

# MECHANICAL SYMBOLS LIST

AC-1	TXF-1	EQUIPMENT SYMBOL	CONTROLS AND SENSORS	
		POINT OF NEW CONNECTION TO EXISTING		THERMOSTAT
AIR DEVICES				TEMPERATURE SENSOR
		CEILING DIFFUSER SUPPLY		DUCT SMOKE DETECTOR
		CEILING DIFFUSER RETURN		CO2 DETECTOR
DUCT ACCESSORIES			DUCTWORK	
		SIDEWALL/DUCT MOUNTED GRILLE-SUPPLY		AIR DUCT W/ 1.5" ACOUSTICAL LINING
		SIDEWALL/DUCT MOUNTED GRILLE-RETURN		FLEXIBLE DUCT
		FLEXIBLE CONNECTION		FLEXIBLE CONNECTION
		RECTANGULAR DUCT (WIDTH X DEPTH)		RECTANGULAR DUCT (WIDTH X DEPTH)
		SUPPLY AIR RECTANGULAR DUCT CROSS SECTION		RETURN AIR RECTANGULAR DUCT CROSS SECTION
		RETURN AIR RECTANGULAR DUCT CROSS SECTION		ROUND DUCT (DIAMETER)
		ROUND DUCT CROSS SECTION		
		BACK DRAFT DAMPER		
		VOLUME DAMPER W/ ACCESS DOOR		
		MOTORIZED DAMPER W/ ACCESS DOOR		

MECHANICAL ABBREVIATIONS	
AL	ACOUSTIC LINING
CDS	CEILING DIFFUSER SUPPLY
CDR	CEILING DIFFUSER RETURN
CFM	CUBIC FEET OF AIR PER MINUTE
COP	COEFFICIENT OF PERFORMANCE
EER	ENERGY EFFICIENCY RATIO
EN	ENERGY ANALYSIS
FC	FLEXIBLE CONNECTION
IEER	INTEGRATED ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
SEER	SEASONAL ENERGY EFFICIENCY RATIO
TEF	TOILET EXHAUST FAN
VD	VOLUME DAMPER
VFD	VARIABLE FREQUENCY DRIVE
FD	FIRE DAMPER
MD	MOTORIZED DAMPER
OA	OUTSIDE AIR
MAU	MAKE UP AIR UNIT
KEF	KITCHEN EXHAUST FAN
RTU	ROOF TOP UNIT
W.M.S	WIRE MESH SCREEN
SG	SUPPLY GRILLE
RG	RETURN GRILLE
TD	TRANSFER DUCT
TG	TRANSFER GRILLE

MECHANICAL DRAWING LIST	
M1.0	MECHANICAL GENERAL NOTES, SYMBOLS LIST & ABBREVIATIONS
M1.1	MECHANICAL SPECIFICATIONS (1 OF 2)
M1.2	MECHANICAL SPECIFICATIONS (2 OF 2)
M2.0	MECHANICAL FLOOR PLAN
M2.1	MECHANICAL ROOF PLAN
M5.0	MECHANICAL DETAILS (1 OF 3)
M5.1	MECHANICAL DETAILS (2 OF 3)
M5.2	MECHANICAL DETAILS (3 OF 3)
M6.0	MECHANICAL SCHEDULES
M7.0	HOOD DETAILS (1 OF 2)
M7.1	HOOD DETAILS (2 OF 2)

CODE COMPLIANCE	
ALL WORK AND MATERIAL SHALL BE PERFORMED AND INSTALLED IN COMPLIANCE WITH THE FOLLOWING CODES AS ADOPTED AND AMENDED BY THE INSPECTING AUTHORITY. NOTHING IN THESE DRAWINGS IS TO BE CONSTRUCTED TO PERMIT WORK NOT CONFORMING TO THESE CODES OR OTHERS APPLICABLE TO THESE PROJECT:	
A.	2015 INTERNATIONAL BUILDING CODE, WITH HOUSTON AMENDMENTS
B.	2015 UNIFORM MECHANICAL CODE, WITH HOUSTON AMENDMENTS
C.	2015 UNIFORM PLUMBING CODE, WITH HOUSTON AMENDMENTS
D.	2015 INTERNATIONAL FIRE CODE WITH HOUSTON AMENDMENTS
E.	2020 NATIONAL ELECTRICAL CODE
F.	2015 INTERNATIONAL ENERGY CONSERVATION CODE, WITH HOUSTON AMENDMENTS

## HOUSTON BUILDING DEPARTMENT NOTES

ALL WORK SHALL COMPLY WITH APPLICABLE SECTIONS OF 2015 INTERNATIONAL BUILDING CODE WITH HOUSTON AMENDMENTS, AND ALL RULES AND REGULATIONS OF THE DEPARTMENT OF BUILDINGS TO DATE.

- ALL HEATING AND COOLING LOADS CALCULATED PER ASHRAE/ACCA 183.
- VENTILATION FOR ALL AREA SHALL COMPLY WITH 2015 UNIFORM MECHANICAL CODE, WITH HOUSTON AMENDMENTS CHAPTER 4.
- AS PER C408.2.5 OF IECC 2015, CONSTRUCTION DOCUMENT SHALL REQUIRE THAT, WITHIN 90 DAYS AFTER THE DATE OF SYSTEM ACCEPTANCE, RECORD DRAWINGS OF THE ACTUAL INSTALLATION BE PROVIDED TO THE BUILDING OWNER OR THE DESIGNATED REPRESENTATIVE OF THE BUILDING OWNER.
- AS PER C408.3.2 OF IECC 2015, CONSTRUCTION DOCUMENT SHALL REQUIRE THAT AN OPERATING MANUAL AND A MAINTAINED MANUAL BE PROVIDED TO THE BUILDING OWNER WITHIN 90 DAYS AFTER THE DATE OF SYSTEM ACCEPTANCE THE CONTRACTOR SHALL ENGAGE THE SERVICES OF A PROFESSIONAL ENGINEER TO PROVIDE THE REQUIRED SPECIAL INSPECTIONS AND TESTS.
- TESTS WILL BE CONDUCTED UNDER DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSON HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS. THE TESTS WILL SHOW COMPLIANCE IBC 2015, REQUIREMENTS AS OUTLINES IN SECTION.
- THE LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSON HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS AND CONDUCTING SUCH TESTS WILL FILE DOCUMENTATION AND REPORTS OF TESTS THAT THE SYSTEM COMPLIES WITH THE CONSTRUCTION DOCUMENTS AND APPLICABLE LAWS.
- TESTS OF MECHANICAL SYSTEMS SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING SECTIONS OF UMC 2015 WITH HOUSTON AMENDMENTS CHAPTER 4 AND CHAPTER 5:
  - MECHANICAL VENTILATION – SECTION 403.
- THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIES, ETC. SHALL COMPLY WITH THE REFERENCED CODE OR STANDARD:
  - STANDARDS OF HEATING – UMC 2015.
  - DUCT CONSTRUCTION AND INSTALLATION—SECTION 603 OF UMC 2015.
  - AIR INTAKES, EXHAUSTS AND RELIEF—SECTION 401 OF UMC 2015.
  - MANUAL AND AUTOMATIC FIRE AND SMOKE CONTROLS FOR AIR DISTRIBUTION SYSTEMS—SECTION 405 OF UMC 2015 WITH HOUSTON AMENDMENTS.
- MINIMUM TEMPERATURE TO BE MAINTAINED IN OCCUPIED SPACES DURING HEATING SEASON: 68 DEG. FAHRENHEIT.
- A STATEMENT SHALL BE FILED BY THE OWNER OR TENANT IN POSSESSION THAT THE VENTILATION SYSTEM WILL BE KEPT IN CONTINUOUS OPERATION AT ALL TIMES DURING THE NORMAL OCCUPANCY OF THE STRUCTURE AS REQUIRED BY UMC 2015 CHAPTER 4.
- SMOKE DETECTION SYSTEMS SHALL BE INSTALLED AND SEQUENCED TO FOLLOW CONTROLS OPERATIONS WITH THE REQUIREMENTS OF SECTION 608 UMC 2015, TO CLOSE DAMPERS AND AUTOMATICALLY STOP THE FAN.
- REFER TO ARCHITECTURAL DRAWINGS FOR REQUIRED FIRE-RATED WALL AND SMOKE WALL CONSTRUCTION AND LOCATION.
- THESE PLANS ARE APPROVED ONLY FOR THE WORK INDICATED ON THE APPLICATION SPECIFICATION SHEET. ALL OTHER MATTERS SHOWN ARE NOT TO BE RELIED UPON OR TO BE CONSIDERED AS EITHER BEING APPROVED OR IN ACCORDANCE WITH APPLICABLE CODES.

## GENERAL NOTES

- CONTRACTOR SHALL SURVEY THE AREA OF THIS WORK BEFORE SUBMITTING A BID AND SHALL BE RESPONSIBLE FOR NOTIFYING THE ARCHITECT OF ANY CONDITIONS WHICH WOULD PREVENT THE INSTALLATION OF THE WORK AS SHOWN ON DRAWINGS.
- ALL APPLICABLE CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS, AND THEIR PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR WHO SHALL INFORM THE OWNER, PRIOR TO SUBMITTING A PROPOSAL, OF ANY WORK OR MATERIALS WHICH VIOLATE ANY OF THE ABOVE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED BY THE CONTRACTOR.
- BEFORE PROCEEDING WITH ANY WORK IN OCCUPIED OR USED AREAS, THE CONTRACTOR SHALL APPLY TO OWNER FOR PERMISSION TO ENTER SUCH AREAS. THE CONTRACTOR IS OBLIGED TO PERFORM HIS WORK ONLY AT THE TIMES DESIGNATED BY OWNER. THERE WILL BE NO ADDITIONAL COMPENSATION FOR THE WORK PERFORMED AFTER HOURS OR ON OFF-DAYS WITHOUT PRIOR WRITTEN APPROVAL.
- THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, AND IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.
- 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 IN OVERTIME AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.
- CONTRACTOR SHALL ASCERTAIN THE APPROPRIATE METHOD FOR BRINGING THE UNITS INTO AND THROUGH THE BUILDING TO POSITION UNIT IN LOCATION SHOWN ON THE PLANS. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH RESTRICTIVE SPACES. COORDINATE WITH BUILDING OWNER APPROPRIATE TIMES OF DAY SUCH EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.
- DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW SYSTEM.
- CONNECT NEW WORK TO EXISTING WORK IN NEAT AND APPROVED MANNER. RESTORE EXISTING WORK DISTURBED WHILE INSTALLING NEW WORK TO ACCEPTABLE CONDITION AS DETERMINED BY ARCHITECT.
- PLAN INSTALLATION OF NEW WORK AND CONNECTIONS TO EXISTING WORK TO INSURE MINIMUM INTERFERENCE WITH REGULAR OPERATION OF EXISTING FACILITIES. ALL SYSTEM SHUTDOWNS AFFECTING OTHER AREAS SHALL BE COORDINATED

WITH BUILDING OWNER. INSTALL ISOLATION VALVES AT POINT OF CONNECTION TO THE EXISTING PIPING. PROVIDE TEMPORARY DUCT CAPS AND/OR CONNECTIONS TO MINIMIZE SHUTDOWN TIME.

- SUPPORT ALL DUCTWORK AND PIPING FROM BUILDING STRUCTURE AND/OR FRAMING IN AN APPROVED MANNER. WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING OR SUPPORTS FOR EQUIPMENT, FURNISH ADDITIONAL FRAMING. INSERTS SHALL BE STEEL, SLOTTED TYPE AND FACTORY PAINTED. SINGLE ROD SHALL BE SIMILAR TO GRINNELL FIG. 281. MULTI-ROD SHALL BE SIMILAR TO FEE & MASON SERIES 9000 WITH END CAPS AND CLOSURE STRIPS. MAXIMUM LOADING INCLUDING PIPES, DUCTWORK CONTENTS AND COVERING SHALL NOT EXCEED 75% OF RATED INSERT CAPABILITY. WHEN SUPPORTING FROM BUILDING USE BEAM CLAMPS IN APPROVED MANNER.
- PROVIDE ALL NECESSARY FLASHING AND COUNTER FLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF PIPES, DUCTS, LOUVERS, CONDUIT, AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AND DUNNAGE STEEL AS REQUIRED.
- SEAL OPENINGS AROUND DUCTS AND PIPING THROUGH PARTITIONS, WALLS AND FLOORS (NOT IN SHAFTS) WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL (FIBERGLASS INSULATION IS NOT ACCEPTABLE).
- WHERE PENETRATIONS THROUGH FIRE RATED WALLS ARE NOT FIRE PROOFED THIS CONTRACTOR SHALL BE RESPONSIBLE TO SEAL SAME TO MAINTAIN THE RATED INTEGRITY.
- INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES WHICH INVOLVE EXTRA COST SHALL NOT BE MADE WITHOUT APPROVAL.
- ACCESS DOORS ARE REQUIRED FOR ALL BUILDING SERVICE VALVES THAT RUN THROUGH THE SPACE, AND ACCESS DOOR SHALL HAVE THE EQUAL RATED CAPACITY (1HR, 2HR, ETC.) AS WALL. COORDINATE ALL LOCATIONS OF ACCESS DOORS WITH THE ARCHITECT.
- REMOVABLE ACCESS TILE AND/OR ACCESS DOOR ARE REQUIRED IN HUNG CEILINGS, SHAFTS AND WALLS FOR ALL VOLUME AND FIRE DAMPERS, AUTOMATIC DAMPERS AND ALL OTHER MECHANICAL EQUIPMENT AND DEVICES. HVAC CONTRACTOR TO FURNISH ACCESS LOCATION REQUIREMENTS TO GENERAL CONTRACTOR. ACCESS TILE IDENTIFICATION: PROVIDE BUTTONS, TABS, AND MARKERS TO IDENTIFY LOCATION OF CONCEALED VALVES, DAMPERS AND EQUIPMENT.
- 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.
- UNLESS OTHERWISE SPECIFICALLY 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.
- MATERIALS AND WORKMANSHIP, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- ALL EQUIPMENT SHALL BE PROVIDED WITH ONE YEAR WARRANTY PARTS AND LABOR AND FIVE YEARS ON COMPRESSORS. WARRANTY PERIOD BEGINS UPON PROJECT ACCEPTANCE
- ALL MATERIAL AND EQUIPMENT TO BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR HIS WORK WITH ITS COMPLETION AND FINAL ACCEPTANCE AND SHALL REPLACE ANY OF THE SAME WHICH MAY BE DAMAGED, LOST, OR STOLEN WITHOUT ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FAILURE OF ANY DUCTWORK SYSTEM OR EQUIPMENT TO FUNCTION PROPERLY UPON COMPLETION OF HIS WORK UPON SAID SYSTEM OR EQUIPMENT.
- SUBMIT SHOP DRAWING OF ALL WORK WHICH MUST BE APPROVED BY THE ARCHITECT AND ENGINEER BEFORE WORK COMMENCES.
- ALL MATERIAL AND EQUIPMENT TO BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE EXISTING BUILDING, EQUIPMENT, ETC., WHICH AFFECT THIS WORK, AND THE ACCESS TO SUCH SPACES, HAS BEEN MADE AND THAT THE CONTRACTOR IS FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THE WORK. LATER CLAIMS SHALL NOT BE MADE FOR LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN DURING SUCH AN EXAMINATION. THE ON-SITE INSPECTION SHALL VERIFY EXISTING DUCTWORK, PIPING (SIZES, CLEARANCES, ETC) AND CONDITIONS.
- INSURANCE: IN ACCORDANCE WITH BUILDING REQUIREMENTS THE CONTRACTOR SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.
- THE FINAL ACCEPTANCE WILL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, BALANCED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES OF INSPECTION AND APPROVAL.
- SPECIFICATIONS ARE OF SIMPLIFIED FORM AND INCLUDE INCOMPLETE SENTENCES, WORDS OR PHRASES SUCH AS "THE CONTRACTOR SHALL," "SHALL BE," "FURNISH," "PROVIDE," "A," "THE," AND "ALL" HAVE BEEN OMITTED FOR BREVITY.
- WHERE A CONFLICT EXISTS BETWEEN THE DRAWINGS, THE SPECIFICATIONS OR ANY OTHER CONSTRUCTION DOCUMENT, THE ONE WITH THE MOST STRINGENT REQUIREMENT(S) SHALL APPLY.

### DEFINITIONS:

- "PROVIDE": TO SUPPLY, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.
- "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.
- "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.

## SCOPE OF WORK

### SCOPE OF WORK

- THE WORK UNDER CONTRACT INCLUDES ALL LABOR, MATERIALS AND APPLIANCES NECESSARY FOR THE FURNISHING, INSTALLING AND TESTING, COMPLETE AND READY FOR SAFE OPERATION OF THE SYSTEMS AS DESCRIBED IN THE SPECIFICATIONS, FLOOR PLAN(S) DESIGN, DETAIL DRAWINGS, NOTES, RFIs, ETC. FOR THIS PROJECT. WORK SHALL BE INSTALLED IN A NEAT, WORKMANLIKE MANNER.
- THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH THE DEPARTMENT HAVING JURISDICTION, OBTAIN PERMITS OR LICENSES NECESSARY TO CARRY OUT THIS 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.
- 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 OF 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 PROVIDE THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.

### THERMOSTATIC CONTROL NOTES:-

#### A. C403.2.4.1 THERMOSTATIC CONTROLS.

THE SUPPLY OF HEATING AND COOLING ENERGY TO EACH ZONE SHALL BE CONTROLLED BY INDIVIDUAL THERMOSTATIC CONTROLS CAPABLE OF RESPONDING TO TEMPERATURE WITHIN THE ZONE, WHERE HUMIDIFICATION OR DEHUMIDIFICATION OR BOTH IS PROVIDED, AT LEAST ONE HUMIDITY CONTROL DEVICE SHALL BE PROVIDED FOR EACH HUMIDITY CONTROL SYSTEM.

EXCEPTION: INDEPENDENT PERIMETER SYSTEMS THAT ARE DESIGNED TO OFFSET ONLY BUILDING ENVELOPE HEAT LOSSES, GAINS OR BOTH SERVING ONE OR MORE PERIMETER ZONES ALSO SERVED BY AN INTERIOR SYSTEM PROVIDED:

- THE PERIMETER SYSTEM INCLUDES AT LEAST ONE THERMOSTATIC CONTROL ZONE FOR EACH BUILDING EXPOSURE EXTERIOR WALLS FACING ONLY ONE ORIENTATION (WITHIN +/-45 DEGREES) (0.8 RAD) FOR MORE THAN 50 CONTIGUOUS FEET (15 240 MM); AND
- THE PERIMETER SYSTEM HEATING AND COOLING SUPPLY IS CONTROLLED BY THERMOSTATS LOCATED WITHIN THE ZONES SERVED BY THE SYSTEM.

#### B. C403.2.4.1.2 DEADBAND.

WHERE USED TO CONTROL BOTH HEATING AND COOLING, ZONE THERMOSTATIC CONTROLS SHALL BE CAPABLE OF PROVIDING A TEMPERATURE RANGE OR DEADBAND OF AT LEAST 5°F (2.8°C) WITHIN WHICH THE SUPPLY OF HEATING AND COOLING ENERGY TO THE ZONE IS CAPABLE OF BEING SHUT OFF OR REDUCED TO A MINIMUM.

#### EXCEPTIONS:

- THERMOSTATS REQUIRING MANUAL CHANGEOVER BETWEEN HEATING AND COOLING MODES.
- OCCUPANCIES OR APPLICATIONS REQUIRING PRECISION IN INDOOR TEMPERATURE CONTROL AS APPROVED BY THE CODE OFFICIAL.

#### C. C403.2.4.1.3 SET POINT OVERLAP RESTRICTION.

WHERE A ZONE HAS A SEPARATE HEATING AND A SEPARATE COOLING THERMOSTATIC CONTROL LOCATED WITHIN THE ZONE, A LIMIT SWITCH, MECHANICAL STOP OR DIRECT DIGITAL CONTROL SYSTEM WITH SOFTWARE PROGRAMMING SHALL BE PROVIDED WITH THE CAPABILITY TO PREVENT THE HEATING SET POINT FROM EXCEEDING THE COOLING SET POINT AND TO MAINTAIN A DEADBAND IN ACCORDANCE WITH SECTION C403.2.4.1.2.

#### D. C403.2.4.2 OFF-HOUR CONTROLS.

EACH ZONE SHALL BE PROVIDED WITH THERMOSTATIC SETBACK CONTROLS THAT ARE CONTROLLED BY EITHER AN AUTOMATIC TIME CLOCK OR PROGRAMMABLE CONTROL SYSTEM.

#### EXCEPTIONS:

- ZONES THAT WILL BE OPERATED CONTINUOUSLY.
- ZONES WITH A FULL HVAC LOAD DEMAND NOT EXCEEDING 6,800 BTU/H (2 KW) AND HAVING A READILY ACCESSIBLE MANUAL SHUTOFF SWITCH.

#### E. C403.2.4.2.1 THERMOSTATIC SETBACK CAPABILITIES.

THERMOSTATIC SETBACK CONTROLS SHALL HAVE THE CAPABILITY TO SET BACK OR TEMPORARILY OPERATE THE SYSTEM TO MAINTAIN ZONE TEMPERATURES DOWN TO 55°F (13°C) OR UP TO 85°F (29°C).

#### F. C403.2.4.2.3 AUTOMATIC START CAPABILITIES (MANDATORY).

AUTOMATIC START CONTROLS SHALL BE PROVIDED FOR EACH HVAC SYSTEM. THE CONTROLS SHALL BE CONFIGURED TO AUTOMATICALLY ADJUST THE DAILY START TIME OF THE HVAC SYSTEM IN ORDER TO BRING EACH SPACE TO THE DESIRED OCCUPIED TEMPERATURE IMMEDIATELY PRIOR TO SCHEDULED OCCUPANCY.

### CONSULTANTS (ENGINEER):

**NY ENGINEERS**

NEARBY ENGINEERS  
382 NE 191ST STREET SUITE  
49674, MIAMI, FL 33179  
PH-914.257.3455  
WWW.NY-ENGINEERS.COM

PERMIT SET

REVISION SCHEDULE  
NO. REV. / SUBMISSION DATE ISSUED BY

ISSUE DATE: 05/30/2024

INTERIOR BUILD-OUT

810 BILLIARDS &  
BOWLING  
HOUSTON, TX

DRAWN BY: NYE

QAQC: NYE

APPROVED BY: NYE

PROJECT NUMBER: 2323

MECHANICAL GENERAL NOTES,  
SYMBOL LIST & ABBREVIATIONS

M1.0

GENERAL HVAC NOTES

- 1. PROVIDE ALL MATERIAL AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE.
2. CONTRACT DOCUMENT DRAWINGS FOR MECHANICAL WORK (HVAC, PLUMBING, AND FIRE PROTECTION) ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY.
3. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.
4. WHEN MECHANICAL WORK (HVAC, PLUMBING, SHEET METAL, FIRE PROTECTION, ETC.) IS SUBCONTRACTED, IT SHALL BE THE MECHANICAL CONTRACTOR'S RESPONSIBILITY TO COORDINATE SUBCONTRACTORS AND THE ASSOCIATED CONTRACTS. WHEN DISCREPANCIES ARISE PERTAINING TO WHICH CONTRACTOR PROVIDES A PARTICULAR ITEM OF THE MECHANICAL CONTRACT OR WHICH CONTRACTOR PROVIDES FINAL CONNECTIONS FOR A PARTICULAR ITEM OF THE MECHANICAL CONTRACT, IT SHALL BE BROUGHT TO THE ATTENTION OF THE MECHANICAL CONTRACTOR, WHOSE DECISION SHALL BE FINAL.
5. COORDINATE CONSTRUCTION OF ALL MECHANICAL WORK WITH ARCHITECTURAL, STRUCTURAL, CIVIL, ELECTRICAL WORK, ETC., SHOWN ON OTHER CONTRACT DOCUMENT DRAWINGS.
6. INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS.
7. WHERE TWO OR MORE ITEMS OF THE SAME TYPE OF EQUIPMENT ARE REQUIRED, THE PRODUCT OF ONE MANUFACTURER SHALL BE USED.
8. COORDINATE ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. COORDINATE AND PROVIDE ALL DUCT AND PIPING TRANSITIONS REQUIRED FOR FINAL EQUIPMENT CONNECTIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DUCT AND PIPING DIMENSIONS BEFORE FABRICATION.
9. ALL CONTROL WIRE AND CONDUIT SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE AND ELECTRICAL DIVISION OF THE SPECIFICATION.
10. PROVIDE VIBRATION ISOLATION FOR ALL MECHANICAL EQUIPMENT TO PREVENT TRANSMISSION OF VIBRATION TO BUILDING STRUCTURE.
11. PROVIDE VIBRATION ISOLATORS FOR ALL PIPING SUPPORTS CONNECTED TO, AND WITHIN 50 FT. OF, ISOLATED EQUIPMENT (EXCEPT AT BASE ELBOW SUPPORTS AND ANCHOR POINTS).
12. LOCATE ALL TEMPERATURE, PRESSURE, AND FLOW MEASURING DEVICES IN ACCESSIBLE LOCATIONS WITH THE STRAIGHT SECTION OF PIPE OR DUCT UP- AND DOWNSTREAM AS RECOMMENDED BY THE MANUFACTURER FOR GOOD ACCURACY.
13. WHERE BEAMS ARE INDICATED TO BE PENETRATED WITH DUCTWORK OR PIPING, COORDINATE DUCTWORK AND PIPING LAYOUT WITH BEAM OPENING SIZE AND OPENING LOCATIONS. COORDINATION SHALL BE DONE PRIOR TO THE FABRICATION OF DUCTWORK, CUTTING OF PIPING, OR FABRICATION OF BEAMS.
14. ALL MISCELLANEOUS STEEL REQUIRED TO ENSURE PROPER INSTALLATION AND AS SHOWN IN THE DETAILS FOR PIPING, DUCTWORK, AND EQUIPMENT (UNLESS OTHERWISE NOTED) SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.
15. PROVIDE ACCESS PANELS FOR INSTALLATION IN WALLS AND CEILINGS, WHERE REQUIRED, TO SERVICE DAMPERS, VALVES, SMOKE DETECTORS, AND OTHER MECHANICAL EQUIPMENT. ACCESS PANELS SHALL BE TURNED OVER TO THE GENERAL CONTRACTOR FOR INSTALLATION. ACCESS PANELS SHALL HAVE THE EQUAL RATED CAPACITY (1HR, 2HR, ETC.) AS WALL.
16. MECHANICAL EQUIPMENT, DUCTWORK, AND PIPING SHALL NOT BE SUPPORTED FROM A METAL DECK.
17. ALL EQUIPMENT, PIPING, DUCTWORK, ETC., SHALL BE SUPPORTED AS DETAILED, SPECIFIED AND REQUIRED TO PROVIDE A VIBRATION-FREE INSTALLATION.
18. 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.
19. ALL ROOF-MOUNTED EQUIPMENT CURBS/STEEL RAILS FOR EQUIPMENT PROVIDED BY THE MECHANICAL CONTRACTOR SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE GENERAL CONTRACTOR.
20. LOCATIONS AND SIZES OF ALL FLOOR, WALL, AND ROOF OPENINGS SHALL BE COORDINATED WITH ALL OTHER TRADES INVOLVED.
21. ALL OPENINGS IN FIRE WALLS DUE TO DUCTWORK, PIPING, CONDUIT, ETC., SHALL BE FIRE STOPPED WITH A PRODUCT SIMILAR TO 3M OR APPROVED EQUAL.
22. ALL AIR CONDITIONING CONDENSATE DRAIN LINES FROM EACH AIR HANDLING 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.
23. REFER TO TYPICAL DETAILS FOR DUCTWORK, PIPING, AND EQUIPMENT INSTALLATION.

AIR OUTLETS

GENERAL:

- 1) MARGIN TYPES, COLORS, FINISH AND METHODS OF ATTACHMENT FOR ALL DIFFUSERS, GRILLES AND REGISTERS SHALL BE COORDINATED WITH ARCHITECTURAL CEILING AND WALL DETAILS AND SPECIFICATIONS.
2) FRAME TYPE SUITABLE FOR MOUNTING IN CEILING OR WALL CONSTRUCTION AS INDICATED ON ARCHITECTURAL PLANS.
3) EXACT LOCATION OF ALL AIR OUTLETS AS PER ARCHITECTURAL PLANS.
4) SUITABLE FOR OPERATION AT 20% EXCESS AND 20% LESS THAN NOTED CAPACITY FOR CONSTANT VOLUME SYSTEMS AND AT 20% EXCESS AND 60% LESS THAN NOTED CAPACITY FOR VARIABLE VOLUME SYSTEMS. MANUFACTURER RESPONSIBLE FOR EXAMINING APPLICATION OF EACH OUTLET AND GUARANTEE THAT EACH WILL PROVIDE REQUIRED NC LEVELS AND COMFORT SPACE CONDITIONS WITHOUT DRAFTS THROUGHOUT OPERATING RANGE.
5) ALL DIFFUSERS SHALL BE PROVIDED WITH OPPOSED BLADE VOLUME DAMPERS. DAMPER OPERATING LEVERS SHALL BE ACCESSIBLE AT THE FACE OF AIR OUTLETS.

- A. SQUARE DIFFUSERS: DIFFUSERS SHALL BE STEEL CONSTRUCTION PAINTED WHITE SIMILAR TO ANEMOSTAT

INSULATION - GENERAL REQUIREMENTS

- A. 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.

B. DEFINITIONS:

- 1) 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.
2) CONCEALED: INDOOR DUCTS, PIPING OR EQUIPMENT WHICH IS NOT EXPOSED.
3) OUTDOOR: DUCTS, PIPING OR EQUIPMENT WHICH IS EXPOSED TO THE WEATHER.

C. NON-INSULATED DUCTWORK:

- 1) WHERE SOUND LINING IS OF MINIMUM THICKNESS SPECIFIED FOR INSULATION.
2) AIR CONDITIONING RETURN AIR DUCTWORK EXPOSED IN AIR CONDITIONED SPACES AND INSTALLED IN HUNG CEILINGS WHERE SPACE IMMEDIATELY ABOVE AND BELOW ARE BOTH AIR CONDITIONED MATERIAL.

D. MATERIAL:

- 1) TYPE D-1: MINIMUM 1-LB DENSITY FIBERGLASS BLANKET, MAXIMUM 0.28 K-FACTOR AT 75 ADEG F MEAN TEMPERATURE WITH FACTORY-APPLIED FOIL-SKIRM-KRAFT FACING SIMILAR TO MANVILLE MICROLITE.
2) TYPE D-2: 3 LB. FIBERGLASS BOARD. THE MAXIMUM K FACTOR SHALL BE 0.23 AT 75 DEG F MEAN TEMPERATURE WITH A MINIMUM DENSITY OF 3 LB. THE INSULATION SHALL BE PROVIDED WITH A FACTORY-APPLIED ALL PURPOSE OR ALL SERVICE FACING. THE INSULATION SHALL BE EQUAL TO MANVILLE TYPE 814 SPIN-GLAS AP.
3) TYPE D-3: MINIMUM 6 LB FIBERGLASS BOARD. MAXIMUM 0.22 K-FACTOR AT 75 DEG F MEAN TEMPERATURE WITH FACTORY APPLIED ALL PURPOSE OR ALL SERVICE FACING. SIMILAR TO MANVILLE 817 SPIN-GLAS AP.

E. 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.

F. INSTALLATION:

- a. FIBERGLASS BLANKET: 2 IN. LAP STRIPS AT ALL SEAMS. SECURE BOTTOM OF ALL DUCTS OVER 24 IN. WIDE WITH MIN 2 ROWS OF WELD PINS 12 IN. ON CENTER. SECURE ALL SEAMS WITH FOIL VAPOR BARRIER TAPE AND VAPORSEAL ADHESIVE.
b. FIBERGLASS BOARD: SEAL JOINTS AND BREAKS IN FACING WITH 3 IN. WIDE TAPE TO MATCH FACING AND ADHERE WITH VAPOR SEAL ADHESIVE. APPLY 5 IN. WIDE TAPE AT CORNERS, WELD PINS ON TOP, SIDES AND BOTTOM.

SPECIFICATIONS

SECTION 0001 - NOTICE TO BIDDERS

1.1 BIDDERS REPRESENTATIONS

A. THE BIDDER BY MAKING A BID REPRESENTS THAT:

- THE BIDDER HAS READ AND UNDERSTANDS THE BIDDING DOCUMENTS, TO THE EXTENT THAT SUCH DOCUMENTATION RELATES TO THE WORK FOR WHICH THE BID IS SUBMITTED, AND FOR OTHER PORTIONS OF THE PROJECT, IF ANY, BEING BID CONCURRENTLY OR PRESENTLY UNDER CONSTRUCTION.
B. THE BID IS MADE IN COMPLIANCE WITH THE BIDDING DOCUMENTS.
C. THE SPECIFICATIONS AND DRAWINGS ARE INTENDED TO BE JOINTLY AS A BASIS FOR THE BIDDER TO SUBMIT A CONTRACT PRICE FOR THE MATERIAL AND LABOR.
D. SHOULD CONFLICTS OR DISCREPANCIES OCCUR WITHIN THE BIDDING DOCUMENTS, THE ITEM OR ITEMS IN DISPUTE THAT REPRESENT THE GREATER COST SHALL PREVAIL IN THE FINAL BID.
E. THE BID IS BASED UPON THE MATERIALS, EQUIPMENT AND SYSTEMS REQUIRED BY THE BIDDING DOCUMENTS WITHOUT EXCEPTION.

1.2 EXISTING CONDITIONS AND COORDINATION

- A. THE BIDDER HAS VISITED THE SITE, BECOME FAMILIAR WITH LOCAL CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED AND HAS CORRELATED THE BIDDER'S PERSONAL OBSERVATIONS WITH THE REQUIREMENTS OF THE PROPOSED BIDDING DOCUMENTS.
B. THE BIDDER SHALL PROPOSE COORDINATION OF WORK SUCH THAT CONFLICTS WITH OTHER TRADES AND SPACE ALLOCATIONS ARE AVOIDED.

1.3 RESPONSIBILITIES

- A. THE BIDDER UNDERSTANDS THAT ANY CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE TIMELY COMPLETION AND ACCEPTANCE OF THEIR WORK AND THAT ANY ITEMS DAMAGED, LOST OR STOLEN DURING TIME OF CONSTRUCTION SHALL BE REPAIRED OR REPLACED WITHOUT ANY ADDITIONAL COST TO THE OWNER.
B. THE BIDDER UNDERSTANDS THAT ANY PROPOSED WORK IN OCCUPIED TENANT SPACES SHALL BE PERFORMED DURING TIMES OF NON-TENANT OCCUPANCY OR AS SCHEDULED OR DIRECTED BY THE BUILDING MANAGER.
C. THE BIDDER UNDERSTANDS THAT ANY PROPOSED SHUT-DOWN OF EXISTING SYSTEMS DURING CONSTRUCTION SHALL BE PRE-ARRANGED WITH THE BUILDING MANAGER AND THAT SUCH SHUT-DOWNS ARE TO BE KEPT TO A MINIMUM.

END OF SECTION 0001

SECTION 0101 - QUALITY OF WORK

1.1 WORKMANSHIP

- A. ALL WORK SHALL BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE.
B. ALL DEFECTS WHICH DEVELOP OR ARE DISCOVERED WITHIN THIS PERIOD SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE ARCHITECT OR BUILDING MANAGER AT NO ADDITIONAL COST TO THE OWNER.
C. UPON COMPLETION OF THE WORK THE CONTRACTOR SHALL REMOVE FROM THE SITE ALL TOOLS, DEMOLISHED APPLIANCES AND ANY SURPLUS MATERIAL.

1.2 CODE COMPLIANCE

- A. ALL WORK SHALL MEET ALL STATE AND LOCAL CODES HAVING JURISDICTION.

END OF SECTION 0101

SECTION 0102 -REQUIRED DOCUMENTS

1.1 SHOP DRAWINGS

- A. A SET OF PRINTS FOR ANY MECHANICAL WORK INCLUDING BUT NOT LIMITED TO, DUCTWORK AND PIPING LAYOUT SHALL BE SUBMITTED FOR APPROVAL TO THE ENGINEER PRIOR TO CONSTRUCTION OR PURCHASE OF MATERIALS.

1.2 SUBMITTALS

- A. EQUIPMENT SUBMITTALS OF ALL PROPOSED MECHANICAL AND AUXILIARY EQUIPMENT INCLUDING ALL ACCESSORIES SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. ALL PERTINENT MODELS, SIZES, ACCESSORIES AND CHOICES SHALL BE CLEARLY CHECKED, PRINTED OR OTHERWISE INDICATED ON THE SUBMITTALS.

1.3 RECORD DRAWINGS

- A. UPON COMPLETION OF THE WORK, A RECORD DRAWING SHALL BE SUBMITTED TO THE OWNER DEPICTING ALL SUBSEQUENT CHANGES, ADDITIONS AND OR CORRECTIONS TO THE CONTRACT DRAWINGS AND OR CONTRACT SCOPE MADE DURING CONSTRUCTION. THIS DRAWING SHALL REPRESENT A COMPLETE RECORD OF THE WORK INSTALLED.

1.4 EQUIPMENT OPERATING INSTRUCTIONS

- A. ON COMPLETION AND ACCEPTANCE OF WORK, THIS CONTRACTOR SHALL FURNISH WRITTEN INSTRUCTIONS, 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. THE CONTRACTOR SHALL GIVE THREE COPIES OF THE INSTRUCTIONS TO THE OWNER AND ONE ELECTRONIC COPY TO THE ENGINEER.

- C. THE INSTRUCTION BOOKLET SHALL BE ORGANIZED IN SECTIONS, WITH ONE SECTION PER SYSTEM. THE COVER OF THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND PHONE NUMBER OF THE PROJECT, ARCHITECT, ENGINEER, MECHANICAL CONTRACTOR AND SUBCONTRACTORS.

END OF SECTION 0102

SECTION 078413--PENETRATION FIRE--STOPPING

1.1 QUALITY ASSURANCE

- A. INSTALLER QUALIFICATIONS: AN FM GLOBAL-APPROVED FIRE-STOP CONTRACTOR OR A UL-QUALIFIED FIRE-STOP CONTRACTOR.

- B. FIRE-TEST-RESPONSE CHARACTERISTICS: UL, INTERTEK ETL SEMKO OR FM GLOBAL

1.2 PENETRATION FIRESTOPPING

- A. PENETRATIONS IN FIRE-RESISTANCE-RATED WALLS: F-RATINGS PER ASTM E 814 OR UL 1479.

- B. PENETRATIONS IN HORIZONTAL ASSEMBLIES: F- AND T-RATINGS PER ASTM E 814 OR UL 1479:

- C. PENETRATIONS IN SMOKE BARRIERS: L-RATINGS PER UL 1479.

- D. W-RATINGS: PER UL 1479.

1.3 INSTALLATION

- A. IDENTIFICATION: PREPRINTED METAL OR PLASTIC LABELS.

1.4 FIELD QUALITY CONTROL

- A. INSPECTION OF INSTALLED FIRE-STOPPING: BY OWNER-ENGAGED AGENCY ACCORDING TO ASTM E 2174.

1.5 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

WHERE UL-CLASSIFIED SYSTEMS ARE INDICATED, THEY REFER TO SYSTEM NUMBERS IN UL'S "FIRE RESISTANCE DIRECTORY" UNDER PRODUCT CATEGORY XHEZ.

FOR THE FOLLOWING SYSTEMS:

METALLIC AND NON-METALLIC PIPES, CONDUIT, OR TUBING, ELECTRICAL CABLES, CABLE TRAYS WITH ELECTRIC CABLES, MISCELLANEOUS ELECTRICAL PENETRANTS, INSULATED PIPES, GROUPINGS OF PENETRANTS, USE ON OR MORE THE FOLLOWING MATERIALS:

- a. LATEX SEALANT
b. SILICONE SEALANT
c. INTUMESCENT PUTTY
d. MORTAR
h. SILICONE FOAM
i. PILLOWS/BAGS
j. INTUMESCENT WRAP STRIPS
k. INTUMESCENT COMPOSITE SHEET

1.6 MANUFACTURERS

- 1. HILTI CONSTRUCTION CHEMICAL, INC
2. TREMCO INC.
3. 3M FIRE PROTECTION PRODUCTS

END OF SECTION 078413

SECTION 230517 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

1.1 SLEEVE-SEAL SYSTEMS

- A. FIELD-ASSEMBLED, MODULAR SEALING-ELEMENT UNIT FOR FILLING ANNULAR SPACE BETWEEN PIPING AND SLEEVE.

- 1. SEALING ELEMENTS: EPDM RUBBER OR NBR.
2. PRESSURE PLATES: CARBON STEEL, PLASTIC, STAINLESS STEEL.
3. CONNECTING BOLTS AND NUTS: CARBON STEEL WITH CORROSION-RESISTANT COATING, STAINLESS STEEL.
B. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

- 1. ADVANCE PRODUCTS & SYSTEMS, INC.
2. CALPICO, INC.
3. METRAFLEX COMPANY (THE).
4. PIPELINE SEAL AND INSULATOR, INC.
5. PROCO PRODUCTS, INC.

1.2 SLEEVE-SEAL FITTINGS

- A. MANUFACTURED PLASTIC, SLEEVE-TYPE, PLASTIC OR RUBBER WATER-STOP ASSEMBLY MADE FOR IMBEDDING IN CONCRETE SLAB OR WALL.

1.3 GROUT

- A. NON-SHRINK, FACTORY PACKAGED.

1.4 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. USE SLEEVES AND SLEEVE SEALS FOR THE FOLLOWING PIPING-PENETRATION APPLICATIONS:

- 1. INTERIOR PARTITIONS:
a. PIPING SMALLER THAN NPS 6 (DN 150): GALVANIZED-STEEL-PIPE SLEEVES, PVC-PIPE SLEEVES.
b. PIPING NPS 6 (DN 150) AND LARGER: GALVANIZED-STEEL-SHEET SLEEVES.

END OF SECTION 230517

SECTION 230518 - ESCUTCHEONS FOR HVAC PIPING

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. ONE-PIECE, CAST-BRASS TYPE: WITH POLISHED, CHROME-PLATED AND ROUGH-BRASS FINISH AND SETSCREW FASTENER.
B. ONE-PIECE, DEEP-PATTERN TYPE: DEEP-DRAWN, BOX-SHAPED BRASS WITH CHROME-PLATED FINISH AND SPRING-CLIP FASTENERS.
C. ONE-PIECE, STAMPED-STEEL TYPE: WITH CHROME-PLATED FINISH AND SPRING-CLIP FASTENERS.

2.2 FLOOR PLATES

- A. ONE-PIECE FLOOR PLATES: CAST-IRON FLANGE WITH HOLES FOR FASTENERS.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. INSTALL ESCUTCHEONS FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FINISHED FLOORS.

- B. INSTALL ESCUTCHEONS WITH ID TO CLOSELY FIT AROUND PIPE, TUBE, AND INSULATION OF PIPING AND WITH OD THAT COMPLETELY COVERS OPENING.

- 1. ESCUTCHEONS FOR NEW PIPING:
a. PIPING WITH FITTING OR SLEEVE PROTRUDING FROM WALL: ONE-PIECE, DEEP-PATTERN TYPE.
b. INSULATED PIPING: ONE-PIECE, STAMPED-STEEL TYPE.
c. BARE PIPING AT WALL AND FLOOR PENETRATIONS IN FINISHED SPACES: ONE-PIECE, CAST-BRASS TYPE WITH POLISHED, CHROME-PLATED FINISH OR STAMPED-STEEL TYPE.
d. BARE PIPING AT CEILING PENETRATIONS IN FINISHED SPACES: ONE-PIECE, CAST-BRASS TYPE WITH POLISHED, CHROME-PLATED FINISH OR STAMPED-STEEL TYPE.

3.2 FIELD QUALITY CONTROL

- A. REPLACE BROKEN AND DAMAGED ESCUTCHEONS AND FLOOR PLATES USING NEW MATERIALS.

END OF SECTION 230518

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

1.1 PERFORMANCE REQUIREMENTS

- A. DELEGATED DESIGN: DESIGN TRAPEZE PIPE HANGERS AND EQUIPMENT SUPPORTS, INCLUDING COMPREHENSIVE ENGINEERING ANALYSIS BY A QUALIFIED PROFESSIONAL ENGINEER, USING PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA INDICATED.

- B. STRUCTURAL PERFORMANCE: HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT SHALL WITHSTAND THE EFFECTS OF GRAVITY LOADS AND STRESSES WITHIN LIMITS AND UNDER CONDITIONS INDICATED ACCORDING TO ASCE/SEI 7.

- 1. DESIGN SUPPORTS FOR MULTIPLE PIPES CAPABLE OF SUPPORTING COMBINED WEIGHT OF SUPPORTED SYSTEMS, SYSTEM CONTENTS, AND TEST WATER.

DESIGN EQUIPMENT SUPPORTS CAPABLE OF SUPPORTING COMBINED OPERATING WEIGHT OF SUPPORTED EQUIPMENT AND CONNECTED SYSTEMS AND 3.DESIGN SEISMIC-RESTRAINT HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT AND OBTAIN APPROVAL FROM AUTHORITIES HAVING JURISDICTION.

1.2 SUBMITTALS

- A. SHOP DRAWINGS: SIGNED AND SEALED BY A PROFESSIONAL ENGINEER

1.3 QUALITY ASSURANCE

- A. AWS D1.1/D1.1M, "STRUCTURAL WELDING CODE - STEEL."

1.4 COMPONENTS

- A. METAL PIPE HANGERS AND SUPPORTS: CARBON OR STAINLESS STEEL
B. TRAPEZE PIPE HANGERS: CARBON OR STAINLESS STEEL
C. FIBERGLASS PIPE HANGERS: -CLEVIS, CENTURY COMPOSITES, COOPER B-LINE
D. METAL FRAMING SYSTEMS: MFMA MANUFACTURER
E. FIBERGLASS STRUT SYSTEMS: COOPER B-LINE
F. THERMAL-HANGER SHIELD INSERTS:
G. FASTENER SYSTEMS: POWDER-ACTUATED FASTENERS OR MECHANICAL-EXPANSION ANCHORS
H. PIPE STANDS: COMPACT, LOW TYPE, SINGLE PIPE, HIGH TYPE, SINGLE PIPE, HIGH TYPE, MULTIPLE PIPES, CURB-MOUNTED TYPE

1. EQUIPMENT SUPPORTS.

END OF SECTION 230529

SECTION 230548 - VIBRATION CONTROLS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 COMPONENTS

- A. VIBRATION ISOLATORS:
1. ISOLATOR PADS: NEOPRENE, RUBBER, HERMETICALLY AND/OR SEALED COMPRESSED FIBERGLASS
2. MOUNTS: DOUBLE-DEFLECTION TYPE.
3. RESTRAINED MOUNTS: ALL DIRECTIONAL MOUNTINGS WITH SEISMIC RESTRAINT; CAST-DUCTILE-IRON HOUSING.
4. SPRING ISOLATORS: FREESTANDING, LATERALLY STABLE, OPEN-SPRING TYPE.
5. RESTRAINED SPRING ISOLATORS: FREESTANDING, STEEL, OPEN-SPRING TYPE WITH SEISMIC RESTRAINT.
6. HOUSED SPRING MOUNTS: DUCTILE-IRON OR STEEL HOUSING, WITH INTEGRAL, VERTICALLY ADJUSTABLE SEISMIC SNUBBERS.
7. ELASTOMERIC HANGERS: DOUBLE-DEFLECTION TYPE.
8. SPRING HANGERS: COMBINATION COIL-SPRING AND ELASTOMERIC-INSERT HANGERS WITH SPRING AND INSERT IN COMPRESSION.
9. SPRING HANGERS WITH VERTICAL-LIMIT STOP: COMBINATION COIL-SPRING AND ELASTOMERIC-INSERT HANGERS WITH SPRING AND INSERT IN COMPRESSION AND WITH VERTICAL-LIMIT STOP.
10. PIPE RISER RESILIENT SUPPORT: ALL-DIRECTIONAL, ACOUSTICAL PIPE ANCHOR.
11. RESILIENT PIPE GUIDES.

CONSULTANTS (ENGINEER):

NY ENGINEERS

NEARBY ENGINEERS
382 NE 191ST STREET SUITE
49674, MIAMI, FL 33179
PH-914.257.3455
WWW.NY-ENGINEERS.COM

PERMIT SET

REVISION SCHEDULE

NO. REV. / SUBMISSION DATE ISSUED BY

ISSUE DATE: 05/30/2024

INTERIOR BUILD-OUT

810 BILLIARDS & BOWLING HOUSTON, TX

DRAWN BY: NYE

QAQC: NYE

APPROVED BY: NYE

PROJECT NUMBER: 2323

MECHANICAL SPECIFICATIONS (1 OF 2)

M1.1

B. AIR-MOUNTING SYSTEMS:

- 1. AIR MOUNTS: FREESTANDING, SINGLE OR MULTIPLE, COMPRESSED-AIR BELLOWES.
  - 2. RESTRAINED AIR MOUNTS: HOUSED COMPRESSED-AIR BELLOWES.
- C. RESTRAINED VIBRATION ISOLATION ROOF-CURB RAILS: FACTORY-ASSEMBLED, FULLY ENCLOSED, INSULATED, AIR-AND WATERTIGHT CURB RAIL; WITH SPRING ISOLATORS MOUNTED ON ELASTOMERIC ISOLATION PADS, AND SNUBBER BUSHINGS.

- D. VIBRATION ISOLATION EQUIPMENT BASES:
- 1. STEEL BASE: FACTORY-FABRICATED, WELDED, STRUCTURAL-STEEL BASES AND RAILS.
  - 2. INERTIA BASE: FACTORY-FABRICATED, WELDED, STRUCTURAL-STEEL BASES AND RAILS READY FOR FIELD-APPLIED, CAST-IN-PLACE CONCRETE

- 1.2 FIELD QUALITY CONTROL
- A. TESTING: BY EITHER: OWNER-ENGAGED AGENCY, CONTRACTOR-ENGAGED AGENCY, OR CONTRACTOR.

PART-2 PRODUCTS

- 1.1 VIBRATION ISOLATORS & SEISMIC-RESTRAINT DEVICES
- A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

- B. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:

- 1. ACE MOUNTINGS CO., INC.
- 2. AMBER/BOOTH COMPANY, INC.
- 3. CALIFORNIA DYNAMICS CORPORATION.
- 4. HILTI, INC.
- 5. ISOLATION TECHNOLOGY, INC.
- 6. KINETICS NOISE CONTROL.
- 7. LOOS & CO.; CABLEWARE DIVISION.
- 8. MASON INDUSTRIES.
- 9. TOLCO INCORPORATED; A BRAND OF NIBCO INC.
- 10. UNISTRUT; TYCO INTERNATIONAL, LTD.

END OF SECTION 230548

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

1.1 SUMMARY

- A. TESTING, ADJUSTING, AND BALANCING FOR THE FOLLOWING:

- 1. AIR SYSTEMS: CONSTANT VOLUME.
- 2. MOTORS.

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:

	SUPPLY	RETURN
UNCONDITIONED SPACES WITHIN BUILDING:	R-6	R-6
WITHIN BUILDING ENVELOPE ASSEMBLY:	R-8	R-8
OUTSIDE OF BUILDING:	R-8	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.

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 A524 STANDARD SPECIFICATION FOR GENERAL REQUIREMENT FOR SHEET METAL 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.

- 1. 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:

USG	MAX. SIDE INCHES	TRANSVERSE JOINTS AND BRACING
-----	------------------	-------------------------------

- 22 UP TO 12 S SLIP, DRIVE SLIP, ONE INCH POCKET LOCK ON 8 FOOT CENTERS

- 22 13 TO 24 1"x1"x1/8" ANGLES ON 4 FOOT CENTERS
- 20 25 TO 35 1"x1"x1/8" ANGLES ON 2 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.

- 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

CONSULTANTS (ENGINEER):

NY ENGINEERS

NEARBY ENGINEERS  
 382 NE 191ST STREET SUITE  
 49674, MIAMI, FL 33179  
 PH-914.257.3455  
 WWW.NY-ENGINEERS.COM

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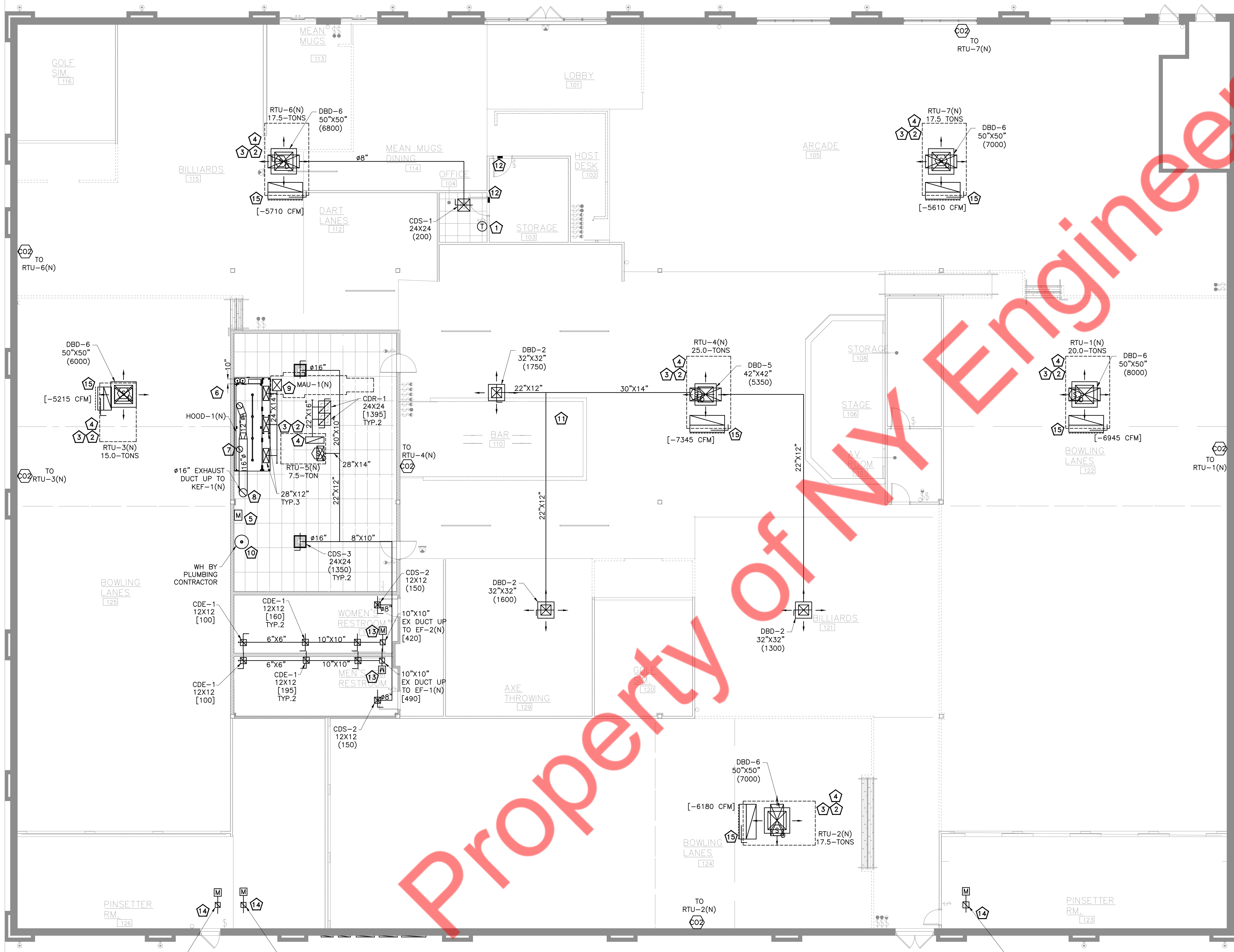
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MECHANICAL SPECIFICATIONS (2 OF 2)

M1.2



**CO2 SENSOR AND INSTALLATION NOTES**

- UNOCCUPIED MODE: REMAINS SHUT AT ALL TIMES DURING UNOCCUPIED MODE.
- OCCUPIED MODE: ENERGIZED WHEN FAN IS RUNNING. CLOSED WHEN FAN IS NOT RUNNING. DAMPER SHALL MODULATE BASED ON SIGNAL FROM CO2 SENSORS TO MAINTAIN LEVEL AT OR BELOW 600 PPM ABOVE AMBIENT LEVEL. THE AMBIENT LEVEL CAN BE ASSUMED TO BE 400 PPM. RECOMMENDED LEVEL IS 400 PPM.
- COMMERCIAL SENSOR UTILIZES A SIGNAL BEAM ABSORPTION INFRARED DIFFUSION SAMPLE METHOD FOR CO2 DETECTION. USING CO2 AS AN INDICATOR OF OCCUPANCY WILL ALLOW VENTILATION BASED ON ACTUAL OCCUPANCY WHILE MAINTAINING CODE MINIMUM VENTILATION.
- SENSOR WILL MODULE OUTSIDE AIR QUANTITIES THROUGH ECONOMIZER DAMPER ACTUATOR AND WILL CONTROL AMOUNT BETWEEN 0 AND 100% OUTSIDE AIR.
- SENSOR SHALL BE PROVIDED WITH ROOFTOP AIR CONDITIONING UNIT AND INSTALL PER MANUFACTURERS REQUIREMENTS.
- CO2 SENSORS SHALL BE LOCATED WITHIN THE BREATHING ZONE BETWEEN 3' TO 6' ABOVE FINISHED FLOOR.

**MECHANICAL GENERAL NOTES**

- CONTRACTOR SHALL BALANCE EACH DEVICE WITH THE CFM SHOWN ON PLAN.
- 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.
- COORDINATE LOCATIONS AND SIZES OF ROOF OPENINGS WITH OWNER AND STRUCTURAL ENGINEERS.
- EQUIPMENT SIZES, DIMENSIONS AND REQUIRED CONNECTIONS SHALL BE VERIFIED WITH THE ACTUAL EQUIPMENT SELECTED VENDOR DRAWINGS BEFORE FABRICATION OF DUCTWORK, PIPING ETC.
- DUCT SIZES SHOWN ON PLANS ARE CLEAR INSIDE AIR STREAM DIMENSIONS.
- CONTRACTOR SHALL COORDINATE ALL ELECTRICAL REQUIREMENTS FOR ALL HVAC BASED ON ACTUAL EQUIPMENT SELECTED PRIOR TO INSTALLATION.
- CONTRACTOR SHALL COORDINATE EQUIPMENT WEIGHTS AND SUPPORTS BASED ON ACTUAL EQUIPMENT SELECTED.
- MOUNT DUCTWORK AS HIGH AS POSSIBLE.
- TEST AND BALANCE AIR SYSTEMS. PROVIDE REPORT TO G.C AND OWNER.
- MECHANICAL CONTRACTOR TO COORDINATE INSTALLATION OF WATER HEATER EXHAUST FLUE WITH PLUMBING CONTRACTOR.
- ALL EXPOSED DUCTWORK SHALL BE INTERNALLY LINED. ALL DUCTWORK.
- NEW DUCTWORK IN CONCEALED AREAS MAY BE RECTANGULAR WITH EQUIVALENT CROSS SECTIONAL FLOW AREA.
- 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.
- 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.
- ALL SUPPLY AND RETURN AIR PLENUMS SHALL BE STENCILED WITH RTU NUMBERS FOR IDENTIFICATION.
- STANDARD BLACK FINISH FOR ALL DUCTWORK AND ACCESSORIES.

**MECHANICAL PLAN KEY NOTES:**

- LOCATE ALL T-STATS NEAR FRONT DESK/MANAGER OFFICE. MECHANICAL CONTRACTOR TO COORDINATE T-STAT LOCATION WITH TENANT. INSTALL AND WIRE NEW 7-DAY PROGRAMMABLE THERMOSTAT WITH RESPECTIVE RTUS. PROVIDE INSULATION AT THE BACK.
- 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. PROVIDE WMS TO THE RETURN AIR DUCT.
- SMOKE DETECTOR (IN SUPPLY AIR DUCT) SHALL BE FURNISHED/INSTALLED BY MECHANICAL CONTRACTOR AND WIRED BY ELECTRICAL CONTRACTOR TO SHUT DOWN CORRESPONDING RTU UNDER ALARM CONDITIONS. ALL WIRING SHALL BE IN CONDUIT PER N.E.C.
- PROVIDE REMOTE TEMP SENSOR MOUNTED IN RETURN DUCT AND WIRE BACK TO T-STAT NEAR FRONT DESK.
- LOCATION OF ANSUL SYSTEM REMOTE MANUAL PULL STATION. VERIFY EXACT LOCATION WITH KITCHEN EQUIPMENT SUPPLIER.
- INSTALL TYPE 1 GREASE EXHAUST HOOD-2(N). SUPPORT HOOD PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. PROVIDE TRAPEZE HANGERS FOR ALL THREAD SUPPORT UNDER DUCTWORK AS REQUIRED. TRANSITION FROM HOOD CONNECTION TO WELDED KITCHEN EXHAUST DUCT SIZES SHOWN.
- GREASE DUCT TO BE PROVIDED WITH KITCHEN EQUIPMENT AND INSTALLED BY MECHANICAL CONTRACTOR. INSTALL PER MANUFACTURER'S INSTRUCTIONS. PROVIDE CLEANOUTS AT EVERY CHANGE OF DIRECTION IN THE DUCT AND EVERY 10 FEET WITH MINIMUM OF 3 FEET OF CLEARANCE IN FRONT OF CLEAN-OUT. COORDINATE EXACT DUCT LENGTHS REQUIRED BASED ON FIELD CONDITIONS WITH MANUFACTURER.
- 16" GREASE EXHAUST DUCT FROM HOOD-1(N) UP THRU ROOF TO KEF-1(N).
- EXTEND MAKE-UP AIR DUCT FROM HOOD-1(N) UP TO MAKE-UP AIR UNIT ON ROOF MAU-1(N).
- 10" #3"/#5" CONCENTRIC VENT FROM HOT WATER HEATER. TERMINATE VENT AT LEAST 36" ABOVE ROOF. INSTALL AS PER MANUFACTURER'S RECOMMENDATIONS.
- COORDINATE WITH LIGHTING PLAN AND ELECTRICAL ENGINEER.
- PROVIDE 10"X6" DOOR GRILLE.
- MOTORIZED DAMPER TO BE INTERLOCKED WITH RESPECTIVE FAN.
- MOTORIZED DAMPER TO BE INTERLOCKED WITH RESPECTIVE RTUS.
- FULL SIZE RETURN AIR DUCT WITH W.M.S.

CONSULTANTS (ENGINEER):  
**NY ENGINEERS**  
 NEARBY ENGINEERS  
 382 NE 191ST STREET SUITE  
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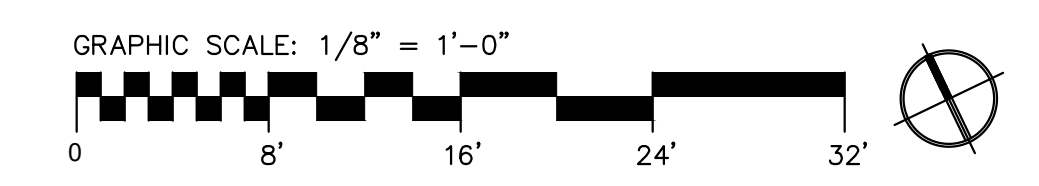
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MECHANICAL FLOOR PLAN

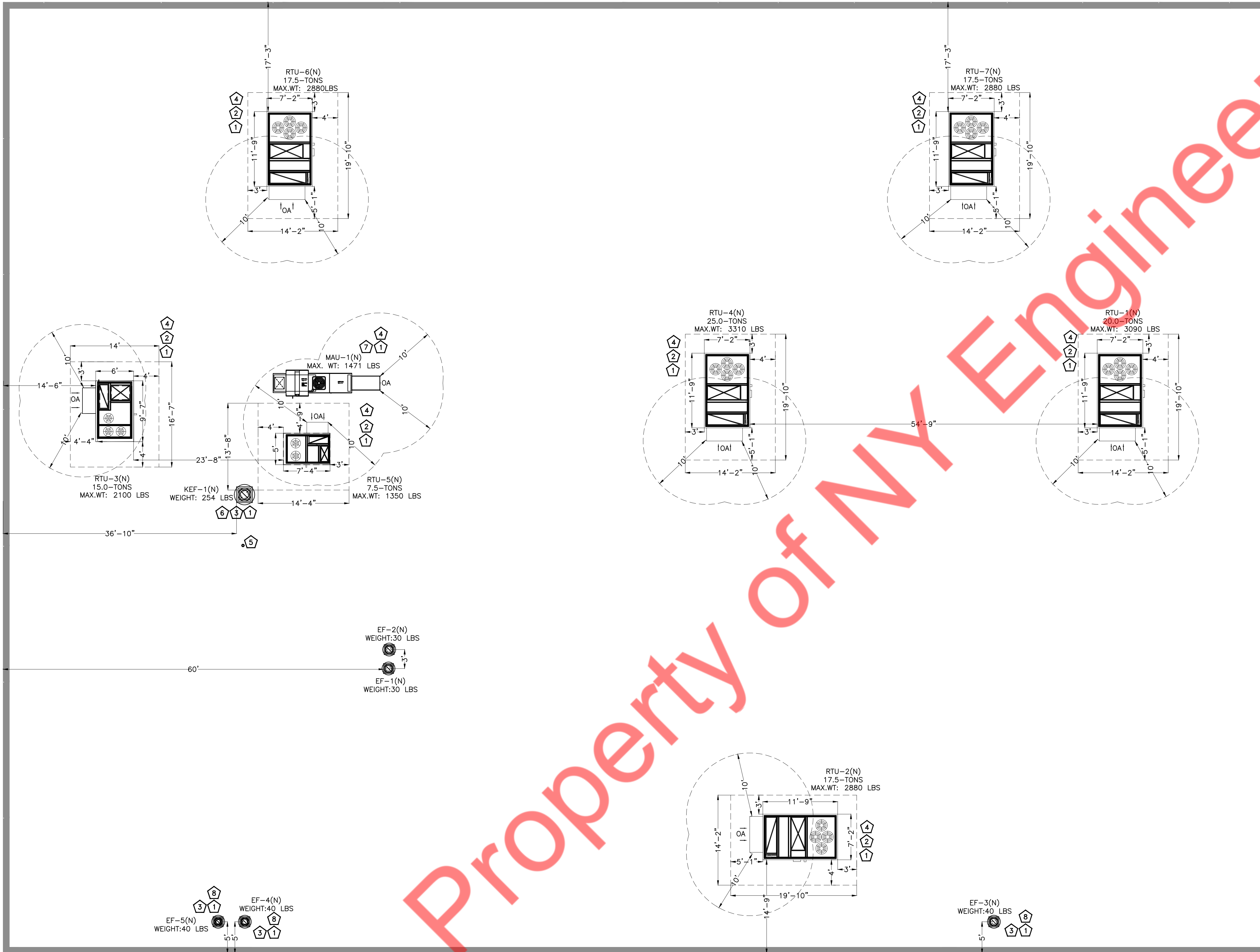
M2.0



1 MECHANICAL FLOOR PLAN  
 SCALE: 1/8" = 1'-0"

10X10 CUTOUT FOR EXHAUST WITH WMS & MD  
 10X10 CUTOUT FOR EXHAUST WITH WMS & MD

12X12 CUTOUT FOR EXHAUST WITH WMS & MD



**MECHANICAL GENERAL NOTES**

- COORDINATE LOCATIONS AND SIZES OF ROOF OPENINGS WITH OWNER AND STRUCTURAL ENGINEERS.
- EQUIPMENT SIZES, DIMENSIONS AND REQUIRED CONNECTIONS SHALL BE VERIFIED WITH THE ACTUAL EQUIPMENT SELECTED VENDOR DRAWINGS BEFORE FABRICATION OF DUCTWORK, PIPING ETC.
- CONTRACTOR SHALL COORDINATE ALL ELECTRICAL REQUIREMENTS FOR ALL HVAC BASED ON ACTUAL EQUIPMENT SELECTED PRIOR TO INSTALLATION.
- 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.
- TEST AND BALANCE AIR SYSTEMS. PROVIDE REPORT TO GENERAL CONTRACTOR AND OWNER.
- ALL RTU WEIGHTS ARE INCLUDING ROOF CURBS AND/OR ADAPTORS.
- M.C TO COORDINATE INSTALLATION OF WATER HEATER EXHAUST FLUE WITH PLUMBING CONTRACTOR.

**MECHANICAL ROOF PLAN KEY NOTES:**

- COORDINATE FINAL LOCATION OF EQUIPMENT WITH STRUCTURAL DRAWINGS.
- NEW ROOFTOP UNIT IS PROVIDED. 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.
- EXHAUST TERMINATION TO BE 10 FT. AWAY FROM ANY OUTDOOR INTAKE OPENING.
- ROUTE CONDENSATE DRAIN FROM RTU/MAU ON THE ROOF TO THE NEAREST DRAIN POINT. CONNECT TO A DRAIN LINE VIA AIR GAP IN AN APPROVED MANNER.
- Ø3"/Ø5" CONCENTRIC VENT FROM HOT WATER HEATER. TERMINATE VENT AT LEAST 36" ABOVE ROOF. INSTALL AS PER MANUFACTURER'S RECOMMENDATIONS.
- ROOF MOUNTED KITCHEN EXHAUST FAN AND FAN CURB ARE OWNER PROVIDED. COORDINATE INSTALLATION OF FAN WITH LANDLORD AND EXISTING CONDITIONS TO ENSURE THAT EXHAUST OUTLETS SHALL BE LOCATED NOT LESS THAN 10 FT. HORIZONTALLY FROM AIR INTAKE SOURCE.
- MAKE-UP AIR UNIT AND ROOF CURB ARE OWNER PROVIDED. PROVIDE FLEXIBLE CONNECTION ON THE SUPPLY DUCT CONNECTION TRANSITION TO DUCT SIZE INDICATED. FIELD VERIFY EXISTING CONDITIONS PRIOR TO BID.
- ROOF MOUNTED EXHAUST FAN AND FAN CURB ARE OWNER PROVIDED. COORDINATE INSTALLATION OF FAN WITH LANDLORD TO.

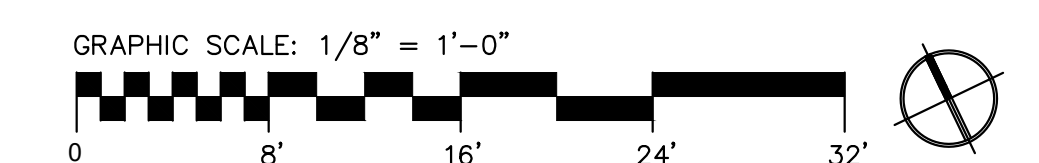
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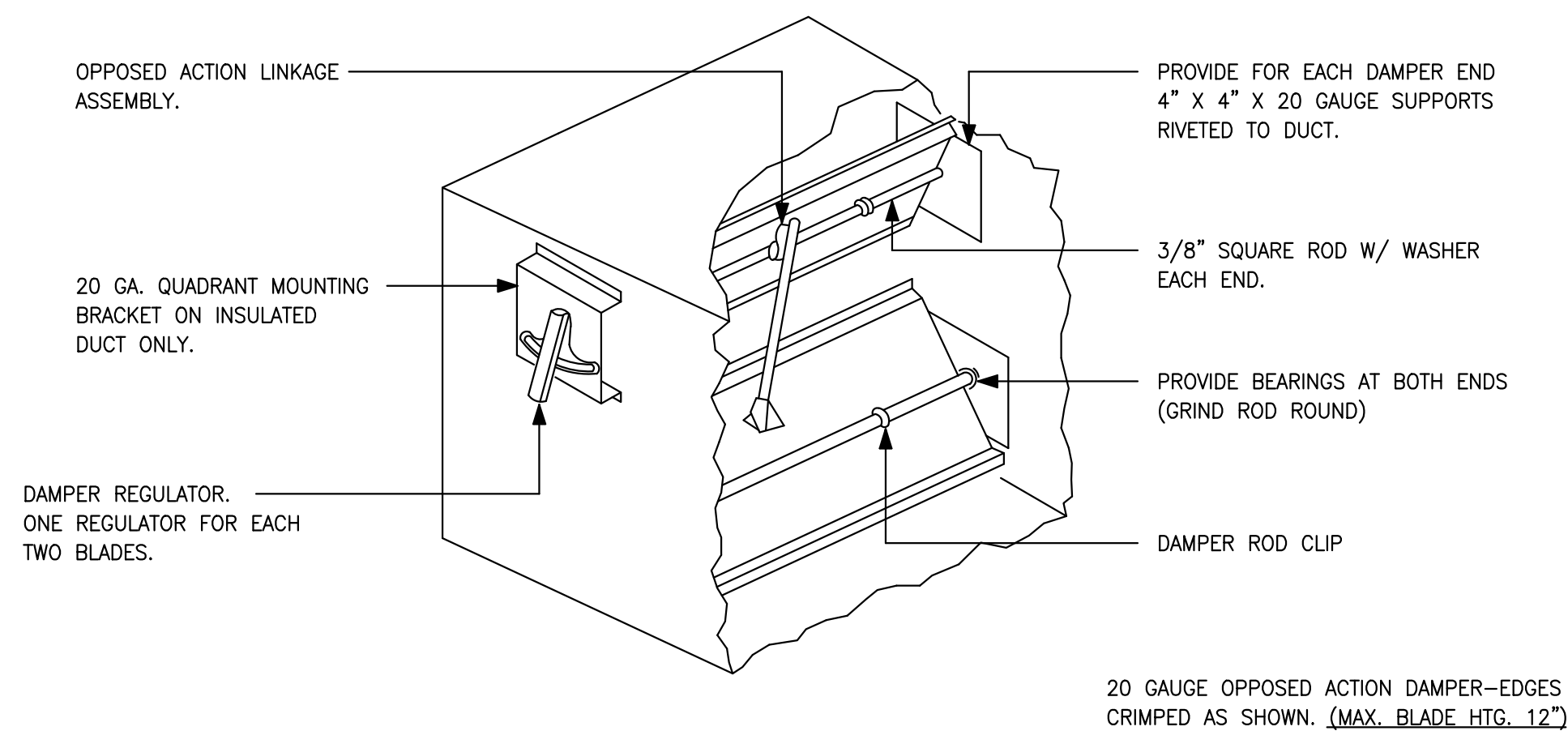
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1 MECHANICAL ROOF PLAN  
SCALE: 1/8" = 1'-0"

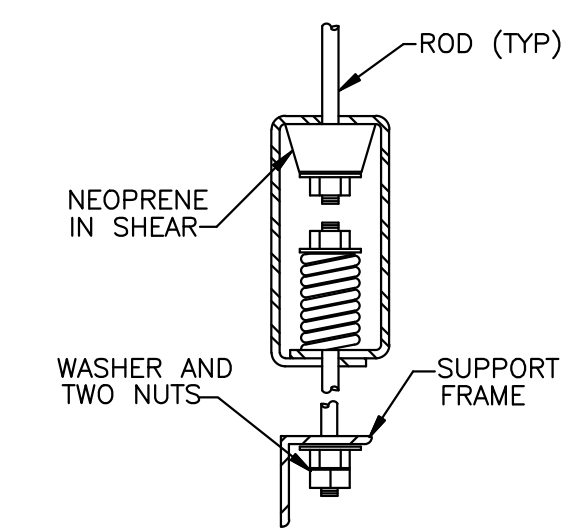


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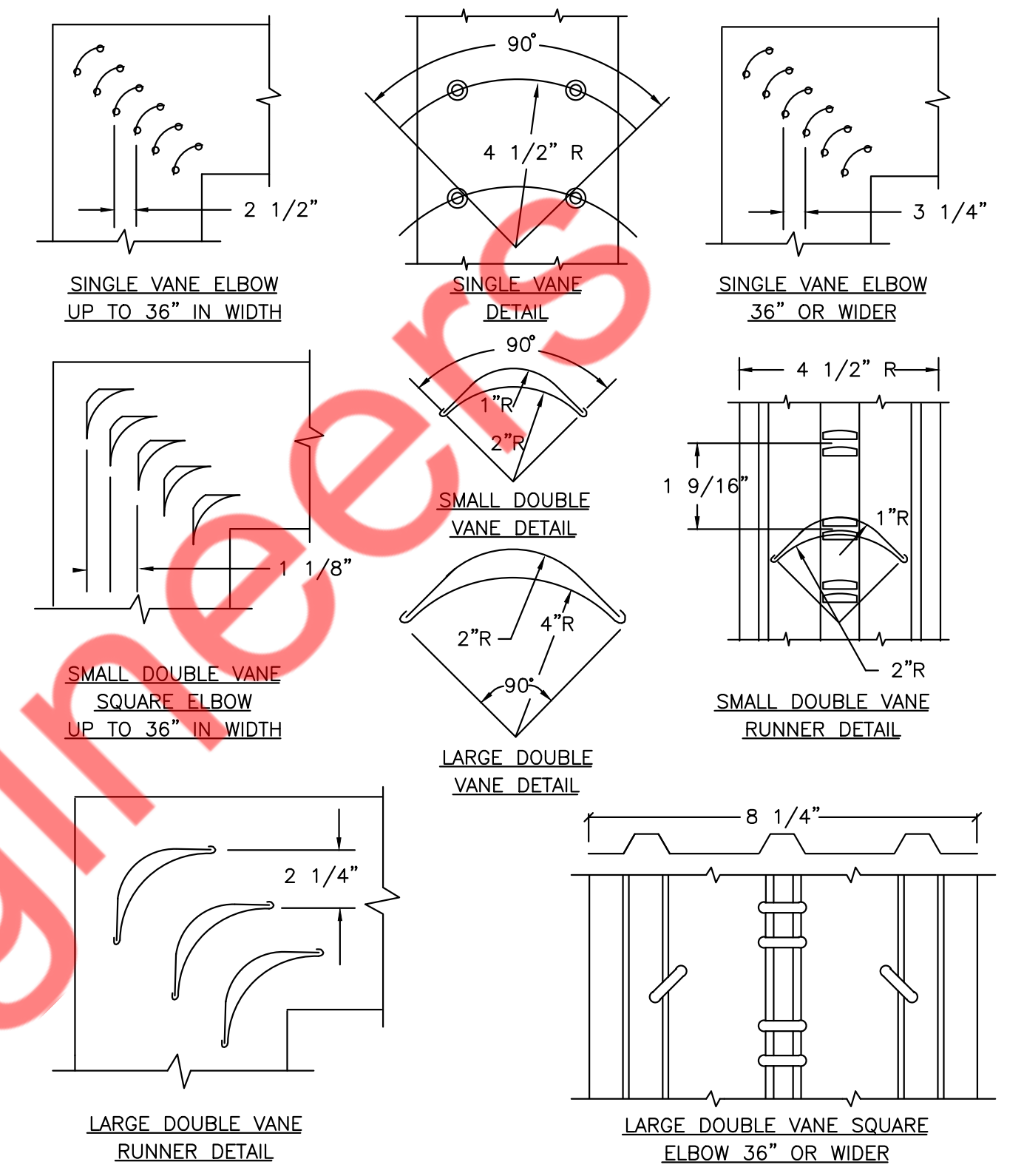


NOTE: 1. FOR DUCTS OVER 29" WIDE AND/OR OVER 12" HIGH.

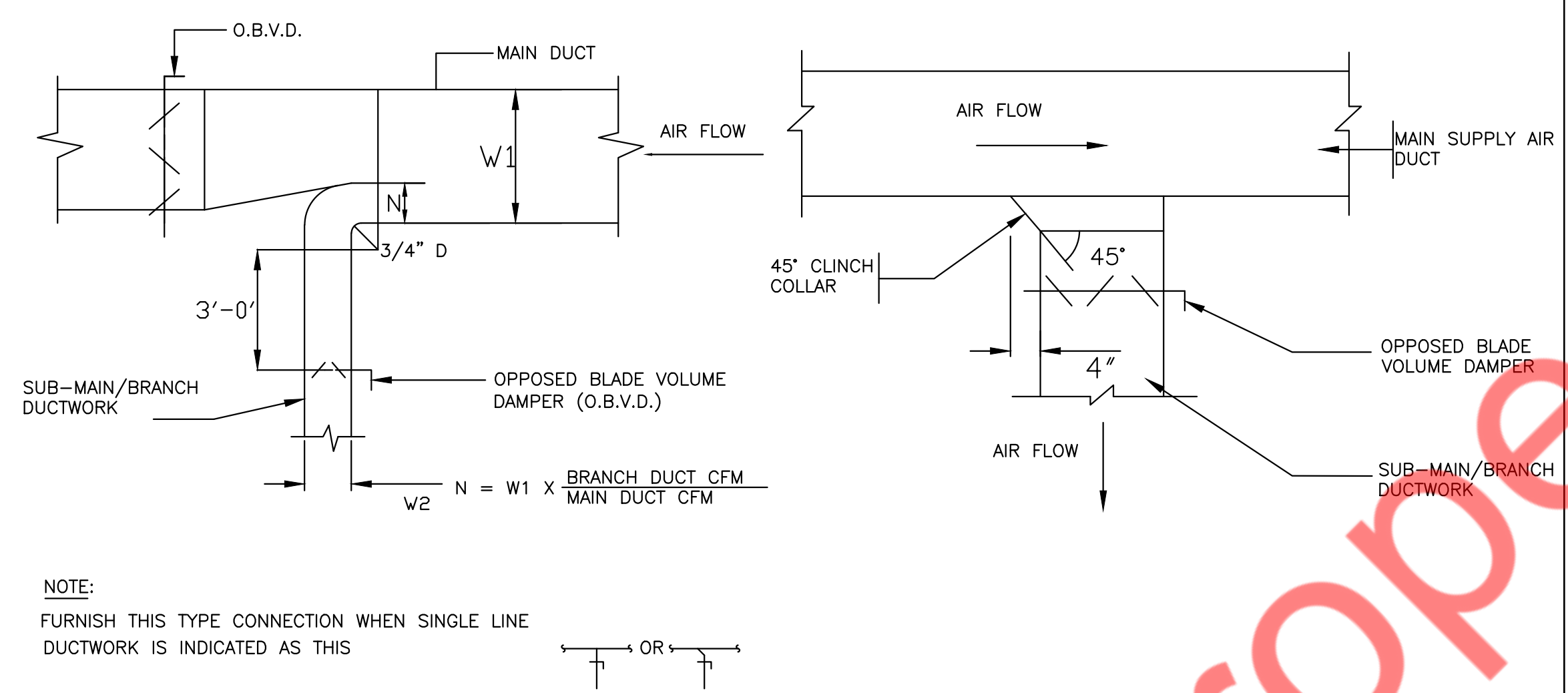
1 LOW PRESSURE BALANCING DAMPER  
M5.0 N.T.S



2 VIBRATION ISOLATOR DETAIL  
M5.0 N.T.S

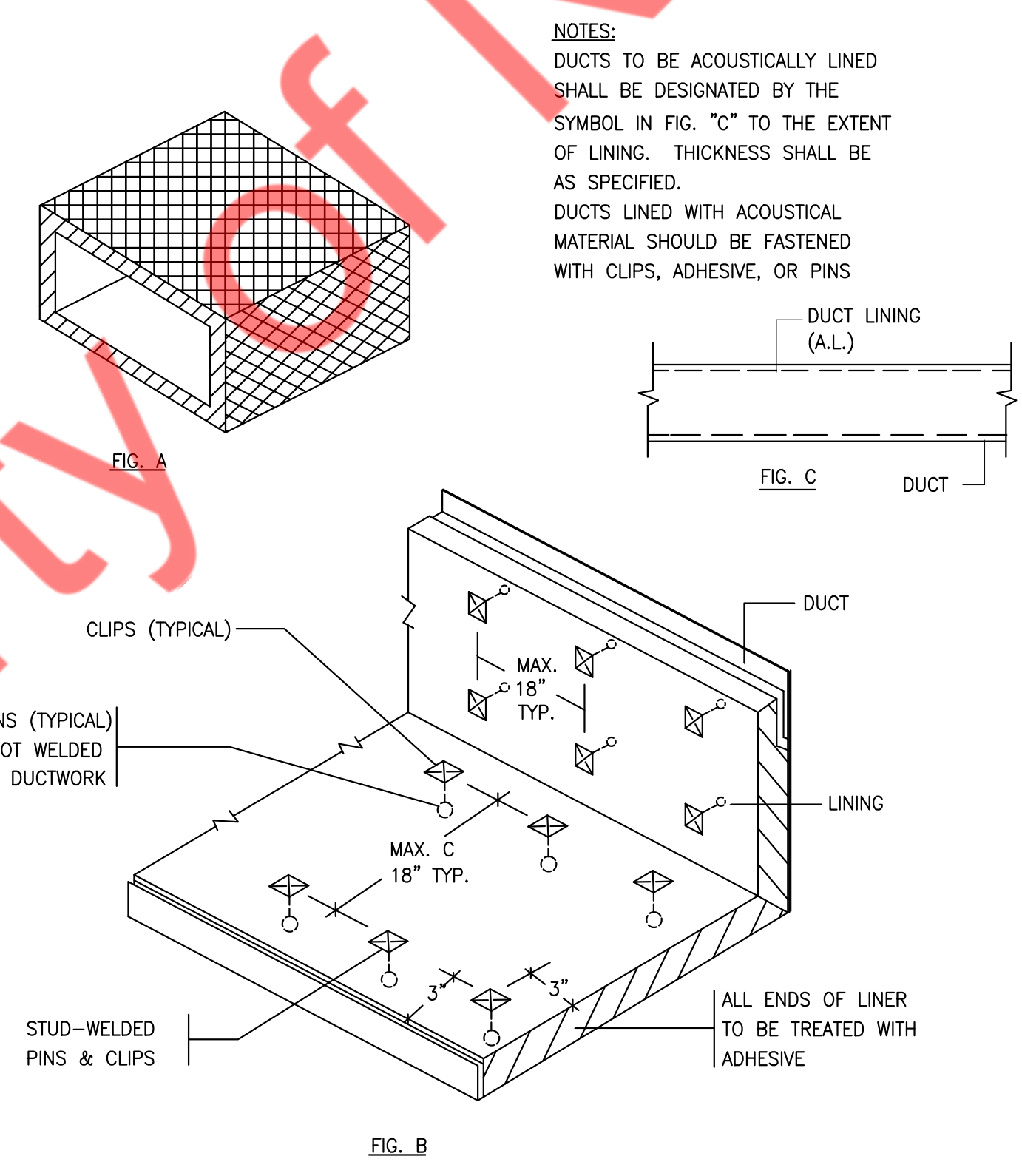


3 LOW VELOCITY DUCTWORK ELBOWS  
M5.0 N.T.S

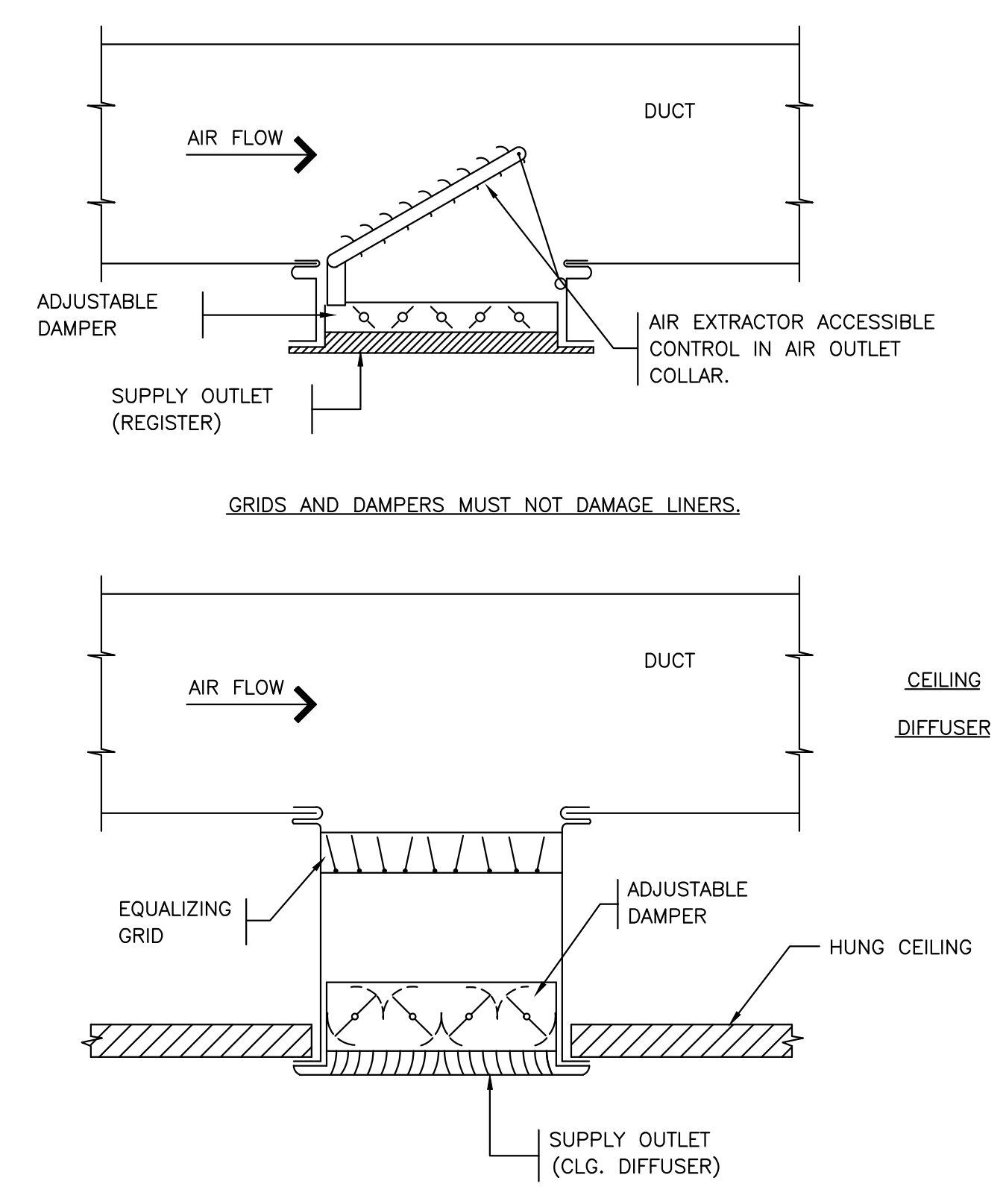


NOTE: FURNISH THIS TYPE CONNECTION WHEN SINGLE LINE DUCTWORK IS INDICATED AS THIS

4 SUPPLY AIR DUCTWORK SUB-MAIN/BRANCH DUCT CONNECTION  
M5.0 N.T.S



5 ACOUSTICAL TREATMENT DUCT LINING  
M5.0 N.T.S



6 DIFFUSER AND GRILLE REGISTER CONNECTIONS  
M5.0 N.T.S

CONSULTANTS (ENGINEER):  
**NY ENGINEERS**  
NEARBY ENGINEERS  
382 NE 191ST STREET SUITE  
49674, MIAMI, FL 33179  
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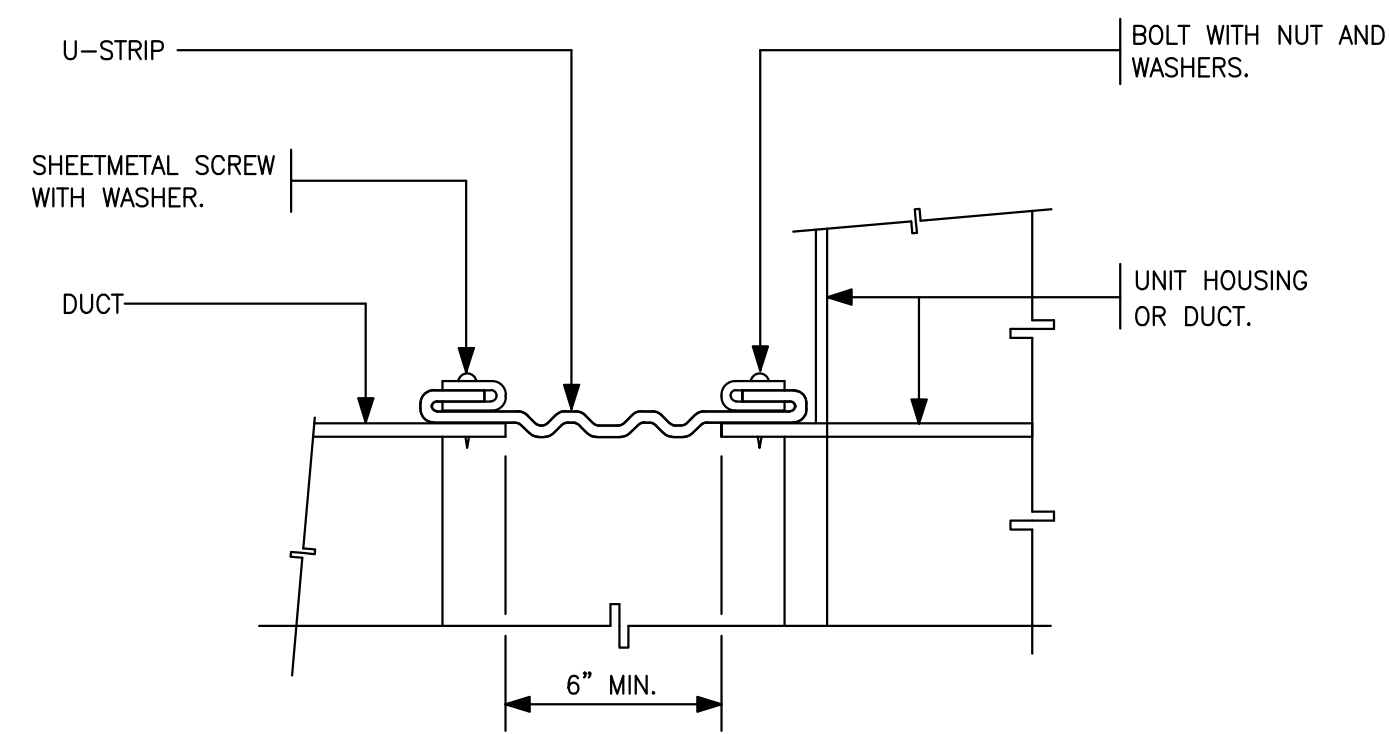
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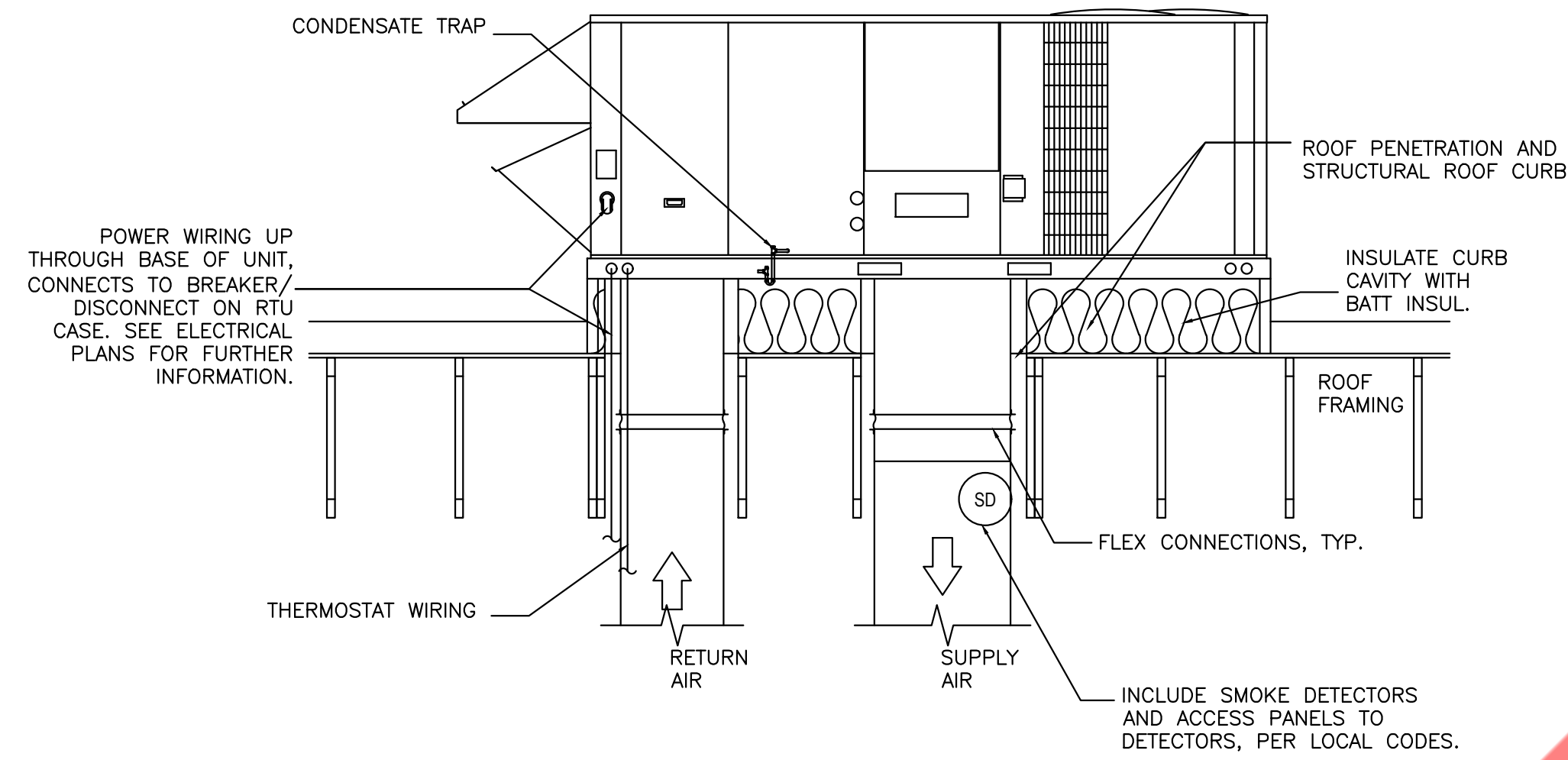
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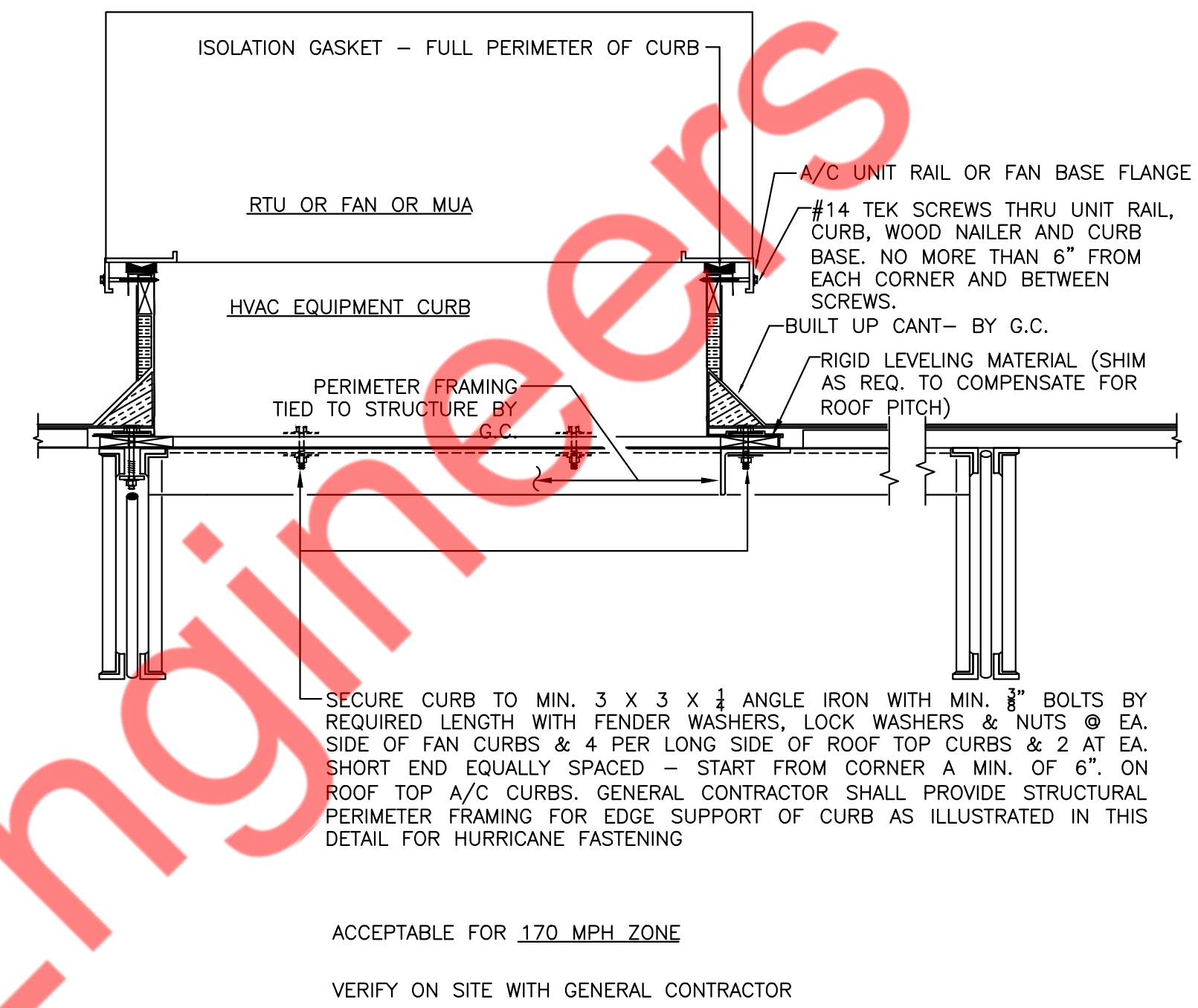
MECHANICAL DETAILS  
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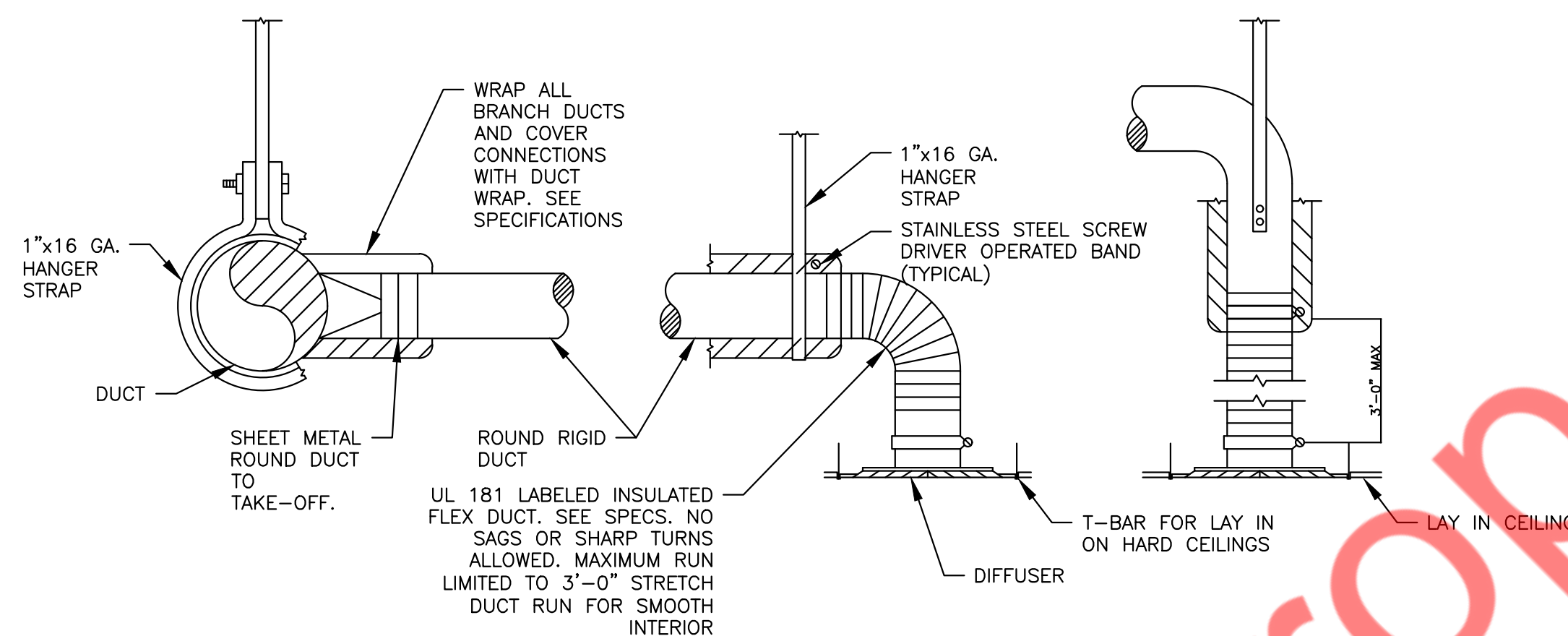
1 FLEXIBLE CONNECTION (DUCT-EQUIPMENT)  
 M5.1 N.T.S



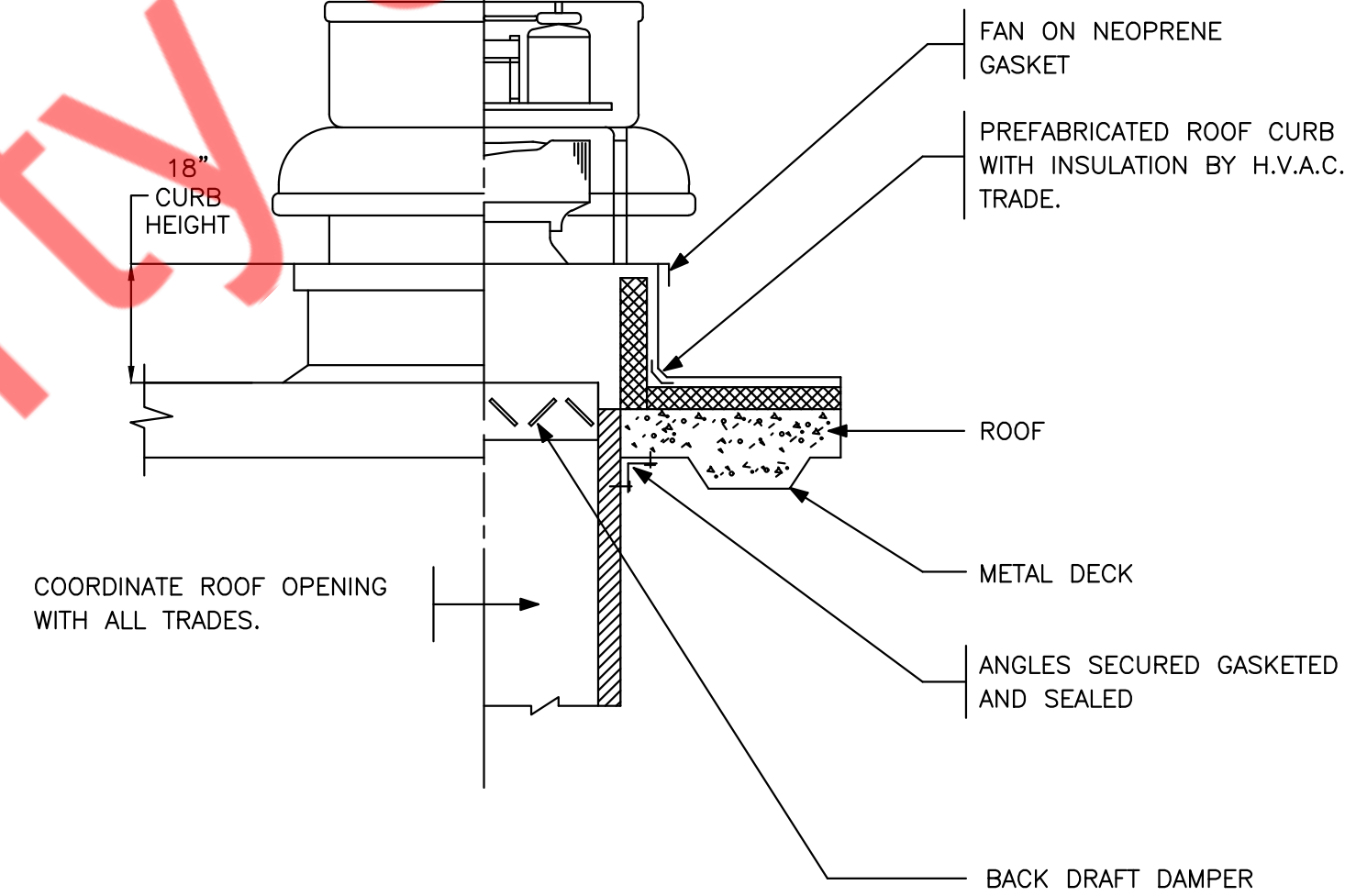
2 TYPICAL ROOF TOP UNIT DETAILS  
 M5.1 N.T.S



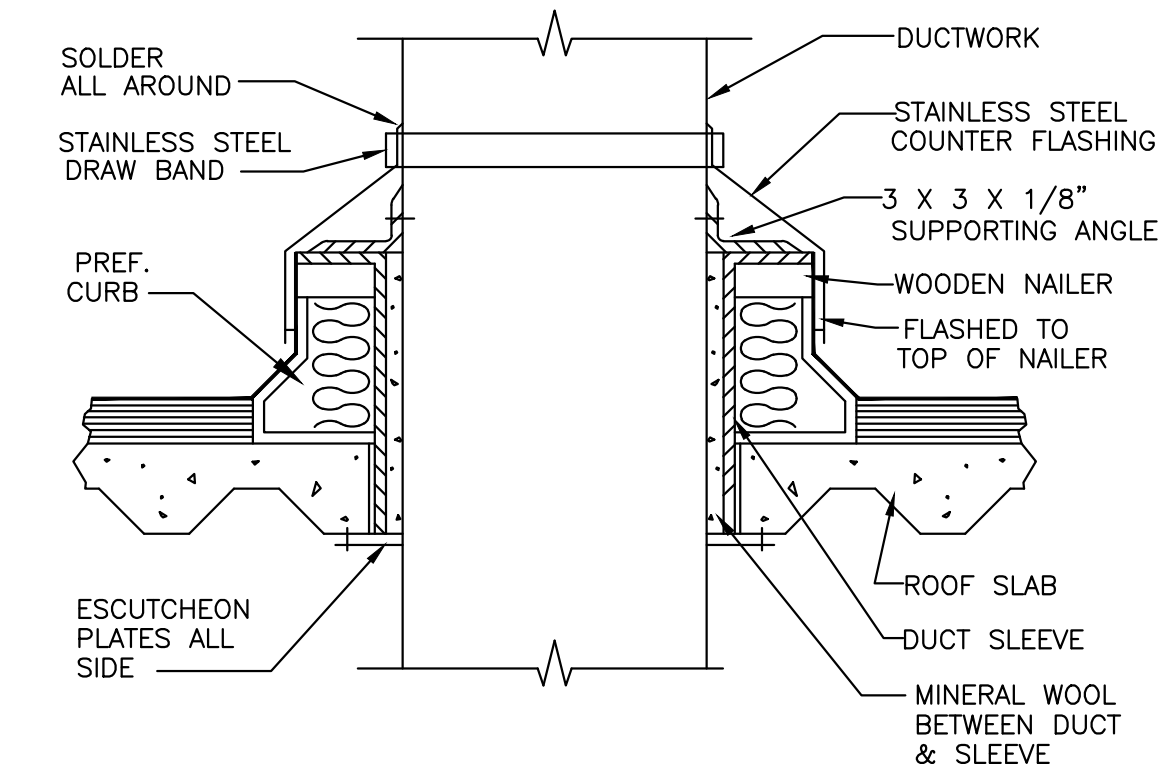
3 ROOF TOP UNIT INSTALLATION ON ROOF  
 M5.1 N.T.S



4 TYPICAL DIFFUSER CONNECTION DETAIL  
 M5.1 N.T.S



5 DOWN BLAST FAN  
 M5.1 N.T.S



6 DUCT PENETRATION DETAIL THROUGH ROOF  
 M5.1 N.T.S

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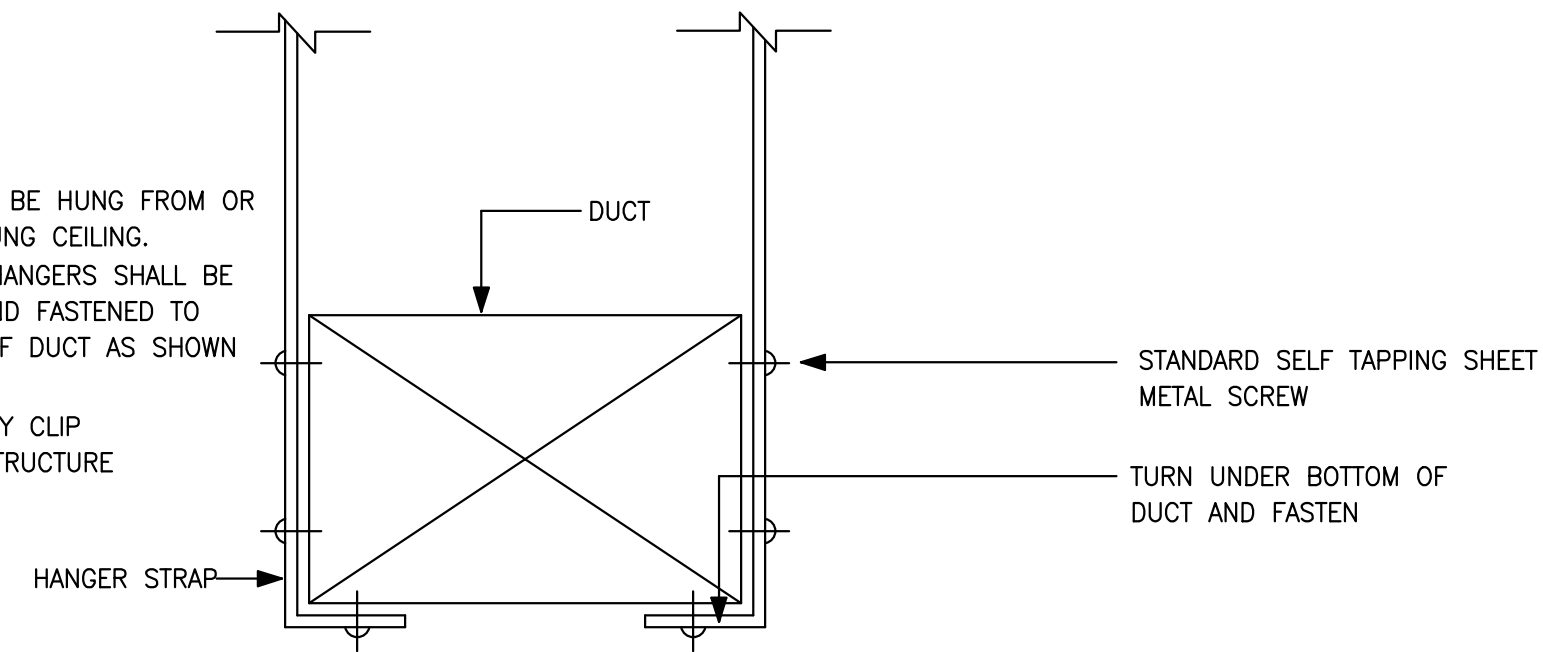
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MECHANICAL DETAILS  
 (2 OF 3)  
 M5.1

NOTES:

- DUCTS SHALL NOT BE HUNG FROM OR SUPPORTED BY HUNG CEILING.
- FOR ALL DUCTS, HANGERS SHALL BE TURNED UNDER AND FASTENED TO THE BOTTOM OF DUCT AS SHOWN ABOVE.
- FRICTION OR CADDY CLIP ATTACHMENT TO STRUCTURE IS NOT PERMITTED.

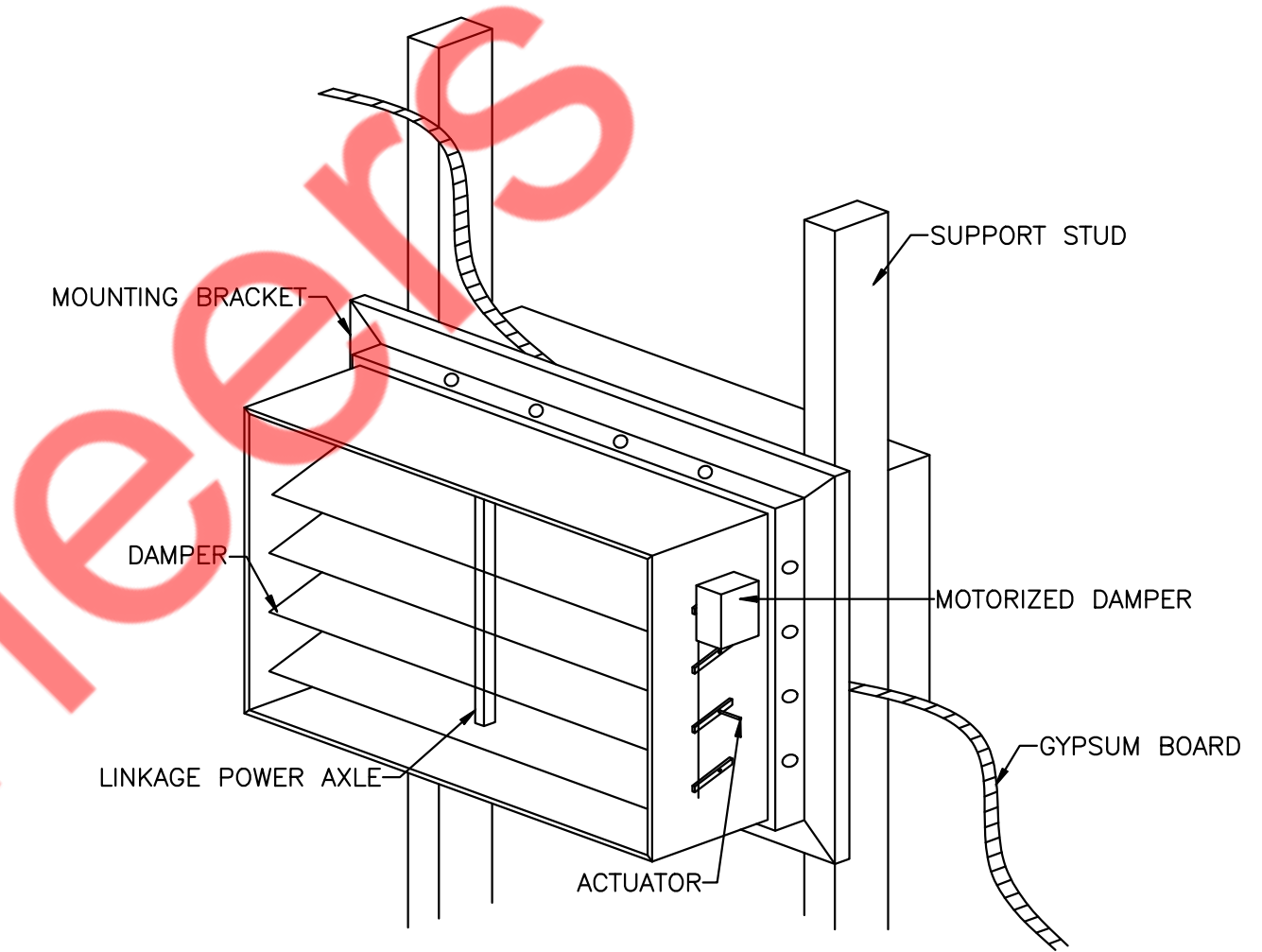
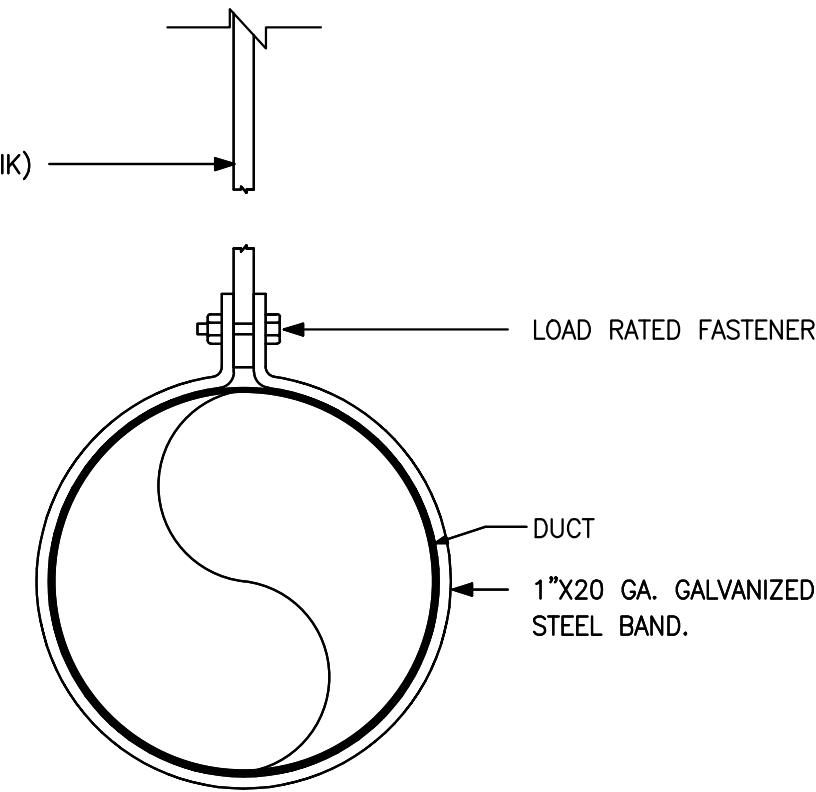


DUCT HANGER SCHEDULE		
DUCT CROSS SECTIONAL AREA	STRAP HANGER SIZE	MAX. SPACING
UNDER 2 SQ. FT.	1" X 1/16"	6'-0" O.C.
2 TO 4 SQ. FT.	1" X 1/8"	8'-0" O.C.
4 TO 8 SQ. FT.	1" X 1/8"	6'-0" O.C.
OVER 8 SQ. FT.	1" X 1/8"	4'-0" O.C.

STRAP HANGER (1"x20 GA. THICK)  
10'-0" MAX. ON CENTER.

NOTES :

- DUCT CONSTRUCTION SHALL CONFORM TO LOW PRESSURE MATCHNA CONSTR. STD.
- DUCTS SHALL BE FABRICATED WITH LONGITUDINAL SEAMS.
- PROVIDE ONE PRIME-COAT PAINT FOR ROUND DUCTS INSTALLED IN EXPOSED AREAS.



1 DUCT HANGING DETAILS  
M5.2 N.T.S

2 METHOD OF HANGING DUCTWORK  
M5.2 N.T.S

3 MOTORIZED DAMPER DETAIL  
M5.2 N.T.S

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Property of NY Engineers

REVISION SCHEDULE		
NO. REV.	SUBMISSION DATE	ISSUED BY

ISSUE DATE: 05/30/2024

INTERIOR BUILD-OUT  
810 BILLIARDS &  
BOWLING  
HOUSTON, TX

DRAWN BY: NYE

QAQC: NYE

APPROVED BY: NYE

PROJECT NUMBER: 2323

MECHANICAL DETAILS  
(3 OF 3)

M5.2



ROOF TOP UNIT SCHEDULE																						
UNIT ID	MANUFACTURER	EFFICIENCY	MODEL	NOMINAL TONS	SUPPLY FAN DATA			GAS HEAT				COOLING DATA				ELECTRICAL DATA			THERMAL EFFICIENCY (%)	OPERATING WEIGHT (LBS)		
					TOTAL	OUTSIDE AIR	EXTERNAL STATIC	INPUT	OUTPUT	TOTAL	SENSIBLE	AMBIENT TEMP.	ENTERING TEMP.	STAGES	VOLTS	PHASE	MCA(A)	MOC(P)			EER	IEER
					CFM	CFM	PRESSURE (IN. W.G.)	MBH	MBH	MBH	MBH	DB (°F)	DB / WB(°F)									
RTU-1(N)	CARRIER	STANDARD	48FCDN24 (OR EQUIVALENT)	20	8000	1055	1.0	220	178	256.1	184.9	95	80/67	2	460	3	52.0	60	10.00	14.50	81.0	3090
RTU-2(N)	CARRIER	STANDARD	48FCDN20 (OR EQUIVALENT)	17.5	7000	820	1.0	220	178	218.2	162.4	95	80/67	2	460	3	46.0	60	10.80	14.50	81.0	2880
RTU-3(N)	CARRIER	STANDARD	48FCSN16 (OR EQUIVALENT)	15	6000	785	1.0	180	146	183.1	136.1	95	80/67	2	460	3	35.0	45	10.80	14.50	81.0	2100
RTU-4(N)	CARRIER	STANDARD	48FCDN28 (OR EQUIVALENT)	25	10000	2655	1.0	220	178	296	220.5	95	80/67	2	460	3	59.0	70	9.80	14.00	81.0	3310
RTU-5(N)	CARRIER	STANDARD	48FCSN08 (OR EQUIVALENT)	7.5	3000	210	1.0	125	103	90.5	66	95	80/67	2	460	3	21.0	25	11.20	15.00	82.0	1350
RTU-6(N)	CARRIER	STANDARD	48FCDN20 (OR EQUIVALENT)	17.5	7000	1290	1.0	220	178	218.2	162.4	95	80/67	2	460	3	46.0	60	10.80	14.50	81.0	2880
RTU-7(N)	CARRIER	STANDARD	48FCDN20 (OR EQUIVALENT)	17.5	7000	1390	1.0	220	178	218.2	162.4	95	80/67	2	460	3	46.0	60	10.80	14.50	81.0	2880

- NOTES:**
- ALL EQUIPMENT MUST BE MEETING OR EXCEEDING THE MINIMUM REQUIREMENTS.
  - ELECTRICAL CONNECTION TO BE SINGLE POINT AND TO BE THROUGH THE BOTTOM OF THE UNIT.
  - PROVIDE DISCONNECT SWITCH AND AN UNPOWERED GFCI RECEPTACLE.
  - 14" ROOF CURB - CONTRACTOR SHALL FIELD INSULATE. SHIP ASAP AHEAD OF THE UNIT.
  - CONNECT CONDENSATE DRAIN LINE FROM ALL RTUS ON THE ROOF TO THE NEAREST DRAIN POINT. CONNECT TO A DRAIN LINE VIA AIR GAP IN AN APPROVED MANNER.
  - CABINET WITH 1/2" FIBERGLASS INSULATION.
  - UNIT SHALL BE COMPLETE WITH GAS HEATING SECTION. GAS REGULATOR TO RECEIVE 4.5-14" GAS PRESSURE FROM MAIN.
  - DRY BULB & ENTHALPY ECONOMIZER WITH BAROMETRIC RELIEF / 25% MANUAL OUTSIDE AIR DAMPER ASSEMBLY WITH HOOD (ZONE 'E' ONLY). PROVIDE ECONOMIZER WITH FDD.
  - PROVIDE 8-WIRE, 24 VAC, AUTOMATIC CHANGEVER, 2-STAGE HEAT / COOL, REMOTELY PROGRAMMABLE THERMOSTAT.
  - REMOTE SENSORS SHALL BE PROVIDED IN SPACE WIRED BACK TO PROGRAMMABLE, 24 HOUR, 7 DAY, THERMOSTATS.
  - ANTI SHORT CYCLE TIMER.
  - THROWAWAY 2" FILTERS (MERV 13).
  - PROVIDE ALL COMPRESSORS WITH 5 YEAR WARRANTY.
  - PROVIDE SMOKE DETECTOR IN SUPPLY AIR SIDE. PROVIDE GLOBAL SHUTDOWN TO ALL HVAC UNITS UPON ACTIVATION OF A BUILDING'S FIRE ALARM SYSTEM.
  - VFD SUPPLY FAN.
  - PROVIDE CO2 SENSOR TO ALL RTUS EXCEPT RTU-5(N).
  - PROVIDE POWER EXHAUST FOR ALL RTUS.

KITCHEN MAKE UP AIR UNIT SCHEDULE																						
TAG	SERVICE	FLOW RATE	EXTERNAL STATIC PRESSURE	SPEED	COOLING CAPACITY		HEATING CAPACITY		BURNER EFFICIENCY	FAN DATA				CONDENSER DATA			BASIS OF DESIGN					
					TOTAL CAPACITY	SENSIBLE CAPACITY	INPUT	OUTPUT		V/PH/Hz	FLA	MCA (A)	MOC(P)	HP	BHP	CAPACITY (TON)	V/PH/Hz	MCA (A)	MOC(P)	WEIGHT (LBS)	MANUFACTURER	MODEL
					CFM	MBH	MBH	MBH		%												
MAU-1(N)	HOOD-1(N)	2565	0.375	1130	60	33.2	115.9	106.6	92	208/3/60	4.4	27.4	40	1.50	0.81	5.00	208-230/3/60	21.4	30	1471	CAPTIVEAIRE	A2-D.250-200-MPU

- NOTES:**
- PROVIDE ALL NECESSARY ACCESSORIES AS PER MANUFACTURER'S RECOMMENDATIONS.
  - REFER MAKE UP AIR UNIT DATA ON SHEET M7.0 TO M7.1 FOR DETAILED INFORMATION.
  - CONTRACTOR TO PROVIDE MAKE UP AIR UNIT SELECTION EQUIVALENT TO ABOVE SELECTION.

HOOD SCHEDULE										
UNIT ID	MANUFACTURER	LENGTH (FEET-INCH)	MODEL	TYPE	COOKING TEMPERATURE (DEG F)	EXHAUST AIR (CFM)	COLLARS (INCH)	TOTAL SUPPLY (CFM)	CONSTRUCTION	WEIGHT (LBS)

- NOTES:**
- REFER HOOD DETAILS ON SHEET M7.0 TO M7.1.

EXHAUST FANS SCHEDULE												
TAG	QUANTITY	FLOW RATE	EXTERNAL STATIC PRESSURE	FAN SPEED	ELECTRIC DATA			MAXIMUM LOUDNESS	BASIS OF DESIGN		WEIGHTS (LBS)	REMARK
					V/PH/Hz	MOTOR HP	FLA (AMPS)		MANUFACTURER	MODEL		
					CFM	IN W.G.	RPM					
KEF-1(N)	1	3206	1.5	1309	208/3/60	3	8.5	63	CAPTIVEAIRE	DU180HFA	254	1,3,6
EF-1(N)	1	490	0.5	1575	115/1/60	1/10	1.38	55	GREENHECK	G-090-VG	30	1,2,5
EF-2(N)	1	420	0.5	1491	115/1/60	1/10	1.38	53	GREENHECK	G-090-VG	30	1,2,5
EF-3(N)	1	700	0.5	1623	115/1/60	1/6	2.3	58	GREENHECK	G-095-VG	40	1,2,4
EF-4(N)	1	520	0.5	1462	115/1/60	1/6	2.3	55	GREENHECK	G-095-VG	40	1,2,4
EF-5(N)	1	520	0.5	1462	115/1/60	1/6	2.3	55	GREENHECK	G-095-VG	40	1,2,4

- NOTES:**
- PROVIDE ALL NECESSARY ACCESSORIES AS PER MANUFACTURER'S RECOMMENDATIONS.
  - PROVIDE ROOF CURB, WEATHER PROOF DISCONNECT SWITCH, AMCA SEAL & UL CERTIFIED, THERMAL OVERLOAD PROTECTION.
  - INTERLOCK KEF-1(N) WITH RTU-5(N). ALSO INTERLOCK OPERATION OF KEF-1(N) WITH MAU-1(N).
  - INTERLOCK EF-3(N) WITH RTU-1(N), EF-4(N) WITH RTU-2(N), EF-5(N) WITH RTU-3(N).
  - EF-1(N) & EF-2(N) SHALL RUN CONTINUOUSLY DURING OPERATIONAL HOURS.
  - CONTRACTOR TO FIELD VERIFY THE SPECIFICATION OF KITCHEN FAN WITH VENDOR.

MECHANICAL AIR TERMINAL DEVICES SCHEDULE									
TAG	SIZE	NECK SIZE	CFM RANGE	DESCRIPTION	BASIS OF DESIGN		NOTES		
					MANUFACTURER	MODEL			
CDS-1	24X24	6"	0-100	SUPPLY AIR DIFFUSER	TITUS	OMNI	1-4		
		8"	101-250						
		10"	251-400						
		12"	401-650						
CDS-2	12X12	8"	0-151	PERFORATED SUPPLY AIR DIFFUSER	TITUS	OMNI			
CDS-3	24X24	16"	900-1400		TITUS	PDS			
DBD-1	24X24	14X14	800-1200	4-WAY DROP BOX DIFFUSER	CARNE	TDBA_D4	1,3,4		
DBD-2	32X32	20X20	1300-2300	4-WAY DROP BOX DIFFUSER	CARNE	TDBA_D4	1,3,4		
DBD-3	36X36	24X24	2400-3500	4-WAY DROP BOX DIFFUSER	CARNE	TDBA_D4	1,3,4		
DBD-4	40X40	28X28	3600-4000	4-WAY DROP BOX DIFFUSER	CARNE	TDBA_D4	1,3,4		
DBD-5	42X42	30X30	4100-5500	4-WAY DROP BOX DIFFUSER	CARNE	TDBA_D4	1,3,4		
DBD-6	50X50	36X36	5600-8000	4-WAY DROP BOX DIFFUSER	CARNE	TDBA_D4	1,3,4		
CDR-1	24X24	20X20	0-1400	RETURN AIR GRILLE	TITUS	350FL	1-4		
CDE-1	12X12	6"	0-100	EXHAUST AIR DIFFUSER	TITUS	OMNI	1-4		
		8"	101-250						

- NOTES:**
- COORDINATE FINAL COLOR/FINISH WITH ARCHITECT/OWNER.
  - 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.
  - UNLESS OTHERWISE NOTED, BRANCH DUCTS SERVING AIR DEVICES SHALL BE SAME SIZE AS NECK OF AIR DEVICE.
  - AIR DEVICE SHALL BE OF GALVANIZED FINISH WHEN INSTALLED ON EXPOSED DUCTWORK.
  - PROVIDE AIR SCOOP DEVICE.
- FOR ROUND NECK DIFFUSERS:  
6" DIA: 0-100 CFM  
8" DIA: 101-250 CFM  
10" DIA: 251-400 CFM  
12" DIA: 401-650 CFM  
14" DIA: 651 CFM & ABOVE

AIR BALANCE SCHEDULE					
UNIT	AREA SERVED	SUPPLY AIR (CFM)	OUTSIDE AIR (CFM)	RETURN AIR (CFM)	EXHAUST AIR (CFM)
RTU-1(N)	SEE PLAN	8000	1055	6945	0
RTU-2(N)	SEE PLAN	7000	820	6180	0
RTU-3(N)	SEE PLAN	6000	785	5215	0
RTU-4(N)	SEE PLAN	10000	2655	7345	0
RTU-5(N)	SEE PLAN	3000	210	2790	0
RTU-6(N)	SEE PLAN	7000	1290	5710	0
RTU-7(N)	SEE PLAN	7000	1390	5610	0
MAU-1(N)	SEE PLAN	2565	2565	0	0
KEF-1(N)	SEE PLAN	0	0	0	3206
EF-1(N)	SEE PLAN	0	0	0	490
EF-2(N)	SEE PLAN	0	0	0	420
EF-3(N)	SEE PLAN	0	0	0	700
EF-4(N)	SEE PLAN	0	0	0	520
EF-5(N)	SEE PLAN	0	0	0	520
TOTAL:		50565	10770	39795	5856
BUILDING PRESSURE:		4914		POSITIVE	

- NOTES:**
- CONTRACTOR TO ADJUST MOTORIZED DAMPER ON FRESH AIR TAP TO PROVIDE OUTSIDE AIR AS MENTIONED IN ABOVE TABLE.

VENTILATION SCHEDULE											
ROOM NAME	AREA (SQ.FT.)	NUMBER OF PEOPLE/1000sq.ft AS PER 2015 UMC	NUMBER OF PEOPLE AS PER 2015 UMC	NUMBER OF PEOPLE AS PER LAYOUT	MIN OUTSIDE AIR AS PER 2015 UMC		REQ. OA (CFM)	OA PROVIDED (CFM)	EXHAUST AIRFLOW RATE (CFM)/(CFM/SQ.FT)	REQ EXHAUST (CFM)	PROVIDED EXHAUST (CFM)
					CFM/PERSON	CFM/SQ.FT					
BOWLING LANE -122	2535	0	0	0	0	0.12	304	1055	0	0	0
BOWLING STANDING-122	600	40	24	16	10	0.12	232	820	0	0	0
BOWLING SEATING-122	884	40	36	32	10	0.12	426	820	0	0	0
PINSETTER ROOM-123	692	0	0	0	0	0.12	83	820	692	3206	
BOWLING LANE -124	1870	0	0	0	0	0.12	224	820	0	0	0
BOWLING STANDING-124	462	40	19	12	10	0.12	175	820	0	0	0
BOWLING SEATING-124	700	40	28	24	10	0.12	324	820	0	0	0
PINSETTER ROOM-124	518	0	0	0	0	0.12	62	820	518	520	
CORRIDOR-124	393	0	0	0	0	0.06	24	820	0	0	0
BOWLING LANE -125	1890	0	0	0	0	0.12	227	785	0	0	0
BOWLING STANDING-125	446	40	18	12	10	0.12	174	785	0	0	0
BOWLING SEATING-125	585	40	24	24	10	0.12	310	785	0	0	0
PINSETTER ROOM-126	518	0	0	0	0	0.12	62	785	518	520	
BILLIARDS-121	1280	40	52	24	10	0.12	394	2655	0	0	0
GOLF SIMULATORS-120	402	7	3	6	20	0.18	192	2655	0	0	0
AXE THROWING-119	622	7	5	20	20	0.18	512	2655	0	0	0
STORAGE-108	174	0	0	0	0	0.12	21	2655	0	0	0
STORAGE-106	300	0	0	0	0	0.12	36	2655	0	0	0
AV ROOM-107	101	0	0	0	0	0.12	12	2655	0	0	0
DINING-109	3022	100	303	86	7.5	0.18	1189	210	0	0	0
BAR-110	508	100	51	25	7.5	0.18	279	210	0	0	0
RR CORRIDOR	168	0	0	0	0	0.06	10	210	0	0	0
WOMEN RR-117	264	0	0	0	0	0	0	210	70*7(5 closet+2)	490	
MEN RR-118	238	0	0	0	0	0	0	210	70*6(4 closet+2)	420	
KITCHEN-111	1112	20	23	8	7.5	0.12	193	210	0.7	778	800
BILLIARDS-115	1450	40	58	20	10	0.12	374	210	0	0	0
GOLF SIMULATORS-116	389	7	3	6	20	0.18	190	210	0	0	0
MEAN MUGS-113	286	20	6	5	7.5	0.12	72	210	0	0	0
MEAN MUGS DINING-114	760	20	16	20	7.5	0.12	241	210	0	0	0
OFFICE-104	60	5	1	2	5	0.06	14	1290	0	0	0
STORAGE-103	176	0	0	0	0	0.12	21	1290	0	0	0
HOT DESK-102	241	30	8	5	5	0.06	39	1290	0	0	0
LOBBY-101	343	10	4	10	5	0.06	71	1290	0	0	0
DART LANES-112	236	0	0	10	20	0.18	242	1390	0	0	0
ARCADE-105	4180	20	84	85	7.5	0.18	1390	1390	0	0	0
TOTAL	28405	-	-	452	-	-	8120	8205	-	3416	5956

CONSULTANTS (ENGINEER):

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## ELECTRICAL SYMBOLS LIST

### GENERAL NOTES (APPLY TO ALL "E" DRAWINGS)

SWITCHES AND CONTROLS	
Ⓞ	20A SPST TOGGLE SWITCH U.O.N. "o" DENOTES LIGHTING FIXTURE CONTROLLED.
Ⓞ <sub>3</sub>	20A 3-WAY TOGGLE SWITCH U.O.N. "o" DENOTES LIGHTING FIXTURE CONTROLLED
Ⓞ <sub>4</sub>	20A 4-WAY TOGGLE SWITCH U.O.N. "o" DENOTES LIGHTING FIXTURE CONTROLLED
Ⓞ <sub>0</sub>	WALL BOX INCANDESCENT DIMMER SWITCH, LUTHRON MAESTRO SERIES. "o" DENOTES LIGHTING FIXTURE CONTROLLED.
Ⓞ <sub>OS</sub>	WALL OCCUPANCY SENSOR, NUMBER INDICATES TYPE; SEE OCCUPANCY SENSOR SCHEDULE.
Ⓞ <sub>VS</sub>	WALL MOUNTED VACANCY SENSOR SWITCH, WAITSTOPPER CS-50PIR SERIES.
Ⓞ <sub>0</sub>	WALL MOUNTED SPRING WOUND TIME SWITCH TORK
Ⓞ <sub>0</sub>	DIMMER SWITCH
Ⓞ <sub>OS</sub>	OCCUPANCY SENSOR SWITCH
Ⓞ <sub>OS</sub>	COMBINATION OF DIMMER AND OCCUPANCY SENSOR SWITCH
Ⓞ <sub>OS</sub>	ASCO CONTACTOR C-25 TORK TIMER T-25 STACKED.
Ⓞ <sub>D</sub>	DOOR SWITCH
Ⓞ <sub>PC</sub>	PHOTOCELL IN NEMA 3R ENCLOSURE.
Ⓞ <sub>PC</sub>	WALL MOUNTED PHOTOCELL MOUNTED IN NEMA 3R ENCLOSURE.
Ⓞ <sub>BP</sub>	BELL PUSH
Ⓞ <sub>OS</sub> <sub>A</sub>	CEILING OCCUPANCY SENSOR, NUMBER INDICATES TYPE; SEE OCCUPANCY SENSOR SCHEDULE. 'A' LETTER REFERS TO WIRING DIAGRAM.
Ⓞ <sub>OS</sub>	WALL OCCUPANCY SENSOR, NUMBER INDICATES TYPE; SEE OCCUPANCY SENSOR SCHEDULE.
Ⓞ <sub>VS</sub>	WALL VACANCY SENSOR, NUMBER INDICATES TYPE; SEE OCCUPANCY SENSOR SCHEDULE.
Ⓞ <sub>VS</sub>	CEILING VACANCY SENSOR, NUMBER INDICATES TYPE; SEE OCCUPANCY SENSOR SCHEDULE.
Ⓞ <sub>OS</sub>	CEILING MOUNTED DAYLIGHT SENSOR.

POWER AND TELECOMMUNICATION	
Ⓞ	JUNCTION BOX WITH BLANK COVER PLATE, FLUSH IN FLOOR.
Ⓞ	JUNCTION BOX WITH BLANK COVER PLATE, WALL MOUNTED, +18" AFF OR AS NOTED.
Ⓞ	JUNCTION BOX WITH BLANK COVER PLATE, CEILING MOUNTED..
Ⓞ	DUPLEX CONVENIENCE RECEPTACLE, +18" AFF OR AS NOTED.
Ⓞ	DUPLEX DEDICATED RECEPTACLE, +18" AFF OR AS NOTED.
Ⓞ <sub>CL</sub>	DUPLEX CONVENIENCE RECEPTACLE - 20A-1P, 125V, NEMA 5-20R MOUNTED FLUSH IN CEILING.
Ⓞ <sub>GFI</sub>	DUPLEX CONVENIENCE RECEPTACLE, +18" AFF OR AS NOTED.
Ⓞ <sub>GFI</sub>	DUPLEX DEDICATED GFI RECEPTACLE, +18" AFF OR AS NOTED.
Ⓞ	ELECTRICAL FLOOR BOX
Ⓞ	SPECIAL RECEPTACLE
Ⓞ	NETWORK INTERFACE DEVICE. NID IS 'ONT' BOX WHICH INCLUDES BOTH 'ONT' AND ITS SISTER BOX AS PER VERIZON STANDARDS.
Ⓞ	QUAD RECEPTACLE
Ⓞ	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.
Ⓞ	TELEPHONE OUTLET, WALL-MOUNTED +48" AFF UNO TEL / DATA OUTLET TO BE PROVIDED WITH 1" CONDUIT U.O.N. TO H.C. AND TERMINATED WITH 90 DEGREE REE ELBOW AND BUSHING. TEL / DATA OUTLET PLATE SHALL BE PROVIDED WITH 1 1/4" DIAMETER GROMMETED OPENING.
Ⓞ	DATA OUTLET - (1) PORT UNO, +18" AFF, UNO TEL / DATA OUTLET TO BE PROVIDED WITH 1" CONDUIT U.O.N. TO H.C. AND TERMINATED WITH 90 DEGREE ELBOW AND BUSHING. TEL / DATA OUTLET PLATE SHALL BE PROVIDED WITH 1 1/4" DIAMETER GROMMETED OPENING.
Ⓞ	CABLE TV OUTLET, WALL-MOUNTED AT 18" AFF UNO.

ELECTRICAL ABBREVIATIONS			
A	AMPERES	EA	EACH
A/C, AC	AIR CONDITIONING UNIT	EC	EMPTY CONDUIT/ ELECTRICAL CONTRACTOR
AF	AMPERE FRAME/AMP FUSE	EF	EXHAUST FAN
AFF	ABOVE FINISHED FLOOR	EM	EMERGENCY
AS	AMP SWITCH	EMT	ELECTRICAL METALLIC TUBING
AIC	AMPS INTERRUPTING CAPACITY	EQUIP	EQUIPMENT
AT	AMP TRIP	ER	EXISTING TO BE RELOCATED
ATS	AUTOMATIC TRANSFER SWITCH	ETR	EXISTING TO REMAIN
AUTO	AUTOMATIC	EFW	ELECTRIFIED WORKSTATION FURNITURE
AWG	AMERICAN WIRE GAUGE	EW	ELECTRIC WATER HEATER
C	CONDUIT	FA	FIRE ALARM
C/B,CB	CIRCUIT BREAKER	FBO	FURNISHED BY OTHERS, INSTALLED & WIRED BY EC
CKT	CIRCUIT	FDR	FEEDER
CLG	CEILING	FIBO	FURNISHED & INSTALLED BY OTHERS, WIRED BY EC
COMM	COMMUNICATION	FIXT	FIXTURE
CT	CURRENT TRANSFORMER	FL	FLOOR
CU	COPPER	FLUOR	FLUORESCENT
*C	DEGREE CELSIUS	G	GROUND
*F	DEGREE FAHRENHEIT	GFI	GROUND FAULT INTERRUPTER
DIA	DIAMETER	GP	GENERAL PURPOSE
DISC	DISCONNECT	HC	HUNG CEILING
DN	DOWN	HP	HORSEPOWER
DP	DISTRIBUTION PANEL	HWH	HOW WATER HEATER
DWH	DOMESTIC WATER HEATER	HZ	HERTZ
DWG	DRAWING	IC	INTERRUPTING CAPACITY
JB	JUNCTION BOX	PP	POWER PANEL
KCMIL	ONE THOUSAND CIRCULAR MILS	PVC	POLYVINYL CHLORIDE
KV	KILOVOLT	PWR	POWER
KVA	KILOVOLT-AMPERES	R	REMOVE
KW	KILOWATTS	RE	RELOCATED EXISTING
LP	LIGHTING PANEL	REC	RECEPTACLE
LTG	LIGHTING	RGS	RIGID GALVANIZED STEEL
MAX	MAXIMUM	RR	REMOVE & RELOCATE
MC	MOTOR CONTROLLER	SECT	SECTION
MCB	MAIN CIRCUIT BREAKER	SPDT	SINGLE POLE DOUBLE THROW
MER	MECHANICAL EQUIPMENT ROOM	SPST	SINGLE POLE SINGLE THROW
MIN	MINIMUM	SPEC	SPECIFICATION
MLO	MAIN LUGS ONLY	SW	SWITCH
MTD	MOUNTED	SWBD	SWITCHBOARD
MTS	MANUAL TRANSFER SWITCH	SYM	SYMMETRICAL
N	NEUTRAL	SYS	SYSTEMS
NE	NEW DEVICE TO REPLACE EXISTING	TELE	TELEPHONE
NIC	NOT IN CONTRACT	TEMP	TEMPERATURE
NL	NIGHT LIGHT	TXF	TOILET EXHAUST FAN
NTS	NOT TO SCALE	TYP	TYPICAL
OC	ON CENTER	UON	UNLESS OTHERWISE NOTED
P	POLES	V	VOLT/VOLTAGE
PB	PULLBOX	VA	VOLT AMPERE
PC	PERSONAL COMPUTER	VAV	VARIABLE AIR VOLUME
∅	PHASE	VFD	VARIABLE FREQUENCY DRIVE
PNL	PANEL	VP	VAPORPROOF
W	WATT	WP	WEATHER PROOF
W	WIRE	XFMR	TRANSFORMER
WH	WALL HEATER	ZRT	ZONE REGISTER TERMINALS
E	EXISTING	IG	ISOLATED GROUND

- ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH CURRENT ELECTRICAL CODE, 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 RATING. 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. VARIATIONS IN FIREPROOFING AND PLASTERING, WINDOW AND DOOR TRIM, PANELING, HUNG CEILING 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 PULL BOXES 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 GASKET FOR A COMPLETE RAIN TIGHT 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 CEILING SHALL BE APPROVED FOR THAT APPLICATION.
- OUTLET BOXES AND JUNCTION BOXES ON OPPOSITE SIDES OF FIRE-RATED WALLS SHALL BE SEPARATED BY A 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 PANEL BOARD. PROVIDE WIRE AND CONDUIT TO INTERCONNECT EQUIPMENT AND DEVICES WITH SAME CIRCUIT NUMBERS AND RUN TO PANEL BOARD.

WIRING SYSTEMS	
Ⓞ <sub>3</sub> UP-	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF 1#12 Ø, 1#12 N. & 1#12 G. IN 3/4"C, UNLESS OTHERWISE NOTED.
Ⓞ <sub>3 5</sub> UP-	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"C, UNLESS OTHERWISE NOTED.
Ⓞ <sub>3 5 7</sub> UP-	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"C, UNLESS OTHERWISE NOTED.
Ⓞ	CONDUIT TURNING UP, SEE FLOOR PLANS FOR CONDITIONS.
Ⓞ	CONDUIT TURNING DOWN, SEE FLOOR PLANS FOR CONDITION.
Ⓞ	CONDUIT AND WIRE TO BUILDING GROUND.
Ⓞ	CABLE TRAY, WIDTH AND MOUNTING AS NOTED.
Ⓞ	UNDERGROUND
Ⓞ	EXISTING
Ⓞ	NEW
Ⓞ <sub>S</sub>	CEILING MOUNTED SMOKE DETECTOR.
Ⓞ <sub>S/CO</sub>	COMBINATION OF SMOKE AND CO DETECTOR.

MOTORS AND CONTROLS	
Ⓞ <sub>M</sub>	AC INDOOR UNIT MOTOR AS NOTED WITH LIQUID TIGHT FLEXIBLE CONNECTION WITH JUNCTION BOX AND MOTOR SWITCH.
Ⓞ <sub>MWP</sub>	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 NON FUSED DISCONNECT SWITCH
Ⓞ	60A NON FUSED DISCONNECT SWITCH
Ⓞ	100A NON FUSED DISCONNECT SWITCH
Ⓞ	200A NON FUSED DISCONNECT SWITCH
Ⓞ	COMBINATION MAGNETIC STARTER AND DISCONNECT SWITCH, FURNISHED BY HVAC/CONTRACTOR, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.
Ⓞ <sub>400/350</sub>	FUSED DISCONNECT SWITCH AND FUSE AMPERAGE AS INDICATED. TOP NUMBER DENOTS SWITCH SIZE AND BOTTOM NUMBER DENOTES FUSE.
Ⓞ	COMBINATION SOLID-STATE MOTOR STARTER.
Ⓞ <sub>MD</sub>	MOTORIZED DAMPER.
Ⓞ <sub>PSD</sub>	FIRE SMOKE DAMPER
Ⓞ <sub>M/M</sub>	DUPLEX PUMP. NUMBER INDICATES HP RATING OF PUMP.
Ⓞ <sub>St</sub>	THERMAL OVERLOAD SWITCH AT MOTOR. PROVIDE THERMAL ELEMENTS AS PER MOTOR RATING.
Ⓞ <sub>Sw</sub>	MANUAL MOTOR SWITCH
Ⓞ <sub>1.5 kW</sub>	ELECTRICAL HEATER, NUMBER DENOTES HEATER RATING

ELECTRICAL DRAWING LIST	
E1.0	ELECTRICAL SYMBOL LIST, ABBREVIATIONS & GENERAL NOTES
E1.1	ELECTRICAL SPECIFICATIONS SHEET 1 OF 2
E1.2	ELECTRICAL SPECIFICATIONS SHEET 2 OF 2
E2.1	ELECTRICAL LIGHTING PLAN
E2.2	ELECTRICAL LIGHTING PLAN AND SCHEDULES
E3.1	ELECTRICAL POWER PLAN
E3.2	ELECTRICAL ROOF POWER PLAN
E3.3	ELECTRICAL POWER & ROOF PLAN SCHEDULE AND NOTES
E4.1	ELECTRICAL DETAILS
E5.1	ELECTRICAL RISER DIAGRAM AND PANEL SCHEDULE SHEET 1 OF 3
E5.2	ELECTRICAL RISER DIAGRAM AND PANEL SCHEDULE SHEET 2 OF 3
E5.3	ELECTRICAL RISER DIAGRAM AND PANEL SCHEDULE SHEET 3 OF 3

ANNOTATION	
+24"	INDICATES MOUNTING HEIGHT, CENTER LINE TO FINISHED FLOOR.
Ⓞ	KEYED NOTE REFERENCE
Ⓞ <sub>1</sub> E/2-1	DETAIL REFERENCE: DETAIL NUMBER INDICATED ON TOP; DRAWING NUMBER INDICATED ON BOTTOM

POWER DISTRIBUTION	
Ⓞ	MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.
Ⓞ	BRANCH PANELBOARD, 208Y/120V-SURFACE OR FLUSH MOUNTED TRANSFORMER, SIZE AS NOTED.
Ⓞ	DISTRIBUTION PANELBOARD, 208Y/120V-SURFACE OR FLUSH MOUNTED.

CONSULTANTS (ENGINEER):  
**NY ENGINEERS**  
NEARBY ENGINEERS  
382 NE 191ST STREET SUITE  
49674, MIAMI, FL 33179  
PH-914.257.3455  
WWW.NY-ENGINEERS.COM

PERMIT SET

REVISION SCHEDULE  
NO. REV. / SUBMISSION DATE ISSUED BY

ISSUE DATE: **05/30/2024**

**INTERIOR BUILD-OUT**  
**810 BILLIARDS & BOWLING**  
**HOUSTON, TX**

DRAWN BY: **NYE**

QAQC: **NYE**

APPROVED BY: **NYE**

PROJECT NUMBER: **2323**

ELECTRICAL SYMBOL LIST,  
ABBREVIATIONS & GENERAL  
NOTES  
**E1.0**

ELECTRICAL SPECIFICATIONS

1. GENERAL:

- A. THE "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," AIA DOCUMENT, 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...
C. BIDDERS, BEFORE SUBMITTING PROPOSALS, SHALL VISIT AND CAREFULLY EXAMINE THE AREA AFFECTED BY THIS WORK...
D. INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR, MINOR DEVIATIONS FROM DRAWING MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES WHICH INVOLVE EXTRA COST SHALL NOT BE MADE WITHOUT APPROVAL.
E. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK MAY BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK...
F. CONNECTIONS TO EXISTING WORK: INSTALL NEW WORK AND CONNECT TO EXISTING WORK WITH MINIMUM INTERFERENCE TO EXISTING FACILITIES...
G. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW WORK.
H. 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...
I. SEAL OPENINGS THROUGH PARTITIONS, WALLS AND FLOORS WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL, UNLESS OTHERWISE NOTED.
J. 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...
K. ALL EXISTING MATERIAL, EQUIPMENT AND CONSTRUCTION DEBRIS TO BE REMOVED UNDER THIS CONTRACT SHALL BECOME THE PROPERTY OF THE CONTRACTOR...
L. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS...
M. UNLESS OTHERWISE SPECIFICALLY NOTED OR SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING...
N. ALL MATERIAL AND EQUIPMENT SHALL BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
O. INSURANCE: PROVIDE IN ACCORDANCE WITH OWNER/BUILDING REQUIREMENTS AND SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.
P. 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.
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 FISHPATES (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 PRIMER COAT SHALL BE UTILIZED FOR STEEL OR IRONWORK.

- E. 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.

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

- G. 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 THE NATIONAL ELECTRICAL CODE (NEC), AND ALL OTHER APPLICABLE INDUSTRY, 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 OF 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 PROVIDE 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 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 PROVIDE 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) PANEL BOARDS/LOAD CENTER (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 SWITCH, 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 OVE 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. 6808. 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 BUSSMANN 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 BUSSMANN 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 ND 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 PANELBOARDS, CIRCUIT BREAKER TYPE:

- A. THREE PHASE, 4 OR 5 WIRE, COPPER BUS BARS, WITH 2, 3, OR 4 WIRE BRANCHES, AS NOTED. CAPACITY OF PANEL AND CIRCUITS, AS NOTED BELOW. PANELBOARD TO HAVE GROUND BUS SAME SIZE AS PHASE BUSES.

- B. CABINETS: CODE GAUGE GALVANIZED SHEET STEEL PRIMED AND PAINTED WITH TRIM AND DOOR. TYPE AS NOTED, LAP AND RIVET CORNERS OR FORM AS APPROVED.

- C. TRIM: ONE PIECE FULL FINISH PRIMED AND PAINTED SHEET STEEL. TRIM SHALL BE MOUNTED WITH A CONTINUOUS PIANO HINGE CONFIGURED IN SUCH A MANNER THAT IT SHALL BE POSSIBLE TO GAIN FULL ACCESS TO CIRCUIT BREAKERS AND WIRING GUTTERS WITHOUT REMOVING THE TRIM. PROVIDE A MULTI-PIN CYLINDER LOCK (YALE, CORBIN OR EQUAL) TO LATCH THE TRIM. KEYS SHALL BE MILLED.

- D. HARDWARE: MULTI-PIN, CYLINDER LOCKS WITH MILLED KEYS. ALL PANELS SHALL BE KEYS ALIKE. DOOR OVER 48" HIGH SHALL BE EQUIPPED WITH A CHROME PLATED VAULT HANDLE, BUILT-IN LOCK AND 3-POINT CATCH FASTENING DOOR AT TOP, BOTTOM AND CENTER.

- E. HINGES: CONCEALED, CONTINUOUS PIANO HINGE AS DESCRIBED ABOVE.

- F. DIRECTORY HOLDER: MEAL FRAME WITH NONBREAKABLE TRANSPARENT COVER AND ONE DIRECTORY CARD. QUANTITY, POLES AND TRIP RATINGS TO BE INDICATED ON DRAWINGS. QUANTITY, POLES AND TRIP RATINGS BY ELECTRICAL CONTRACTOR. PROVIDE AN ENGRAVED LAMINATED NAMEPLATE ADJACENT TO EACH BRANCH BREAKER. MOUNT WITH SELF TAPPING MACHINE SCREWS.

- G. FURNISH MULTI-CABLE LUGS WHERE REQUIRED. DOUBLE LUGGING NOT PERMITTED. SECURE LUGS TO BUS BY STUD BOLTS.

- H. PANELBOARD CONSTRUCTION FOR BOLTED TYPE BREAKERS. MINIMUM SHORT CIRCUIT RATING 25,000 AMPERES, RMS SYMMETRICAL FOR ALL 120/208V APPLICATIONS. INDIVIDUAL CIRCUIT BREAKERS SHALL HAVE MINIMUM 100A FRAME, TRIPS SIZED AS SHOW ON THE PLANS.

- I. MINIMUM GUTTER SPACES: PANELS WITH 225 AMPERE MAINS, 5-1/4" MINIMUM, 400 AMPERES AND OVER, MINIMUM GUTTERS 8". FOR PANELS WITH THROUGH FEEDERS, INCREASE GUTTER WIDTH BY 2" MINIMUM AND PROVIDE A SHEET STEEL BARRIER BETWEEN THE PANEL GUTTER AND THE THROUGH FEEDER PORTION OF THE BACK BOX. BRANCH CIRCUIT BREAKERS SHALL BE MECHANICALLY INTERLOCKED WHEN SHOWN ON DRAWINGS.

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

- K. PANELBOARD SHALL HAVE MAIN CIRCUIT BREAKER OR MAIN LUGS AS INDICATED ON THE DRAWINGS. QUANTITY, POLES 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).

9. DISTRIBUTION PANELBOARDS, SWITCH 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, INDIVIDUAL ENCLOSED SWITCHES, FRONT REMOVABLE, SWITCH AND DOOR INTERLOCKS. COVERS TO BE PAD-LOCKABLE.

- C. PANELBOARD 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 PANELBOARD 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, FUSIBLE 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, POLES 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).

B. MATERIALS

1) RACEWAYS:

- a. RIGID STEEL CONDUIT: FULL-WEIGHT PIPE, GALVANIZED, THREADED.
b. ELECTRO-METALLIC TUBING (EMT): THIN WALL PIPE, GALVANIZED, THREAD LESS.
c. FLEXIBLE STEEL CONDUIT: CONTINUOUS SINGLE STRIP, GALVANIZED.
d. WIRE-WAYS: 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: NONSPLIT, THREADED, STEEL OR MALLEABLE IRON. ZINC DIE CAST NOT PERMITTED.
b. CABINET-METALLIC TUBING: COMPRESSION TYPE. GALVANIZED RIGID ELECT ELBOWS, 2 IN. OR LARGER.
c. FLEXIBLE METALLIC CONDUIT: ANGLE WEDGE TYPE WITH INSULATED THROAT.
d. BUSHINGS: METALLIC INSULATED TYPE.

CONSULTANTS (ENGINEER):

NY ENGINEERS

NEARBY ENGINEERS
382 NE 191ST STREET SUITE
49674, MIAMI, FL 33179
PH-914.257.3455
WWW.NY-ENGINEERS.COM

PERMIT SET

REVISION SCHEDULE

NO. REV. / SUBMISSION DATE ISSUED BY

ISSUE DATE: 05/30/2024

INTERIOR BUILD-OUT

810 BILLIARDS & BOWLING HOUSTON, TX

DRAWN BY: NYE

QAQC: NYE

APPROVED BY: NYE

PROJECT NUMBER: 2323

ELECTRICAL SPECIFICATIONS SHEET 1 OF 2

E1.1

ELECTRICAL SPECIFICATIONS (CONT.)

CONSULTANTS (ENGINEER):  
**NY ENGINEERS**  
 NEARBY ENGINEERS  
 382 NE 191ST STREET SUITE  
 49674, MIAMI, FL 33179  
 PH-914.257.3455  
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**HOUSTON, TX**

DRAWN BY: **NYE**

QAQC: **NYE**

APPROVED BY: **NYE**

PROJECT NUMBER: **2323**

ELECTRICAL SPECIFICATIONS  
 SHEET 2 OF 2

E1.2

- 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.
  - c. 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 TELEPHONE 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.

EXPOSED 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 PIPE 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 POLYETHYLENE 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 PIPE 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.
- d. 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-GEENEY. 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).
- a. ERECT WALL AND SWITCH OUTLETS IN ADVANCE OF FURRING AND FIREPROOFING. OUTLET BOXES SHALL BE SET SQUARE AND TRUE 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.

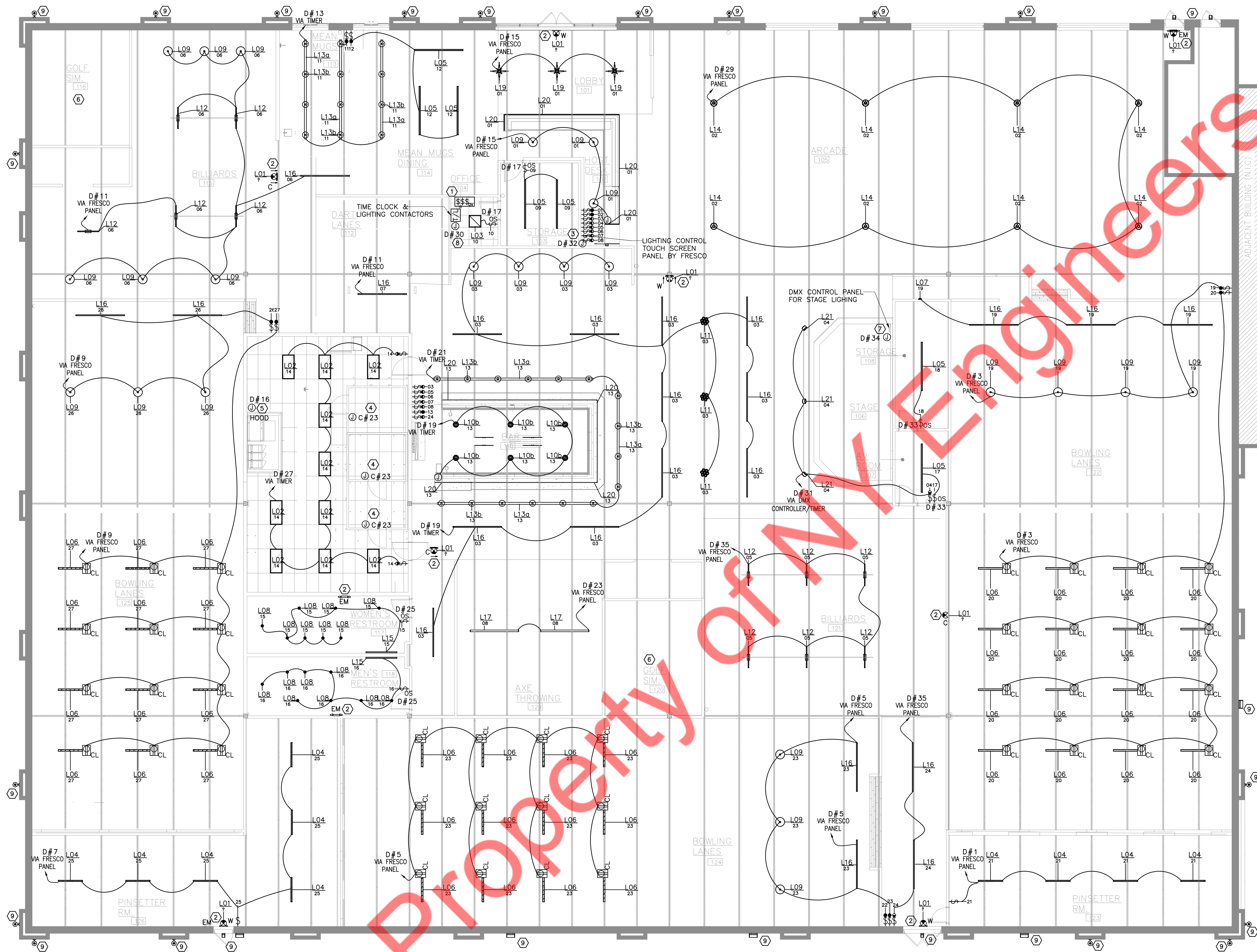
- b. PANEL, JUNCTION AND PULL BOXES SHALL BE LOCATED CLEAR OF OTHER TRADES. CONCEAL JUNCTION AND PULL BOXES IN FINISHED SPACES. WHERE NECESSARY, REROUTE RACEWAYS OR MAKE OTHER ARRANGEMENTS FOR CONCEALMENT. BOXES SHALL BE ACCESSIBLE. SUPPORT BOXES FROM BUILDING STRUCTURE, INDEPENDENT OF CONDUIT. PROVIDE 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.
- c. FIRE SEALANTS: PROVIDE FOR RACEWAYS AND WIRE PASSING THROUGH FLOOR SLOTS, SLEEVES OR OPENINGS IN FIRE-PARTITIONS ROOMS.
- d. 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.
- 9. 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 STRIATED (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 IPCEA STANDARDS. TYPE THW OR THWN 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. 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.
  - g. 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.
  - h. 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 METAL AS CONDUCTOR. PROVIDE TO MATCH CABLE, WITH MARKING INDICATING SIZE AND TYPE. COPPER LUG CONNECTIONS TO BUS BARS: USE ANTISEIZE COMPOUND ON TANG.
  - i. 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 SYSTEMS, EXCEPT 460 VOLT MOTOR BRANCH CIRCUIT WIRING AND RELATED 120 VOLT CONTROL WIRING. THERMOPLASTIC WIRES SHALL NOT BE INSTALLED IN COMPUTER AREA RAISED FLOORS.
  - j. LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS.
  - k. 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.
- 10. 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, 120/277 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, U GROUND SLOT, 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.
- 11. 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.
  - 12. 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.
  - 13. GROUNDING AND BONDING:
    - a. PROVIDE GROUNDING SYSTEM IN ACCORDANCE WITH (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 GROUND 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 , 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.
- 14. PANEL BOARDS:
  - a. PANELBOARDS 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 KEYED 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 INDICATED.
  - c. LOCKING TABS SHALL BE PROVIDED ON ALL CIRCUIT BREAKERS SERVING EMERGENCY LIGHTING, FIRE ALARM SYSTEM, SAFETY 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 AND 14,000 AMPERES R.M.S. SYMMETRICAL FOR 480Y/277 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.
- 14. LOAD CENTERS
  - a. LOAD CENTERS SHALL COMPLY WITH UL67 AND MEET FEDERAL SPECIFICATION W-P-115c.
  - b. CIRCUIT BREAKERS SHALL BE OF THE PLUG-IN, 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. TANDEM OR DUPLEX TYPE CIRCUIT BREAKERS SHALL NOT BE PERMITTED. ONLY ONE WIRE SHALL BE INSTALLED UNDER EACH CIRCUIT BREAKER LUG. TIE-BARS SHALL NOT BE USED TO CREATE MULTI-POLE CIRCUITS.
  - c. 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.
  - d. ENCLOSURES MANUFACTURED IN CODE GAUGE AND SIZE BOXES FOR FLUSH MOUNTING AS INDICATED ON PLANS COMPLETE WITH TRIM, DOORS AND LOCKS. ALL LOCKS SHALL BE KEYED ALIKE. 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. ALL LOAD CENTERS SHALL BE 14 1/2" WIDE AND 3 1/2" DEEP.
  - e. 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.
  - f. 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 22,000/10,000 AMPERES R.M.S. SYMMETRICAL SERIES RATING FOR 208Y/120 VOLT. SERIES RATED LOAD CENTERS SHALL BE USED TO ACHIEVE REQUIRED SHORT CIRCUIT RATINGS.
- 15. SMOKE ALARMS:
  - a. PROVIDE SOLID STATE, PHOTOELECTRIC TYPE, HARD-WIRED SMOKE ALARM WITH 9V BATTERY BACKUP AND INTEGRAL TEMPORAL PATTERN EVACUATION HORN. EDWARDS 517 SERIES OR APPROVED EQUAL.
  - b. THREE POSITION TEST FEATURE THAT SIMULATES ACTUAL SMOKE CONDITIONS. SHALL CONTAIN MAINTENANCE INDICATOR.
  - c. PROVIDE WITH INTEGRAL 135 DEGREE F ISOLATED HEAT DETECTION OR INTEGRAL RELAY RATED 0.6A AT 125V AC., AS INDICATED ON THE PLANS AND DRAWINGS.
  - d. DEVICE SHALL BE RATED TO OPERATE AT A RANGE OF 40' TO 100'.
  - e. UL LISTED TO UL217 AND APPROVED.
- 17. INTERCOM CONDUIT SYSTEM:
  - a. PROVIDE COMPLETE SYSTEM OF: RACEWAYS AND ACCESSORIES, OUTLET BOXES, SLEEVES AND FISHWIRES.
  - b. EQUIPMENT SHALL CONFORM TO REQUIREMENTS OF INTERCOM MANUFACTURER.
  - c. OUTLETS SHALL BE:
    - 1) WALL: 4 IN. SQUARE WITH SINGLE GANG COVER PLATE.
  - d. PROVIDE FISHWIRES, IN RACEWAYS OVER 10 FT LONG.
  - e. CONDUIT SHALL BE 3/4 IN. MINIMUM. FURNISH EMPTY CONDUIT FROM EACH APARTMENT TO MAIN INTERCOM CONTROLLER AT ENTRANCE.



DIRECTIONAL ARROWS  
 EXIT SIGN - DUAL LAMP  
 W=BACK WALL MOUNTED  
 S=SIDE WALL MOUNTED  
 C=CEILING MOUNTED

CONSULTANTS (ENGINEER):  
**NY ENGINEERS**  
 NEARBY ENGINEERS  
 382 NE 191ST STREET SUITE  
 49674, MIAMI, FL 33179  
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INTERIOR BUILD-OUT  
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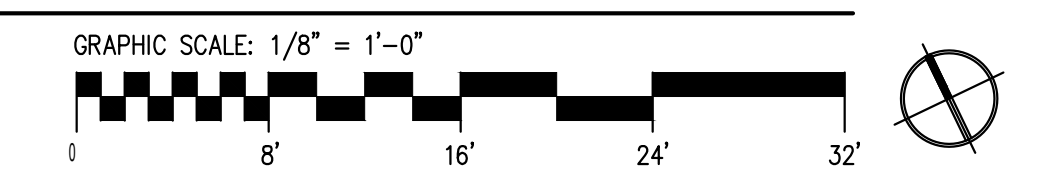
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ELECTRICAL LIGHTING PLAN

1 ELECTRICAL LIGHTING PLAN  
 E2.1 SCALE: 1/8" = 1'-0"



E2.1

LIGHT FIXTURE SCHEDULE						
TAG	DESCRIPTION	MANUFACTURER	MODEL	TYPE	WATTAGE	COMMENTS
L01	EXIT SIGN	LITHONIA	ECC-R-SPV	LED	1.5	
L02	2X4 LED PANEL	ELED LIGHTS	DTF4UZD3835	LED	55	
L03	2X2 LED PANEL	LITHONIA	EPANL-24-34L-35K	LED	40	
L04	48" LED STRIP LIGHT	LITHONIA	CSS L48 4000LM MVOLT 40K 80CRI	LED	35	
L05	96" LED STRIP LIGHT	LITHONIA	CSS L96 8000LM MVOLT 40K 80CRI	LED	60	
L06	4FT ZOT COLOR SPLASH PENDANT	VERSALAMP	VERIFY W/ FRANCHISOR	LED	7.6	PROVIDED AND INSTALLED BY OTHERS. VERIFY MOUNTING W/ FRANCHISOR
L07	MIDNIGHT WALL SCNCE	MODERN FORMS	WS-W66236-30-BK	LED	36	
L08	4" CAN LIGHT	LITHONIA	LDN4 AL02 SWW1 MVOLT UGZ HSG	LED	42	
L09	24" LED LAMP PENDANT	VISUAL COMFORT	LED930 LED 90CRI 3000K 120V (T20/T24)	LED	10	FOSSIL GRAY FINISH
L10b	8" CYLINDER PENDANT	VANTAGE LIGHTING	VP610FCRU1527KBLKSDMCK72	LED	18	
L11	MARIMBA PENDANT	MODERN FORMS	PD-5271-GL	LED	55	
L12	DRIIFT LINEAR PENDANT	MODERN FORMS	PD-58738-DW	LED	44	
L13a	SINGLE CIRCUIT TRACK	JUNO	R 8FT BL	LED	10.5	
L13b	WL TRACK LIGHTING	JUNO	R605L 30K 80CRI PDIM WFL BL	LED	10.5	
L14	CPRB LED LAMP	LITHONIA	CPRBAL013 UVOLT SWW9 80CRI DBL	LED	83	
L15	PERIMETER RECESSED LINEAR	STARTEK	PSLIM XX 500WW35K80FPWDRR2.5U1CDT1	LED	15	
L16	96" SLIM BEAM LINEAR PENDANT	STARTEK	SLIMD 8 350 WD 30K 80 PB AC805 U 1C D T1	LED	45	
L17	96" LED STRIP LIGHT BLK	LITHONIA	CLX L96 8000LM SEF SBLMB FDL MVOLT GZ1 30K 80CRI E10WLCP NLTAIR2 RES7 MB	LED	18	
L19	LARGE THORNE	MODERN FORMS	F3258-8DWZ-WOW	LED	60	
L20	LED STRIP TAPE	PHILIPS	B08P2CV1KF	LED	1.5	WRAP WALLS UNDERCOUNTER
L21	STAGE LIGHT	CHAUVET PROFESSIONAL	COLORDASH PAR H7X	LED	84	
<b>NOTE:</b>						
1 COORDINATE WITH THE ARCHITECT FOR THE FINAL FINISH, COLOR AND QTY. OF THE LIGHT FIXTURE.						
2 ALL LIGHTING CONTROLS SHALL BE PER AHJ AND CODE COMPLIANCE.						

**GENERAL NOTES:**

- CONTRACTOR TO COORDINATE WITH ARCHITECT/OWNER FOR EXACT LIGHTING FIXTURE SELECTION, WATTAGE, MANUFACTURER AND ALL OTHER REQUIRED DETAILS.
- INSTALLATION OF ELECTRICAL COMPONENTS IN METAL CEILING SUSPENSION SYSTEMS FOR ACOUSTICAL TILE AND LAY-IN PANELS (ASTM C636) ELECTRICAL CEILING FIXTURES SHALL BE INSTALLED IN COMPLIANCE WITH THE ASTM C636 2.7.1, 2.7.2, 2.7.3 AND 4. COORDINATE WITH ARCHITECT FOR MORE DETAILS.
- ELECTRICAL SWITCHES:  
CONTROLS AND SWITCHES INTENDED TO BE USED BY THE OCCUPANT OF A ROOM OR AREA TO CONTROL LIGHTING AND RECEPTACLE OUTLETS, APPLIANCES OR COOLING, HEATING AND VENTILATING EQUIPMENT, SHALL COMPLY WITH CODE EXCEPT THE LOW REACH SHALL BE MEASURED TO THE BOTTOM OF THE OUTLET BOX AND THE HIGH REACH SHALL BE MEASURED TO THE TOP OF THE OUTLET BOX.
- E.C. TO VERIFY REQUIREMENT OF THE NO. OF SWITCHES AND CONTROL PER PLAN AND PROVIDE ACCORDINGLY.

**LIGHTING PLAN KEYED NOTES:**

- SWITCH BANK FOR CONTROL OF INTERIOR LIGHT FIXTURES. ELECTRICAL CONTRACTOR SHALL COORDINATE LOCATION WITH OWNER PRIOR TO ROUGH-IN. PROVIDE AND INSTALL SWITCH(ES) AS REQUIRED. COORDINATE AND VERIFY LOCATIONS WITH ARCHITECT/OWNER.
- ALL EMERGENCY, EXIT FIXTURES AND NIGHT LIGHT SHALL BE CONNECTED TO NEAREST LIGHTING CIRCUIT AHEAD OF ANY SWITCHING. PROVIDE ADDITIONAL FIXTURES AS NEEDED TO MEET THE CODE REQUIREMENTS PER LOCAL AHJ.
- E.C. TO COORDINATE WITH FRESKO LIGHTING VENDOR FOR FRESKO LIGHTING CONTROLLER DEVICES AND FRESKO LIGHTING CONTROL PANEL. COORDINATE AND VERIFY EXACT LOCATIONS WITH ARCHITECTURE/OWNER.
- WALK-IN LIGHTING FIXTURES AND RELATED LOCAL CONTROLS SHALL BE PROVIDED BY EQUIPMENT SUPPLIER. E.C. SHALL MAKE ALL FINAL CONNECTION TO FIXTURES AS REQUIRED TO ENSURE A COMPLETE OPERATION.
- HOOD LIGHTS PROVIDED BY HOOD MANUFACTURER. CONNECT HOOD LIGHTS TO ADJACENT LIGHTING CIRCUIT AND COORDINATE WITH HOOD MANUFACTURER FOR THE CONTROLS OF THE HOOD LIGHTS.
- EXISTING LIGHTING FIXTURE AND ITS CONTROLLING SHALL REMAIN. E.C TO FIELD VERIFY OPERABLE CONDITION OF EXISTING LIGHTING FIXTURE AND ITS CONTROLS, REPLACE IF FOUND INOPERABLE. BASE BID ACCORDINGLY.
- E.C. TO COORDINATE WITH LIGHTING VENDOR/ARCHITECT AND PROVIDE DMX/DMX512 AND ARTNET CONTROLLERS OR EQUIVALENT APPROVED TO CONTROL STAGE LIGHTING.
- TIME CLOCK AND LIGHTING CONTACTORS FOR LIGHTING CONTROL. COORDINATE EXACT LOCATION IN FIELD.
- EXISTING EXTERIOR LIGHTING FIXTURE AND ITS CONTROLLING SHALL REMAIN.

CONSULTANTS (ENGINEER):

**NY ENGINEERS**

NEARBY ENGINEERS  
382 NE 191ST STREET SUITE  
49674, MIAMI, FL 33179  
PH-914.257.3455  
WWW.NY-ENGINEERS.COM

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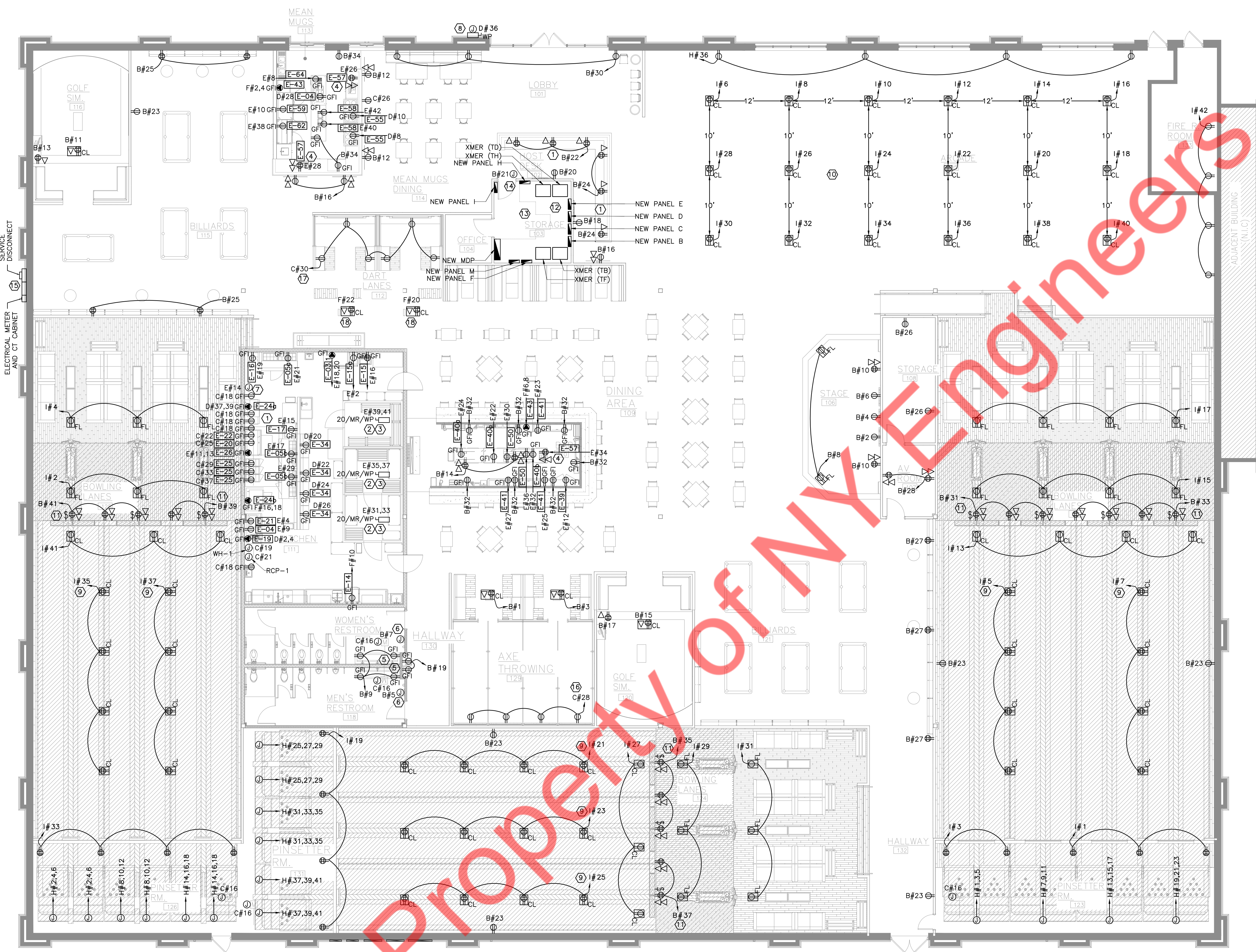
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ELECTRICAL LIGHTING  
PLAN AND SCHEDULES

E2.2



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 382 NE 191ST STREET SUITE  
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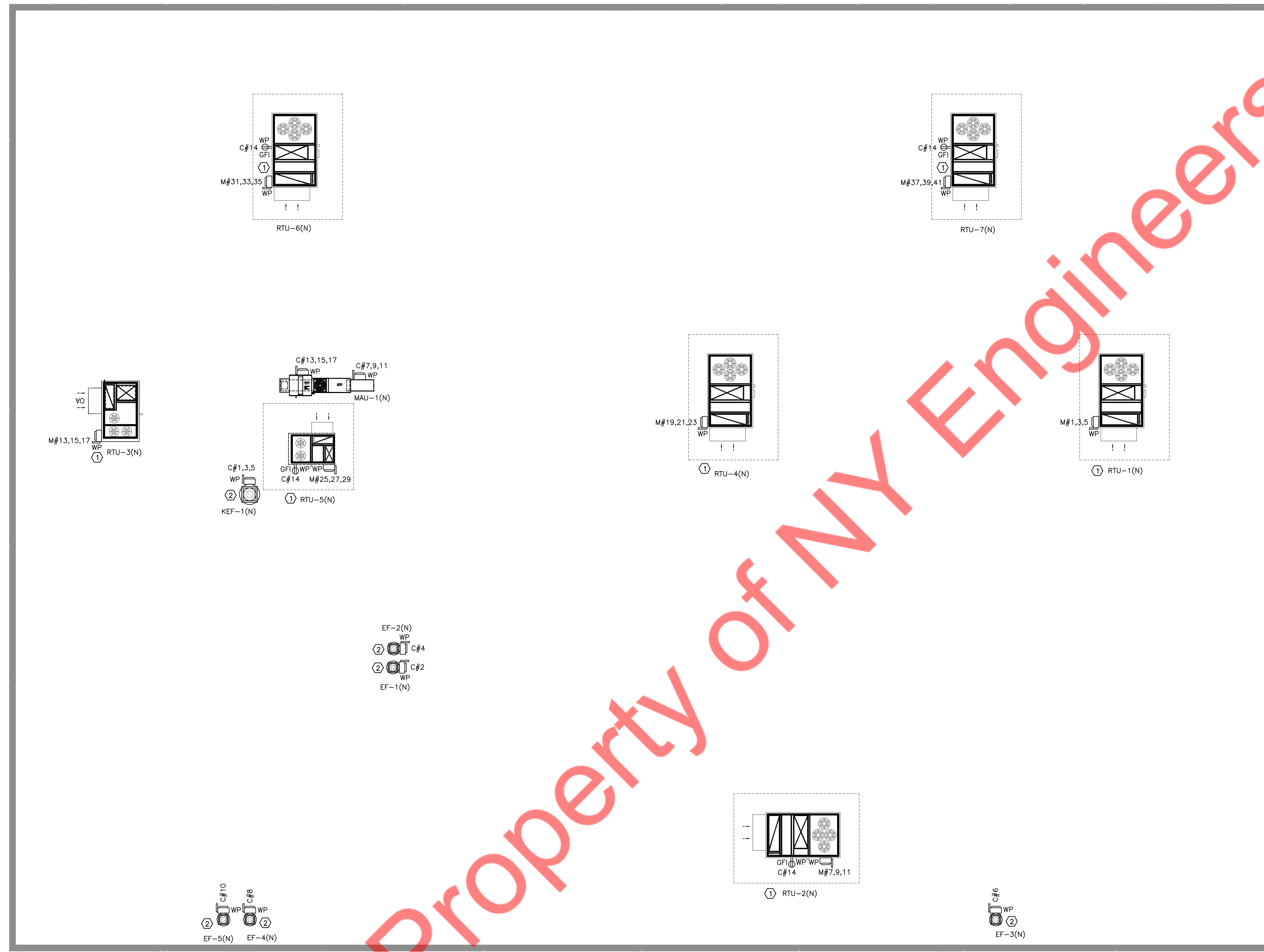
ELECTRICAL POWER PLAN  
 E3.1

1 ELECTRICAL POWER PLAN  
 E3.1 SCALE: 1/8" = 1'-0"

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49674, MIAMI, FL 33179  
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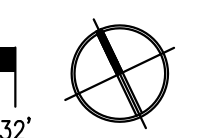
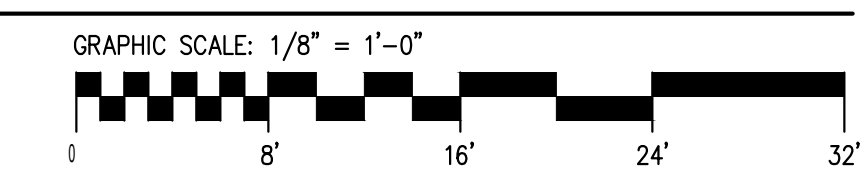
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ELECTRICAL ROOF  
POWER PLAN  
E3.2

1 ELECTRICAL POWER PLAN-ROOF  
E3.2 SCALE: 1/8" = 1'-0"





GENERAL POWER PLAN NOTES:

- EXACT LOCATION OF MECHANICAL, PLUMBING, KITCHEN, FURNITURE SYSTEMS, OWNER FURNISHED EQUIPMENT ETC. THAT REQUIRE ELECTRICAL CONNECTIONS ARE SHOWN ON THE MECHANICAL, PLUMBING, AND/OR ARCHITECTURAL DRAWINGS. E.C. TO COORDINATE EXACT LOCATIONS WITH RESPECTIVE CONTRACTORS AND/OR VENDORS PRIOR TO ANY ROUGH-INS.
- REVIEW AND COORDINATE WITH ALL TRADES CONTRACT DOCUMENTS TO DETERMINE SPECIFIC MOUNTING LOCATIONS FOR EQUIPMENT WITH ELECTRICAL CONNECTIONS. COORDINATE EXACT MOUNTING LOCATIONS WITH THE SPECIFIC TRADE AND ARCHITECT.
- MINIMUM CONDUCTOR SIZE FOR 120V BRANCH CIRCUITS SHALL BE 12-AWG. FOR 120V BRANCH CIRCUITS WITH HOME-RUN OVER 100 LINEAR FEET, A MINIMUM WIRE SIZE OF 10-AWG SHALL BE PROVIDED FROM FIRST JUNCTION/OUTLET BOX TO BRANCH CIRCUIT PANEL BOARD. FOR 120V BRANCH CIRCUITS WITH HOME RUN OVER 150 LINEAR FEET, A MINIMUM OF 8-AWG SHALL BE PROVIDED FROM FIRST JUNCTION/OUTLET BOX TO BRANCH CIRCUIT PANEL BOARD.
- ALL WIRING SHALL BE IDENTIFIED BY PANEL BOARD AND CIRCUIT NUMBERS IN ALL CABINETS, JUNCTION BOXES, WIRING TROUGH, ENCLOSURES, SPLICE OR TERMINATION POINTS ETC.
- ALL 120V, 15A AND 20A RECEPTACLES IN KITCHEN AREA SHALL BE "GFCI" IN ACCORDANCE WITH NEC ARTICLE 210.8(B). GFI RECEPTACLE TO BE MOUNTED AT ACCESSIBLE LOCATION. ELSE PROVIDE GFI RATED BREAKER AT PANEL FOR KITCHEN EQUIPMENT.
- ELECTRICAL CONDUCTORS FOR FEEDERS AND BRANCH CIRCUITS COMBINED SHALL BE SIZED FOR A MAXIMUM OF 5 PERCENT VOLTAGE DROP.
- ELECTRICAL RECEPTACLE OUTLETS.(CBC 11B-308.1.2) : ELECTRICAL RECEPTACLE OUTLETS ON BRANCH CIRCUITS OF 30 AMPERES OR LESS AND COMMUNICATION SYSTEM RECEPTACLES SHALL COMPLY WITH SECTION 11B-308 EXCEPT THE LOW REACH SHALL BE MEASURED TO THE BOTTOM OF THE OUTLET BOX AND THE HIGH REACH SHALL BE MEASURED TO THE TOP OF THE OUTLET BOX.

FLOOR PLAN – POWER KEYED WORK NOTES

- COORDINATE FINAL PLACEMENT OF ALL DEVICES WITH FRANCHISEE.
- E.C. TO COORDINATE WITH WALK IN COOLER/FREEZER MANUFACTURER FOR EXACT LOCATION OF ELECTRICAL CONNECTION AND POWER SUPPLY REQUIREMENT IN FIELD.
- 20A/2P CIRCUIT FOR WALK-IN FREEZER EVAPORATOR. E.C. SHALL COORDINATE EXACT LOCATION AND ELECTRICAL REQUIREMENT WITH EQUIPMENT MANUFACTURER. PROVIDE BREAKER AND BRANCH CIRCUIT ACCORDINGLY.
- ONE NUMBER OF QUAD RECEPTACLE AND TWO DATA OUTLETS FOR POS. E.C. SHALL COORDINATE EXACT LOCATION WITH ARCHITECT/OWNER.
- POWER FOR AUTOMATIC FAUCET SENSOR. E.C. TO COORDINATE EXACT POWER REQUIREMENT WITH ARCHITECT/OWNER PRIOR TO INSTALLATION.
- JUNCTION BOX FOR HAND DRYER. E.C. TO COORDINATE JUNCTION BOX AND ITS POWER DETAILS AS PER ADA REQUIREMENT.
- E.C. SHALL PROVIDE POWER AND NECESSARY WIRING FOR THE HOOD CONTROL PANEL.
- JUNCTION BOX WITH TOGGLE DISCONNECT PER NEC FOR CONNECTION TO BUILDING MOUNTED SIGNAGE. VERIFY EXACT LOCATION AND CONNECT TO SIGN PER MANUFACTURER'S INSTRUCTION. ROUTE CIRCUIT TO PANEL VIA EXTERIOR LIGHTING/SIGNAGE.
- PROVIDE CEILING MOUNTING RECEPTACLE TO PLUG AR REALITY EQUIPMENT. E.C TO COORDINATE WITH ARCHITECT/OWNER FOR EXACT LOCATION OF AR REALITY EQUIPMENT AND PROVIDE RECEPTACLE ACCORDINGLY.
- E.C. TO COORDINATE WITH FRANCHISEE/MANUFACTURE FOR EXACT LOCATION AND POWER REQUIREMENT OF THE ARCADE EQUIPMENTS. PROVIDE NECESSARY WIRING, BREAKER AND BRANCH CIRCUIT AS REQUIRED.
- E.C. TO COORDINATE WITH THE MANUFACTURER FOR EXACT POWER REQUIREMENTS AND FOR EXACT LOCATION COORDINATE WITH THE ARCHITECT. PROVIDE NECESSARY WIRING, BREAKER, SWITCH AND BRANCH CIRCUIT AS REQUIRED. BASE BID ACCORDINGLY.
- ENSURE A CLEAR WORKING AND DEDICATED SPACE PER CODE.
- E.C. SHALL COORDINATE WITH THE ARCHITECT/OWNER FOR EXACT LOCATION OF THE PANEL AND TRANSFORMER IN FIELD. PRIOR TO ROUGH IN.
- THE DOOR SHALL BE EQUIPPED WITH THE PANIC HARDWARE, AND SHALL SWING OUTWARDS. ARCHITECT SHALL PROVIDE THE DOOR AS REQUIRED PER NEC.
- E.C. SHALL COORDINATE WITH THE ARCHITECT/UTILITY/OWNER FOR EXACT LOCATION OF THE CT CABINET, METER AND SERVICE DISCONNECT SWITCH IN THE FIELD.
- 4 NEW RECEPTACLES WITH POWER RAN BACK TO PANEL FOR AXE THROWING EQUIPMENT. E.C. SHALL COORDINATE WITH ARCHITECT/OWNER FOR POWER REQUIREMENT OF AXE THROWING EQUIPMENT AND EXACT LOCATION OF OUTLETS.
- 6 NEW RECEPTACLES WITH POWER RAN BACK TO PANEL FOR DART THROWING EQUIPMENT. E.C. SHALL COORDINATE WITH ARCHITECT/OWNER FOR POWER REQUIREMENT OF DART THROWING EQUIPMENT AND EXACT LOCATION OF OUTLETS.
- RECEPTACLES WITH POWER RAN BACK TO PANEL FOR DART PROJECTORS. E.C. SHALL COORDINATE WITH ARCHITECT/OWNER FOR POWER REQUIREMENT OF DART PROJECTORS AND EXACT LOCATION OF CEILING OUTLETS.

ELECTRICAL EQUIPMENT SCHEDULE								
CATEGORY	TAG	DESCRIPTION	MANUFACTURER	MODEL	WATTS	VOLTAGE	PHASE	CONNECTION
KITCHEN	E01a	10'X14' WALK-IN COOLER	NORLAKE	596KDF77114C	-	-	-	-
KITCHEN	E01b	8'X10' WALK-IN FREEZER	NORLAKE	TBD	-	-	-	-
KITCHEN	E01c	8'X10' WALK IN REFRIGERATOR	AMERIKOOLER	469QMO606F15	-	-	-	-
KITCHEN	E03.1	ICE MAKER, CUBE-STYLE	HOSHIZAKI AMERICA, INC.	415KM1615AJV	3328	208	1	6-20P (4 WIRE)
KITCHEN/MEAN MUGS	E04	UNDERCOUNTER FREEZER	AVANTCO	178SSUC60FHC	315	120	1	NEMA 5-15P
KITCHEN	E05a	REFRIGERATED PIZZA PREP TABLE	AVANTCO	178SSPPT2B	480	120	1	NEMA 5-15P
KITCHEN	E05b	REFRIGERATED PIZZA PREP TABLE	AVANTCO	178SSPPT260B	480	120	1	NEMA 5-15P
KITCHEN	E14	DISHWASHER, HIGH TEMP VENTLESS ELECTRIC	AUTO-CHLOR	A4 WATERSAVER	1800	120	1	-
KITCHEN	E15	FOUNTAIN DROP-IN DISPENSER W/CABINET STAND	COCA-COLA	42232CO	2400	120	1	-
KITCHEN	E15a	CARBONATOR	TBD	TBD	-	-	-	-
KITCHEN	E16	MANUAL DOUGH PRESS	DOUGH-X-PRESS	325DM18A	1125	120	1	NEMA 5-15P
KITCHEN	E17	FOOD WARMER	VOLLRATH	72789	1400	120	1	NEMA 5-15P
KITCHEN	E19	DOUBLE BURNER ELECTRIC HOT PLATE	AVANTCO	177E8202F28M	3000	240	1	NEMA 6-20P
KITCHEN	E20	COUNTERTOP GRIDDLE, GAS	GLOBE	GG48TG	-	-	-	-
KITCHEN	E21	STACKABLE COMMERCIAL MICROWAVE	SOLWAVE	180MMV112T	1000	120	1	NEMA 5-15P
KITCHEN	E22	REFRIGERATED CHEF BASE	AVANTCO	APT-48-HC	290	120	1	NEMA 5-15P
KITCHEN	E24a	ELECTRIC CONVEYOR OVEN	LINCOLN	2500-4/1346	6000	208	1	NEMA 6-50P
KITCHEN	E24b	SINGLE DECK ELECTRIC CONVECTION OVEN W 6" CASTORS WITHOUT LEGS	COOKING PERFORMANCE GROUP	FEC-100-B	11440	208	1	HARDWIRE
KITCHEN	E25	FLOOR FRYER, GAS	AVANTCO	FF50	120	120	1	NEMA 5-15P
KITCHEN	E26	10' EXHAUST HOOD	CAPTIVE-AIRE	TBD	-	-	-	-
KITCHEN	E34	FOOD WARMER	HATCO	GRAHL-36	980	120	1	NEMA 5-15P
BAR COUNTER	E39	UNDERBAR REFRIGERATED CABINET	AVANTCO	178UBB60GTS	325	120	1	NEMA 5-15P
BAR COUNTER	E40a	BACK BAR COOLER, PASS-THRU	CONTINENTAL REFRIGERATOR	270BBC59GDPT	1152	120	1	-
BAR COUNTER	E40b	BACK BAR COOLER, PASS-THRU	CONTINENTAL REFRIGERATOR	270BBC69GDPT	1236	120	1	-
BAR COUNTER	E41	65" BOTTLE COOLER	AVANTCO	178HBB65HC	300	120	1	NEMA 5-15P
BAR COUNTER/MEAN MUGS	E43	WAREWASHER, UNDERCOUNTER	CMA DISHMACHINES	CMA-181GW	6864	208	1	-
BAR COUNTER	E50	60" LIQUOR BOTTLE DISPLAY	BEVERAGE-AIR	185LBD360L	72	120	1	NEMA 5-15P
MEAN MUGS	E55	8 TUB ICE CREAM DIPPING CABINET - 47"	AVANTCO REFRIGERATION	CPW-47-HC	438	120	1	NEMA 5-15P
BAR COUNTER/MEAN MUGS	E57	POINT OF SALE REGISTER	TBD	TBD	360	120	1	NEMA 5-20R
MEAN MUGS	E58	TRIPLE-SPINDLE DRINK MIXER	HAMILTON BEACH COMMERCIAL	411HMD400PCE	900	120	1	-
MEAN MUGS	E59	54" REACH-IN FREEZER	AVANTCO	SS-2F-HC	780	120	1	NEMA 5-15P
MEAN MUGS	E62	REFRIGERATOR, SANDWITCH PREP TABLE	BEVERAGE-AIR	185SPE4812HC	240	120	1	NEMA 5-15P
MEAN MUGS	E64	DOUBLE BOTTLE WARMER	CARNIVAL KING	3825BW2B	400	120	1	NEMA 5-15P

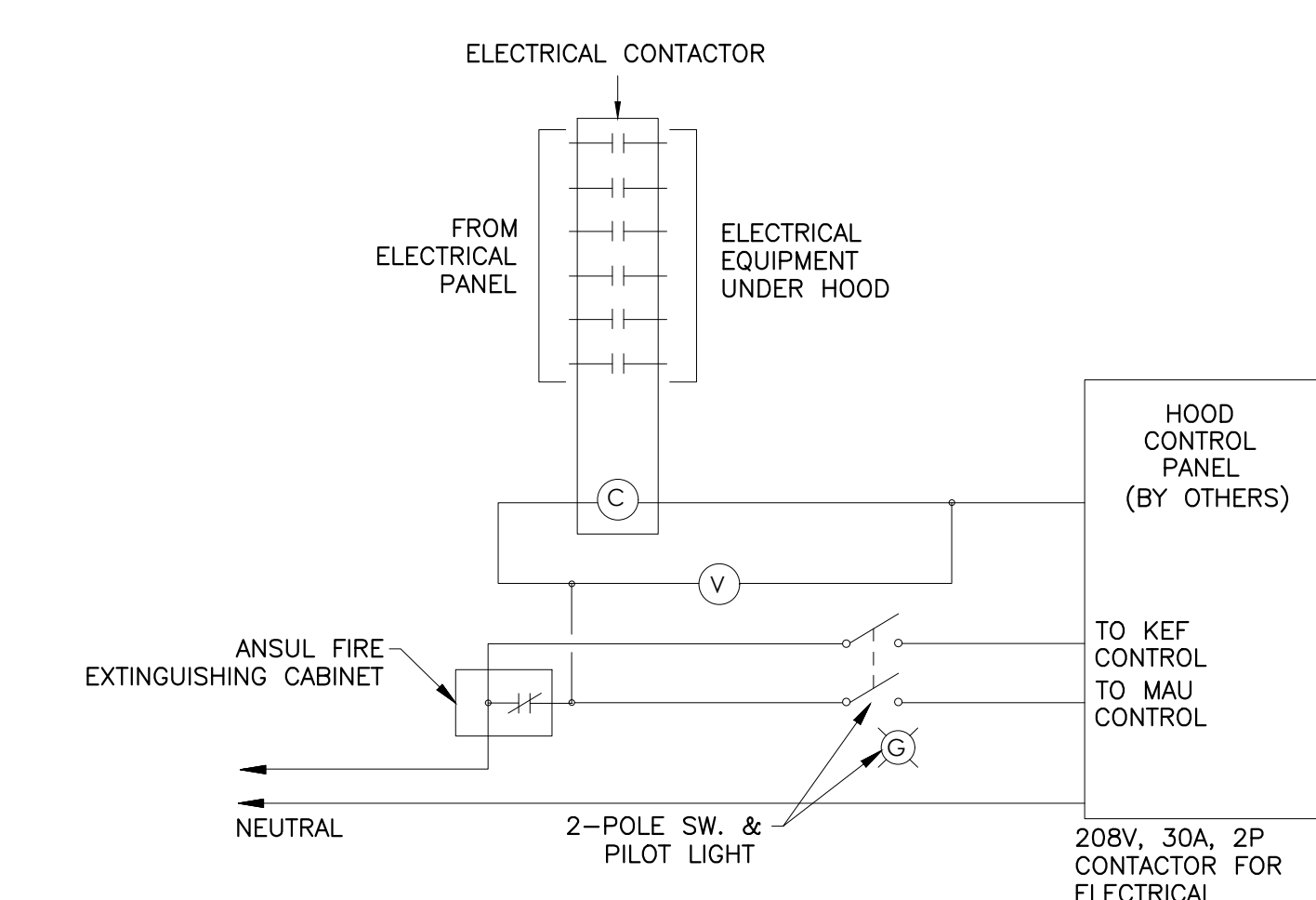
**NOTES:**  
 1. REFER TO THE PANEL SCHEDULE FOR CIRCUIT NUMBER INFORMATION.  
 2. REFER TO MANUFACTURER'S INSTALLATION MANUAL FOR POWER AND CONNECTION REQUIREMENTS.  
 3. CONTRACTOR TO COORDINATE WITH MANUFACTURER INSTALLATION MANUAL FOR ALL POWER AND COMMUNICATION CONNECTION REQUIREMENTS.  
 4. ALL EQUIPMENT UNDER THE HOOD SHALL HAVE SHUNT TRIP BREAKER.  
 5. E.C. TO VERIFY E19 VOLTAGE WITH EQUIPMENT VENDOR.

POWER ROOF PLAN – GENERAL NOTES

- COORDINATE EXACT LOCATION OF HVAC EQUIPMENTS ON ROOF WITH MECHANICAL CONTRACTOR.
- ELECTRICAL CONTRACTOR SHALL COORDINATE DISCONNECT AND FUSE REQUIREMENT FOR MECHANICAL UNIT WITH MECHANICAL CONTRACTOR AND EQUIPMENT MANUFACTURER FOR FINAL SELECTION PRIOR TO ROUGH-IN. E.C. COORDINATE LOCATION OF DISCONNECT SWITCH WITH MANUFACTURER AND MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN. LOCATE AS REQUIRED TO MAINTAIN NEC CLEARANCES.

POWER PLAN – KEYED WORK NOTES

- 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.
- EXHAUST FANS FURNISHED AND INSTALLED BY MECHANICAL CONTRACTOR. E.C. SHALL COORDINATE WITH MECHANICAL CONTRACTOR FOR SWITCHING & CONTROLS AND PROVIDE ALL NECESSARY WIRING, BREAKER AND BRANCH CIRCUIT AS REQUIRED.



- NOTES:  
 1. ELECTRICAL CONTRACTOR SHALL PROVIDE CONTACTORS AND ALL INTERLOCK WIRING. COORDINATE EXACT TERMINATION REQUIREMENTS WITH HOOD CONTROL PANEL AND ANSUL CABINET WITH HOOD MANUFACTURER.  
 2. EXACT QUANTITY AND NUMBER OF POLES OF THE ELECTRICAL CONTACTORS TO BE COORDINATED WITH THE PANEL SCHEDULE.

1 FIRE SUPPRESSION SYSTEM TYPICAL DETAIL  
 E3.3 N.T.S.

CONSULTANTS (ENGINEER):  
**NY ENGINEERS**  
 NEARBY ENGINEERS  
 382 NE 191ST STREET SUITE  
 49674, MIAMI, FL 33179  
 PH-914.257.3455  
 WWW.NY-ENGINEERS.COM

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REVISION SCHEDULE  
 NO. REV. / SUBMISSION DATE ISSUED BY

ISSUE DATE: 05/30/2024

INTERIOR BUILD-OUT  
 810 BILLIARDS &  
 BOWLING  
 HOUSTON, TX

DRAWN BY: NYE

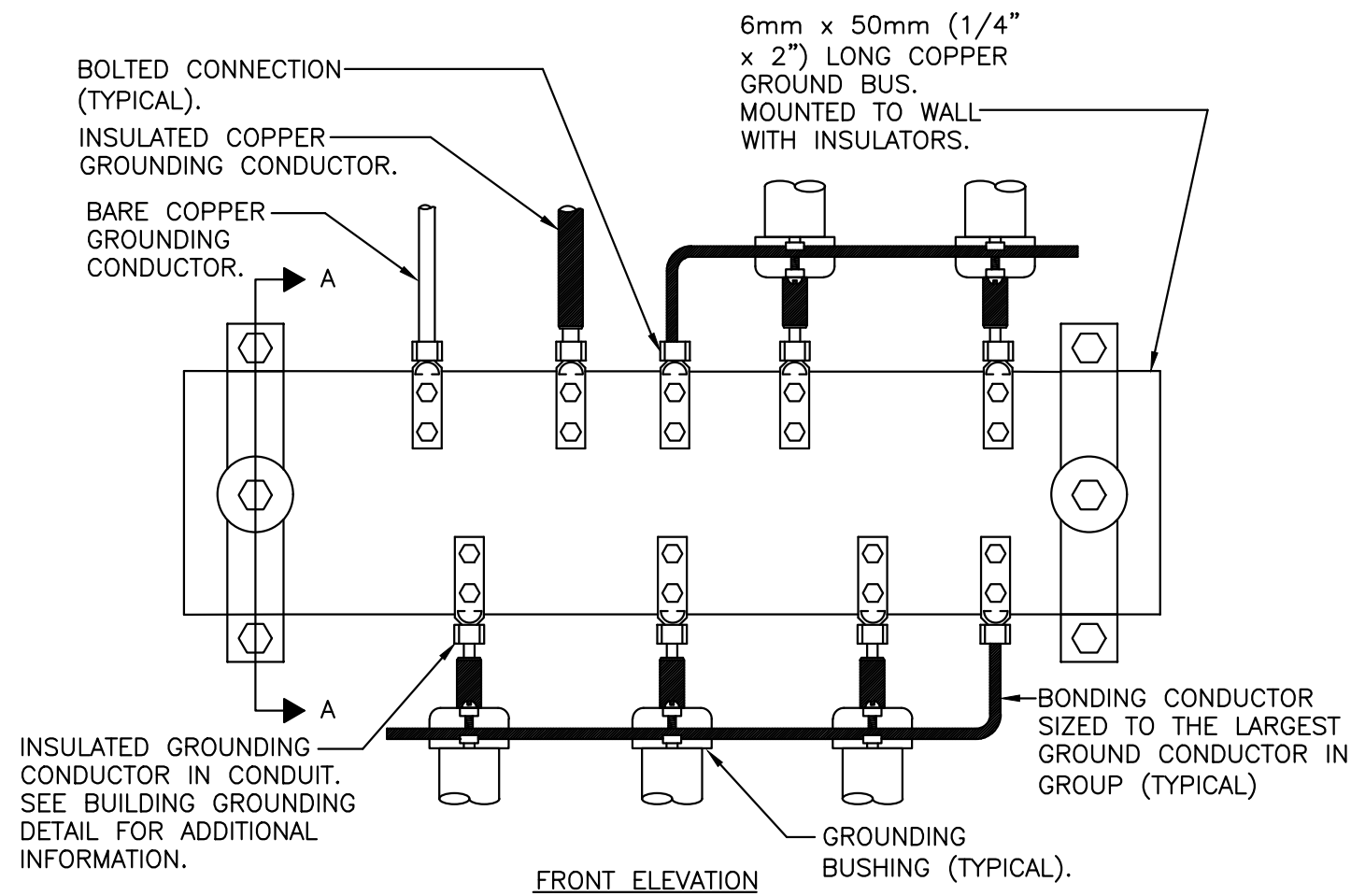
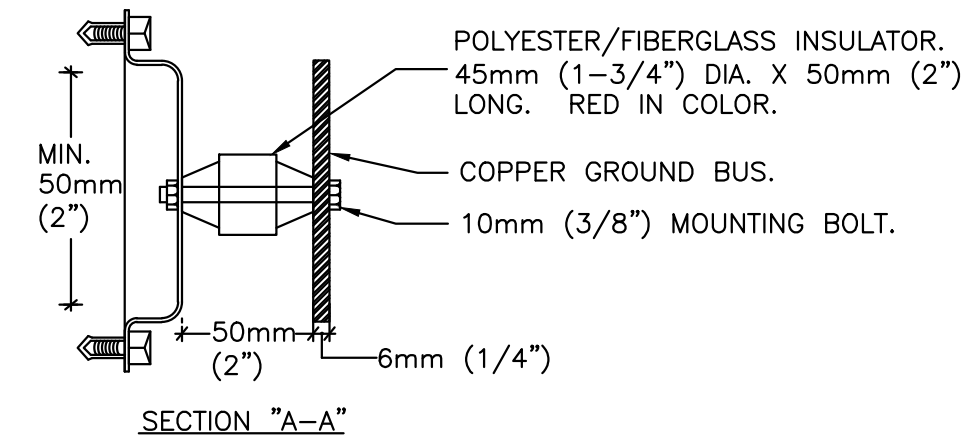
QAQC: NYE

APPROVED BY: NYE

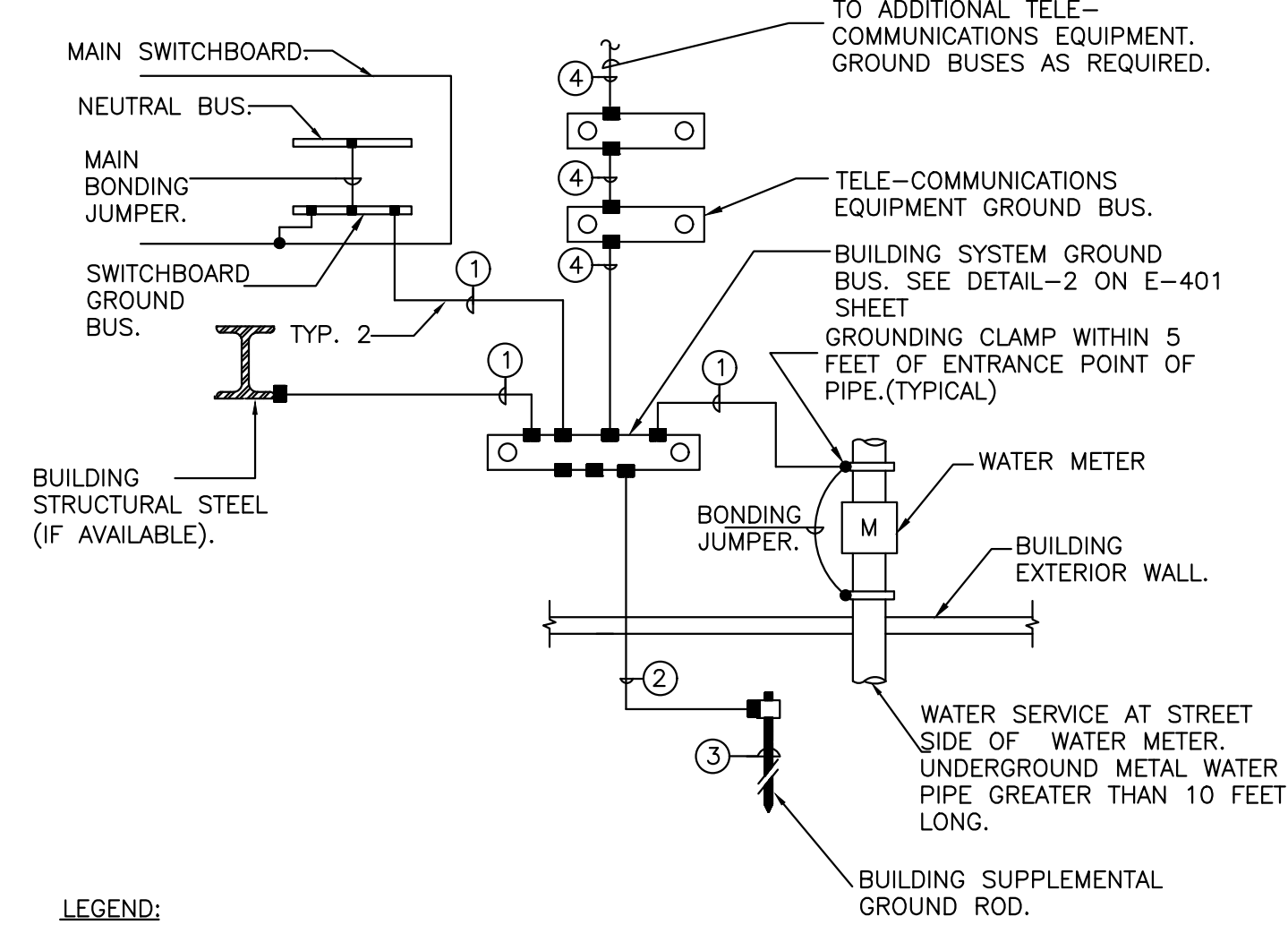
PROJECT NUMBER: 2323

ELECTRICAL POWER &  
 ROOF PLAN SCHEDULE  
 AND NOTES  
 E3.3

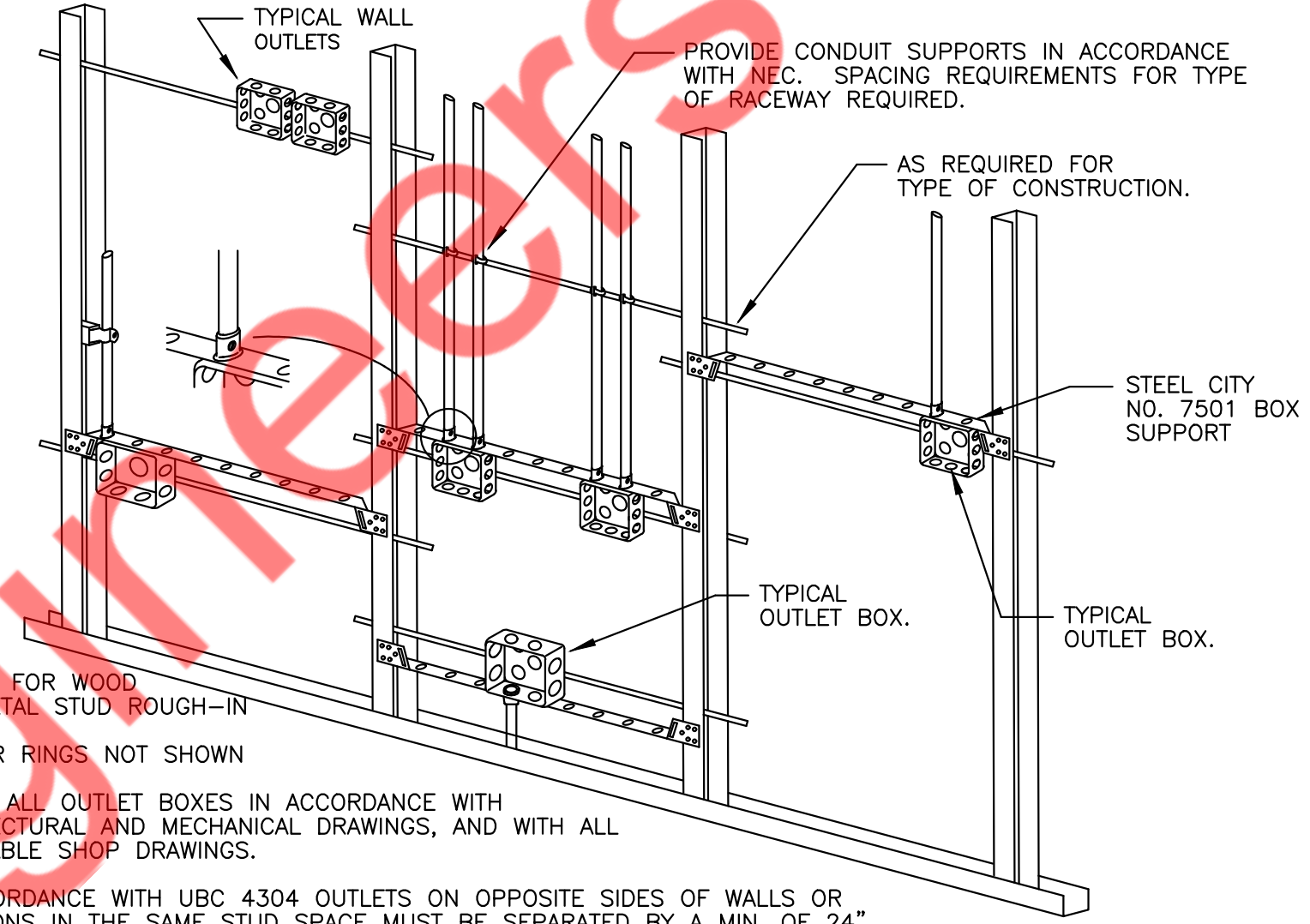
THESE BOTH GROUNDING DETAILS TO BE USED TOGETHER



NOTES:  
1. REFER TO BUILDING GROUNDING ELECTRODE SYSTEM DETAIL FOR EXACT CONFIGURATION.



- LEGEND:
- INDICATES BOLTED CONNECTION.
  - INDICATES EXOTHERMIC WELD CONNECTION, COMPATIBLE WITH MATERIALS BEING JOINED.
  - ① INSULATED COPPER GROUNDING ELECTRODE CONDUCTOR IN CONDUIT SIZED AS PER NEC ARTICLE 250.66.
  - ② 1/0 AWG BARE COPPER GROUND CONDUCTOR.
  - ③ 3/4" x 10'-0" LONG COPPER-CLAD GROUND ROD DRIVEN WITH TOP 12" BELOW GRADE.
  - ④ 2/0 AWG INSULATED COPPER GROUND CONDUCTOR IN 30mm CONDUIT.



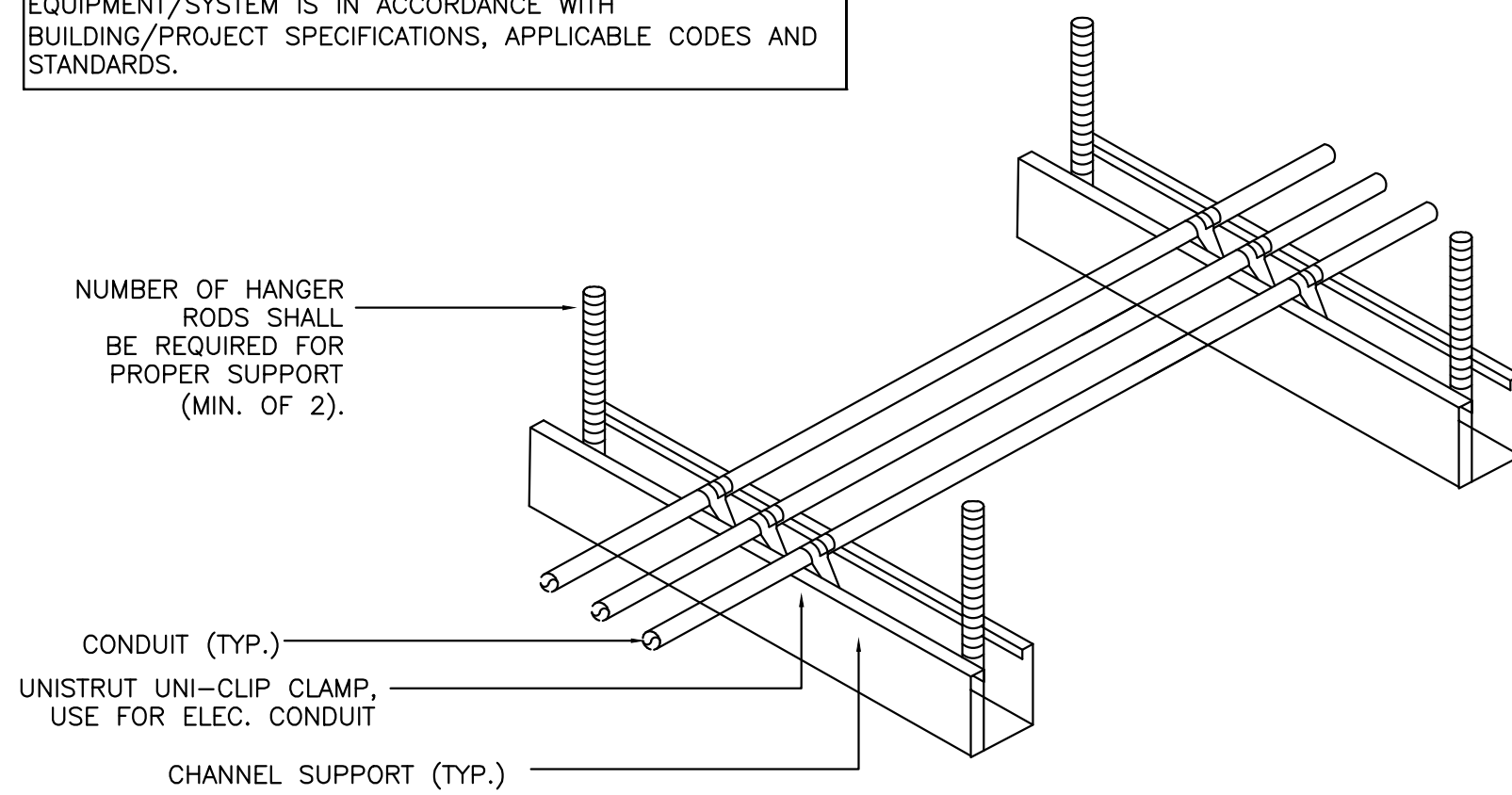
- NOTES:
- ① TYPICAL FOR WOOD AND METAL STUD ROUGH-IN
  - ② PLASTER RINGS NOT SHOWN
  - ③ LOCATE ALL OUTLET BOXES IN ACCORDANCE WITH ARCHITECTURAL AND MECHANICAL DRAWINGS, AND WITH ALL APPLICABLE SHOP DRAWINGS.
  - ④ IN ACCORDANCE WITH UBC 4.304 OUTLETS ON OPPOSITE SIDES OF WALLS OR PARTITIONS IN THE SAME STUD SPACE MUST BE SEPARATED BY A MIN. OF 24" HORIZONTAL DISTANCE.

1 BUILDING ELECTRICAL SYSTEM GROUND BUS  
E4.1 N.T.S

2 BUILDING GROUNDING ELECTRODE SYSTEM  
E4.1 N.T.S

3 DETAIL TYPICAL ROUGH-IN REQUIREMENTS  
E4.1 N.T.S

NOTE:  
THIS INFORMATION MAY NOT CONTAIN ALL DETAILS REQUIRED FOR CONSTRUCTION. APPROPRIATE MODIFICATION MAY BE REQUIRED TO ENSURE SUITABILITY OF THESE DRAWINGS FOR THE SPECIFIC APPLICATION. IT IS THE USER'S RESPONSIBILITY TO ENSURE INSTALLATION OF THE EQUIPMENT/SYSTEM IS IN ACCORDANCE WITH BUILDING/PROJECT SPECIFICATIONS, APPLICABLE CODES AND STANDARDS.

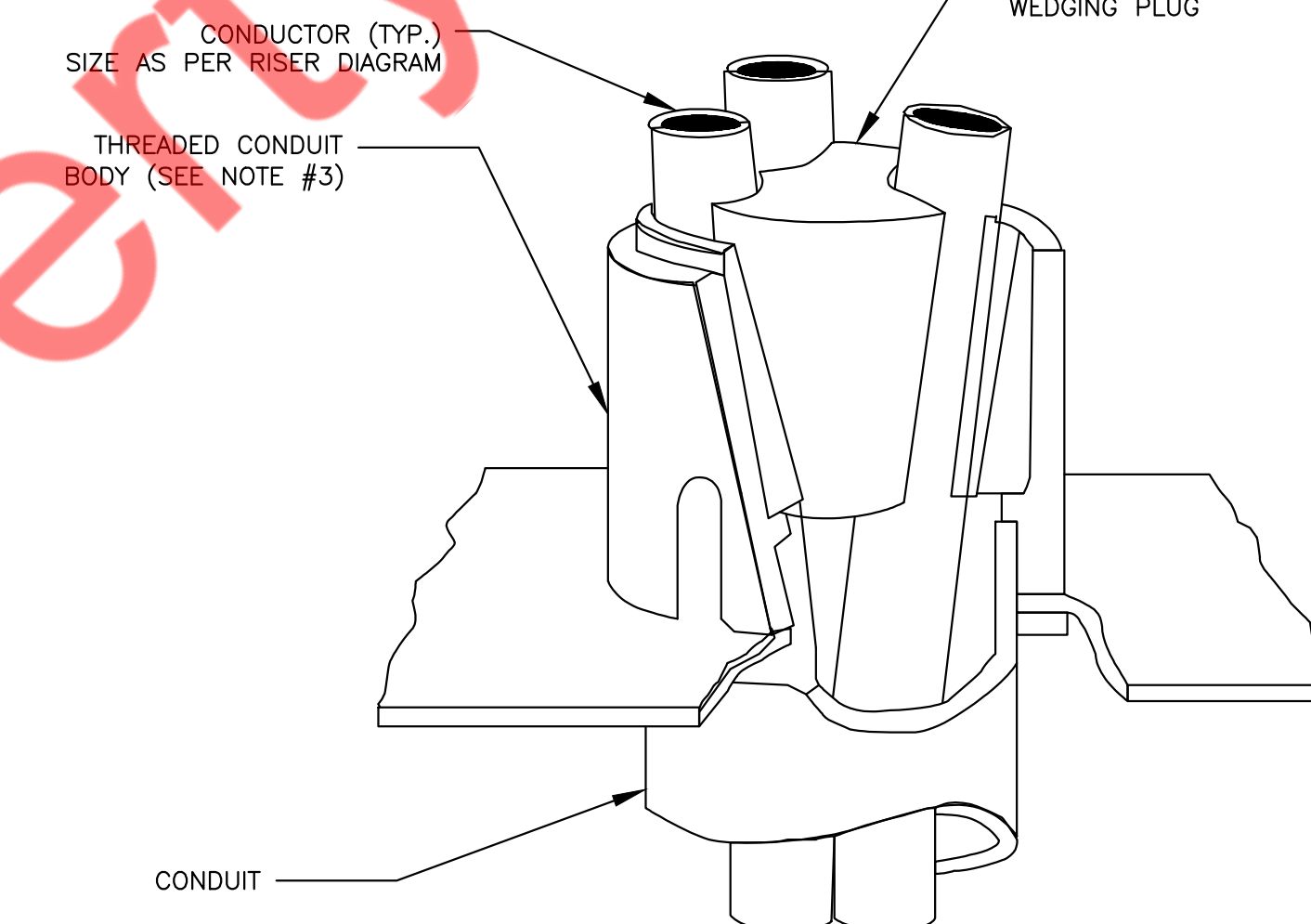


- NOTES:
1. ALL CONDUIT MAY BE COMBINED ON SAME SUPPORT CHANNEL WHERE PRACTICAL.
  2. SUPPORT CHANNEL LENGTH SHALL NOT BE DETERMINED UNTIL ALL PIPING, CONDUIT, ETC. TO BE SUPPORTED IS COORDINATED.
  3. SUPPORT CHANNEL SPACING SHALL BE NO MORE THAN 10'-0".
  4. UNISTRUT AND CONDUIT INSTALLATION MAY BE REVERSED.

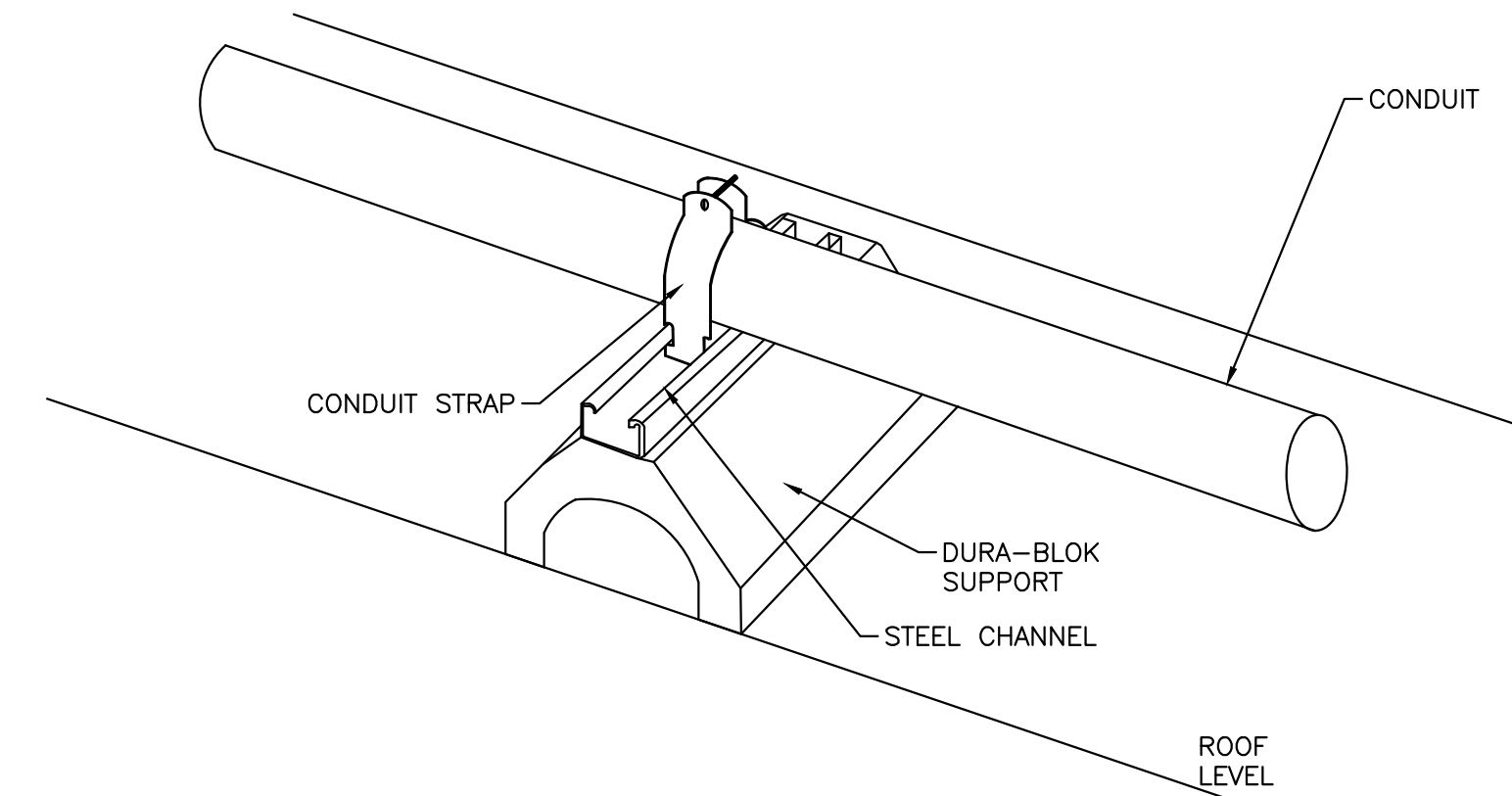
4 CONDUIT SUPPORT DETAIL  
E4.1 N.T.S

NOTES:

1. ALL CONDUCTORS IN VERTICAL RACEWAYS SHALL BE SUPPORTED IN ACCORDANCE WITH ARTICLE 300.19 OF NEC. CABLE SUPPORTS SHALL BE LOCATED AT THE INTERVALS REQUIRED BY THE NEC.
2. CABLE SUPPORT SYSTEM SHALL BE AS MANUFACTURED BY O-Z GEDNEY WITH POZI-GRIP "S-STYLE" WEDGING PLUG OR APPROVED EQUAL.
3. FOR THREADLESS CONDUIT (RIGID, IMC OR EMT), ATTACH CONDUIT BODY TO MALE THREADS OF A SET SCREW OR COMPRESSION CONNECT, AS PERMITTED BY SPECIFICATIONS.
4. PROVIDE PULL BOX AT EACH LOCATION OF CABLE SUPPORTS. PULL BOX SHALL BE SIZED AS PER CODE TO ACCOMMODATE ALL CONDUITS.



5 VERTICAL CABLE SUPPORT DETAIL  
E4.1 N.T.S



- NOTES:
1. ALL CONDUIT MAY BE COMBINED ON SAME SUPPORT CHANNEL WHERE PRACTICAL.
  2. SUPPORT CHANNEL LENGTH SHALL NOT BE DETERMINED UNTIL ALL PIPING, CONDUIT, ETC. TO BE SUPPORTED IS COORDINATED.
  3. SUPPORT CHANNEL SPACING SHALL BE NO MORE THAN 10'-0".

6 CONDUIT SUPPORT DETAIL ON ROOF  
E4.1 N.T.S

CONSULTANTS (ENGINEER):  
**NY ENGINEERS**  
NEARBY ENGINEERS  
382 NE 191ST STREET SUITE  
49674, MIAMI, FL 33179  
PH-914.257.3455  
WWW.NY-ENGINEERS.COM

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INTERIOR BUILD-OUT  
810 BILLIARDS &  
BOWLING  
HOUSTON, TX

DRAWN BY: NYE

QAQC: NYE

APPROVED BY: NYE

PROJECT NUMBER: 2323

ELECTRICAL DETAILS

E4.1

PANEL: MDP (NEW)											MOUNTING: SURFACE			
480Y/277	VOLTS:		3	PHASE	4	WIRE	PANEL LOCATION: STORAGE							
MCB	800A						FED FROM: SERVICE DISCONNECT							
NOTE: L: LIGHTING, H: HVAC LOAD, M: MOTOR LOAD, R: RECEPTACLES, O: OTHER/MISC. (TYPICAL)														
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.
						A	B	C						
1			O	84.48		104.41				19.93	O	TRANS. 75 kVA (TB) / PANEL-B	150/3P	2
3	400/3P	TO PANEL M	O	84.48	REFER RISER		104.41			19.93	O			4
5			O	84.48						19.93	O			6
7						18.40				18.40	O	TRANS. 75 kVA (TD) / PANEL-D	150/3P	8
9	200/3P	SPARE					18.40			18.40	O			10
11								18.40		18.40	O			12
13								23.64		23.64	O	TRANS. 150 kVA (TH) / PANEL-H	300/3P	14
15		SPACE						23.64		23.64	O			16
17								23.64		23.64	O			18
19						6.06				6.06	O	TRANS. 75 kVA (TF) / PANEL-F	150/3P	20
21		SPACE				6.06				6.06	O			22
23							6.06			6.06	O			24
25		SPACE						6.06		6.06	O			26
27		SPACE				0.00				0.00		SPACE		28
29								0.00		0.00				30
31								0.00		0.00		SPACE		32
33		SPACE						0.00		0.00		SPACE		34
35												SPACE		36
37								0.00		0.00		SPACE		38
39		SPACE						0.00		0.00		SPACE		40
41												SPACE		42
						152.51	152.51	152.51						

PANEL: M (NEW)											MOUNTING: SURFACE			
480Y/277	VOLTS:		3	PHASE	4	WIRE	PANEL LOCATION: STORAGE							
MCB	400A						FED FROM: MDP							
NOTE: L: LIGHTING, H: HVAC LOAD, M: MOTOR LOAD, R: RECEPTACLES, O: OTHER/MISC. (TYPICAL)														
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.
						A	B	C						
1			H	14.41		14.41						SPARE	20	2
3	60/3P	RTU-1 (N)	H	14.41	3#6, #10G, 3/4" C		14.41					SPARE	20	4
5			H	14.41				14.41				SPARE	20	6
7			H	12.74		12.74						SPARE	20	8
9	60/3P	RTU-2 (N)	H	12.74	3#6, #10G, 3/4" C		12.74					SPARE	20	10
11			H	12.74				12.74				SPARE	20	12
13			H	9.69		9.69						SPARE	20	14
15	45/3P	RTU-3 (N)	H	9.69	3#8, #10G, 3/4" C		9.69					SPARE	20	16
17			H	9.69				9.69				SPARE	20	18
19			H	16.35		16.35						SPARE	20	20
21	70/3P	RTU-4 (N)	H	16.35	3#4, #8G, 1" C		16.35					SPARE	20	22
23			H	16.35				16.35				SPARE	20	24
25			H	5.81		5.81						SPARE	20	26
27	25/3P	RTU-5 (N)	H	5.81	3#10, #10G, 3/4" C		5.81					SPARE	20	28
29			H	5.81				5.81				SPARE	20	30
31			H	12.74		12.74						SPARE	20	32
33	60/3P	RTU-6 (N)	H	12.74	3#6, #10G, 3/4" C		12.74					SPARE	20	34
35			H	12.74				12.74				SPARE	20	36
37			H	12.74		12.74						SPARE	20	38
39	60/3P	RTU-7 (N)	H	12.74	3#6, #10G, 3/4" C		12.74					SPARE	20	40
41			H	12.74				12.74				SPARE	20	42
						84.48	84.48	84.48						

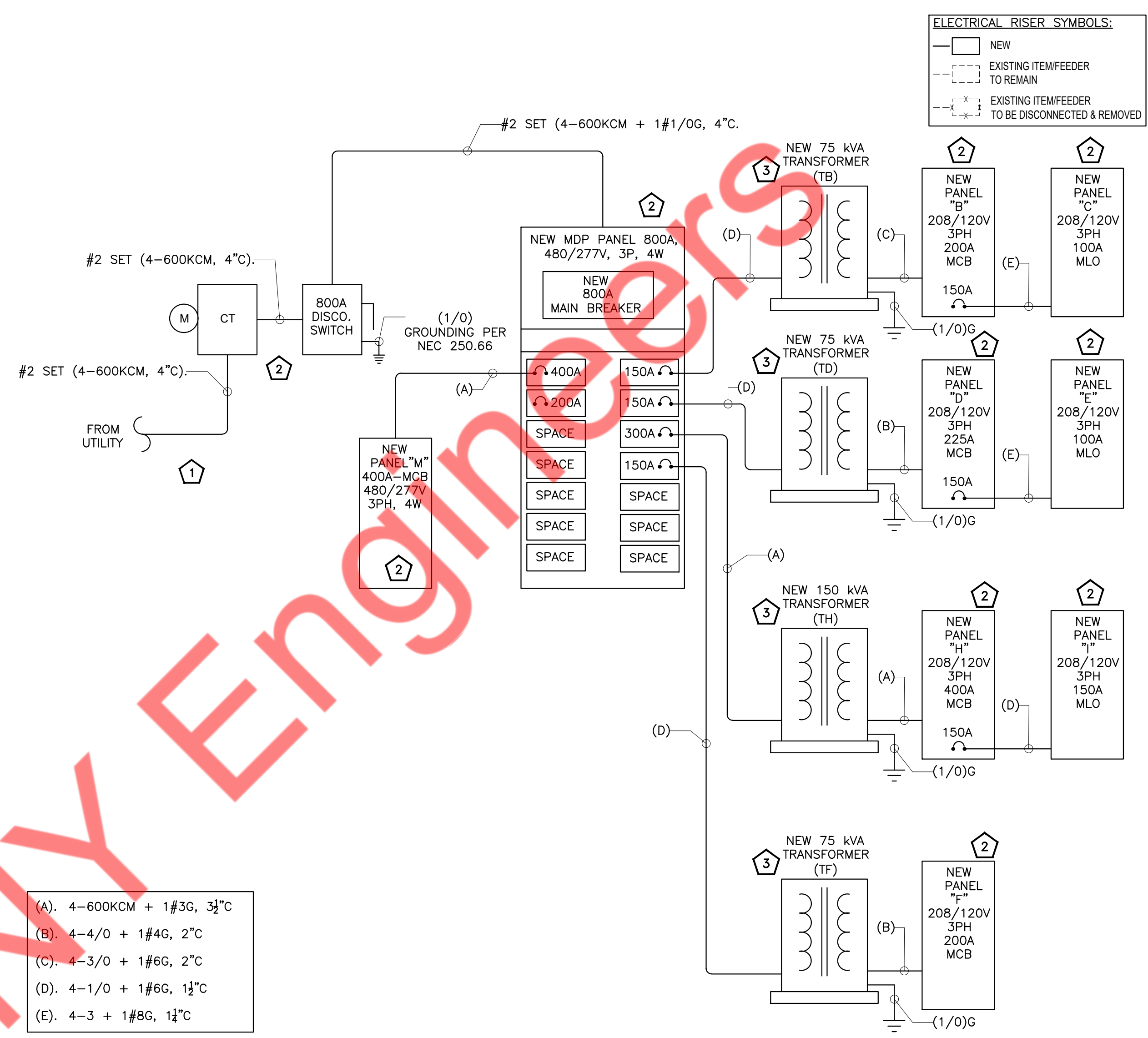
**PANEL SCHEDULE GENERAL NOTE:**

- ALL CIRCUITING SHOWN IS FOR REFERENCE PURPOSE ONLY. E.C. SHALL VERIFY CIRCUITING OF THE EXISTING DEVICES IN FIELD AND INFORM ENGINEER FOR DISCREPANCIES.
- ELECTRICAL CONTRACTOR TO VERIFY THE EXACT PANEL SIZES AND INCOMING FEEDER SIZE IN FIELD. INFORM ENGINEER FOR ANY DISCREPANCY BEFORE COMMENCING ANY WORK.
- E.C. SHALL PROVIDE NEW CIRCUIT BREAKERS IN PLACE OF EXISTING CIRCUIT BREAKERS WHEREVER NECESSARY TO BE IN LINE WITH THE PANEL SCHEDULE.
- E.C. SHALL VERIFY OPERABLE CONDITION OF EXISTING PANEL, CABLE, FEEDERS, CIRCUIT BREAKER ETC. IN FIELD. REPLACE IN FOUND INOPERABLE.

**PANEL SCHEDULE ABBREVIATIONS:**

L = LIGHTING  
R = RECEPTACLE  
H = HVAC  
E = EQUIPMENT  
M = MOTOR  
O = OTHER

\* = SHUNT TRIP BREAKER



**ELECTRICAL RISER KEYED WORK NOTES:**

- NEW 800A, 480/277V, 3PH, 4 WIRE ELECTRICAL SERVICE FOR THE PROJECT SPACE. E.C. TO COORDINATE WITH UTILITY/OWNER FOR MORE INFORMATION. BASE BID ACCORDINGLY.
- NEW ELECTRICAL EQUIPMENT FOR THE PROJECT SPACE. E.C. SHALL COORDINATE WITH ARCHITECT/OWNER FOR EXACT LOCATION OF THE EQUIPMENTS.
- PROVIDE NEW TRANSFORMER WITH NECESSARY ACCESSORIES. COORDINATE EXACT LOCATION WITH THE OWNER PRIOR TO WORK.

**GENERAL NOTE**

- E.C. SHALL VERIFY EXACT POWER DISTRIBUTION IN FIELD AND INFORM ENGINEER ON RECORD FOR ANY DISCREPANCY.
- E.C. SHALL VERIFY INCOMING SERVICE AMPERAGE, WIRE SIZING AND DISTRIBUTION IN FIELD COORDINATION WITH OWNER/ARCHITECT.
- ELECTRICAL CONTRACTOR TO COORDINATE FAULT CURRENT (Isc) RATING WITH UTILITY COMPANY AND AHJ PRIOR TO COMMENCING ANY WORK.
- E.C. SHALL VERIFY THE RATING, SIZE, LOCATION AND OPERABLE CONDITION OF ALL THE EXISTING PANELS AND ELECTRICAL CONNECTION IN FIELD. INFORM ENGINEER FOR ANY DISCREPANCY FOUND BEFORE COMMENCING ANY WORK.
- E.C. SHALL VERIFY THE EXACT POWER DISTRIBUTION & INCOMING CONNECTION TO ALL PANELS IN FIELD. INFORM ENGINEER FOR ANY DISCREPANCY FOUND.
- E.C. SHALL COORDINATE WITH LANDLORD/OWNER/ARCHITECT FOR THE EXACT LOCATION OF EXISTING ELECTRICAL SERVICE IN THE LANDLORD RISER ROOM. BASE BID ACCORDINGLY.
- E.C. TO VERIFY SCOPE OF WORK WITH LANDLORD/OWNER PRIOR TO BID.
- E.C. TO EXTEND/PROVIDE NEW CIRCUIT AS NEEDED IF THE EXISTING EQUIPMENT ARE BEING RELOCATED.

1 ELECTRICAL PANEL SCHEDULE  
E5.1 SCALE

2 ELECTRICAL RISER DIAGRAM  
E5.1 SCALE

CONSULTANTS (ENGINEER):  
**NY ENGINEERS**  
NEARBY ENGINEERS  
382 NE 191ST STREET SUITE  
49674, MIAMI, FL 33179  
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ELECTRICAL RISER DIAGRAM  
AND PANEL SCHEDULE  
SHEET 1 OF 3  
E5.1

PANEL: B (NEW)												MOUNTING: SURFACE		
208Y/120	VOLTS:	3			PHASE	4			WIRE	PANEL LOCATION: STORAGE				
MCB	200 A											FED FROM: TRANS. (T-B)		
NOTE: L : LIGHTING, H : HVAC LOAD, M : MOTOR LOAD, R : RECEPTACLES, O : OTHER/MISC. (TYPICAL)														
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.
						A	B	C						
1	20	AXE THROWING RECEP.	R	0.36	2#12, #12G, 3/4"C	1.56			2#12, #12G, 3/4"C	1.20	R	STAGE 810 LOGO SIGNAGE	20	2
3	20	AXE THROWING RECEP.	R	0.36	2#12, #12G, 3/4"C		1.56		2#12, #12G, 3/4"C	1.20	R	STAGE 810 LOGO SIGNAGE	20	4
5	20	HAND DRYER	M	1.20	2#12, #12G, 3/4"C			2.40	2#12, #12G, 3/4"C	1.20	R	STAGE 810 LOGO SIGNAGE	20	6
7	20	HAND DRYER	M	1.20	2#12, #12G, 3/4"C	1.56			2#12, #12G, 3/4"C	0.36	R	STAGE FLOOR RECEPTACLE	20	8
9	20	RESTROOM RECEPTACLES	R	0.72	2#12, #12G, 3/4"C		1.44		2#12, #12G, 3/4"C	0.72	R	STAGE QUAD RECEPTACLES	20	10
11	20	GOLF SIMULATOR	R	0.36	2#12, #12G, 3/4"C			1.16	2#12, #12G, 3/4"C	0.80	R	55" TV RECEPTACLES	20	12
13	20	GOLF SIMULATOR	R	0.36	2#12, #12G, 3/4"C	1.96			2#12, #12G, 3/4"C	1.60	R	55" TV RECEPTACLES	20	14
15	20	GOLF SIMULATOR	R	0.36	2#12, #12G, 3/4"C		1.56		2#12, #12G, 3/4"C	1.20	R	55" TV RECEPTACLES	20	16
17	20	GOLF SIMULATOR	R	0.36	2#12, #12G, 3/4"C			1.56	2#12, #12G, 3/4"C	1.20	R	HOST DESK 810 LOGO SIGNAGE	20	18
19	20	WATER FOUNTAIN	R	1.00	2#12, #12G, 3/4"C	2.20			2#12, #12G, 3/4"C	1.20	R	HOST DESK 810 LOGO SIGNAGE	20	20
21	20	PANIC DOOR HARWARE	R	0.20	2#12, #12G, 3/4"C		1.28		2#12, #12G, 3/4"C	1.08	R	HOST DESK QUAD RECEPTACLES	20	22
23	20	CLEANING EQ. RECEPTACLES	R	1.08	2#12, #12G, 3/4"C			2.16	2#12, #12G, 3/4"C	1.08	R	HOST DESK QUAD RECEPTACLES	20	24
25	20	BILLIARDS GENERAL RECEPTACLES	R	1.44	2#12, #12G, 3/4"C	1.80			2#12, #12G, 3/4"C	0.36	R	STORAGE GENERAL RECEPTACLES	20	26
27	20	BILLIARDS GENERAL RECEPTACLES	R	1.08	2#12, #12G, 3/4"C		1.80		2#12, #12G, 3/4"C	0.72	R	AV ROOM QUAD RECEPTACLES	20	28
29	20	SPARE					0.54		2#12, #12G, 3/4"C	0.54	R	GENERAL RECEPTACLES	20	30
31	20	50" TV RECEP.	R	1.08	2#12, #12G, 3/4"C	2.34			2#12, #12G, 3/4"C	1.26	R	GENERAL RECEPTACLES	20	32
33	20	50" TV RECEP.	R	1.08	2#12, #12G, 3/4"C		1.62		2#12, #12G, 3/4"C	0.54	R	GENERAL RECEPTACLES	20	34
35	20	50" TV RECEP.	R	1.08	2#12, #12G, 3/4"C			1.08				SPARE		36
37	20	50" TV RECEP.	R	1.08	2#12, #12G, 3/4"C	10.07				8.99	O			38
39	20	50" TV RECEP.	R	1.08	2#12, #12G, 3/4"C		10.07		4-3, #8G, 1 1/4"C	8.99	O	PANEL-C	100/3P	40
41	20	50" TV RECEP.	R	1.08	2#12, #12G, 3/4"C			10.07		8.99	O			42
						21.49	19.33	18.97						

PANEL SCHEDULE GENERAL NOTE:

- ALL CIRCUITING SHOWN IS FOR REFERENCE PURPOSE ONLY. E.C. SHALL VERIFY CIRCUITING OF THE EXISTING DEVICES IN FIELD AND INFORM ENGINEER FOR DISCREPANCIES.
- ELECTRICAL CONTRACTOR TO VERIFY THE EXACT PANEL SIZES AND INCOMING FEEDER SIZE IN FIELD. INFORM ENGINEER FOR ANY DISCREPANCY BEFORE COMMENCING ANY WORK.
- E.C. SHALL PROVIDE NEW CIRCUIT BREAKERS IN PLACE OF EXISTING CIRCUIT BREAKERS WHEREVER NECESSARY TO BE IN LINE WITH THE PANEL SCHEDULE.
- E.C. SHALL VERIFY OPERABLE CONDITION OF EXISTING PANEL, CABLE, FEEDERS, CIRCUIT BREAKER ETC. IN FIELD. REPLACE IN FOUND INOPERABLE.

PANEL SCHEDULE ABBREVIATIONS:

L = LIGHTING  
R = RECEPTACLE  
H = HVAC  
E = EQUIPMENT  
M = MOTOR  
O = OTHER

\* = SHUNT TRIP BREAKER

PANEL: C (NEW)												MOUNTING: SURFACE		
208Y/120	VOLTS:	3			PHASE	4			WIRE	PANEL LOCATION: STORAGE				
MCB	100 A											FED FROM: PANEL-B		
NOTE: L : LIGHTING, H : HVAC LOAD, M : MOTOR LOAD, R : RECEPTACLES, O : OTHER/MISC. (TYPICAL)														
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.
						A	B	C						
1			H	0.40		0.50			2#12, #12G, 3/4"C	0.10	H	EF-1 (N)	20	2
3	20/3P	KEF-1 (N)	H	0.40	3#12, #12G, 3/4"C		0.50		2#12, #12G, 3/4"C	0.10	H	EF-2 (N)	20	4
5			H	0.40				0.55	2#12, #12G, 3/4"C	0.15	H	EF-3 (N)	20	6
7			H	3.20		3.35			2#12, #12G, 3/4"C	0.15	H	EF-4 (N)	20	8
9	40/3P	MAU-1 (N) - FAN	H	3.20	3#8, #10G, 3/4"C		3.35		2#12, #12G, 3/4"C	0.15	H	EF-5 (N)	20	10
11			H	3.20				3.20				SPARE	20	12
13			H	2.50		3.22			2#12, #12G, 3/4"C	0.72	R	SERVICE RECEP.	20	14
15	30/3P	MAU-1 (N) - CONDENSER	H	2.50	3#10, #10G, 3/4"C		3.00		2#12, #12G, 3/4"C	0.50	M	MOTORISED DAMPERS	20	16
17			H	2.50				3.50	2#12, #12G, 3/4"C	1.00	R	KITCHEN GENERAL RECEPTACLES	20*	18
19	20	WH-1	O	0.50	2#12, #12G, 3/4"C	0.50						SHUNT TRIP		20
21	20	RCP-1	M	0.50	2#12, #12G, 3/4"C		0.79		2#12, #12G, 3/4"C	0.29	E	E22 - REFRIGERATED CHEF BASE	20*	22
23	20	WALK-IN MISCELLANEOUS LOAD	L	1.00	2#12, #12G, 3/4"C			1.00				SHUNT TRIP		24
25	20*	E20 - COUNTERTOP GRIDDLE, GAS	E	0.20	2#12, #12G, 3/4"C	1.40			2#12, #12G, 3/4"C	1.20	R	MEAN MUGS LOGO SIGNAGE	20	26
27		SHUNT TRIP					0.72		2#12, #12G, 3/4"C	0.72	R	AXE THROWING GEN. RECEPTACLES	20	28
29	20*	E25 - FLOOR FRYER, GAS	E	0.12	2#12, #12G, 3/4"C			1.20	2#12, #12G, 3/4"C	1.08	R	DART LANES GEN. RECEPTACLES	20	30
31		SHUNT TRIP				0.00						SPARE	20	32
33	20*	E25 - FLOOR FRYER, GAS	E	0.12	2#12, #12G, 3/4"C		0.12					SPARE	20	34
35		SHUNT TRIP						0.00				SPARE	20	36
37	20*	E25 - FLOOR FRYER, GAS	E	0.12	2#12, #12G, 3/4"C	0.12						SPARE	20	38
39		SHUNT TRIP					0.00					SPARE	20	40
41	20	SPARE						0.00				SPARE	20	42
						9.09	8.48	9.45						

PANEL: D (NEW)												MOUNTING: SURFACE		
208Y/120	VOLTS:	3			PHASE	4			WIRE	PANEL LOCATION: STORAGE				
MCB	225 A											FED FROM: TRANS. (T-D)		
NOTE: L : LIGHTING, H : HVAC LOAD, M : MOTOR LOAD, R : RECEPTACLES, O : OTHER/MISC. (TYPICAL)														
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.
						A	B	C						
1	20	PINSETTER RM 123	L	0.50	2#12, #12G, 3/4"C	2.00			2#12, #12G, 3/4"C	1.50	E	E19 - DOUBLE BURNER ELECTRIC HOT	20/2P	2
3	20	LIGHTING BOWLING LANES 122	L	0.90	2#12, #12G, 3/4"C		2.40			1.50	E	PLATE		4
5	20	LIGHTING BOWLING LANES 124	L	1.00	2#12, #12G, 3/4"C			1.00				SPARE	20	6
7	20	PINSETTER RM 126	L	0.60	2#12, #12G, 3/4"C	1.04			2#12, #12G, 3/4"C	0.44	E	E55 - ICE CREAM DIPPING CABINET	20	8
9	20	LIGHTING BOWLING LANES 125	L	1.00	2#12, #12G, 3/4"C		1.44		2#12, #12G, 3/4"C	0.44	E	E55 - ICE CREAM DIPPING CABINET	20	10
11	20	BILLIARDS & DARK LANES LIGHTING	L	0.80	2#12, #12G, 3/4"C			0.80				SPARE	20	12
13	20	MEAN MUGS DINING LIGHTING	L	1.00	2#12, #12G, 3/4"C	1.00						SPARE	20	14
15	20	LOBBY AND HOST DESK LIGHTING	L	0.50	2#12, #12G, 3/4"C		0.50					SPARE	20	16
17	20	OFFICE AND STORAGE LIGHTING	L	0.50	2#12, #12G, 3/4"C			0.50				SPARE	20	18
19	20	BAR 110 LIGHTING	L	0.80	2#12, #12G, 3/4"C	1.78			2#12, #12G, 3/4"C	0.98	E	E34 - FOOD WARMER	20	20
21	20	BAR 110 LIGHTING	L	0.80	2#12, #12G, 3/4"C		1.78		2#12, #12G, 3/4"C	0.98	E	E34 - FOOD WARMER	20	22
23	20	AXE THROWING AREA LIGHTING	L	0.50	2#12, #12G, 3/4"C			1.48	2#12, #12G, 3/4"C	0.98	E	E34 - FOOD WARMER	20	24
25	20	RESTROOM LIGHTING	L	0.40	2#12, #12G, 3/4"C	1.38			2#12, #12G, 3/4"C	0.98	E	E34 - FOOD WARMER	20	26
27	20	KITCHEN LIGHTING	L	0.80	2#12, #12G, 3/4"C		1.16		2#12, #12G, 3/4"C	0.36	E	E04 - UNDERCOUNTER FREEZER	20	28
29	20	ARCADE LIGHTING	L	0.80	2#12, #12G, 3/4"C			1.80	2#12, #12G, 3/4"C	1.00	L	TIME CLOCK/LIGHTING CONTACTORS	20	30
31	20	STAGE LIGHTING	L	0.80	2#12, #12G, 3/4"C	1.80			2#12, #12G, 3/4"C	1.00	L	FRESCO PANEL	20	32
33	20	STORAGE/AV ROOM LIGHTING	L	0.40	2#12, #12G, 3/4"C		1.40		2#12, #12G, 3/4"C	1.00	L	DMX CONTROLLER	20	34
35	20	BILLIARDS LIGHTING	L	1.00	2#12, #12G, 3/4"C		2.20		2#12, #12G, 3/4"C	1.20	L	EXTERIOR SIGNAGE	20	36
37	40/2P*	E24a - ELECTRIC CONVEYOR OVEN	E	3.00		11.12				8.12	O			38
39			E	3.00	2#8, #10, 3/4"C		11.12		4-3, #8G, 1 1/4"C	8.12	O	PANEL-E	100/3P	40
41		SHUNT TRIP						8.12		8.12	O			42
						20.12	19.80	15.90						

CONSULTANTS (ENGINEER):  
**NY ENGINEERS**

NEARBY ENGINEERS  
382 NE 191ST STREET SUITE  
49674, MIAMI, FL 33179  
PH-914.257.3455  
WWW.NY-ENGINEERS.COM

PERMIT SET

REVISION SCHEDULE  
NO. REV. / SUBMISSION DATE ISSUED BY

ISSUE DATE: 05/30/2024

INTERIOR BUILD-OUT  
810 BILLIARDS &  
BOWLING  
HOUSTON, TX

DRAWN BY: NYE

QAQC: NYE

APPROVED BY: NYE

PROJECT NUMBER: 2323

ELECTRICAL RISER DIAGRAM  
AND PANEL SCHEDULE  
SHEET 2 OF 3  
E5.2

PANEL: E (NEW)												MOUNTING: SURFACE		
208Y/120	VOLTS,	3			4			WIRE			PANEL LOCATION: STORAGE			
MLO	100 A											FED FROM: PANEL-D		
NOTE: L: LIGHTING, H: HVAC LOAD, M: MOTOR LOAD, R: RECEPTACLES, O: OTHER/MISC. (TYPICAL)														
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.
						A	B	C						
1	20	SPARE				0.18			2#12, 1#12, 3/4"C	0.18	E	E15a - CARBONATOR	20	2
3	20	SPARE				1.00			2#12, 1#12, 3/4"C	1.00	E	E21 - STACKABLE COMMERCIAL MICROWAVE	20	4
5	20	SPARE						0.00				SPARE	20	6
7	20	SPARE				0.40			2#12, 1#12, 3/4"C	0.40	E	E64 - DOUBLE BOTTLE WARMER	20	8
9	20	E04 - UNDERCOUNTER FREEZER	E	0.32	2#12, 1#12, 3/4"C	1.10			2#12, 1#12, 3/4"C	0.78	E	E59 - 54" REACH-IN FREEZER	20	10
11	20/2P	E26 - 10" EXHAUST HOOD	E	0.41	2#12, 1#12, 3/4"C			0.74	2#12, 1#12, 3/4"C	0.33	E	E39 - UNDERBAR REFRIGERATED CABINET	20	12
13	20	E26 - 10" EXHAUST HOOD	E	0.41	2#12, 1#12, 3/4"C	1.39			2#12, 1#12, 3/4"C	0.98	R	HOOD CONTROL PANEL	20	14
15	20	E17 - FOOD WARMER	E	1.40	2#12, 1#12, 3/4"C	3.80			2#12, 1#12, 3/4"C	2.40	E	E15 - SODA DROP-IN DISPENSER	30	16
17	20	E05b - REFRIGERATED PIZZA PREP TABLE	E	0.48	2#12, 1#12, 3/4"C			2.14	3#12, 1#12, 3/4"C	1.66	E	E03.1 - ICE MAKER, CUBE-STYLE	20/2P	18
19	20	E16 - MANUAL DOUGH PRESS	E	1.13	2#12, 1#12, 3/4"C	2.79			2#12, 1#12, 3/4"C	1.15	E	E40a - BACK BAR COOLER, PASS-THRU	20	22
21	20	E05a - REFRIGERATED PIZZA PREP TABLE	E	0.48	2#12, 1#12, 3/4"C	1.63			2#12, 1#12, 3/4"C	1.15	E	E40a - BACK BAR COOLER, PASS-THRU	20	24
23	20	E41 - 65" BOTTLE COOLER	E	0.30	2#12, 1#12, 3/4"C			1.45	2#12, 1#12, 3/4"C	1.15	E	E57 - POS REGISTER	20	26
25	20	E41 - 65" BOTTLE COOLER	E	0.30	2#12, 1#12, 3/4"C	0.66			2#12, 1#12, 3/4"C	0.36	E	E57 - POS REGISTER	20	28
27	20	E41 - 65" BOTTLE COOLER	E	0.30	2#12, 1#12, 3/4"C	0.66			2#12, 1#12, 3/4"C	0.36	E	E57 - POS REGISTER	20	30
29	20	E05b - REFRIGERATED PIZZA PREP TABLE	E	0.48	2#12, 1#12, 3/4"C			0.55	2#12, 1#12, 3/4"C	0.07	E	E50 - 60" LIQUOR BOTTLE DISPLAY	20	32
31	20/2P	E01a - WALK IN COOLER	H	1.60	2#12, 1#12, 3/4"C	2.84			2#12, 1#12, 3/4"C	1.24	E	E40b - BACK BAR COOLER, PASS-THRU	20	34
33	20/2P	E01a - WALK IN COOLER	H	1.60	2#12, 1#12, 3/4"C	1.96			2#12, 1#12, 3/4"C	0.36	E	E57 - POS REGISTER	20	36
35	20/2P	E01b - WALK IN FREEZER	H	1.60	2#12, 1#12, 3/4"C	1.84			2#12, 1#12, 3/4"C	0.24	E	E62 - REFRIGERATOR, SANDWICH PREP TABLE	20	38
37	20/2P	E01c - WALK IN REFRIGERATOR	H	1.60	2#12, 1#12, 3/4"C	2.50			2#12, 1#12, 3/4"C	0.90	E	E58 - TRIPLE-SPINDLE DRINK MIXER	20	40
41	20/2P	E01c - WALK IN REFRIGERATOR	H	1.60	2#12, 1#12, 3/4"C	2.50			2#12, 1#12, 3/4"C	0.90	E	E58 - TRIPLE-SPINDLE DRINK MIXER	20	42
						10.10	12.65	9.06						

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- ELECTRICAL CONTRACTOR TO VERIFY THE EXACT PANEL SIZES AND INCOMING FEEDER SIZE IN FIELD. INFORM ENGINEER FOR ANY DISCREPANCY BEFORE COMMENCING ANY WORK.
- E.C. SHALL PROVIDE NEW CIRCUIT BREAKERS IN PLACE OF EXISTING CIRCUIT BREAKERS WHEREVER NECESSARY TO BE IN LINE WITH THE PANEL SCHEDULE.
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PANEL SCHEDULE ABBREVIATIONS:

L = LIGHTING  
R = RECEPTACLE  
H = HVAC  
E = EQUIPMENT  
M = MOTOR  
O = OTHER

\* = SHUNT TRIP BREAKER

PANEL: H (NEW)												MOUNTING: SURFACE		
208Y/120	VOLTS,	3			4			WIRE			PANEL LOCATION: STORAGE			
MCB	400 A											FED FROM: TRANS. (T-H)		
NOTE: L: LIGHTING, H: HVAC LOAD, M: MOTOR LOAD, R: RECEPTACLES, O: OTHER/MISC. (TYPICAL)														
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.
						A	B	C						
1	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C	3.84			4#12, #12G, 3/4"C	1.92	E	BOWLING MACHINE JB	20/3P	2
3	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C	3.84	3.84		4#12, #12G, 3/4"C	1.92	E	BOWLING MACHINE JB	20/3P	4
5	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C			3.84	4#12, #12G, 3/4"C	1.92	E	BOWLING MACHINE JB	20/3P	6
7	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C	3.84			4#12, #12G, 3/4"C	1.92	E	BOWLING MACHINE JB	20/3P	8
9	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C			3.84	4#12, #12G, 3/4"C	1.92	E	BOWLING MACHINE JB	20/3P	10
11	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C			3.84	4#12, #12G, 3/4"C	1.92	E	BOWLING MACHINE JB	20/3P	12
13	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C	3.84			4#12, #12G, 3/4"C	1.92	E	BOWLING MACHINE JB	20/3P	14
15	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C			3.84	4#12, #12G, 3/4"C	1.92	E	BOWLING MACHINE JB	20/3P	16
17	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C			3.84	4#12, #12G, 3/4"C	1.92	E	BOWLING MACHINE JB	20/3P	18
19	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C	1.92						SPARE	20	20
21	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C		1.92					SPARE	20	22
23	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C			1.92				SPARE	20	24
25	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C			1.92				SPARE	20	26
27	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C			1.92				SPARE	20	28
29	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C			1.92				SPARE	20	30
31	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C			1.92				SPARE	20	32
33	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C			1.92				SPARE	20	34
35	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C			2.64	2#12, #12G, 3/4"C	0.72	R	ARCADE AREA GNERAL RECEPT.	20	36
37	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C	12.84				10.92	O	PANEL-I	150/3P	38
39	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C		12.84			10.92	O	PANEL-I	150/3P	40
41	20/3P	BOWLING MACHINE JB	E	1.92	4#12, #12G, 3/4"C		12.84			10.92	O	PANEL-I	150/3P	42
						30.12	30.12	30.84						

PANEL: F (NEW)												MOUNTING: SURFACE		
208Y/120	VOLTS,	3			4			WIRE			PANEL LOCATION: STORAGE			
MCB	200 A											FED FROM: TRANS. (T-F)		
NOTE: L: LIGHTING, H: HVAC LOAD, M: MOTOR LOAD, R: RECEPTACLES, O: OTHER/MISC. (TYPICAL)														
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.
						A	B	C						
1	20	SPARE				3.40								2
3	20	SPARE				3.40	3.40		2#8, 1#10, 3/4"C	3.40	E	E43 - DISHWASHER, U/C	40/2P	4
5	20	SPARE						3.40	2#8, 1#10, 3/4"C	3.40	E	E43 - DISHWASHER, U/C	40/2P	6
7	20	SPARE				3.40			2#8, 1#10, 3/4"C	3.40	E	E43 - DISHWASHER, U/C	40/2P	8
9	20	SPARE						1.80	2#12, #12G, 3/4"C	1.80	E	E14 - DISHWASHER, HIGH TEMP VENTLESS ELECTRIC	20	10
11	20	SPARE						0.00				SPARE	20	12
13	20	SPARE						0.00				SPARE	20	14
15	20	SPARE						5.72				SPARE	20	16
17	20	SPARE						5.72	2#4, #8G, 1"C	5.72	E	E24b - SINGLE DECK ELECTRIC CONVECTION OVEN	80/2P	18
19	20	SPARE				0.36			2#12, #12G, 3/4"C	0.36	R	PROJECTOR FOR DART GAME	20	20
21	20	SPARE				0.36			2#12, #12G, 3/4"C	0.36	R	PROJECTOR FOR DART GAME	20	22
23	20	SPARE						0.00				SPARE	20	24
25	20	SPARE						0.00				SPARE	20	26
27	20	SPARE						0.00				SPARE	20	28
29	20	SPARE						0.00				SPARE	20	30
31	20	SPARE						0.00				SPARE	20	32
33	20	SPARE						0.00				SPARE	20	34
35	20	SPARE						0.00				SPARE	20	36
37	20	SPARE						0.00				SPARE	20	38
39	20	SPARE						0.00				SPARE	20	40
41	20	SPARE						0.00				SPARE	20	42
						7.16	11.28	9.12						

PANEL: I (NEW)												MOUNTING: SURFACE		
208Y/120	VOLTS,	3			4			WIRE			PANEL LOCATION: STORAGE			
MLO	150 A											FED FROM: PANEL-H		
NOTE: L: LIGHTING, H: HVAC LOAD, M: MOTOR LOAD, R: RECEPTACLES, O: OTHER/MISC. (TYPICAL)														
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.
						A	B	C						
1	20	PINSETTER RM RECEPT.	R	1.08	2#12, #12G, 3/4"C	1.62			2#12, #12G, 3/4"C	0.54	R	BOWLING LANE FLOOR MOUNT RECEPT.	20	2
3	20	PINSETTER RM RECEPT.	R	0.72	2#12, #12G, 3/4"C			1.26	2#12, #12G, 3/4"C	0.54	R	BOWLING LANE FLOOR MOUNT RECEPT.	20	4
5	20	BOWLING LANE RECEPT.	R	1.44	2#12, #12G, 3/4"C			2.44	2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	6
7	20	BOWLING LANE RECEPT.	R	1.44	2#12, #12G, 3/4"C	2.44			2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	8
9	20	SPARE				1.00			2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	10
11	20	SPARE						1.00	2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	12
13	20	BOWLING LANE CEILING RECEPT.	R	0.72	2#12, #12G, 3/4"C	1.72			2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	14
15	20	BOWLING LANE FLOOR MOUNT RECEPT.	R	0.72	2#12, #12G, 3/4"C			1.72	2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	16
17	20	BOWLING LANE FLOOR MOUNT RECEPT.	R	0.72	2#12, #12G, 3/4"C			1.72	2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	18
19	20	PINSETTER RM RECEPT.	R	1.44	2#12, #12G, 3/4"C	2.44			2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	20
21	20	BOWLING LANE RECEPT.	R	1.44	2#12, #12G, 3/4"C			2.44	2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	22
23	20	BOWLING LANE RECEPT.	R	1.44	2#12, #12G, 3/4"C			2.44	2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	24
25	20	BOWLING LANE RECEPT.	R	1.44	2#12, #12G, 3/4"C	2.44			2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	26
27	20	BOWLING LANE CEILING RECEPT.	R	0.72	2#12, #12G, 3/4"C			1.72	2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	28
29	20	BOWLING LANE FLOOR MOUNT RECEPT.	R	0.54	2#12, #12G, 3/4"C			1.54	2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	30
31	20	BOWLING LANE FLOOR MOUNT RECEPT.	R	0.54	2#12, #12G, 3/4"C	1.54			2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	32
33	20	PINSETTER RM RECEPT.	R	1.44	2#12, #12G, 3/4"C			2.44	2#12, #12G, 3/4"C	1.00	E	ARCADE EQUIPMENT	20	34
35	20	BOWLING LANE RECEPT.	R	1.44	2#12, #									

**PLUMBING SYMBOLS LIST**

— SAN —	SANITARY SEWER (UNDER FLOOR)
— G SAN —	GREASE SANITARY SEWER (UNDER FLOOR)
— EX.SAN —	EXISTING SANITARY SEWER (UNDER FLOOR)
----	VENT PIPING
----	COLD WATER PIPING
----	HOT WATER PIPING
----	HOT WATER RETURN PIPING
— G —	GAS PIPING
— P —	P-TRAP
— O —	PIPE UP
— D —	PIPE DROP
— C —	CLEANOUT
— I —	PLUGGED OUTLET/CLEANOUT
— P —	POINT OF CONNECTION
— I —	ISOLATION VALVE
— S —	GAS SHUT-OFF VALVE
— F —	FLOOR SINK
— D —	FLOOR DRAIN

**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
RCP	RE-CIRCULATION PUMP
EX	EXISTING

**PLUMBING DRAWING LIST**

P1.0	PLUMBING NOTES, SYMBOLS, ABBREVIATIONS & SPECIFICATIONS
P1.1	PLUMBING SANITARY AND VENT PIPING PLAN
P1.2	PLUMBING WATER AND GAS PIPING PLAN
P2.1	PLUMBING DETAILS
P3.1	PLUMBING WATER RISERS & SCHEDULES
P3.2	PLUMBING RISERS

**BUILDING DEPARTMENT PLUMBING NOTES**

- ALL PLUMBING SYSTEMS (SANITARY, WASTE, VENT, WATER) AND ASSOCIATED EQUIPMENT SHALL BE INSTALLED, OPERATED AND MAINTAINED IN ACCORDANCE WITH THE REQUIREMENTS OF HOUSTON PLUMBING CODE(ADOPTS 2015 UPC)
- INSTALLATION OF UNDERGROUND PIPING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC 702.2
- 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 707
- 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 INSTALLED 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.

**PLUMBING SPECIFICATIONS:**

**1. BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS**

**1.01 SCOPE**

- 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.
- 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.
- 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.
- THE GENERAL CONDITIONS OF THE CONTRACT AND ALL DIVISION 1 REQUIREMENTS APPLY TO THE WORK OF THIS SECTION.
- 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.
- IN ALL AREAS SUBJECT TO FREEZING CONDITIONS, THE CONTRACTOR SHALL PROVIDE FREEZE PROTECTION FOR ALL DOMESTIC WATER PIPING INSTALLED UNDER HIS CONTRACT.
- 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.
- COLOR AND FINISH SELECTIONS FOR ALL MATERIALS, INCLUDING PAINTING OF PIPING, SHALL BE AS DIRECTED AND/OR APPROVED BY THE ARCHITECT.
- 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.
- 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.
- 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**

- 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
  - GREASE INTERCEPTOR
  - MIXING VALVES
  - ALL SCHEDULED PLUMBING EQUIPMENT
- 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.
- 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.
- 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.
- SUBMIT PROOF OF APPROVAL AND/OR CONFIRMATION OF SATISFACTORY TEST RESULTS TO THE OWNER AND THE ARCHITECT.
- 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.
- FOR ALL BELOW GRADE PIPING WHERE ACTUAL INSTALLATION DEVIATES FROM CONSTRUCTION DRAWINGS, THE CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS INDICATING BELOW GRADE PIPE LOCATIONS DIMENSIONED TO NEAREST COLUMN LINES.
- 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.

- AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2015, C404.7, HAVING ONE OR MORE RE-CIRCULATION PUMPS THAT PUMP WATER FROM A HEATED-WATER SUPPLY PIPE BACK TO THE HEATED-WATER SOURCE THROUGH A COLD-WATER SUPPLY PIPE SHALL BE A DEMAND RE-CIRCULATION WATER SYSTEM. PUMPS SHALL HAVE CONTROLS THAT COMPLY WITH BOTH OF THE FOLLOWING:
  - THE CONTROL SHALL START THE PUMP UPON RECEIVING A SIGNAL FROM THE ACTION OF A USER OF A FIXTURE OR APPLIANCE, SENSING THE PRESENCE OF A USER OF A FIXTURE OR SENSING THE FLOW OF HOT OR TEMPERED WATER TO A FIXTURE FITTING OR APPLIANCE.
  - THE CONTROL SHALL LIMIT THE TEMPERATURE OF THE WATER ENTERING THE COLD-WATER PIPING TO 104°F (40°C).
- AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2015, C404.6.1 HEATED-WATER CIRCULATION SYSTEMS SHALL BE PROVIDED WITH A CIRCULATION PUMP. THE SYSTEM RETURN PIPE SHALL BE A DEDICATED RETURN PIPE OR A COLD WATER SUPPLY PIPE. CONTROLS FOR CIRCULATING HOT WATER SYSTEM PUMPS SHALL START THE PUMP BASED ON THE IDENTIFICATION OF A DEMAND FOR HOT WATER WITHIN THE OCCUPANCY. THE CONTROLS SHALL AUTOMATICALLY TURN OFF THE PUMP WHEN THE WATER IN THE CIRCULATION LOOP IS AT THE DESIRED TEMPERATURE AND WHEN THERE IS NO DEMAND FOR HOT WATER.

**1.03 SUBSTITUTIONS**

- ALL EQUIPMENT SHALL BE PRODUCTS OF THE SPECIFIED MANUFACTURER OR MANUFACTURERS. ALL BIDS SHALL BE BASED ON THE SPECIFIED MANUFACTURER OR MANUFACTURER'S 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.
- 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**

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

**1.06 DRAWINGS**

- 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.
- PROVIDE ALL NECESSARY INCIDENTAL MATERIALS AND ACCESSORIES REQUIRED TO MAKE THE WORK COMPLETE IN ALL RESPECTS, EVEN IF NOT PARTICULARLY SHOWN OR SPECIFIED.
- REFER TO PLUMBING EQUIPMENT/FIXTURE SCHEDULE ON THE DRAWINGS FOR ALL FIXTURE AND EQUIPMENT SPECIFICATIONS.
- REFER TO FIXTURE CONNECTION SIZE SCHEDULE FOR ALL FIXTURE ROUGHING SIZE REQUIREMENTS.
- 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.
- LOCATE ALL FIXTURES AND EQUIPMENT AS PER THE FINAL ARCHITECTURAL DRAWINGS.

**1.07 PRODUCTS**

- SANITARY AND VENT PIPING:
  - ABOVE GRADE PIPING SHALL BE HUBLESS CAST IRON PIPE WITH STAINLESS STEEL COUPLINGS AND ELASTOMERIC GASKETS WITH A MINIMUM 4 BANDS PER COUPLING.
  - 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.
  - PVC OR OTHER COMBUSTIBLE PLASTIC PIPING SHALL NOT BE INSTALLED IN CEILING PLENUM SPACES.
  - 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:**

- ABOVE GRADE WATER PIPING SHALL BE TYPE 'L' HARD-DRAWN COPPER TUBE AS PER ASTM D2846, ASTM F441, ASTM F442 AND CSA B137.6 STANDARDS.
- FITTINGS IN DOMESTIC WATER PIPING SHALL BE WROUGHT COPPER OR CAST BRASS OR CPVC AS PER ASSE 1061, ASTM D2846, ASTM F437, ASTM F438, ASTM F439, CSA B137.6 STANDARDS.
- JOINTS SHALL BE MADE WITH LEAD-FREE SOLDER.
- THE ENTIRE DOMESTIC WATER DISTRIBUTION SYSTEM SHALL BE INSULATED INCLUDING ALL VALVES, FITTINGS, ETC.
- COMPLY WITH NSF 61 FOR MATERIALS FOR WATER-SERVICE PIPING AND SPECIALTIES FOR DOMESTIC WATER.
- ALL DOMESTIC WATER PIPING ABOVE GRADE SHALL BE INSULATED WITH FIRE-RETARDANT, FACTORY-APPLIED JACKET. PROVIDE COLD WATER PIPING WITH FACTORY-APPLIED VAPOR BARRIER. INSULATION REQUIREMENT SHOULD COMPLY WITH 2015 INTERNATIONAL ENERGY CONSERVATION CODE SECTION C403.2.10 REFER BELOW TABLE.

MINIMUM PIPE INSULATION THICKNESS					
FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (INCHES)		
	CONDUCTIVITY BTU·IN./ (H·FT <sup>2</sup> ·°F)	MEAN RATING TEMPERATURE, °F	< 1	1½	4 to > 8
141-200	0.25-0.29	125	1.5	1.5	2 2 2
105-140	0.21-0.28	100	1.0	1.0	1.5 1.5 1.5
40-60	0.21-0.27	75	0.5	0.5	1.0 1.0 1.0

- WATER DISTRIBUTION SYSTEM AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2015, C404.7, HAVING ONE OR MORE RE-CIRCULATION PUMPS THAT PUMP WATER FROM A HEATED-WATER SUPPLY PIPE BACK TO THE HEATED-WATER SOURCE THROUGH A COLD-WATER SUPPLY PIPE SHALL BE A DEMAND RE-CIRCULATION WATER SYSTEM. PUMPS SHALL HAVE CONTROLS THAT COMPLY WITH BOTH OF THE FOLLOWING:
  - THE CONTROL SHALL START THE PUMP UPON RECEIVING A SIGNAL FROM THE ACTION OF A USER OF A FIXTURE OR APPLIANCE, SENSING THE PRESENCE OF A USER OF A FIXTURE OR SENSING THE FLOW OF HOT OR TEMPERED WATER TO A FIXTURE FITTING OR APPLIANCE.
  - THE CONTROL SHALL LIMIT THE TEMPERATURE OF THE WATER ENTERING THE COLD-WATER PIPING TO 104°F (40°C).
- AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2015, C404.6.1 HEATED-WATER CIRCULATION SYSTEMS SHALL BE PROVIDED WITH A CIRCULATION PUMP. THE SYSTEM RETURN PIPE SHALL BE A DEDICATED RETURN PIPE OR A COLD WATER SUPPLY PIPE. CONTROLS FOR CIRCULATING HOT WATER SYSTEM PUMPS SHALL START THE PUMP BASED ON THE IDENTIFICATION OF A DEMAND FOR HOT WATER WITHIN THE OCCUPANCY. THE CONTROLS SHALL AUTOMATICALLY TURN OFF THE PUMP WHEN THE WATER IN THE CIRCULATION LOOP IS AT THE DESIRED TEMPERATURE AND WHEN THERE IS NO DEMAND FOR HOT WATER.

9. HW SYSTEM PIPING IS DESIGNED AS PER MAXIMUM ALLOWED PIPE LENGTH METHOD AS PER 2015 INTERNATIONAL ENERGY CONSERVATION CODE , C404.5.1. THE HOT WATER PIPE LENGTH FROM THE NEAREST SOURCE OF HEATED WATER TO THE TERMINATION OF THE FIXTURE SUPPLY PIPE SHALL BE AS PER FOLLOWING TABLE.

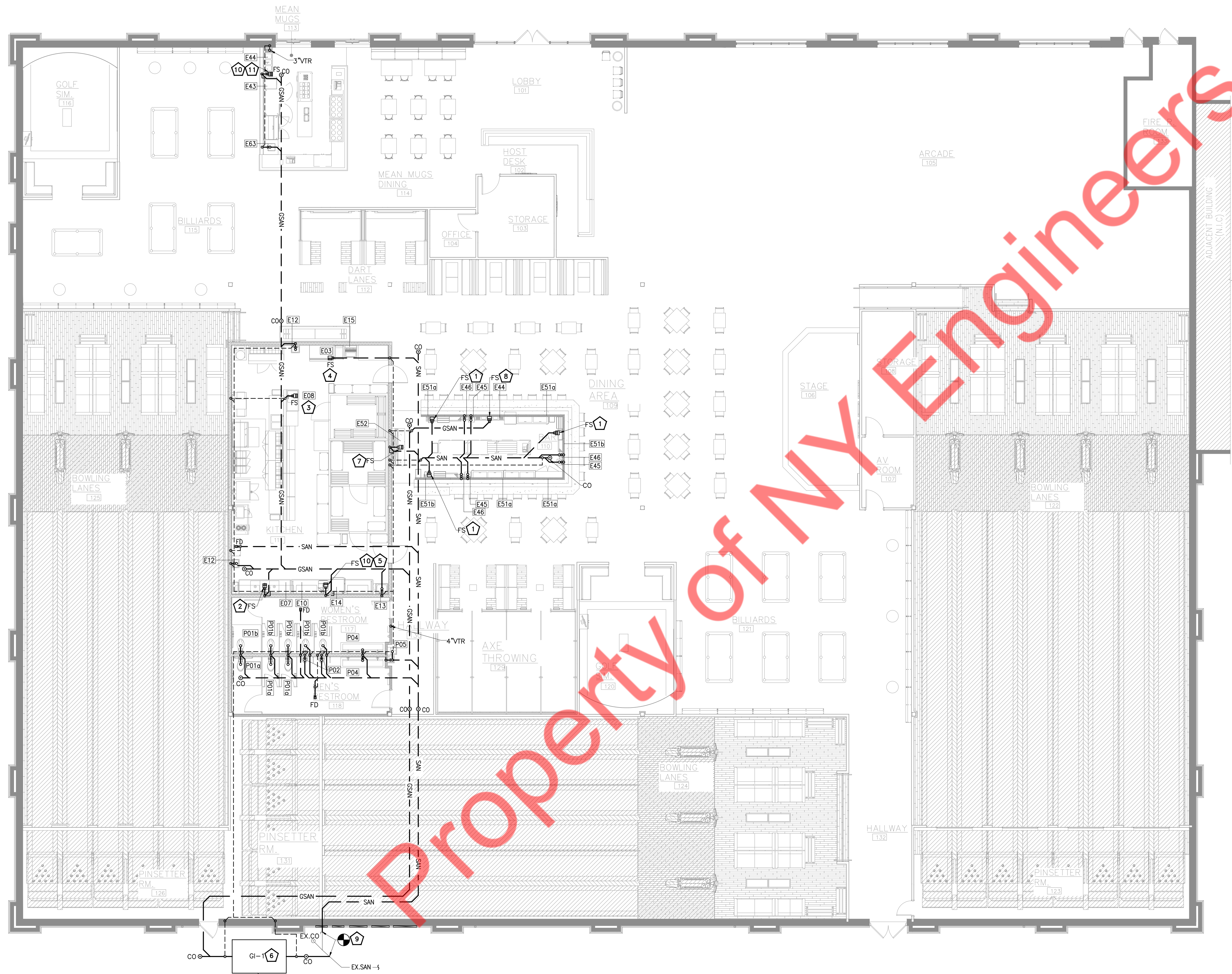
NOMINAL PIPE SIZE (INCHES)	MIXIMUM PIPING LENGTH (FEET)	
	PUBLIC LAV	OTHER FIXTURES
½"	2'	43'
¾"	0.5'	21'
1"	0.5'	13'
1¼"	0.5'	8'
1½"	0.5'	6'
2" OR LARGER	0.5'	4'

- SEAL ALL JOINTS BETWEEN SEGMENTS OF INSULATION.
- PROVIDE SHIELDS BETWEEN HANGERS AND INSULATION.
- HANGERS AND SUPPORTS:
  - 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.
  - SECTIONS OF INDIVIDUAL PIPE RUNS SHALL BE SUPPORTED BY CLEVIS HANGERS.
  - ALL EQUIPMENT SHALL BE PROVIDED WITH APPROVED SUPPORTS.
  - PROVIDE SEISMIC RESTRAINTS IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL CODES AND STANDARDS AND THE REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION.
  - SUPPORTS SHALL BE PROVIDED IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE PIPING MANUFACTURER.

- VALVES:
  - 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.
  - ALL FIXTURES WITH THE EXCEPTION O FLUSHOMETER-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.
  - ALL PLUMBING FIXTURES AND EQUIPMENT TO HAVE SHUT-OFF VALVES ON SUPPLY LINES.
  - ALL BRANCH LINES TO HAVE SHUT-OFF VALVES.
  - ALL VALVES SHALL BE ACCESSIBLE. PROVIDE ACCESS DOORS WHERE REQUIRED FOR VALVE ACCESS.
  - PROVIDE GLOBE VALVES FOR THROTTLING/BALANCING OF THE HOT WATER CIRCULATING SYSTEM.
- GAS PIPING:
  - GAS PIPING SHALL BE SIZED IN ACCORDANCE WITH PIPE SIZING TABLES OR SIZING EQUATIONS IN ACCORDANCE WITH UPC 2015 CHAPTER 12 FUEL GAS PIPING SECTION 1216.0.
  - INDIVIDUAL OUTLETS TO GAS RANGES SHALL NOT BE LESS THAN ¾ INCHES NPS.
  - METALLIC PIPE SHALL COMPLY WITH UPC 2015 FUEL GAS PIPING SECTIONS 1208.5
  - PIPING SYSTEM INSTALLATION SHALL COMPLY WITH REQUIREMENTS OF UPC 2015 CHAPTER 12 FUEL GAS PIPING SECTION 1210.0.
  - THE GAS PIPING IS ENCASED IN A CONDUIT OF WROUGHT IRON OR STEEL PIPE TO WITH STAND THE SUPERIMPOSED LOADS.
  - SHUTOFF VALVES SHALL BE LOCATED IN PLACES SO AS TO PROVIDE ACCESS FOR OPERATION AND SHALL BE INSTALLED SO AS TO BE PROTECTED FROM DAMAGE.

- IF WATER PRESSURE EXCEEDS 80 PSI, A WATER PRESSURE REDUCING VALVE SHALL BE INSTALLED IN WATER PIPING AT CONNECTION TO MAIN.
- PROVIDE DIELECTRIC FITTINGS BETWEEN DISSIMILAR METALS.
- PIPE BACKFLOW PREVENTER DRAINS TO FLOOR DRAIN OR OTHER APPROVED INDIRECT WASTE SOURCE.
- 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.
- ALL FIXTURES REQUIRING VACUUM BREAKERS SHALL BE EQUIPPED WITH INTEGRAL VACUUM BREAKERS.
- 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.
- 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.
- AT ALL INDIRECT WASTE DRAINS, MAINTAIN AIR GAP AS REQUIRED BY CODE.
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- WHEN THE WATER PIPING SYSTEM IS COMPLETE, THOROUGHLY FLUSH ALL



- GENERAL NOTES:**
1. CONTRACTOR TO FIELD VERIFY FEASIBILITY OF SLAB PENETRATION AS PER STRUCTURAL REQUIREMENT.
  2. PROVIDE ACCESS PANELS FOR WATER HAMMER ARRESTOR, CLEANOUTS & SHUT-OFF VALVES AS REQUIRED.
  3. REFER RISER DIAGRAMS FOR ALL PIPE SIZES.
  4. PROVIDE TRAP PRIMER FOR FLOOR DRAIN AS PER LOCAL JURISDICTION.

- SANITARY AND VENT PLAN NOTES:**
1. INDIRECT DRAIN FROM BEER TRIP TRAY TO FLOOR SINK WITH APPROVED AIR GAP.
  2. INDIRECT DRAIN FROM 3-COMPARTMENT SINK TO FLOOR SINK WITH APPROVED AIR GAP.
  3. INDIRECT DRAIN FROM 1-COMPARTMENT SINK TO FLOOR SINK WITH APPROVED AIR GAP.
  4. INDIRECT DRAIN FROM ICE MACHINE AND DROP IN DISPENSER TO FLOOR SINK WITH APPROVED AIR GAP.
  5. INDIRECT DRAIN FROM SOILED DISH TABLE AND DISHWASHER TO FLOOR SINK WITH APPROVED AIR GAP.
  6. 1250 EXTERIOR GREASE INTERCEPTOR. CONTRACTOR TO INSTALL GREASE INTERCEPTOR AS PER MANUFACTURER RECOMMENDATION AND LOCAL GUIDELINES. CONTRACTOR TO COORDINATE GREASE INTERCEPTOR FINAL LOCATION WITH LANDLORD AND CIVIL PLAN.
  7. INDIRECT DRAIN FROM 36"SS FLUSH MOUNT DRIP TRAY TROUGH TO FLOOR SINK WITH APPROVED AIR GAP.
  8. INDIRECT DRAIN FROM UNDERBAR 3-COMPARTMENT SINK TO FLOOR SINK WITH APPROVED AIR GAP.
  9. CONNECT NEW 4" SANITARY WASTE PIPING TO EXISTING 6" SANITARY STUB UP FOR THE SPACE CONTRACTOR TO FIELD VERIFY EXISTING SANITARY SIZE, ROUTING, LOCATION AND INVERT PRIOR TO BID.
  10. CONTRACTOR TO PROVIDE APPROVED DRAIN TEMPERING VALVE (DTV) FOR DISHWASHER.
  11. INDIRECT DRAIN FROM UNDERBAR 3-COMPARTMENT SINK AND DISHWASHER TO FLOOR SINK WITH APPROVED AIR GAP.

CONSULTANTS (ENGINEER):  
**NY ENGINEERS**  
 NEARBY ENGINEERS  
 382 NE 191ST STREET SUITE  
 49674, MIAMI, FL 33179  
 PH-914.257.3455  
 WWW.NY-ENGINEERS.COM

PERMIT SET

REVISION SCHEDULE		
NO. REV.	/ SUBMISSION DATE	ISSUED BY

ISSUE DATE: 05/30/2024

INTERIOR BUILD-OUT  
 810 BILLIARDS &  
 BOWLING  
 HOUSTON, TX

DRAWN BY: NYE

QAQC: NYE

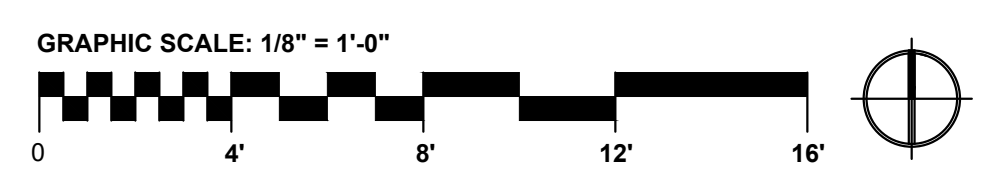
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PROJECT NUMBER: 2323

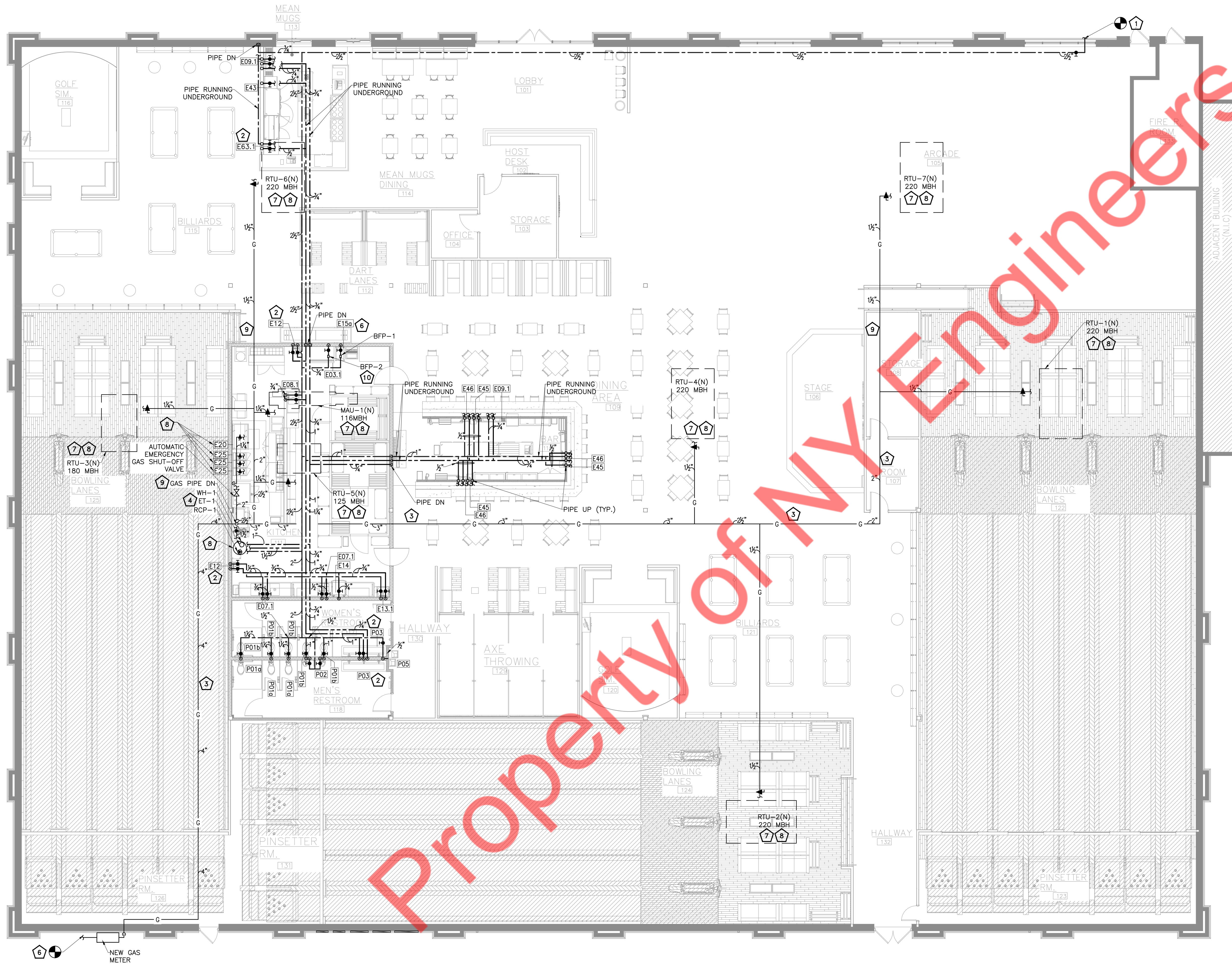
PLUMBING SANITARY &  
 VENT PIPING PLAN

P1.1

1 SANITARY & VENT PIPING PLAN  
 P1.1 SCALE: 1/8" = 1'-0"



GI-1 6  
 1250 GALLON  
 GREASE  
 INTERCEPTOR



- GENERAL NOTES:**
1. CW/HW PIPING TO BE PROVIDED WITH INSULATION AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2015 (REFER SHEET P1.0)
  2. PROVIDE BRANCH PRV IF PRESSURE EXCEEDS 80 PSI.
  3. CONTRACTOR TO FIELD VERIFY FEASIBILITY OF SLAB PENETRATION AS PER STRUCTURAL REQUIREMENT.
  4. PROVIDE ACCESS PANELS FOR WATER HAMMER ARRESTOR, CLEANOUTS & SHUT-OFF VALVES AS REQUIRED.
  5. REFER RISER DIAGRAMS FOR ALL PIPE SIZES.

- DOMESTIC WATER AND GAS PLAN NOTES:**
1. ROUTE NEW 2-1/2" CW PIPING WITH SHUT OFF VALVE AND TIE-INTO THE EXISTING WATER LINE. CONTRACTOR TO FIELD VERIFY EXISTING WATER SIZE AND LOCATION PRIOR TO BID AND REFER TO THE CIVIL PLAN FOR BFP AND WATER METER LOCATION.
  2. PROVIDE A TEMPERING VALVE FOR LAVATORIES AND HAND SINK. POWER HYDROGUARD SERIES LFLM495, ASSE. 1070 OR EQUAL. SET TEMPERATURE TO A MAXIMUM OF 110° F.
  3. GAS PIPES RUNNING ON ROOF
  4. ROUTE T&P RELIEF TO DRAIN IN FLOOR DRAIN WITH APPROVED AIR GAP.
  5. PROVIDE ASSE 1022 APPROVED BACKFLOW PREVENTER FOR CARBONATOR.
  6. CONNECT NEW 4" GAS LINE WITH NEW GAS METER TO EXISTING GAS LINE IN AREA. CONTRACTOR TO FIELD VERIFY EXISTING GAS PRESSURE AND FINAL GAS METER LOCATION COORDINATE ALL WORK WITH UTILITY COMPANY AND LANDLORD.
  7. EXTEND GAS LINE TO MECHANICAL EQUIPMENT, WATER HEATER AND KITCHEN GAS FIRED EQUIPMENT. PROVIDE SHUTOFF VALVE, UNION AND DIRTLEG.
  8. CONTRACTOR TO FIELD VERIFY EXISTING AVAILABLE GAS PRESSURE AND MAKE SURE TO PROVIDE ADEQUATE INLET PRESSURE REQUIRED FOR GAS WATER HEATER, MECHANICAL EQUIPMENT AND KITCHEN EQUIPMENT.
  9. 2-1/2" GAS PIPE DOWN TO KITCHEN EQUIPMENT AND WATER HEATER. CONTRACTOR TO FIELD VERIFY SIZE, PENETRATION LOCATION AND ROUTING.
  10. PROVIDE ASSE 1012 APPROVED BACKFLOW PREVENTER FOR ICE MAKER.

PERMIT SET

REVISION SCHEDULE		
NO. REV.	/	SUBMISSION DATE ISSUED BY

ISSUE DATE: 05/30/2024

INTERIOR BUILD-OUT  
810 BILLIARDS & BOWLING  
HOUSTON, TX

DRAWN BY: NYE

QAQC: NYE

APPROVED BY: NYE

PROJECT NUMBER: 2323

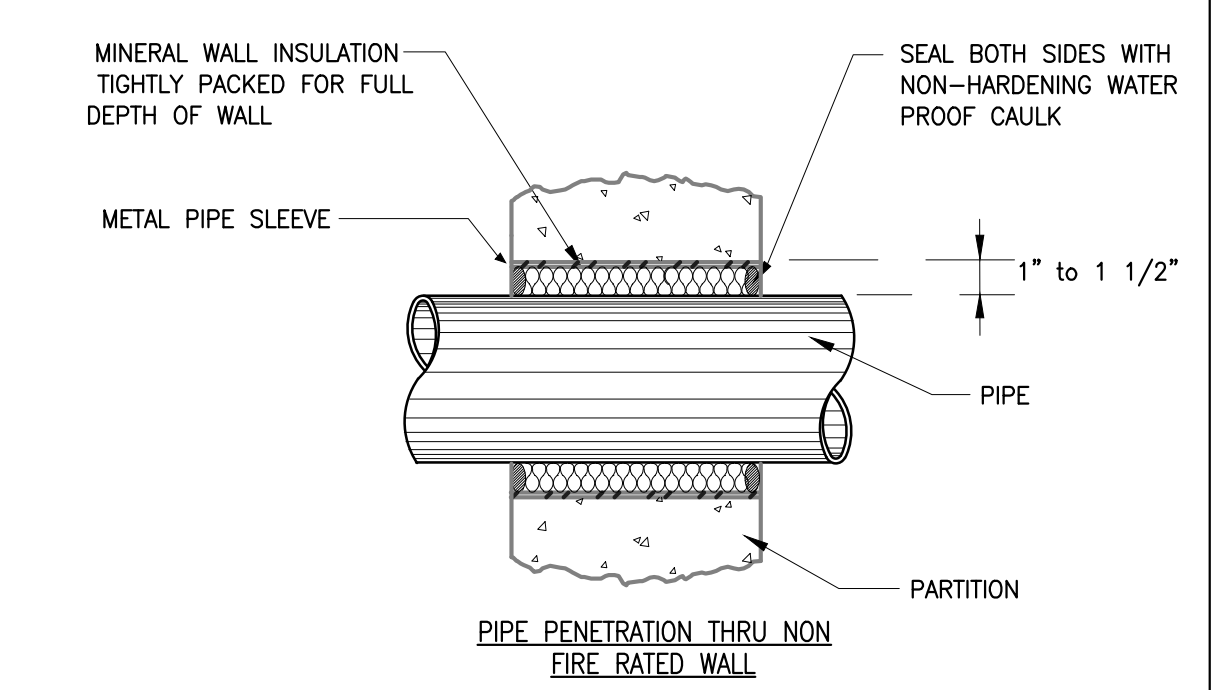
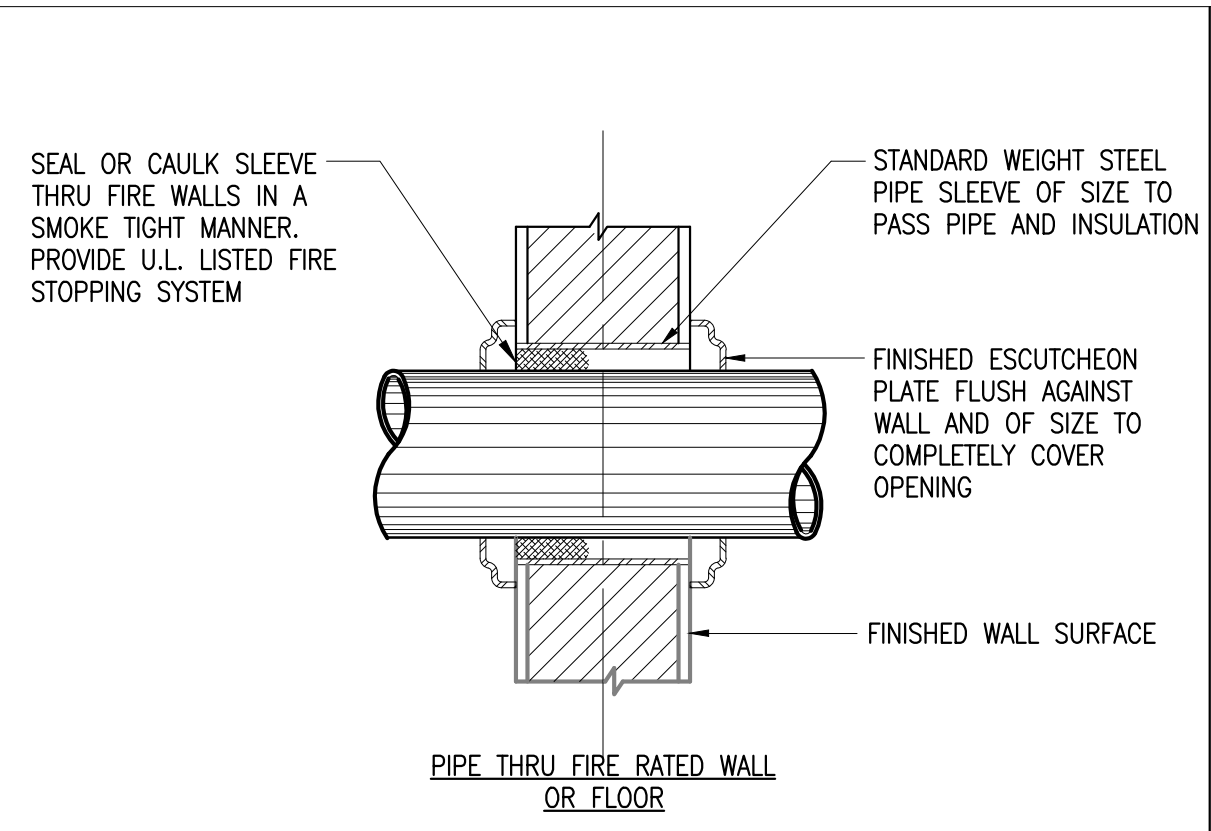
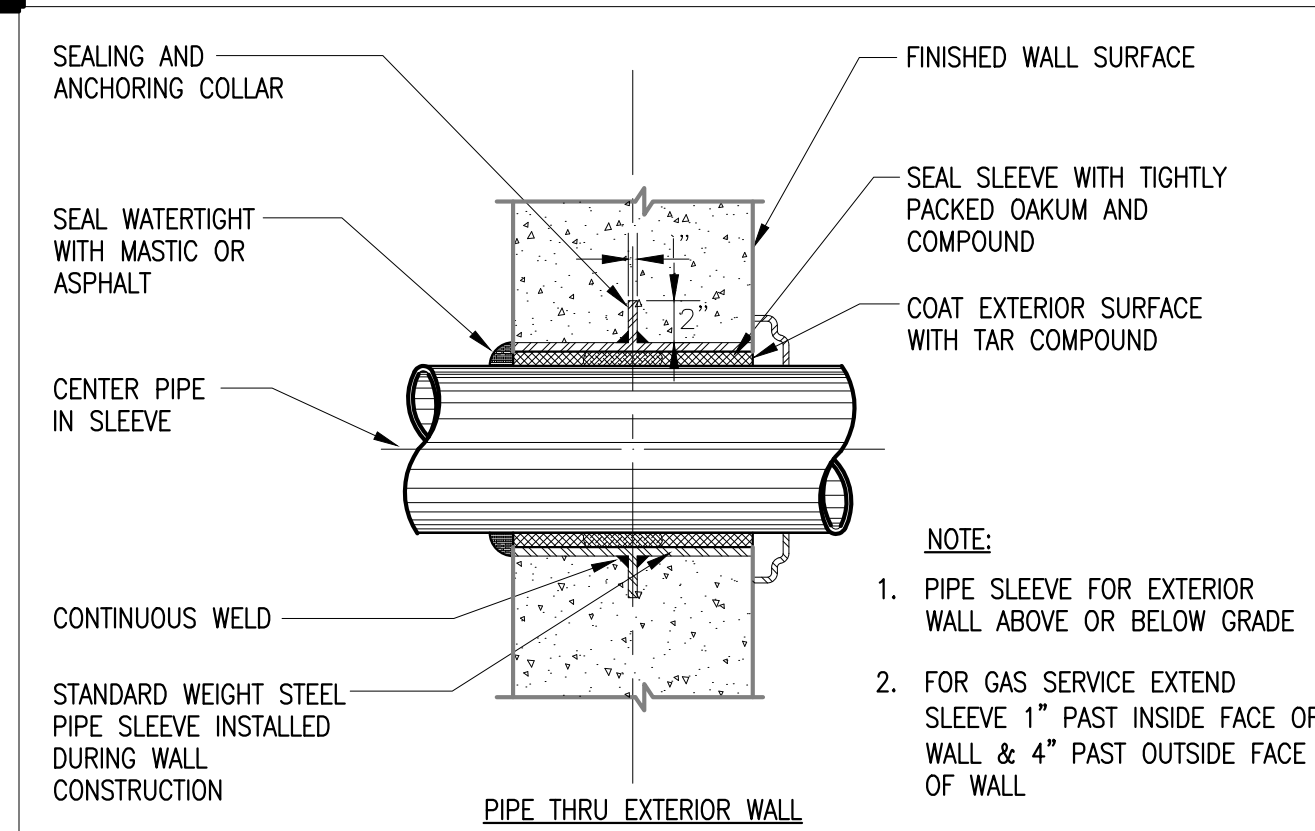
PLUMBING WATER & GAS PIPING PLAN

P1.2

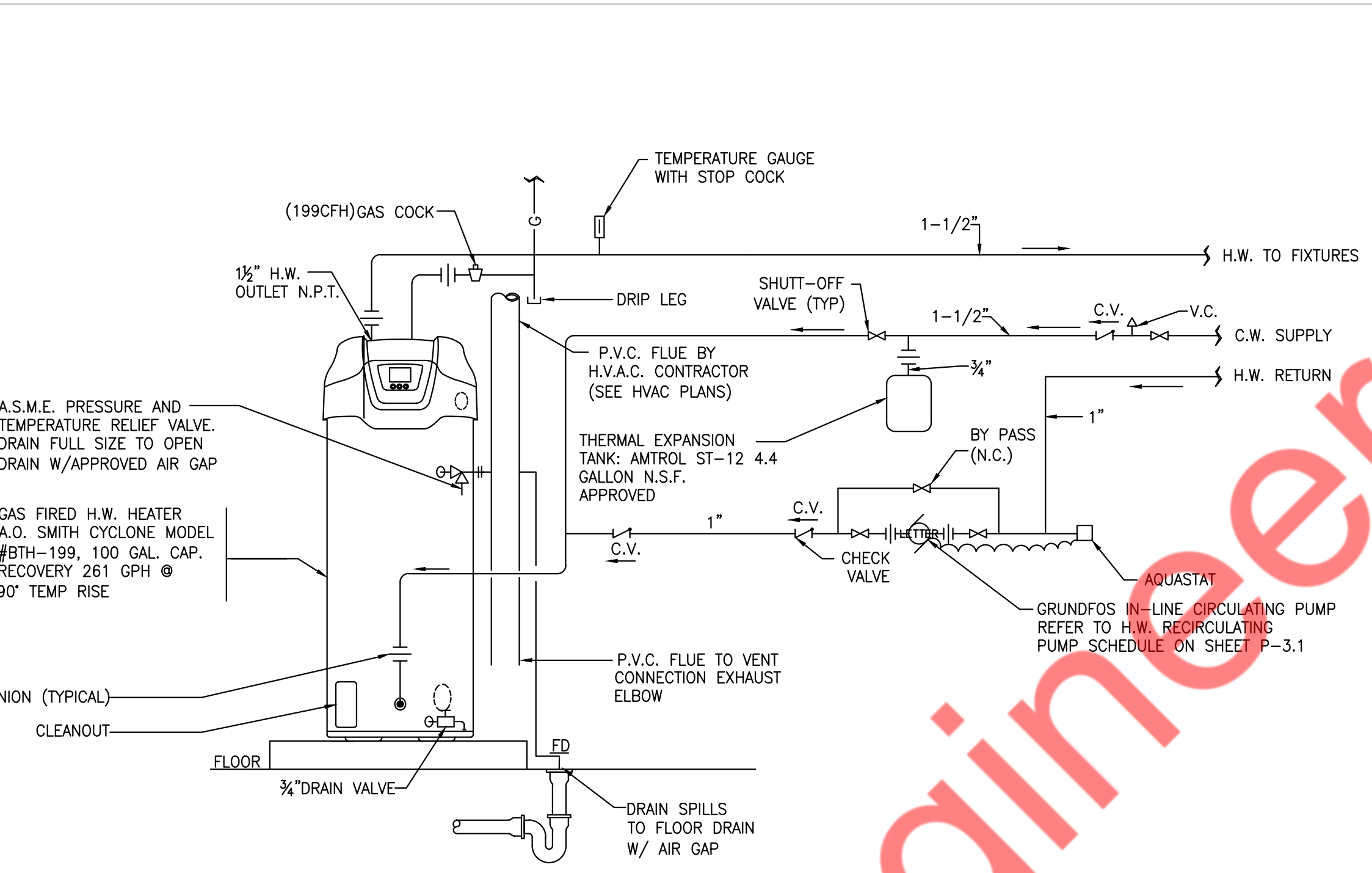
1 WATER & GAS PIPING PLAN  
P1.2 SCALE: 1/8" = 1'-0"



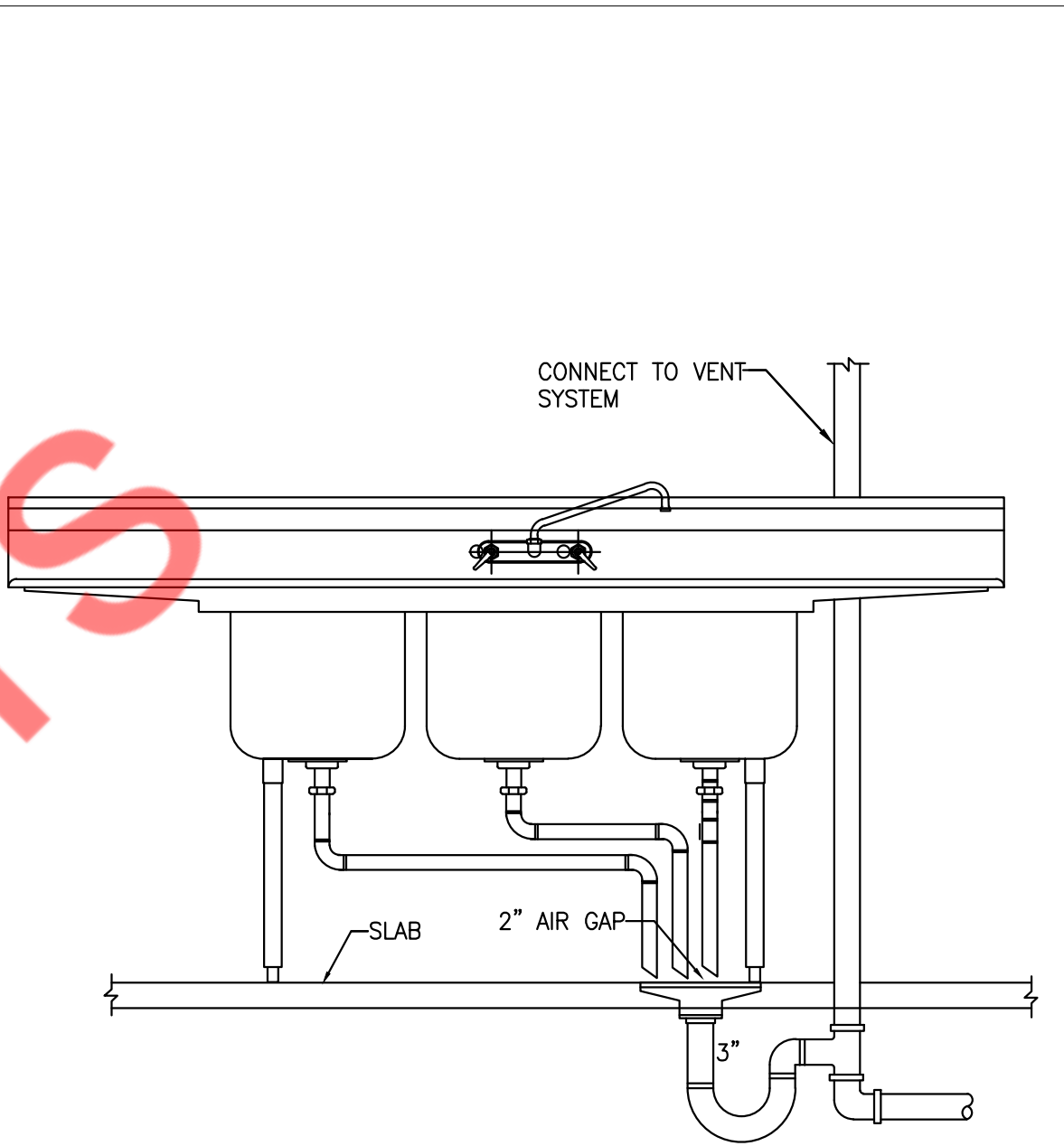




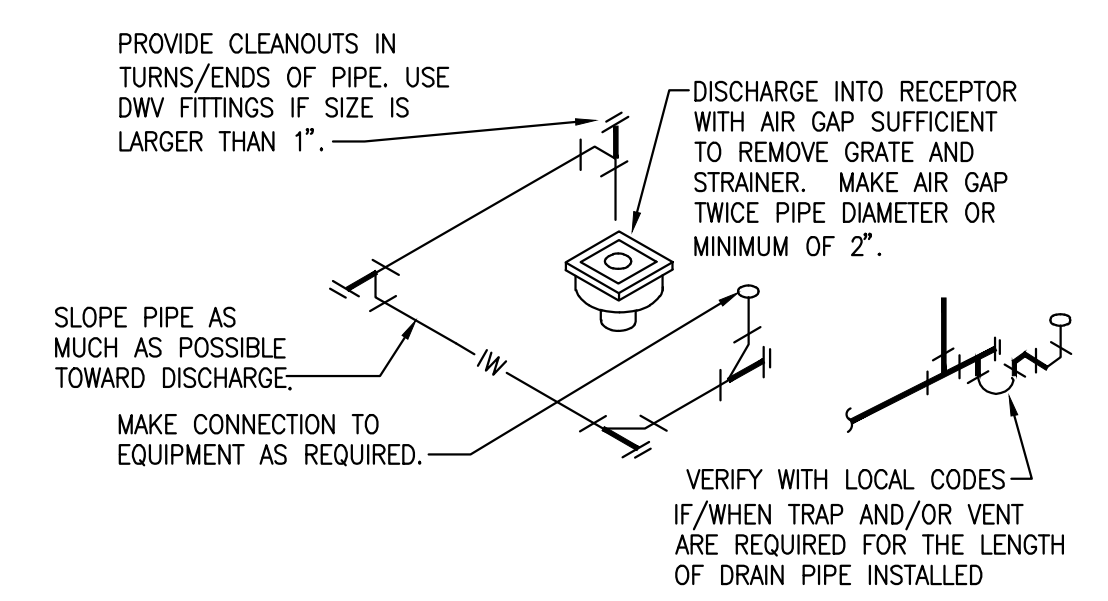
1 PIPE SLEEVE THRU WALL SECTION  
P2.1 N.T.S



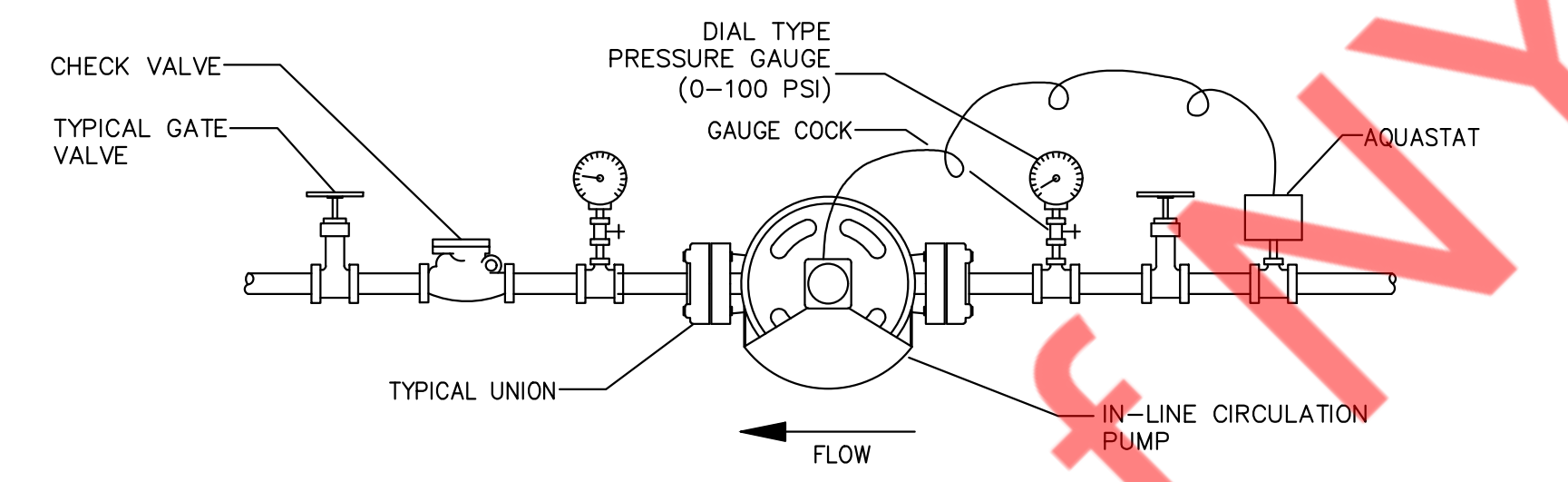
2 GAS WATER HEATER  
FLOOR MOUNTED) DETAILS  
P2.1 N.T.S



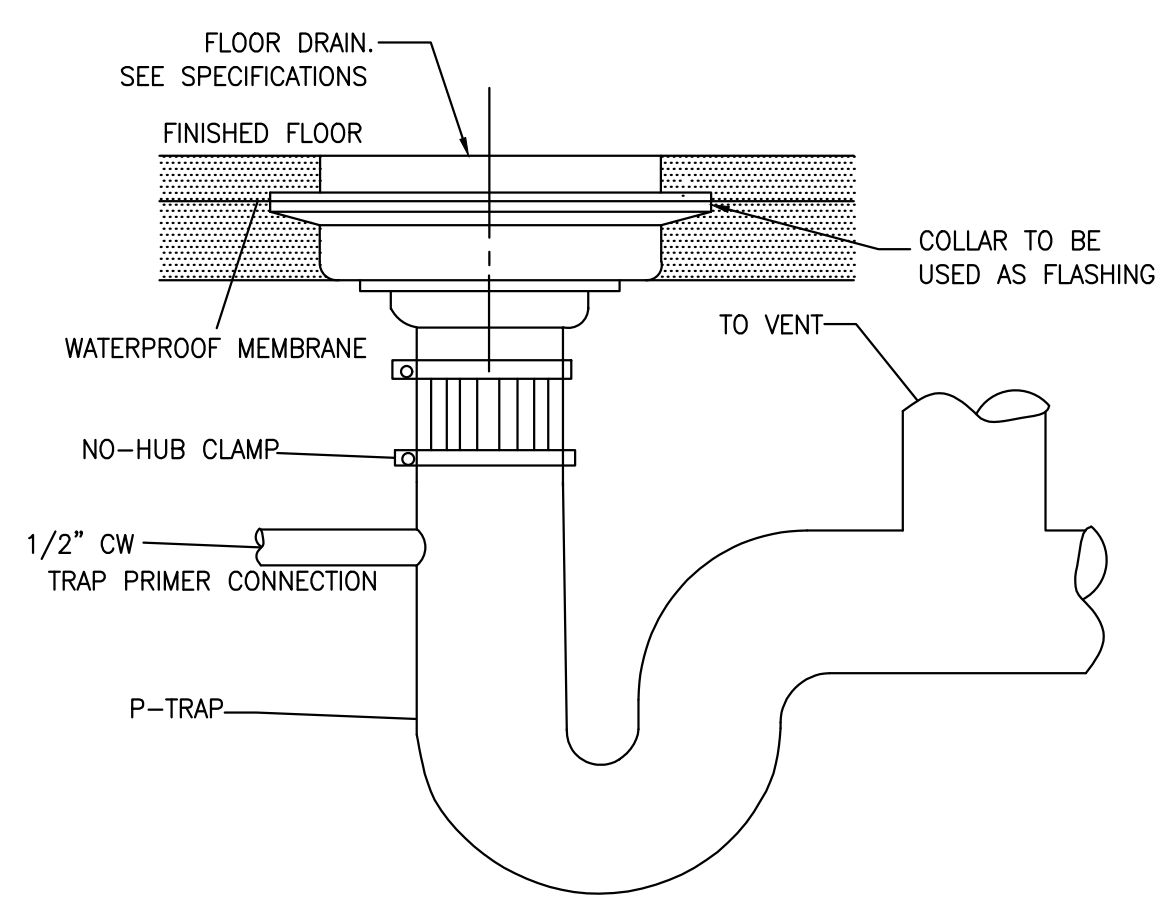
3 3 COMPARTMENT SINK DETAIL  
P2.1 N.T.S



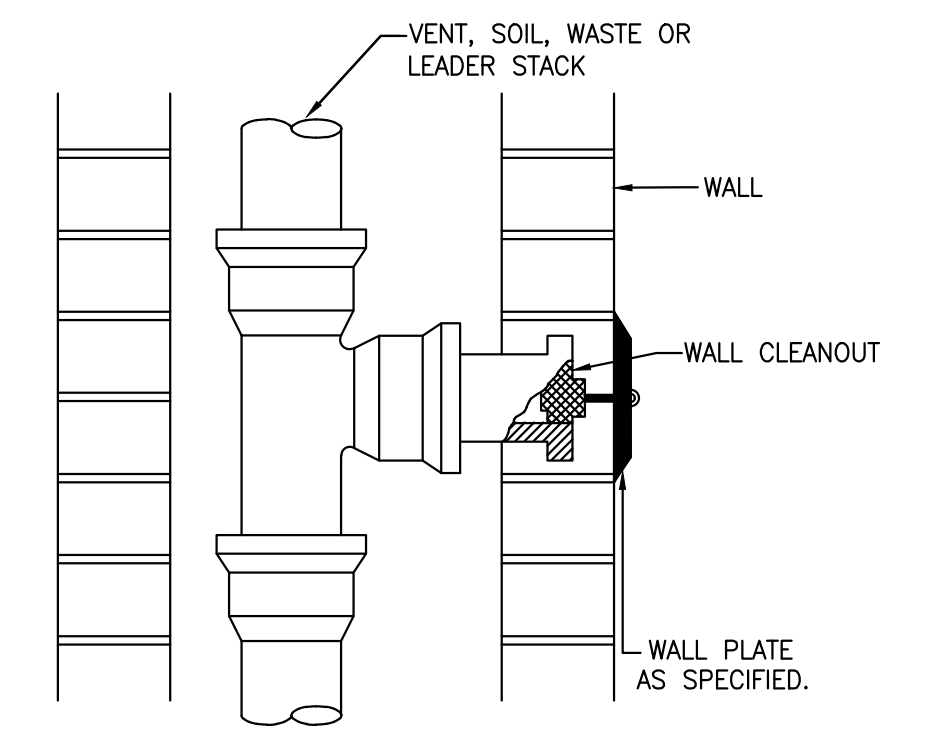
4 INDIRECT WASTE CONNECTION DETAIL  
P2.1 N.T.S



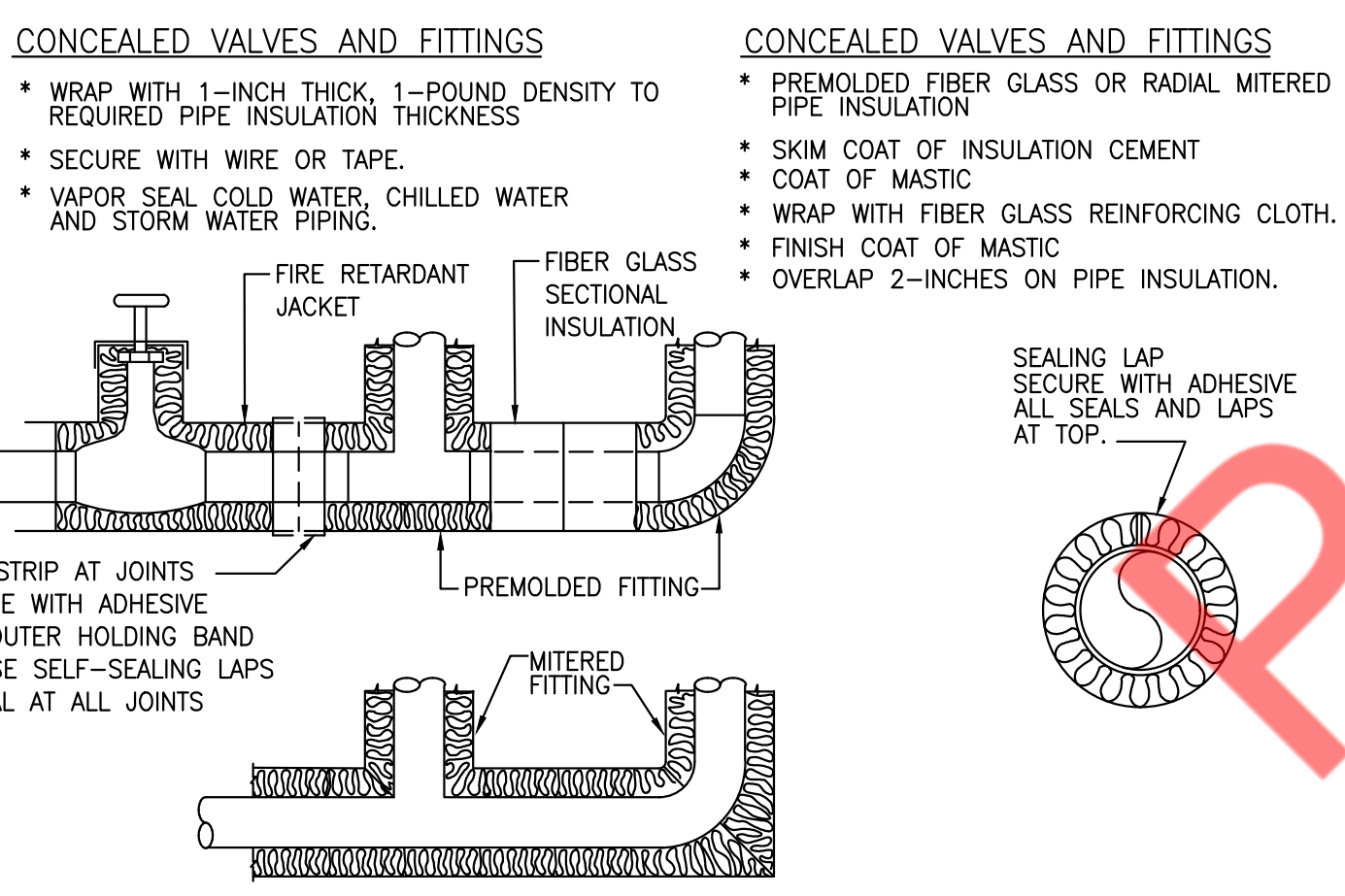
6 INLINE RECIRCULATING PUMP DETAIL  
P2.1 N.T.S



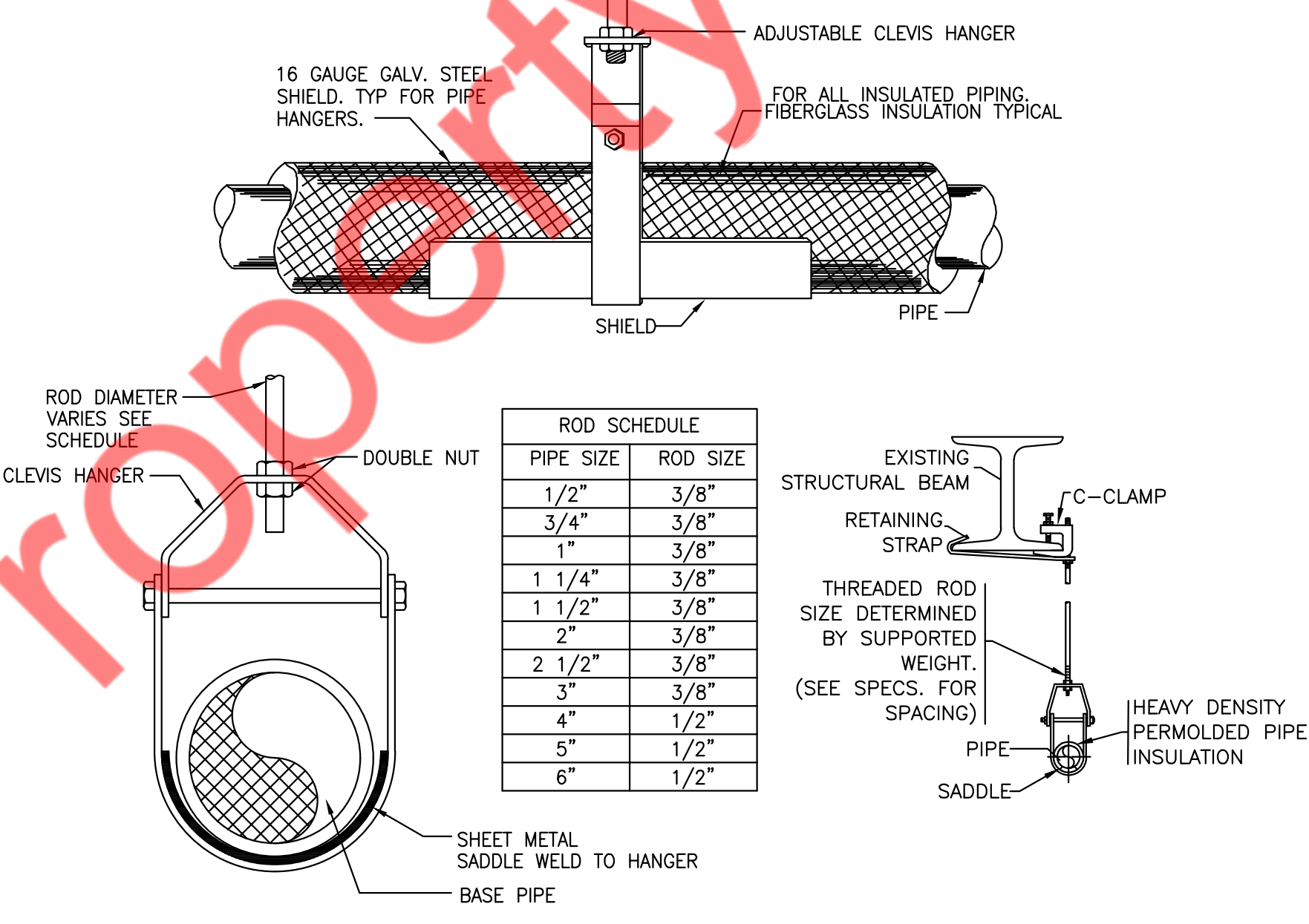
8 FLOOR DRAIN DETAIL  
P2.1 N.T.S



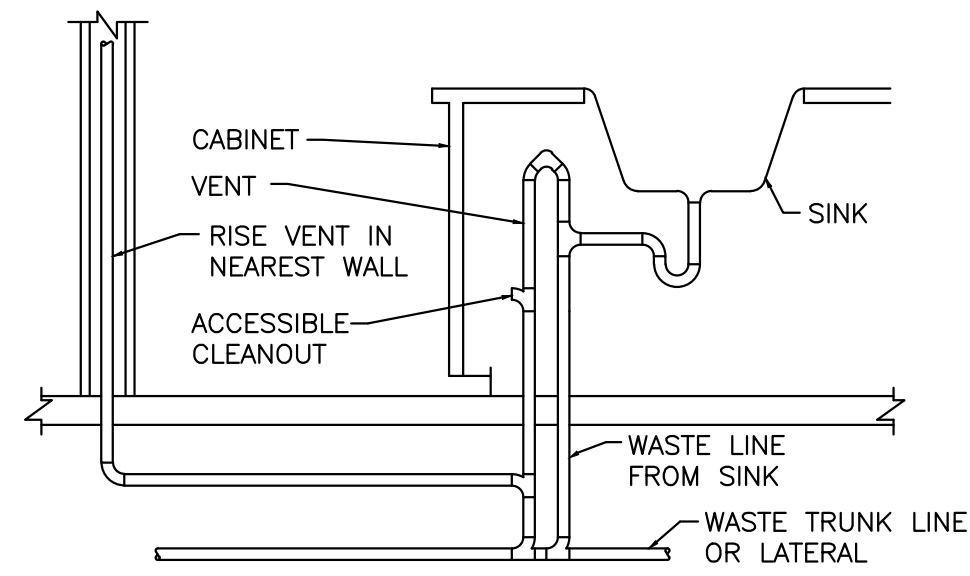
9 WALL CLEANOUT DETAIL  
P2.1 N.T.S



5 INSULATION OF PIPING, VALVES AND FITTINGS  
FOR EXPOSED AND CONCEALED LOCATIONS  
P2.1 N.T.S



7 HANGER DETAIL  
P2.1 N.T.S



10 TYPICAL ISLAND SINK PLUMBING CONNECTIONS  
P2.1 N.T.S

CONSULTANTS (ENGINEER):  
**NY ENGINEERS**  
NEARBY ENGINEERS  
382 NE 191ST STREET SUITE  
49674, MIAMI, FL 33179  
PH-914.257.3455  
WWW.NY-ENGINEERS.COM

PERMIT SET

REVISION SCHEDULE  
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INTERIOR BUILD-OUT  
810 BILLIARDS &  
BOWLING  
HOUSTON, TX

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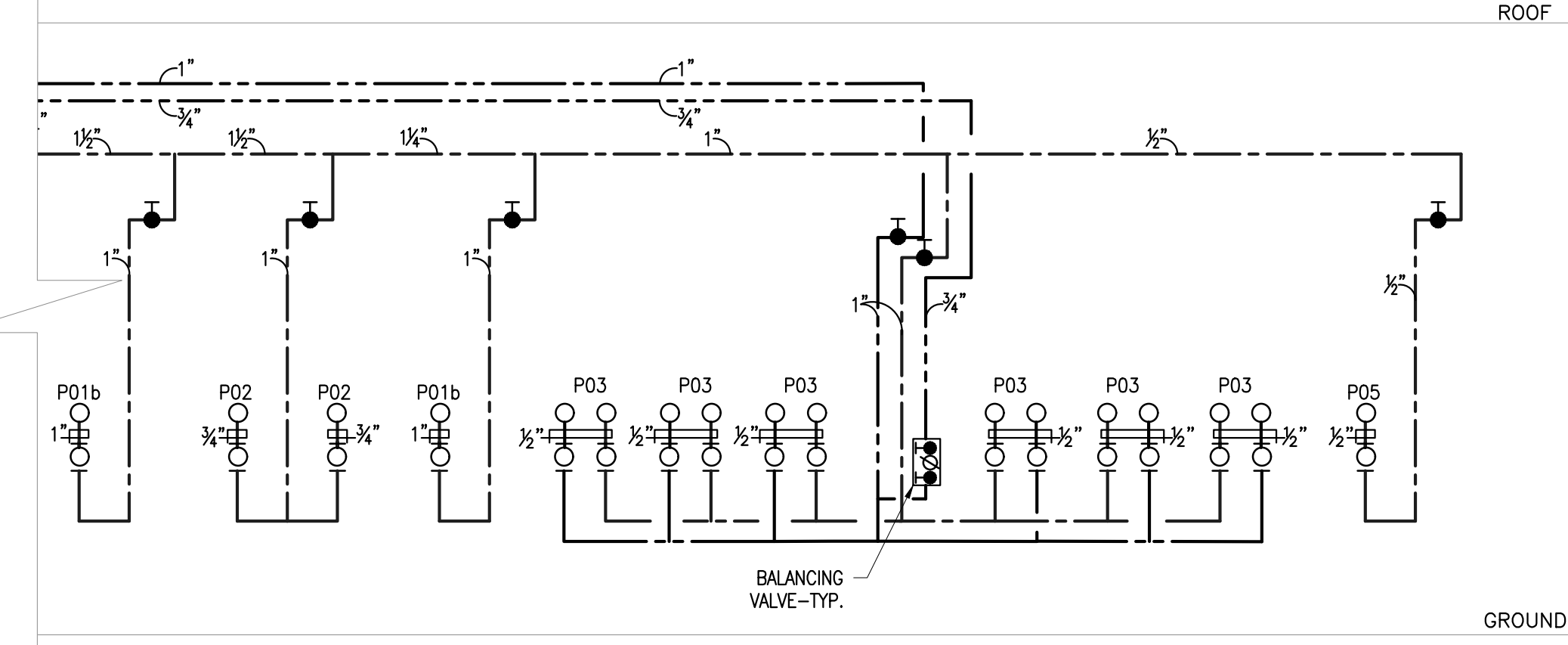
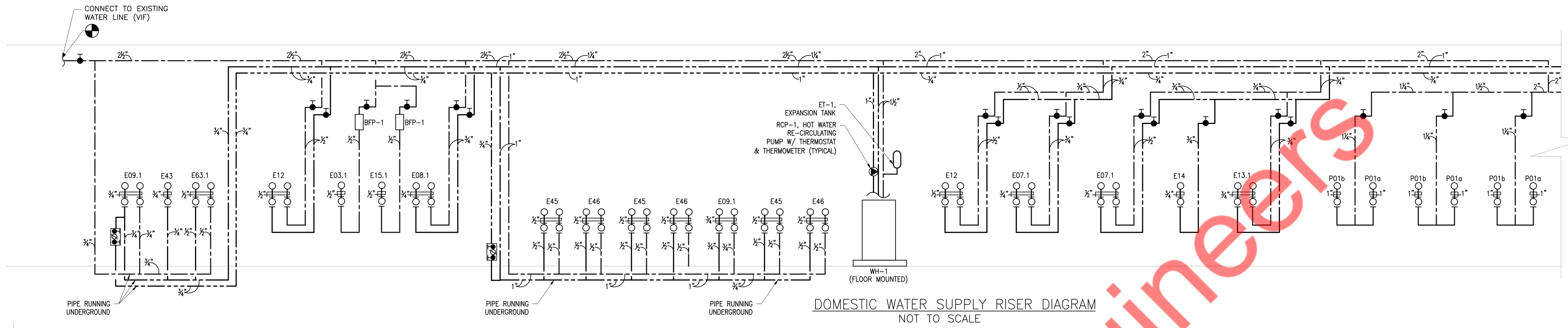
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PROJECT NUMBER: 2323

PLUMBING DETAILS

P2.1



PLUMBING FIXTURE SCHEDULE								
FIXTURE	EQUIPMENT CATEGORY	MANUFACTURER	MODEL	SAN				
				DIRECT	INDIRECT	VENT	CW	HW
P01a	WATER CLOSET	AMERICAN STANDARD	3691.001.020	4"	-	2"	1"	-
P01b	WATER CLOSET	AMERICAN STANDARD	3691.001.020	4"	-	2"	1"	-
P02	URINAL	AMERICAN STANDARD	6581.001EC	3"	-	2"	3/4"	-
P03	SINK FAUCET	AMERICAN STANDARD	7075.002.002	-	-	-	1/2"	1/2"
P04	3 STATION SINK	SLOAN	ELGR-83000	1-1/2"	-	1-1/2"	-	-
P05	DRINKING FOUNTAIN	MERDOCK MFG	A1724005-UG-VR-D1	2"	-	1-1/2"	1/2"	-
E03	ICE BIN	HOSHIZAKI AMERICA, INC	B-8005F	-	3/4"	-	-	-
E03.1	ICE MAKER	HOSHIZAKI AMERICA, INC	KM-1601SAJ	-	3/4"	-	1/2"	-
E07	3-COMP SINK	REGENCY	600S321824X	-	2"	-	-	-
E07.1	PRE-RINSE FAUCET	REGENCY	600PPRW8LLLF	-	-	-	3/4"	3/4"
E08	1-COMP SINK	REGENCY	60S1172324GL	-	2"	-	-	-
E08.1	FAUCET W/ 8" 10" SWING-SPOUT	REGENCY	600FW810	-	-	-	3/4"	3/4"
E09.1	FAUCET W/ 4" 10" SWING-SPOUT	REGENCY	600FW410	-	-	-	3/4"	3/4"
E10	SOLID DISHTABLE	REGENCY	600DDT84L	-	2"	-	3/4"	3/4"
E12	HAND SINK	REGENCY	600HS17SP	1 1/2"	-	1 1/2"	1/2"	1/2"
E13	MOP SINK	REGENCY	600SM16206	3"	-	2"	-	-
E13.1	WALL MOUNT MOP SINK FAUCET	WATERLOO	750FMS8	-	-	-	3/4"	3/4"
E14	DISHWASHER	AUTO-CHLOR	A4 WATERSAVER	-	2"	-	-	1/2"
E15	FOUNTAIN, DROP-IN DISPENSER W/ CABINET STAND	COCA-COLA	42232CO	-	3/4"	-	-	-
E15a	CARBONATOR	-	-	-	-	-	1/2"	-
E43	DISHWASHER UNDERCOUNTER	CMA DISHMACHINES	CMA-181GW	-	1"	-	-	3/4"
E44	3-COMP SINK UNDERBAR	REGENCY	600B31014213	-	2"	-	-	-
E45	BLENDER STATION	REGENCY	600BSD231246G	1"	-	-	1/2"	1/2"
E46	UNDERBAR HAND SINK	STEELTON	522UHS1812	2"	-	1-1/2"	1/2"	1/2"
E51A	48" DRIP TRAY	REGENCY	600BDR48	-	3/4"	-	-	-
E51B	36" DRIP TROUGH	REGENCY	600BDR36	-	3/4"	-	-	-
E52	DRIP TRAY TROUGH, BEVERAGE	JOHN BOOS	URN72	-	3/4"	-	-	-
E63	UNDER COUNTER BASIN	KADO	LUX	2"	-	1-1/2"	-	-
E63.1	FAUCET FOR UNDERCOUNTER BASIN	-	-	-	-	-	1/2"	1/2"

NOTE: ALL FIXTURE MAY BE SUBSTITUTED WITH APPROVED EQUAL. CONTACT OWNER FOR APPROVAL.

GAS FIRED WATER HEATER SCHEDULE								
HEATER TAG	LOCATION	STORAGE GALLONS	FUEL TYPE	INPUT BTU/H	RECOVERY RATE AT 90°F (GPH)	TYPE	MANUFACTURER & MODEL NO.	REMARKS
WH-1	STORAGE ROOM	100	NATURAL GAS	199,900	261	STORAGE GAS-FIRED WATER HEATER (FLOOR MOUNTED)	AO SMITH 8TH-199(A)	-DIMENSION 27'-3/4" DIA X 76" H -INDOOR FLOOR MOUNTED

EXPANSION TANK SCHEDULE							
TAG	LOCATION	SERVICE	CAPACITY (GALLONS)	MANUFACTURER & MODEL	DIMENSION (DIA X HEIGHT)	WEIGHT (LBS)	NO. OF EXPANSION TANK
ET-1	REFER FLOOR PLANS	HW	3.2	THERM-X-TROL ST-8	9" X 15"	7	1

RECIRCULATING PUMP SCHEDULE					
ITEM	QUANTITY	GPM	TOTAL HEAD(FT)	MOTOR HP	MANUFACTURER & MODEL NO
RCP-1	1	2	10	0.115	GRUNDFOS UP 15-18

GREASE INTERCEPTOR CALCULATION GREASE INTERCEPTOR SIZING TABLE AS PER UPC 2015, TABLE 1014.3.6

GREASE INTERCEPTOR CALCULATIONS				
SR.NO	QTY.	FIXTURE	DFU	TOTAL DFU'S
1.	3	3-COMPARTMENT SINK	6	18
2.	1	1-COMPARTMENT SINK	6	6
3.	3	HAND SINK	4	12
4.	1	MOP SINK	6	6
5.	1	1-DISH TABLE	6	6
TOTAL				48

GRAVITY GREASE INTERCEPTOR SIZING	
DRAINAGE FIXTURE UNITS (DFU'S)	INTERCEPTOR VOLUME (GALLONS)
8	500
21	750
35	1000
90	1250
172	1500
216	2000
307	2500
342	3000
428	4000
576	5000
720	7500
2112	10000
2640	15000

AS PER HOUSTON PLUMBING CODE - 2015, SECTION 1014.3 (ADOPTS UPC 2015), FOR 48 DFU'S, A MINIMUM 1250 GALLONS GREASE INTERCEPTOR IS REQUIRED.

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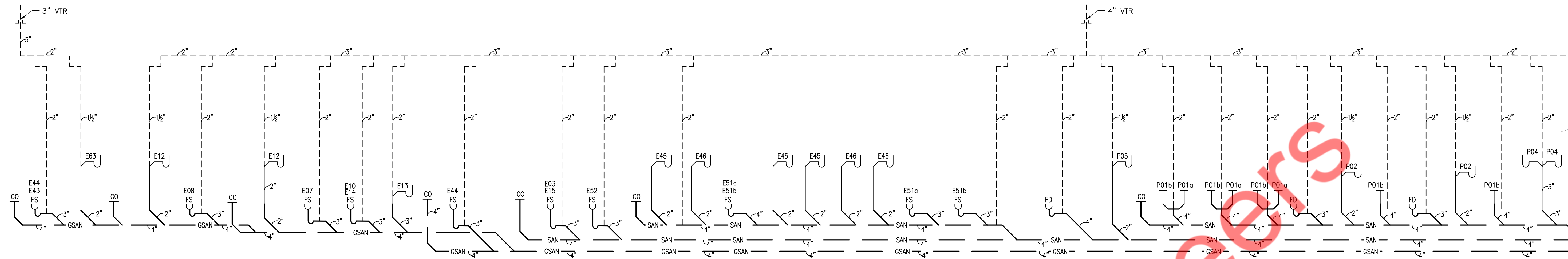
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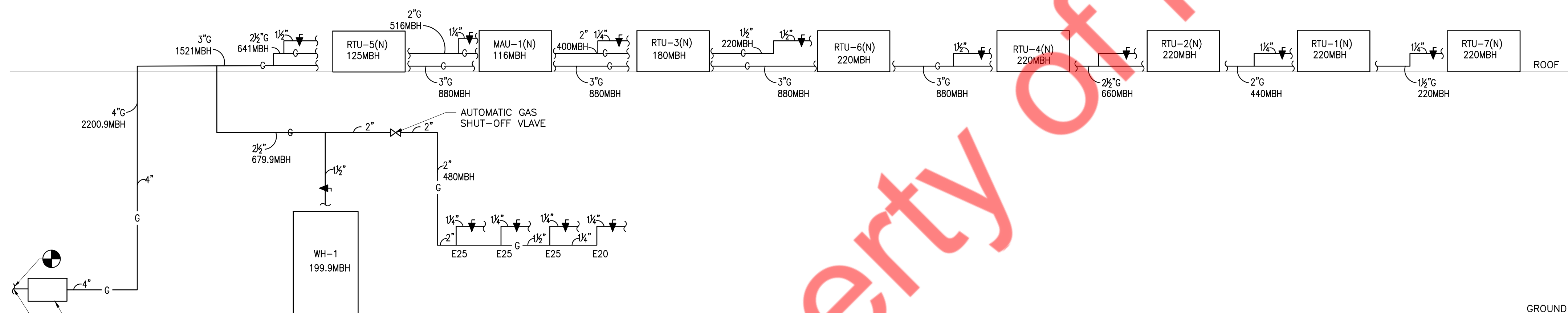
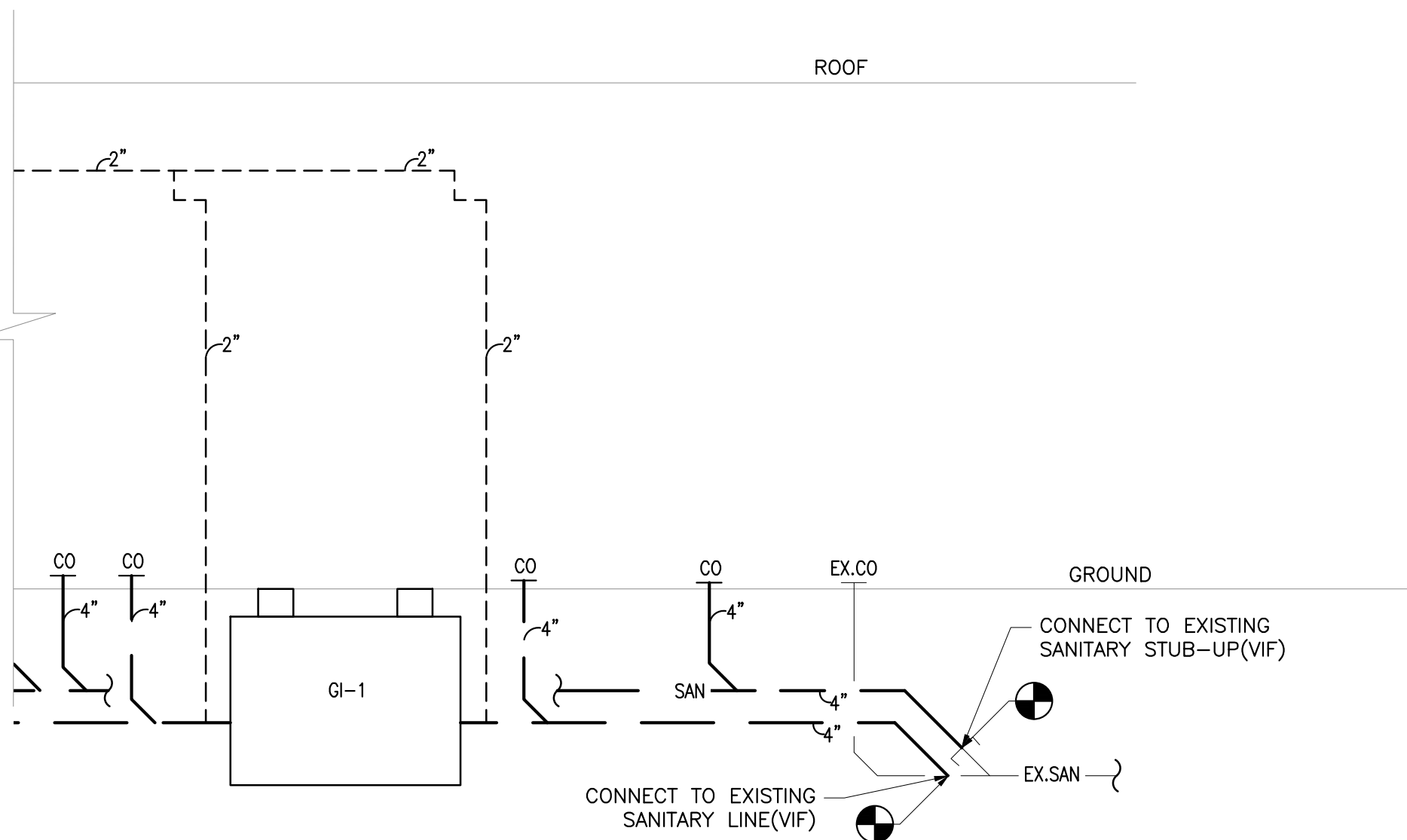
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PLUMBING WATER RISER AND SCHEDULE



SANITARY RISER DIAGRAM  
NOT TO SCALE



GAS RISER DIAGRAM  
NOT TO SCALE

GAS LOAD SUMMARY

ITEM NO.	QTY.	DESCRIPTION	MANUFACTURER	MODEL	SIZE	BTU/HR.
WH-1	1	WATER HEATER	AO SMITH	BTH-199(A)	1-1/4"	199,900
E20	1	COUNTER TOP GRIDDLE	GLOBE	GG48TG	1-1/4"	120,000
E25	3	FLOOR FRYER, GAS	AVANTCO	FF50	1-1/4"	360,000
RTU-1(N)	1	ROOF TOP UNIT	CARRIER	48FCDN24	1-1/2"	220,000
RTU-2(N)	1	ROOF TOP UNIT	CARRIER	48FCDN20	1-1/2"	220,000
RTU-3(N)	1	ROOF TOP UNIT	CARRIER	48FCSN16	1-1/4"	180,000
RTU-4(N)	1	ROOF TOP UNIT	CARRIER	48FCDN28	1-1/2"	220,000
RTU-5(N)	1	ROOF TOP UNIT	CARRIER	48FCSN08	1-1/4"	125,000
RTU-6(N)	1	ROOF TOP UNIT	CARRIER	48FCDN20	1-1/2"	220,000
RTU-7(N)	1	ROOF TOP UNIT	CARRIER	48FCDN20	1-1/2"	220,000
MAU-1(N)	1	MAKEUP AIR UNIT	CAPTIVEAIRE	A2-D.250-20D-MPU	1-1/4"	116,000
TOTAL LOAD						2200,900

GAS NOTE:

- PROVIDE SHUT-OFF VALVE AN ACCESSIBLE LOCATION. PROVIDE GAS PRESSURE REGULATOR FOR ALL GAS EQUIPMENT IF REQUIRED.
- CONTRACTOR SHALL VERIFY ACTUAL GAS PRESSURE AND LONGEST LENGTH OF RUN TO FARTHEST APPLIANCE PRIOR TO INSTALLATION AND NOTIFY ENGINEER IF CONDITION DIFFER THAN SHOWN ON THIS PLAN.

GAS PIPE SIZING PER 2015 UNIFORM PLUMBING CODE CHAPTER 12 FUEL GAS PIPING, SECTION 1216, TABLE 1216.2(1)

INLET PRESSURE- LESS THAN 2 PSI  
SPECIFIC GRAVITY- 0.6  
PRESSURE DROP 0.5" WC

EQUIVALENT LENGTH OF PIPE =  
280 + FITTINGS (+40%) = 392 FEET

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PLUMBING RISERS

P3.2