90MINUTE BATTERY PACK.
- H. PROVIDE SHATTER-RESISTANT LAMPS OR PROVIDE CLEAR LENSES ON ALL FIXTURES LOCATED ABOVE ALL KITCHEN AREA.
- I. VERIFY FINAL SELECTION OF LIGHT FIXTURES WITH ARCHITECT.
- J. E.C. SHALL COORDINATE WITH THE LIGHTING VENDOR FOR LIGHTING FIXTURE DRIVER REQUIREMENT.



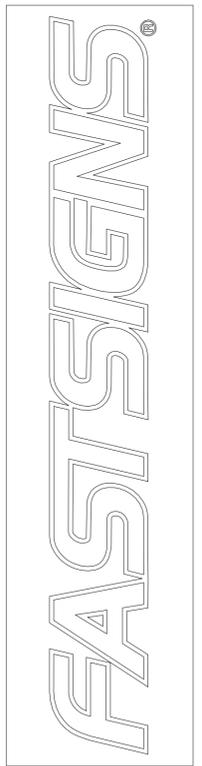
KEY ELECTRICAL NOTES:

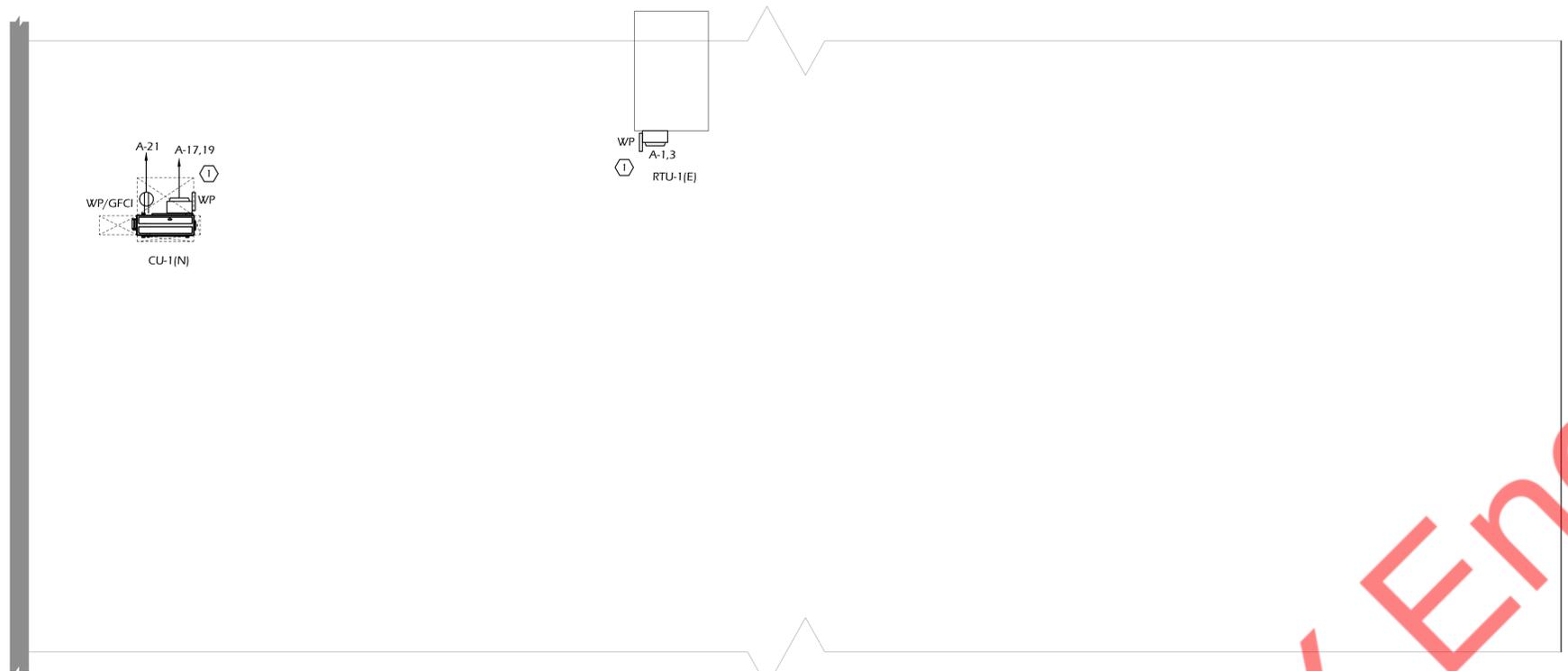
- 1. WIRE ALL EMERGENCY, EXIT LIGHT AND NIGHT LAMPS AHEAD OF SWITCHING FOR CONTINUOUS OPERATIONS. CONNECT IT TO THE ADJACENT LIGHTING CIRCUIT.
- 2. WALL MOUNTED OCCUPANCY SENSOR WITH SWITCH. COORDINATE EXACT LOCATION AND MOUNTING HEIGHT IN FIELD.
- 3. E.C. SHALL COORDINATE EXACT LOCATION OF THE SIGNAGE, AND PROVIDE JUNCTION BOX AND TOGGLE SWITCH FOR EXTERIOR SIGNAGE. CONNECT TO THE INDICATED CIRCUIT VIA TIME CLOCK. COORDINATE WITH THE OWNER FOR TIME SETTING.
- 4. SWITCH BANK. COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
- 5. E.C. TO PROVIDE SHOW WINDOW RECEPTACLES AS PER NEC 210.62 .
- 6. MANUAL OVERRIDE SWITCH.

1 ELECTRICAL LIGHTING PLAN
SCALE: 1/4"=1'-0"

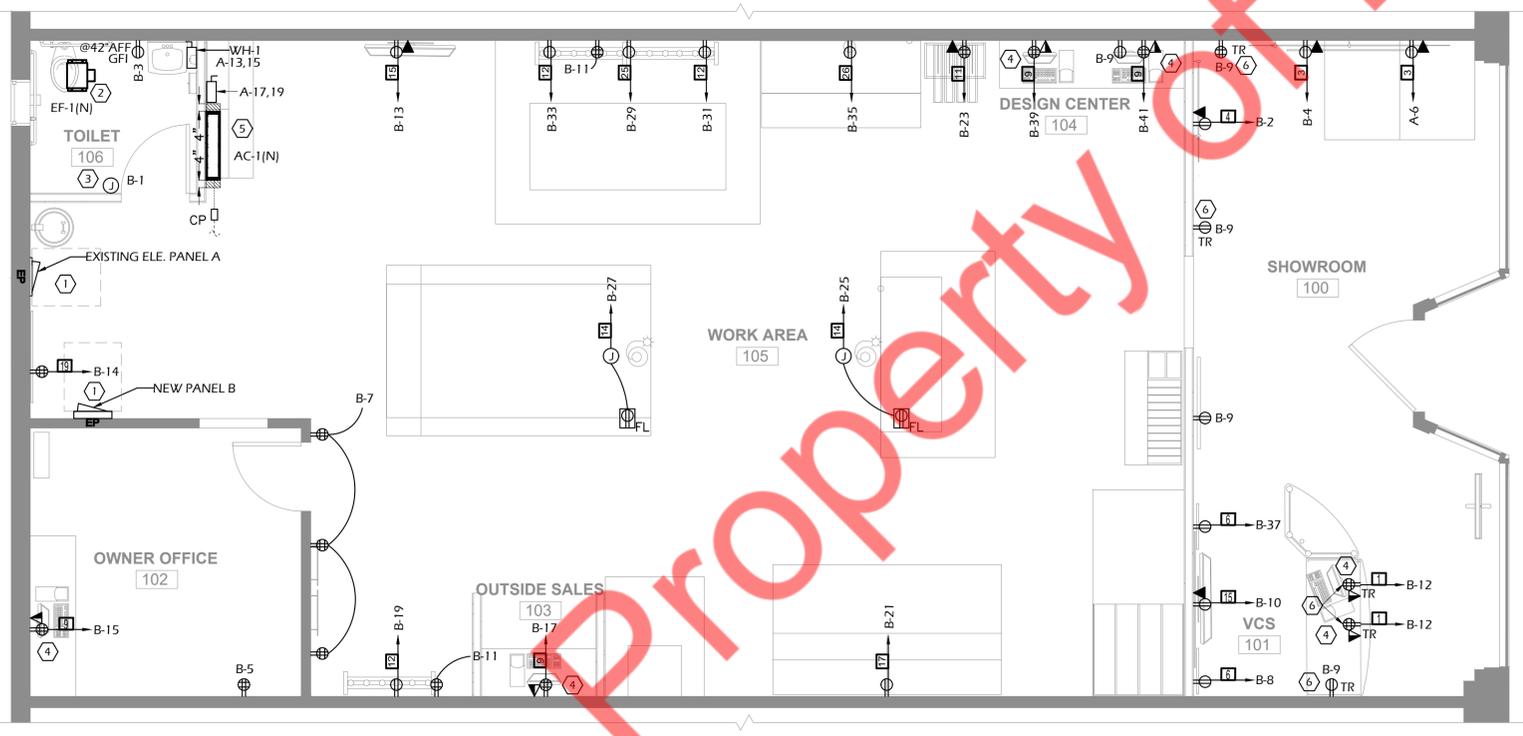
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1 ELECTRICAL ROOF POWER PLAN
SCALE: 1/4"=1'-0"



2 ELECTRICAL FLOOR POWER PLAN
SCALE: 1/4"=1'-0"

ELECTRICAL POWER PLAN GENERAL NOTES:

- A. ALL CONDUCTORS SHALL BE COPPER UNLESS OTHERWISE INDICATED.
- B. MOUNT ALL RECEPTACLES AT 18" ABOVE FINISHED FLOOR TO CENTER OF THE COVER PLATE UNLESS OTHERWISE INDICATED.
- C. FOR OUTLETS REQUIRING GFCI PROTECTION WHERE THE RECEPTACLE IS CONCEALED SUCH AS IN THE CASE OF A WATER FOUNTAIN OR VENDING MACHINE INSTALLATION, THE CONTRACTOR SHALL PROVIDE A STANDARD RECEPTACLE WITH GFCI CIRCUIT BREAKER IN THE ASSOCIATED PANEL. BLANK FACE GFCI TEST/RESET BUTTONS ARE NOT PERMITTED UNLESS EXPLICITLY LOCATED ON THESE DRAWINGS.
- D. FURNISH AND INSTALL ALL EXTERIOR RECEPTACLES WITH WEATHERPROOF COVERS. EXTERIOR RECEPTACLES SHALL BE GFCI TYPE.
- E. FOR ALL EXTERIOR ELECTRICAL EQUIPMENT, FURNISH AND INSTALL WITH NEMA 3R ENCLOSURES MINIMUM. IN THE EVENT THAT THERE IS A DISCREPANCY BETWEEN THIS REQUIREMENT AND INFORMATION LOCATED ELSEWHERE IN THE ELECTRICAL DOCUMENTS, THE CONTRACTOR SHALL BID ACCORDING TO THE MOST STRINGENT REQUIREMENT.
- F. IN BREAK ROOMS AND SIMILAR SPACES, THE CONTRACTOR SHALL REFER TO ARCHITECTURAL DOCUMENTS AND LOCATE ELECTRICAL DEVICES AT LOCATIONS AND ELEVATIONS TO BEST SERVE EACH DEDICATED APPLIANCE.
- G. COORDINATE WITH OTHER DISCIPLINES IN THE FIELD TO ENSURE THAT THE INTEGRITY OF FIRE RATED CONSTRUCTION IS PRESERVED WHERE PENETRATING RATED WALLS AND FLOORS.
- H. THE CONTRACTOR SHALL ROUTE ALL EXPOSED CONDUIT NEATLY AND TIGHT TO SUPPORTING SURFACES. IN THE EVENT THAT THE OWNER IS NOT SATISFIED WITH WORKMANSHIP, THE CONTRACTOR SHALL MAKE CORRECTIONS AT NO ADDITIONAL COST TO THE OWNER. MC CABLE IS NOT PERMITTED IN EXPOSED AREAS.
- I. FOR ALL CONDUIT RUNS SHOWN ON ELECTRICAL DRAWINGS, THE ROUTING IS APPROXIMATE. THE CONTRACTOR SHALL MAKE ROUTING ADJUSTMENTS AS REQUIRED BASED ON FIELD CONDITIONS AND COORDINATION WITH OTHER DISCIPLINES.
- J. IN THE EVENT THAT THERE IS A DISCREPANCY IN THE MINIMUM CIRCUIT AMPACITY (MCA) AND/OR THE MAXIMUM OVERCURRENT PROTECTION (MOCP) BETWEEN THE DIVISION 26 AND DIVISION 22/23 SCHEDULES, THE CONTRACTOR SHALL BID ACCORDING TO THE MORE STRINGENT REQUIREMENTS.
- K. MECHANICAL, PLUMBING, AND OTHER EQUIPMENT FURNISHED AND INSTALLED BY OTHER DIVISIONS IS SHOWN ON ELECTRICAL DRAWINGS FOR CIRCUITING PURPOSES ONLY. THE CONTRACTOR SHALL REFER TO OTHER DISCIPLINE CONSTRUCTION DOCUMENTS FOR EXACT LOCATIONS OF EQUIPMENT PRIOR TO ROUGH-IN OF THE ASSOCIATED ELECTRICAL CIRCUITS, DISCONNECTING MEANS, OUTLETS, ETC. AND ADJUST ROUTING AND LOCATIONS ACCORDINGLY.
- L. THE RECEPTACLES MARKED AS "GFI" ON THE FLOOR PLAN INDICATES THAT THE RECEPTACLE SHALL BE GFI PROTECTED. E.C. SHALL PROVIDE GFI BREAKER IN PANEL IF GFI RECEPTACLE IS NOT READILY ACCESSIBLE OR FOR THE RECEPTACLES OTHER THAN 20A.
- M. TAMPER RESISTANT "TR" RECEPTACLES SHALL BE PROVIDED AS PER ARTICLE 406.12 OF NEC.
- N. ALL THE RECEPTACLES SHALL BE GFI PROTECTED EITHER AT RECEPTACLE OR AT ELECTRICAL PANEL AS SPECIFIED IN 210.8(B)
- O. ELECTRICAL CONTRACTOR SHALL VERIFY AND PROVIDE THE EXACT ELECTRICAL REQUIREMENT INCLUDING RECEPTACLE, PLUG, CORD, CIRCUIT BREAKER AND CABLES FOR ALL THE EQUIPMENT IN COORDINATION WITH THE EQUIPMENT SUPPLIER/MANUFACTURER IN THE FIELD. BASE BID ACCORDINGLY.
- P. E.C. SHALL COORDINATE EXACT LOCATION & MOUNTING HEIGHT OF ALL RECEPTACLES WITH ARCHITECT / OWNER.

ELECTRICAL FLOOR POWER PLAN KEYED NOTES:

- 1. CLEAR WORKING & DEDICATED SPACE SHALL BE PROVIDED FOR THE ELECTRICAL PANELS IN ACCORDANCE WITH THE NEC 110.26.
- 2. EXHAUST FAN IN THE ROOM SHALL BE CIRCUITED TO LIGHTING CIRCUIT IN THE SAME ROOM & CONTROLLED WITH THE RTU-1(E).
- 3. VERIFY EXACT LOCATION AND REQUIREMENTS FOR HAND DRYERS WITH ARCHITECT PRIOR TO BID.
- 4. PROVIDE RECEPTACLES FOR POS SYSTEM. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH OWNER/ARCHITECT PRIOR TO ROUGH-IN. VERIFY WITH MILLWORK FOR EXACT POWER CONNECTION.
- 5. E.C. TO COORDINATE THE EXACT LOCATION AND ELECTRICAL REQUIREMENT OF MECHANICAL EQUIPMENTS WITH MECHANICAL CONTRACTOR. PROVIDE THE ELECTRICAL CONNECTION AS PER MECHANICAL EQUIPMENTS REQUIREMENT IN FIELD. INFORM ENGINEERS FOR ANY DISCREPANCY FOUND.
- 6. HALF SWITCHED RECEPTACLE. HALF RECEPTACLE SHALL BE PERMANENTLY HOT, WHERE AS HALF RECEPTACLE SHALL BE CONTROLLED VIA TIMER CONTROLLED CONTACTORS.

ROOF POWER PLAN KEYED NOTES:

- 1. E.C. TO COORDINATE THE EXACT LOCATION AND ELECTRICAL REQUIREMENT OF MECHANICAL EQUIPMENTS WITH MECHANICAL CONTRACTOR. PROVIDE THE ELECTRICAL CONNECTION AS PER MECHANICAL EQUIPMENTS REQUIREMENT IN FIELD. INFORM ENGINEERS FOR ANY DISCREPANCY FOUND.

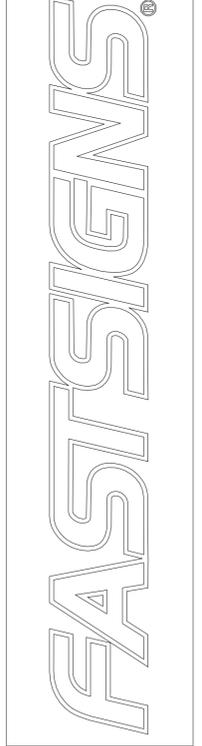
EQUIPMENT SCHEDULE

TAG	EQUIPMENT
1	NEW 2 PC, 6"-(1 P.O.S.) COUNTER MODULES W/ ADA CORNER COUNTER BY TENANT- ASSEMBLED AND INSTALLED BY G.C.
3	2 PANEL DISPLAY- ARCH. BOARD, BY TENANT, INSTALLED BY G.C.
4	1 PANEL DISPLAY- ARCH. BOARD, BY TENANT, INSTALLED BY G.C.
6	25" x 33" LIGHT BOXES BY TENANT AND INSTALLED BY TENANT. GC TO SUPPLY AND INSTALL REQUIRED RECESSED ELECTRIC.
9	COMPUTER
11	MEDIA RACK BY TENANT- INSTALL BY GC
12	ROLLING MEDIA RACK BY TENANT - INSTALL BY GC
14	CEILING MTD "REEL" TYPE DROP CORDS & REQUIRED ELECTRIC-HUSKY MODEL# HD-LPR-050-14PB- GC TO PROVIDE & INSTALL
15	WALL MOUNTED MONITOR PROVIDED AND INSTALLED BY SEPARATE VENDOR
17	SAFETY SPEED CUTTER PROVIDED AND INSTALLED BY TENANT.
19	PHONE/DATA BOARD LOCATION - PAINT TO MATCH WALL - SEE DETAIL ON ELECTRICAL SHEET
25	EPSON SURECOLOR S80600 PRINTER
26	MIMAKI CG-160FX-11 PLOTTER

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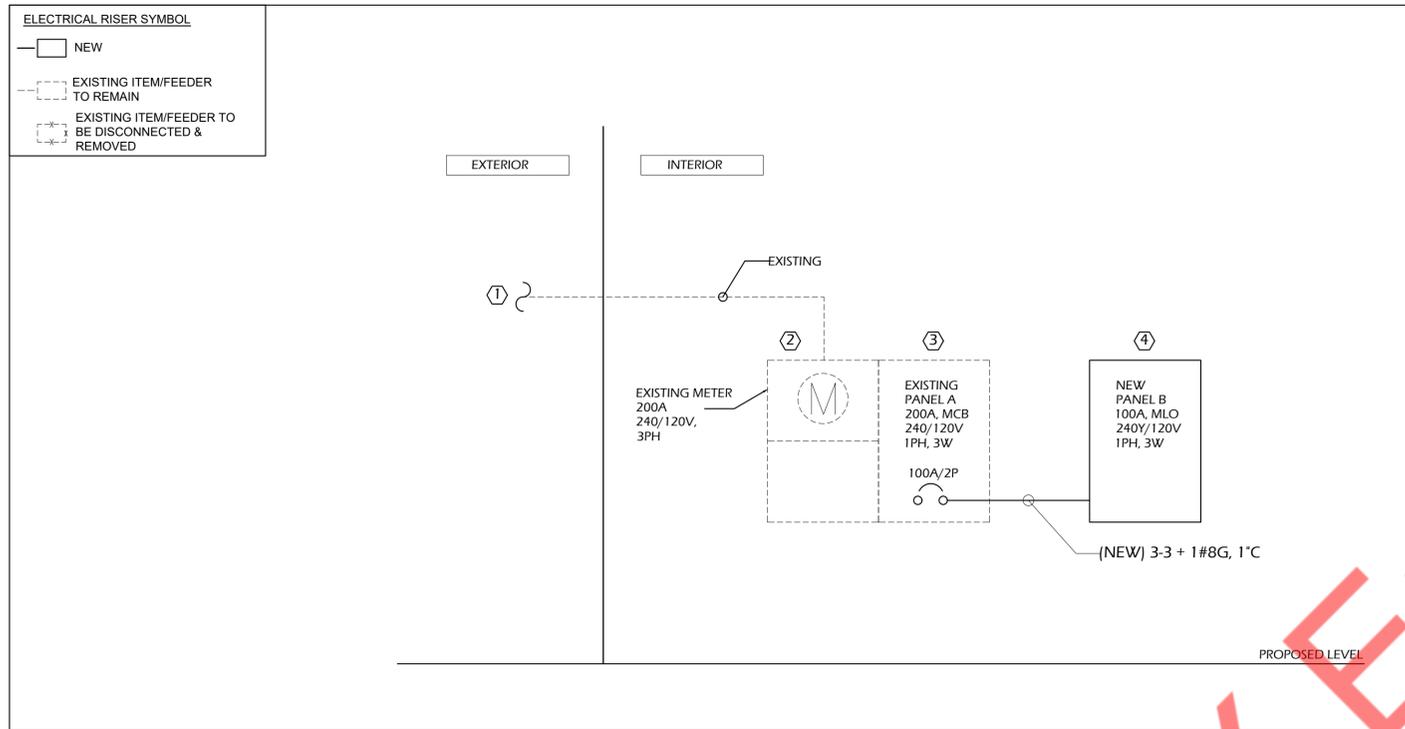
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SHEET NO. **ELECTRICAL POWER PLAN**

E-2.0



- ELECTRICAL RISER DIAGRAM GENERAL NOTES:**
- ELECTRICAL CONTRACTOR (E.C.) SHALL PROVIDE AND INSTALL ALL THE DEVICES IN FIELD IN COORDINATION WITH THE OWNER AND UTILITY. ALL THE INSTALLATIONS SHALL BE IN COMPLIANCE WITH THE NEC AND LOCAL CODES.
 - E.C. SHALL COORDINATE WITH THE UTILITY COMPANY AND AHJ FOR EXACT FAULT CURRENT (Isc) RATING AVAILABLE IN THE FIELD. PRIOR TO BID.
 - E.C. SHALL COORDINATE EXACT LOCATION AND MOUNTING HEIGHT OF ALL THE DEVICES SHOWN, WITH THE ARCHITECT/OWNER AND UTILITY.
 - PROVIDE SEPARATE GROUND CONDUCTOR IN ALL CONDUITS.
 - E.C. SHALL COORDINATE WITH THE ARCHITECT / OWNER / FOR EXACT SCOPE OF WORK PRIOR TO BID.
 - E.C. SHALL COORDINATE WITH THE ARCHITECT / OWNER / LANDLORD FOR ANY TYPE OF ADDITION / ALTERATION TO THE EXISTING SYSTEM PRIOR TO BID. NO WORK SHALL BE PERFORMED WITHOUT THEIR CONSENT.
 - ALL THE FEEDERS SHALL BE NEW (U.N.O.). SIZE SHALL BE AS PER RISER.
 - E.C. SHALL VERIFY OPERABLE CONDITION OF ALL THE EXISTING & RELOCATED EXISTING EQUIPMENT PRIOR TO BID. REPLACE EQUIPMENT WITH NEW ONE. KEEPING ALL THE PARAMETERS SAME.
 - E.C. SHALL VERIFY VOLTAGE DROP IS LIMITED TO A TOTAL OF 5% FOR ELECTRICAL CIRCUITING (FEEDERS AND BRANCH CIRCUITS COMBINED).

- ELECTRICAL RISER DIAGRAM KEY NOTES: (#)**
- EXISTING SERVICE FEEDER TO REMAIN. E.C. TO VERIFY RATING, OPERABLE CONDITION AND EXACT LOCATION IN FIELD. REPLACE IF FOUND INOPERABLE. BASE BID ACCORDINGLY.
 - EXISTING METER CABINET TO REMAIN. E.C. TO VERIFY RATING, OPERABLE CONDITION AND EXACT LOCATION IN FIELD. REPLACE IF FOUND INOPERABLE BASE BID ACCORDINGLY.
 - EXISTING PANEL TO REMAIN. E.C. TO VERIFY EXISTING PANEL RATING, OPERABLE CONDITION AND EXACT LOCATION IN FIELD. REPLACE IF FOUND INOPERABLE BASE BID ACCORDINGLY.
 - NEW 100A, 240/120V, 1-PHASE, 3-WIRE ELECTRICAL PANEL 'B'. E.C. COORDINATE EXACT LOCATION OF PANEL WITH ARCHITECT/OWNER.

- PANEL SCHEDULE GENERAL NOTES:**
- ELECTRICAL CONTRACTOR SHALL VERIFY THE BREAKER AND CABLE RATING WITH EQUIPMENT SUPPLIER/OWNER AND ACCORDINGLY UPDATE THE BREAKER RATING CABLE SIZE IN FIELD.
 - GFI MARKED ON THE POWER PLAN INDICATES THAT THE CIRCUIT SHALL BE GFCI PROTECTED. E.C. SHALL PROVIDE GFCI BREAKER FOR THE GFI MARKED RECEPTACLES. IF EITHER RECEPTACLE IS NOT ACCESSIBLE OR NOT AVAILABLE.
 - PROVIDE HACR BREAKER FOR HVAC UNITS. COORDINATE WITH HVAC DRAWINGS.
 - PROVIDE LOCKING DEVICES ON CIRCUIT BREAKER WHERE EVER REQUIRED.
 - E.C. TO VERIFY SCOPE OF WORK WITH OWNER/ARCHITECT. PRIOR TO BID.
 - VERIFY EXACT POWER DISTRIBUTION IN FIELD.

- PANEL SCHEDULE ABBREVIATIONS:**
- L-LIGHTING
 - R-RECEPTACLE
 - H-HVAC
 - M-MOTOR
 - O-OTHER
- (*) GFCI BREAKER
 (**) NEW BREAKER IN EXISTING PANEL
 (***) PROVIDE HACR BREAKER

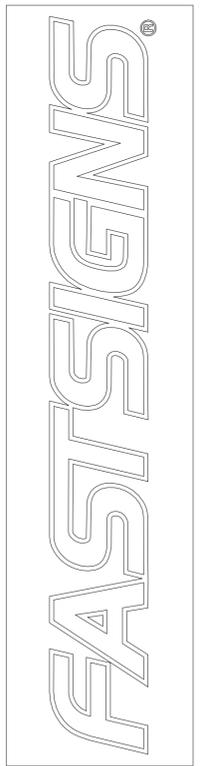
PANEL: A (EXISTING)												MOUNTING: SURFACE	
240/120	VOLTS	1		PHASE	3		WIRE		PANEL LOCATION: BOH				
MCB	200A	BUS:		EXISTING	MINIMUM				FED FROM: ELECTRICAL METER				
NOTE:													
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)		MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1			H	3.84	2-8 + 1#10G, 3/4" C	4.18		2-12 + 1#12G, 3/4" C	0.34	L	LIGHTING	20	2
3	40/2P	RTU-1 (E)	H	3.84			4.41		2-12 + 1#12G, 3/4" C	0.57	L	LIGHTING	20
5	20**	SPARE				1.20		2-12 + 1#12G, 3/4" C	1.20	O	EXTERIOR SIGNAGE	20	6
7	20	SPARE				1.00		2-12 + 1#12G, 3/4" C	1.00	R	SHOW WINDOW RECEPTACLE	20	8
9	20**	SPARE				1.00		2-12 + 1#12G, 3/4" C	1.00	R	SHOW WINDOW RECEPTACLE	20	10
11	20	SPARE				0.20		2-12 + 1#12G, 3/4" C	0.20	L	TIME CLOCK	20	12
13	30/2P**	WH-1	O	2.40	2-10 + 1#10G, 3/4" C	2.40					SPARE	20**	14
15			O	2.40			2.40					SPARE	20**
17	20/2P**	CU-1 (N) & AC-1 (N)	H	1.20	2-12 + 1#12G, 3/4" C	1.20					SPARE	20**	18
19			H	1.20			1.20					SPARE	20**
21	20**	SERVICE RECEPTACLE	R	0.18	2-12 + 1#12G, 3/4" C	9.55		3-3 + 1#8G, 1" C	9.37	O		100/2P**	22
23	20**	SPARE							9.37	O	PANEL B		24
						19.53			18.58				

PANEL: B (NEW)												MOUNTING: SURFACE	
240/120	VOLTS	1		PHASE	3		WIRE		PANEL LOCATION: BOH				
MLO	100A	BUS:		125A	MINIMUM				FED FROM: EX. PANEL A				
NOTE:													
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)		MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.
1	20	HAND DRYER	R	1.00	2-12 + 1#12G, 3/4" C	1.50		2-12 + 1#12G, 3/4" C	0.50	R	4-1 PANEL DISPLAY	20	2
3	20	TOILET RECEPTACLE	R	0.18	2-12 + 1#12G, 3/4" C	0.68		2-12 + 1#12G, 3/4" C	0.50	R	3-2 PANEL DISPLAY	20	4
5	20	GENERAL RECEPTACLE	R	0.36	2-12 + 1#12G, 3/4" C	0.86		2-12 + 1#12G, 3/4" C	0.50	R	3-2 PANEL DISPLAY	20	6
7	20	GENERAL RECEPTACLE	R	1.08	2-12 + 1#12G, 3/4" C	1.58		2-12 + 1#12G, 3/4" C	0.50	R	6-25" X 33" LIGHT BOXES	20	8
9	20	GENERAL RECEPTACLE	R	1.08	2-12 + 1#12G, 3/4" C	1.58		2-12 + 1#12G, 3/4" C	0.50	R	15-MONITOR RECEPTACLE	20	10
11	20	GENERAL RECEPTACLE	R	0.72	2-12 + 1#12G, 3/4" C	2.52		2-12 + 1#12G, 3/4" C	1.80	R	1-POS SYSTEM	20	12
13	20	15-MONITOR RECEPTACLE	R	0.50	2-12 + 1#12G, 3/4" C	0.86		2-12 + 1#12G, 3/4" C	0.36	R	19-PHONE DATA RACK	20	14
15	20	9-COMPUTER QUAD RECEPTACLE	R	1.00	2-12 + 1#12G, 3/4" C	1.00					SPARE	20	16
17	20	9-COMPUTER QUAD RECEPTACLE	R	1.00	2-12 + 1#12G, 3/4" C	1.00					SPARE	20	18
19	20	12-ROLLING MEDIA RACK	R	0.50	2-12 + 1#12G, 3/4" C	0.50					SPARE	20	20
21	20	17-SAFETY SPEED CUTTER	R	0.50	2-12 + 1#12G, 3/4" C	0.50					SPARE	20	22
23	20	11-FASTSIGNS MANIFESTO	R	0.50	2-12 + 1#12G, 3/4" C	0.50					SPARE	20	24
25	20	14-CEILING MTD "REEL"	R	0.50	2-12 + 1#12G, 3/4" C	0.50					SPARE	20	26
27	20	14-CEILING MTD "REEL"	R	0.50	2-12 + 1#12G, 3/4" C	0.50					SPARE	20	28
29	20	25-EPSON SURECOLOR S80600 PRINTER	R	0.65	2-12 + 1#12G, 3/4" C	0.65					SPARE	20	30
31	20	12-ROLLING MEDIA RACK	R	0.50	2-12 + 1#12G, 3/4" C	0.50					SPARE	20	32
33	20	12-ROLLING MEDIA RACK	R	0.50	2-12 + 1#12G, 3/4" C	0.50					SPARE	20	34
35	20	26-MIMAKI CG-160FX-11 PLOTTER	R	0.50	2-12 + 1#12G, 3/4" C	0.50					SPARE	20	36
37	20	6-25" X 33" LIGHT BOXES	R	0.50	2-12 + 1#12G, 3/4" C	0.50					SPARE	20	38
39	20	9-COMPUTER QUAD RECEPTACLE	R	1.00	2-12 + 1#12G, 3/4" C	1.00					SPARE	20	40
41	20	9-COMPUTER QUAD RECEPTACLE	R	1.00	2-12 + 1#12G, 3/4" C	1.00					SPARE	20	42
						9.45			9.28				

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NO.	REVISION	DATE
1	REVISION 1	09/27/23
0	ISSUE FOR PERMIT	06/16/23

REVISIONS



PLUMBING SPECIFICATIONS:

PLUMBING SYMBOLS LIST

— SAN —	SANITARY SEWER (UNDERFLOOR)
— G SAN —	GREASE SANITARY SEWER (UNDERFLOOR)
----	VENT PIPING
----	COLD WATER PIPING
----	HOT WATER PIPING
----	HOT WATER RETURN PIPING
----	EXISTING HOT WATER PIPING
----	EXISTING COLD WATER PIPING
—○—	P-TRAP
—○—	PIPE UP
—○—	PIPE DROP
—○—	CLEANOUT
— —	PLUGGED OUTLET/CLEANOUT
●	POINT OF CONNECTION

PLUMBING ABBREVIATIONS

CO	CLEANOUT
CW	COLD WATER
HW	HOT WATER
HWR	HOT WATER RETURN
SAN	SANITARY
V	VENT
W	WASTE
LAV	LAVATORY
WC	WATER CLOSET
TYP.	TYPICAL
DN	DOWN
AFF	ABOVE FINISH FLOOR
FD	FLOOR DRAIN
BFP	BACK FLOW PREVENTER
WH	WATER HEATER
N.I.C.	NOT IN SCOPE
ET	EXPANSION TANK
FFD	FUNNEL DRAIN

PLUMBING DRAWING LIST

P-0	PLUMBING SYMBOLS & SPECIFICATIONS
P-1	PLUMBING FLOOR PLANS
P-2	PLUMBING DETAILS
P-3	PLUMBING RISERS & SCHEDULES
P-4	TITLE-24 SHEET (1 OF 2)
P-5	TITLE-24 SHEET (2 OF 2)

BUILDING DEPARTMENT PLUMBING NOTES

- ALL PLUMBING SYSTEMS (SANITARY, WASTE, VENT, WATER, STORM) AND ASSOCIATED EQUIPMENT SHALL BE INSTALLED, OPERATED AND MAINTAINED IN ACCORDANCE WITH THE REQUIREMENTS OF 2019 CALIFORNIA PLUMBING CODE.
- INSTALLATION OF UNDERGROUND PIPING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC 701
- PROTECTION OF PIPING AND PLUMBING SYSTEM COMPONENTS AS PER SECTION PC 312.
- TRENCHING, EXCAVATION AND BACKFILL AS PER SECTION PC 314.
- RODENT PROOFING AS PER PC 312.12
- MATERIALS USED IN PLUMBING SYSTEMS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC 312, PC 604, PC 701, PC 903, PC 1102.
- EQUIPMENT CONNECTIONS AND JOINING OF PIPING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTERS 4, 5, 6, 7 AND 9.
- DEEP SEAL TRAPS FOR FLOOR DRAINS SHALL BE PROVIDED AS PER PC 1002, AND CLEAN-OUTS SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC 708
- DRAINAGE PIPE CLEANOUTS AS PER SECTION PC 719.
- VERTICAL AND HORIZONTAL PIPING SHALL BE SUPPORTED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC 313
- WATER SUPPLY SYSTEMS SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTER 6 SECTION PC 601-603, 604, 606, 607, 608, 610
- THE SANITARY DRAINAGE SYSTEM SHALL BE SIZED AND INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTER 7 SECTION PC 701, 704, 705, 706, 707, 708, 711.
- VENT PIPING FOR THE SANITARY DRAINAGE SYSTEM SHALL BE INDICATED IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTER 9 SECTIONS PC 901 THROUGH PC 912 THROUGH PC 917
- INSPECTION AND TESTING OF PLUMBING SYSTEMS SHALL BE IN ACCORDANCE WITH SECTION PC 107.

1. BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS

1.01 SCOPE

- A. PROVIDE ALL MATERIAL, TOOLS, SUPERVISION AND LABOR INCLUDING ALL MISCELLANEOUS AND INCIDENTAL ITEMS REQUIRED FOR COMPLETE AND OPERABLE PLUMBING INSTALLATIONS AS SHOWN OR DESCRIBED ON THE DRAWINGS AND IN THESE SPECIFICATIONS.
- B. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING AND NEW CONDITIONS AND MATERIALS WITHIN THE CONSTRUCTION AREA. ANY DAMAGE CAUSED BY THE CONTRACTOR SHALL BE REPAIRED TO THE OWNER'S SATISFACTION.
- C. OBTAIN ALL PERMITS, PAY ALL PERMIT FEES AND SCHEDULE ALL REQUIRED INSPECTIONS. COPIES OF ALL PERMITS AND INSPECTION CERTIFICATES SHALL BE FORWARDED TO THE OWNER FOR RECORD.
- D. THE GENERAL CONDITIONS OF THE CONTRACT AND ALL DIVISION 1 REQUIREMENTS APPLY TO THE WORK OF THIS SECTION.
- E. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING BID TO DETERMINE CONDITIONS AND THE EXTENT OF THE WORK. BY COMMENCING WORK, THE CONTRACTOR ACKNOWLEDGES HIS CONFIRMATION OF ALL CONDITIONS AS ACCEPTABLE WITH REFERENCE TO HIS CONTRACT, SCOPE OF WORK AND BID PRICE SUCH THAT NO ADDITIONAL COMPENSATION SHALL BE FORTHCOMING FOR UNFORESEEN EXISTING CONDITIONS.

- F. IN ALL AREAS SUBJECT TO FREEZING CONDITIONS, THE CONTRACTOR SHALL PROVIDE FREEZE PROTECTION FOR ALL DOMESTIC WATER PIPING INSTALLED UNDER HIS CONTRACT.

- G. ALL ELECTRICAL REQUIREMENTS SHALL BE COORDINATED WITH THE CONTRACTOR FOR ELECTRICAL WORK. THIS CONTRACTOR IS RESPONSIBLE FOR ALL LOW VOLTAGE WIRING FOR EQUIPMENT INSTALLED UNDER HIS CONTRACT. THE CONTRACTOR FOR ELECTRICAL WORK IS RESPONSIBLE FOR LINE VOLTAGE POWER WIRING ONLY.

- H. COLOR AND FINISH SELECTIONS FOR ALL MATERIALS, INCLUDING PAINTING OF PIPING, SHALL BE AS DIRECTED AND/OR APPROVED BY THE ARCHITECT.

- I. MINOR DETAILS NOT SHOWN OR SPECIFIED, BUT NECESSARY FOR THE PROPER AND ACCEPTABLE CONSTRUCTION, INSTALLATION OR OPERATION OF ANY PART OF THE WORK AS DETERMINED BY THE ENGINEER SHALL BE INCLUDED AS IF SPECIFIED OR INDICATED ON THE DRAWINGS.

- J. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL REQUIREMENTS FOR THE INSTALLATION, CONNECTION, EXTENSION OR MODIFICATION TO ALL UTILITY SERVICES WITH RESPECTIVE PROVIDERS INCLUDING PAYMENT OF ALL ASSOCIATED FEES.

- K. THE CONTRACTOR IS RESPONSIBLE FOR ALL PAINTING ASSOCIATED WITH CUTTING AND PATCHING. ALL PAINTING IN AREAS WITH COMPLETE FINISH RENOVATIONS SHALL BE PROVIDED BY THE GENERAL CONTRACTOR.

1.02 SUBMITTALS

- A. SUBMITTAL REQUIREMENTS SHALL BE COORDINATED WITH THE ARCHITECT AND AUTHORITIES HAVING JURISDICTION. UNLESS OTHERWISE DIRECTED, CONTRACTOR SHALL PROVIDE SUBMITTALS AS LISTED BELOW.

- PIPE AND FITTINGS
- VALVES
- HANGERS AND SUPPORTS
- PLUMBING PIPING LAYOUT
- TESTS
- PLUMBING FIXTURES
- WATER HEATERS & ACCESSORIES
- MIXING VALVES
- ALL SCHEDULED PLUMBING EQUIPMENT

- B. SUBMITTALS FROM SUPPLIERS OR MANUFACTURERS WHICH DO NOT BEAR THE STAMP OF THE SUBMITTING CONTRACTOR INDICATING THAT THE CONTRACTOR HAS REVIEWED THE SUBMITTAL FOR CONFORMANCE WITH THE PROJECT REQUIREMENTS WILL BE RETURNED REJECTED.

- C. THE ENGINEER'S REVIEW OF SUBMITTALS IS A COURTESY WHICH DOES NOT RELIEVE THE CONTRACTOR FROM CONFORMING WITH THE CONSTRUCTION DOCUMENTS REGARDLESS OF THE ACTION INDICATED BY THE SHOP DRAWINGS STAMP.

- D. REVIEW OF SHOP DRAWINGS BY THE ENGINEER SHALL BE LIMITED TO THE INITIAL REVIEW, AND A SECOND REVIEW OF ANY REQUIRED RESUBMITTED DATA. IF THE ENGINEER IS REQUIRED TO REVIEW SHOP DRAWINGS FOR A THIRD (OR MORE) SUBMISSION OF THE SAME ITEM, THE CONTRACTOR SHALL BE LIABLE FOR COMPENSATING THE ENGINEER FOR THESE SUBSEQUENT REVIEWS AS PER THE ENGINEER'S CURRENT HOURLY RATE SCHEDULE.

- E. SUBMIT PROOF OF APPROVAL AND/OR CONFIRMATION OF SATISFACTORY TEST RESULTS TO THE OWNER AND THE ARCHITECT.

- F. SUBMIT TO THE OWNER'S MAINTENANCE PERSONNEL OPERATION AND MAINTENANCE DATA FOR ALL SYSTEM COMPONENTS, SERVICING REQUIREMENTS, INSPECTION DATA, REPLACEMENT PART NUMBERS AND AVAILABILITY AND CONTACT INFORMATION FOR SERVICE/SUPPLY COMPANY.

- G. FOR ALL BELOW GRADE PIPING WHERE ACTUAL INSTALLATION DEVIATES FROM DRAWINGS, THE CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS INDICATING BELOW GRADE PIPE LOCATIONS DIMENSIONED TO NEAREST COLUMN LINES.

- H. RECORD AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE OWNER/TENANT AFTER COMPLETION OF THE WORK SHOWING ANY ALTERATIONS, ADDITIONS AND/OR DELETIONS TO THE SYSTEM(S) INSTALLED.

1.03 SUBSTITUTIONS

- A. ALL EQUIPMENT SHALL BE PRODUCTS OF THE SPECIFIED MANUFACTURER OR MANUFACTURERS. ALL BIDS SHALL BE BASED ON THE SPECIFIED MANUFACTURER OR MANUFACTURERS' EQUIPMENT. FOR SUBSTITUTIONS OF OTHER MANUFACTURER'S EQUIPMENT TO BE CONSIDERED, THE SUBSTITUTION MUST BE INDICATED PRIOR TO BIDDING WITH THE REASON FOR THE PROPOSED SUBSTITUTION IDENTIFIED, AND THE PROPOSED CREDIT TO THE OWNER INDICATED. THE ENGINEER SHALL DETERMINE THE ACCEPTABILITY OF ANY PROPOSED SUBSTITUTIONS.

- B. THE CONTRACTOR ASSUMES ALL RESPONSIBILITY FOR COORDINATING THE WORK OF OTHER TRADES WHICH MAY BE AFFECTED BY SUBSTITUTIONS, INCLUDING ALL RELATED COSTS.

1.05 DEFINITIONS

- A. FURNISH: TO PURCHASE, PROCURE, ACQUIRE AND DELIVER, COMPLETE WITH RELATED ACCESSORIES.
- B. INSTALL: TO ERECT, MOUNT AND CONNECT, COMPLETE WITH RELATED ACCESSORIES.
- C. PROVIDE: TO FURNISH AND INSTALL.
- D. PLUMBING CONTRACTOR, THE CONTRACTOR, THIS CONTRACTOR: THE CONTRACTOR FOR PLUMBING WORK WHICH IS SPECIFIED HEREIN AND SHOWN ON THESE DRAWINGS.

1.06 DRAWINGS

- A. THE DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO ILLUSTRATE THE GENERAL ARRANGEMENT AND ROUTING OF PIPING AND GENERAL LOCATIONS OF EQUIPMENT. PRECISE LOCATIONS OF EQUIPMENT, RISERS AND STACKS, AND ROUTING AND ELEVATION OF ALL PIPING SYSTEMS SHALL BE COORDINATED IN THE FIELD WITH THE ARCHITECT, ARCHITECTURAL DRAWINGS, THE WORK OF OTHER TRADES, EXISTING AND NEW BUILDING CONDITIONS AND/OR THE PREFERENCES OF THE OWNER/TENANT AS CONSTRUCTION PROCEEDS. ALL PIPING SHALL BE INSTALLED CONCEALED IN FINISHED SPACES, UNLESS NOTED OTHERWISE.

- B. PROVIDE ALL NECESSARY INCIDENTAL MATERIALS AND ACCESSORIES REQUIRED TO MAKE THE WORK COMPLETE IN ALL RESPECTS, EVEN IF NOT PARTICULARLY SHOWN OR SPECIFIED.

- C. REFER TO PLUMBING EQUIPMENT/FIXTURE SCHEDULE ON THE DRAWINGS FOR ALL FIXTURE AND EQUIPMENT SPECIFICATIONS.

- D. REFER TO FIXTURE CONNECTION SIZE SCHEDULE FOR ALL FIXTURE ROUGHING SIZE REQUIREMENTS.

- E. VERIFY ALL INDICATED CONDITIONS BEFORE STARTING WORK AND REPORT ANY DISCREPANCIES. THE DRAWINGS REFLECT CONDITIONS WHICH CAN BE REASONABLY INTERPRETED FROM THE EXISTING VISIBLE CONDITIONS OR FROM DRAWINGS AND INFORMATION FURNISHED BY THE OWNER.

- F. LOCATE ALL FIXTURES AND EQUIPMENT AS PER THE FINAL ARCHITECTURAL DRAWINGS.

1.07 PRODUCTS

- A. SANITARY AND VENT PIPING:

1. ABOVE GRADE PIPING SHALL BE HUBLESS CAST IRON PIPE WITH STAINLESS STEEL COUPLINGS AND ELASTOMERIC GASKETS WITH A MINIMUM 4 BANDS PER COUPLING.

2. SLOPE OF DRAINAGE SYSTEM SHALL BE 1/8" PER FOOT OF RUN FOR PIPE OVER 3" (I.D.) AND 1/4" PER FOOT OF RUN FOR PIPE 3" AND SMALLER (I.D.). VENT PIPING SHALL BE PITCHED TO DRAIN.

3. ALL CAST IRON SOIL PIPE AND FITTINGS SHALL BE MARKED WITH THE COLLECTIVE TRADEMARK OF THE CAST IRON SOIL PIPE INSTITUTE (CISPI) AND BE LISTED BY NSF INTERNATIONAL.

A.1 DOMESTIC WATER PIPING:

1. ABOVE GRADE WATER PIPING SHALL BE TYPE 'L' HARD-DRAWN COPPER TUBE.

2. FITTINGS IN DOMESTIC WATER PIPING SHALL BE WROUGHT COPPER OR CAST BRASS.

3. JOINTS SHALL BE MADE WITH LEAD-FREE SOLDER.

4. THE ENTIRE DOMESTIC WATER DISTRIBUTION SYSTEM SHALL BE INSULATED INCLUDING ALL VALVES, FITTINGS, ETC.

5. COMPLY WITH NSF 61 FOR MATERIALS FOR WATER-SERVICE PIPING AND SPECIALTIES FOR DOMESTIC WATER.
6. ALL DOMESTIC WATER PIPING ABOVE GRADE SHALL BE INSULATED WITH FIRE-RETARDENT, FACTORY APPLIED JACKET. PROVIDE COLD WATER PIPING WITH FACTORY-APPLIED VAPOR BARRIER. INSULATION REQUIREMENT SHOULD COMPLY WITH CALIFORNIA STATE ENERGY CODE 2019, SECTION 150.0.

7. AS PER CALIFORNIA STATE ENERGY CODE 2019, SERVICE WATER HEATING EQUIPMENT SHALL BE EQUIPPED WITH AUTOMATIC TEMPERATURE CONTROLS CAPABLE OF ADJUSTING FROM THE LOWEST TO THE HIGHEST ACCEPTABLE TEMPERATURE SETTING FOR THE INTENDED USE AS PER TABLE 613.1 OF THE CALIFORNIA STATE PLUMBING CODE.

8. AS PER CALIFORNIA STATE ENERGY CODE 2019, SYSTEMS DESIGNED TO MAINTAIN USAGE TEMPERATURES IN HOT WATER PIPES, SUCH AS RECIRCULATING HOT WATER SYSTEM SHALL BE EQUIPPED WITH AUTOMATIC TIME SWITCHES OR OTHER CONTROLS THAT CAN BE SET TO SWITCHES OF THE USAGE TEMPERATURE MAINTENANCE SYSTEM DURING EXTENDED PERIOD WHEN HOT WATER IS NOT REQUIRED.

9. AS PER CALIFORNIA STATE PLUMBING CODE, SECTION 613.5, TEMPERATURE CONTROL VALVE SHALL BE PROVIDED TO AUTOMATICALLY REGULATE THE TEMPERATURE OF HOT WATER DELIVERED TO PLUMBING FIXTURE TO A RANGE OF 105°F (41°C) MINIMUM TO 120°F (49°C) MAXIMUM.

10. INSULATION REQUIREMENT SHOULD COMPLY WITH CALIFORNIA STATE ENERGY CODE 2019. REFER BELOW TABLE FOR MINIMUM PIPE INSULATION THICKNESS ACC. TO CALIFORNIA PLUMBING CODE 2019 SECTION 609.11, 2019 CALIFORNIA ENERGY CODE 2019 SECTION 120.3

MINIMUM PIPE INSULATION THICKNESS				
FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	INSULATION CONDUCTIVITY (BTU IN./(H FT2 °F))	MEAN RATING TEMPERATURE, °F	<1	1 to < 1½
141-200	0.25-0.29	125	1.5	1.5
105-140	0.22-0.28	100	1.0	1.5

11. SEAL ALL JOINTS BETWEEN SEGMENTS OF INSULATION.
12. PROVIDE SHIELDS BETWEEN HANGERS AND INSULATION.

B. HANGERS AND SUPPORTS:

1. HANGERS SHALL BE STANDARD STEEL, MALLEABLE OR WROUGHT IRON, AS MANUFACTURED BY GRINNELL OR APPROVED EQUAL, SUITABLE FOR THE TYPE OF CONSTRUCTION. PIPING SHALL NOT BE HUNG FROM OTHER PIPE.

2. SECTIONS OF INDIVIDUAL PIPE RUNS SHALL BE SUPPORTED BY CLEVIS HANGERS.

3. ALL EQUIPMENT SHALL BE PROVIDED WITH APPROVED SUPPORTS.

4. PROVIDE SEISMIC RESTRAINTS IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL CODES AND STANDARDS AND THE REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION.

5. SUPPORTS SHALL BE PROVIDED IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE PIPING MANUFACTURER.

C. VALVES:

1. PROVIDE GATE VALVES, BUTTERFLY OR BALL VALVES FOR SHUT-OFF DUTY ON MAIN AND BRANCH SUPPLY LINES. FOR ALL PIPE RUNS 2" AND SMALLER, PROVIDE BALL FOR ALL PIPE RUNS LARGER THAN 2" AND SMALLER THAN 4", PROVIDE GATE VALVES. PIPING 4" AND LARGER, PROVIDE BUTTERFLY VALVES FOR SHUT-OFF DUTY.

2. ALL FIXTURES WITH THE EXCEPTION OF FLUSHMETER-EQUIPPED WATER CLOSETS AND URINALS SHALL HAVE STOP VALVES TO CONTROL SUPPLY TO THE FIXTURE. WHERE SUPPLIES ARE EXPOSED PROVIDE CHROME-PLATED STOPS WITH CHROME-PLATED ESCUTCHEONS ON PIPING PENETRATIONS.

3. ALL PLUMBING FIXTURES AND EQUIPMENT TO HAVE SHUT-OFF VALVES ON SUPPLY LINES.

4. ALL BRANCH LINES TO HAVE SHUT-OFF VALVES.

5. ALL VALVES SHALL BE ACCESSIBLE. PROVIDE ACCESS DOORS WHERE REQUIRED FOR VALVE ACCESS.

6. PROVIDE GLOBE VALVES FOR THROTTLING/BALANCING OF THE HOT WATER CIRCULATING SYSTEM.

- D. INSTALL PIPING TO CONSERVE BUILDING SPACE. DO NOT INTERFERE WITH USE OF BUILDING SPACE AND THE WORK OF OTHER TRADES. ALL PIPING RUN IN CEILING SHALL BE INSTALLED TIGHT TO THE STRUCTURE ABOVE.

- E. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE, JOINTS OR CONNECTED EQUIPMENT. PROVIDE PIPE ANCHORS, GUIDES AND EXPANSION JOINTS OR LOOPS IN ALL HOT WATER AND HOT WATER CIRCULATING MAIN SUPPLY PIPING AND SEGMENTS OF SUCH PIPE THAT EXCEED 30'-0" IN LENGTH.

- F. IN ALL AREAS WITH FINISHED SURFACES, SYSTEM PIPING AND COMPONENTS SHALL BE CONCEALED ABOVE OR WITHIN FINISHED SURFACES.

- G. REDUCTIONS IN PIPE SIZES SHALL BE MADE WITH ONE-PIECE REDUCING FITTINGS. BUSHINGS ARE NOT ACCEPTABLE. USE FLANGED FITTINGS AT THE BASE OF RISERS.

- H. VENT PENETRATIONS THROUGH THE ROOF SHALL BE FLASHED.

- I. IF WATER PRESSURE EXCEEDS 80 PSI, A WATER PRESSURE REDUCING VALVE SHALL BE INSTALLED IN WATER PIPING AT CONNECTION TO MAIN.

- J. PROVIDE DIELECTRIC FITTINGS BETWEEN DISSIMILAR METALS.

- K. PIPE BACKFLOW PREVENTER DRAINS TO FLOOR DRAIN OR OTHER APPROVED INDIRECT WASTE SOURCE.

- L. PROVIDE ACCESS DOORS/PANELS FOR SERVICE AND ACCESS TO ALL VALVES AND OTHER SYSTEM COMPONENTS ENCLOSED IN WALLS AND CEILINGS. ACCESS DOORS SHALL BE FURNISHED BY THIS CONTRACTOR, INSTALLED BY THE GENERAL CONTRACTOR.

- M. ALL FIXTURES REQUIRING VACUUM BREAKERS SHALL BE EQUIPPED WITH INTEGRAL VACUUM BREAKERS.

- N. ANY PENETRATIONS THROUGH FIRE RATED PARTITIONS, FLOORS, OR CEILINGS SHALL BE STEEL SLEEVED AND SEALED WITH 3M BRAND UL RATED FIRE BARRIER CAULK OR APPROVED EQUAL.

- O. WHEN THE WATER PIPING SYSTEM IS COMPLETE, THOROUGHLY FLUSH ALL DIRT, SEDIMENT, SOLDER, ETC., OUT OF THE SYSTEM, REMOVING ALL STRAINERS, VALVE STEM SEATS, ETC., REQUIRED TO ACCOMPLISH THE FLUSHING.

- P. AT ALL INDIRECT WASTE DRAINS, MAINTAIN AIR GAP AS REQUIRED BY CODE.

- Q. INSTALL SLEEVES FOR ALL PIPES WHICH PASS THROUGH WALLS, FLOORS, AND CEILINGS. WHERE PIPES ARE TO BE INSULATED, THE SLEEVE SHALL BE LARGE ENOUGH TO ACCOMMODATE INSULATION. SLEEVES SHALL BE FLUSH WITH FINISHED SURFACES AT BOTH ENDS. ON FINISHED SURFACES IN EXPOSED AREAS PROVIDE ESCUTCHEONS COMPATIBLE WITH FINISH.

2.01 INSTALLATION

2.01 GENERAL

- T. ALL WORK WHICH REQUIRES DISRUPTION OF THE ROOFING SHALL BE DONE BY A CONTRACTOR CERTIFIED BY THE ROOFING MANUFACTURER AS REQUIRED TO MAINTAIN ANY EXISTING ROOF WARRANTIES.

- U. EXTERIOR INSTALLATIONS TO BE WEATHER PROOF IN ALL RESPECTS.

- V. EXTERIOR MATERIALS AND EQUIPMENT SHALL BE PAINTED TO PREVENT CORROSION, COLOR PER ARCHITECT.

- W. COORDINATE THE PLUMBING WORK WITH ALL OTHER AFFECTED WORK AND THE CONSTRUCTION SCHEDULE.

- X. REAM PIPE AND TUBE ENDS. REMOVE BURRS. BEVEL PLAIN AND FERROUS END PIPE.

- Y. REMOVE SCALE AND FOREIGN MATERIAL, FROM INSIDE AND OUTSIDE, BEFORE ASSEMBLY.

- Z. PREPARE PIPING CONNECTIONS TO EQUIPMENT WITH FLANGES AND UNIONS.

- AA. COORDINATION WITH THE WORK OF OTHER TRADES IS REQUIRED. PROVIDE OFFSETS IN PIPING SYSTEMS OR MINOR DEVIATIONS TO THE INDICATED PIPE ROUTING IN ORDER TO COORDINATE THE PLUMBING WORK WITH THE WORK OF ALL OTHER TRADES AND THE GENERAL BUILDING CONDITIONS.

- AB. NO DOMESTIC WATER PIPING SHALL BE INSTALLED IN UNHEATED SPACES.

- AC. PRIOR TO DISCONNECTING AND CONNECTING NEW WORK TO EXISTING SYSTEMS, THE PLUMBING CONTRACTOR SHALL NOTIFY THE PROPERTY MANAGER AND OFFER A PROPOSED SCHEDULE OF WORK. ESB WILL AUTHORIZE CONNECTIONS AND COORDINATE NECESSARY SHUT DOWNS AND DRAIN DOWNS AS REQUIRED. SHUT DOWNS AND DRAIN DOWNS MAY BE PERFORMED BY THE PLUMBING CONTRACTOR ONLY AFTER RECEIVING ESB AUTHORIZATION, AND SHOULD BE PERFORMED UNDER SUPERVISION OF ESB PERSONNEL. THREE (3) DAYS ADVANCE NOTICE TO THE PROPERTY MANAGER IS REQUIRED.

- AD. THE PLUMBING CONTRACTOR IS ADVISED THAT DUE TO THE NATURE OF THE OPERATIONS AND TENANT REQUIREMENTS, CONNECTIONS TO EXISTING SYSTEMS MAY HAVE TO BE MADE AFTER REGULAR WORKING HOURS. THE PROPERTY MANAGER WILL ADVISE THE PLUMBING CONTRACTOR OF THE TIME CONSTRAINTS UPON RECEIPT AND APPROVAL OF THE PLUMBING CONTRACTOR'S REQUEST FOR SHUT DOWN AND CONNECTION TO EXISTING SYSTEMS.

- AE. WHEN CONNECTING TO EXISTING STACKS AND RISERS, PROVISION IS TO BE MADE FOR FUTURE CONNECTIONS BY PROVIDING CAPPED AND VALVED OUTLETS ON DOMESTIC WATER RISERS AND PLUGGED OUTLETS ON THE SANITARY AND VENT STACKS.

2.02 ABOVE GRADE

- A. INSTALL PLUMBING PIPING IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICES TO ENSURE THAT PIPING COMPLIES WITH REQUIREMENTS AND SERVES INTENDED PURPOSES.

- B. ROUTE PIPING IN AN ORDERLY MANNER, PLUMB AND PARALLEL TO BUILDING STRUCTURE. MAINTAIN GRADIENT. SLOPE PIPING AND ARRANGE SYSTEMS TO DRAIN. IN DOMESTIC WATER SYSTEMS, PROVIDE DRAIN VALVES AT MAIN SHUT-OFF VALVES AND ALL LOW POINTS IN PIPING.

- C. USE EXISTING CONNECTIONS AT MAINS WHERE AVAILABLE FOR NEW BRANCH PIPING. LOCATE ALL RISERS AND PIPING BEFORE CONSTRUCTION COMMENCES AND TAKE CARE NOT TO DAMAGE SAME. ANY DAMAGE OCCURRING TO THE EXISTING PIPING WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

3. TESTING

- A. AT THE COMPLETION OF THE PLUMBING WORK, COMPLETELY TEST THE ENTIRE INSTALLATION OF ALL SYSTEMS FOR PROPER OPERATION AND COMPLIANCE WITH APPLICABLE CODES AND LOCAL REQUIREMENTS. CORRECT ALL DEFICIENCIES FOUND.

- B. TESTING OF THE INSTALLED SYSTEMS SHALL BE MADE BY THE CONTRACTOR IN THE PRESENCE OF A REPRESENTATIVE OF THE OWNER.

- C. THE CONTRACTOR SHALL NOT COVER UP OR PERMANENTLY CONCEAL PIPING, DEVICES OR ANY PORTION OF NEWLY CONSTRUCTED PLUMBING SYSTEM(S) UNTIL SUCH SYSTEM, OR PORTION OF THE SYSTEM, HAS BEEN TESTED IN THE PRESENCE OF A REPRESENTATIVE OF THE OWNER AND INSPECTED BY THE LOCAL INSPECTOR AND APPROVED IN WRITING, EXCEPT PIPING PASSING THROUGH FLOORS, WALLS, PARTITIONS, OR BEAMS, FOR DISTANCES EQUAL TO THE THICKNESS OF SUCH FLOOR, WALL, PARTITION OR BEAM.

- D. THIS CONTRACTOR SHALL NOTIFY THE VARIOUS DEPARTMENTS, BUREAUS AND INDIVIDUALS AT LEAST TWO WEEKS IN ADVANCE OF THE TIME THAT THE TESTS ARE TO BE CONDUCTED.

- E. ALL DEFECTIVE PARTS SHALL BE REPLACED OR CORRECTED BY THIS CONTRACTOR AND AN EXTRA TEST OR TESTS SHALL BE MADE UNTIL THE OPERATION IS SATISFACTORY. ALL ARRANGEMENTS AND EXPENSES NECESSARY TO CONDUCT ALL TESTS REQUIRED BY THESE SPECIFICATIONS AND THE VARIOUS AGENCIES HAVING JURISDICTION OVER THE WORK INSTALLED UNDER THIS CONTRACT SHALL BE MADE BY THIS CONTRACTOR. NO EXTRA COMPENSATION WILL BE ALLOWED FOR THESE TESTS, THE COST THEREOF BEING INCLUDED IN THE LUMP SUM BID FOR THIS CONTRACT.

- F. WHERE ANY EVIDENCE OF STOPPAGE IS FOUND IN PIPING OR EQUIPMENT, THIS CONTRACTOR SHALL DISCONNECT, CLEAN, REPAIR AND RECONNECT ALL OBSTRUCTED PIPING OR EQUIPMENT AND SHALL ALSO PAY FOR ALL NECESSARY CUTTING AND REPAIRS TO ADJOINING WORK.

- G. ALL PIPING AND EQUIPMENT SHALL BE THOROUGHLY CLEANED INSIDE AND OUT, OF DIRT, CUTTINGS, OILS AND OTHER FOREIGN SUBSTANCES AND SHALL BE LEFT CLEAN.

- H. ALL REQUIRED TESTS SHALL BE WITNESSED BY LOCAL AUTHORITIES AND THE OWNER'S REPRESENTATIVE.

- J. ALL EQUIPMENT WILL BE FACTORY TESTED.

- I. CONTRACTOR SHALL IDENTIFY TO THE OWNER'S REPRESENTATIVE ANY LEAKS OR DAMAGE THAT OCCURS AS A RESULT OF SYSTEM TESTING. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO LIMIT ANY POTENTIAL DAMAGE. CORRECTIVE ACTION REQUIRED AS A RESULT OF TESTING SHALL BE PERFORMED IMMEDIATELY AND AT THE CONTRACTOR'S EXPENSE.

- K. REPORT IN WRITING TO AUTHORITIES HAVING JURISDICTION, THE ARCHITECT AND THE OWNER THE RESULTS OF ALL TESTING.

L. TESTING REQUIREMENTS

- a. TEST ALL DOMESTIC WATER PIPING HYDROSTATICALLY TO 125 PSIG.
- b. HYDROSTATIC TEST PRESSURES SHALL REMAIN CONSTANT WITH NO VARIATION FOR 120 MINUTES.
- c. TESTS SHALL BE WITNESSED BY THE BUILDING ENGINEER.
- d. THE PLUMBING CONTRACTOR WILL BE HELD RESPONSIBLE FOR ALL DAMAGE DUE TO TEST FAILURES AND LEAKAGE IN THE TEST AREA AND ADJACENT TENANT OR ESB SPACES.

- M. REFILL ENTIRE POTABLE HOT AND COLD WATER SUPPLY SYSTEM WITH CHLORINE SOLUTION (HTH OLIN CHEMICAL CORP.) AT A STRENGTH TO MEET STANDARDS OF THE DEPARTMENT OF HEALTH, AND FOR A PERIOD OF RETENTION AS STIPULATED.

- N. THOROUGHLY FLUSH PIPING SYSTEM WITH FRESH WATER IMMEDIATELY PRIOR TO FINAL ACCEPTANCE.

4. WARRANTY

- A. EQUIPMENT, MATERIALS AND WORKMANSHIP FURNISHED UNDER THIS CONTRACT SHALL BE GUARANTEED BY THE CONTRACTOR FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE OF THE WORK BY THE OWNER. THE CONTRACTOR SHALL KEEP THE WORK IN GOOD REPAIR FOR ONE YEAR AFTER THE DATE OF FINAL APPROVAL. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, PROMPTLY CORRECT AND REPAIR ANY AND ALL BREAKS, FAILURES OR WEAR DUE TO FAULTY MATERIALS, WORKMANSHIP OR EQUIPMENT. ALL SETTLEMENTS OF SURFACES THAT MAY OCCUR WITHIN THAT PERIOD SHALL ALSO BE PROMPTLY REPAIRED.

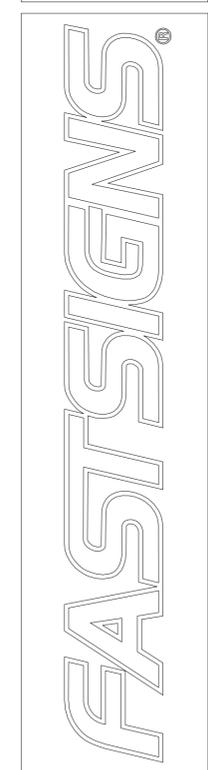
CONSULTANTS (ENGINEER):

NY ENGINEERS

NEARBY ENGINEERS
382 NE 191ST STREET SUITE
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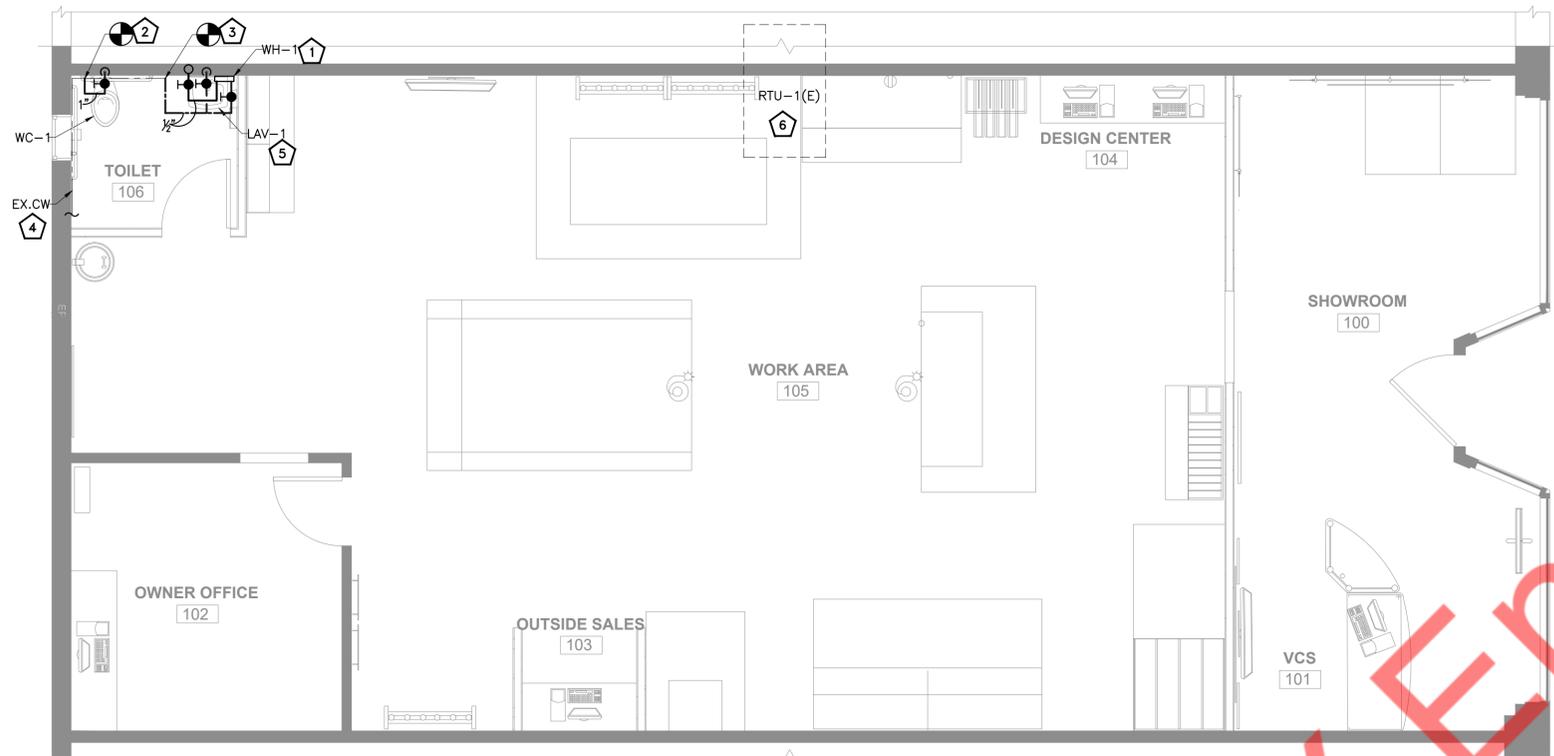
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SHEET NO.

PLUMBING SYMBOLS & SPECIFICATION

P-0



1 DOMESTIC WATER AND GAS PIPING PLAN
SCALE: 1/4" = 1'-0"

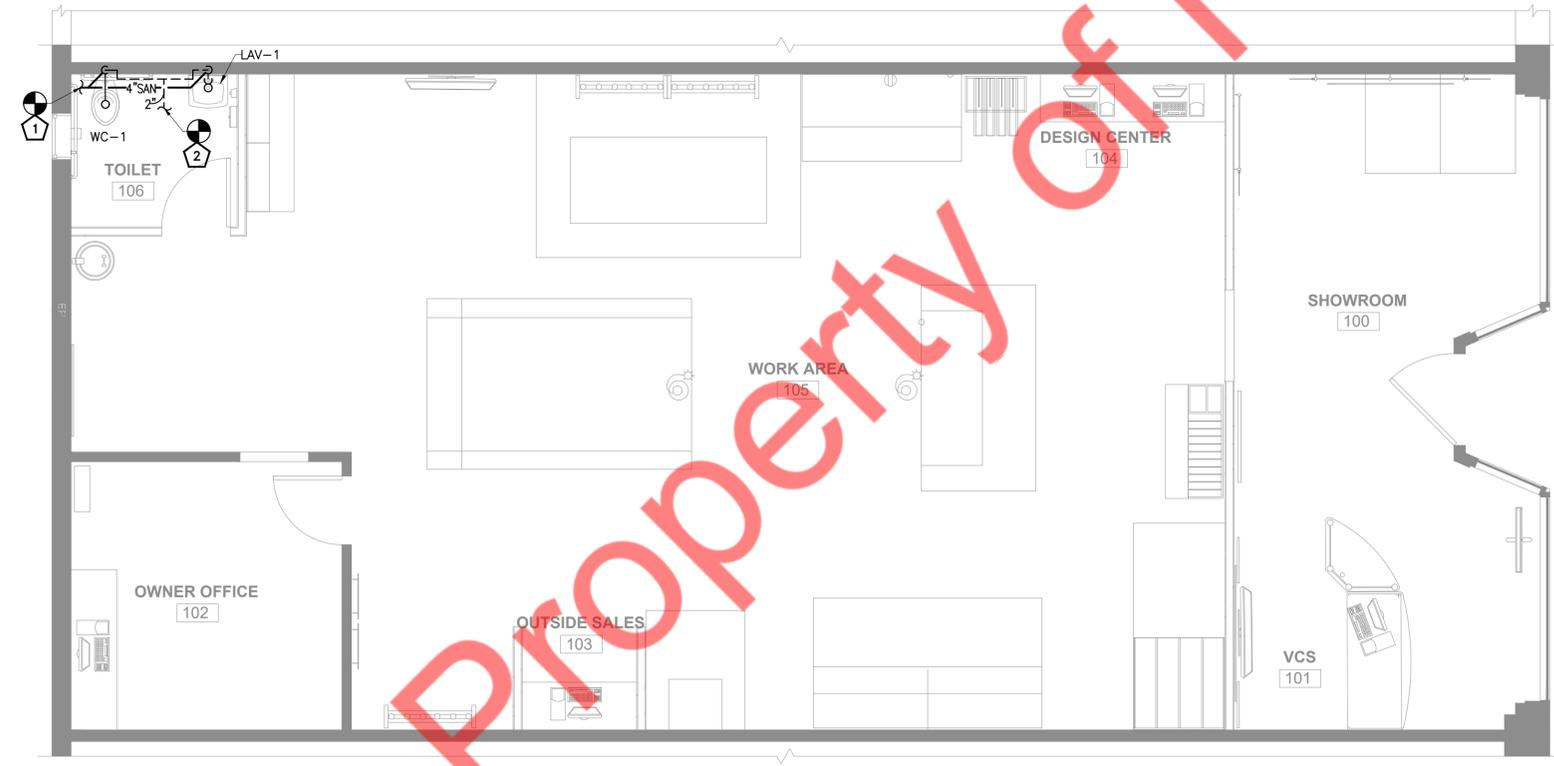
- GENERAL NOTES:**
1. PROVIDE BRANCH PRV IF PRESSURE EXCEEDS 80 PSI.
 2. PROVIDE ACCESS PANELS FOR WATER HAMMER ARRESTOR, CLEANOUTS & SHUT-OFF VALVES AS REQUIRED.
 3. ANY ROOF PENETRATION SHALL BE PERFORMED BY LANDLORD'S ROOFERS AT LANDLORD OPTION, A BONDED ROOFER APPROVED IN ADVANCE BY LANDLORD.
 4. REFER RISER DIAGRAMS FOR ALL PIPE SIZES.
 5. CW/HW PIPING TO BE PROVIDED WITH INSULATION AS PER CALIFORNIA STATE ENERGY CODE 2019(REFER SHEET PD.1)

- WATER AND GAS PIPING KEYED NOTES:**
- 1 PROVIDE NEW ELECTRIC POINT OF USE WATER HEATER FOR LAVATORY.
 - 2 CONNECT NEW 1" CW LINE TO EXISTING CW LINE IN SPACE. CONTRACTOR TO FIELD VERIFY THE SIZE, LOCATION OF EXISTING CW LINE. UPGRADE IF REQUIRED.
 - 3 CONNECT NEW 1/2" CW LINE TO EXISTING CW LINE IN SPACE. CONTRACTOR TO FIELD VERIFY THE SIZE, LOCATION OF EXISTING CW LINE. UPGRADE IF REQUIRED.
 - 4 CONTRACTOR TO FIELD VERIFY THE SIZE, CONDITION AND LOCATION OF EXISTING BFP AND WATER METER. UPGRADE IF REQUIRED. BASE BID ACCORDINGLY.
 - 5 PROVIDE ASSE 1070 OR SIMILAR APPROVED TEMPERING VALVE FOR LAVATORY. SET AT TEMPERATURE TO A MAXIMUM 110F.
 - 6 EXISTING RTU WITH EXISTING ACCESSORIES AND GAS PIPING TO REMAIN. CONTRACTOR TO FIELD VERIFY THE CONDITION OF EXISTING PIPING. REPLACE IF REQUIRED.

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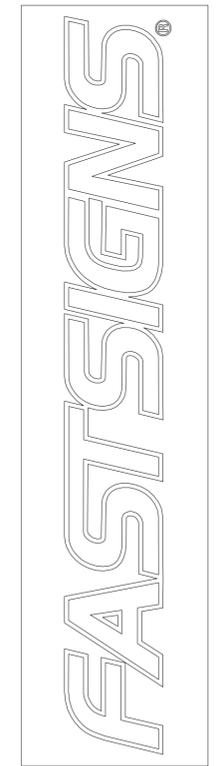
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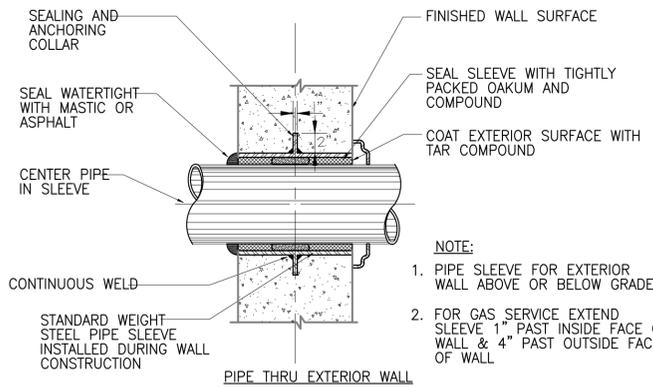


2 SANITARY PIPING PLAN
SCALE: 1/4" = 1'-0"

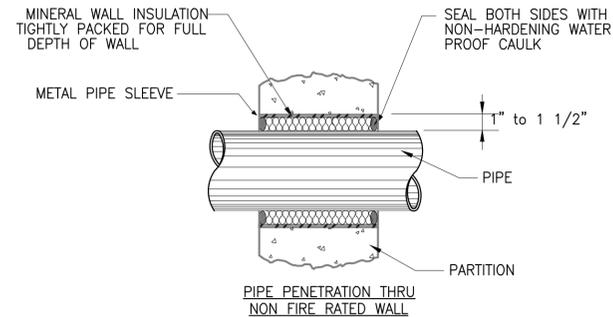
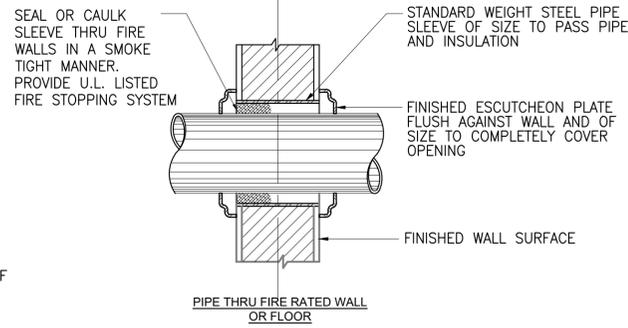
- GENERAL NOTES:**
1. ANY UNUSED PLUMBING EQUIPMENT, PIPING, ETC., WITHIN OR SERVING THE PREMISES MUST BE COMPLETELY REMOVED TO POINT OF ORIGIN. DO NOT ABANDON IN PLACE.

- SANITARY PIPING KEYED NOTES:**
- 1 CONNECT NEW 4" SANITARY LINE TO EXISTING SANITARY LINE IN SPACE. CONTRACTOR TO FIELD VERIFY THE SIZE, LOCATION AND INVERT OF EXISTING SANITARY LINE.
 - 2 CONNECT NEW 2" VENT LINE TO EXISTING VENT LINE IN SPACE. CONTRACTOR TO FIELD VERIFY THE SIZE AND LOCATION OF EXISTING VENT LINE.



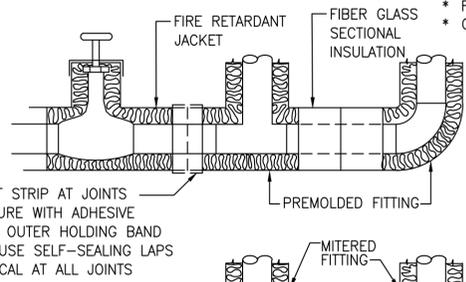


NOTE:
 1. PIPE SLEEVE FOR EXTERIOR WALL ABOVE OR BELOW GRADE
 2. FOR GAS SERVICE EXTEND SLEEVE 1" PAST INSIDE FACE OF WALL & 4" PAST OUTSIDE FACE OF WALL



1 PIPE SLEEVE THRU WALL SECTION
 P-2 N.T.S.

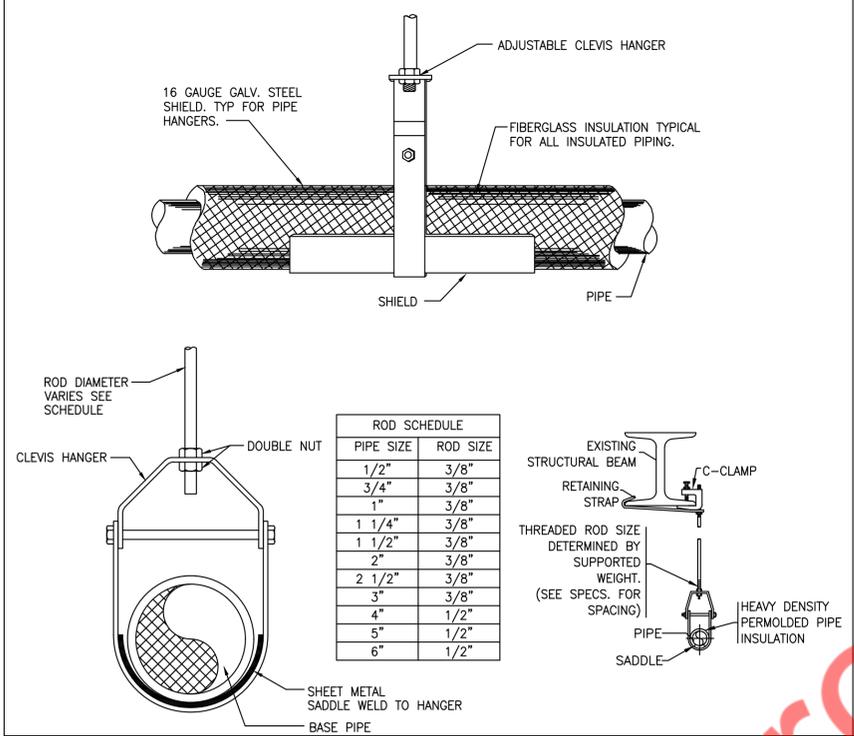
CONCEALED VALVES AND FITTINGS
 * WRAP WITH 1-INCH THICK, 1-POUND DENSITY TO REQUIRED PIPE INSULATION THICKNESS
 * SECURE WITH WIRE OR TAPE.
 * VAPOR SEAL COLD WATER, CHILLED WATER AND STORM WATER PIPING.



CONCEALED VALVES AND FITTINGS
 * PREMOLDED FIBER GLASS OR RADIAL MITERED PIPE INSULATION
 * SKIM COAT OF INSULATION CEMENT
 * COAT OF MASTIC
 * WRAP WITH FIBER GLASS REINFORCING CLOTH.
 * FINISH COAT OF MASTIC
 * OVERLAP 2-INCHES ON PIPE INSULATION.

SEALING LAP SECURE WITH ADHESIVE ALL SEALS AND LAPS AT TOP.

2 INSULATION OF PIPING, VALVES AND FITTINGS FOR EXPOSED AND CONCEALED LOCATIONS
 P-2 N.T.S.



3 HANGER DETAIL
 P-2 N.T.S.

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CHRONOMITE Electric Tankless Water Heater

INSTANT-FLOW® C-MICRO - LOW ACTIVATION

TECHNICAL DIMENSIONS
INSTANT-FLOW® C-MICRO - LOW ACTIVATION
 Dimensions: 6-1/4" (H) x 9-5/8" x 2-3/4"
 Weight: 5 lbs.
 Materials: Rugged cast aluminum housing, Celcon plastic element assembly with nichrome coils
 Housing Color: White
 Minimum Operating Flow Rate: 0.2 GPM
 Minimum Operating Pressure: 25 PSI
 Maximum Operating Pressure: 80 PSI
 Maximum Pressure: 150 PSI
 Maximum Water Temperature: 160°F
 Maximum Ambient Operating Temperature: 140°F
 Listing: UL, IAPMO, UPC, ADA, ETL

GENERAL NOTES:
 * The microprocessor adjusts the heater's power for variations in flow rates, inlet water temperature and pressure to assure the selected factory preset water temperature.
 * 240V models when operated at 220V will have approximately a 15% wattage decrease.
 * 220V models when operated 110V will have approximately a 15% wattage decrease.
 * Instant-Flow C-Micro is ideal for sensorless-free faucets with the needed 1/2" C.P.I. factory preset setting temperature - no mixing valve.
 * Factory setting of 110°F or above require cold water heating at hot-hand wash faucet.
 * Microprocessor limits temperature increase according to the pre-selected temperature.

Notes:
 1. Heater to be installed below the level of all hot water outlets provided by the Heater.
 2. Diagram shown with standard 3/8" Compression Fitting. Optional 1/2" NPT Male water connections available.

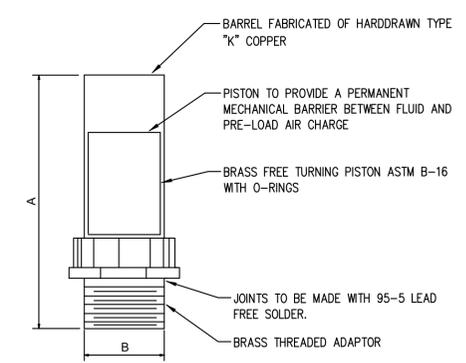
WIRING CONNECTION
 Hot or Neutral
 "GND" is Earth Ground
 Conduit
 Refer to Local Code for Wire size
 Attention: Unit must be hard wired.
 NOTE: Heaters are single phase. All tests are measured at the output of the heater.

Company: _____
 Model Number & Options: _____
 Quantity: _____
 Title: _____
 Date: _____

CHRONOMITE LABORATORIES, INC.
 PH. 800-447-4962
 626-937-4270
 FAX 626-937-4279
 www.chronomite.com

IPC8M-LP 02/01/22

4 POINT OF USE ELECTRIC WATER HEATER DETAIL
 P-2 N.T.S.



PIPE SIZE	P.D.I. SYMBOL	FIXTURE UNIT RATINGS	A SIZE	B SIZE
1/2"	A	1 - 11	5"	1/2"
3/4"	B	12 - 32	5"	3/4"
1"	C	33 - 60	7"	1"
1-1/4"	D	61 - 113	7"	1-1/4"
1-1/2"	E	114 - 154	9"	1-1/2"
2"	F	155 - 330	9"	2"

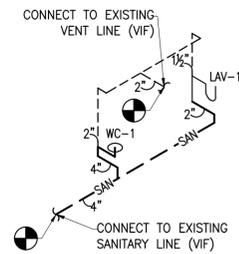
NOTE: LOCATE ONE FOR EACH BANK OF FLUSHMETER FIXTURES AT LAST FIXTURE PROVIDE A STAINLESS STEEL ACCESS DOOR FOR EACH SUFFICIENT IN SIZE TO ALLOW REPLACEMENT OF ARRESTOR AT A FUTURE DATE.

5 WATER HAMMER ARRESTOR DETAILS
 P-2 N.T.S.

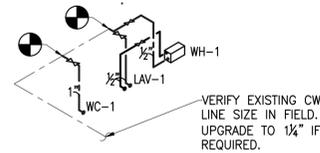
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FASTSIGNS



SANITARY AND VENT RISER DIAGRAM
NTS



WATER SUPPLY RISER DIAGRAM
NTS

WATER CALCULATION		
AVAILABLE PRESSURE	APPROXIMATE	60 PSI
PRESSURE ACROSS METER	LOSS	2 PSI
STATIC PRESSURE (ELEVATION) (10' x 0.43)	LOSS	4.34 PSI
MINIMUM PRESSURE TO BE MAINTAINED	LOSS	15 PSI
TOTAL PRESSURE AVAILABLE		38.66 PSI
DISTANCE FROM METER TO LAST FIXTURE		100'
TOTAL DEVELOPED LENGTH OF SYSTEM (X 1.25)		125'
ALLOW. PRESSURE LOSS FOR TOTAL RUN OF PIPE =(100xAVAILABLE PRESSURE)/TOTAL LENGTH OF RUN		30.92 PSI
AVERAGE PRESSURE DROP AVAILABLE FOR FRICTION		7.73 PSI

FIXTURE UNIT CALCULATION								
FIXTURE	QTY	EQUIPMENT CATEGORY	UNITS PER FIXTURE			TOTAL		
			CW	HW	TOTAL	CW	HW	TOTAL
WC-1	1	WATER CLOSET	8	0	8	8	0	8
LAV-1	1	LAVATORY	1	1	2	1	1	2
TOTAL FIXTURE UNITS			9	1	10	9	1	10
TOTAL FIXTURE UNITS 9 = 25 GPM								
WSFU VALUES AS PER CALIFORNIA PLUMBING CODE 2019 (UPC 2018) TABLE A 103.1								
PER CALIFORNIA PLUMBING CODE 2019(UPC 2018) CHART A 105.1(1) FOR 25 GPM CALCULATED PIPE SIZE IS 1-1/4".								

PLUMBING FIXTURE SCHEDULE								
LEGEND	PLUMBING FIXTURE	CONNECTION SIZE - INCHES						REMARKS
		TRAP	SOIL/WASTE	VENT	COLD WATER	HOT WATER	THERMOSTATIC MIXING VALVE	
WC-1	WATER CLOSET	-	4"	2"	1"	-	-	FLUSH VALVE
LAV-1	LAVATORY	1-1/2"	2"	1-1/2"	1/2"	1/2"	PROVIDE	PROVIDE SELF CLOSING FAUCET.
NOTE: 1. CONTRACTOR TO COORDINATE WITH ARCHITECTURAL DRAWINGS FOR ALL PLUMBING FIXTURES SPECIFICATION.								

ELECTRIC POINT OF USE WATER HEATER SCHEDULE											
HEATER TAG	NO. OF ELEMENTS	LOCATION	MAX. INPUT (kW)	STORAGE CAPACITY (GAL)	RECOVERY CAPACITY @57° F RISE	TYPE	ELECTRICAL CHARACTERISTICS CONTROL	NO. OF HEATERS	EFFICIENCY (%)	MANUFACTURER & MODEL NO.	REMARKS
WH-1	1	DROP- IN SINK	4.8	0	0.5	ELECTRIC	240V/1Ø/60Hz	1	97	CHRONOMITE MODEL-CM-20L/208	-DIMENSIONS: 9-5/8"Wx5-3/4"Hx2-3/4"D WALL MOUNTED

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