

SECTION 23 05 00
COMMON WORK RESULTS FOR HVAC

1.0 GENERAL
1.01 DESCRIPTION

A. THIS DIVISION 23 AND THE ACCOMPANYING DRAWINGS COVER THE PROVISION OF ALL LABOR, EQUIPMENT, APPLIANCES, AND MATERIALS AND PERFORMANCE ALL OPERATIONS IN CONNECTION WITH THE CONSTRUCTION OF THE AIR CONDITIONING, VENTILATING, HEATING, FIRE SUPPRESSION AND PLUMBING SYSTEMS AS SPECIFIED HEREIN AND AS SHOWN.

B. THE GENERAL PROVISIONS AND DIVISION 01, INCLUDING THE GENERAL, SUPPLEMENTARY AND OTHER CONDITIONS AND OTHER DIVISIONS, AS APPROPRIATE, APPLY TO WORK SPECIFIED IN THIS DIVISION.

1.02 EXISTING CONDITIONS

A. ATTENTION IS CALLED TO THE FACT THAT THE WORK IS TO BE PERFORMED WITHIN AN EXISTING OPERATIONAL FACILITY. PRIOR TO THE SUBMISSION OF BIDS, EACH BIDDER SHALL VISIT THE PROJECT SITE, THOROUGHLY INVESTIGATE AND BE FAMILIAR WITH ALL EXISTING CONDITIONS WHICH WILL AFFECT THEIR WORK, ESPECIALLY THE WORK TO BE PERFORMED ABOVE THE EXISTING CEILINGS.

B. CONNECT NEW WORK TO EXISTING WORK IN A NEAT AND WORKMANLIKE MANNER. WHERE AN EXISTING STRUCTURE MUST BE CUT OR EXISTING UTILITIES INTERFERE, SUCH OBSTRUCTIONS SHALL BE CAREFULLY REMOVED, REFINISHED OR RELOCATED, PATCHED AND REPAIRED. WORK DISTURBED OR DAMAGED SHALL BE REPLACED OR REPAIRED TO ITS PRIOR CONDITION.

C. PRIOR TO THE START OF ANY DEMOLITION OR CONSTRUCTION, SECURE THE SERVICES OF A QUALIFIED, EPA CERTIFIED ASBESTOS ABATEMENT AGENCY TO CHECK THE EXISTING INSULATION, ETC. FOR ASBESTOS. SHOULD ASBESTOS BE FOUND, DO NOT PROCEED WITH DEMOLITION OR CONSTRUCTION; NOTIFY THE ARCHITECT IN ANY CASE IN WRITING OF THE AGENCY'S FINDINGS.

1.03 INTENT OF DRAWINGS AND SPECIFICATIONS

A. THE IMPLIED AND STATED INTENT OF THE DRAWINGS AND SPECIFICATIONS IS TO ESTABLISH MINIMUM ACCEPTABLE STANDARDS FOR MATERIALS, EQUIPMENT AND WORKMANSHIP, AND TO PROVIDE OPERABLE MECHANICAL SYSTEMS COMPLETE IN EVERY RESPECT.

B. THE ENGINEERING DRAWINGS ARE DIAGRAMMATIC, INTENDED TO SHOW GENERAL ARRANGEMENT AND SIZES OF SYSTEM COMPONENTS, AND SHALL NOT BE SCALED. RATHER, THE ARCHITECTURAL AND STRUCTURAL DRAWINGS SHALL GOVERN SPACE CONSTRAINTS, DIMENSIONS AND FINISHES. ALL OFFSETS AND FITTINGS WHICH WILL BE NECESSARY TO ACCOMPLISH THE FINISHED INSTALLATION SHALL BE PROVIDED AT NO ADDITIONAL COST OR INCREASE IN THE CONTRACT.

1.04 SPACE PRIORITY

A. ENSURE OPTIMUM USE OF AVAILABLE SPACE FOR MATERIALS AND EQUIPMENT INSTALLED ABOVE CEILINGS. ALLOCATE SPACE IN THE ORDER OF PRIORITY AS LISTED BELOW EXCEPT AS OTHERWISE DETAILED. ITEMS ARE LISTED IN THE ORDER OF PRIORITY, WITH ITEMS OF EQUAL IMPORTANCE LISTED UNDER A SINGLE PRIORITY NUMBER.

- GRAVITY FLOW PIPING SYSTEMS
- VENT PIPING SYSTEMS
- RECESSED LIGHTING FIXTURES
- CONCEALED HVAC TERMINALS AND EQUIPMENT
- AIR DUCT SYSTEMS
- SPRINKLER PIPING SYSTEMS
- PRE-SPECIFIED PIPING SYSTEMS
- ELECTRICAL CONDUIT, WIRING, CONTROL AIR TUBING

B. ORDER OF SPACE PRIORITY DOES NOT DICTATE INSTALLATION SEQUENCE. INSTALLATION SEQUENCE SHALL BE AS REQUIRED TO INSTALL ALL AFFECTED TRADES.

C. THE WORK OF THIS DIVISION 23 SHALL NOT OBSTRUCT ACCESS FOR INSTALLATION, OPERATION AND MAINTENANCE OF THE WORK OF ANY OTHER DIVISION.

D. ALL MAJOR ITEMS OF EQUIPMENT SHALL BE ARRANGED SO AS TO PROVIDE A MINIMUM OF 28" CLEAR AISLE SPACE. ADDITIONAL SPACE SHALL BE PROVIDED BETWEEN AND AROUND EQUIPMENT FOR MAINTENANCE AND PROPER OPERATION AS SHOWN IN THE EQUIPMENT MANUFACTURER'S LITERATURE.

1.05 COORDINATION

A. COORDINATE ALL WORK UNDER THIS DIVISION 23 WITH WORK UNDER ALL OTHER DIVISIONS, PROVIDING ADJUSTMENT AS NECESSARY.

B. COORDINATION OF SPACE REQUIREMENTS WITH RESPECT TO DIVISION 26 SHALL BE PERFORMED SUCH THAT:

NO EQUIPMENT, PIPING OR DUCTWORK, OTHER THAN ELECTRICAL, SHALL BE INSTALLED WITHIN 42" OF SWITCHBOARDS OR PANELBOARDS. NO PIPING OR DUCTWORK WHICH EVER OPERATES AT A TEMPERATURE IN EXCESS OF 120°F SHALL BE INSTALLED WITHIN 3" OF ANY ELECTRICAL CONDUCTOR.

C. ALL ITEMS MOUNTED IN OR BELOW THE CEILING, AND ALL ITEMS PENETRATING THE CEILING, SHALL BE COORDINATED WITH THE ARCHITECTURAL REFLECTED CEILING PLANS. IF ANY ITEMS ARE NOT SHOWN ON THESE PLANS, OR ANY ITEMS NEED TO BE RELOCATED FOR COORDINATION PURPOSES, PREPARE A REFLECTED CEILING PLAN AND SUBMIT IT TO THE ARCHITECT FOR APPROVAL.

D. VARIABLE-FREQUENCY DRIVES SHALL BE PROVIDED UNDER DIVISION 23 AND INSTALLED BY DIVISION 26. SEE SPECIFICATION 26 29 23 VARIABLE - FREQUENCY MOTOR CONTROLLERS.

E. FUSED DISCONNECTS SHALL BE PROVIDED UNDER THIS DIVISION 23 FOR ALL EQUIPMENT CONNECTED DIRECTLY TO BUS DUCT, AND RATINGS SHALL MATCH BUS DUCT RATING. COORDINATE WITH DIVISION 26.

1.06 CODE COMPLIANCE

A. ALL WORKMANSHIP AND MATERIALS PROVIDED UNDER THIS DIVISION 23 SHALL COMPLY WITH ALL LAWS, ORDINANCES, CODES AND REGULATIONS OF ALL FEDERAL, STATE AND LOCAL AUTHORITIES HAVING JURISDICTION.

B. ALL FIRE SUPPRESSION, PLUMBING, HEATING, VENTILATING, AND AIR CONDITIONING MATERIALS AND WORKMANSHIP SHALL COMPLY WITH THE FOLLOWING CODES AND STANDARDS AS MINIMUM REQUIREMENTS:

- 2020 NATIONAL ELECTRIC CODE - NFPA70, 2020
- 2021 INTERNATIONAL BUILDING CODE
- ASHRAE 90.1-2019
- 2021 INTERNATIONAL MECHANICAL CODE
- 2021 NATIONAL STANDARD PLUMBING CODE
- 2021 INTERNATIONAL FUEL GAS CODE
- ALL OTHER NFPA CODES AND STANDARDS - APPLICABLE EDITIONS

C. SECURE AND PAY ALL FEES ASSOCIATED WITH ALL PERMITS AND LICENSES REQUIRED FOR EXECUTION OF THE CONTRACT. ARRANGE FOR ALL INSPECTIONS REQUIRED BY CITY, COUNTY, STATE AND OTHER AUTHORITIES HAVING JURISDICTION, AND DELIVER CERTIFICATES OF APPROVAL TO THE ARCHITECT.

D. THE CODE REQUIREMENTS ARE STRICTLY A MINIMUM AND SHALL BE MET WITHOUT INCURRING ADDITIONS TO THE CONTRACT. WHERE REQUIREMENTS OF THE DRAWINGS OR SPECIFICATIONS EXCEED THE CODE REQUIREMENTS, THE WORK SHALL BE PROVIDED IN ACCORDANCE WITH THESE DRAWINGS OR SPECIFICATIONS. IN THE EVENT OF CONFLICT OR AMBIGUITY BETWEEN THE VARIOUS CODES, THE MOST STRINGENT REQUIREMENT SHALL GOVERN.

1.07 ELECTRICAL REQUIREMENTS AND INTERFACE

A. ALL ELECTRICAL EQUIPMENT AND WIRING PROVIDED UNDER THIS DIVISION 23 SHALL COMPLY WITH THE ELECTRICAL SYSTEM CHARACTERISTICS INDICATED ON THE ELECTRICAL DRAWINGS AND SPECIFIED IN DIVISION 26.

B. ELECTRIC CONTROLS, CONTACTORS, STARTERS, PILOT LIGHTS, PUSH BUTTONS, ETC., SHALL BE PROVIDED COMPLETE AS PART OF THE MOTOR, HEATER OR OTHER EQUIPMENT WHICH IT OPERATES. ALL ELECTRICAL COMPONENTS SHALL BE IN CONFORMANCE WITH THE REQUIREMENTS OF THE:

NATIONAL ELECTRICAL CODE AND DIVISION 26. STARTERS SHALL BE WYE-DELTA, CLOSED TRANSITION TYPE. REFERENCE DIVISION 26 AND THE ELECTRICAL ENGINEERING DRAWINGS FOR THOSE MOTOR STARTERS PROVIDED UNDER THAT DIVISION 26. ALL STARTERS NOT SHOWN SHALL BE PROVIDED UNDER THIS DIVISION 23. UNLESS SPECIFIED OTHERWISE UNDER OTHER INDIVIDUAL EQUIPMENT SECTIONS, MOTOR STARTERS SHALL CONFORM TO THE FOLLOWING MINIMUM REQUIREMENTS:

1. STARTERS FOR MOTORS 1/3 HORSEPOWER OR SMALLER SHALL BE MANUAL UNLESS REMOTE OR AUTOMATIC STARTING IS REQUIRED. IN WHICH CASE THE STARTERS SHALL BE MAGNETIC, FULL VOLTAGE, NON-REVERSING, SINGLE-SPEED, UNLESS OTHERWISE INDICATED. ALL OTHER STARTERS SHALL BE MAGNETIC.

2. EACH STARTER FOR A THREE-PHASE MOTOR SHALL BE FURNISHED WITH THREE (3) OVERLOAD RELAYS SIZED FOR THE FULL LOAD RUNNING CURRENT OF THE MOTOR ACTUALLY PROVIDED. PROVIDE AN EXTERNAL "HAND-OFF-AUTO" SELECTOR SWITCH WITH RED "RUNNING" LIGHT, PROVIDE A GREEN PILOT LIGHT TO INDICATE MOTOR "STOPPED". EACH PILOT LIGHT SHALL HAVE A LEGEND PLATE INDICATING REASON FOR SIGNAL.

3. EACH OVERLOAD RELAY SHALL HAVE A NORMALLY OPEN ALARM CONTACT WHICH WILL CLOSE ONLY WHEN ACTUATED BY AN OVERLOAD (NOT TO BE CONFUSED WITH N.O. OR N.C. AUXILIARY CONTACTS). THESE CONTACTS SHALL BE PROPERLY WIRED TO THEIR RESPECTIVE BLUE PILOT LIGHT PROVIDED ON THE STARTER FRONT COVER AND HAVING A "TRIPPED" LEGEND PLATE.

4. INDIVIDUALLY MOUNTED MOTOR STARTERS SHALL BE IN A NEMA TYPE 1 GENERAL PURPOSE ENCLOSURE UNLESS OTHERWISE SPECIFIED AND SHALL BE FLUSH MOUNTED IN ALL FINISHED AREAS. ALL STARTERS MOUNTED IN EXTERIOR AREAS SHALL HAVE A NEMA 3R ENCLOSURE. EACH STARTER SHALL HAVE A LAMINATED NAMEPLATE TO INDICATE EQUIPMENT UNIT NUMBER, FUNCTION AND CIRCUIT NUMBER.

5. ALL MOTOR STARTERS, PUSH BUTTONS AND PILOT LIGHTS SHALL BE OF THE SAME MANUFACTURER AS THE SWITCHBOARD AND SHALL BE GENERAL ELECTRIC, SQUARE D, SIEMENS I.T.E., OR WESTINGHOUSE.

C. MOTOR STARTERS FOR THE FOLLOWING EQUIPMENT SHALL BE PROVIDED UNDER THIS DIVISION 23 BY THE MANUFACTURER OF THE EQUIPMENT:

1. PACKAGED AIR CONDITIONING EQUIPMENT

2. OTHER EQUIPMENT HEREAFTER SPECIFIED IN OTHER SECTIONS TO BE PROVIDED WITH INTEGRAL STARTERS

D. UNLESS OTHERWISE NOTED OR SPECIFIED IN INDIVIDUAL SECTIONS, ALL 3-PHASE MOTORS SHALL BE STANDARD NEMA CONTINUOUS DUTY "B" TYPE, WITH GLASS B INSULATION, OPEN DRIP FRAME FOR INDOOR SERVICE, TEFZ FOR OUTDOOR SERVICE AND A SERVICE FACTOR OF 1.15. ALL MOTORS 5 HP AND LARGER SHALL BE U.S. MOTORS HI-EFFICIENCY MODEL OR RELIANCE XE HI-EFFICIENCY MODEL.

E. ALL POWER WIRING AND FINAL CONNECTIONS TO EQUIPMENT SHALL BE PROVIDED UNDER DIVISION 26.

F. CONTROL COMPONENTS, ALL INTERLOCKS, (VALVS, ACTUATORS, SMOKE DAMPERS, FIRE/SMOKE DAMPERS, MOTOR-OPERATED DAMPERS, FIRE ALARM MOTORS, ETC.) AND CONTROL WIRING (277 VOLT, SINGLE PHASE AND LESS) SHALL BE PROVIDED UNDER THIS DIVISION 23 AS REQUIRED TO ACHIEVE THE SPECIFIED CONTROL SEQUENCES. ALL ELECTRICAL CONNECTIONS SHALL BE SPECIFICALLY COORDINATED WITH DIVISION 26 AND ANY NECESSARY SCOPE INCLUDED AS PART OF DIVISION 23.

1.08 SLEEVES, SEALS AND ESCUTCHEONS

A. SLEEVES SHALL BE PROVIDED THROUGH ALL PIPE AND DUCTWORK PENETRATIONS OF CONCRETE OR MASONRY WALLS, ELEVATED FLOORS AND ROOFS, EXCEPT THOSE PIPING PENETRATIONS FOR EQUIPMENT, ETC.

B. SLEEVES SHALL BE FABRICATED FROM SCHEDULE 40 STEEL PIPE THROUGH 10" AND STANDARD WALL STEEL PIPE FOR SLEEVE SIZES 12" AND LARGER. ALL SLEEVES PENETRATING EXTERIOR WALLS, UNDERGROUND WALLS, PIT OR VAULT WALLS SHALL BE PROVIDED WITH A 3" X 3/8" THICK WATERSTOP RING WELDED COMPLETELY TO THE MIDPOINT OF THE SLEEVE.

C. ALL SLEEVES PENETRATING EXTERIOR WALLS, UNDERGROUND WALLS, PIT OR VAULT WALLS AND ELEVATED FLOORS SHALL BE PACKED AND SEALED WATERTIGHT.

D. SLEEVES THROUGH ROOFS SHALL EXTEND ABOVE THE ROOF SURFACE AND BE FLASHED WATERTIGHT.

E. SLEEVES THROUGH WALLS SHALL BE CUT AND FINISHED FLUSH WITH EACH SURFACE OF THE WALL IN WHICH THEY ARE INSTALLED.

F. SLEEVES THROUGH FLOORS IN MECHANICAL ROOMS OR OTHER BACK OF HOUSE SPACES SHALL BE INSTALLED WITH THE TOP NO LESS THAN 1/2" ABOVE THE FINISHED FLOOR TO ALLOW FOR LEAK PROTECTION. SPACE BETWEEN THE TOP OF THE FIRE-STOPPING AND TOP OF THE SLEEVE SHALL BE PACKED WITH MINERAL WOOL AND CAULKED TO NOT ALLOW WATER PONDING WITHIN THE SLEEVE.

G. SLEEVES SHALL BE SIZED TO PROVIDE A MINIMUM OF 1/2" CLEARANCE BETWEEN THE INSIDE SURFACE OF THE SLEEVE AND THE OUTSIDE FINISHED SURFACE OF THE PIPE PLUS ANY INSULATION SPECIFIED.

H. FIRE-STOPS SHALL BE PROVIDED AS SPECIFIED HEREIN. ALL ANNULAR SPACES BETWEEN PIPING AND SLEEVES, WHICH DO NOT REQUIRE FIRE-STOPS, SHALL BE PACKED WITH MINERAL WOOL AND CAULKED.

I. PROVIDE ROUND, CHROME-PLATED ESCUTCHEONS ON ALL EXPOSED PIPING AND DUCTWORK PENETRATIONS PASSING THROUGH WALLS, FLOORS, PARTITIONS AND CEILINGS. ESCUTCHEONS SHALL BE PAINTED AND CAULKED IN COORDINATION WITH ARCHITECT. NOTE THAT ESCUTCHEONS SHOULD BE ONLY ATTACHED TO THE WALL AS PIPING AND DUCTWORK MAY MOVE SLIGHTLY DURING OPERATION.

1.09 FIRESTOPS

A. WHERE PIPING, CONDUIT, ETC. PASS THROUGH FIRE PARTITIONS, FIRE WALLS AND FLOORS, A FIRESTOP SHALL BE PROVIDED THAT WILL ENSURE AN EFFECTIVE BARRIER AGAINST THE SPREAD OF FIRE, SMOKE AND GASES. FIRESTOP MATERIALS SHALL BE PACKED TIGHT AND COMPLETELY FILL GAPS BETWEEN THE DUCTWORK, PIPING, CONDUIT, ETC. AND THE PERIMETER OF THEIR ROUGH OPENINGS.

B. ALL PENETRATIONS SHALL BE IN ACCORDANCE WITH UL 1479 OR ASTM E 814 LISTED SYSTEMS, AND PRODUCTS USED SHALL BE SPECIFICALLY APPLICABLE FOR THE APPROPRIATE INSTALLATION CONDITIONS. ASSEMBLIES SHALL PROVIDE A MINIMUM RATING EQUAL TO THE CONSTRUCTION PENETRATED. PRODUCTS SHALL BE BY HILTI, 3M, OR PROSET.

C. INSTALLATION SHALL BE BY A QUALIFIED INSTALLER. INSTALLER SHALL BE CERTIFIED, LICENSED, OR OTHERWISE QUALIFIED BY THE FIRESTOPPING MANUFACTURER AS HAVING THE NECESSARY TRAINING TO INSTALL THE MANUFACTURER'S SPECIFIC PRODUCT. THE MANUFACTURER OR VENDOR'S WILLINGNESS TO SELL THE FIRESTOPPING PRODUCT TO THE CONTRACTOR OR INSTALLER DOES NOT IN ITSELF CONFER QUALIFICATION.

D. INSTALLER SHALL HAVE AT LEAST ONE OF THE FOLLOWING QUALIFICATIONS:
FM 4989 APPROVED CONTRACTOR
UL APPROVED CONTRACTOR
HILTI, 3M, OR PROSET ACCREDITED FIRE STOP SPECIALTY CONTRACTOR

E. INSTALLING FIRM SHALL HAVE NO LESS THAN 3 YEARS OF EXPERIENCE WITH FIRESTOP INSTALLATION.

F. A MANUFACTURER'S DIRECT REPRESENTATIVE (NOT DISTRIBUTOR OR AGENT) SHALL BE ON SITE DURING INITIAL INSTALLATION OF FIRESTOP SYSTEMS TO TRAIN APPROPRIATE CONTRACTOR PERSONNEL IN PROPER SELECTION AND INSTALLATION PROCEDURES.

G. THE FIRESTOP CONTRACTOR OR INSTALLER SHALL SUPPLY AS-BUILT DOCUMENTATION OF EACH INDIVIDUAL PENETRATION LOCATION ON THE PROJECT. DOCUMENTATION SHALL INCLUDE A SEQUENTIAL LOCATION NUMBER, DETAILED DESCRIPTION OF THE PENETRATION LOCATION, SIZE, AND TYPE, TESTED SYSTEM NUMBER, TYPE OF ASSEMBLY PENETRATED, AND RATING TO BE ACHIEVED. AS-BUILT DOCUMENTATION SHALL BE INCLUDED WITH THE CLOSE-OUT MATERIALS.

H. IDENTIFY THROUGH-PENETRATION FIRESTOP SYSTEMS WITH PRESSURE-SENSITIVE, SELF-ADHESIVE, PREPRINTED VINYL LABELS. ATTACH LABEL PERMANENTLY ON BOTH SIDES OF PENETRATED CONSTRUCTION IN A VISIBLE LOCATION. THE LABEL SHALL INCLUDE THE FOLLOWING:

1. THE WORDS "WARNING - THROUGH PENETRATION FIRESTOP SYSTEM - DO NOT DISTURB"

2. THROUGH PENETRATION FIRESTOP SYSTEM DESIGNATION AND MANUFACTURER

3. DATE OF INSTALLATION

1.10 CORE DRILLING

A. CUTTING OF HOLES THROUGH CONCRETE AND MASONRY SHALL BE BY DIAMOND CORE OR CONCRETE SAW. PNEUMATIC HAMMER, IMPACT ELECTRIC, AND HAND OR MANUAL HAMMER TYPE DRILLS WILL NOT BE ALLOWED, EXCEPT AS PERMITTED BY THE ARCHITECT WHERE REQUIRED BY LIMITED WORKING SPACE. LOCATE HOLES SUCH THAT THEY WILL NOT AFFECT STRUCTURAL SECTIONS SUCH AS RIBS OR BEAMS. HOLES SHALL BE LAID OUT WELL IN ADVANCE OF THE INSTALLATION. THESE LAYOUT LOCATIONS SHALL BE APPROVED BY THE ARCHITECT PRIOR TO DRILLING.

1.11 IDENTIFICATION OF PIPING

A. ALL ABOVEGROUND HVAC PIPING SIZED 3/4" AND LARGER WHICH IS INSTALLED IN ACCESSIBLE LOCATIONS (INCLUDING PIPING ABOVE REMOVABLE CEILINGS AND BEHIND ACCESS PANELS) SHALL BE IDENTIFIED IN STRICT CONFORMANCE WITH THE "SCHEME FOR THE IDENTIFICATION OF PIPING SYSTEMS" (ANSI A13.1-2015).

B. PIPING LABELS IN EXPOSED AREAS SHALL BE ORIENTED AND LOCATED IN COORDINATION WITH THE ARCHITECT.

C. SPECIFIC SYSTEM NAMES SHALL BE SUBJECT TO OWNER APPROVAL. SYSTEM NAMES SHALL AT MINIMUM UNIQUELY IDENTIFY THE SYSTEM AND PERFORMANCE CATEGORY - I.E., BASE BUILDING CONDENSER WATER SUPPLY, COOLING TOWER MAKE-UP, ETC.

D. EACH IDENTIFICATION MARKER SHALL INCLUDE THE FOLLOWING:

- PROPER COLOR-CODED BACKGROUND
- PROPER COLOR OF LEGEND IN RELATION TO BACKGROUND COLOR
- PROPER LEGEND LETTER SIZE
- PROPER MARKER LENGTH
- DIRECTION OF FLOW ARROWS SHALL BE INCLUDED ON EACH MARKER

E. LOCATIONS FOR PIPE MARKERS SHALL BE AS FOLLOWS:

- ADJACENT TO EACH VALVE AND FITTING
- AT EACH BRANCH AND RISER TAKE-OFF
- AT EACH PIPE PASSAGE THROUGH WALLS, FLOORS, OR CEILINGS
- ON ALL STRAIGHT PIPE RUNS EVERY 25 FEET

F. IDENTIFICATION MARKERS MAY BE STENCILED OR SHALL BE SETMARK PIPE MARKERS, AS MANUFACTURED BY SETON NAME PLATE CORPORATION.

G. ALL VALVES SHALL BE IDENTIFIED WITH THE APPROPRIATE SERVICE DESIGNATION AND VALVE NUMBER WITH BRASS VALVE TAGS. EACH VALVE TAG SHALL BE 19 GAUGE BRASS WITH 1/4" BLACK-FILLED LETTERS OVER 1/2" BLACK-FILLED NUMBERS. TAGS SHALL BE FASTENED TO VALVES WITH BRASS "S" HOOKS OR BRASS JACK CHAIN. BRASS TAGS AND FASTENERS SHALL BE AS MANUFACTURED BY SETON NAME PLATE CORPORATION.

H. PROVIDE CHARTS OF ALL VALVES. VALVE CHARTS SHALL INCLUDE THE FOLLOWING ITEMS:

- VALVE NUMBER
- LOCATION
- PURPOSE / MATERIAL

2.0 PRODUCTS

2.01 BID BASIS AND SUBSTITUTION PROCEDURES

A. MANUFACTURER NAMES, SERIES AND MODEL NUMBERS, AS NOTED OR SPECIFIED, ARE FOR THE PURPOSE OF DESCRIBING TYPE, CAPACITY, AND QUALITY OF EQUIPMENT, MATERIALS AND PRODUCTS TO BE USED. UNLESS OTHERWISE SPECIFICALLY STATED, BIDS SHALL BE BASED ONLY ON THE SPECIFIED "BASIS OF DESIGN" MANUFACTURER. THE LISTING OF A PARTICULAR MANUFACTURER AS AN "EQUAL" OR "ACCEPTABLE SUBSTITUTE" MANUFACTURER SHALL NOT BE MISCONSTRUED AS APPROVING NOR ALLOWING THE SUBSTITUTION OF THAT MANUFACTURER'S STANDARD PRODUCT IN PLACE OF THE BASIS OF DESIGN. NO CONSIDERATION WILL BE GIVEN TO A PRODUCT, WHICH WOULD REQUIRE DIMENSIONAL, SPATIAL OR AESTHETIC CHANGES TO THE PROJECT. "ACCEPTABLE SUBSTITUTE" AND "EQUAL" MANUFACTURERS SHALL ONLY BID THOSE PRODUCTS, WHICH EXACTLY MATCH THE SIZE AND OTHER CHARACTERISTICS OF THE SPECIFIED BASIS OF DESIGN. ANY CHANGES TO OTHER DISCIPLINES AND TRADES OF WORK REQUIRED BY AN "OR EQUAL" OR "SUBSTITUTE" PRODUCT SHALL BE DULY CONSIDERED AND PRICED ACCORDINGLY PRIOR TO BIDDING OR PRICING. THE DECISION AS TO WHETHER OR NOT A PROPOSED SUBSTITUTE OR "EQUAL" PRODUCT IS ACTUALLY EQUAL TO THAT SPECIFIED SHALL REST SOLELY WITH THE ARCHITECT.

B. REQUESTS TO PROVIDE "EQUAL" PRODUCTS IN LIEU OF THOSE SPECIFIED SHALL BE SUBMITTED TO THE ARCHITECT IN WRITING AT LEAST TEN (10) DAYS PRIOR TO FINAL PRICING AND EXECUTION OF THE CONTRACT. NO CONSIDERATION WILL BE GIVEN TO SUBSTITUTE PRODUCTS AFTER FINAL PRICING AND EXECUTION OF THE CONTRACT.

C. ANY "OR EQUAL" PRODUCT OR PROPOSED PRODUCT SUBSTITUTION WHICH WILL CAUSE A CHANGE IN THE APPEARANCE, DIMENSIONS OR DESIGN OF ANY PART OF THE BUILDING, IT STRUCTURE, ELECTRICAL SYSTEM OR ANY OTHER ENGINEERED SYSTEMS SHALL BE ACCOMPANIED BY A SCALED DRAWING AND WRITTEN DESCRIPTION OF THE REQUIRED CHANGES FOR APPROVAL BY THE ARCHITECT. IF DEEMED NECESSARY BY THE ARCHITECT, OWNER, OR A.H.J. DESIGN CHANGES SHALL BE SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER, CURRENTLY LICENSED IN THIS STATE. THIS SHALL BE PERFORMED UNDER THE CONTRACTOR'S SCOPE WHO SELECTS THE SUBSTITUTION.

D. ANY AND ALL CHANGES DUE TO A SUBSTITUTION OF BASIS OF DESIGN EQUIPMENT INCLUDING BUT NOT LIMITED TO ELECTRICAL CONNECTION, PHYSICAL SIZE, ACCESS, DUCT OR PIPING CONNECTIONS, CONTROLS, ETC. SHALL BE SOLELY THE RESPONSIBILITY OF SUBMITTING CONTRACTOR.

2.02 MINIMUM STANDARDS
A. EVERY PIECE OF ENERGY CONSUMING EQUIPMENT, ALL FIRE SUPPRESSION PRODUCTS AND LIFE SAFETY EQUIPMENT SHALL COMPLY WITH THE FOLLOWING STANDARDS AS APPLICABLE, ESPECIALLY IN REGARD TO PREVAILING CODES:

- FACTORY MUTUAL LABORATORIES (FM)
- INDUSTRIAL RISK INSURERS (IRI)
- UNDERWRITERS LABORATORIES, INC. (UL)
- ADC: AIR DIFFUSION COUNCIL
- AGA: AMERICAN GAS ASSOCIATION
- AMCA: AIR MOVING AND CONDITIONING ASSOCIATION, INC.
- ANSI: AMERICAN NATIONAL STANDARDS INSTITUTE
- API: AMERICAN PETROLEUM INSTITUTE
- AHRI: AIR CONDITIONING, HEATING, AND REFRIGERATION INSTITUTE
- ASHRAE: AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS
- ASME: AMERICAN SOCIETY OF MECHANICAL ENGINEERS
- ASTM: AMERICAN SOCIETY OF TESTING AND MATERIALS
- AWWA: AMERICAN WATER WORKS ASSOCIATION
- IBR: INSTITUTE OF BOILER AND RADIATOR MANUFACTURERS
- MSS: MANUFACTURERS STANDARDIZATION SOCIETY

- NBBPV: NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS
- NEMA: NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION

18. OSHA: OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION

19. PDI: PLUMBING DRAINAGE INSTITUTE

20. PPI: PLASTIC PIPE INSTITUTE

21. SMACNA: SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION, INC.

2.03 PIPE HANGERS AND SUPPORTS

A. PIPE HANGERS, TRAPEZE HANGERS, UPPER ATTACHMENTS, RODS AND OTHER SUPPORTS SHALL BE SELECTED BASED ON PIPE SIZE AND MATERIAL CONTAINED THEREIN. PROVIDE ALL HANGERS, RODS, TURNBUCKLES, ANGLES, CHANNELS AND OTHER SUPPORTS TO SECURELY SUPPORT THE PIPING SYSTEMS FROM THE BUILDING STRUCTURE.

B. ALL MATERIALS UTILIZED FOR THE HANGING AND SUPPORT OF THE PIPING SYSTEMS SHALL BE MANUFACTURED PRODUCTS, WHICH ARE SPECIFICALLY INTENDED FOR THE PURPOSE OF HANGING PIPING SYSTEMS. THE USE OF WIRE, STEEL STRAPS, PLASTIC TIES, ETC. IS STRICTLY PROHIBITED.

C. SUPPORTS AND HANGERS SHALL BE SELECTED TO FIT AROUND THE PIPE (AND INSULATION UNLESS OTHERWISE SPECIFIED HEREIN) AND PROVIDE ADEQUATE MOVEMENT FOR EXPANSION OF THE PIPING SYSTEMS. ANCHORS SHALL BE PROVIDED TO RESTRICT AND CONTROL SUCH MOVEMENT WITHIN OFFSETS AND EXPANSION LOOPS.

D. ALL HANGERS AND SUPPORTS SHALL BE SELECTED AT A MINIMUM FACTOR OF SAFETY OF FIVE BASED ON THE ULTIMATE TENSILE STRENGTH OF THE MATERIAL.

E. INTERMEDIATE PIPE SUPPORTS SHALL BE PROVIDED BETWEEN BUILDING STRUCTURAL MEMBERS SO AS NOT TO EXCEED MAXIMUM SUPPORT SPACING SPECIFIED AND SHALL BE STRUCTURAL STEEL ANGLES (MINIMUM 2 1/2" X 2 1/2" X 1/4") IN STEEL CONSTRUCTION. INTERMEDIATE SUPPORTS SHALL BE SECURELY CLAMPED TO STEEL BEAMS AND TO STEEL JOISTS, AND IN NO CASE SHALL SUPPORTS BE ATTACHED TO ROOF DECKS.

F. FOR SUSPENDING PIPES FROM CONCRETE BEAMS, UPPER ATTACHMENTS SHALL BE SIDE BEAM BRACKET UTILIZING BOLTS IN SLEEVES SET IN TOP PORTIONS OF THE BEAMS. WHERE SLEEVES ARE NOT USED, PROVIDE EXPANSION SHIELDS OR POWER-ACTUATED FASTENERS.

G. HANGER RODS FOR PIPE HANGERS SHALL BE AS FOLLOWS:

- 3/8" HANGER ROD 2" NOMINAL PIPE AND SMALLER
- 1/2" HANGER ROD 2 1/2" AND 3" NOMINAL PIPE
- 5/8 HANGER ROD 4" AND 5" NOMINAL PIPE
- 3/4" HANGER ROD 6" NOMINAL PIPE
- 7/8 HANGER ROD 8" THROUGH 16" NOMINAL PIPE

H. PIPE HANGERS SELECTED FOR SUPPORTING HORIZONTAL INSULATED PIPING SHALL BE SIZED TO FIT AROUND THE OUTSIDE OF THE PIPE INSULATION EXCEPT FOR THE FOLLOWING SERVICES, WHICH SHALL BE SIZED TO FIT AROUND THE PIPE AND UNDER THE INSULATION:

1. HOT WATER SUPPLY AND RETURN PIPING, STEAM, CONDENSATE RETURN AND RELATED PIPING SIZED 2" AND SMALLER.

I. PROVIDE PIPE SADDLES, INSERTS AND SHIELDS ON ALL INSULATED PIPING AS OUTLINED BELOW.

1. HOT WATER SUPPLY AND RETURN PIPING AND ASSOCIATED STEAM AND CONDENSATE RETURN PIPING OVER 2" SHALL BE SUPPORTED BY STEEL SADDLES WELDED TO PIPE. INSULATION SHALL BE CONTINUOUS THROUGH THE SADDLE.

2. ALL OTHER INSULATED PIPING SHALL BE SUPPORTED ON FOAMGLAS INSULATION INSERTS AND GALVANIZED SHIELDS, EXCEPT THAT NO INSERTS ARE REQUIRED ON PIPING SIZED LESS THAN 2". FOAMGLAS INSERTS SHALL EXTEND AT LEAST 2" PAST EACH END OF THE PIPE SHIELDS.

A. SHIELDS SHALL BE AS FOLLOWS:

- PIPES 2" AND SMALLER: 18 GAUGE X 12" LONG
- PIPES 2 1/2" AND LARGER: 16 GAUGE X 18" LONG

B. SHIELDS AND INSERTS SHALL BE 180 DEGREES AROUND THE LOWER HALF OF THE PIPE AT ALL PIPE HANGERS, EXCEPT THAT ON TRAPEZE HANGERS, PIPE RACKS AND FLOOR SUPPORTS AND HORIZONTAL PIPES, SHIELDS SHALL BE 360 DEGREES AROUND THE ENTIRE PIPE.

3.0 EXECUTION

3.01 SUBMITTALS

A. BEFORE PREPARING SUBMITTALS, STUDY ALL CONTRACT DRAWINGS AND SPECIFICATIONS IN DETAIL. OBTAIN MANUFACTURER'S RECOMMENDED INSTRUCTIONS, AND HAVE SUBMITTALS PREPARED BASED ON SPECIFIC EQUIPMENT AND MATERIAL PROPOSED FOR INSTALLATION. AN OFFICER OF THE CONTRACTING FIRM SHALL SIGN ALL SHOP DRAWINGS (CERTIFYING CONFORMANCE WITH PLANS AND SPECIFICATIONS) BEFORE SUBMITTING TO THE ARCHITECT OR RELEASING TO THE FIELD.

B. THE SUBMITTALS PROCESS SHALL NOT BE UTILIZED AS AN AVENUE TO SUBSTITUTE PRODUCTS AFTER THE EXECUTION OF THE CONTRACT. SHOULD ON UNSPECIFIED OR UNEQUAL PRODUCT BE SUBMITTED, IT WILL BE REJECTED. IF A SECOND ATTEMPT AT SUBSTITUTION IS MADE DURING THE RE-SUBMITTAL OF THE SAME PRODUCT, THEN NO MORE REVIEWS OF THAT PRODUCT WILL BE PERFORMED WITHOUT DIRECT COMPENSATION TO THE ENGINEER BEING PAID FOR THE ADDITIONAL SERVICES REQUIRED FOR THE THIRD REVIEW AND ANY FURTHER REVIEWS.

C. ALL SUBMITTALS SHALL BE SUBMITTED AND RETURNED ELECTRONICALLY.

D. SUBMITTALS WILL NOT BE ACCEPTED FOR REVIEW UNLESS THEY:

- COMPLY WITH THE REQUIREMENTS OF DIVISION 1
- INCLUDE COMPLETE INFORMATION PERTAINING TO ALL APPURTENANCES AND ACCESSORIES
- ARE SUBMITTED AS COMPLETE PACKAGES WHICH PERTAIN TO OIL RELATED ITEMS IN DIVISION 23. SEPARATE PACKAGES SHALL BE SUBMITTED AS FOLLOWS:
 - ALL HVAC EQUIPMENT AND COMPONENTS
 - THE AUTOMATIC CONTROLS AND EMS
- ARE PROPERLY MARKED WITH EQUIPMENT, SERVICE, OR FUNCTION IDENTIFICATION AS RELATED TO THE PROJECT AND ORE MARKED WITH PERTINENT SPECIFICATION PARAGRAPH NUMBER

E. SUBMIT CATALOG INFORMATION, FACTORY ASSEMBLY DRAWINGS, FIELD INSTALLATION DRAWINGS AND CERTIFICATIONS AS REQUIRED FOR COMPLETE EXPLANATION AND DESCRIPTION OF ALL ITEMS OF EQUIPMENT. THE SUBMITTALS DATA SHALL PROVIDE AMPLE, UNQUESTIONABLE COMPLIANCE WITH THE CONTRACT DOCUMENTS.

F. REVIEW OF SUBMITTALS SHALL NOT BE CONSTRUED AS AUTHORIZING ANY DEVIATIONS FROM THE PLANS AND SPECIFICATIONS UNLESS SUCH DEVIATIONS ORE CLEARLY Y IDENTIFIED AND SEPARATELY Y SUBMITTED IN THE FORM OF O LETTER THAT IS ENCASED WITH THE SUBMITTALS.

G. SUBMITTALS ORE REQUIRED ON ALL MANUFACTURED EQUIPMENT, ESPECIALLY ENERGY CONSUMING EQUIPMENT. SUBMITTALS SHALL INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING ITEMS OF EQUIPMENT:

- PIPING AND PIPING SPECIALTIES
- DUCTWORK AND PIPING INSULATION

3. PUMPS

4. PACKAGED ROOFTOP UNITS INCLUDING PROPOSED CONTROLLER AND POINTS LIST

5. AIR DISTRIBUTION DEVICES

6. DUCTWORK ACCESSORIES (INCLUDING AIR DAMPERS)

7. FANS

8. UNIT, WALL, CEILING, DUCT, ETC. HEATERS

9. LOUVERS AND HOODS

10. TAG COMPANY CERTIFICATIONS AND FINAL REPORT

11. DUCTWORK AND PIPING SHOP DRAWINGS

12. FIRESTOPPING PRODUCTS AND APPLICABLE UL FORETOP DETAILS

3.02 EXCAVATION, TRENCHING AND BACKFILLING

A. PERFORM ALL EXCAVATION, TRENCHING AND BACKFILLING FOR UNDERGROUND WORK UNDER THIS DIVISION 23. DURING EXCAVATION, THE EXCAVATED MATERIAL SHALL BE PILED BACK FROM THE BANKS OF THE TRENCH TO AVOID OVERLOADING, SLIDES OR CAVE-INS. DO NOT EXCEED THE ANGLE OF REPOSE UNLESS WRITTEN APPROVAL IS OBTAINED IN ADVANCE FROM THE ARCHITECT FOR SHORINGS, BRACING OR OTHER ALTERNATE EXCAVATION METHODS. ALL EXCAVATED MATERIAL NOT USED FOR BACKFILLING SHALL BE REMOVED FROM THE BUILDING AND DISPOSED OF AS INDICATED OR DIRECTED BY THE ARCHITECT. TAKE MEASURES TO PREVENT SURFACE WATER FROM FLOWING INTO TRENCHES AND OTHER EXCAVATIONS AND ANY WATER ACCUMULATING THEREIN SHALL BE REMOVED BY PUMPING. ALL EXCAVATION SHALL BE MADE BY OPEN CUT. TUNNELING SHALL NOT BE ALLOWED.

B. THE BOTTOM OF ALL TRENCHES SHALL BE EVENLY GRADED TO PROVIDE FIRM SUPPORT AND ON EVEN BEARING SURFACE. PIPE SHALL BE LAID ON FIRM SOIL, LAID IN STRAIGHT LINES AND ON UNIFORM GRADES. PROVIDE BELL HOLES SO THAT THE BARREL OF THE PIPE RESTS EVENLY ON THE BOTTOM OF THE TRENCH ALONG THE ENTIRE LENGTH OF THE PIPE.

C. PIPE SHALL BE INSPECTED AND TESTED PRIOR TO BACKFILLING. TRENCH SHALL BE HAND FILLED TO A MINIMUM OF 12" ABOVE THE TOP OF PIPE WITH SUITABLE EARTH (FREE OF ROCKS, TRASH, LARGE CLUMS AND ORGANIC MATERIAL) AND COMPACTED TO A MINIMUM 95G PROCTOR. AFTER THE FIRST LAYER IS COMPLETED, SUBSEQUENT LAYERS SHALL BE FILLED AND COMPACTED THE SAME AS THE FIRST LAYER. SETTLING THE BACKFILL WITH WATER SHALL NOT BE PERMITTED.

3.03 INSTALLATION REQUIREMENTS

A. ALL EQUIPMENT SHALL BE INSTALLED IN STRICT CONFORMANCE WITH THE RECOMMENDATIONS OF THE EQUIPMENT MANUFACTURER, AS INDICATED ON THE DRAWINGS AND AS SPECIFIED.

B. PROVIDE INSTALLATION MANUALS FOR EACH PIECE OF EQUIPMENT. SUBMIT IN SEPARATELY BOUND VOLUMES AFTER REVIEW OF SUBMITTALS.

C. PROVIDE SUPPLEMENTARY STEEL FRAMING AND WELDED STEEL EQUIPMENT SUPPORT STANDS AS REQUIRED FOR PROPER HANGING AND SUPPORT OF THE MECHANICAL SYSTEMS. STEEL ANGLES, CHANNELS AND TUBING UTILIZED FOR SUCH FRAMING SHALL BE SELECTED FOR A MAXIMUM DEFLECTION OF 1/360TH OF THE SPAN.

B. ALL LOW PRESSURE DUCTWORK (DESIGN OPERATING PRESSURE OF 1.0" WC ESP OR LESS) SHALL BE TESTED BY THE OPERATION OF THE SYSTEM TO WHICH IT IS CONNECTED.

C. ALL MEDIUM AND HIGH PRESSURE DUCTWORK (OPERATING PRESSURE OF MORE THAN 1.0" WC ESP) SHALL BE TESTED AT 1.5 TIMES THE DESIGN OPERATING PRESSURE OF THE SYSTEM TO WHICH IT IS CONNECTED, OR AT THE TOTAL FAN PRESSURE AT SHUT-OFF WHICHEVER IS GREATER, UP TO THE MAXIMUM PRESSURE CLASSIFICATION OF THE ASSOCIATED DUCTWORK SYSTEM.

D. ALL VISIBLE AND AUDIBLE AIR LEAKS FROM THE DUCTWORK SYSTEMS SHALL BE REPAIRED.

E. SEE SPECIFICATION SECTION 23 11 23 FOR TESTING REQUIREMENTS OF NATURAL GAS "AND LIQUID PROPANE GAS PIPING. SYSTEM SHALL BE PORT OF DIVISION 22 SCOPE UNLESS OTHERWISE ARRANGED WITHIN THE CONTRACT. COORDINATE WITH DIVISION 22.

F. CHILLED WATER, CONDENSER WATER, AND HOT WATER SUPPLY AND RETURN PIPING SHALL BE HYDROSTATICALLY TESTED AT A PRESSURE OF NOT LESS THAN THE GREATER OF 1.5 TIMES THE OPERATING PRESSURE OR 100 PSIG, WHICHEVER IS GREATER, FOR A MINIMUM OF ONE HOUR. NO LOSS IN PRESSURE SHALL BE PERMITTED.

G. STEAM AND CONDENSATE RETURN PIPING SHALL BE TESTED AT A TEST PRESSURE OF 100 PSIG MINIMUM BUT NOT LESS THAN 1.25 TIMES THE SYSTEM OPERATING PRESSURE FOR A MINIMUM OF ONE HOUR. NO LOSS OF PRESSURE SHALL BE PERMITTED.

H. ALL REFRIGERANT PIPING SHALL BE 100S TESTED WITH THE APPLICABLE ASHRAE STANDARD LATEST VERSION.

I. ALL LEAKS SHALL BE REPAIRED BY TIGHTENING, REMAKING JOINTS, OR REPLACING PIPE AND FITTINGS. CAULKING OF JOINTS SHALL NOT BE PERMITTED.

3.07 RECORD (AS-BUILT) DRAWINGS

A. AT THE COMPLETION OF THE PROJECT, PROVIDE A SET OF REPRODUCIBLE PRINTS TO THE ARCHITECT WHICH REFLECTS ALL CHANGES, REVISIONS AND DEVIATIONS MADE TO THE ORIGINAL DESIGN DOCUMENTS. LOCATIONS OF ALL UNDERGROUND PIPING AND UTILITIES SHALL BE CLEARLY SHOWN AND DIMENSIONED FROM PERMANENT REFERENCE POINTS SUCH AS BUILDING COLUMN LINES. RECORD DRAWINGS SHALL BE PRODUCED IN ELECTRONIC FORMAT COMPATIBLE WITH AUTOCAD. FURNISH ELECTRONIC COPIES OF ALL DRAWINGS IN DWG. FORMAT, AND TWO (2) BOND COPIES OF ALL DRAWING SHEETS. *AS-BUILTS FOR ELECTRONIC INCORPORATION BY THE DESIGN TEAM, AS APPLICABLE, SHALL BE REDLINE MARK-UPS OF THE CONSTRUCTION DOCUMENTS.

3.08 OPERATING AND MAINTENANCE MANUALS AND INSTRUCTIONS

A. COMPLETE OPERATING AND MAINTENANCE MANUALS SHALL BE PROVIDED TO THE OWNER. FOUR COPIES SHALL BE PROVIDED. EACH COPY SHALL BE BOUND IN A SEPARATE 3-RING, LOOSE-LEAF NOTEBOOK. OPERATING INSTRUCTIONS SHALL BE PROVIDED FOR EACH MECHANICAL SYSTEM, AND SHALL EACH INCLUDE A BRIEF SYSTEM DESCRIPTION, A SIMPLE SCHEMATIC AND D SEQUENCE OF OPERATION. OPERATING AND MAINTENANCE INSTRUCTIONS SHALL BE PROVIDED FOR EACH PIECE OF EQUIPMENT. A CONTROL SYSTEM WIRING DIAGRAM SHALL BE INCLUDED IN EACH OPERATING AND MAINTENANCE MANUAL.

B. PRIOR TO FINAL ACCEPTANCE OR BENEFICIAL OCCUPANCY, PROVIDE THE SERVICES OF A COMPETENT TECHNICIAN FOR NOT LESS THAN ONE (1)**TWO (2) DAYS* TO INSTRUCT THE OWNER IN THE OPERATION OF THE MECHANICAL SYSTEMS.

3.09 TESTING AND BALANCING

A. TESTING AND BALANCING OF THE HVAC SYSTEM SHALL BE PERFORMED "IN ACCORDANCE WITH THE STANDARDS OF A ABC AND SHALL BE PERFORMED UNDER THE DIRECT SUPERVISION OF A CERTIFIED TEST AND BALANCE ENGINEER" AS SPECIFIED IN SECTION 23 05 93. NOTE THAT THIS WORK IS TO BE PERFORMED UNDER A SEPARATE CONTRACT DIRECTLY UNDER THE GENERAL CONTRACTOR. SUBMIT FOUR (4) COPIES OF THE TEST AND BALANCE REPORT DIRECTLY TO THE ARCHITECT.

3.10 PIPING SUPPORTS

A. PIPE HANGERS OR SUPPORTS SHALL BE PROVIDED WITHIN 18" OF EACH HORIZONTAL FITTING, EQUIPMENT CONNECTION, VALVE, ETC. AND WITHIN 18" OF THE CENTERLINE OF HORIZONTAL OR VERTICAL CHANGES IN DIRECTION SUMMING TO 90° OR MORE. SPECIFIC ATTENTION IS CALLED TO VERTICAL TURNS INTO RISERS.

B. PIPING SUPPORTS SHALL BE PROVIDED, AT A MINIMUM, IN ACCORDANCE WITH THE GREATER OF THE BELOW OR AT CODE MINIMUM, WHERE THE BELOW OR CODE DOES NOT ADDRESS SUPPORT FOR SPECIFIC PIPING. SUPPORTS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS.

PIPING MATERIAL	MAX. HORIZ. SPACING	MAX. VERT. SPACING
CAST-IRON PIPE	5'	15'
COPPER PIPE	12'	10'
COPPER TUBING ½ 1-1/4" DIA.	6'	10'
COPPER TUBING ≥ 1-1/2" DIA.	10'	10'
PVC PIPE 4" 10"		

*MIDSTORY GUIDE REQUIRED FOR PIPING 2" DIAMETER AND SMALLER

C. RISER CLOMPS SHALL BE PROVIDED AT EACH FLOOR PENETRATION FOR PRESSURIZED PIPING SYSTEMS EXCEPT REFRIGERANT SUCTION AND LIQUID SERVICE, PROVIDE VIBRATION ISOLATION AT ALL RISER CLAMPS WITH TWO (2) POD-TYPE MOUNTINGS CONSISTING OF A MINIMUM 3/8" THICK RIBBED OR WAFFLED ELASTOMERIC PADS BONDED BETWEEN MINIMUM 16-GAUGE GALVANIZED STEEL SEPARATOR PLATES. PODS SHALL BE SIZED FOR A DEFLECTION OF 0.12" TO 0.16". PODS SHALL BE MINIMUM 3" X 3" SQUARE.

3.11 WARRANTY

A. ALL WORK PROVIDED UNDER THIS DIVISION 23 SHALL BE SUBJECT TO A MINIMUM ONE YEAR WARRANTY. THE WARRANTY SHALL INCLUDE PROMPT REPAIR OR REPLACEMENT OF EQUIPMENT OR SYSTEM FAILURES AND SHALL INCLUDE ALL PORTS, REFRIGERANT, AND LABOR. IN ADDITION, ALL COMPRESSORS SHALL CARRY AN ADDITIONAL FOUR YEAR PARTS-ONLY WARRANTY. EXTENDED WARRANTIES SHALL BE PROVIDED ON ALL OTHER EQUIPMENT SO SPECIFIED IN OTHER SECTIONS.

3.14SHOP DRAWINGS

A. SHOP DRAWINGS PER THE SUBMITTAL REQUIREMENTS SHALL BE SUBMIT TO THE DESIGN TEAM WITH ADEQUATE TIME FOR MULTIPLE ROUNDS OF REVIEW. SHOP DRAWINGS SHALL SHOW "AS-BUILT" CONDITIONS INCLUDING ELEVATIONS, OFFSETS, TRANSITIONS, AND ACCESSORIES. SHOP DRAWINGS SHALL INDICATE ALL CODE AND MANUFACTURER'S RECOMMENDED CLEARANCES, ACCESS, AND COORDINATE THE CLEARANCE AND ACCESS REQUIREMENTS WITH ALL OTHER TRADES.

B. SHOP DRAWINGS THAT USE KEYNOTES DIRECT FROM THE DESIGN DOCUMENTS SHALL NOT BE ACCEPTABLE AS THEY DO NOT DEMONSTRATE COORDINATION WITH ALL OTHER TRADES, NECESSARY TRANSITIONS, ETC.

C. SHOP DRAWINGS SHALL BE PROVIDED AS COMPLETE PACKAGES IN PARALLEL WITH ALL TRADES TO DOCUMENT COORDINATION. FLOOR-BY-FLOOR OR OTHERWISE PIECEMEAL SHOP DRAWINGS ARE GENERALLY NOT ACCEPTABLE.

3.15 OWNER TRAINING

A. OWNER TRAINING SHALL BE PROVIDED FOR ALL SYSTEMS AND EQUIPMENT AND SHALL INCLUDE THE FOLLOWING:

- 8-HOURS OF TRAINING FOR EACH TYPE OF EQUIPMENT
- 24-HOURS OF TRAINING FOR HVAC CONTROLS
- 16-HOURS FOR OVERALL SYSTEM OPERATIONAL TRAINING

B. A TRAINING SUMMARY AND SCHEDULE SHALL BE SUBMITTED TO THE ARCHITECT FOR APPROVAL WITHIN NINETY (90) DAYS OF THE DATE OF SUBSTANTIAL COMPLETION.

C. TRAINING TIME WILL VARY AND SHALL BE ASSUMED TO INCLUDE MULTIPLE SESSIONS AS REQUIRED BY THE OWNER.

3.17 BID REQUIREMENTS

A. THE CONTRACTOR SHALL INCLUDE ALL SYSTEMS, EQUIPMENT AND ACCESSORIES SHOWN ON THE PLANS AND SPECIFICATIONS.

B. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL DESIGN DOCUMENTS TO ALL SUBCONTRACTORS. ALL SYSTEMS, EQUIPMENT AND ACCESSORIES SHALL BE INCLUDED IN THE BID, WHETHER SHOWN ON THE SUBCONTRACTOR APPLICABLE PLANS OR OTHER DESIGN DOCUMENTS.

C. SHOULD ANY DISCREPANCY OCCUR IN THE DESIGN DOCUMENTS, THE CONTRACTOR SHALL PROVIDE A REQUEST FOR CLARIFICATION PRIOR TO BID OR NOTE THE DISCREPANCY IN THE BID AND PROVIDE AN APPROPRIATE COST ALLOWANCE IN THE BID.

D. THE CONTRACTOR SHALL ACKNOWLEDGE THAT THE DESIGN DOCUMENTS ARE DIAGRAMMATIC AND SHALL PROVIDE ALL SYSTEMS, EQUIPMENT AND ACCESSORIES REQUIRED FOR A COMPLETE FACILITY. ANY AREAS THAT APPEAR TO BE VOID OF SYSTEMS OR INAPPROPRIATE SYSTEMS SHALL BE NOTED IN THE BID. NO POST BID CHANGE ORDER SHALL BE CONSIDERED FOR AREAS OR DISCREPANCIES NOT NOTED IN THE BID.

E. ALL INSTALLATION COORDINATION AND MEANS AND METHODS AND LABOR AND MATERIALS REQUIRED FOR PROPER SYSTEM INSTALLATION SHALL BE INCLUDED.

F. THESE REQUIREMENTS ARE IN ADDITION TO BID PROCEDURES AND REQUIREMENTS OF THE RFP OR GENERAL SPECIFICATIONS.

END OF SECTION

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

1.0 GENERAL

1.01 DESCRIPTION

A. ALL WORK SPECIFIED IN THIS SECTION IS GOVERNED BY THE COMMON WORK RESULTS FOR HVAC SECTION 23 05 00.

B. THIS SECTION 23 05 93 AND THE ACCOMPANYING DRAWINGS COVER THE PROVISION OF ALL LABOR, EQUIPMENT, APPLIANCES, AND MATERIALS AND PERFORMING ALL OPERATIONS IN CONNECTION WITH THE TESTING AND BALANCING (TAB) OF THE HEATING, VENTILATING AND AIR CONDITIONING (HVAC) SYSTEMS AS SPECIFIED HEREIN AND AS SHOWN. THESE SYSTEMS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1. SUPPLY DISTRIBUTION SYSTEMS

2. RETURN AND EXHAUST AIR SYSTEMS

3. HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT (ALL SCHEDULED EQUIPMENT AS A MINIMUM)

4. HYDRONIC SYSTEMS

1.02 INTENT

A. IT IS THE INTENT OF THIS SECTION OF THE SPECIFICATIONS TO PROVIDE A COMPLETE OPERABLE AND BALANCED HVAC SYSTEM AS SHOWN AND SPECIFIED WHICH IS REASONABLY AIRTIGHT, COMFORTABLE AND FREE OF OBJECTIONABLE NOISE AND VIBRATION.

1.03 SCOPE OF WORK

A. HVAC TEST AND BALANCE SHALL BE PERFORMED BY AN INDEPENDENT AGENCY CERTIFIED BY THE ASSOCIATED AIR BALANCE COUNCIL (AABC) OR NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) UNDER DIRECT CONTRACT TO THE GENERAL CONTRACTOR. ALL WORK PERFORMED BY THIS AGENCY SHALL BE PERFORMED BY QUALIFIED TECHNICIANS UNDER THE DIRECT SUPERVISION OF AN AABC OR NEBB CERTIFIED TEST AND BALANCE ENGINEER. THE AGENCY SHALL BE INDEPENDENT AND SHALL NOT BE ASSOCIATED IN ANY WAY WITH THE INSTALLING HVAC SUBCONTRACTOR.

B. HVAC TEST AND BALANCE SHALL BE PERFORMED IN ACCORDANCE WITH THE 7TH EDITION OF THE AABC NATIONAL STANDARDS, 2016 FOR TOTAL SYSTEM BALANCE OR THE NEBB PROCEDURAL STANDARDS FOR TAB OF ENVIRONMENTAL SYSTEMS, 8TH EDITION, 2015 TOGETHER WITH THE NEBB TAB MANUAL FOR TECHNICIANS, 2ND EDITION.

C. THE FINAL TEST AND BALANCE REPORT SHALL SERVE TO SUBSTANTIATE COMPLIANCE WITH THE INTENT OF THE CONTRACT DOCUMENTS, SPECIFICALLY THE HVAC SYSTEMS.

D. HVAC TEST AND BALANCE SHALL NOT BEGIN UNTIL THE SYSTEMS ARE SUBSTANTIALLY COMPLETE.

E. UPON THE COMPLETION OF THE TEST AND BALANCE WORK, THE AGENCY SHALL SUBMIT FOUR (4) COPIES OF THE COMPLETE HVAC TEST AND BALANCE REPORT DIRECTLY TO THE ARCHITECT.

F. THE AGENCY, AS A PART OF ITS CONTRACT WITH THE GENERAL CONTRACTOR, SHALL ACT AS AN AUTHORIZED INSPECTION AGENCY, RESPONSIBLE TO THE GENERAL CONTRACTOR AND THE ARCHITECT AND SHALL, DURING THE TEST AND BALANCE, LIST THOSE ITEMS WHICH REQUIRE CORRECTION OR HAVE NOT BEEN INSTALLED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

G. THE AGENCY SHALL PLAINLY MARK THE SETTINGS OF ALL VALVES, DAMPERS AND OTHER ADJUSTABLE DEVICES. IF A BALANCING DEVICE IS PROVIDED WITH A MEMORY STOP, IT SHALL BE SET, LOCKED AND MARKED.

H. THE AGENCY SHALL RECORD ALL OF THE FINAL SET POINTS ON ALL VARIABLE SPEED DRIVES.

1.04 SUBMITTALS

A. THE NAME AND CERTIFICATION OF THE AGENCY, ALONG WITH THE NAME AND CERTIFICATION OF THE CERTIFIED TEST AND BALANCE ENGINEER, SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW WITHIN 30 DAYS AFTER THE AWARD OF THE GENERAL CONTRACT.

B. THE SELECTED AGENCY SHALL SUBMIT TO THE OWNER:

- PROCEDURAL MANUAL
- REPORT FORMS
- AABC OR NEBB PERFORMANCE GUARANTEE
- INSTRUMENT LIST AND CALIBRATION DATES
- SCHEDULE
- FLOOR PLANS AS NEEDED TO UNIQUELY IDENTIFY DEVICE LOCATIONS

C. A REVIEWED COPY OF EACH OF THE ABOVE SHALL BE RETURNED TO THE AGENCY BEFORE THE HVAC TEST AND BALANCE BEGINS.

D. IF A COMPLETE SUBMITTAL IN ACCORDANCE WITH THESE REQUIREMENTS IS NOT RECEIVED WITHIN 60 DAYS FROM AWARD OF THE GENERAL CONTRACT, THEN THE ARCHITECT RESERVES THE RIGHT TO SELECT THE AGENCY.

2.0 PRODUCTS

2.01 (NOT APPLICABLE)

3.0 EXECUTION

D. HVAC TEST AND BALANCE SHALL NOT BEGIN UNTIL THE SYSTEMS ARE SUBSTANTIALLY COMPLETE.

E. UPON THE COMPLETION OF THE TEST AND BALANCE WORK, THE AGENCY SHALL SUBMIT FOUR (4) COPIES OF THE COMPLETE HVAC TEST AND BALANCE REPORT DIRECTLY TO THE ARCHITECT.

F. THE AGENCY, AS A PART OF ITS CONTRACT WITH THE GENERAL CONTRACTOR, SHALL ACT AS AN AUTHORIZED INSPECTION AGENCY, RESPONSIBLE TO THE GENERAL CONTRACTOR AND THE ARCHITECT AND SHALL, DURING THE TEST AND BALANCE, LIST THOSE ITEMS WHICH REQUIRE CORRECTION OR HAVE NOT BEEN INSTALLED IN

3.01 GENERAL CONTRACTOR'S DUTIES

A. THE GENERAL CONTRACTOR SHALL PROVIDE THE FOLLOWING, WITHIN 10 DAYS AFTER HIS RECEIPT, TO THE AGENCY:

- CONTRACT DRAWINGS
- CONTRACT APPLICABLE SPECIFICATION DIVISION 23 (OTHERS AS APPLICABLE)
- ADDENDA
- CHANGE ORDERS
- REVIEWED SUBMITTALS

B. THE GENERAL CONTRACTOR SHALL START-UP AND MAINTAIN THE HVAC SYSTEMS AND SHALL CONTINUE THE OPERATION OF THE HVAC SYSTEMS DURING EACH DAY OF TESTING AND BALANCING. START-UP AND OPERATION SHALL INCLUDE, AS A MINIMUM, THE FOLLOWING:

- ALL EQUIPMENT OPERABLE AND IN SAFE CONDITION.
- TEMPERATURE CONTROL SYSTEM COMPLETE.
- PROPER THERMAL OVERLOAD PROTECTION IN PLACE FOR ELECTRICAL EQUIPMENT.
- DUCTWORK LEAKAGE RATES NOT EXCEEDING THOSE SPECIFIED AND ALL DUCT SYSTEMS CLEAN OF DEBRIS.
- AIR TRANSFER SYSTEMS SHALL HAVE:
 - CORRECT FAN ROTATION AND RPM.
 - COIL FINS CLEANED AND COMBED.
 - FILTERS CLEAN AND IN PLACE.
 - ACCESS DOORS CLOSED.
 - ALL DAMPERS IN PLACE AND OPEN.
 - ALL GRILLES, REGISTERS, AND DIFFUSERS INSTALLED.

C. PROVIDE SUFFICIENT TIME BEFORE THE FINAL COMPLETION DATE SO THAT TESTING AND BALANCING CAN BE ACCOMPLISHED. COORDINATE THE SUBMITTED TAB SCHEDULE.

D. PROVIDE IMMEDIATE LABOR AND TOOLS TO MAKE REQUIRED CORRECTIONS AND REPAIRS WITHOUT UNDUE DELAY.

E. THE GENERAL CONTRACTOR AND HIS SUBCONTRACTORS SHALL COOPERATE FULLY WITH THE AGENCY TO PROVIDE THE FOLLOWING:

- ACCESS TO HVAC SYSTEM COMPONENTS.
- THE RIGHT TO ADJUST THE SYSTEMS.

F. ANY CONDITIONS WHICH PREVENT PROPER HVAC TEST AND BALANCE SHALL BE REPORTED BY THE AGENCY TO THE GENERAL CONTRACTOR AND ARCHITECT WITHIN 7 DAYS OF THEIR DISCOVERY.

G. IF IT IS DETERMINED BY THE AGENCY AND CONFIRMED BY THE ARCHITECT THAT DRIVE CHANGES OR ADDITIONAL BALANCING DAMPERS ARE REQUIRED, THE CONTRACTOR SHALL OBTAIN AND INSTALL ALL NECESSARY COMPONENTS.

H. THE AGENCY SHALL COOPERATE WITH THE ARCHITECT AND THE CONTRACTOR AND ALL HIS SUBCONTRACTORS TO PERFORM THE WORK IN SUCH A MANNER AS TO MEET THE JOB SCHEDULE.

I. THE AGENCY SHALL VERIFY THAT ALL SYSTEM COMPONENTS ARE IN PLACE AND IN PROPER WORKING ORDER PRIOR TO LEAVING THE PROJECT.

J. ALL REPORTED AND RECORDED DATA SHALL REPRESENT TRUE MEASURED CONDITIONS.

K. WHERE EQUIPMENT USES VARIABLE SPEED DRIVES, AND WHERE FEASIBLE, VFDS SHALL BE USED AS THE PRIMARY BALANCING METHOD PRIOR TO ADJUSTMENT OR BALANCING OF VALVES, DAMPERS, ETC.

END OF SECTION

SECTION 23 07 13
DUCT INSULATION

1.0 GENERAL

1.01 DESCRIPTION

A. ALL WORK SPECIFIED IN THIS SECTION IS GOVERNED BY THE COMMON WORK RESULTS FOR HVAC SECTION 23 05 00.

B. THIS SECTION 23 07 13 AND THE ACCOMPANYING DRAWINGS COVER THE PROVISIONS OF ALL LABOR, EQUIPMENT, APPLIANCES, AND MATERIALS AND PERFORMING ALL OPERATIONS IN CONNECTION WITH THE CONSTRUCTION OF THE DUCTWORK SYSTEMS AS SPECIFIED HEREIN AND AS SHOWN. THESE SYSTEMS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

- INSULATION FOR TYPICAL DUCTWORK
- DUCT LINER
- INSULATION FOR DUCTWORK OUTSIDE
- INSULATION FOR GREASE EXHAUST DUCTWORK
- INSULATION FOR GENERATOR EXHAUST PIPE

1.02 INTENT

A. IT IS THE INTENT OF THIS SECTION OF THE SPECIFICATIONS TO PROVIDE A COMPLETE OPERABLE DUCT SYSTEM AS SHOWN AND SPECIFIED WHICH IS REASONABLY AIRTIGHT, FREE OF NOISE, VIBRATION, AND SWEATING, AND FABRICATED SO AS TO FIT INTO THE SPACE ALLOTTED AND TO EXHIBIT A MINIMUM RESISTANCE TO AIRFLOW.

2.0 PRODUCTS

2.01 DUCT LINER

A. DUCT LINER SHALL BE ONE INCH THICK, 1 1 LB. DENSITY (3 LB. DENSITY ON MEDIUM- AND HIGH-PRESSURE SUPPLY AIR SYSTEMS, EXCEPT THAT 1 1 LB. DENSITY IS ACCEPTABLE IF THE LINER IS AT LEAST R 4.2 AND NRC ≥ 0.6) FIBROUS GLASS WITH ONE FACE COATED WITH A BLOCK FIRE RETARDANT COMPOUND. THE PERMANENT COMPOSITE FIRE AND SMOKE HAZARD RATING OF THE LINER SHALL BE STENCILED ON THE LINER FACE AND SHALL BE:

MAXIMUM FLAME SPREAD 25

MAXIMUM SMOKE DEVELOPED 50

2.02 TYPICAL DUCT INSULATION

A. DUCT INSULATION SHALL BE 2" THICK, MINIMUM 3/4 LB. DENSITY FIBERGLASS WITH AN FSKL 0.00035" THICK ALUMINUM FOIL JACKET, REINFORCED WITH FIBERGLASS SCRIM. THERMAL CONDUCTIVITY SHALL BE A MAXIMUM OF K = 0.29 AT 75T MEAN TEMPERATURE, OR O MAXIMUM OF K=0.27 AT 25A COMPRESSION.

B. INSULATION ADHESIVE SHALL BE BENJAMIN FOSTER 85-20. TAPE SHALL BE ALUMINUM FOIL AND SHALL BE SMACNA LISTED AND LABELED.

C. THE COMPOSITE NFPA 90A AND 90B, ASTM E84, UL RATING OF THE INSTALLED INSULATION SHALL NOT EXCEED 25/50.

D. THE GREASE EXHAUST DUCTWORK SHALL HAVE ZERO-CLEARANCE TO COMBUSTIBLES WRAP FROM THE HOOD CONNECTION TO DISCHARGE TERMINATION. COORDINATE THE INSULATION WITH ALL REQUIRED ACCESS PANELS, DRAINS, ETC. AS REQUIRED BY NFPA 96.

2.03 MINIMUM INSULATION REQUIREMENTS AS PER ASHRAE 90.1 2019:

	SUPPLY	RETURN
UNCONDITIONED SPACES WITHIN BUILDING:	R-6	R-6
INDIRECTLY CONDITIONED SPACES:	R-1.9	R-1.9
OUTSIDE OF BUILDING:	R-8	R-8

3.0 EXECUTION

3.1 INSTALLATION

A. DUCTWORK SHALL BE INSTALLED IN STRICT ACCORDANCE WITH SMACNA, UL, AND NFPA STANDARDS.

B. DUCT LINER SHALL BE PROVIDED THROUGHOUT ALL RETURN AIR, TRANSFER, AND PLENUMS. DUCT LINER SHALL ALSO BE PROVIDED FOR THE FOLLOWING MINIMUM DISTANCES, THROUGH THE FIRST ELBOW(S), OR AS OTHERWISE INDICATED ON THE DRAWINGS, WHICHEVER IS GREATER, DOWNSTREAM OF EACH UNIT INDICATED BELOW:

- PACKAGED ROOFTOP UNIT — 10 FT
- SELF-CONTAINED AIR CONDITIONING UNIT — 10 FT
- CENTRAL AIR HANDLING UNIT — 10 FT
- SPLIT SYSTEM AIR HANDLING UNIT — 10 FT
- WATER-SOURCE HEAT PUMP — 10 FT
- FAN COIL UNIT — 5 FT
- TERMINAL UNIT — 5 FT

C. STRAIGHT RUNS ONLY SHALL BE FACTORED INTO THE ABOVE DISTANCE REQUIREMENTS, ELBOWS, ETC., WITHIN THE LENGTH SHALL BE LINED BUT SHALL NOT COUNT TOWARDS THE LENGTH REQUIREMENT.

D. DUCT LINER SHALL NOT BE INSTALLED WITHIN SIX INCHES OF A DAMPER, INCLUDING FIRE AND/OR SMOKE DAMPERS. METAL CASINGS ARE REQUIRED ON THE DOWNSTREAM SIDE OF THE EXPOSED INSULATION, WHERE LINING HAS BEEN INTERRUPTED, EXTERNAL INSULATION IS REQUIRED.

E. DUCT LINER SHALL BE CUT TO PROVIDE OVERLAPPED AND COMPRESSED LONGITUDINAL CORNER JOINTS. LINER SHALL BE INSTALLED WITH THE COATED SURFACE FACING THE AIR STREAM. DUCT LINER SHALL BE ADHERED TO THE DUCTWORK WITH A 100% COVERAGE OF THE SHEET METAL SURFACES USING A FIRE RETARDANT ADHESIVE APPLIED BY SPRAYING. COAT ALL EXPOSED LEADING EDGES AND ALL TRANSVERSE JOINTS WITH FIRE RETARDANT ADHESIVE. THE LINER SHALL BE ADDITIONALLY SECURED USING METAL PINS WELDED TO THE DUCT AND SPEED WASHERS. ALL LEADING EDGES SHALL BE SECURED WITH SHEET METAL AIRFOILS.

F. INSIDE THE VAPOR BARRIER OF THE BUILDING, ALL SUPPLY AIR DUCTWORK WHICH IS NOT LINED SHALL BE INSULATED. ALL SUPPLY AIR DUCTWORK WHICH IS ON THE TOP FLOOR, DOWNSTREAM OF A PIU SERVING AN EXTERIOR EXPOSURE OR IS WITHIN 25 FEET OF AN EXTERIOR DOOR SHALL BE INSULATED. ALL OUTSIDE AIR DUCTWORK SHALL BE INSULATED. INSULATION SHALL BE CUT SLIGHTLY LONGER THAN CIRCUMFERENCE OF DUCT TO ENSURE FULL THICKNESS AT CORNERS. ALL INSULATION SHALL BE APPLIED WITH EDGES TIGHTLY SEALED. INSULATION SHALL BE ADHERED TO DUCT WITH FIRE-RESISTANT ADHESIVE. ADHESIVE SHALL BE APPLIED SO THAT INSULATION CONFORMS TO DUCT SURFACES UNIFORMLY AND FIRMLY. IN ADDITION TO THE ADHESIVE, THE INSULATION SHALL BE ADDITIONALLY SECURED TO THE BOTTOM OF ALL DUCTS 18" OR WIDER BY MEANS OF WELDED PINS AND SPEED CLIPS. THE PROTRUDING END OF THE PINS SHALL BE CUT OFF FLUSH AFTER THE SPEED CLIPS HAVE BEEN APPLIED. THE VAPOR BARRIER FACING SHALL BE THOROUGHLY SEALED WITH TAPE WHERE THE PINS HAVE PIERCED THROUGH. ALL JOINTS SHALL BE SEALED WITH 2" WIDE SMACNA TAPE. ANY CUTS OR TEARS SHALL BE SEALED WITH SMACNA TAPE.

G. ALL OUTSIDE AIR DUCTWORK LOCATED IN CONDITIONED OR SEMI-CONDITIONED SPACES SHALL BE EXTERNALLY INSULATED SIMILAR TO SUPPLY DUCTWORK.

H. ALL CONDITIONED AIR DUCTWORK, INCLUDING PARTIALLY CONDITIONED ENERGY RECOVERY VENTILATOR OUTSIDE AIR SUPPLY TO THE BUILDING AND EXHAUST DUCTWORK, INSTALLED IN SPACES THAT ARE VENTILATED ONLY, I.E. PENTHOUSES, SHALL BE INSULATED.

END OF SECTION

SECTION 23 31 00
HVAC DUCTS, ACCESSORIES, AND CASINGS

1.0 GENERAL

1.01 DESCRIPTION

A. ALL WORK SPECIFIED IN THIS SECTION IS GOVERNED BY THE COMMON WORK RESULTS FOR HVAC SECTION 23 05 00.

- SUPPLY AIR DUCTWORK
- RETURN, TRANSFER, AND RELIEF AIR DUCTWORK
- EXHAUST DUCTWORK
- OUTSIDE AIR DUCTWORK
- DUCTWORK ACCESSORIES

C. C. DUCT SIZES SHOWN ON PLANS ARE CLEAR INSIDE AIR STREAM DIMENSIONS.

1.02 INTENT

A. IT IS THE INTENT OF THIS SECTION OF THE SPECIFICATIONS TO PROVIDE A COMPLETE OPERABLE DUCT SYSTEM AS SHOWN AND SPECIFIED WHICH IS REASONABLY AIRTIGHT, FREE OF NOISE, VIBRATION, AND SWEATING, AND FABRICATED SO AS TO FIT INTO THE SPACE ALLOTTED AND TO EXHIBIT A MINIMUM RESISTANCE TO AIRFLOW.

1.03 DESIGN AND CONSTRUCTION — DUCTWORK

A. DUCTWORK SHALL BE PROVIDED IN STRICT ACCORDANCE WITH THE THIRD EDITION — 2005 — OF THE SMACNA HVAC DUCT CONSTRUCTION STANDARDS — METAL AND FLEXIBLE. NFPA NO. 90A, 90B, 91 AND 96, AND UL 181. WHERE SMACNA TABLES HAVE AN OPTION BETWEEN DIFFERENT GAUGES AND SUPPORTS, THE HEAVIER GAUGE SHALL BE USED.

B. DUCTWORK DIMENSIONS SHOWN ARE NET, CLEAR, INSIDE DIMENSIONS WITH NO ALLOWANCE SHOWN FOR DUCT LINER. ALL DUCTWORK SPECIFIED TO BE LINED SHALL BE 2" LARGER THAN SHOWN IN EACH DIMENSION TO COMPENSATE FOR THE LINER. DUCTWORK SHALL BE SQUARE, RECTANGULAR, ROUND, SPIRAL, OR FLAT OVAL AS NOTED. CONVERSION OF DUCT SHAPES AND SIZES SHOWN SHALL BE ACCOMPLISHED WITHOUT INCREASING AIR VELOCITIES OR FRICTION LOSSES AND IS SUBJECT TO PRIOR APPROVAL BY THE ARCHITECT AND ENGINEER.

C. ELBOWS SHALL BE EITHER FULL RADIUS TYPE (INSIDE RADIUS EQUAL TO DUCT WIDTH), FIVE-CORE RADIUS FLAT-OVAL TYPE OR, IN LOW-PRESSURE SYSTEMS ONLY, MITERED WITH DOUBLE-THICKNESS TURNING VANES.

D. ABRUPT CHANGES IN DUCT SIZES AND SHAPES SHALL NOT BE PERMITTED. THE TOTAL ANGLE OF DIVERGING TRANSITIONS SHALL BE NOT MORE THAN 15 DEGREES; CONVERGING TRANSITIONS SHALL BE NOT MORE THAN 30 DEGREES UNLESS OTHERWISE NOTED OR REQUIRED DUE TO STRUCTURAL CONSTRAINTS.

E. OFFSETS, TRANSITIONS, RISES, AND DROPS ARE NOT INDIVIDUALLY DETAILED ON THE DESIGN DRAWINGS. THEY SHALL BE PROVIDED AS REQUIRED TO FIT THE DUCTWORK INTO THE ALLOCATED SPACES.

F. TRANSITION RECTANGULAR DUCTWORK ON BOTTOM AND SIDES. MAINTAIN TOP OF DUCTWORK LEVEL AND AS HIGH AS POSSIBLE.

G. "MEDIUM PRESSURE DUCTWORK" SHALL BE CONSTRUCTED FOR 3" WC STATIC PRESSURE CLASS AT 4000 FPM VELOCITY WITH CLASS A SEALS. APPLICATIONS SHALL INCLUDE:

- ALL SUPPLY AIR DUCTWORK BETWEEN THE PACKAGED ROOFTOP UNIT AND THE TERMINAL UNITS.
- ALL DUCTWORK BETWEEN CENTRAL VENTILATION FANS (SUCH AS OUTSIDE AIR, TOILET EXHAUST, PRESSURE RELIEF, ENERGY RECOVERY UNITS, 100% OUTDOOR AIR UNITS) AND THEIR TERMINAL UNITS.
- ALL DUCTWORK IN SYSTEMS SUBJECT TO MORE THAN 1" WC.
- H. ALL OTHER DUCTWORK SHALL BE CONSTRUCTED FOR STANDARD 1" WC STATIC PRESSURE CLASS AT 2500 FPM WITH CLASS C SEALS AND IS HEREIN DEFINED AS "LOW-PRESSURE DUCTWORK".

I. PROVIDE THE FOLLOWING TYPES OF DUCTWORK MATERIAL FOR THE SERVICES INDICATED:

1. GALVANIZED SHEET METAL: SUPPLY, RETURN, EXHAUST, AND RELIEF OF CONDITIONED AND OUTSIDE AIR

2.0 PRODUCTS

2.01 GALVANIZED SHEETMETAL

A. GALVANIZED SHEET METAL SHALL BE LOCK-FORMING GRADE G90—ASTM A 525 HOT DIP GALVANIZED STEEL SHEETS. SHEET METAL SHALL BE GALVANIZED ON EACH SIDE WITH NOT LESS THAN 1.25 OUNCES OF ZINC PER SQUARE FOOT.

B. GALVANIZED SHEET METAL INSTALLED OUTSIDE THE BUILDING AND SUBJECT TO WEATHER SHALL BE SOLDERED OR WELDED. SECTION 23 07 13 FOR ADDITIONAL INFORMATION ABOUT COVERING AND INSULATION.

C. GALVANIZED SHEET METAL INSTALLED OUTSIDE THE BUILDING AND NOT EXPOSED TO WEATHER, SUCH AS IN COVERED LOADING DOCKS AND PARKING DECKS, MAY MATCH THE CONSTRUCTION OF DUCTWORK INSIDE THE BUILDING.

D. GALVANIZED SHEET METAL DUCTWORK OUTSIDE THE BUILDING WITHIN 20 MILES OF THE SEACOAST SHALL HAVE CORROSION COATING APPROPRIATE TO THE INSTALLATION LOCATION.

2.02 SPIRAL DUCT

A. SPIRAL DUCT SHALL BE UTILIZED FOR ALL FLAT-OVAL AND ROUND DUCTWORK IN MEDIUM AND HIGH-PRESSURE SYSTEMS.

B. SPIRAL DUCT SHALL BE THE PRODUCT OF UNITED MCGILL CORPORATION, R.V. MONEY, EASTERN SHEET METAL, OR AN APPROVED EQUAL.

C. SPIRAL DUCT WITH INTERNAL RIBS IS NOT ACCEPTABLE.

D. SPIRAL DUCT SHALL CONFORM TO SMACNA 2005 STANDARDS. LIGHTER GAUGES, ETC., DUE TO STANDING RISBS, ARE NOT ACCEPTABLE.

2.03 DOUBLE-WALL DUCTWORK

A. SEE SECTION 23 07 13 FOR INSULATION. INSULATION SHALL BE SANDWICHED BETWEEN TWO (2) LAYERS OF SHEET METAL IN ACCORDANCE WITH SMACNA STANDARDS. ALL JOINTS SHALL BE PERMANENTLY SEALED AIRTIGHT.

2.08 DAMPERS

2. SMOKE DAMPERS SHALL BE APPROPRIATE FOR THE INSTALLATION LOCATION AND APPLICATION. ALL FIRE DAMPERS IN SUPPLY, RETURN, EXHAUST, ETC. SHALL BE DYNAMIC-TYPE.

3. SMOKE DAMPERS SHALL BE MANUFACTURED BY PREFCO, LOUVERS & DAMPERS, INC., POTTORFF, GREENHECK, NAILOR, RUSKIN, OR AN APPROVED EQUAL.

E. FIRE/SMOKE DAMPERS:
1. FIRE/SMOKE DAMPERS MAY BE COMBINED INTO A COMBINATION FIRE/SMOKE DAMPERS. ALL PROVISIONS OF THE ABOVE SHALL APPLY. FIRE/SMOKE DAMPERS SHALL BE UL-LISTED.
2. CONTRACTOR TO 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.

F. BACKDRAFT DAMPERS:
1. BACKDRAFT DAMPERS SHALL BE SIZED ACCORDING TO THEIR INSTALLATION LOCATION AND NOTED PRESSURE SETTING. DAMPER PRESSURE SETTING SHALL BE ADJUSTABLE AND SHALL BE ACCESSIBLE FROM OUTSIDE DUCTWORK OR VIA ACCESS HATCH, AS APPLICABLE.

2.09 LOW-PRESSURE DUCT BRANCHES:
A. SPLITTER DAMPERS SHALL BE PROVIDED AT ALL LOW-PRESSURE DUCTWORK BRANCHES. ALL LOW-PRESSURE DUCTWORK BRANCHES SHALL BE RADIUS OR 45-DEGREE TAKE-OFFS. STRAIGHT TAPS ARE UNACCEPTABLE. THE LENGTH OF THE DAMPER BLADE SHALL BE THE SAME AS THE WIDTH OF THE WIDEST DUCT SECTION AT THE SPLIT, BUT IN NO CASE SHALL BLADE LENGTH BE LESS THAN 12". EACH OPERATOR ROD SHALL HAVE A LOCKING SWIVEL JOINT.

2.10 FLEXIBLE DUCT:
A. FLEXIBLE DUCTWORK SHALL BE CLASS 1, UL 181 AIR DUCT AND MEET NFPA 90A AND 90B STANDARDS.

B. THE INTERNAL DUCT SURFACE SHALL BE ACOUSTICALLY RATED, BLACK CPE BONDED TO A COATED STEEL WIRE HELIX. THE EXTERNAL JACKET SHALL BE A FIBERGLASS, BI-DIRECTIONALLY REINFORCED, METALLIZED VAPOR BARRIER WITH A STANDING, TRIPLE-PLY SEAM. FIBERGLASS INSULATION SHALL BE PROVIDED BETWEEN THE DUCT SURFACE AND THE JACKET TO ACHIEVE A MAXIMUM THERMAL CONDUCTANCE OF 0.24 BTUHR/SQ. FT./F AT 75°F MEAN.

C. FLEXIBLE DUCTWORK SHALL BE SUITABLE FOR 10" W.G. POSITIVE PRESSURE AND 1" W.G. NEGATIVE PRESSURE IN SIZES 4" THROUGH 12" ID, AND 6" W.G. POSITIVE PRESSURE AND 0.5" W.G. NEGATIVE PRESSURE IN SIZES 14"–16" ID.

D. FLEXIBLE DUCTWORK, INSULATION, AND INSULATION COVER SHALL BE SUITABLE FOR CEILING RETURN AIR PLENUM INSTALLATION AND SHALL COMPLY WITH ALL APPLICABLE CODES AND STANDARDS REGARDING SUCH CEILING PLENUM INSTALLATIONS.

E. FLEXIBLE DUCT SHALL BE THERMAFLEX M—KE OR AN APPROVED EQUAL.

F. THE MAXIMUM ALLOWABLE INSTALLED LENGTH OF FLEXIBLE DUCTWORK SHALL BE AS FOLLOWS:

1. 5"—0" ON SUPPLY AIR SYSTEMS LIMITED TO THE RUNOUTS FROM THE SHEETMETAL DUCTWORK TO EACH TERMINAL UNIT.

2. 2"—0" ON CONNECTIONS FROM ROUND NECK GRILLES TO SHEETMETAL DUCTWORK ON RETURN, EXHAUST AND TRANSFER DUCTWORK.

G. PROVIDE A SPIN-IN FITTING WITH INTEGRAL SCOOP AND VOLUME DAMPER AT ALL FLEXIBLE RUN—OUT CONNECTIONS IN LOW—PRESSURE SUPPLY AIR DUCTWORK ONLY, EXCEPT LOCATIONS WHERE SPIN-IN FITTINGS WOULD PROJECT MORE THAN 50A INTO THE PROJECTING DUCTWORK DIMENSION. ADHESIVE FITTINGS ARE ACCEPTABLE PROVIDED THEY ARE ALSO SCREWED TO THE DUCTWORK AND SEALED WITH MASTIC.

H. FLEXIBLE DUCTWORK SHALL NOT PASS THROUGH WALL, FLOORS, OR CEILINGS.

2.11 TERMINAL UNIT RUNOUTS

A. MEDIUM AND HIGH—PRESSURE RUNOUTS TO TERMINAL UNITS SHALL BE CONNECTED TO THE TRUNK DUCT WITH FACTORY—WELDED LATERALS, CONICAL TEES OR BELLMOUTH FITTINGS. ABRUPT ROUND TO RECTANGULAR TAPS ARE STRICTLY PROHIBITED AND SHALL BE REJECTED.

B. TERMINAL UNIT RUNOUTS SHALL BE THE LARGER OF THE ASSOCIATED TERMINAL UNIT INLET SIZE OR THE SIZE NOTED ON THE DRAWINGS.

3.0 EXECUTION

3.01 INSTALLATION

A. DUCTWORK SHALL BE INSTALLED IN STRICT ACCORDANCE WITH SMACNA, UL, AND NFPA STANDARDS.

B. ALL DUCTWORK INSTALLED OUTSIDE THE BUILDING SHALL BE SECURED TO THE STRUCTURE. COORDINATE WITH THE STRUCTURAL ENGINEER AS NEEDED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DESIGN AND COORDINATE ALL SUPPORTS. ALL SUPPORTS SHALL BE DESIGNED TO WITHSTAND ALL CODE—REQUIRED WIND AND SEISMIC LOADS.

C. FLEXIBLE DUCTS UTILIZED IN THE LOW—PRESSURE DUCTWORK SYSTEMS SHALL BE INSTALLED WITHOUT KINKS OR BENDS WHICH ARE LESS THAN A CENTERLINE RADIUS EQUAL TO OR GREATER THAN TWICE THE DIAMETER OF THE FLEXIBLE DUCT BEING INSTALLED. ALSO, IN THE RUNOUTS FROM THE MEDIUM OR HIGH—PRESSURE DUCTWORK TO THE TERMINAL UNITS, THE FLEXIBLE DUCTS SHALL BE INSTALLED WITH A VARIANCE OF NO MORE THAN 1" PER FOOT OF INSTALLED LENGTH OFF A STRAIGHT AND LEVEL LINE FROM THE CENTERLINE OF THE SHEETMETAL DUCTWORK RUNOUT OR TOP TO THE CENTERLINE OF THE TERMINAL UNIT INLET. THE SIZE OF THE FLEXIBLE DUCTWORK CONNECTED TO EACH TERMINAL UNIT SHALL BE THE EQUIVALENT SIZE OF THE LARGER OF THE FOLLOWING:

1. THE INLET SIZE OF THE TERMINAL UNIT OR VVT VALVE
2. THE RUNOUT SIZE INDICATED ON THE DRAWINGS

SHOULD THE RUNOUT SIZE INDICATED ON THE DRAWINGS DIFFER FROM THE INLET SIZE OF THE TERMINAL UNIT OR VVT VALVE, OR WHERE THE INLET TO THE TERMINAL UNIT VVT IS RECTANGULAR, THE TRANSITION SHALL BE MADE WITH SHEETMETAL AND SHALL OCCUR AT THE INLET TO THE TERMINAL UNIT VVT.

D. ALL LOW PRESSURE DUCTWORK DOWNSTREAM OF VAV UNITS SHALL BE LEFT UNCAPPED FOR BALANCING UNLIT TENANT FIT—UP AFFECTS THE UNITS.

E. ALL INTERSECTIONS (CROSSING) OF LOW—PRESSURE AND MEDIUM—PRESSURE DUCTWORK SHALL BE MADE WITH OFFSETS IN THE LOW—PRESSURE DUCTWORK ONLY. THE MEDIUM PRESSURE DUCTWORK SHALL BE RUN STRAIGHT AND LEVEL.

F. ELECTRIC DUCT HEATERS SHALL BE INSTALLED AS INDICATED AND IN CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. COORDINATE THE ACTUAL UNITS TO BE PROVIDED WITH ALL TRADES. THE HEATER SHALL BE TESTED AND ADJUSTED AFTER INSTALLATION TO PROVIDE THE CAPACITIES INDICATED.

G. DUCTWORK LABELS, INCLUDING FACTORY LABELS, TAGS, ETC. EXCEPT EQUIPMENT NAMEPLATES SHALL BE REMOVED TO THE SATISFACTION OF THE ARCHITECT IN ALL EXPOSED AREAS.

END OF SECTION

SECTION 23 34 00 HVAC FANS

DIRECT DRIVE PREMIUM CEILING MOUNTED CENTRIFUGAL EXHAUST FANS - GREENHECK MODEL SP-A

A. GENERAL DESCRIPTION:
1. BASE FAN PERFORMANCE AT STANDARD CONDITIONS (DENSITY 0.075 LB/FT³)
2. CEILING MOUNTED APPLICATIONS
3. PERFORMANCE CAPABILITIES UP TO 1,600 CUBIC FEET PER MINUTE (CFM) AND STATIC PRESSURE TO 0.75 INCHES OF WATER GAUGE
4. FANS ARE AVAILABLE IN NINETEEN SIZES (50 - 1550 UNIT SIZES)
5. MAXIMUM OPERATING TEMPERATURE IS 130 FAHRENHEIT (54.4 CELSIUS)
6. SOUND LEVELS AS LOW AS 0.7 AMCA SONSOUND LEVELS AS LOW AS <0.3 AMCA SONES
7. UL/CUL LISTED FOR ABOVE BATHTUB EXHAUST
8. FANS ARE UL/CUL LISTED 507 - ELECTRIC FANS
9. EACH FAN SHALL BEAR A PERMANENTLY AFFIXED MANUFACTURER'S NAMEPLATE CONTAINING THE MODEL NUMBER AND INDIVIDUAL SERIAL NUMBER

B. WHEEL:
1. FORWARD CURVED CENTRIFUGAL WHEEL
2. CONSTRUCTED OF GALVANIZED STEEL OR CALCIUM CARBONATE FILLED POLYPROPYLENE
3. STATICALLY AND DYNAMICALLY BALANCED IN ACCORDANCE TO AMCA STANDARD 20405

C. MOTORS:
1. AC INDUCTION MOTOR
a. MOTOR ENCLOSURES: TOTALLY ENCLOSED AIR OVER; (TEAO)- DESIGNED TO BE USED SOLELY IN THE AIRSTREAM. CONSTRUCTED WITH A DUST TIGHT COVER AND A AERODYNAMIC BODY WHICH REPLES UPON THE STRONG AIRFLOW OF THE FAN TO COOL THE MOTOR, NOT SUITABLE FOR HAZARDOUS ENVIRONMENTS.
b. MOTORS SHALL BE PERMANENTLY LUBRICATED SLEEVE BEARING TYPE TO MATCH WITH THE FAN LOAD AND FURNISHED AT THE SPECIFIC VOLTAGE AND PHASE.
c. MOTOR SHALL BE MOUNTED ON VIBRATION ISOLATORS AND BE ACCESSIBLE FOR MAINTENANCE
d. THERMAL OVERLOAD PROTECTION

D. HOUSING:
1. CONSTRUCTED OF HEAVY GAUGE GALVANIZED STEEL
2. INTERIOR SHALL BE LINED WITH 0.5 INCHES OF ACOUSTICAL INSULATION
3. PROFILE AS LOW AS 10 1/2 INCHES
E. SPRING LOADED ALUMINUM BACKDRAFT DAMPER:
1. PREVENTS AIR FROM ENTERING BACK INTO THE BUILDING WHEN FAN IS OFF
2. ELIMINATES RATTLING OR UNWANTED BACKDRAFTS

F. OUTLET:
1. TYPE OF OUTLET: ROUND
2. FIELD ROTATABLE FROM HORIZONTAL TO VERTICAL DISCHARGE
3. SHALL INCLUDE AN ALUMINUM BACKDRAFT DAMPER

G. EXTERNAL ELECTRICAL ACCESSORIES:
1. ELIMINATES REMOVING THE MOTOR PACK WHICH SAVES TIME ON INSTALLATION
2. FULLY ADJUSTABLE FOR MULTIPLE INSTALLATION CONDITIONS

H. MOUNTING BRACKETS:
1. FULLY ADJUSTABLE FOR MULTIPLE INSTALLATION CONDITIONS

END OF SECTION 23 34 00

SECTION 23 37 13

DIFFUSERS, REGISTERS, AND GRILLES

1.0 GENERAL
1.01 DESCRIPTION
A. ALL WORK SPECIFIED IN THIS SECTION IS COVERED BY THE COMMON WORK RESULTS FOR HVAC SECTION 23 05 00. B. THIS SECTION 23 37 13 AND THE ACCOMPANYING DRAWINGS COVER THE PROVISIONS OF ALL LABOR, EQUIPMENT, APPLIANCES AND MATERIALS, AND PERFORMING ALL OPERATIONS IN CONNECTION WITH THE CONSTRUCTION AND INSTALLATION OF AIR DISTRIBUTION DEVICES AS SPECIFIED HEREIN AND AS SHOWN. THESE UNITS INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING:

1. CEILING DIFFUSERS (CD)
2. RETURN AIR GRILLES (RG)
3. SUPPLY AIR GRILLES (SG)
4. EXHAUST AIR GRILLE (EG)

A. IT IS THE INTENT OF THIS SECTION OF THE SPECIFICATIONS TO PROVIDE COMPLETE, OPERABLE, ADJUSTED AIR DISTRIBUTION DEVICES AS SHOWN AND SPECIFIED WHICH ARE FREE OF EXCESSIVE NOISE, VIBRATION AND AIRFLOW FLUCTUATIONS.

1.03 SELECTION CRITERIA
A. ALL AIR DISTRIBUTION DEVICES SHALL BE SELECTED IN ACCORDANCE WITH THE FOLLOWING MINIMUM CRITERIA UNLESS OTHERWISE NOTED BELOW OR ON THE DRAWINGS:

1. METHOD OF MOUNTING SHALL BE COMPATIBLE WITH THE CEILING, WALL OR DUCT SURFACE WHICH IT MOUNTS ON OR IN; I.E. LAY-IN, SURFACE MOUNTING, PLASTER FRAME, DUCT COLLAR, ETC. THE ARCHITECTURAL DRAWINGS SHALL BE REFERENCED TO DETERMINE THE MOUNTING METHOD FOR EACH DEVICE. ALL FLANGES ON SURFACE MOUNTED DEVICES SHALL BE PROVIDED WITH A GASKET.

2. FINISH OF ALL CEILING MOUNTED DEVICES SHALL BE SELECTED TO MATCH THE COLOR OF THE ADJACENT CEILING. FINISH OF ALL WALL MOUNTED DEVICES SHALL BE PRIMER WHICH IS COMPATIBLE WITH THE FINISH COATING SPECIFIED FOR THE ADJACENT WALL; FINISH COAT WILL BE APPLIED UNDER DIVISION 9.

1.04 BASIS OF DESIGN
A. THE BASIS OF DESIGN IS TITUS. ANY PROPOSED SUBSTITUTIONS SHALL BE PROVEN EQUAL IN ALL RESPECTS TO THE EQUIPMENT SPECIFIED AS THE BASIS OF DESIGN. ANY MODIFICATIONS TO DUCTWORK, CONTROLS, CEILINGS, BUILDING STRUCTURE ETC., THAT RESULT FROM ANY SUBSTITUTION SHALL BE COORDINATED WITH ALL TRADES. THIS COORDINATION SHALL OCCUR BEFORE DELIVERY OF EQUIPMENT AND ANY MODIFICATIONS SHALL BE PERFORMED WITHOUT INCURRING ADDITIONS TO THE CONTRACT.

1.05 ACCEPTABLE MANUFACTURERS
A. ACCEPTABLE MANUFACTURERS ARE PRICE, CARNES, METAL AIRE, KRUEGER, NAILOR, AND TITUS, UON, PROVIDED THAT THEIR UNITS, PERFORMANCE, APPEARANCE AND PHYSICAL CHARACTERISTICS ARE EQUAL IN ALL RESPECTS FOR THIS SPECIFIC PROJECT.

2.0 PRODUCTS
2.01 DESCRIPTION
A. CEILING SUPPLY DIFFUSERS (CD-1, CD-2)

1. CD CEILING DIFFUSERS (CD) SHALL BE TITUS MODEL TMS (STEEL) OF THE SIZES AND MOUNTING TYPES SHOWN ON THE PLANS AND OUTLET SCHEDULE. THE TMS SHALL HAVE THREE CONES, WHICH GIVE A UNIFORM FACE SIZE AND APPEARANCE WHEN DIFFERENT NECK SIZES ARE USED IN THE SAME AREA. ALL CONES SHALL BE ONE PIECE PRECISION DIE-STAMPED; THE BACK CONE SHALL ALSO INCLUDE AN INTEGRALLY DRAWN INLET (WELDED-IN INLETS AND CORNER JOINTS ARE NOT ACCEPTABLE). THE TWO INNER CONES SHALL BE CONSTRUCTED AS A SINGLE, REMOVABLE INNER CONE ASSEMBLY FOR EASY INSTALLATION AND CLEANING. THE INNER CONE ASSEMBLY MUST HAVE A HOLE WITH REMOVABLE PLUG IN THE CENTER TO ALLOW QUICK ADJUSTMENT OF AN OPTIONAL INLET DAMPER WITHOUT REMOVING THE INNER CONE ASSEMBLY. DIFFUSERS SHALL BE CONSTRUCTED OF 24-GAUGE STEEL.

THE FINISH SHALL BE #26 WHITE. THE FINISH SHALL BE AN ANODIC ACRYLIC PAINT, BAKED AT 315°F FOR 30 MINUTES. THE PENCIL HARDNESS MUST BE HB TO H. THE PAINT MUST PASS A 100-HOUR ASTM B117 CORROSIVE ENVIRONMENTS SALT SPRAY TEST WITHOUT CREEPAGE, BLISTERING OR DETERIORATION OF FILM. THE PAINT MUST

PASS A 250-HOUR ASTM D870 WATER IMMERSION TEST. THE PAINT MUST ALSO PASS THE ASTM D2794 REVERSE IMPACT CRACKING TEST WITH A 50-INCH POUND FORCE APPLIED. OPTIONAL ROUND DAMPER SHALL BE CONSTRUCTED OF HEAVY GAUGE STEEL. DAMPER MUST BE OPERABLE FROM THE FACE OF THE DIFFUSER. OPTIONAL SECTORIZING BAFFLES SHALL BE AVAILABLE TO RESTRICT THE DISCHARGE AIR IN CERTAIN DIRECTIONS. OPTIONAL MOLDED INSULATION BLANKET SHALL BE AVAILABLE. THE INSULATION WILL BE R-6, FOIL-BACKED AND PROVIDED AN ADDITIONAL 1-INCH GAP AROUND THE NECK TO INSTALL INSULATED FLEX DUCT.
THE MANUFACTURER SHALL PROVIDE PUBLISHED PERFORMANCE DATA FOR THE SQUARE DIFFUSER. THE DIFFUSER SHALL BE TESTED IN ACCORDANCE WITH ANSI/ASHRAE STANDARD 70-1991.

B. RETURN AIR/EXHAUST GRILLES (RG-1, RG-2)
STEEL RETURN GRILLES SHALL BE TITUS MODEL 350R (¼-INCH BLADE SPACING) OF THE SIZES AND MOUNTING TYPES SHOWN ON THE PLANS AND OUTLET SCHEDULE. THE FIXED DEFLECTION BLADES SHALL BE AVAILABLE PARALLEL TO THE LONG OR SHORT DIMENSION OF THE GRILLE. CONSTRUCTION SHALL BE OF STEEL WITH A ¼-INCH WIDE BORDER ON ALL SIDES. SCREW HOLES SHALL BE COUNTERSUNK FOR A NEAT APPEARANCE. CORNERS SHALL BE WELDED WITH FULL PENETRATION RESISTANCE WELDS.
DEFLECTION BLADES SHALL BE CONTOURED TO A SPECIFICALLY DESIGNED AND TESTED CROSS-SECTION TO MEET PUBLISHED TEST PERFORMANCE DATA. BLADES SHALL BE FIRMLY HELD IN PLACE BY MULLIONS FROM BEHIND THE GRILLE AND FIXED TO THE GRILLE BY WELDING IN PLACE. BLADE DEFLECTION ANGLE SHALL BE AVAILABLE AT 35".

OPTIONAL OPPOSED-BLADE VOLUME DAMPER SHALL BE CONSTRUCTED OF HEAVY GAUGE STEEL. DAMPER MUST BE OPERABLE FROM THE FACE OF THE GRILLE.

THE GRILLE FINISH SHALL BE #26 WHITE. THE FINISH SHALL BE AN ANODIC ACRYLIC PAINT, BAKED AT 315° F FOR 30 MINUTES. THE PENCIL HARDNESS MUST BE HB TO H. THE PAINT MUST PASS A 100-HOUR ASTM B117 CORROSIVE ENVIRONMENTS SALT SPRAY TEST WITHOUT CREEPAGE, BLISTERING OR DETERIORATION OF FILM. THE PAINT MUST PASS A 250-HOUR ASTM D870 WATER IMMERSION TEST. THE PAINT MUST ALSO PASS THE ASTM D2794 REVERSE IMPACT CRACKING TEST WITH A 50-INCH POUND FORCE APPLIED.
THE MANUFACTURER SHALL PROVIDE PUBLISHED PERFORMANCE DATA FOR THE GRILLE. THE GRILLE SHALL BE TESTED IN ACCORDANCE WITH ANSI/ASHRAE STANDARD 70-1991.

C. SUPPLY AIR GRILLE (SG-1)
1. ALUMINUM SUPPLY GRILLES SHALL BE TITUS MODEL 300F (DOUBLE DEFLECTION) OF THE SIZES AND MOUNTING TYPES SHOWN ON THE PLANS AND OUTLET SCHEDULE. THE DEFLECTION BLADES SHALL BE AVAILABLE PARALLEL TO THE LONG DIMENSION OF THE GRILLE OR REGISTER. CONSTRUCTION SHALL BE OF ALUMINUM WITH A ¼-INCH WIDE BORDER ON ALL SIDES. SIZES 24 X 24 INCHES AND BELOW SHALL HAVE ROLL-FORMED BORDERS WITH A MINIMUM THICKNESS OF .032 INCH. LARGER SIZES SHALL BE CONSTRUCTED USING EXTRUSIONS WITH A NOMINAL THICKNESS OF .040 THROUGH 0.050 INCH AND SHALL BE INTERLOCKED AT THE FOUR CORNERS AND MECHANICALLY STAKED TO FORM A RIGID FRAME. SCREW HOLES SHALL BE COUNTERSUNK FOR A NEAT APPEARANCE.

DEFLECTION BLADES SHALL BE CONTOURED TO A SPECIFICALLY DESIGNED AND TESTED CROSS-SECTION TO MEET PUBLISHED TEST PERFORMANCE DATA. BLADES SHALL BE SPACED ON ¼-INCH CENTERS. BLADES SHALL HAVE FRICTION PIVOTS ON BOTH SIDES TO ALLOW INDIVIDUAL BLADE ADJUSTMENT WITHOUT LOOSENING OR RATTLING OR BE INSERTED THROUGH THE FRAME AND HELD TIGHT WITH STEEL FRICTION WIRE INTERLOCKED TO THE FRAME ON BOTH ENDS OF EACH SIDE. PLASTIC BLADE PIVOTS ARE NOT ACCEPTABLE.
OPTIONAL OPPOSED BLADE VOLUME DAMPER SHALL BE CONSTRUCTED OF HEAVY GAUGE STEEL OR ALUMINUM. DAMPER MUST BE OPERABLE FROM THE FACE OF THE GRILLE.
THE GRILLE FINISH SHALL BE #26 WHITE. THE FINISH SHALL BE AN ANODIC ACRYLIC PAINT, BAKED AT 315° F FOR 30 MINUTES. THE PENCIL HARDNESS MUST BE HB TO H. THE PAINT MUST PASS A 100-HOUR ASTM B117 CORROSIVE ENVIRONMENTS SALT SPRAY TEST WITHOUT CREEPAGE, BLISTERING OR DETERIORATION OF FILM. THE PAINT MUST PASS A 250-HOUR ASTM D870 WATER IMMERSION TEST. THE PAINT MUST ALSO PASS THE ASTM D2794 REVERSE IMPACT CRACKING TEST WITH A 50-INCH POUND FORCE APPLIED.
THE MANUFACTURER SHALL PROVIDE PUBLISHED PERFORMANCE DATA FOR THE GRILLE. THE GRILLE SHALL BE TESTED IN ACCORDANCE WITH ANSI/ASHRAE STANDARD 70-1991.

D. SPIRAL DUCT SUPPLY AIR GRILLE (SG-2)
ALUMINUM SUPPLY GRILLES SHALL BE TITUS DIRECT SPIRAL DUCT-MOUNTED SUPPLY GRILLES MODEL S301F (SINGLE DEFLECTION) OR S300F (DOUBLE DEFLECTION) OR S8F (PERFORATED FACE) FOR THE SIZES AND MOUNTING TYPES AS SHOWN ON THE PLANS AND OUTLET SCHEDULE. THE DEFLECTION BLADES SHALL BE AVAILABLE PARALLEL TO THE LONG OR SHORT DIMENSION OF THE GRILLE. ALL SUPPLY GRILLES SHALL BE CONSTRUCTED WITH RADIUS END CAPS AND FOAM GASKETS FOR A TIGHT SEAL TO THE DUCT DIAMETER. ALL SUPPLY GRILLES SHALL BE CONSTRUCTED WITH A 1 3/8-INCH WIDE BORDER.

BLADES SHALL BE CONSTRUCTED OF HEAVY DUTY EXTRUDED ALUMINUM AND SHALL BE SPACED ¼-INCH APART. BLADES SHALL EXTEND COMPLETELY THROUGH THE SIDE FRAME ON EACH SIDE TO ENSURE STABILITY THROUGHOUT THE COMPLETE CFM OPERATING RANGE OF THE GRILLE. BLADES SHALL BE INDIVIDUALLY ADJUSTABLE WITHOUT LOOSENING OR RATTLING AND SHALL BE SECURELY HELD IN PLACE WITH TENSION WIRE. (S8F: PERFORATED FACE WILL HAVE 3/16-INCH HOLES ON ¼-INCH STAGGERED CENTERS).
OPTIONAL AIR SCOOP DAMPER/EXTRACTOR (OPTION ASD) SHALL BE CONSTRUCTED OF HEAVY DUTY ALUMINUM. THE ASD MUST BE OPERABLE FROM THE FACE WITH A SCREWDRIVER.

THE GRILLE FINISH SHALL BE #26 WHITE. THE FINISH SHALL BE AN ANODIC ACRYLIC PAINT, BAKED AT 315° F FOR 30 MINUTES. THE PENCIL HARDNESS MUST BE HB TO H. THE PAINT MUST PASS A 100-HOUR ASTM B117 CORROSIVE ENVIRONMENTS SALT SPRAY TEST WITHOUT CREEPAGE, BLISTERING OR DETERIORATION OF FILM. THE PAINT MUST PASS A 250-HOUR ASTM D870 WATER IMMERSION TEST. THE PAINT MUST ALSO PASS THE ASTM D2794 REVERSE IMPACT CRACKING TEST WITH A 50-INCH POUND FORCE APPLIED.

THE MANUFACTURER SHALL PROVIDE PUBLISHED PERFORMANCE DATA FOR THE GRILLE. THE GRILLE SHALL BE TESTED IN ACCORDANCE WITH ANSI/ASHRAE STANDARD 70-1991.

3.0 EXECUTION
3.01 INSTALLATION
A. AIR DISTRIBUTION DEVICES SHALL BE INSTALLED AS INDICATED AND IN CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. THE COLOR, FRAME, AND BORDER TYPES SHALL BE COORDINATED WITH ARCHITECTURAL REQUIREMENTS AND SHALL BE SELECTED TO INSTALL IN THE FINISHED SURFACE INDICATED.
B. ALL AIR DISTRIBUTION DEVICES TO BE REUSED SHALL BE INSTALLED THE SAME WAY AS INDICATED FOR NEW DEVICES. ALL EXISTING COLOR, FRAME, AND BORDER TYPES SHALL BE MODIFIED AS REQUIRED TO MATCH NEW DEVICE REQUIREMENTS.
C. ALL AIR DISTRIBUTION DEVICES WITH BLADE ORIENTATIONS SHALL BE COORDINATED WITH ARCHITECT. SPECIFIC ATTENTION IS CALLED TO DEVICES IN EXPOSED CEILING AREAS, INCLUDING WALL—MOUNTED.

1. 3.02 ADJUSTMENT
D. GRILLES, REGISTERS, DIFFUSERS, ETC. SHALL BE TESTED AND ADJUSTED TO PROVIDE THE SCHEDULED AIR FLOW CAPACITIES.
E. ALL DEVICES SHALL HAVE ADJUSTABLE AND ACCESSIBLE VOLUME DAMPERS. WHERE DAMPERS ARE NOT OR WILL NOT BE ACCESSIBLE WITHOUT ACCESS PANELS, PROVIDE AND INSTALL REMOTE BALANCING CABLE CONTROL SYSTEM. YOGESS REGULATOR OR EQUAL. ADJUSTMENT SHALL BE FROM THE FACE OF THE AIR DISTRIBUTION DEVICE COORDINATED WITH THE AIR DISTRIBUTION MANUFACTURER. COORDINATE THE LOCATION AND SIZE OF THE DAMPER WITH THE INSTALLATION.

C. ALL ADJUSTABLE AIR DISTRIBUTION DEVICES LOCATED WITHIN THREE FEET OF ANY WALL OR KITCHEN HOOD SHALL BE SET TO BLOW DIRECTLY AWAY FROM, OR PARALLEL TO, THE WALL OR HOOD. ALL AIR DISTRIBUTION PATTERNS NEAR KITCHEN HOODS SHALL BE COORDINATED WITH THE KITCHEN HOOD MANUFACTURER.

D. IN ALL SLOT DIFFUSER APPLICATIONS, THE INACTIVE SECTIONS OF THE SLOT SHALL BE FINISHED WITH PERFORATED STEEL, PAINTED FLAT BLACK, SELECTED TO MATCH THE LSDS. THESE SECTIONS SHALL BE OPEN TO THE PLENUM AS A RETURN AIR PATH. INACTIVE SECTIONS SHALL HAVE AN INSULATED LIGHT SHIELD.

END OF SECTION

GENERAL NOTES

1. THESE DRAWINGS ARE SCHEMATIC IN NATURE AND ARE NOT INTENDED TO SHOW ALL POSSIBLE CONDITIONS. IT IS INTENDED THAT A COMPLETE TENANT MECHANICAL SYSTEM BE PROVIDED WITH ALL NECESSARY EQUIPMENT, ACCESSORIES, OPTIONS AND CONTROLS, COMPLETELY COORDINATED WITH ALL DISCIPLINES. ALL ITEMS AND LABOR REQUIRED FOR A COMPLETE TENANT MECHANICAL SYSTEM IN ACCORDANCE WITH ALL APPLICABLE CODES, STANDARDS AND THE BASE BUILDING CONTRACT DOCUMENTS SHALL BE FURNISHED WITHOUT INCURRING ADDITIONS TO THE CONTRACT.

2. REFER TO THE ARCHITECTURAL DRAWINGS FOR EXACT PARTITION LAYOUTS, REFLECTED CEILING PLANS, DIMENSIONS, ETC.
3. EXISTING MECHANICAL EQUIPMENT AND DUCTWORK ARE SHOWN BY DASHED LINES. NEW WORK AND RELOCATED WORK ARE SHOWN BY SOLID LINES. EXISTING WORK TO BE REMOVED IS SHOWN CROSSHATCHED. WHEN ANY DUCTWORK OR AIR DISTRIBUTION DEVICE IS REMOVED, THE ASSOCIATED TRUNK DUCT SHALL BE SEALED AIRTIGHT WITH A SHEET METAL PATCH OR CAP.

4. VISIT SITE AND CAREFULLY EXAMINE EXISTING CONDITIONS PRIOR TO SUBMITTING BID. THE EXISTING CONDITIONS SHOWN ARE BASED ON DOCUMENTS PROVIDED BY OTHERS AND HAVE NOT BEEN VERIFIED BY THE ENGINEER. IF EXISTING CONDITIONS DIFFER FROM DRAWINGS IN SUCH A MANNER THAT WILL AFFECT PRICING, (I.E. DUCTWORK, VAV OR PIU ARE NOT IN THE SHOWN LOCATION) CONTRACTOR WILL NOTIFY OWNER SO THAT A RESOLUTION CAN BE MADE PRIOR TO SUBMITTING BIDS. NO ALLOWANCE WILL BE MADE FOR LACK OF KNOWLEDGE OF EXISTING CONDITIONS.

5. REFER TO THE ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF ALL CEILING MOUNTED AIR DISTRIBUTION DEVICES. IF ANY ITEMS ARE NOT SHOWN ON THE REFLECTED CEILING PLANS, PREPARE A DRAWING OF THE PROPOSED LOCATION AND PRESENT IT TO THE ARCHITECT FOR APPROVAL PRIOR TO INSTALLATION.

6. ALL ROUND AND FLEXIBLE DUCTWORK EXTENDING TO DIFFUSERS SHALL BE SIZED FLAT SIZE OF DISTRIBUTION DEVICE INLET, AND TAPS TO THE EXISTING LOW-PRESSURE DUCTWORK SHALL BE MADE WITH SPIN-IN FITTINGS HAVING INTENSIFIED GENERAL ROUTING OF THE DUCTWORK. DO NOT HANG WIRING OR TUBING FROM DUCTWORK; RATHER, SUSPEND FROM THE STRUCTURE. ALL NEW TERMINAL UNITS SHALL BE TIED INTO THE BASE BUILDING CONTROL SYSTEM. SEE BASE BUILDING SPECIFICATIONS FOR REQUIREMENTS.

7. FLEXIBLE DUCTS SHALL BE INSTALLED FREE OF SAGS AND KINKS; SUPPORTED AT NOT MORE THAN 48" O.C.

8. TEST AND BALANCE ALL DIFFUSERS, BOXES, FANS, ETC. TO THE AIRFLOWS AND CONDITIONS INDICATED. ALL EXISTING DIFFUSERS, BOXES, FANS, ETC. WHICH ARE NOT NOTED OTHERWISE SHALL BE BALANCED TO THEIR PRIOR DESIGN AIRFLOWS; REFERENCE THE EXISTING RECORD DRAWING AVAILABLE FROM THE OWNER. TESTING AND BALANCING OF HVAC SYSTEM SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS OF ASHRAE/NEBB AND SHALL BE PERFORMED UNDER THE DIRECT SUPERVISION OF AN ABC OR NEBB CERTIFIED TEST AND BALANCE ENGINEER. SUBMIT 4 COPIES OF THE REPORT TO THE OWNER.

9. NEW PERIMETER SLOT DIFFUSERS SHALL BE PROVIDED AS REQUIRED, AND SELECTED IN ACCORDANCE WITH BASE BUILDING STANDARD.

10. PORTIONS OF DUCTWORK VISIBLE THROUGH GRILLES AND REGISTERS IN FINISHED AREA SHALL BE PAINTED FLAT BLACK.

11. ALL CONTROL WIRING AND TUBING INSTALLED ABOVE THE CEILING SHALL BE LOCATED AS HIGH ABOVE THE CEILING AS POSSIBLE AND SHALL FOLLOW THE DESIGNATED GENERAL ROUTING OF THE DUCTWORK. DO NOT HANG WIRING OR TUBING FROM DUCTWORK; RATHER, SUSPEND FROM THE STRUCTURE. ALL NEW TERMINAL UNITS SHALL BE TIED INTO THE BASE BUILDING CONTROL SYSTEM. SEE BASE BUILDING SPECIFICATIONS FOR REQUIREMENTS.

12. SPRINKLER HEADS AND ASSOCIATED BRANCH PIPING SHALL BE PROVIDED AND RELOCATED IN ACCORDANCE WITH NFPA 13 AND ALL PREVALUING LOCAL CODES AS REQUIRED TO PROTECT ALL SPACES IN THIS TENANT AREA. SPRINKLER HEADS SHALL BE SEMI-RECESSED SPRINKLER HEADS IN TENANT AREAS AND CONCEALED FULLY RECESSED TYPE IN PUBLIC CORRIDORS.

13. COORDINATE ALL WORK IN OCCUPIED AREAS WITH THE TENANT IN THAT AREA. COORDINATE ALL WORK IN UNOCCUPIED AREAS AND COMMON AREAS WITH LANDLORD.

14. ALL MATERIALS IN PLENUM SHALL BE PLENUM-RATED.
15. THERMOSTATS SHALL BE LOCATED IN EACH ZONE AS SHOWN. THE EXACT LOCATION ON THE WALL INDICATED SHALL BE AS DIRECTED BY THE ARCHITECT. NEW THERMOSTATS SHALL BE SELECTED TO MATCH EXISTING BASE BUILDING THERMOSTATS AND SHALL BE COMPATIBLE WITH EQUIPMENT SERVED.

16. ADJUST ALL DIFFUSERS IN CORRIDORS OR WITHIN 3 FEET OF A WALL TO PROVIDE 2-WAY OR 3-WAY BLOW AWAY FROM OR PARALLEL TO WALLS. ALL LAY-IN DIFFUSERS SHALL HAVE 4-WAY BLOW UNLESS NOTED OTHERWISE.

17. REFERENCE BASE BUILDING SPECIFICATIONS FOR EQUIPMENT AND MATERIAL REQUIREMENTS. ALL NEW WORK SHALL CONFORM TO BASE BUILDING STANDARD AS A MINIMUM.

NJ BUILDING DEPARTMENT NOTES:

ALL WORK SHALL COMPLY WITH APPLICABLE SECTIONS OF THE 2021 INTERNATIONAL BUILDING CODE, AND ALL AMENDMENTS AND RULES AND REGULATIONS OF THE DEPARTMENT OF BUILDINGS TO DATE.

1. ALL HEATING AND COOLING LOADS CALCULATED PER ASHRAE/ACCA 183.
2. VENTILATION FOR ALL AREA SHALL COMPLY WITH 2021 INTERNATIONAL MECHANICAL CODE CHAPTER 4.
3. AS PER ASHRAE 90.1, 2019 SECTION 6.7.3.1, 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.
4. AS PER ASHRAE 90.1, 2019 SECTION 6.7.3.2, 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.

5. 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 WITH 2021 INTERNATIONAL BUILDING CODE REQUIREMENTS AS OUTLINES IN SECTION 16C 1704J.

6. 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.

7. TESTS OF MECHANICAL SYSTEMS SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING SECTIONS OF THE 2021 INTERNATIONAL MECHANICAL CODE:
A. VENTILATION SYSTEM BALANCING IMC 2021 - 403.1
B. SMOKE CONTROL SYSTEMS - IMC 2021 - 513

8. THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIES, ETC. SHALL COMPLY WITH THE REFERENCED CODE OR STANDARD:

- A. STANDARDS OF HEATING -IMC 2021 - 309.1
- B. DUCT CONSTRUCTION AND INSTALLATION-IMC 2021 - 603
- C. AIR INTAKES, EXHAUSTS AND RELIEF - IMC 2021 - 401.5 & 501.3
- D. AIR FILTERS - IMC 2021 - 605
- E. MANUAL AND AUTOMATIC FIRE AND SMOKE CONTROLS FOR AIR DISTRIBUTION SYSTEMS - IMC 2021 - 513
- F. MINIMUM TEMPERATURE TO BE MAINTAINED IN OCCUPIED SPACES DURING HEATING SEASON: 68 DEG. FAHRENHEIT.

9. 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 IMC 2021 - 403.3

10. SMOKE DETECTION SYSTEMS SHALL BE INSTALLED AND SEQUENCED TO FOLLOW CONTROLS OPERATIONS WITH THE REQUIREMENTS OF SECTION IMC 2021 - 606 TO CLOSE DAMPERS AND AUTOMATICALLY STOP THE FAN.

11. REFER TO ARCHITECTURAL DRAWINGS FOR REQUIRED FIRE-RATED WALL AND SMOKE WALL CONSTRUCTION AND LOCATION & PROVIDE FIRE DAMPER FOR DUCT PENETRATING THOSE WALLS.

12. 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.

THERMOSTATIC CONTROLS.
6.4.3.1 ZONE THERMOSTATIC CONTROLS
6.4.3.1.1 GENERAL

THE SUPPLY OF HEATING AND COOLING ENERGY TO EACH ZONE SHALL BE INDIVIDUALLY CONTROLLED BY THERMOSTATIC CONTROLS RESPONDING TO TEMPERATURE WITHIN THE ZONE. FOR THE PURPOSES OF SECTION 6.4.3.1, A DWELLING UNIT SHALL BE PERMITTED TO BE CONSIDERED A SINGLE ZONE.

EXCEPTIONS: INDEPENDENT PERIMETER SYSTEMS THAT ARE DESIGNED TO OFFSET ONLY BUILDING ENVELOPE LOADS SHALL BE PERMITTED TO SERVE ONE OR MORE ZONES ALSO SERVED BY AN INTERIOR SYSTEM PROVIDED

a. THE PERIMETER SYSTEM INCLUDES AT LEAST ONE THERMOSTATIC CONTROL ZONE FOR EACH BUILDING EXPOSURE HAVING EXTERIOR WALLS FACING ONLY ONE ORIENTATION FOR 50 CONTIGUOUS FEET OR MORE, AND
b. THE PERIMETER SYSTEM HEATING AND COOLING SUPPLY IS CONTROLLED BY A THERMOSTATIC CONTROLS LOCATED WITHIN THE ZONES SERVED BY THE SYSTEM. EXTERIOR AND SEMIEXTERIOR WALLS ARE CONSIDERED TO HAVE DIFFERENT ORIENTATIONS IF THE EXPOSURES THEY FACE DIFFER BY MORE THAN 45 DEGREES.

6.4.3.1.2 DEAD BAND
WHERE USED TO CONTROL BOTH HEATING AND COOLING, ZONE THERMOSTATIC CONTROLS SHALL BE CAPABLE OF PROVIDING A TEMPERATURE RANGE OR DEAD BAND OF AT LEAST 5°F WITHIN WHICH THE SUPPLY OF HEATING AND COOLING ENERGY TO THE ZONE IS SHUT OFF OR REDUCED TO A MINIMUM.
EXCEPTIONS:

a. THERMOSTATS THAT REQUIRE MANUAL CHANGEVER BETWEEN HEATING AND COOLING MODES.
b. SPECIAL OCCUPANCY OR SPECIAL APPLICATIONS WHERE WIDE TEMPERATURE RANGES ARE NOT ACCEPTABLE (SUCH AS RETIREMENT HOMES, PROCESS APPLICATIONS, MUSEUMS, SOME AREAS OF HOSPITALS) AND ARE APPROVED BY THE AUTHORITY HAVING JURISDICTION.

6.4.3.2 SET POINT OVERLAP RESTRICTION
WHERE HEATING AND COOLING TO A ZONE ARE CONTROLLED BY SEPARATE ZONE THERMOSTATIC CONTROLS LOCATED WITHIN THE ZONE, MEANS (SUCH AS LIMIT SWITCHES, MECHANICAL STOPS, OR FOR DDC SYSTEMS, SOFTWARE PROGRAMMING) SHALL BE PROVIDED TO PREVENT THE HEATING SET POINT FROM EXCEEDING THE COOLING SET POINT MINUS ANY APPLICABLE PROPORTIONAL BAND.

6.4.3.3 OFF-HOUR CONTROLS
HVAC SYSTEMS SHALL HAVE THE OFF-HOUR CONTROLS REQUIRED BY SECTIONS 6.4.3.3.1 THROUGH 6.4.3.3.5
EXCEPTIONS:

a. HVAC SYSTEMS INTENDED TO OPERATE CONTINUOUSLY.
b. HVAC SYSTEMS HAVING A DESIGN HEATING CAPACITY AND COOLING CAPACITY LESS THAN 15,000 BTU/H THAT ARE EQUIPPED WITH READILY ACCESSIBLE MANUAL ON/OFF CONTROLS.

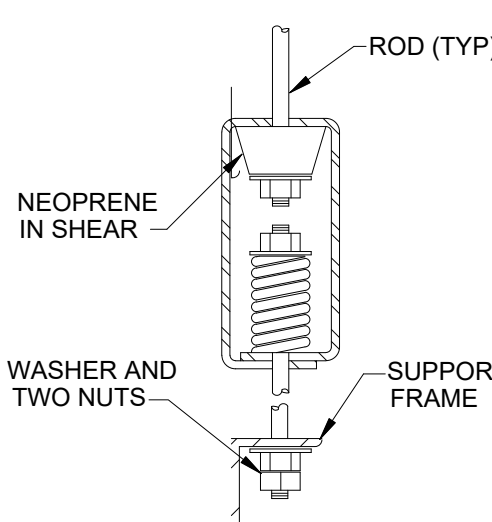
6.4.3.3.1 AUTOMATIC SHUTDOWN
HVAC SYSTEMS SHALL BE EQUIPPED WITH AT LEAST ONE OF THE FOLLOWING:

ABBREVIATIONS

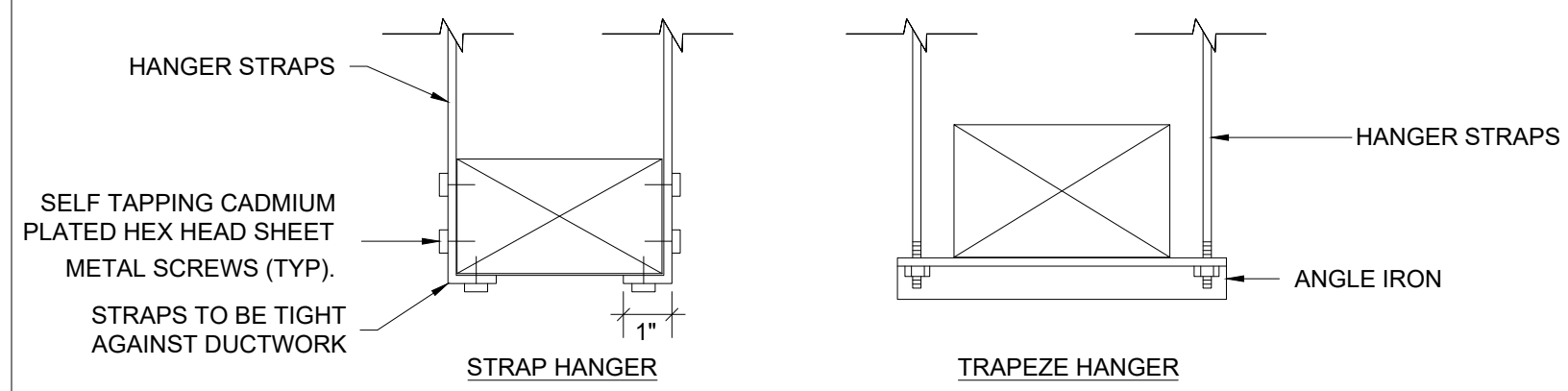
A/C	ABOVE CEILING ACCESS DOOR	ID	INSIDE DIMENSION INCHES
ADJ	ADJUSTABLE	KW	KILOWATTS
AFF	ABOVE FINISHED FLOOR	LAT	LEAVING AIR TEMPERATURE
AUTO	AUTOMATIC	LB	POUNDS
AC	AIR CONDITIONING	LRG	LINEAR GRILLE
AHU	AIR HANDLING UNIT	LWR	LOOP WATER RETURN
		LWS	LOOP WATER SUPPLY
BAL	BALANCING	MIN	MINIMUM
BDD	BACKDRAFT DAMPER	MAX	MAXIMUM
B/F	BELOW FLOOR	MD	MANUAL DAMPER
B/G	BELOW GRADE	MOD	MOTOR OPERATED DAMPER
BFLY	BUTTERFLY	MFR	MANUFACTURER
BHP	BRAKE HORSEPOWER	NC	NORMALLY CLOSED
BCO	BASE CLEANOUT	NG	NATURAL GAS
		NFWH	NON-FREEZE WALL HYDRANT
CFM	CUBIC FEET PER MINUTE	NO	NORMALLY OPEN
CBCR	CURVED BLADE CEILING REGISTER	NOM	NOMINAL
CSD	CEILING SUPPLY DIFFUSER	OA	OUTSIDE AIR
CU	CONDENSING UNIT	OD	OUTSIDE DIMENSION
CW	COLD WATER (DOMESTIC)	OBD	OPPOSED BLADE DAMPER
CHWS	CHILLED WATER SUPPLY		
CHWR	CHILLED WATER RETURN	PIU	POWERED INDUCTION UNIT
CWS	CONDENSER WATER SUPPLY	PSI	POUNDS PER SQUARE INCH
CWR	CONDENSER WATER RETURN		
CON	CONCENTRIC CLEANOUT	RA	RETURN AIR
COND	CONDENSATE	RAD	RADIUS
		RG	RETURN AIR GRILLE
db	DRY BULB	RED	REDUCER
DN	DOWN	RL	REFRIGERANT LIQUID
DR	DRAIN	RS	REFRIGERANT SUCTION / RETURN SLOTS
do	DITTO	RTU	ROOFTOP UNIT
dB	DECIBELS	RR	RETURN REGISTER
DWG	DRAWING		
EA	EACH	SP	STATIC PRESSURE
EAT	ENTERING AIR TEMPERATURE	SPS	STATIC PRESSURE SENSOR
ECC	ECCENTRIC	SA	SUPPLY AIR
EF	EXHAUST FAN	SAN	SANITARY
EOD	EMERGENCY OVERFLOW DRAIN	SD	SMOKE DAMPER / SLOT DIFFUSER
ER	EXHAUST REGISTER	SEN	SENSIBLE
ESP	EXTERNAL STATIC PRESSURE	SQ	SQUARE
EWT	ENTERING WATER TEMPERATURE	SR	SUPPLY REGISTER
EXH	EXHAUST	ST	STORM
EFF	EFFICIENCY	SS	SPLIT SYSTEM
EG	EXHAUST AIR GRILLE	SG	SUPPLY AIR GRILLE
F	FAHRENHEIT		
FCO	FLOOR CLEAN OUT	TEMP	TEMPERATURE
FCU	FAN COIL UNIT	TG	TRANSFER GRILLE
FSD	FIRE SMOKE DAMPER	TYP	TYPICAL
FD	FIRE DAMPER OR FLOOR DRAIN		
FL DR	FLOOR DRAIN (only)	UON	UNLESS OTHERWISE NOTED
FLR	FLOOR		
FOB	FLAT ON BOTTOM	V	VENT
FOR	FUEL OIL RETURN	VA	VALVE
FOS	FUEL OIL SUPPLY	VTR	VENT THRU ROOF
FOT	FLAT ON TOP	VAV	VARIABLE AIR VOLUME
FPM	FEET PER MINUTE		
FPS	FEET PER SECOND	wb	WET BULB
FT	FEET	wc	WATER COLUMN
G	GATE	WHA	WATER HAMMER ARRESTOR
GA	GALVE	WT	WEIGHT
GPM	GALLONS PER MINUTE	W	WASTE
GL	GLOBE		
GCO	GRADE CLEANOUT		
HD	HUB DRAIN		
HP	HORSEPOWER		
HTG	HEATING		
HW	HOT WATER (DOMESTIC)		
HWR	HOT WATER RETURN		
HWRR	HOT WATER REVERSE RETURN		
HWS	HOT WATER SUPPLY		
Hz	HERTZ		

LEGEND

	CEILING SUPPLY DIFFUSER
	CEILING RETURN AIR GRILLE
	CEILING EXHAUST GRILLE
	SIDE-WALL OR DUCT MOUNTED REGISTER
	SLOT DIFFUSER
	MANUAL VOLUME DAMPER
	FIRE DAMPER, FIRE SMOKE DAMPER
	THERMOSTAT
	HUMIDSTAT
	CO2 MONITOR
	MOTOR OPERATED DAMPER
	EXISTING WORK
	NEW WORK
	WORK TO BE REMOVED
	SMOKE DETECTOR
	PRESSURE REGULATOR VALVE 5 PSI TO 7 WATER GAUGE
	TEMPERATURE SENSOR
	BACKDRAFT DAMPER
	POINT OF CONNECTION
	POINT OF DISCONNECTION



7 VIBRATION ISOLATOR DETAIL
M-0.4 N.T.S.



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

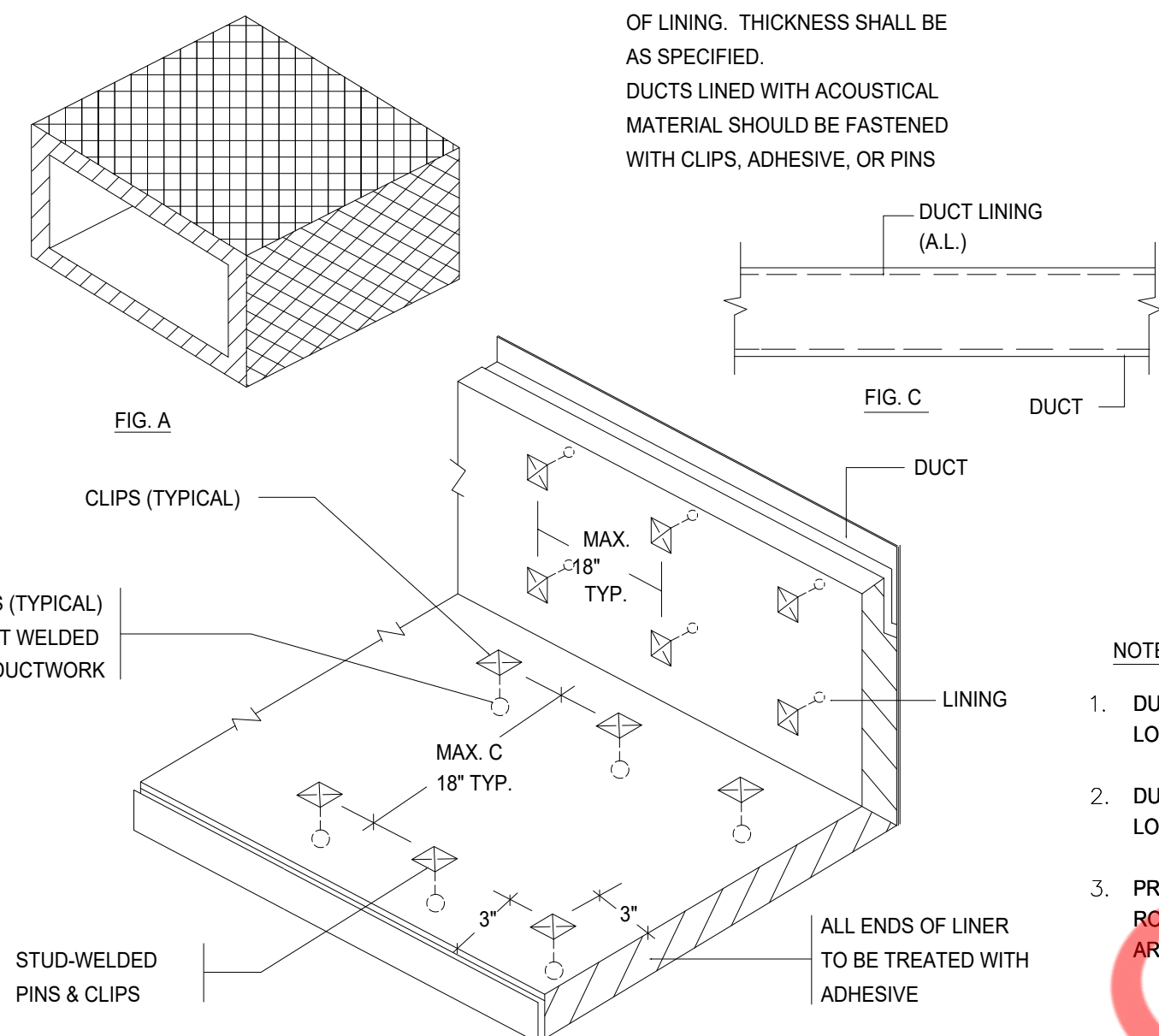
HANGER SIZES*

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

* FOR RECTANGULAR DUCTS

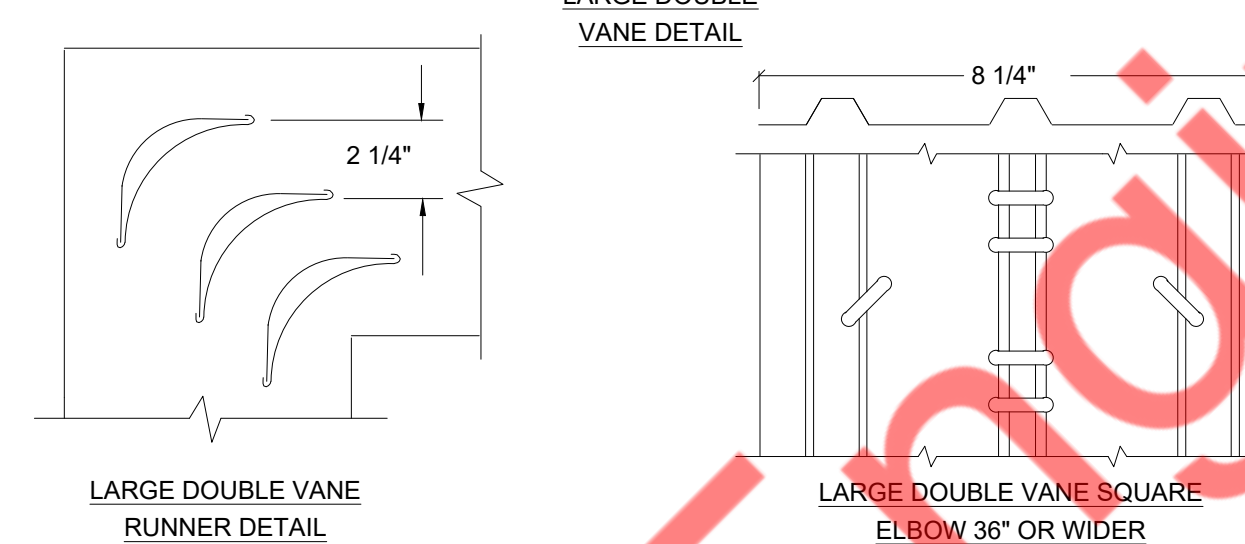
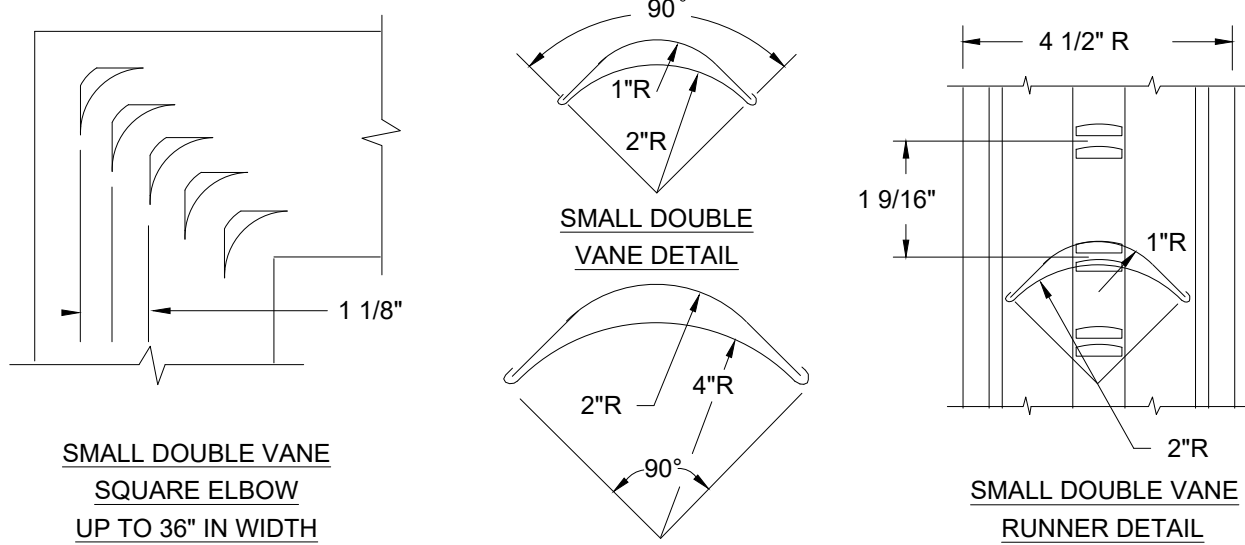
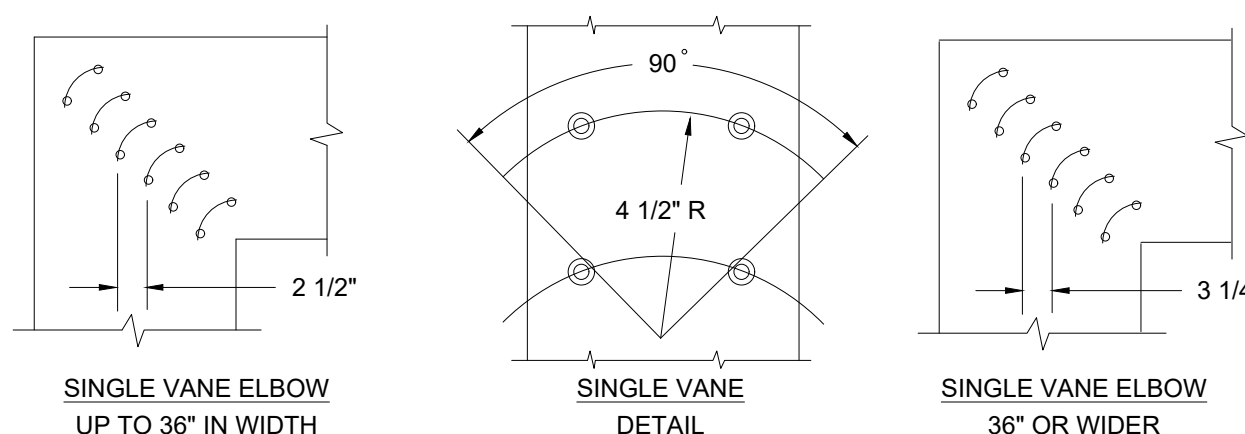
1 DUCT HANGING DETAILS

M-0.4 N.T.S.



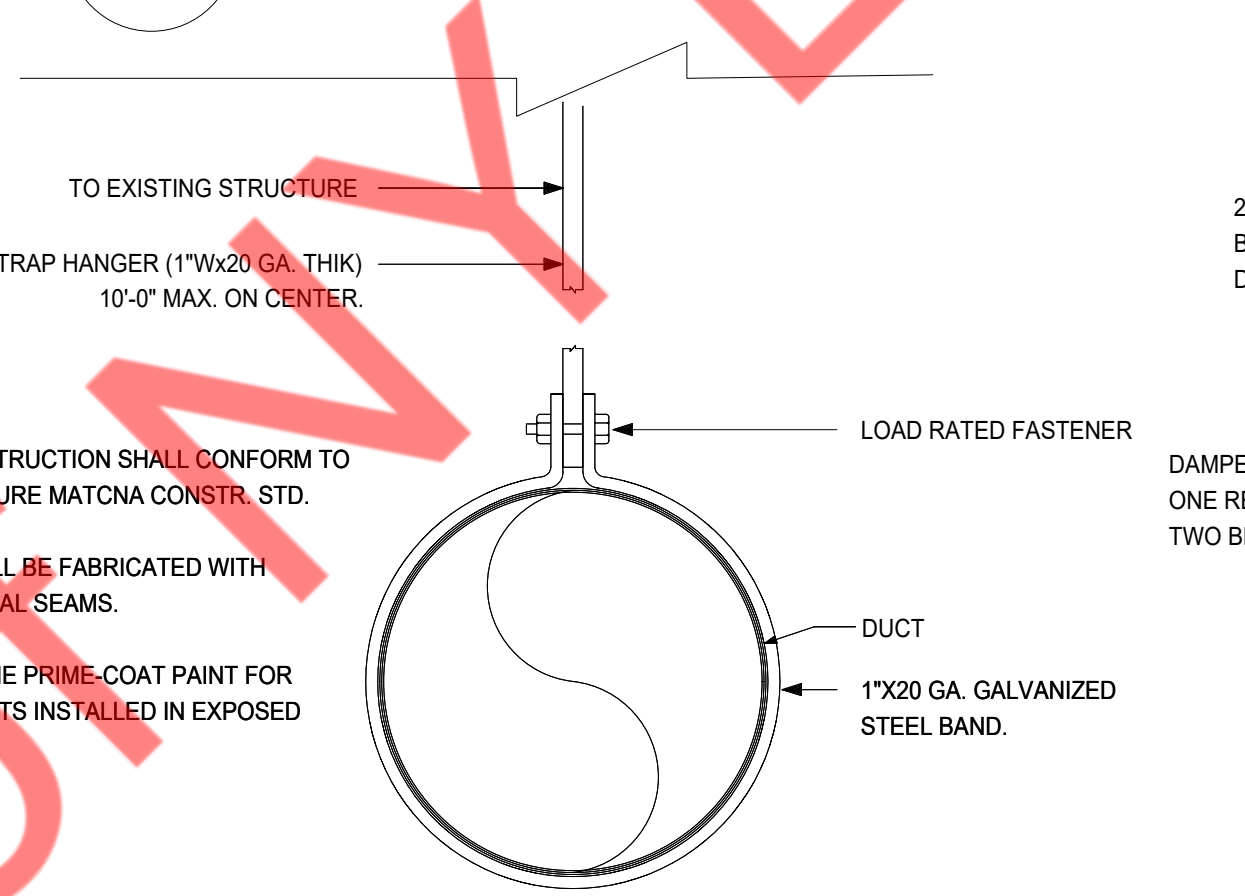
4 ACOUSTICAL TREATMENT DUCT LINING

M-0.4 N.T.S.



2 LOW VELOCITY DUCTWORK ELBOWS

M-0.4 N.T.S.

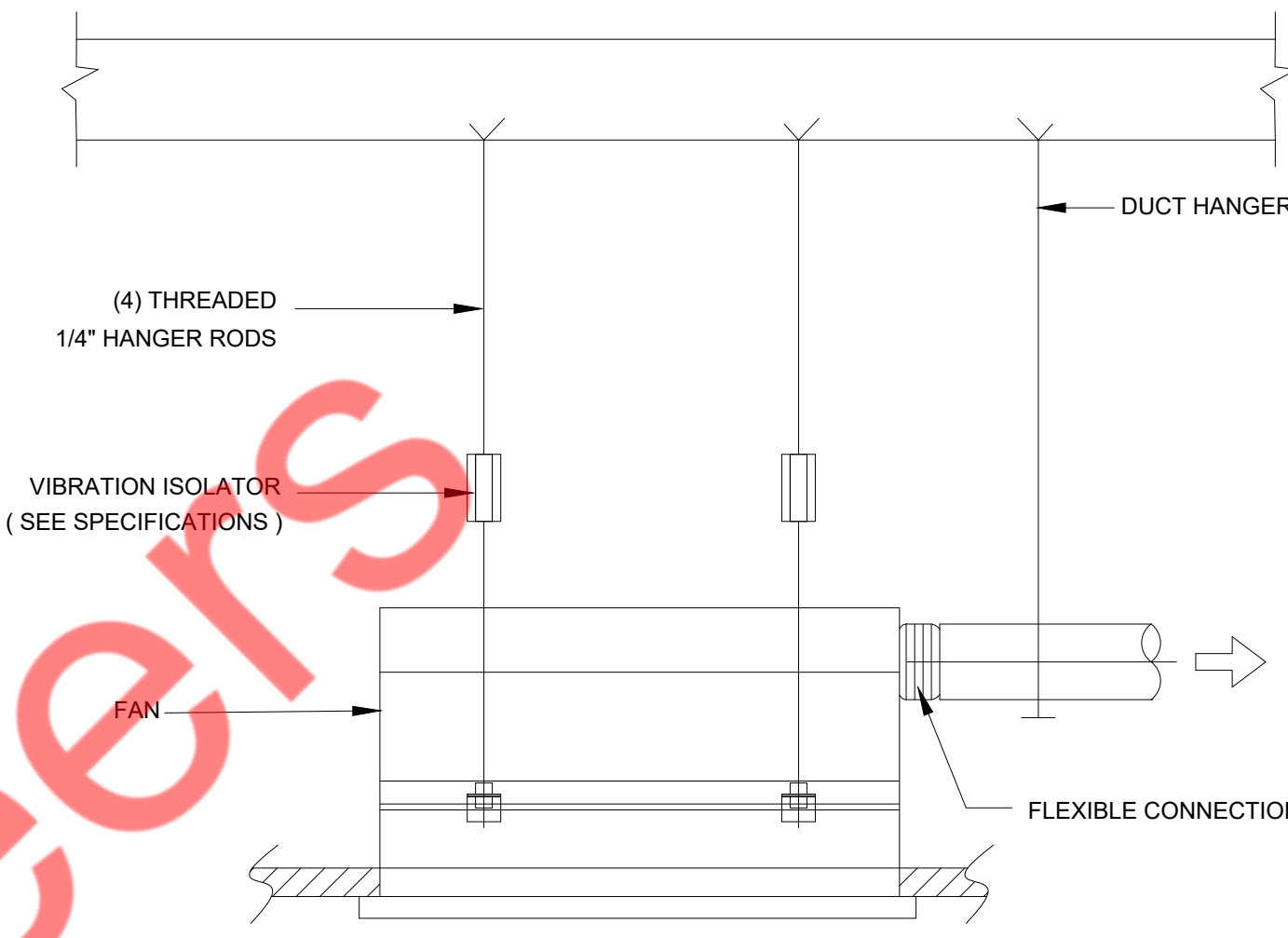


NOTES:

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

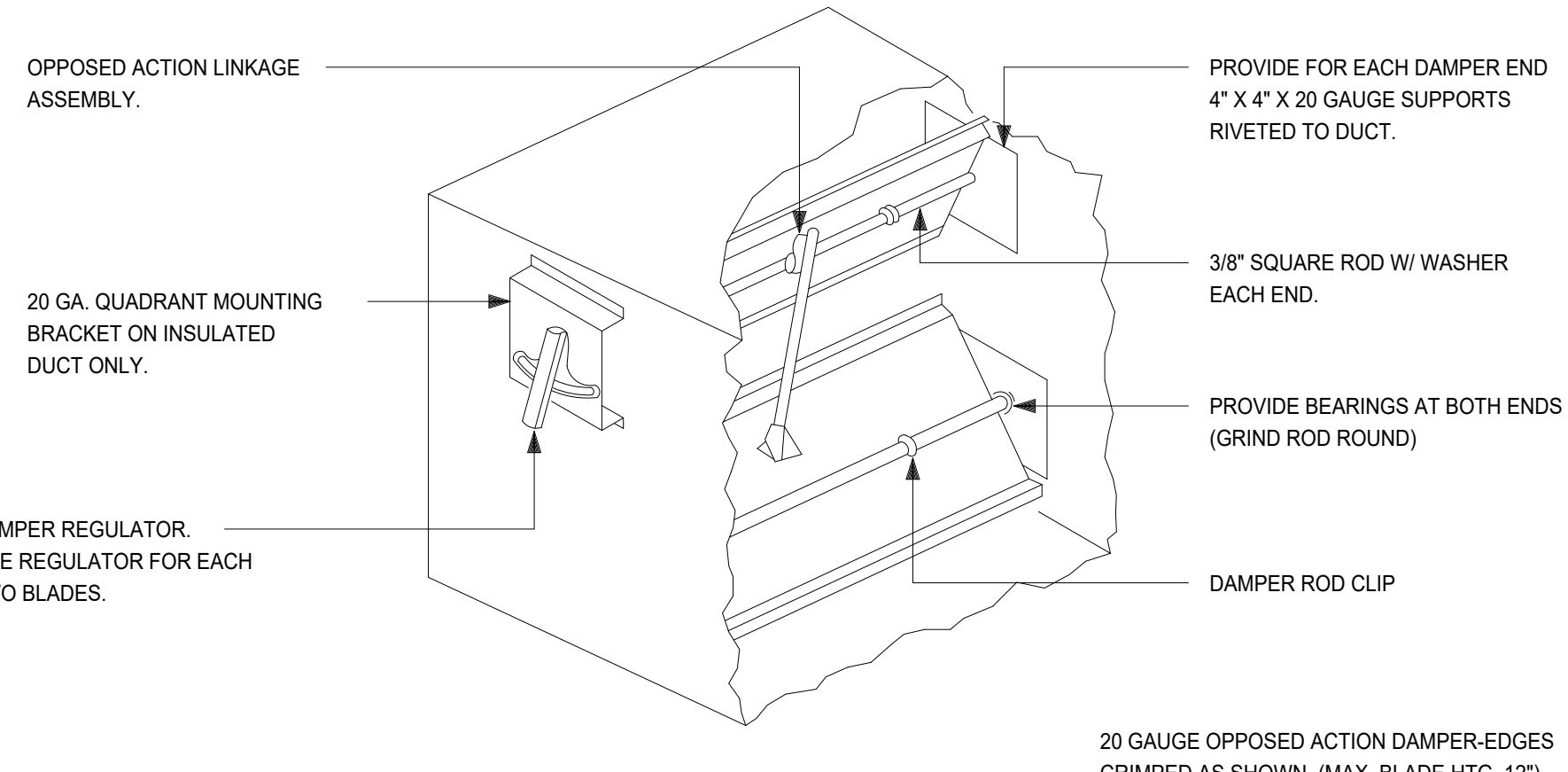
5 ROUND HANGING DETAIL

M-0.4 N.T.S.



3 CEILING FAN HANGING SUPPORT DETAIL

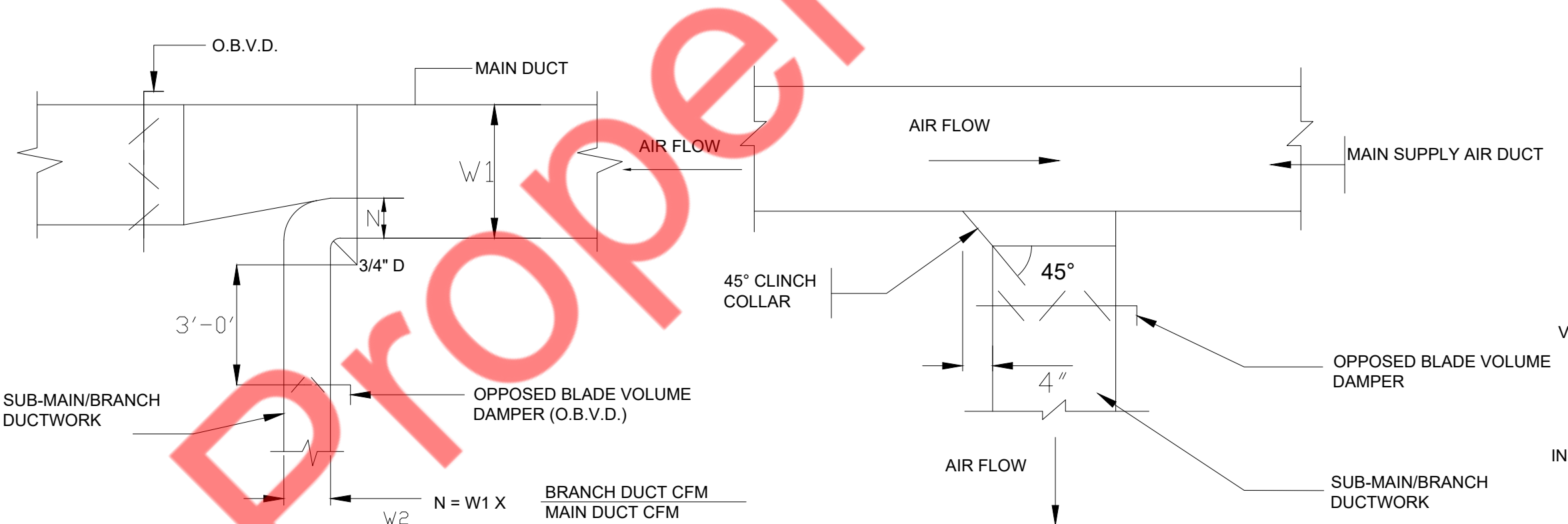
M-0.4 N.T.S.



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

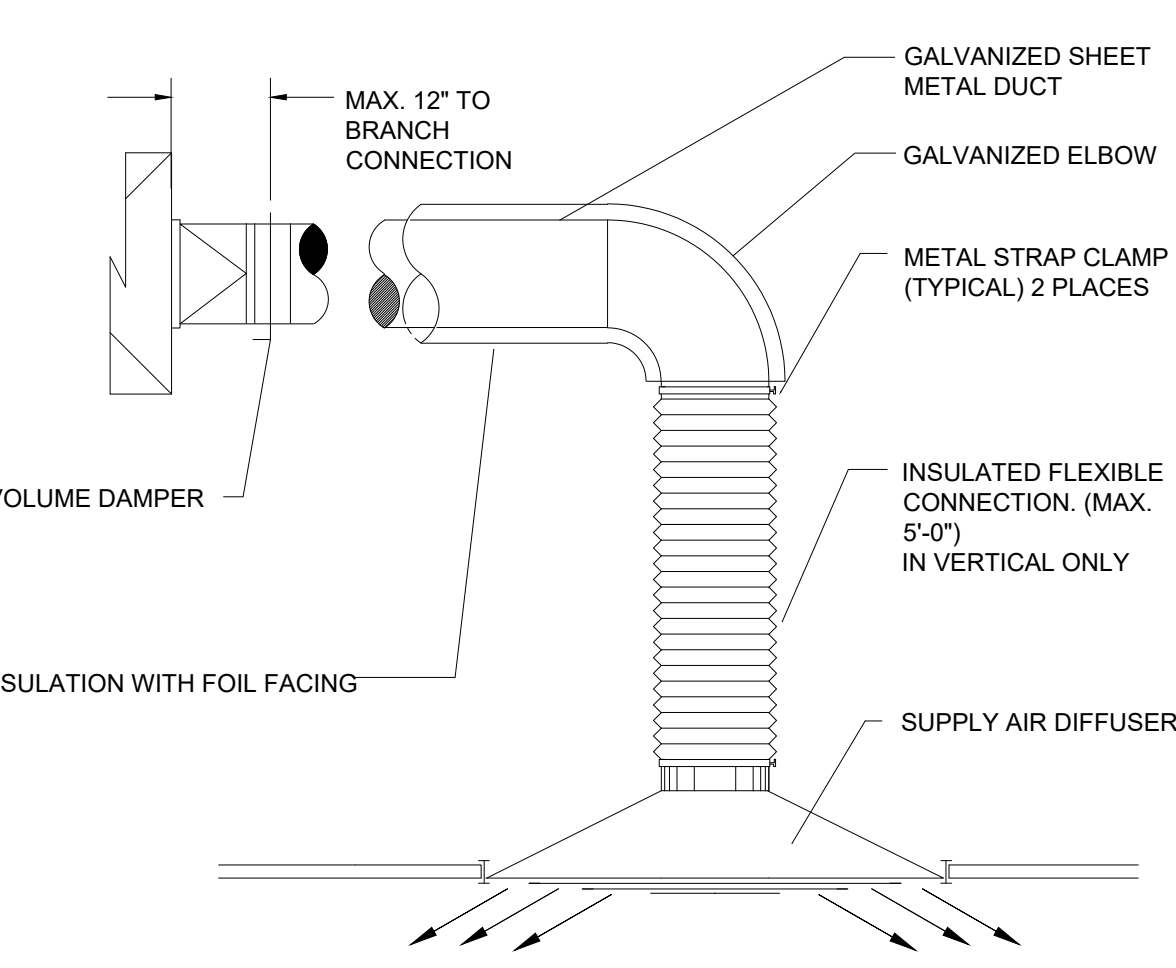
6 LOW PRESSURE BALANCING DAMPER

M-0.4 N.T.S.



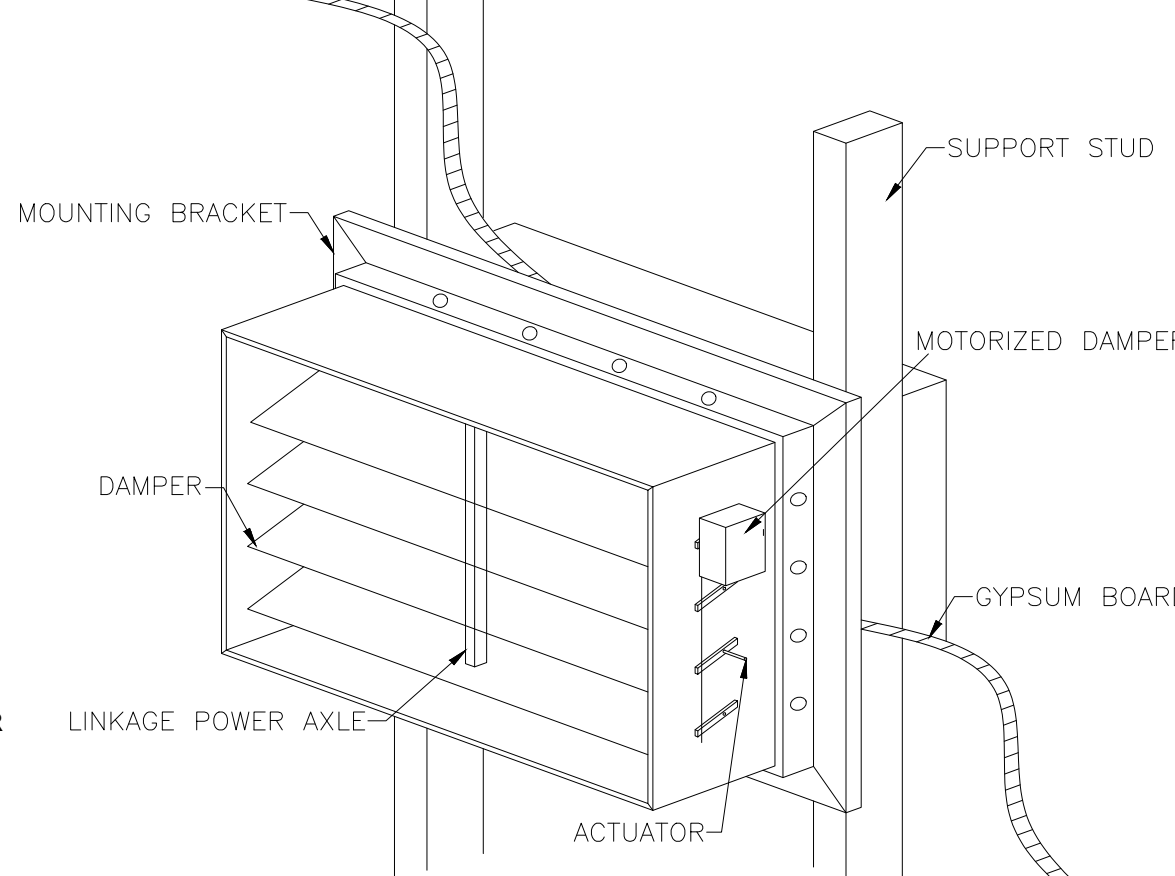
8 SUPPLY AIR DUCTWORK SUB-MAIN BRANCH DUCT CONNECTION

M-0.4 N.T.S.



9 DIFFUSER DETAILS

M-0.4 N.T.S.



10 MOTORIZED DAMPER DETAILS

M-0.4 N.T.S.

CONSULTANTS

NY ENGINEERS
NEARBY ENGINEERS
382 NE 191ST STREET SUITE 4967A,
MIAMI, FL 33179
PH-914.257.3455
WWW.NY-ENGINEERS.COM

ARCHITECT/ENGINEER SEAL:

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF NEW JERSEY.
LICENSE NO. 0662649100
EXPIRATION DATE: 04/30/2026

CONTRACTOR'S NOTES:

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DATE	ISSUE
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03.11.25	CLIENT COMMENTS
03.14.25	PERMIT SUBMISSION
04.21.25	CLIENT COMMENTS
05.06.25	CLIENT COMMENTS
05/06/25	CLIENT COMMENTS
04/21/25	CLIENT COMMENTS
03/11/25	CLIENT COMMENTS
DATE	REVISION



LOCATION:

PROJECT INFORMATION:

PROJECT NUMBER: 12366-25
DRAWN BY: NYE
REVIEWED BY: NYE
AREA: 3,134 SQ. FT.

TITLE:

MECHANICAL ABBREVIATION, LEGENDS & DETAILS

SHEET NUMBER:

M-0.4

EXISTING SPLIT HEAT PUMP INDOOR UNIT SCHEDULE (PROVIDED BY LL)															BASIS OF DESIGN: GOODMAN												
UNIT TAG	LOCATION	ODU	TYPE	CAP. (TON)	COOLING MBH	HEATING MBH @17 Deg.F	HEATING MBH @7 Deg.F	TOTAL CFM (MAX.)	MAX. ESP. (IN. WG)	OUTSIDE AIR(CFM)	MAX. SOUND PRESS.(DBA)	AUXILIARY ELECTRIC HEAT					ELECTRICAL DATA			DIMENSIONS (HXWXD) (IN.)			PIPE SIZE			WEIGHT (LBS.)	MODEL NO.
												TOTAL (KW)	VOLTS	PH	AMPS	MCA	MOC	MODEL	PH/VOLT/HZ	MCA	MOC	UNIT	LIQ	SUCTION	DRAIN (ID)		
AHU-1 (E)	SEE PLAN	CU-1 (E)	AIR HANDLER	4 (V.I.F)	48 (V.I.F)	46 (V.I.F)	27.6 (V.I.F)	1465 (V.I.F)	S.A.E	350	S.A.E	8 (V.I.F)	208 (V.I.F)	1 (V.I.F)	28.9 (V.I.F)	45 (V.I.F)	45 (V.I.F)	HKS*08XC* (V.I.F)	1/208/60 (V.I.F)	8 (V.I.F)	15 (V.I.F)	S.A.E	S.A.E	S.A.E	S.A.E	S.A.E	ASPT49D14 (V.I.F)
AHU-2 (E)	SEE PLAN	CU-2 (E)	AIR HANDLER	4 (V.I.F)	48 (V.I.F)	46 (V.I.F)	27.6 (V.I.F)	1465 (V.I.F)	S.A.E	350	S.A.E	8 (V.I.F)	208 (V.I.F)	1 (V.I.F)	28.9 (V.I.F)	45 (V.I.F)	45 (V.I.F)	HKS*08XC* (V.I.F)	1/208/60 (V.I.F)	8 (V.I.F)	15 (V.I.F)	S.A.E	S.A.E	S.A.E	S.A.E	S.A.E	ASPT49D14 (V.I.F)
AHU-3 (E)	SEE PLAN	CU-3 (E)	AIR HANDLER	4 (V.I.F)	48 (V.I.F)	46 (V.I.F)	27.6 (V.I.F)	1465 (V.I.F)	S.A.E	175	S.A.E	8 (V.I.F)	208 (V.I.F)	1 (V.I.F)	28.9 (V.I.F)	45 (V.I.F)	45 (V.I.F)	HKS*08XC* (V.I.F)	1/208/60 (V.I.F)	8 (V.I.F)	15 (V.I.F)	S.A.E	S.A.E	S.A.E	S.A.E	S.A.E	ASPT49D14 (V.I.F)

NOTES:
 1) EXISTING SYSTEM WITH ALL ACCESSORIES TO REMAIN SAME AND TO BE REUSED.
 2) S.A.E : SAME AS EXISTING & V.I.F. : VERIFY IN FIELD.
 3) CONTRACTOR TO FIELD VERIFY IF ALL AHU IS WORKING AT THEIR 100% RATED CAPACITIES/LOADS. INFORM TO DESIGN ENGINEER IF ANY DISCREPANCIES ARE FOUND IN PERFORMANCE PRIOR TO CONSTRUCTION.
 4) CONTRACTOR TO FIELD VERIFY EXACT LOCATION AND CONFIGURATION OF UNITS ON SITE.
 5) IF REQUIRED, PROVIDE NEW THERMOSTAT AND TEMPERATURE SENSORS COMPATIBLE WITH EXISTING AHU. COORDINATE FINAL LOCATIONS OF T-STAT AND T-SENSORS WITH ARCHITECT/OWNER.
 6) CONTRACTOR TO BALANCE OUTSIDE AIR & RETURN AIR DAMPERS ON EXISTING AHU TO MATCH VALUES MENTIONED IN ABOVE TABLE.
 7) CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF AHUs IN CEILING AND PROVIDE SUFFICIENT SERVICE CLEARANCE AS PER THE MANUFACTURER RECOMMENDATIONS.
 8) REPLACE AIR FILTERS WITH NEW FILTERS IF REQUIRED, PROVIDE MINIMUM MERV 8 FILTERS.
 9) CONTRACTOR TO PROVIDE CONDENSATE DRAIN PUMP IF REQUIRED.
 10) ALL UNITS SHALL BE COMPLIED/ PERMITTED, PROVIDED AND INSTALLED BY LL.

SPLIT HEAT PUMP OUTDOOR UNIT SCHEDULE (PROVIDED BY LL)															BASIS OF DESIGN: GOODMAN				
UNIT TAG	LOCATION	INDOOR UNITS SERVED	CAP.TR	COOLING MBH	HEATING MBH @47 Deg.F	HEATING MBH @17 Deg.F	TYPE	UNIT DIMENSIONS IN.(HXWXD)	WEIGHT (LBS)	PIPING DIMENSION		ELECTRICAL			SOUND LEVEL (Dba)	EER2	SEER2	HSPF2	MODULE NO.
										LIQUID-HI PRESSURE	GAS LOW-PRESSURE	(V/Hz/Ph)	MCA	MOP					
CU-1 (E)	ROOF	AHU-1 (E)	4	48	46 (V.I.F)	27.6 (V.I.F)	INVERTER DRIVEN COMPRESSOR	S.A.E	S.A.E	S.A.E	S.A.E	208/60/1 (V.I.F)	26 (V.I.F)	45 (V.I.F)	S.A.E	S.A.E	S.A.E	S.A.E	GS2140491K
CU-2 (E)	ROOF	AHU-2 (E)	4	48	46 (V.I.F)	27.6 (V.I.F)	INVERTER DRIVEN COMPRESSOR	S.A.E	S.A.E	S.A.E	S.A.E	208/60/1 (V.I.F)	26 (V.I.F)	45 (V.I.F)	S.A.E	S.A.E	S.A.E	S.A.E	GS2140491K
CU-3 (E)	ROOF	AHU-3 (E)	4	48	46 (V.I.F)	27.6 (V.I.F)	INVERTER DRIVEN COMPRESSOR	S.A.E	S.A.E	S.A.E	S.A.E	208/60/1 (V.I.F)	26 (V.I.F)	45 (V.I.F)	S.A.E	S.A.E	S.A.E	S.A.E	GS2140491K

NOTES:
 1) EXISTING SYSTEM WITH ALL ACCESSORIES TO REMAIN SAME AND TO BE REUSED.
 2) S.A.E : SAME AS EXISTING & V.I.F. : VERIFY IN FIELD. PROVIDE COMPRESSOR CYCLE PROTECTOR.
 3) PROVIDE COMPRESSOR CYCLE PROTECTOR.
 4) CONTRACTOR TO FIELD VERIFY IF ACCU IS WORKING AT THEIR 100% RATED CAPACITIES/LOADS. INFORM TO DESIGN ENGINEER IF ANY DISCREPANCIES ARE FOUND IN PERFORMANCE PRIOR TO CONSTRUCTION.
 5) CONTRACTOR TO FIELD VERIFY EXACT LOCATION AND CONFIGURATION OF UNITS ON SITE.
 6) CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF CUs ON THE ROOF.
 7) ALL UNITS SHALL BE COMPLIED/ PERMITTED, PROVIDED AND INSTALLED BY LL.

FAN SCHEDULE												
TAG	MANUFACTURER	MODEL	LOCATION	FAN PERFORMANCE				VOLTS	PHASE	HZ	WEIGHT LBS	CONTROL
				CFM	ESP	FAN RPM	FLA					
EF-1	PANASONIC	FV-0511VQ1	UTILITY	50	0.5	756	0.27	120	1	60	25	WALL SWITCH
EF-2	PANASONIC	FV-0511VQ1	MEN RR	80	0.5	821	0.27	120	1	60	25	LIGHT SWITCH
EF-3	PANASONIC	FV-0511VQ1	WOMEN RR	80	0.5	821	0.27	120	1	60	25	LIGHT SWITCH

NOTES:
 1. PROVIDE FACTORY MOUNTED AND INSTALLED DISCONNECT.
 2. COORDINATE EXACT POWER REQUIREMENT WITH ELECTRICAL CONTRACTOR.
 3. PROVIDE FAN WITH A BACKDRAFT DAMPER, AND SPEED CONTROLLER FOR BALANCING PURPOSE.
 4. ALL DIRECT DRIVE FANS TO HAVE ECM MOTORS.
 5. MANUFACTURE TO PROVIDE WITH DECORATIVE GRILLE.

BUILDING AIR BALANCE				
UNIT TAG	SUPPLY AIR	OUTSIDE AIR	RETURN AIR	EXHAUST AIR
AHU-1(E)	1465	350	1115	-
AHU-2(E)	1465	350	1115	-
AHU-3(E)	1465	175	1290	-
EF-1	-	-	-	50 CFM
EF-2	-	-	-	80 CFM
EF-3	-	-	-	80 CFM
EFL-1	-	-	-	80 CFM
TOTAL:	4395 CFM	875 CFM	3520 CFM	290 CFM
BUILDING PRESSURE:			585 CFM	POSITIVE

FAN/LIGHT COMBO SCHEDULE												
TAG	MANUFACTURER	MODEL	LOCATION	FAN PERFORMANCE				VOLTS	PHASE	HZ	WEIGHT LBS	CONTROL
				CFM	ESP	FAN RPM	FLA					
EFL-1	PANASONIC	FV-08VR2	SHOWER RM	80	0.5	1342	0.15	120	1	60	15	LIGHT SWITCH/ OCCUPANCY SENSOR

NOTES:
 1. PROVIDE FACTORY MOUNTED AND INSTALLED DISCONNECT.
 2. COORDINATE EXACT POWER REQUIREMENT WITH ELECTRICAL CONTRACTOR.
 3. PROVIDE FAN WITH A BACKDRAFT DAMPER, AND SPEED CONTROLLER FOR BALANCING PURPOSE.
 4. ALL DIRECT DRIVE FANS TO HAVE ECM MOTORS.
 5. MANUFACTURE TO PROVIDE WITH DECORATIVE GRILLE.

VENTILATION CALCULATION AS PER IMC 2021											
ROOM NAME	AREA	OCCUPANCY AS PER IMC 2021/1000SQ.FT.	OCCUPANCY AS PER IMC 2021	FINAL OCCUPANCY AS PER ARCHITECTURAL	CFM/SQ.FT	CFM/PERSON	OA CFM	EFFECTIVENESS	REQUIRED OA	PROVIDED OA	PROVIDED EXHAUST CFM
RECEPTION/ WAITING AREA	194	30	6	4	0.06	5	32	0.8	40	40	0
LOBBY AREA-HALLWAY	270	10	3	3	0.06	5	31	0.8	39	40	0
MEN RESTROOM	61	0	0	0	0	0	0	0.8	0	0	80
WOMEN RESTROOM	61	0	0	0	0	0	0	0.8	0	0	80
ADA SHOWER/CHANGING	75	25	2	2	0.12	20	49	0.8	61	65	80
TRAINING ROOM	2010	40	81	20	0.06	20	521	0.8	651	700	0
OFFICE	104	5	1	1	0.06	5	11	0.8	14	15	0
UTILITY	82	0	0	0	0.12	0	10	0.8	12	15	50
TOTAL	2857	-	-	30	-	-	-	-	817	875	290

DRYER BOOSTER FAN SCHEDULE												
TAG	MANUFACTURER	MODEL	LOCATION	FAN PERFORMANCE				MOTOR DATA			WEIGHT LBS	CONTROL
				CFM	ESP	FAN RPM	POWER	VOLTS	PHASE	HZ		
DBF-1	FANTECH	DEDPV-705	SEE PLAN	160	0.5	2600	70 W	120	1	60	13	INTERLOCK WITH DRYER

NOTES:
 1) DRYER FAN SHALL BE UL705 LISTED
 2) CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURER'S TO ENSURE THE BOOSTER FAN IS COMPATIBLE FOR THE DRYER

ELECTRICAL DUCT HEATER									
UNIT TAG	LOCATION	TYPE	ELECTRICAL DATA			UNIT DIMENSION (WXDXH)	MODEL NO.	MAKE	CONTROL
			KW	AMPS	(V/Hz/Ph)				
EDH-1	SEE PLAN	SLIP IN DUCT HEATER	5.7	16.0	208-230/60/3	12X12X6	IDHE	HORIZ	INTERLOCK WITH AHU-1
EDH-2	SEE PLAN	SLIP IN DUCT HEATER	5.7	16.0	208-230/60/3	12X12X6	IDHE	HORIZ	INTERLOCK WITH AHU-2

NOTES:
 1. PROVIDE FACTORY MOUNTED AND INSTALLED DISCONNECT.
 2. COORDINATE EXACT POWER REQUIREMENT WITH ELECTRICAL CONTRACTOR.
 3. PROVIDE DUCT HEATER AS PER MANUFACTURER RECOMMENDATION.
 4. PROVIDE REMOTE THERMOSTAT FOR DUCT HEATER AT LOCATION APPROVED BY ARCHITECT/OWNER.

AIR TERMINAL SCHEDULE								
TAG	MANUFACTURER	MODEL	TYPE	CFM RANGE	NECK SIZE	NOMINAL FACE SIZE	REMARKS	NOTES
RG-1	TITUS	350RL	RETURN GRILLE	0-145	6"X6"	24"X24"	CEILING MOUNT	1-4
				150-370	10"X10"	24"X24"	CEILING MOUNT	1-4
				375-860	14"X14"	24"X24"	CEILING MOUNT	1-4
				860-1350	20"X20"	24"X24"	CEILING MOUNT	1-4
CD-1	TMS	SUPPLY DIFFUSER		0-200	8" DIA	24"X24"	CEILING MOUNT	1-4
				201-400	10" DIA	24"X24"	CEILING MOUNT	1-4
				401-600	12" DIA	24"X24"	CEILING MOUNT	1-4

NOTES:
 1) BORDER TYPE TO BE COMPATIBLE WITH CEILING/WALL TYPE.
 2) COLOR AND FINISH TO BE REVIEWED AND APPROVED BY THE ARCHITECT.
 3) PROVIDE OPPOSED BLADE DAMPER AS NECESSARY FOR ALL AIR TERMINAL FOR AIR BALANCING OR ELSE PROVIDE DAMPER IN DUCTS, WHERE LOCATED IN INACCESSIBLE AREAS, PROVIDE CABLE OPERATED DAMPER LOCATED IN THE BRANCH, OPERABLE THROUGH THE FACE OF THE DIFFUSER (KEY OPERATED).
 4) INSTALL AS PER MANUFACTURER'S RECOMMENDATIONS.

CONSULTANTS

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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LOCATION:

PROJECT INFORMATION:

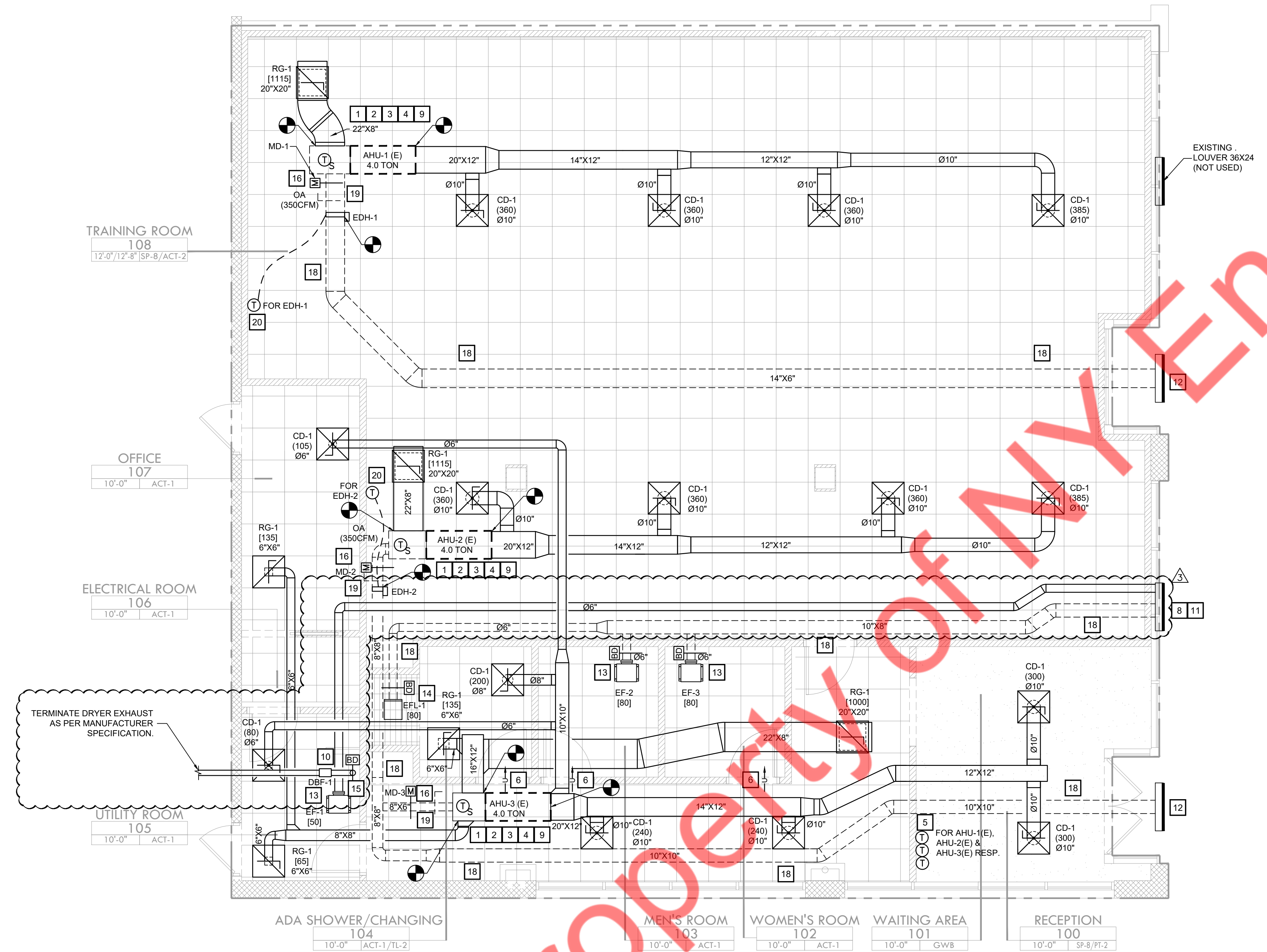
PROJECT NUMBER: 12366-25
 DRAWN BY: NYE
 REVIEWED BY: NYE
 AREA: 3,134 SQ. FT.

TITLE:

MECHANICAL SCHEDULES

SHEET NUMBER:

M-0.5

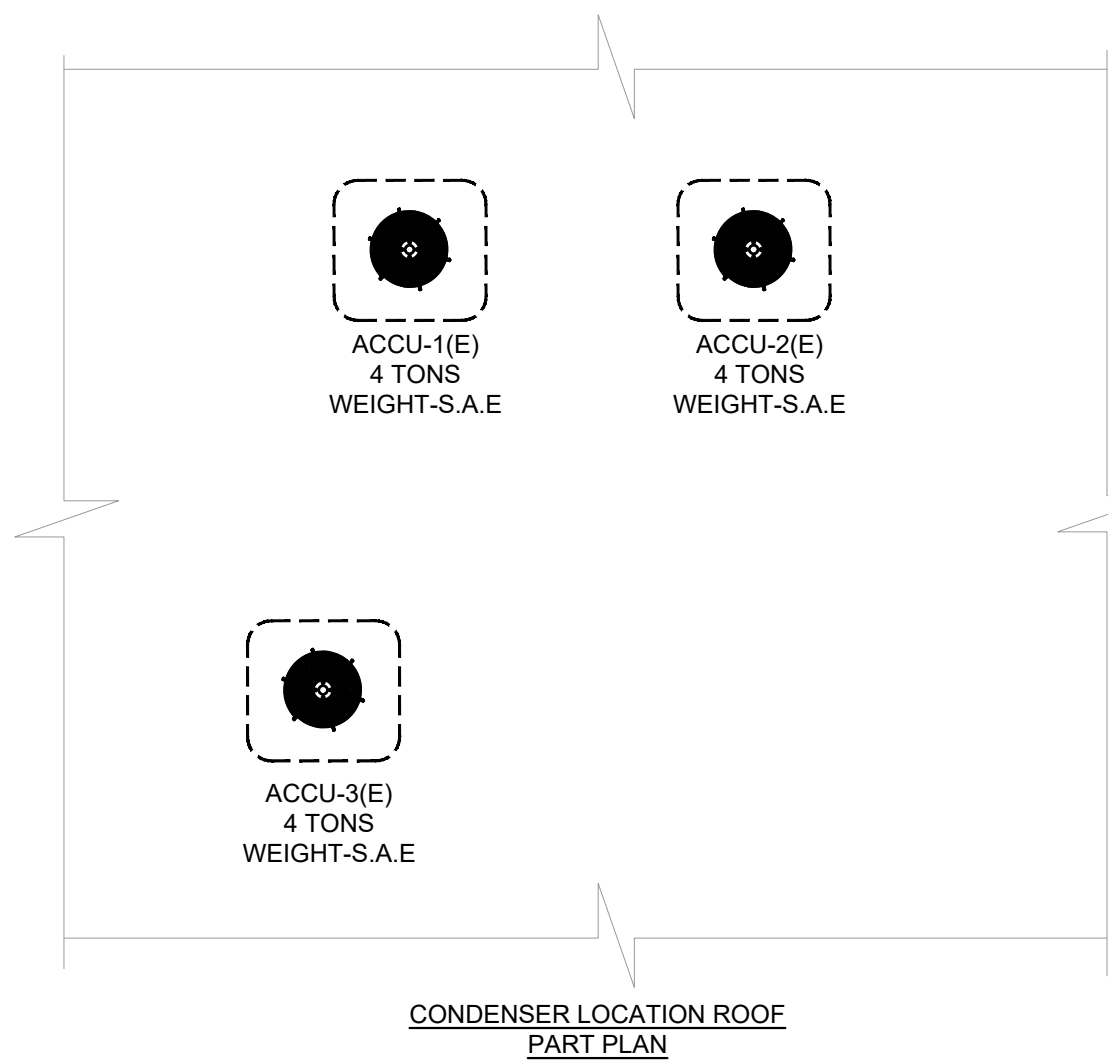


GENERAL NOTES:

1. ALL AIR DISTRIBUTION DEVICES SHALL BE COORDINATED WITH THE ARCHITECTURAL RCP & LIGHTING LAYOUT.
2. COORDINATE ALL WORK ON OTHER FLOORS AND IN OTHER TENANT SPACES WITH OWNERS REP. SO THAT WORK DOES NOT INTERFERE WITH OTHER TENANTS.
3. COORDINATE THE EXACT LOCATION OF ALL THERMOSTATS WITH FINAL FURNITURE LAYOUT, EQUIPMENT LAYOUT, ARCH AND OWNERS REPRESENTATIVE. CONTRACTOR SHALL TIE NEW T-STATS INTO BUILDING EMS AND UPDATE IT ACCORDINGLY.
4. PROVIDE ALL MANUFACTURER AND NEC REQUIRED CLEARANCE FOR ALL EQUIPMENT.
5. ENSURE ALL NEW BUILDING VENTS ARE FITTED WITH ANIMAL SCREENS EXCEPT OTHERWISE NOTED.
6. CONTRACTOR SHALL BALANCE EACH DEVICE WITH THE CFM SHOWN ON PLAN.
7. 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.
8. EQUIPMENT SIZES, DIMENSIONS AND REQUIRED CONNECTIONS SHALL BE VERIFIED WITH THE ACTUAL EQUIPMENT SELECTED VENDOR DRAWINGS BEFORE FABRICATION OF DUCTWORK, PIPING ETC.
9. DUCT SIZES SHOWN ON PLANS ARE CLEAR INSIDE AIR STREAM DIMENSIONS.
10. CONTRACTOR SHALL COORDINATE ALL ELECTRICAL REQUIREMENTS FOR ALL HVAC BASED ON ACTUAL EQUIPMENT SELECTED PRIOR TO INSTALLATION.
11. CONTRACTOR SHALL COORDINATE EQUIPMENT WEIGHTS AND SUPPORTS BASED ON ACTUAL EQUIPMENT SELECTED.
12. MOUNT DUCTWORK AS HIGH AS POSSIBLE.
13. TEST AND BALANCE AIR SYSTEMS. PROVIDE REPORT TO G.C AND OWNER.
14. NEW DUCTWORK IN CONCEALED AREAS MAY BE RECTANGULAR WITH EQUIVALENT CROSS SECTIONAL FLOW AREA.
15. PROVIDE FIRE OR FIRE-SMOKE DAMPER WHEREVER DUCTS ARE CROSSING FIRE/SMOKE RATED WALLS/BARRIERS/ROOF PENETRATIONS. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR FIRE RATINGS OF THE WALLS.
16. PROVIDE CABLE OPERATED DAMPER IN INACCESSIBLE CEILINGS.
17. COORDINATE FINAL LOCATION OF ALL HVAC EQUIPMENT WITH STRUCTURAL ENGINEER/ OWNER/ ARCHITECT.
18. PROVIDE ACCESS DOOR FOR HVAC UNITS & FANS AS PER MANUFACTURER RECOMMENDATIONS.
19. 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.
20. PORTIONS OF DUCTWORK VISIBLE THROUGH GRILLES AND REGISTERS IN FINISHED AREA SHALL BE PAINTED FLAT BLACK.
21. THE EXISTING UNIT SHALL BE PROVIDED AND INSTALLED BY LL. LL SHALL BE RESPONSIBLE FOR AHU/CU PERMITTING AND COMPLYING WITH CODE MINIMUM PERFORMANCE.
22. COORDINATE WITH ARCHITECT FOR THE FINAL PLACEMENT OF THE DIFFUSER IN TRAINING ROOM AREA. CONTRACTOR SHALL INSTALL DIFFUSER ABOVE THE BAFFLES WITH MINIMUM OBSTRUCTION OF AIR FLOW.
23. THE GAP BETWEEN THE BAFFLES SHALL BE 12" IN THE RECEPTION & TRAINING AREA TO INSTALL THE SQUARE DIFFUSER.

KEYED NOTES: #

- 1 EXTEND FULL SIZE SUPPLY & RETURN DUCTWORK FROM HVAC EQUIPMENT AS SHOWN. ACOUSTICALLY LINE THE FIRST 10'-0" OF BOTH SUPPLY AND RETURN MAIN DUCTS.
- 2 CONTRACTOR TO FIELD VERIFY EXACT LOCATION, CONFIGURATION & WORKING CONDITIONS OF EXISTING AHU (PROVIDED BY LL) PRIOR TO START WORK. INFORM TO ENGINEER ON RECORD. IF ANY DISCREPANCIES ARE FOUND, VERIFY EXISTING CONDENSATE DRAIN TERMINATION. PROVIDE NEW SECONDARY DRAIN PAN WITH LEAK DETECTOR IF EXISTING IS NOT FOUND OR DAMAGED IF REQUIRED RELOCATE/RAISE THE UNIT AS PER NEW CEILING ADJUSTMENTS.
- 3 PROVIDE REMOTE TEMPERATURE/HUMIDITY SENSOR MOUNTED IN RETURN DUCT AND WIRE BACK TO T-STAT.
- 4 CONTRACTOR TO FIELD VERIFY THE EXISTING AHU IS HAVING ELECTRIC SUPPLEMENT HEAT AS SHOWN IN SCHEDULE. IF EXISTING IS NOT AVAILABLE PROVIDE NEW AS PER REQUIREMENT MENTIONED IN SCHEDULE. REPORT BACK TO EOR IN CASE OF ANY DISCREPANCY BEFORE BID.
- 5 LOCATION OF DIGITAL THERMOSTAT CONTROL FOR ALL AHUS. INSTALL AND WIRE NEW 7-DAY PROGRAMMABLE THERMOSTAT. COORDINATE EXACT LOCATION WITH ARCHITECT AND OWNER PRIOR TO ROUGH-IN. PROVIDE LOCKABLE COVER.
- 6 1" DOOR UNDERCUT FOR AIR PASSAGE. COORDINATE WITH ARCHITECT.
- 7 ALL EXHAUST AIR SOURCES SHALL BE MINIMUM 10 FT. AWAY FROM OUTSIDE AIR INTAKES.
- 8 EXHAUST TERMINATION SHALL BE 3 FEET (914 MM) FROM THE PROPERTY LINES; 3 FEET (914 MM) FROM OPERABLE OPENINGS INTO BUILDINGS; 10 FEET (3048 MM) FROM MECHANICAL AIR INTAKES.
- 9 CONTRACTOR TO ENSURE THE UNIT IS WORKING AT THE RATED CAPACITY AS MENTIONED IN THE SCHEDULE.
- 10 PROVIDE DBF-1 BOOSTER FAN AS RECOMMENDED BY THE MANUFACTURER. COORDINATE WITH MANUFACTURER FOR THE FINAL REQUIREMENT OF THE BOOSTER FAN. FIELD VERIFY THE TOTAL LENGTH FROM THE DRYER TO THE TERMINATION LOCATION.
- 11 CONNECT THE EXHAUST DUCT WITH THE EXISTING LOUVER OF SIZE 36"X24" AS SHOWN ON PLAN.
- 12 EXISTING OUTSIDE INTAKE LOUVER OF SIZE 36"X24" TO REMAIN SAME. COORDINATE IN FIELD FOR THE FINAL LOCATION.
- 13 CEILING MOUNTED EXHAUST FAN, INTERLOCKED WITH TIMELOCK. PROVIDE BACKDRAFT DAMPER. EXHAUST DUCT SHALL BE GALVANIZED STEEL. FIELD VERIFY ALL ROUTING AND REQUIREMENTS PRIOR TO BID.
- 14 CEILING MOUNTED EXHAUST FAN, INTERLOCKED WITH SEPERATE LIGHT SWITCH. PROVIDE BACKDRAFT DAMPER. EXHAUST DUCT SHALL BE GALVANIZED STEEL. FIELD VERIFY ALL ROUTING AND REQUIREMENTS PRIOR TO BID.
- 15 4"Ø DRYER DUCT ROUTE TO PARKING AREA AND TERMINATE ON SIDE WALL. COORDINATE WITH LL FOR THE FINAL TERMINATION LOCATION AND ROUTING. PROVIDE WITH WALL DRYER BOX AT 48" AFF. TERMINATE AS PER MANUFACTURERS INSTRUCTION. SCREEN SHALL NOT BE PROVIDED FOR THE TERMINATION.
- 16 INTERLOCK OPERATION OF MD-1, MD-2 & MD-3 WITH AHU-1(E),2(E) & 3(E) RESPECTIVELY.
- 17 CONTRACTOR TO COORDINATE WITH THE LL FOR FINAL LOCATION OF THE CONDENSER UNIT. INSTALL AS PER MANUFACTURER'S RECOMMENDATIONS. ROUTE THE REFRIGERANT PIPE AS PER MANUFACTURER'S SPECIFICATIONS. CONTRACTOR TO FIELD VERIFY THE EXACT LOCATION OF REFRIGERANT PIPE CONDUITS ALLOTTED FOR THE SPACE.
- 18 EXISTING DUCTING (PROVIDED BY LL) TO REMAIN SAME ALONG WITH ALL SUPPORTS AND ACCESSORIES. CONTRACTOR TO FIELD VERIFY THE EXACT ROUTING OF THE EXISTING DUCTING. REROUTE/ MODIFY DUCTING AS REQUIRED.
- 19 BALANCE THE OUTSIDE AIR FLOW CFM AS SHOWN IN THE SCHEDULE.
- 20 LOCATION OF DIGITAL THERMOSTAT CONTROL FOR DUCT HEATER. INSTALL AND WIRE NEW 7-DAY PROGRAMMABLE THERMOSTAT. COORDINATE EXACT LOCATION WITH ARCHITECT AND OWNER PRIOR TO ROUGH-IN. PROVIDE LOCKABLE COVER.



CONSULTANTS

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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04/21/25	CLIENT COMMENTS
03/11/25	CLIENT COMMENTS



LOCATION:

PROJECT INFORMATION:

PROJECT NUMBER: 12366-25
 DRAWN BY: NYE
 REVIEWED BY: NYE
 AREA: 3,134 SQ. FT.

TITLE:

MECHANICAL FLOOR PLAN

SHEET NUMBER:

M-1.0

1.0 GENERAL

1.01 DESCRIPTION

- A. THIS DIVISION 22 AND THE ACCOMPANYING DRAWINGS COVER THE PROVISION OF ALL LABOR, EQUIPMENT, APPLIANCES, AND MATERIALS AND PERFORMING ALL OPERATIONS IN CONNECTION WITH THE CONSTRUCTION OF THE PLUMBING SYSTEMS AS SPECIFIED HEREIN AND AS SHOWN.
- B. ALL WORK SPECIFIED IN THIS SECTION IS GOVERNED BY THE COMMON WORK RESULTS FOR PLUMBING 22 05 00.
- C. THE GENERAL PROVISIONS AND DIVISION 1, INCLUDING THE GENERAL, SUPPLEMENTARY AND OTHER CONDITIONS AND OTHER DIVISIONS, AS APPROPRIATE, APPLY TO WORK SPECIFIED IN THIS DIVISION.

1.02 EXISTING CONDITIONS

- A. ATTENTION IS CALLED TO THE FACT THAT THE WORK IS TO BE PERFORMED WITHIN AN EXISTING, OPERATIONAL FACILITY. PRIOR TO THE SUBMISSION OF BIDS, EACH BIDDER SHALL VISIT THE PROJECT SITE, THOROUGHLY INVESTIGATE AND BE FAMILIAR WITH ALL EXISTING CONDITIONS WHICH WILL AFFECT THE WORK; ESPECIALLY THE WORK TO BE PERFORMED ABOVE THE EXISTING CEILING.
- B. CONNECT NEW WORK TO EXISTING WORK IN A NEAT AND WORKMANLIKE MANNER. WHERE AN EXISTING STRUCTURE MUST BE CUT OR EXISTING UTILITIES INTERFERE, SUCH OBSTRUCTIONS SHALL BE BYPASSED, REMOVED, REPLACED OR RELOCATED, PATCHED AND REPAIRED. WORK DISTURBED OR DAMAGED SHALL BE REPLACED OR REPAIRED TO ITS PRICE CONDITION.
- C. PRIOR TO THE START OF ANY DEMOLITION OR CONSTRUCTION, SECURE THE SERVICES OF A QUALIFIED, EPA CERTIFIED ASBESTOS ABATEMENT AGENCY TO CHECK THE EXISTING INSULATION, ETC. FOR ASBESTOS. SHOULD ASBESTOS BE FOUND, DO NOT PROCEED WITH DEMOLITION OR CONSTRUCTION; NOTIFY THE ARCHITECT IN ANY CASE IN WRITING OF THE AGENCY'S FINDINGS.

1.03 INTENT OF DRAWINGS AND SPECIFICATIONS

- A. THE IMPLIED AND STATED INTENT OF THE DRAWINGS AND SPECIFICATIONS IS TO ESTABLISH MINIMUM ACCEPTABLE STANDARDS FOR MATERIALS, EQUIPMENT AND WORKMANSHIP, AND TO PROVIDE OPERABLE PLUMBING SYSTEMS COMPLETE IN EVERY RESPECT.

- B. THE ENGINEERING DRAWINGS ARE DIAGRAMMATIC, INTENDED TO SHOW GENERAL ARRANGEMENT AND SIZES OF SYSTEM COMPONENTS, AND SHALL NOT BE SCALED. RATHER, THE ARCHITECTURAL AND STRUCTURAL DRAWINGS SHALL GOVERN SPACE CONSTRAINTS, DIMENSIONS AND FINISHES. AN OFFSETS AND FITTINGS WHICH WILL BE NECESSARY TO ACCOMPLISH THE FINISHED INSTALLATION SHALL BE PROVIDED AT NO ADDITIONAL COST OR INCREASE IN THE CONTRACT.

1.04 SPACE PRIORITY

- A. ENSURE OPTIMUM USE OF AVAILABLE SPACE FOR MATERIALS AND EQUIPMENT INSTALLED ABOVE CEILING, ALLOCATE SPACE IN THE ORDER OF PRIORITY AS LISTED BELOW EXCEPT AS OTHERWISE DETAILED. ITEMS ARE LISTED IN THE ORDER OF PRIORITY, WITH ITEMS OF EQUAL IMPORTANCE LISTED UNDER A SINGLE PRIORITY NUMBER.

- GRAVITY FLOW PIPING SYSTEMS
- VENT PIPING SYSTEMS
- RECESSED LIGHTING FIXTURES
- CONCEALED HVAC TERMINALS AND EQUIPMENT
- AIR DUCT SYSTEMS
- SPRINKLER PIPING SYSTEMS
- PRESSURIZED PIPING SYSTEMS
- ELECTRICAL CONDUIT, WIRING, CONTROL AIR TUBING

- B. ORDER OF SPACE PRIORITY DOES NOT DICATE INSTALLATION SEQUENCE. INSTALLATION SEQUENCE SHALL BE AS REQUIRED TO INSTALL ALL AFFECTED THREADS.

- C. THE WORK OF THIS DIVISION 22 SHALL NOT OBSTRUCT ACCESS FOR INSTALLATION, OPERATION AND MAINTENANCE OF THE WORK OF ANY OTHER DIVISION.

- D. ALL MAJOR ITEMS OF EQUIPMENT SHALL BE ARRANGED SO AS TO PROVIDE A MINIMUM OF 28" CLEAR AISLE SPACE. ADDITIONAL SPACE SHALL BE PROVIDED BETWEEN AND AROUND EQUIPMENT FOR MAINTENANCE AND PROPER OPERATION AS SHOW IN THE EQUIPMENT MANUFACTURER'S LITERATURE.

1.05 COORDINATION

- A. COORDINATE ALL WORK UNDER THIS DIVISION 22 WITH WORK UNDER AL OTHER DIVISIONS, PROVIDING ADJUSTMENT AS NECESSARY.

- B. COORDINATION OF SPACE REQUIREMENTS WITH RESPECT TO DIVISION 26 SHALL BE PERFORMED SUCH THAT:
 - NO EQUIPMENT, PIPING OR DUCTWORK, OTHER THAN ELECTRICAL, SHALL BE INSTALLED WITHIN 42" OF SWITCHBOARDS OR PANEL BOARDS.
 - NO PIPING OR DUCTWORK WHICH EVER OPERATES AT A TEMPERATURE IN EXCESS OF 120°F SHALL BE INSTALLED WITHIN 3" OF ANY ELECTRICAL CONDUCTOR.

- C. ALL ITEMS MOUNTED IN OR BELOW THE CEILING, AND ALL ITEMS PENETRATING THE CEILING, SHALL BE COORDINATED WITH THE ARCHITECTURAL REFLECTED CEILING PLANS. IF ANY ITEMS ARE NOT SHOWN ON THESE PLANS, OR ANY ITEMS NEED TO BE RELOCATED FOR COORDINATION PURPOSES, PREPARE A REFLECTED CEILING PLAN AND SUBMIT IT TO THE ARCHITECT FOR APPROVAL.

1.06 CODE COMPLIANCE

- A. ALL WORKMANSHIP AND MATERIALS PROVIDED UNDER THIS DIVISION 22 SHALL COMPLY WITH ALL LAWS, ORDINANCES, CODES AND REGULATIONS OF ALL FEDERAL, STATE AND LOCAL AUTHORITIES HAVING JURISDICTION.

- B. ALL FIRE SUPPRESSION, PLUMBING, HEATING, VENTILATION, AND A CONDITIONING MATERIALS AND WORKMANSHIP SHALL COMPLY WITH ALL LOCAL, STATE, AND FEDERAL CODES AND THE FOLLOWING STANDARDS AS MINIMUM REQUIREMENTS:
 - NEW JERSEY UCC ELECTRICAL SUBCODE 2020 (NFPA 70, 2020).
 - NEW JERSEY UCC BUILDING SUBCODE 2021 (IBC 2021).
 - NEW JERSEY COMMERCIAL ENERGY CODE 2019 (ASHRAE 90.1, 2019).
 - NEW JERSEY UCC MECHANICAL SUBCODE 2021 (IMC 2021).
 - NEW JERSEY UCC PLUMBING SUBCODE 2021 (NSPC 2021).

- C. SECURE AND PAY ALL FEES ASSOCIATED WITH ALL PERMITS AND LICENSES REQUIRED FOR EXECUTION OF THE CONTRACT. ARRANGE FOR ALL INSPECTIONS REQUIRED BY CITY, COUNTY, STATE AND OTHER AUTHORITIES HAVING JURISDICTION, AND DELIVER CERTIFICATES OF APPROVAL TO THE ARCHITECT.
- D. THE CODE REQUIREMENTS ARE STRICTLY A MINIMUM AND SHALL BE MET WITHOUT INCURRING ADDITIONS TO THE CONTRACT. WHERE REQUIREMENTS OF THE DRAWINGS OR SPECIFICATIONS EXCEED THE CODE REQUIREMENTS THE WORK SHALL BE PROVIDED IN ACCORDANCE WITH THESE DRAWINGS OR SPECIFICATIONS. IN THE EVENT OF CONFLICT OR AMBIGUITY BETWEEN THE VARIOUS CODES, THE MOST STRINGENT REQUIREMENT SHALL GOVERN.

1.07 ELECTRICAL REQUIREMENTS AND INTERFACE

- A. ALL ELECTRICAL EQUIPMENT AND WIRING PROVIDED UNDER THIS DIVISION 22 SHALL COMPLY WITH THE ELECTRICAL SYSTEM CHARACTERISTICS INDICATED ON THE ELECTRICAL DRAWINGS AND SPECIFIED IN DIVISION 26.

- B. ELECTRIC CONTROLS, CONTRACTORS, STARTERS, PILOT LIGHTS, PUSH BUTTONS, ETC., SHALL BE PROVIDED COMPLETE AS PORT OF THE MOTOR, HEATER OR OTHER EQUIPMENT WHICH IT OPERATES. ALL ELECTRICAL COMPONENTS SHALL BE IN CONFORMANCE WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE AND DIVISION 26. STARTERS SHALL BE WYE-DELTA, CLOSED TRANSITION TYPE. REFERENCE DIVISION 26 AND THE ELECTRICAL ENGINEERING DRAWINGS FOR THOSE MOTOR STARTERS PROVIDED UNDER DIVISION 26. ALL STARTERS NOT SHOWN SHALL BE PROVIDED UNDER THIS DIVISION 22, UNLESS SPECIFIED OTHERWISE UNDER OTHER INDIVIDUAL EQUIPMENT SECTIONS, MOTOR STARTERS SHALL CONFORM TO THE FOLLOWING MINIMUM REQUIREMENTS:
 - STARTERS FOR MOTORS 1/3 HORSEPOWER OR SMALLER SHALL BE MANUAL UNLESS REMOTE OR AUTOMATIC STARTING IS REQUIRED, IN WHICH CASE THE STARTERS SHALL BE MAGNETIC, FULL VOLTAGE, NON-REVERSING, SINGLE-SPEED, UNLESS OTHERWISE INDICATED. ALL OTHER STARTERS SHALL BE MAGNETIC.
 - EACH STARTER FOR A THREE-PHASE MOTOR SHALL BE FURNISHED WITH THREE (3) OVERLOAD RELAYS SIZED FOR THE FULL-LOAD RUNNING CURRENT OF THE MOTOR PROVIDED. PROVIDE AN EXTERNAL "HAND-OFF-AUTO" SELECTOR SWITCH WITH RED "RUNNING" LIGHT, PROVIDE A GREEN PILOT LIGHT TO INDICATE MOTOR STOPPED. EACH PILOT LIGHT SHALL HAVE A LEGEND PLATE INDICATING REASON FOR SIGNAL.
 - EACH OVERLOAD RELAY SHALL HAVE A NORMALLY OPEN ALARM CONTACT, WHICH WILL CLOSE ONLY WHEN ACTUATED BY AN OVERLOAD (NOT TO BE CONFUSED WITH N.O. OR N.C. AUXILIARY CONTACTS). THESE CONTACTS SHALL BE PROPERLY WIRED TO THEIR RESPECTIVE BLUE PILOT LIGHT PROVIDED ON THE STARTER FRONT COVER AND HAVE 0 "TRIPPED" LEGEND PLATE.
 - INDIVIDUALLY MOUNTED MOTOR STARTERS SHALL BE IN A NEMA TYPE 1 GENERAL PURPOSE ENCLOSURE IN UNFINISHED AREAS AND SHALL BE FLUSH MOUNTED IN FINISHED AREAS. ALL STARTERS MOUNTED IN EXTERIOR AREAS SHALL HAVE A NEMA 3R ENCLOSURE. EACH STARTER SHALL HAVE A LAMINATED NAMEPLATE TO INDICATE EQUIPMENT UNIT NUMBER, FUNCTION, AND CIRCUIT NUMBER.
 - ALL MOTOR STARTERS, PUSH BUTTONS AND PILOT LIGHTS SHALL BE OF THE SAME MANUFACTURER AS THE SWITCHBOARD AND SHALL BE GENERAL ELECTRIC, SQUARED, SIEMENS, OR WESTINGHOUSE.
 - MOTOR STARTERS FOR THE FOLLOWING EQUIPMENT SHALL BE PROVIDED UNDER DIVISION 22 BY THE MANUFACTURER OF THE EQUIPMENT:
 - PUMPS WITHOUT VFDS
 - OTHER EQUIPMENT HEREIN AFTER SPECIFIED IN OTHER SECTIONS TO BE PROVIDED WITH INTEGRAL STARTERS
 - UNLESS OTHERWISE NOTED OR SPECIFIED IN INDIVIDUAL SECTIONS, ALL 3-PHASE MOTORS SHALL BE STANDARD NEMA CONTINUOUS DUTY "B" TYPE, WITH CLASS B INSULATION, OPEN DRIP-PROOF FRAME FOR INDOOR SERVICE, TEFC FOR OUTDOOR SERVICE, AND A SERVICE FACTOR OF 1.15. ALL MOTORS 5 HP AND LARGER SHALL BE U.S. MOTORS HI-EFFICIENCY MODEL OR RELIANCE XE HI-EFFICIENCY MODEL.
 - ALL POWER WIRING AND FINAL CONNECTIONS TO EQUIPMENT SHALL BE PROVIDED UNDER DIVISION 26.
 - CONTROL COMPONENTS, ALL INTERLOCKS (CONTROL VALVES, LEAK SENSORS, ETC.) AND CONTROL WIRING (120 VOLTS, SINGLE PHASE OR LESS) SHALL BE PROVIDED UNDER DIVISION 22 AS REQUIRED TO ACHIEVE THE SPECIFIED CONTROL SEQUENCES.
 - ALL CONTROL WIRING OVER 30 VOLTS SHALL BE INSTALLED BY A LICENSED ELECTRICIAN WORKING UNDER THIS DIVISION 22.

- A. CUTTING OF HOLES THROUGH CONCRETE AND MASONRY SHALL BE BY DIAMOND CORE OR CONCRETE SAW, PNEUMATIC HAMMER, IMPACT ELECTRIC AND HAND OR MANUAL HAMMER TYPE DRILLS WILL NOT BE ALLOWED, EXCEPT AS PERMITTED BY THE ARCHITECT WHERE REQUIRED BY LIMITED WORKING SPACE. LOCATE HOLES SUCH THAT THEY WILL NOT AFFECT STRUCTURAL SECTIONS SUCH AS RIBS OR BEAMS. HOLES SHALL BE LAID OUT WELL IN ADVANCE OF THE INSTALLATION. THESE LAYOUT LOCATIONS SHALL BE APPROVED BY THE ARCHITECT PRIOR TO DRILLING.

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- ALL CONTROL WIRING OVER 30 VOLTS SHALL BE INSTALLED BY A LICENSED ELECTRICIAN WORKING UNDER THIS DIVISION 22.

- 1. IDENTIFICATION OF PIPING
 - A. ALL ABOVEGROUND PLUMBING SYSTEMS PIPING AND VALVES SIZED 3/4" AND LARGER WHICH ARE INSTALLED IN ACCESSIBLE LOCATIONS (INCLUDING PIPING ABOVE REMOVABLE CEILING AND BEHIND ACCESS PANELS) SHALL BE IDENTIFIED IN STRICT CONFORMANCE WITH THE "SCHEME FOR THE IDENTIFICATION OF PIPING SYSTEMS" (ANSI A13.1-2015)
 - PIPING LABELS IN EXPOSED AREAS SHALL BE ORIENTED AND LOCATED IN COORDINATION WITH THE ARCHITECT.
 - SYSTEM AMES SHALL, AT MINIMUM, UNIQUELY IDENTIFY THE SYSTEM AND PERFORMANCE CATEGORY I.E 140% HOT WATER SUPPLY, HIGH PRESSURE COLD WATER, ETC.
 - SPECIALIZED PIPING (GREASE WASTE, ACID WASTE, FUEL PIPING, ETC.) INSTALLED UNDERGROUND SHALL BE LABELED. THE LABEL SHALL BE CORROSION-RESISTANT OR SHALL BE PERMANENTLY MARKED.
 - EACH IDENTIFICATION MARKER SHALL INCLUDE THE FOLLOWING:
 - PROPER COLOR-CODED BACKGROUND
 - PROPER COLOR OF LEGEND IN RELATION TO BACKGROUND COLOR
 - PROPER LEGEND LETTER SIZE
 - PROPER MARKER LENGTH
 - DIRECTION OF THE FLOW ARROW SHALL BE INCLUDED ON EACH MARKER
 - LOCATIONS FOR PIPE MARKERS SHALL BE AS FOLLOWS:
 - ADJACENT TO EACH VALVE AND FITTING
 - AT EACH BRANCH AND RISER TAKE OFF
 - AT EACH PIPE PASSAGE THROUGH WALLS, FLOORS AND CEILING
 - ON ALL STRAIGHT PIPE RUNS EVERY 25 FEET EXCEPT THAT PIPING UNDERGROUND REQUIRED TO BE LABELED SHALL BE LABELED EVERY 10 FEET OR MORE OFTEN AS REQUIRED BY THE AHU
 - IDENTIFICATION MARKERS MAY BE STENCILED OR SHALL BE SET MARK PIPE MARKERS, AS MANUFACTURED BY SETON NAME PLATE CORPORATION.
 - ALL VALVES SHALL BE IDENTIFIED WITH THE APPROPRIATE SERVICE DESIGNATION AND VIVE NUMBER BRASS VALVE TAGS. EACH VALVE TAG SHALL BE 19 GAUGE BRASS WITH 1/4" BLOCK-FILLED LETTERS OVER 1/2" BLACK-FILLED NUMBERS. TAGS SHALL BE FASTENED TO VALVES WITH BRASS "S" HOOKS OR BRASS JACK CHAIN BRASS TAGS AND FASTENERS SHALL BE AS MANUFACTURED BY SETON NAME PLATE CORPORATION. PROVIDE CHARTS OF ALL VALVES. VALVE CHARTS SHALL INCLUDE THE FOLLOWING ITEMS:
 - VALVE IDENTIFICATION NUMBER
 - LOCATION
 - PURPOSE / MATERIAL

- 2.0 PRODUCTS
 - 2.01 810 BASIS AND SUBSTITUTION PROCEDURES
 - A. MANUFACTURER NAMES, SERIES, AND MODEL NUMBERS, AS NOTED OR SPECIFIED, ARE FOR THE PURPOSE OF DESCRIBING TYPE, CAPACITY, AND QUALITY OF EQUIPMENT, MATERIALS, AND PRODUCTS TO BE USED, UNLESS "OR EQUAL" IS SPECIFICALLY STATED. BIDS SHALL BE BASED ONLY ON THE SPECIFIED BASIS OF DESIGN MANUFACTURER. THE LISTING OF A PARTICULAR MANUFACTURER AS AN "EQUAL" OR "ACCEPTABLE SUBSTITUTE" MANUFACTURER SHALL NOT BE MISCONSTRUED AS APPROVING, NOR ALLOWING THE SUBSTITUTION OF, THAT MANUFACTURER'S STANDARD PRODUCT IN PLACE OF THE BASIS OF DESIGN. NO CONSIDERATION WILL BE GIVEN TO A PRODUCT THAT WOULD REQUIRE DIMENSIONAL, SPATIAL, OR AESTHETIC CHANGES TO THE PROJECT. "ACCEPTABLE SUBSTITUTE" AND "EQUAL" MANUFACTURERS SHALL ONLY BID THOSE PRODUCTS THAT EXACTLY MATCH THE SIZE AND OTHER CHARACTERISTICS OF THE SPECIFIED BASIS OF DESIGN. ANY CHANGES TO OTHER DISCIPLINES AND TRADES OF WORK REQUIRED BY AN "OR EQUAL" OR "SUBSTITUTE" PRODUCT SHALL BE FULLY CONSIDERED AND PRICED ACCORDINGLY BEFORE BIDDING OR PRICING. THE DECISION AS TO WHETHER OR NOT A PROPOSED SUBSTITUTE OR "EQUAL" PRODUCT SHALL REST SOLELY WITH THE ARCHITECT.
 - REQUESTS TO PROVIDE "EQUAL" PRODUCTS IN LIEU OF THOSE SPECIFIED SHALL BE SUBMITTED TO THE ARCHITECT IN WRITING AT LEAST TEN (10) DAYS PRIOR TO FINAL PRICING AND EXECUTION OF THE CONTRACT. NO CONSIDERATION WILL BE GIVEN TO SUBSTITUTE PRODUCTS AFTER FINAL PRICING AND EXECUTION OF THE CONTRACT.
 - ANY "OR EQUAL" PRODUCT OR PROPOSED PRODUCT SUBSTITUTION WHICH WILL CAUSE A CHANGE IN THE APPEARANCE, DIMENSIONS, OR DESIGN OF ANY PART OF THE BUILDING, STRUCTURE, ELECTRICAL SYSTEM, OR ANY OTHER ENGINEERED SYSTEM SHALL BE ACCOMPANIED BY A SCALED DRAWING AND WRITTEN DESCRIPTION OF THE REQUIRED CHANGES FOR APPROVAL BY THE ARCHITECT. IF DEEMED NECESSARY BY THE ARCHITECT, DESIGN CHANGES SHALL BE SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER, CURRENTLY LICENSED IN THIS STATE. THIS SHALL BE PERFORMED UNDER THE CONTRACTOR SELECTING THE SUBSTITUTION'S SCOPE.
 - ANY AND ALL CHANGES DUE TO THE SUBSTITUTION OF BASIS OF DESIGN EQUIPMENT INCLUDING BUT NOT LIMITED TO ELECTRICAL CONNECTION, PHYSICAL SIZE, ACCESS, PIPING CONNECTIONS, CONTROLS, ETC. SHALL BE SOLELY THE RESPONSIBILITY OF THE CONTRACTOR SELECTING THE SUBSTITUTION.
 - 2.02 MINIMUM STANDARDS
 - EVERY PIECE OF ENERGY-CONSUMING EQUIPMENT, ALL FIRE SUPPRESSION PRODUCTS, AND LIFE SAFETY EQUIPMENT SHALL COMPLY WITH THE FOLLOWING STANDARDS AS APPLICABLE, ESPECIALLY REGARDING PREVAILING CODES:
 - FACTORY MUTUAL LABORATORIES (FM)
 - INDUSTRIAL RISK INSURERS (IRI)
 - UNDERWRITERS LABORATORIES, INC. (UL)
 - ADC: AIR DIFFUSION COUNCIL
 - AGA: AMERICAN GAS ASSOCIATION
 - AMCA: AIR MOVING AND CONDITIONING ASSOCIATION, INC.
 - ANSI: AMERICAN NATIONAL STANDARDS INSTITUTE
 - API: AMERICAN PETROLEUM INSTITUTE
 - AHRI: AIR CONDITIONING, HEATING, AND REFRIGERATION INSTITUTE
 - ASHRAE: AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS
 - ASME: AMERICAN SOCIETY OF MECHANICAL ENGINEERS
 - ASTM: AMERICAN SOCIETY OF TESTING AND MATERIALS
 - AWWA: AMERICAN WATER WORKS ASSOCIATION
 - IBR: INSTITUTE OF BOILER AND RADIATOR MANUFACTURERS
 - MSS: MANUFACTURERS STANDARDIZATION SOCIETY
 - NBBPV: NATIONAL BOARD OF BOARD AND PRESSURE VESSEL INSPECTORS
 - NEMA: NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
 - OSHA: OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION
 - PD1: PLUMBING DRAINAGE INSTITUTE
 - PP: PLASTIC PIPE INSTITUTE
 - CISPI: CAST IRON SOIL PIPING INSTITUTE

- 1.08 SLEEVES, SEALS, AND ESCUTCHEONS
 - A. SLEEVES SHALL BE PROVIDED THROUGH ALL PIPE PENETRATIONS OF CONCRETE OR MASONRY WALLS, ELEVATED FLOORS, AND ROOFS, EXCEPT THOSE PLUMBING PIPING PENETRATIONS FOR FIXTURES, VENTS, ETC.
 - SLEEVES SHALL BE FABRICATED FROM SCHEDULE 40 STEEL PIPE THROUGH 10" AND STANDARD WALL STEEL PIPE FOR SLEEVE SIZES 12" AND LARGER. ALL SLEEVES PENETRATING EXTERIOR WALLS, UNDERGROUND WALLS, PIT OR VAULT WALLS SHALL BE PROVIDED WITH A 3" X 3/8" THICK WATERSTOP RING WELDED COMPLETELY TO THE MIDPOINT OF THE SLEEVE.
 - ALL SLEEVES PENETRATING EXTERIOR WALLS, UNDERGROUND WALLS, PIT OR VAULT WALLS, AND ELEVATED FLOORS SHALL BE PACKED AND SEALED WATER TIGHT.
 - SLEEVES THROUGH ROOFS SHALL EXTEND ABOVE THE ROOF SURFACE AND BE FLASHED WATER TIGHT.
 - SLEEVES THROUGH WALLS SHALL BE CUT AND FINISHED FLUSH WITH EACH SURFACE OF THE WALL IN WHICH THEY ARE INSTALLED.
 - SLEEVES THROUGH ELEVATED FLOORS SHALL EXTEND AT LEAST 4" ABOVE THE FINISHED FLOOR AND BE SEALED WATERPROOF BETWEEN THE SLEEVE AND SLAB.
 - SLEEVES SHALL BE SIZED TO PROVIDE A MINIMUM OF 1/2" CLEARANCE BETWEEN THE INSIDE SURFACE OF THE SLEEVE AND THE OUTSIDE FINISHED SURFACE OF THE PIPE PLUS ANY INSULATION SPECIFIED.
 - FIRE-STOPPS SHALL BE PROVIDED AS SPECIFIED HEREIN. ALL ANNULAR SPACES BETWEEN PIPING AND SLEEVES THAT DO NOT REQUIRE FIRE-STOPPS SHALL BE PACKED WITH MINERAL WOOL AND CAULKED.
 - FIRE-STOPPING OR PACKING AT ELEVATED FLOOR PENETRATIONS SHALL BE LEVEL WITH OR ABOVE THE ELEVATION ON THE TOP OF THE SLEEVE TO PREVENT ANY WATER POOLING ON TOP OF THE SLEEVE.
 - PROVIDES ROUND, CHROME-PLATED ESCUTCHEONS ON ALL EXPOSED PIPING PENETRATIONS PASSING THROUGH WALLS, FLOORS, PARTITIONS AND CEILING.
 - ALL PENETRATIONS THROUGH RAFTER SLABS, WALLS, ETC. SHALL BE UNDER UL-LISTED SYSTEMS. PROVIDE RATED BOX-OUT, FIRE CAULKING, ETC. AS NEEDED TO ENSURE FIRE RATING IS MAINTAINED IN COMPLIANCE WITH UL-LISTED SYSTEMS.

- 1.09 FIRE STOPPS
 - A. WHERE PIPING, CONDUIT, ETC. PASS THROUGH FIRE PARTITIONS, FIRE WALLS, AND FLOORS, A FIRESTOP SHALL BE PROVIDED THAT WILL ENSURE AN EFFECTIVE BARRIER AGAINST THE SPREAD OF FIRE, SMOKE, AND GASES. FIRESTOP MATERIAL SHALL BE PACKED TIGHT AND COMPLETELY FILL GAPS BETWEEN THE DUCTWORK, PIPING, CONDUITS, ETC. AND THE PERIMETER OF THEIR ROUGH OPENINGS.
 - ALL PENETRATIONS SHALL BE IN ACCORDANCE WITH UL 1479 OR ASTM E 814 LISTED SYSTEMS, AND PRODUCTS USED SHALL BE SPECIFICALLY APPLICABLE FOR THE PENETRATION LOCATION, SIZE, AND TYPE. TESTED SYSTEM NUMBER, TYPE OF ASSEMBLY PENETRATED, AND RATING TO BE ACHIEVED, AS-BUILT DOCUMENTATION SHALL BE INCLUDED WITH THE CLOSE-OUT MATERIALS.
 - INSTALLATION SHALL BE BY A QUALIFIED INSTALLER. THE INSTALLER SHALL BE CERTIFIED, LICENSED, OR OTHERWISE QUALIFIED BY THE FIRES TOPPING MANUFACTURER AS HAVING THE NECESSARY TRAINING TO INSTALL THE MANUFACTURER-SPECIFIC PRODUCT. A MANUFACTURER OR VENDORS WILLINGNESS TO SELL THE FIRES TOPPING PRODUCT TO THE CONTRACTOR OR INSTALLER DOES NOT IN ITSELF CONFER QUALIFICATION.
 - INSTALLER SHALL HAVE AT LEAST ONE OF THE FOLLOWING QUALIFICATIONS:
 - FA 4991 APPROVED CONTRACTOR
 - UL APPROVED CONTRACTOR
 - HILT, 3M, OR PROSET ACCREDITED FIRE STOP SPECIALTY CONTRACTOR
 - INSTALLING FIRM SHALL HAVE NO LESS THAN 3 YEARS OF EXPERIENCE WITH FIRESTOP INSTALLATION.
 - A MANUFACTURER'S DIRECT REPRESENTATIVE (NOT DISTRIBUTOR OR AGENT) SHALL BE ON SITE DURING THE INITIAL INSTALLATION OF FIRESTOP SYSTEMS TO TRAIN APPROPRIATE CONTRACTOR PERSONNEL IN PROPER SELECTION AND INSTALLATION PROCEDURES.
 - THE FIRESTOP CONTRACTOR OR INSTALLER SHALL SUPPLY AS-BUILT DOCUMENTATION OF EACH INDIVIDUAL PENETRATION LOCATION ON THE PROJECT. DOCUMENTATION SHALL INCLUDE A SEQUENTIAL LOCATION NUMBER, DETAILED DESCRIPTION OF THE PENETRATION LOCATION, SIZE, AND TYPE, TESTED SYSTEM NUMBER, TYPE OF ASSEMBLY PENETRATED, AND RATING TO BE ACHIEVED, AS-BUILT DOCUMENTATION SHALL BE INCLUDED WITH THE CLOSE-OUT MATERIALS.
 - IDENTIFY THROUGH-PENETRATION FIRESTOP SYSTEMS WITH PRESSURE-SENSITIVE, SELF-ADHESIVE, PREPRINTED VINYL LABELS. ATTACH LABEL PERMANENTLY ON BOTH SIDES OF THE PENETRATED CONSTRUCTION IN A VISIBLE LOCATION. THE LABEL SHALL INCLUDE THE FOLLOWING:
 - THE WORDS "WARNING -- THROUGH PENETRATION FIRESTOP SYSTEM--DO NOT DISTURB"
 - THROUGH PENETRATION FIRESTOP SYSTEM DESIGNATION AND MANUFACTURER
 - DATE OF INSTALLATION

- 1.10 CORE DRILLING
 - A. CUTTING OF HOLES THROUGH CONCRETE AND MASONRY SHALL BE BY DIAMOND CORE OR CONCRETE SAW, PNEUMATIC HAMMER, IMPACT ELECTRIC AND HAND OR MANUAL HAMMER TYPE DRILLS WILL NOT BE ALLOWED, EXCEPT AS PERMITTED BY THE ARCHITECT WHERE REQUIRED BY LIMITED WORKING SPACE. LOCATE HOLES SUCH THAT THEY WILL NOT AFFECT STRUCTURAL SECTIONS SUCH AS RIBS OR BEAMS. HOLES SHALL BE LAID OUT WELL IN ADVANCE OF THE INSTALLATION. THESE LAYOUT LOCATIONS SHALL BE APPROVED BY THE ARCHITECT PRIOR TO DRILLING.

1.11 IDENTIFICATION OF PIPING

- A. ALL ABOVEGROUND PLUMBING SYSTEMS PIPING AND VALVES SIZED 3/4" AND LARGER WHICH ARE INSTALLED IN ACCESSIBLE LOCATIONS (INCLUDING PIPING ABOVE REMOVABLE CEILING AND BEHIND ACCESS PANELS) SHALL BE IDENTIFIED IN STRICT CONFORMANCE WITH THE "SCHEME FOR THE IDENTIFICATION OF PIPING SYSTEMS" (ANSI A13.1-2015)
- PIPING LABELS IN EXPOSED AREAS SHALL BE ORIENTED AND LOCATED IN COORDINATION WITH THE ARCHITECT.
- SYSTEM AMES SHALL, AT MINIMUM, UNIQUELY IDENTIFY THE SYSTEM AND PERFORMANCE CATEGORY I.E 140% HOT WATER SUPPLY, HIGH PRESSURE COLD WATER, ETC.
- SPECIALIZED PIPING (GREASE WASTE, ACID WASTE, FUEL PIPING, ETC.) INSTALLED UNDERGROUND SHALL BE LABELED. THE LABEL SHALL BE CORROSION-RESISTANT OR SHALL BE PERMANENTLY MARKED.
- EACH IDENTIFICATION MARKER SHALL INCLUDE THE FOLLOWING:
 - PROPER COLOR-CODED BACKGROUND
 - PROPER COLOR OF LEGEND IN RELATION TO BACKGROUND COLOR
 - PROPER LEGEND LETTER SIZE
 - PROPER MARKER LENGTH
 - DIRECTION OF THE FLOW ARROW SHALL BE INCLUDED ON EACH MARKER
- LOCATIONS FOR PIPE MARKERS SHALL BE AS FOLLOWS:
 - ADJACENT TO EACH VALVE AND FITTING
 - AT EACH BRANCH AND RISER TAKE OFF
 - AT EACH PIPE PASSAGE THROUGH WALLS, FLOORS AND CEILING
 - ON ALL STRAIGHT PIPE RUNS EVERY 25 FEET EXCEPT THAT PIPING UNDERGROUND REQUIRED TO BE LABELED SHALL BE LABELED EVERY 10 FEET OR MORE OFTEN AS REQUIRED BY THE AHU
- IDENTIFICATION MARKERS MAY BE STENCILED OR SHALL BE SET MARK PIPE MARKERS, AS MANUFACTURED BY SETON NAME PLATE CORPORATION.
- ALL VALVES SHALL BE IDENTIFIED WITH THE APPROPRIATE SERVICE DESIGNATION AND VIVE NUMBER BRASS VALVE TAGS. EACH VALVE TAG SHALL BE 19 GAUGE BRASS WITH 1/4" BLOCK-FILLED LETTERS OVER 1/2" BLACK-FILLED NUMBERS. TAGS SHALL BE FASTENED TO VALVES WITH BRASS "S" HOOKS OR BRASS JACK CHAIN BRASS TAGS AND FASTENERS SHALL BE AS MANUFACTURED BY SETON NAME PLATE CORPORATION. PROVIDE CHARTS OF ALL VALVES. VALVE CHARTS SHALL INCLUDE THE FOLLOWING ITEMS:
 - VALVE IDENTIFICATION NUMBER
 - LOCATION
 - PURPOSE / MATERIAL

- 2.0 PRODUCTS
 - 2.01 810 BASIS AND SUBSTITUTION PROCEDURES
 - A. MANUFACTURER NAMES, SERIES, AND MODEL NUMBERS, AS NOTED OR SPECIFIED, ARE FOR THE PURPOSE OF DESCRIBING TYPE, CAPACITY, AND QUALITY OF EQUIPMENT, MATERIALS, AND PRODUCTS TO BE USED, UNLESS "OR EQUAL" IS SPECIFICALLY STATED. BIDS SHALL BE BASED ONLY ON THE SPECIFIED BASIS OF DESIGN MANUFACTURER. THE LISTING OF A PARTICULAR MANUFACTURER AS AN "EQUAL" OR "ACCEPTABLE SUBSTITUTE" MANUFACTURER SHALL NOT BE MISCONSTRUED AS APPROVING, NOR ALLOWING THE SUBSTITUTION OF, THAT MANUFACTURER'S STANDARD PRODUCT IN PLACE OF THE BASIS OF DESIGN. NO CONSIDERATION WILL BE GIVEN TO A PRODUCT THAT WOULD REQUIRE DIMENSIONAL, SPATIAL, OR AESTHETIC CHANGES TO THE PROJECT. "ACCEPTABLE SUBSTITUTE" AND "EQUAL" MANUFACTURERS SHALL ONLY BID THOSE PRODUCTS THAT EXACTLY MATCH THE SIZE AND OTHER CHARACTERISTICS OF THE SPECIFIED BASIS OF DESIGN. ANY CHANGES TO OTHER DISCIPLINES AND TRADES OF WORK REQUIRED BY AN "OR EQUAL" OR "SUBSTITUTE" PRODUCT SHALL BE FULLY CONSIDERED AND PRICED ACCORDINGLY BEFORE BIDDING OR PRICING. THE DECISION AS TO WHETHER OR NOT A PROPOSED SUBSTITUTE OR "EQUAL" PRODUCT SHALL REST SOLELY WITH THE ARCHITECT.
 - REQUESTS TO PROVIDE "EQUAL" PRODUCTS IN LIEU OF THOSE SPECIFIED SHALL BE SUBMITTED TO THE ARCHITECT IN WRITING AT LEAST TEN (10) DAYS PRIOR TO FINAL PRICING AND EXECUTION OF THE CONTRACT. NO CONSIDERATION WILL BE GIVEN TO SUBSTITUTE PRODUCTS AFTER FINAL PRICING AND EXECUTION OF THE CONTRACT.
 - ANY "OR EQUAL" PRODUCT OR PROPOSED PRODUCT SUBSTITUTION WHICH WILL CAUSE A CHANGE IN THE APPEARANCE, DIMENSIONS, OR DESIGN OF ANY PART OF THE BUILDING, STRUCTURE, ELECTRICAL SYSTEM, OR ANY OTHER ENGINEERED SYSTEM SHALL BE ACCOMPANIED BY A SCALED DRAWING AND WRITTEN DESCRIPTION OF THE REQUIRED CHANGES FOR APPROVAL BY THE ARCHITECT. IF DEEMED NECESSARY BY THE ARCHITECT, DESIGN CHANGES SHALL BE SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER, CURRENTLY LICENSED IN THIS STATE. THIS SHALL BE PERFORMED UNDER THE CONTRACTOR SELECTING THE SUBSTITUTION'S SCOPE.
 - ANY AND ALL CHANGES DUE TO THE SUBSTITUTION OF BASIS OF DESIGN EQUIPMENT INCLUDING BUT NOT LIMITED TO ELECTRICAL CONNECTION, PHYSICAL SIZE, ACCESS, PIPING CONNECTIONS, CONTROLS, ETC. SHALL BE SOLELY THE RESPONSIBILITY OF THE CONTRACTOR SELECTING THE SUBSTITUTION.
 - 2.02 MINIMUM STANDARDS
 - EVERY PIECE OF ENERGY-CONSUMING EQUIPMENT, ALL FIRE SUPPRESSION PRODUCTS, AND LIFE SAFETY EQUIPMENT SHALL COMPLY WITH THE FOLLOWING STANDARDS AS APPLICABLE, ESPECIALLY REGARDING PREVAILING CODES:
 - FACTORY MUTUAL LABORATORIES (FM)
 - INDUSTRIAL RISK INSURERS (IRI)
 - UNDERWRITERS LABORATORIES, INC. (UL)
 - ADC: AIR DIFFUSION COUNCIL
 - AGA: AMERICAN GAS ASSOCIATION
 - AMCA: AIR MOVING AND CONDITIONING ASSOCIATION, INC.
 - ANSI: AMERICAN NATIONAL STANDARDS INSTITUTE
 - API: AMERICAN PETROLEUM INSTITUTE
 - AHRI: AIR CONDITIONING, HEATING, AND REFRIGERATION INSTITUTE
 - ASHRAE: AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS
 - ASME: AMERICAN SOCIETY OF MECHANICAL ENGINEERS
 - ASTM: AMERICAN SOCIETY OF TESTING AND MATERIALS
 - AWWA: AMERICAN WATER WORKS ASSOCIATION
 - IBR: INSTITUTE OF BOILER AND RADIATOR MANUFACTURERS
 - MSS: MANUFACTURERS STANDARDIZATION SOCIETY
 - NBBPV: NATIONAL BOARD OF BOARD AND PRESSURE VESSEL INSPECTORS
 - NEMA: NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
 - OSHA: OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION
 - PD1: PLUMBING DRAINAGE INSTITUTE
 - PP: PLASTIC PIPE INSTITUTE
 - CISPI: CAST IRON SOIL PIPING INSTITUTE

- 3.0 EXECUTION
 - 3.01 GENERAL
 - A. ALL PIPING, VALVES, AND FITTINGS SHALL BE PRODUCTS OF A DOMESTIC MANUFACTURER AND MADE IN THE USA.
 - FLEXIBLE PIPING CONNECTIONS SHALL BE PROVIDED AND INSTALLED AT ALL SUCTION AND DISCHARGE CONNECTIONS OF PACKAGED BOOSTER PUMPS AND AT ANY PUMP 2.0 HP AND ABOVE. FLEXIBLE PIPING CONNECTIONS SHALL BE SUITABLE FOR 150 PSI WORKING PRESSURE OR THE SYSTEM PRESSURE AT THE INSTALLATION LOCATION, WHICHEVER IS GREATER, AND BE SUITABLE FOR THE TEMPERATURE OF THE SYSTEM. FLEXIBLE CONNECTIONS SHALL BE STAINLESS STEEL BRAIDED HOSE TYPE, WITH A LENGTH NOT LESS THAN THEIR PIPE DIAMETER. PROVIDE AND INSTALL RESTRAINING RODS IF RECOMMENDED BY THE MANUFACTURER FOR THE INSTALLATION LOCATION AND APPLICATION.
 - PROVIDE AND INSTALL SHUT-OFF VALVES AT ANY AND ALL EQUIPMENT INCLUDING WATER HEATERS, DOMESTIC BOOSTER PUMPS, RECIRCULATION PUMPS, STORAGE AND PRESSURE TANKS, ETC. AND AT ANY LOCATIONS REQUIRED BY CODE, SUCH AS BRANCH LINES FROM RISERS SERVING MORE THAN ONE FIXTURE. SHUT-OFFS SHALL BE IN ADDITION TO THE SPECIFICALLY SHOWN OR NOTED IN THE CONTRACT DOCUMENTS.
 - 3.02 SUBMITTALS
 - BEFORE PREPARING SUBMITTALS, STUDY ALL CONTRACT DRAWINGS AND SPECIFICATIONS IN DETAIL. OBTAIN MANUFACTURER'S RECOMMENDED INSTALLATION AND PRACTICE SUBMITTALS PREPARED BASED ON SPECIFIC EQUIPMENT AND MATERIAL PROPOSED FOR INSTALLATION. AN OFFICER OF THE CONTRACTING FIRM SHALL SIGN ALL SHOP DRAWINGS (CERTIFYING CONFORMANCE WITH PLANS AND SPECIFICATIONS) BEFORE SUBMITTING TO THE ARCHITECT OR RELEASING TO THE FIELD.
 - THE SUBMITTAL PROCESS SHALL NOT BE UTILIZED AS AN AVENUE TO STRUCTURE PRODUCTS AFTER THE EXECUTION OF THE CONTRACT SHOULD ON UNSPECIFIED OR UNEQUAL PRODUCT BE SUBMITTED. IT WILL BE REJECTED. IF A SECOND ATTEMPT AT SUBSTITUTION IS MADE DURING THE RE-SUBMITTAL OF THE SAME PRODUCT, THEN NO MORE REVIEWS OF THAT PRODUCT WILL BE PERFORMED WITHOUT DIRECT COMPENSATION TO THE ENGINEER BEING PAID FOR THE ADDITIONAL SERVICES REQUIRED FOR THE THIRD REVIEW AND ANY FURTHER REVIEWS.
 - ALL SUBMITTALS SHALL BE SUBMITTED AND RETURNED ELECTRONICALLY.
 - SUBMITTALS WILL NOT BE ACCEPTED FOR REVIEW UNLESS THEY:
 - COMPLY WITH THE REQUIREMENTS OF DIVISION 1.
 - INCLUDE COMPLETE INFORMATION PERTAINING TO ALL APPURTENANCES AND ACCESSORIES.
 - BE SUBMITTED AS COMPLETE PACKAGES WHICH PERTAIN TO ALL RELATED ITEMS IN DIVISION 22. SEPARATE PACKAGES SHALL BE SUBMITTED AS FOLLOWS:
 - ALL PLUMBING EQUIPMENT, PIPING, SPECIALTIES, AND COMPONENTS
 - ALL PLUMBING FIXTURES
 - ARE PROPERLY MARKED WITH EQUIPMENT, SERVICE OR FUNCTION IDENTIFICATION AS RELATED TO THE PROJECT AND ARE MARKED WITH PERTINENT SPECIFICATION PARAGRAPH NUMBER.
 - SUBMIT CATALOG INFORMATION, FACTORY ASSEMBLY DRAWINGS, FIELD INSTALLATION DRAWINGS, AND CERTIFICATIONS AS REQUIRED FOR A COMPLETE EXPLANATION AND DESCRIPTION OF ALL ITEMS OF EQUIPMENT. THE SUBMITTAL DATA SHALL PROVIDE AMPLE, UNQUESTIONABLE COMPLIANCE WITH THE CONTRACT DOCUMENTS.
 - REVIEW OF SUBMITTALS SHALL NOT BE CONSTRUED AS AUTHORIZING ANY DEVIATIONS FROM THE PLANS AND SPECIFICATIONS UNLESS SUCH DEVIATIONS ARE CLEARLY IDENTIFIED AND SEPARATELY SUBMITTED IN THE FORM OF A LETTER THAT IS ENCLOSED WITH THE SUBMITTALS.
 - SUBMITTALS ARE REQUIRED ON ALL MANUFACTURED EQUIPMENT, ESPECIALLY ENERGY CONSUMING EQUIPMENT. SUBMITTALS SHALL INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING ITEMS OF EQUIPMENT:
 - PIPING AND PIPING SPECIALTIES
 - INSULATION
 - WATER HEATERS
 - PUMPS
 - PLUMBING FIXTURES
 - PIPING SHOP DRAWINGS
 - FIRE-STOPPING PRODUCTS AND APPLICABLE UL FIRE-STOP DETAILS

- 3.03 EXCAVATION, TRENCHING, AND BACKFILLING
 - A. PERFORM ALL EXCAVATION, TRENCHING AND BACKFILLING FOR UNDERGROUND WORK UNDER THIS DIVISION 22. DURING EXCAVATION, THE EXCAVATED MATERIAL SHALL BE PILED BACK FROM THE BANKS OF THE TRENCH TO AVOID OVERLOADING, SLIDES OR COVE-INS. DO NOT EXCEED THE ANGLE OF REPOSE UNLESS WRITTEN APPROVAL IS OBTAINED IN ADVANCE FROM THE ARCHITECT FOR SHORING, BRACING OR OTHER ALTERNATE EXCAVATION METHODS. ALL EXCAVATED MATERIAL NOT USED FOR BACKFILLING SHALL BE REMOVED FROM THE BUILDING AND DISPOSED OF AS INDICATED OR DIRECTED BY THE ARCHITECT. TAKE MEASURES TO PREVENT SURFACE WATER FROM FLOWING INTO TRENCHES AND OTHER EXCAVATIONS AND ANY WATER ACCUMULATING THEREIN SHALL BE REMOVED BY PUMPING. ALL EXCAVATION SHALL BE MADE BY OPEN CUT. TUNNELING SHALL NOT BE ALLOWED.
 - THE BOTTOM OF ALL TRENCHES SHALL BE EVENLY GRADED TO PROVIDE FIRM SUPPORT AND AN EVEN BEARING SURFACE. PIPE SHALL BE LAID ON FIRM SOIL, LAID IN STRAIGHT LINES, AND ON UNIFORM GRADES. PROVIDE BELL HOLES SO THAT THE BARREL OF THE PIPE RESTS EVENLY ON THE BOTTOM OF THE TRENCH ALONG THE ENTIRE LENGTH OF THE PIPE.
 - PIPE SHALL BE INSPECTED AND TESTED PRIOR TO BACKFILLING. TRENCH SHALL BE HAND FILLED TO A MINIMUM OF 12" ABOVE THE TOP OF THE PIPE WITH SUITABLE EARTH (FREE OF ROCKS, TRASH, LARGE CLOUDS AND ORGANIC MATERIAL) AND COMPACTED TO A MINIMUM 95% PROCTOR. AFTER THE FIRST LAYER IS COMPLETED, SUBSEQUENT LAYERS SHALL BE FILLED AND COMPACTED THE SAME AS THE FIRST LAYER. SETTLING THE BACKFILL WITH WATER SHALL NOT BE PERMITTED.

- 3.04 INSTALLATION REQUIREMENTS
 - A. ALL EQUIPMENT SHALL BE INSTALLED IN STRICT CONFORMANCE WITH THE RECOMMENDATIONS OF THE EQUIPMENT MANUFACTURER, AS INDICATED ON THE DRAWINGS, AND AS SPECIFIED.
 - PROVIDE INSTALLATION MANUALS FOR EACH PIECE OF EQUIPMENT, SUBMIT IN SEPARATELY BOUND VOLUMES AFTER REVIEW OF SUBMITTALS.
 - PROVIDE SUPPLEMENTARY STEEL FRAMING AND WELDED STEEL EQUIPMENT SUPPORT STANDS AS REQUIRED FOR PROPER HANGING AND SUPPORT OF THE PIPE. THE HANGER MANUFACTURER'S CATALOG LISTED ROD SIZE FOR EACH TYPE HANGER SPECIFIED. HANGERS AND SUPPORTS SHALL BE MICHIGAN, ITI GRINNELL OR B-LINE.
 - ALL MATERIAL UTILIZED FOR THE HANGING AND SUPPORT OF THE PIPING SYSTEMS SHALL BE MANUFACTURED PRODUCTS WHICH ARE SPECIFICALLY INTENDED FOR THE PURPOSE OF HANGING PIPING SYSTEMS. THE USE OF WIRE, STEEL STRAPS, PLASTIC TIES, ETC. IS STRICTLY PROHIBITED.
 - PIPE HANGERS SELECTED FOR SUPPORTING HORIZONTAL INSULATED PIPING SHALL BE SIZED TO FIT AROUND THE OUTSIDE OF THE PIPE INSULATION. INSULATED PIPING SHALL BE SUPPORTED ON GALVANIZED SHIELDS.

- 3.05 CLEANING, LUBRICATION AND ADJUSTMENT
 - A. THE EXTERIOR SURFACES OF PLUMBING EQUIPMENT, PIPING, CONDUIT, ETC., SHALL BE CLEANED AND FREE OF ALL DIRT, GREASE, OIL, PAINT

- A. SHOP DRAWINGS PER THE SUBMITTAL REQUIREMENTS SHALL BE SUBMIT TO THE DESIGN TEAM WITH ADEQUATE TIME FOR MULTIPLE SHOP DRAWINGS SHALL SHOW "AS-BUILT" CONDITIONS INCLUDING ELEVATIONS, OFFSETS, TRANSITIONS, AND ACCESSORIES. SHOP DRAWINGS SHALL INDICATE ALL CODE AND MANUFACTURER'S RECOMMENDED CLEARANCES, ACCESS, AND COORDINATE THE CLEARANCE AND ACCESS REQUIREMENTS WITH ALL OTHER TRADES.
- B. SHOP DRAWINGS THAT USE KEYNOTES DIRECT FROM THE DESIGN DOCUMENTS SHALL NOT BE ACCEPTABLE AS THEY DO NOT DEMONSTRATE COORDINATION WITH AM OTHER TRADES, NECESSARY TRANSITIONS, ETC.
- C. SHOP DRAWINGS SHALL BE PROVIDED AS COMPLETE PACKAGES IN PARALLEL WITH ALL TRADES TO DOCUMENT COORDINATION. FLOOR-BY-FLOOR OR OTHERWISE PIECEMEAL SHOP DRAWINGS ARE GENERALLY NOT ACCEPTABLE.

3.13 OWNER TRAINING

- A. OWNER TRAINING SHALL BE PROVIDED FOR ALL SYSTEMS AND EQUIPMENT AND SHALL INCLUDE THE FOLLOWING:
- 8-HOURS OF TRAINING FOR EACH TYPE OF EQUIPMENT.
 - 16-HOURS FOR OVERALL SYSTEM OPERATIONAL TRAINING.
- B. A TRAINING SUMMARY AND SCHEDULE SHALL BE SUBMITTED TO THE ARCHITECT FOR APPROVAL WITHIN NINETY (90) DAYS OF THE DATE OF SUBSTANTIAL COMPLETION.
- C. TRAINING TIMING WILL VARY AND SHALL BE ASSUMED TO INCLUDE MULTIPLE SESSIONS AS REQUIRED BY THE OWNER.

3.14 BID REQUIREMENTS

- A. THE CONTRACTOR SHALL INCLUDE ALL SYSTEMS, EQUIPMENT AND ACCESSORIES SHOWN ON THE PLANS AND SPECIFICATIONS.
- B. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL CONTRACT DOCUMENTS TO ALL SUBCONTRACTORS. ALL SYSTEMS, EQUIPMENT AND ACCESSORIES SHALL BE INCLUDED IN THE BID, WHETHER SHOWN ON THE SUBCONTRACTOR APPLICABLE PLANS OR OTHER DESIGN DOCUMENTS.
- C. SHOULD ANY DISCREPANCY OCCUR IN THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL PROVIDE A REQUEST FOR CLARIFICATION PRIOR TO BID OR NOTE THE DISCREPANCY IN THE BID AND PROVIDE AN APPROPRIATE COST ALLOWANCE IN THE BID.
- D. THE CONTRACTOR SHALL ACKNOWLEDGE THAT THE CONTRACT DOCUMENTS ARE DIAGRAMMATIC AND SHALL PROVIDE ALL SYSTEMS, EQUIPMENT AND ACCESSORIES REQUIRED FOR A COMPLETE FACILITY. ANY AREAS THAT APPEAR TO BE VOID OF SYSTEMS OR INAPPROPRIATE SYSTEMS SHALL BE NOTED IN THE BID. NO POST BID CHANGE ORDER SHALL BE CONSIDERED FOR AREAS OR DISCREPANCIES NOT NOTED IN THE BID.
- E. ALL INSTALLATION COORDINATION AND MEANS AND METHODS AND LABOR AND MATERIALS REQUIRED FOR PROPER SYSTEM INSTALLATION SHALL BE INCLUDED.
- F. THESE REQUIREMENTS ARE IN ADDITION TO BID PROCEDURES AND REQUIREMENTS OF THE RFP OR GENERAL SPECIFICATIONS.

SECTION 22 07 00
PLUMBING INSULATION

1.0 GENERAL

1.01 DESCRIPTION

- A. ALL WORK SPECIFIED IN THIS SECTION IS GOVERNED BY THE COMMON WORK RESULTS FOR PLUMBING SECTION 22 05 00.
- B. THIS SECTION 22 07 00 AND THE ACCOMPANYING DRAWINGS COVER THE PROVISION OF ALL OTHER, EQUIPMENT, APPLIANCES, AND MATERIALS AND PERFORMING ALL OPERATIONS IN CONNECTION WITH THE INSULATION OF THE PLUMBING SYSTEMS AS SPECIFIED HEREIN AND AS SHOWN. THESE SYSTEMS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
- SANITARY WASTE AND VENT SYSTEMS
 - DOMESTIC WATER SYSTEMS

1.02 INTENT

- A. IT IS THE INTENT OF THIS SECTION OF THE SPECIFICATIONS TO PROVIDE COMPLETE AND OPERABLE PLUMBING SYSTEMS COMPLETE WITH INSULATION, WHICH ARE FREE OF UNREASONABLE NOISE, VIBRATION, AND SWEATING, AND FABRICATED SO AS TO FIT THE SPACE ALLOTTED.
- B. THE WORD "PIPING" IS DEFINED TO MEAN ALL PIPING, FITTINGS, JOINTS, HANGERS, COATINGS, VALVES, COCKS, INSULATION AND ACCESSORIES NECESSARY FOR THE PLUMBING SYSTEMS DESCRIBED, SHOWN AND SPECIFIED.

1.03 ACCEPTABLE MANUFACTURERS

- A. INSULATION PRODUCTS SHALL BE AS MANUFACTURED BY OWENS CORNING, KNAUF, MANVILLE, CERTAIN TEED, DOW, ARMACELL, OR ARMSTRONG.

2.0 PRODUCTS

2.01 PLUMBING INSULATION

- A. ALL PIPE INSULATION PRODUCTS SHALL HAVE A PERMANENT COMPOSITE INSULATION, JOCKEY AND ADHESIVE FIRE AND SMOKE HAZARD RATING AS TESTED BY PROCEDURE ASTM-84, NFPA 255 AND UL 723 NOT EXCEEDING FLAME SPREAD 25 OR SMOKE DEVELOPED 50.
- B. BLANKET-TYPE INSULATION ON STORM DRAINS SHALL HAVE ON AVERAGE THERMAL CONDUCTIVITY (K-VALUE) NOT TO EXCEED 0.27 BTU PER INCH/SQ.FT AT A MEAN TEMPERATURE OF 75 DEG F. INSULATION SHALL HAVE A MINIMUM DENSITY OF 1 LB/CU.FT. AND SHALL BE 2" THICK.
- C. PREFORMED INSULATION FOR ALL DOMESTIC HOT WATER PIPING SHALL BE A MINIMUM 1-1/2" THICK FOR PIPING LESS THAN OR EQUAL TO 1-1/2" DIAMETER, 2" THICK FOR PIPING ABOVE 1-1/2" IN DIAMETER, PREFORMED FIBERGLASS PIPE INSULATION WITH WHITE ALL-SERVICE JACKET. ALL LONGITUDINAL JOINTS SHALL BE LAPPED, SELF-STICKING TYPE WITH ALL BUTT JOINTS, TEARS, ETC. SEALED WITH A MATCHING WHITE VAPOR BARRIER TAPE. ELBOWS SHALL BE MITERED OR MAY BE ZESTON COVERS FILLED WITH EQUIVALENT FIBERGLASS INSULATION. THE MAXIMUM CONDUCTIVITY (K-VALUE) OF THE INSULATION SHALL BE 0.23 BTU PER INCH/SQ.F AT 75 DEG F.
- D. PREFORMED INSULATION FOR ALL DOMESTIC COLD WATER PIPING, EXCEPT TRAP PRIMERS PIPING UNDERGROUND, SHALL BE MINIMUM 1" THICK PREFORMED FIBERGLASS PIPE INSULATION WITH WHITE ALL-SERVICE JACKET. ALL LONGITUDINAL JOINTS SHALL BE LAPPED, SELF-STICKING TYPE WITH BUTT JOINTS, TEARS, ETC. SEALED WITH A MATCHING WHITE VAPOR BARRIER TAPE. ELBOWS SHALL BE MITERED OR MAY BE ZESTON COVERS FILLED WITH EQUIVALENT FIBERGLASS INSULATION. THE MAXIMUM CONDUCTIVITY (K-VALUE) OF THE INSULATION SHALL BE 0.23 BTU PER INCH/SQ.FT AT 75F.
- E. INSULATION SHALL BE CONTINUOUS OVER ALL VALVE BODIES, FITTINGS, AND WALL AND FLOOR PENETRATIONS. DO NOT INSULATE UNIONS ON HOT WATER PIPING, NOR INSTRUMENTS, GOUGES, VALVE HAND WHEELS, ETC. ON ANY PIPER.
- F. ALL PIPING INSULATION COVERING WATER-CARRYING PIPING THAT IS EXPOSED TO THE WEATHER AND SUBJECT TO BURSTING FROM FREEZING TEMPERATURES SHALL HAVE OVERSIZED INSULATION TO ACCOMMODATE HEATING CABLE. SEE SPECIFICATION 23 05 33.
- G. PIPING INSTALLED OUTSIDE THE BUILDING AND EXPOSED TO WEATHER SHALL HAVE POLYISOCYANURATE INSULATION IN ACCORDANCE WITH SPECIFICATION 23 07 19. PROVIDE A CONTINUOUS WATERTIGHT ALUMINUM JACKET AND FITTING COVERS FOR ALL POLYISOCYANURATE INSULATION PIPING EXPOSED TO THE WEATHER.
- H. CLOSED-CELL INSULATION SHALL BE PROVIDED OVER ALL PING CALLED TO HAVE INSULATION THAT IS INSTALLED BELOW GROUND. CLOSED-CELL PIPING INSULATION SHALL MATCH THE THICKNESS FOR ABOVE-GROUND PING, 2550 ARMALFLEX OR RUBATEX. ALL GLUES AND COATINGS SHALL BE PRODUCTS OF THE SOME MANUFACTURER AS THE INSULATION. THE INSULATION SHALL BE INSTALLED BY THE SLIP-ON METHOD; SLITTING OF THE INSULATION IS PROHIBITED AND SHALL BE CAUSE FOR REJECTION.

3.0 EXECUTION

3.01 ARRANGEMENT

- A. FOLLOW THE GENERAL PIPING LAYOUT, ARRANGEMENT, SCHEMATICS AND DETAILS. PROVIDE ALL OFFSETS, VENTS, DRAINS, AND CONNECTIONS NECESSARY TO ACCOMPLISH THE INSTALLATION. FABRICATE PIPING ACCURATELY TO MEASUREMENTS ESTABLISHED AT THE PROJECT SITE TO AVOID INTERFERENCE WITH DUCTWORK, OTHER PIPING, EQUIPMENT, OPENINGS, ELECTRICAL CONDUITS AND LIGHT FIXTURES. MAKE SUITABLE PROVISION FOR EXPANSION AND CONTRACTION WITH EXPANSION LOOPS AND OFFSETS.

3.02 INSULATION INSTALLATION

- A. PROVIDE BLANKET INSULATION OVER ALL HORIZONTAL ROOF DRAIN PIPING WHICH IS WITHIN THE BUILDING INCLUDING THE VERTICAL RISERS TO THE ROOF DRAINS AND THE UNDERBODY OF THE ROOF DRAINS.
- BLANKET INSULATION SHALL BE WRAPPED AROUND THE PIPING AND UNDERBODIES OF ROOF DRAINS, ENDS OF INSULATION SHALL OVERLAP AT LEAST 2" AND THE BOTTOM OF INSULATION SHALL OVERLAP PIPE INSULATION AT PIPE CONNECTION TO ROOF DRAIN AT LEAST 3". ADHERE INSULATION TO ROOF DRAIN UNDERBODIES WITH 100% COVERAGE OF FIRE RETARDANT ADHESIVE AND TAPE ALL JOINTS WITH 3" WIDE FOIL REINFORCED KRAFT TAPE.
- B. PROVIDE INSULATION OVER ALL ABOVE GROUND HOT AND COLD WATER PIPING, EXCEPT THAT NO INSULATION IS REQUIRED ON COLD WATER LINES INSTALLED INSIDE INTERIOR PLUMBING CHASES (THOSE CHASES WITH NO EXTERIOR WALL). IN ADDITION, NO INSULATION IS REQUIRED FOR COLD WATER PIPING OUTSIDE THE BUILDING VAPOR BARRIER, AND DESIGNED TO BE DRAINED DOWN FOR FREEZE-PROTECTION, SUCH AS PARKING DECK THOSE BIBS FOR WASH DOWN. ALL JOINTS AND TEARS SHALL BE SEALED WITH MATCHING WHITE VAPOR BARRIER TAPE.
- C. SEE SPECIFICATION 23 07 19 FOR HVAC PIPING INSULATION REQUIREMENTS.
- END OF SECTION

PLUMBING PIPING

1.0 GENERAL

1.01 DESCRIPTION

- A. ALL WORK SPECIFIED IN THIS SECTION IS GOVERNED BY THE COMMON WORK RESULTS FOR PLUMBING SECTION 22 05 00.
- B. THIS SECTION 22 10 60 AND THE ACCOMPANYING DRAWINGS COVER THE PROVISION OF ALL LABOR, EQUIPMENT, APPLIANCES, AND MATERIALS AND PERFORMING ALL OPERATIONS IN CONNECTION WITH THE CONSTRUCTION OF THE PLUMBING SYSTEMS AS SPECIFIED HEREIN AND AS SHOWN. THESE SYSTEMS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
- SANITARY, WASTE, AND VENT SYSTEMS
 - DOMESTIC WATER SYSTEMS
- C. PROVIDE ALL FINAL PLUMBING CONNECTIONS TO ALL EQUIPMENT FURNISHED BY THE OWNER.
- D. PROVIDE ISOLATION VALVE AND REDUCED PRESSURE BACKFLOW PREVENTER OR VACUUM BREAKER AT THE SERVICE ENTRANCE AND AT THOSE CONNECTIONS (ESPECIALLY TO KITCHEN EQUIPMENT) REQUIRED BY LOCAL PLUMBING CODE.
- E. NOTE: SEE SPECIFICATION SECTION 23 11 23 FOR NATURAL GAS PIPING. NATURAL GAS PIPING SHALL BE PART OF THIS DIVISION'S SCOPE UNLESS OTHERWISE COORDINATED. COORDINATE WITH ALL TRADES.

1.02 INTENT

- A. IT IS THE INTENT OF THIS SECTION OF THE SPECIFICATIONS TO PROVIDE COMPLETE AND OPERABLE PLUMBING SYSTEMS AS SHOWN AND SPECIFIED WHICH ARE FREE OF LEAKS, PROPERLY VENTED, FREE OF UNREASONABLE NOISE, VIBRATION, AND SWEATING, AND FABRICATED SO AS TO FIT THE SPACE ALLOTTED AND TO EXHIBIT A MINIMUM RESISTANCE TO FLUID FLOW.
- B. THE WORD "PIPING" IS DEFINED TO MEAN ALL PIPING, FITTINGS, JOINTS, HANGERS, COATINGS, VALVES, COCKS, INSULATION AND ACCESSORIES NECESSARY FOR THE PLUMBING SYSTEMS DESCRIBED, SHOWN AND SPECIFIED.

1.03 GENERAL REQUIREMENTS

- A. PROVIDE ALL REDUCING FITTINGS, FLANGES, COUPLINGS, AND UNIONS OF THE SIZE AND TYPE OF MATERIAL TO MATCH THE PIPING CONNECTIONS AT EACH FIXTURE, PIECE OF EQUIPMENT, VALVE, AND ACCESSORY.
- B. UNION JOINTS, COUPLINGS, OR FLANGES SHALL BE PROVIDED IN EACH PIPE LINES CONNECTED TO EACH PIECE OF EQUIPMENT, FIXTURE, AND ELSEWHERE AS INDICATED AND SPECIFIED. UNIONS SHALL MATCH THE PIPING SYSTEM IN WHICH THEY ARE INSTALLED.
- C. UNIONS OR FLANGES SHALL BE PROVIDED BETWEEN ALL COPPER-TO-STEEL CONNECTIONS. THESE UNIONS SHALL BE DIELECTRIC, INSULATING TYPE.
- D. ALL CHANGES IN DIRECTION AND BRANCHES SHALL BE MADE WITH MANUFACTURED FITTINGS.
- E. THE USE OF OFFSET-TYPE REDUCERS IS STRICTLY PROHIBITED IN ANY PIPING SYSTEM.
- F. IN ALL WATER PIPING SYSTEMS, CHANGES IN HORIZONTAL PIPE LINE SIZES SHALL BE MADE WITH ECCENTRIC REDUCERS INSTALLED FLAT ON TOP FOR PROPER AIR VENTING. REDUCING TEES, REDUCING ELBOWS AND CONCENTRIC REDUCERS SHALL ONLY BE ALLOWED IN WATER PIPING SYSTEMS FOR CHANGING PIPE SIZES IN VERTICAL RISERS AND TOR MAKING CONNECTIONS TO EQUIPMENT AND ACCESSORIES FROM VERTICAL RISERS.
- G. ALL PIPE JOINTS SHALL BE CUT SQUARE AND ALL BURRS SHALL BE REMOVED.
- H. OPEN ENDS OF PIPELINES NOT CURRENTLY BEING HANDLED SHALL BE PLUGGED DURING INSTALLATION TO KEEP DIRT, WATER, AND FOREIGN MATERIAL OUT OF THE SYSTEM.
- I. SANITARY WASTE AND STORM DRAINAGE PIPING SHALL SLOPE DOWN IN THE DIRECTION OF FLOW AS SHOWN ON THE DRAWINGS OR AS PRESCRIBED BY CODE. OUT NOT LESS THAN 1 PERCENT.
- J. ALL VENTS THROUGH THE ROOF (VTR) SHALL BE OFFSET JUST BELOW THE ROOF SUCH THAT THEIR TERMINATION POINTS ARE AT LEAST 15 FT FROM ANY OUTSIDE AIR INTAKE OF ANY HVAC UNIT; SPECIAL ATTENTION IS CALLED TO PACKAGED ROOF TOP AND DEDICATED MAKE-P AIR UNITS.
- K. TRAP PRIMERS SHALL BE PROVIDED AT ALL FLOOR DRAINS, FLOOR SINKS, TRENCH DRAINS, AND HUB DRAINS EXCEPT TRAP PRIMERS MAY BE OMITTED WHERE DRAIN ROUTES TO THE STORM SYSTEM. ROUTE WATER PIPING FROM THE NEAREST COLD WATER LINE AS ALLOWED BY CODE.
- L. ALL PIPING, VALVES, AND FITTINGS SHALL BE PROVIDED BY A DOMESTIC MANUFACTURER AND MANUFACTURED IN THE USA.

2.0 PRODUCTS

2.01 SANITARY WASTE AND VENT SYSTEMS

- A. ALL UNDERGROUND SANITARY WASTE AND VENT PIPING SHALL BE PC, DWV SOLID WALL SCHEDULE 40 WITH SOCKET-TYPE, SOLVENT WELDED JOINTS IN SIZES UP TO 12"; 14" AND LARGER PIPING SHALL BE PVC, DWV SOLID WALL SCHEDULE 80 WITH SOCKET-TYPE, SOLVENT WELDED JOINTS. ALL PVC PIPING SHALL BE INSTALLED IN ACCORDANCE TO ASTM.
- B. ALL ABOVEGROUND SANITARY, WASTE, AND VENT PIPING SHALL BE HUBLESS CAST IRON SOIL PIPE. ALL CAST IRON SOIL PIPE AND FITTINGS SHALL BEAR THE COLLECTIVE TRADEMARK OF THE CAST IRON SOIL PIPE INSTITUTE AND SHALL BE LISTED BY NSF INTERNATIONAL OR RECEIVE PRIOR APPROVAL BY THE "ARCHITECT/ENGINEER. ALL HUBLESS CAST IRON PIPE SHALL CONFORM TO ASTM A 888 AND CISPI STANDARD 301.
- SANITARY, WASTE, AND VENT PIPING LESS THAN OR EQUAL TO 2.5" MAY BE COPPER DWV WITH BRAZED JOINTS. PIPING SHALL MEET ASTM B 75, B 88, B 251, AND B 306.
 - DRAIN PIPING FROM EQUIPMENT WITH HIGH-TEMPERATURE DISCHARGE, SUCH AS KITCHEN WARE WASHERS, POT SINKS, ETC. SHALL BE TYPE L HARD-DRAWN COPPER TUBING WITH WROUGHT COPPER FITTINGS AND SOLDERED JOINTS.
 - SANITARY AND WASTE PIPING IN PRESSURIZED PIPING SYSTEMS, SUCH AS FOR ELEVATOR SUMP PUMPS OR SANITARY SUMP PUMPS, SHALL BE COPPER DWV WITH WROUGHT COPPER FITTINGS. ALL JOINTS SHALL BE BRAZED.
- C. JOINTS ON HUBLESS CAST IRON SOIL PIPE SHALL BE MADE WITH NEOPRENE COUPLINGS AND STAINLESS STEEL CLAMPS. GASKETS SHALL CONFORM TO ASTM C 264. COUPLINGS AND GASKETS SHALL BE PRODUCED BY THE SAME MANUFACTURER AND SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, INCLUDING BAND TIGHTENING SEQUENCE AND TORQUE. ALL COUPLINGS SHALL BE MANUFACTURED TO THE CISPI 310 STANDARD, ASTM C 1277, ASTM C 150, FM STANDARD 1880 CLASS 1 AND CERTIFIED BY NSF INTERNATIONAL. COUPLING SHALL BE AS FOLLOWS:
- 1" TO 3" - TWO (2) STAINLESS STEEL BANDS
 - 4" TO 8" - FOUR (4) STAINLESS STEEL BANDS
 - 10" TO 15" - HEAVY DUTY COUPLING WITH SIX (6) STAINLESS STEEL BANDS. HEAVY-DUTY COUPLINGS SHALL CONFORM TO ASTM C 1540.
- D. ALL OFFSETS ON 8" PIPE AND LARGER SHALL HAVE METAL RESTRAINING STROPS BY HOLDRITE OR APPROVED EQUI.
- E. CLEANOUTS SHALL BE PROVIDED AT THE LOCATIONS INDICATED AND, AS A MINIMUM, WHERE REQUIRED BY CODE. FLOOR CLEANOUTS SHALL BE A MINIMUM OF 4" AND SHALL BE COMPLETE WITH A FLUSH PLUG AND REMOVABLE, SCORATED BRONZE FLOOR PLATE. PROVIDE CARPET BUTTONS IN CARPETED AREAS. WALL CLEANOUTS SHALL BE THREADED CLEANOUT TEES AND PLUGS WITH POLISHED STAINLESS STEEL COVER PLATE WITH CENTER SET SCREW.
- F. FLOOR DRAINS IN TOILETS AND FINISHED AREAS SHALL BE JR SMITH 2000 SERIES WITH 6" TYPE B SQUARE ADJUSTABLE STAINLESS FINISHED IN SATIN NICKEL, BRONZE, OR EQUAL PRODUCTS BY JOSAM OR ZURN. PROVIDE VANDAL-PROOF SECURED TOPS.
- G. FLOOR DRAINS IN MECHANICAL ROOMS AND UNFINISHED CONCRETE FLOORS SHALL BE JR SMITH 2131 SERIES WITH ROUND 1 1/4" CAST IRON GRATE, SEDIMENT BUCKET AND DEEP-SEAL P-TROP, OR EQUAL PRODUCTS BY JOSAM OR ZURN. PROVIDE VANDAL-PROOF SECURED TOPS.
- H. HUB DRAINS (HD) SHALL BE MADE WITH A REDUCER FITTING WITH OPENING AT LEAST ONE NOMINAL SIZE LARGER THAN THE CONNECTED PIPING AS SCHEDULED. HD SHALL BE SIZED TO RECEIVE ALL DISCHARGES WITHOUT SPLASHING.

2.02 DOMESTIC WATER PIPING

- A. UNDERGROUND DOMESTIC WATER SERVICE ENTRANCE PIPING 3" AND SMALLER IN SIZE SHALL BE TYPE K HARD-DRAWN COPPER TUBING WITH WROUGHT COPPER FITTINGS. ALL JOINTS SHALL BE BRAZED.
- B. UNDERGROUND DOMESTIC WATER SERVICE ENTRANCE PIPING ABOVE 3" IN SIZE SHALL BE CLASS 150 DUCTILE IRON PIPE WITH MECHANICAL JOINTS.
- C. ALL UNDERGROUND COPPER BRANCH LINES (1/2" AND 3/4" ONLY) SHALL BE CONTINUOUS LENGTHS OF SOFT TYPE K COPPER TUBING WITH NO JOINTS ALLOWED UNDERGROUND.
- D. ABOVEGROUND DOMESTIC WATER SYSTEM PIPING 3" IN SIZE AND SMALLER SHALL BE TYPE L HARD-DRAWN COPPER TUBING WITH WROUGHT COPPER FITTINGS AND SOLDERED JOINTS.
- E. ABOVEGROUND DOMESTIC WATER PIPING 4" AND LARGER SHALL BE TYPE L HARD-DRAWN COPPER TUBING WITH ROLLED GROOVED JOINTS AND FITTINGS. INSTALLATION READY COPPER FITTINGS SHALL MEET THE SAME GASKET MATERIAL SPECIFICATIONS AS COUPLINGS. FITTINGS SHALL BE AS FOLLOWS, OR EQUAL, AND SHALL BE PROVIDED BY THE MANUFACTURER WITH THE GASKET INCLUDED IN THE COUPLER ASSEMBLY:
- COUPLING, RIGID, VICTAULIC STYLE 607 (8" AND SMALLER)
 - GASKETS: GRADE EHP EPDM (8" AND SMALLER)
- F. ALL VALVES IN POTABLE WATER SYSTEMS SHALL BE "LEAD-FREE" TYPE.
- G. ALL VALVES 3/4" AND SMALLER SHALL BE "FULL-PORT" TYPE, AND GREATER THAN 3/4" MAYBE "REDUCED-PORT" TYPE.
- H. GATE VALVES (WATER ENTRANCES ONLY) SHALL BE CONSTRUCTED WITH A GRAY IRON, NON-RISING STEM, OUTSIDE SCREW AND YOKE (OS&Y), FULL PORT, STEM TO BE ADJUSTABLE GRAPHITE PACKING, ANSVI 372 LEAD FREE, BRONZE MOUNTED SEAT RINGS, SOLID WEDGE, BOCK SEAT PROTECTION, WITH MALLEABLE IRON HAND WHEELS. VALVE SHALL MEET MSS-SP70, APOLLO VALVES 611F OF APPROVED EQUALS BY HAMMONDMILWAUKEE, NIBCO, OR STOCKHAM.
- I. BALL VALVES:
- VALVES 2 INCH AND SMALLER SHALL BE TWO-PIECE BRONZE BODY, FULL PORT WITH SOLID, SMOOTH BORE CHROME PLATED BRASS BALL, MEETING MSS-SP110 AND RATED FOR NO LESS THAN 300 PSI. SEATS SHALL BE REINFORCED WITH THE TEFLON PACKING RING AND THREADED ADJUSTABLE PACKING NUT. VALVES ON INSULATED LINES WILL BE PROVIDED WITH STEM EXTENSIONS TO PROVIDE CLEARANCE FOR TWO INCHES OF PIPE INSULATION. VALVES TO BE APOLLO VALVES 77C, HAMMONDMILWAUKEE UP9301, OR WATTS B-6080.
 - VALVES LARGER THAN 2 INCH AND UP TO 4 INCHES SHALL BE TWO-PIECE BRONZE BODY, STANDARD PORT WITH SOLID, SMOOTH BORE CHROME PLATED BRASS BALL, MEETING MSS-SP110, AND RATED FOR NO LESS THAN 300 PSI. SEATS SHALL BE REINFORCED THE TOP TFM FOR 4" WITH TEFLON PACKING RING AND THREADED ADJUSTABLE PACKING NUT. VALVES ON INSULATED LINES WILL BE PROVIDED WITH STEM EXTENSIONS TO PROVIDE CLEARANCE FOR TWO INCHES OF PIPE INSULATION. VALVES TO BE APOLLO VALVES 70-100, HAMMONDMILWAUKEE UP8010, OR WATTS B-6000.

J. BALANCING VALVES:

- VALVES SHALL BE NSF/ANSI 61/372 CERTIFIED AND SUITABLE FOR POTABLE WATER APPLICATIONS. VALVE SHALL BE SUITABLE FOR THE GREATER OF 125 PSIG PRESSURE AND 40F TO 250F TEMPERATURE OR THE SYSTEM'S OPERATING CONDITIONS. VALVE SHALL PROVIDE POSITIVE SHUT-OFF AND BE RATED FOR 300 PSIG. EACH BALANCING VALVE SHALL BE EQUIPPED WITH TWO GOUGE TAPS WITH CHECK VALVES AND DRIP CAPS. PROVIDE PREFORMED INSULATION AT ENCASE VALVE ASSEMBLY IN INSULATED PIPING.
- VALVES UP TO 3" SHALL HAVE LEAD-FREE BRASS BODY, FULL-PORT BALL CONSTRUCTED OF 304 STAINLESS STEEL, AND SHALL HAVE CALIBRATED NAMEPLATE WITH MEMORY STOP. BALANCING VALVES SHALL BE BELL AND GOSSETT CIRCUIT-SETTER PLUS OR EQUAL BY NEXUS, FLOW DESIGN, OR WATTS. AFTER THE TEST AND BALANCE IS COMPLETE, PROVIDE TO THE OWNER WITH A DIFFERENTIAL PRESSURE GAUGE TO MATCH THE BALANCING VALVES. AUTO FLOW VALVES ARE ACCEPTABLE AS A SUBSTITUTION PROVIDED THE FLOW CARTRIDGE IS REPLACEABLE AND THE FLOW RATE IS DEARLY AND PERMANENTLY LABELED.

K. CHECK VALVES:

- VALVES IN WATER SYSTEMS SHALL BE NSF/ANSI 61/372 CERTIFIED AND SUITABLE FOR POTABLE WATER APPLICATIONS. VALVE SHALL BE SWING-TYPE, BRASS BODY, BRONZE SEAT, APOLLO VALVES 161S-LF UP TO 200 PSI CWP, OR EQUAL BY MILWAUKEE UP968 OR HAMMOND.
- IN GROOVED PIPING SYSTEMS, CHECK VALVES MAY BE STAINLESS STEEL BODY, DISC SHAFT AND SPRING, GRADE P FLUORO ELASTOMER SEAT, 300 PSI CWP, VICTAULIC 818 OR EQUAL.
- VALVES IN WASTE SYSTEMS BELOW GROUND SHALL MATCH THE MATERIAL OF THE PIPING. VALVES SHALL BE CAST IRON WITH GASKETED BOLT COVER OR PVC ANSI 14 WITH INNER RISER ASSEMBLY. VALVES SHALL HAVE HINGED FLAPPERS.
- VALVES IN WASTE SYSTEMS ABOVE GROUND, SUCH AS ELEVATOR SUMP PUMP DISCHARGES, SHALL BE NON-SLAM TYPE WITH IRON BODY, GLOBE-TYPE SILENT CHECKS WITH BRONZE TRIM, STAINLESS STEEL SPRING AND FLANGED END CONNECTIONS. FLOW AREA THROUGH THE VALVE SHALL EXCEED THE CROSS-SECTIONAL AREA OF THE PIPE IN WHICH THE VALVE IS INSTALLED BY NOT LESS THAN 10%. VALVES SHALL BE APOLLO VALVES 910F UP TO 200 PSI OR 2" AND UNDER, 169T UP TO 600 PSI OR EQUAL BY MUELLER CO., APOC, METRAFLEX GLOBE STYLE SILENT CHECK VALVE, HAMMOND IR 9354, OR MILWAUKEE 1800. IN GROOVED PIPING SYSTEMS, VALVES SHALL BE VICTAULIC 716, 779, OR W715 AS APPROPRIATE.
- ALL CHECK VALVES ON PUMP DISCHARGES SHALL BE NON-SLAM TYPE.
- ALL CHECK VALVES SHALL BE INSTALLED IN AN ORIENTATION ALLOWED BY THE MANUFACTURER'S RECOMMENDATIONS.
- ALL CHECK VALVES INSTALLED IN INSULATED PIPING SYSTEMS SHALL HAVE THE CHECK VALVE LOCATION EXPLICITLY LABELED ON THE OUTSIDE OF THE INSULATION.
- WATER CONNECTIONS TO APPLIANCES SHALL BE MADE WITH FLEXIBLE COPPER TUBING OR COMMERCIAL GRADE DOUBLE REINFORCED STAINLESS STEEL BRAIDED HOSE, NO LESS THAN 3/8" IN SIZE, OR THE CONNECTIONS SIZE OF THE APPLIANCE, WHICHEVER IS GREATER.
- POINT OF USE MIXING VALVES SHALL BE LEONARD 170LF OR AN APPROVED EQUAL WITH LEAD-FREE CONSTRUCTION, VANDAL RESISTANT ADJUSTMENT COP, AND INTEGRAL INLET CHECK VALVES. MIXING VALVE SHALL BE ASSE 1070 RATED. THE MIXING VALVE SHALL BE SIZED BY THE MANUFACTURER FOR THE FIXTURE(S) SERVED. MIXING VALVE SHALL HAVE FOR MORE THAN 0.25 GPM MINIMUM FLOW RATE REQUIRED.
- ALL WATER HAMMER ARRESTERS (WHA) SHALL BE PD CERTIFIED, SIZE A, B, C, D, E OR F, AS INDICATED FOR THE FIXTURE UNITS SERVED. JOSAM, JR SMITH, WATTS, OR ZURN WHA'S THAT ARE NOT PD-CERTIFIED ARE DISALLOWED. WHA'S IN POTABLE WATER APPLICATIONS SHALL BE LEAD-FREE.
- THE HOSE BIGGS (HB) SHALL BE COMPLETE WITH VACUUM BREAKER AND **VANDAL RESISTANT HANDLE. WATTS, APOLLO VALVES, JR SMITH, OR ZURN.
- SOLDERED JOINTS SHALL BE MADE WITH TIN-ANTIMONY/SILVER SOLDER. SOLDER CONTAINING LEAD SHALL NOT BE PERMITTED.
- SADDLE VALVES, AND "T" FITTINGS THAT RELY ON PUNCTURING THE PIPING MAIN ARE DISALLOWED.
- THERMOMETERS AND PRESSURE GAUGES SHALL BE PRODUCTS OF TRICER, WESKLER, OR WEISS. SELECT ALL DEVICES TO OPERATE WITHIN 20% OF THE MIDPOINT OF THEIR SCALES UNDER NORMAL OPERATING CONDITIONS. GAUGES PROVIDED ON PUMPS SHALL BE COMPOUND TYPE.
- PRESSURE AND TEMPERATURE (P&T) TEST PLUGS SHALL BE CONSTRUCTED OF BRASS WITH TWO (2) SELF-CLOSING NORDEL CORES AND BE COMPLETE WITH COP AND GASKET. PLUGS SHALL BE MANUFACTURED BY PETERSON OR LANCASTER. PROVIDE A COMPLETE TEST KIT TO THE OWNER AT THE TIME OF FINAL INSPECTION. TEST KIT SHALL BE COMPLETE WITH A PRESSURE GAUGE, THERMOMETER, PROBES, AND CARRYING CASE.

3.0 EXECUTION -

3.01 ARRANGEMENT

- A. FOLLOW THE GENERAL PIPING LAYOUT, ARRANGEMENT, SCHEMATICS AND DETAILS. PROVIDE ALL OFFSETS, VENTS, DRAINS AND CONNECTIONS NECESSARY TO ACCOMPLISH THE INSTALLATION. FABRICATE PIPING ACCURATELY TO MEASUREMENTS ESTABLISHED AT THE PROJECT SITE TO AVOID INTERFERENCE WITH DUCTWORK, OTHER PIPING, EQUIPMENT, OPENINGS, ELECTRICAL CONDUITS AND LIGHT FIXTURES. MAKE SUITABLE PROVISIONS FOR EXPANSION AND CONTRACTION WITH EXPANSION LOOPS AND OFFSETS.
- B. WATER HAMMER ARRESTERS SHALL BE INSTALLED AT THE TOP OF EACH RISER AND ON EACH FIXTURE BRANCH IN ACCORDANCE WITH PLUMBING AND DRAINAGE INSTITUTE STANDARDS. WHA'S SHALL ALSO BE INSTALLED AT ALL WATER SERVICE TO APPLIANCES WITH QUICK-CLOSING VALVES, SUCH AS CLOTHES WASHERS, KITCHEN WARE WASHERS, ICE MAKERS, ETC.
- C. CLEANOUTS SHALL BE PROVIDED AT THE BASE OF ALL SANITARY AND STORM RISERS AND AS REQUIRED BY CODE.
- D. FITTINGS, UNIONS, JOINTS, COUPLINGS (INCLUDING NO-HUB COUPLINGS), ETC. SHALL NOT BE WITHIN SLABS.
- E. ALL POTABLE DOMESTIC WATER CONNECTIONS TO EQUIPMENT SHALL BE PROVIDED WITH BACKFLOW PREVENTION AS REQUIRED BY THE SPECIFICATION SECTION AND CODE.
- F. PRESSURE GAUGES AND THERMOMETERS CALLED TO BE PERMANENTLY INSTALLED SHALL BE EASILY VISIBLE FROM A STANDING POSITION ON THE GROUND.

3.02 UNDERGROUND WATER PIPING

- A. ALL DOMESTIC WATER PIPING SHALL HAVE A MINIMUM COVER OF 3'-0", OR BELOW THE FROST LINE, WHICHEVER IS DEEPER. EXCEPT PIPING AT LEAST 20" FROM THE EXTERIOR WALL MAY BE INSTALLED 3" OR MORE BELOW THE BOTTOM OF THE SLAB.
- B. FOR WATER PIPING 2" AND ABOVE, PROVIDE CONCRETE THRUST BLOCKS AT ALL CHANGES OF DIRECTION AND SECURE ALL MECHANICAL JOINTS WITH RESTRAINING RODS.
- C. ALL COPPER WATER LINES OR OTHER MATERIAL SUBJECT TO CORROSION, SHALL BE PROTECTED FROM CORROSION WITH A CONTINUOUS PLASTIC SHEATHING OR COATING AND WRAPPING. THIS SHEATHING OR COATING AND WRAPPING SHALL BE EXTENDED 6" TO 12" ABOVE THE FINISHED FLOOR. THE PROTECTION SHALL BE INSTALLED ON THE OUTSIDE OF ANY INSULATION REQUIRED.

3.03 PIPING INSTALLATION ABOVE CEILINGS

- A. ALL DOMESTIC HOT AND COLD WATER PIPING INSTALLED ABOVE THE INSULATED CEILINGS SHALL BE INSTALLED JUST ABOVE (WITHIN 2") OF THE TOP OF THE FINISHED CEILING WITH THE BUILDING INSULATION OVER THE PIPING TO AVOID FREEZE-UP.

3.04 DISINFECTION

- A. ALL DOMESTIC WATER PIPING INSTALLED UNDER THIS DIVISION SHALL BE DISINFECTED WITH CHLORINE BEFORE IT IS PLACED INTO OPERATION. THE CHLORINATING MATERIAL SHALL BE LIQUID CHLORINE CONFORMING TO FEDERAL SPECIFICATION 88-C-120 AND SHALL BE INTRODUCED TO THE SYSTEM BY EXPERIENCED OPERATORS ONLY. THE CHLORINE SOLUTION APPLIED TO THE PIPING SECTIONS OR SYSTEM SHALL CONTAIN AT LEAST FIFTY PARTS PER MILLION OF AVAILABLE CHLORINE AND SHALL REMAIN IN THE SECTIONS OR SYSTEM FOR A PERIOD OF NOT LESS THAN SIXTEEN (16) HOURS. DURING THE DISINFECTION PERIOD, ALL VALVES SHALL BE OPENED AND CLOSED AT LEAST FOUR TIMES. AFTER THE DISINFECTION PERIOD, THE CHLORINATED WATER SHALL BE FLUSHED FROM THE SYSTEM WITH CLEAR WATER UNTIL THE RESIDUAL CHLORINE CONTENT IS NOT GREATER THAN TWO-TENTHS PARTS PER MILLION (0.2 PPM). SUBMIT CERTIFICATION TO THE ARCHITECT THAT THE SYSTEM WAS DISINFECTED.

END OF SECTION

PLUMBING EQUIPMENT

1.0 GENERAL

1.01 DESCRIPTION

- A. ALL WORK SPECIFIED IN THIS SECTION IS GOVERNED BY THE COMMON WORK RESULTS FOR PLUMBING SECTION 22 05 00.
- B. THIS SECTION 22 30 00 AND THE ACCOMPANYING DRAWINGS COVER THE PROVISIONS OF ALL LABOR, EQUIPMENT, APPLIANCES, AND MATERIALS AND PERFORMING ALL OPERATIONS IN CONNECTION WITH THE CONSTRUCTION OF THE WATER HEATING SYSTEMS AS SPECIFIED HEREIN AND AS SHOWN. THESE SYSTEMS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
- WATER HEATERS
 - HOT WATER CIRCULATOR

1.02 GENERAL REQUIREMENTS

- A. ALL PLUMBING EQUIPMENT INSTALLED IN LOCATIONS WITH A WATER HARDNESS OF 25 GRAINS PER GALLON OR MORE, SHALL BE RESISTANT TO CORROSION, WHERE COPPER MATERIALS ARE IN THE WATER STREAM, IT SHALL BE COPRO-NICKEL OF NOT MORE THAN 90% COPPER.
- B. ALL WATER HEATERS SHALL BE NSF/ANSI 61 CERTIFIED TEOD FREE" FOR POTABLE WATER SERVICE.
- C. ALL WATER HEATERS SHALL HAVE ASME-RATED TEMPERATURE AND PRESSURE RELIEF VALVE(S). VALVE(S) SHALL BE PROVIDED BY THE MANUFACTURER AND SIZED FOR THE DISCHARGE LOCATION NOTED IN THE PLANS.
- D. ALL WATER HEATERS AND TANKS SHALL BE GLASS-LINED, 1600F FIRED, WITH A WORKING PRESSURE OF 150 PSI. A TEST PRESSURE OF 300 PSI. OR THE SYSTEM PRESSURE AT THE INSTALLATION LOCATION, WHICHEVER IS GREATER, AND SHALL HAVE MAGNESIUM ANODES FOR ELECTROLYTIC PROTECTION. SEPARATE STORAGE TANKS MAY ALSO BE CEMENT-LINED. TANKS SHALL BE ASTM STAMPED.
- E. ALL WATER HEATERS SHALL MEET OR EXCEED THE ENERGY EFFICIENCY REQUIREMENTS OF THE LATEST VERSION OF ASHRAE 90.1 (2019).
- F. ALL WATER HEATERS AND PUMPS SHALL BE UL APPROVED AND LABELED, AND BE AGA-CERTIFIED WHERE APPLICABLE.
- G. ALL WATER HEATERS AND PUMPS SHALL BE NEMA-RATED APPROPRIATE FOR THE INSTALLATION LOCATION IN WHICH THEY ARE INSTALLED.
- H. WATER HEATER CONTROLS SHALL INCLUDE AN OPERATING THERMOSTAT AND MANUAL RESET HIGH LIMIT CONTROL FOR EACH HEATING ELEMENT OR BURNER. THE SAFETY HIGH LIMIT CONTROL SHALL PREVENT OVERHEATING IN THE EVENT OF A THERMOSTAT FAILURE.
- I. ALL CONTROLS SHALL BE FACTORY-WIRED AND REQUIRE NO EXTERNAL POWER SOURCE.
- J. WATER HEATERS AND TANKS SHALL HAVE DRAINS WITH EXTERNAL ACCESS AND HOSE END CONNECTION.
- K. ALL CHECK VALVES INSTALLED IN INSULATED PIPING SYSTEMS SHALL BE PROTECTED FROM FREEZING OR SHALL BE HEAT TRACED IN ACCORDANCE WITH SPECIFICATION 23 05 93.
- L. THE WATER HEATER SHALL BE CERTIFIED BY AN INDEPENDENT LABORATORY FOR OXIDES OF NITROGEN (NOX) OF LESS THAN 10 PPM CORRECTED TO 3% O2 OR BETTER OS REQUIRED BY THE AHJ.
- M. WHERE CLASSIFIED AS A BOILER BY THE DEPARTMENT OF LABOR, AH, OR APPLICABLE CODES, THE SYSTEM SHALL ADDITIONALLY MEET ALL REQUIREMENTS. AN EMERGENCY POWER OFF (EPO) SWITCH SHALL BE PROVIDED AT LOCATIONS REQUIRED BY THE AHJ. THE EPO(S) SHALL BE ACCESSIBLE, CLEARLY LABELED, AND SHALL SHUT OFF ALL POWER TO THE BOILERS AND CAUSE THE EQUIPMENT TO BE DISENGAGED. EPO(S) SHALL BE COORDINATED WITH CONTROLS AND DIVISION 26 AND SHALL BE INSTALLED AND WIRED UNDER THIS SCOPE.

2.0 PRODUCTS:

2.01 WATER HEATER ** COMMERCIAL ELECTRIC **

- A. TANKS SHALL 65 GALLON STORAGE CAPACITY AND SHALL HAVE 160 PSI WORKING PRESSURE AND BE EQUIPPED WITH GLASS LINING PERMANENTLY BONDED TO TANK INTERIOR SURFACE.
- B. THE WATER HEATER SHALL BE AS SCHEDULED, ACCEPTABLE SUBSTITUTE MANUFACTURERS ARE AO SMITH, LOCHINVAR, STATE, RHEEM, AND BRODFORD, SUBJECT TO SUBSTITUTION REQUIREMENTS. WATER HEATERS SHALL BE COMMERCIAL-GRADE.
- C. THE IMMERSION HEATING ELEMENTS SHALL BE LOW WATT DENSITY WITH A PLATED INCOLOY SHEATH MATERIAL FOR LONG LIFE. THE HEATING ELEMENTS SHALL MOUNT IN INDIVIDUAL SCREW-IN TANK FLANGES.
- D. ALL FIELD ELECTRICAL WIRING CONNECTIONS TO THE WATER HEATER SHALL BE MADE TO A MAIN TERMINAL BLOCK. ALL INTERNAL WIRING SHALL BE MADE TO SOLDERLESS TERMINAL LUG WIRING CONNECTIONS. WIRING TO BE COLOR-CODED FOR EASE OF SERVICING. THE WATER HEATER SHALL BE FACTORY ASSEMBLED, WIRED, AND TESTED.
- E. THE DRAIN VALVE SHALL BE LOCATED IN THE FRONT FOR EASE OF SERVICING.

2.02 HOT WATER CIRCULATOR

- A. HOT WATER CIRCULATOR SHALL BE AS SCHEDULED, ACCEPTABLE SUBSTITUTE MANUFACTURERS ARE B&G, GOULDS, AND GRUNDFOS, SUBJECT TO SUBSTITUTION REQUIREMENTS.
- B. HOT WATER CIRCULATORS USED IN POTABLE WATER SYSTEMS SHALL BE LEAD-FREE.

3.0 EXECUTION

3.01 INSTALLATION

- A. THE WATER HEATERS AND ACCESSORIES SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND THE CONTRACT DOCUMENTS.
- B. ALL TEMPERATURE AND PRESSURE RELIEF VALVES SHALL BE PIPED FULL SIZE TO ON INDIRECT WASTE SUCH AS THE NEAREST FLOOR DRAIN, SERVICE SINK, SINK TAILPIECE, ETC. PIPING SHALL BE IN ACCORDANCE WITH SPECIFICATION 22 10 00 FOR DWV SERVICES. SIZE SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.
- C. ALL WATER HEATERS SHALL HAVE INTERNAL HEAT TRAPS OR SHALL HAVE HEAT TRAPS INSTALLED IN THE COLD WATER AND HOT WATER PIPING. INSTANTANEOUS WATER HEATERS SHALL BE PROVIDED WITH HEAT TRAPS UNLESS MANUFACTURER DOCUMENTATION SPECIFICALLY ALLS EXCLUSION.
- D. WATER HEATERS SHALL BE COMPLETELY ENCASED IN HIGH-DENSITY INSULATION OF SUFFICIENT VALUE TO MEET THE ENERGY EFFICIENCY STANDARDS OF THE LATEST VERSION OF ASHRAE 90.1, OR SHALL BE FACTORY INSULATED WITH NON-CFC POLYURETHANE CLOSED-CELL FOAM INSULATION. PROVIDE REMOVABLE INSULATION PANELS TO MAINTAIN ACCESS TO ALL REQUIRED COMPONENTS.
- E. ALL WATER HEATERS OR BOILERS SUBJECT TO CONDENSING UNDER NORMAL STEADY-STATE OPERATING CONDITIONS SHALL BE PROVIDED AND INSTALLED WITH ACCESSORY CONDENSATE NEUTRALIZATION KITS.

3.02 WARRANTY

- A. PROVIDE 5-YEAR LIMITED WARRANTY ON ALL TANKS AND HEAT EXCHANGERS, AND 1-YEAR LIMITED WARRANTY ON PARTS UNLESS OTHERWISE NOTED.

END OF SECTION

CONSULTANTS

NY ENGINEERS

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

PLUMBING SYMBOLS LIST			
PLUMBING LEGENDS		PLUMBING ABBREVIATIONS	
W	SANITARY SEWER	CW	COLD WATER
-----	VENT PIPING	HW	HOT WATER
-----	COLD WATER	HWR	HOT WATER RETURN
-----	HOT WATER	W	WASTE SANITARY
-----	RECIRCULATING HOT WATER	VTR	VENT THRU ROOF
-----	SECONDARY BFP	V	VENT
-----	BALANCING VALVE	AFF/AFG	ABOVE FINISHED FLOOR/GRADE
-----	PIPE UP OR DOWN	AHJ	AUTHORITY HAVING JURISDICTION
-----	PIPE UP	BFP	BACKFLOW PREVENTER
-----	UNION	ETR	EXISTING TO REMAIN
-----	ISOLATION VALVE	CO	CLEANOUT
-----	FLOOR CLEANOUT	GC	GENERAL CONTRACTOR
-----	BACKFLOW PREVENTER	IW	INDIRECT WASTE
-----	POINT OFF CONNECTION	PC	PLUMBING CONTRACTOR
-----	RE-CIRCULATION PUMP	WCO	WALL CLEANOUT
-----	HUB / FLOOR DRAIN	WH	WATER HEATER
-----	CONDENSATE DRAIN	ET	EXPANSION TANK
-----	FRANCHISE	RCP	RECIRCULATION PUMP
-----	EQUIPMENT VENDOR	FD	FLOOR DRAIN
-----	CONTRACTORS CHOICE	HD	HUB DRAIN
-----	OWNERS CHOICE	TYP	TYPICAL
-----	ACCESS PANEL	CD	CONDENSATE DRAIN
-----		VLL	VERIFY WITH LANDLORD
-----		W/D	WASHER DRYER
-----		WHA	WATER HAMMER ARRESTOR
-----		VIF	VERIFY IN FIELD

PLUMBING DRAWING LIST	
P-0.1	PLUMBING SPECIFICATIONS SHEET (01 OF 02)
P-0.2	PLUMBING SPECIFICATIONS SHEET (02 OF 02)
P-0.3	PLUMBING SYMBOLS, ABBREVIATIONS, NOTES AND SCHEDULE
P-1.0	PLUMBING SANITARY AND VENT FLOOR PLAN
P-2.0	PLUMBING WATER SUPPLY FLOOR PLAN
P-3.0	PLUMBING RISER DIAGRAMS
P-4.0	PLUMBING DETAILS SHEET (01 OF 02)
P-5.0	PLUMBING DETAILS SHEET (02 OF 02)

PLUMBING FIXTURE COUNT AND SIZING									
FIXTURE	NO.	DRAIN		COLD WATER		HOT WATER		TOTAL WSFU	
		D.F.U.	TOTAL D.F.U.	F.U. C.W.	TOTAL C.W.	F.U. H.W.	TOTAL H.W.		
WATER CLOSET (FLUSH TANK)	2	4	8	2.5	5.0	--	--	5.0	
LAVATORY	2	1	2	0.8	1.6	0.8	1.6	2.0	
MOP SINK	1	3	3	2.3	2.3	2.3	2.3	3.0	
FLOOR DRAIN (FD)	3	5	15	--	--	--	--	--	
WASHER DRYER (W/D)	1	3	3	3.0	3.0	3.0	3.0	4.0	
DRINKING FOUNTAIN	1	0.5	0.5	0.5	0.5	--	--	0.5	
SHOWER	1	2	2.0	3.8	3.8	3.8	3.8	5.0	
WATER COOLER	1	--	--	0.5	0.5	--	--	0.5	
TOTAL	--	--	33.5	--	16.7	--	--	10.7	20

PROBABLE DEMANDS/ AND PIPE SIZING REQUIREMENTS: DRAIN: SAN 33.5 DFU SUPPLY: CW 20 WSFU SUPPLY: HW 10.7 WSFU USE 4" SANITARY (MIN) USE 1" WATER SUPPLY SUPPLY: HW 10.7 WSFU USE 1" WATER SUPPLY

SANITARY AND WATER SUPPLY PIPE SIZES BASED ON THE NEW JERSEY UCC PLUMBING SUB CODE 2021. (NSPC 2021).

PLUMBING FIXTURE SCHEDULE									
TAG	FIXTURE	QUANTITY	SAN / WASTE	VENT	COLD WATER	HOT WATER	WASTE FU	WATER FU	FLOW RATE
P-2	WATER CLOSET	2	4"	2"	3/4"	--	4	2.5	1.28 GPF
BASIS OF DESIGN A. FIXTURES P-2 SHALL BE COMFORT HEIGHT ELONGATED BOWL STYLE, FLOOR MOUNT, FLOOR OUTLET STYLE; PROFLO #PF9602SWH / PF9612WH ELONGATED TOILET, 1.28 GPF, FLOOR MOUNT, FLOOR OUTLET STYLE, COMPLETE WITH TANK, FLUSH TYPE - REVOLUTION 360, AQUA-PISTON AND SLOW CLOSE TOILET SEAT.									
P-4 & P-7	LAVATORY	2	2"	1-1/2"	1/2"	1/2"	1	1	1.2 GPM
BASIS OF DESIGN A. FIXTURES P-4 SHALL BE COUNTER/ DECK MOUNT BATHROOM SINK, FIRECLAY MATERIAL, ROUND SHAPE LAVATORY COMPLETE WITH 1-5/8" CENTRE DRAIN HOLE. FITTINGS SHALL INCLUDE SIGNATURE HARDWARE, HIBISCUS ROUND STYLE #SKU 447954. FITTING SHALL NEED AERATOR, CHROME-PLATED TAILPIECES, STRAINERS, P-TRAP, SUPPLY STOPS, ANCHORING CLIPS AND ALL OTHER TRIM. WALL SUPPLY STOPS, DRAINS AND TAILPIECES SHALL BE OFFSET WHEELCHAIR-TYPE. PROVIDE ADA SINK PROTECTOR & 3" DRAIN HOLE IN THE COUNTER, FAUCET (P07) SHALL BE SIGNATURE HARDWARE MAKE & #SKU 483873 SINGLE HANDLE COMMERCIAL FAUCET, MATTE BLACK FINISH.									
P-8, P-9 & P-10	SHOWER	1	3"	2"	3/4"	3/4"	2	5	1.8 GPM
BASIS OF DESIGN A. FIXTURE P-8 SHALL BE SIGNATURE HARDWARE MAKE LEXIA STYLE #SKU-483766, THREE - FUNCTION HAND-SHOWER KIT SHOWER HEAD WITH SHOWER ARM. PROVIDE K-T14491-4-BL SHOWER TRIM WITH LEVER HANDEL, VALVE BODY AND CARTRIDGE KITE SHALL BE #K-8304-KS. COORDINATE ALL OTHER SHOWER TRIM WITH THE ARCHITECT PRIOR TO PURCHASE AND INSTALLATION. INCLUDE MATTE BLACK SHOWER DRAIN. B. SHOWER DRAIN: SIGNATURE HARDWARE, EFFENDI 24" LINEAR SHOWER DRAIN WITH FLANGE, MODEL #443336, MATTE BLACK.									
P-13	DRINKING FOUNTAIN	1	2"	1-1/2"	1/2"	--	0.5	0.5	
BASIS OF DESIGN A. FIXTURE P-13 SHALL BE ELKAY MAKE EZH2O BOTTLE FILLING STATION & SINGLE ADA COOLER HIGH EFFICIENCY FILTERED REFRIGERATED LIGHT GRAY, WALL MOUNT DRINKING FOUNTAIN, CHILLING CAPACITY OF 8.0 GPH.									
P-14	MOP SINK / SERVICE SINK	1	3"	2"	3/4"	3/4"	3.0	3.0	0.5 GPM
BASIS OF DESIGN FIXTURES P-14 SHALL BE SINGLE COMPARTMENT, MOP SINK REGENCY 29" 16- GAUGE STAINLESS STEEL, 24" X 24" X 12" MOP SINK, ROUND CORNER FOR EASY CLEANING, INCLUDED FITTING SHALL BE 3-1/2" DRAIN COMPRESSION & WALL CLIP, MOP SINK FAUCET (P-15) SHALL BE AMERICAN STANDARD, CHROME FITTING FOR MODEL SHALL BE CO-ORDINATE WITH ARCHITECT.									
P-16	WATER COOLER	1	--	--	1/2"	--	0	0.5	0.5 GPM
BASIS OF DESIGN FIXTURE P-16 SHALL BE BEVI MAKE SMART WATER COOLER, MATTE BLACK COLOR.									
FD	FLOOR DRAIN	3	3"	2"	1/2" TP	-	5	-	
FS	FLOOR SINK	0	3"	2"	1/2" TP	-	-	-	
W/D	WASHER DRYER	1	2"	1-1/2"	3/4"	3/4"	3	4	
WASHER BOX: SIOUX CHIEF #696-GZ303, OXBOX WASHING MACHINE OUTLET BOX WITH WATER HAMMER ARRESTOR									
NOTES: 1. PROVIDE WITH 1/2" TRAP PRIMER TO FLOOR DRAIN (TP), WATTS TP300 OR EQUIVALENT. 2. CONTRACTOR TO CROSS REFERENCE ALL LISTED PLUMBING FIXTURES WITH OWNER PROVIDED DIP (DESIGN INTENT PACKAGE) TO ENSURE ALL PLUMBING RELATED ITEMS ARE COORDINATED PROPERLY.									

GENERAL NOTES									
1. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY FITTINGS AS REQUIRED BY ALL APPLICABLE CODES AND GOVERNING AUTHORITIES.									
2. CONTRACTOR SHALL VERIFY AND CORRECT AS REQUIRED TO MEET ALL CODES AND REGULATIONS ANY POSSIBLE DISCREPANCIES BETWEEN TYPE AND SIZE OF CONNECTION SPECIFIED IN PLUMBING FIXTURE SCHEDULE AND FIXTURES ACTUALLY INSTALLED ON THE SITE.									
3. ALL SANITARY 1/8" AND GREASE WASTE PIPING SHALL HAVE A 1/4" PER FOOT SLOPE UNLESS OTHERWISE NOTED OR PER LOCAL CODE.									
4. VENT PIPING SHOWN ON FLOOR PLANS IS ONLY INDICATIVE EXCEPT FOR VTR LOCATIONS.									
5. VALVES AND FITTINGS SHALL BE OF SAME SIZE OF LINE ON WHICH THEY ARE LOCATED, UNLESS OTHERWISE INDICATED ON DRAWINGS.									
6. CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER TRADES.									
7. CONTRACTOR SHALL FIELD VERIFY ALL GIVEN MEASUREMENTS PRIOR TO LAYING AND CONNECTING ALL SANITARY AND WASTE PIPING AND NOTIFY ARCHITECT OF ANY DISCREPANCIES.									
8. AIR CHAMBERS SHALL NOT BE CONSIDERED AN EQUAL TO WATER ARRESTORS AS SPECIFIED.									
9. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING FIRE RATING AND WEATHERPROOFING INTEGRITY OF ALL PIPING AND PENETRATIONS.									
10. ALL WATER SUPPLY AND SANITARY LINES SHALL BE RUN AS CLOSE TO PLANS AS POSSIBLE WITH NO CHANGES IN SIZING.									
11. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY SUPPORTING DEVICES FOR ALL FIXTURES INCLUDED IN CONTRACT OR HEREIN SPECIFIED OR OTHERWISE.									
12. CHANGES IN THE DIRECTION OF SANITARY PIPING SHALL NOT BE MADE WITH FITTINGS WHICH WILL CAUSE EXCESSIVE REDUCTION IN THE VELOCITY OF FLOW OR CREATE ANY OTHER ADVERSE EFFECT UNLESS PHYSICALLY IMPOSSIBLE (IE. USE OF SANITARY TEE IN A HORIZONTAL CONNECTION, USE OF A DOUBLE SANITARY TEE IN A VERTICAL STACK, IN GENERAL, USE OF SHORT-RADIUS FITTINGS FOR BRANCH TO HOUSE DRAIN OR STACK CONNECTION).									
13. ALL DRAINAGE PIPING SHALL BE MARKED WITH THE SEAL OF APPROVAL OF THE NATIONAL SANITATION FOUNDATION.									
14. PROVIDE ACCESS PANELS TO ALL VALVES WITHIN CHASES OR ABOVE NONACCESSIBLE CEILINGS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.									
15. SEE ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS OF PLUMBING FIXTURE MOUNTING HEIGHTS, AND DIMENSIONS.									
16. CONTRACTOR SHALL VERIFY INVERT ELEVATIONS OF SANITARY AND GREASE TRAPS TO WHICH NEW SEWER LINES ARE TO BE CONNECTED BEFORE INSTALLATION OF NEW SEWER LINE.									
17. ALL VENTS THROUGH ROOF SHALL BE MIN. 10'-0" FROM ANY AIR INTAKES.									
18. CONTRACTOR SHALL INSTALL DIELECTRIC UNIONS AT CONNECTIONS OF DISSIMILAR METALS.									
19. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS (INCLUDING PIPE ROUTING AND EQUIPMENT LOCATIONS) TO ARCHITECT/ENGINEER FOR REVIEW AND APPROVAL PRIOR TO THE INSTALLATION OR PURCHASING OF ANY PIPING AND/OR EQUIPMENT.									
20. CLEANOUTS SHALL BE PROVIDED AT THE LOCATIONS INDICATED AND A MINIMUM WHERE REQUIRED BY CODE. FLOOR CLEANOUTS SHALL BE A MINIMUM OF 4" AND SHALL BE COMPLETE WITH A FLUSH PLUG AND REMOVABLE SCORIATED BRONZE FLOOR PLATE, PROVIDE CARPET BUTTONS IN CARPETED AREAS.									
21. PROVIDE BACKFLOW PROTECTION DEVICES REQUIRED BY AGENCIES HAVING JURISDICTION. BACKFLOW DEVICES REQUIRING TESTING SHALL BE INSTALLED NO HIGHER THAN 5'-0" A.F.F.									
22. PROVIDE CONDENSATE DRAIN FROM A/C UNITS TO APPROVED DRAIN. PROVIDE GAS PIPING TO UNITS. MAKE FINAL CONNECTIONS REQUIRED FOR OPERATION.									
23. COORDINATE INSTALLATION OF PLUMBING WORK WITH OTHER TRADES SO AS TO AVOID UNNECESSARY DELAY OR INTERFERENCES. REVIEW ARCHITECTURAL AND EQUIPMENT SHEETS.									

EXPANSION TANK SCHEDULE										
TAG	QUANTITY	LOCATION	SERVICE	TYPE	CONNECTION SIZE	MAX WORKING PRESSURE (PSI)	SHIPPING WEIGHT (LBS)	TANK VOLUME (GAL)	MAKE	REMARKS
ET-1	1	HOT WATER HEATER	HOT WATER	DIAPHRAGM	3/4"	150	17	6.4	AMTROL ST-12C-DD	AMTROL- THERMXTROL ASME APPROVED ST-5C-DD DIMENSIONS- 18"(H)x12"(DIA.)

MASTER THERMOSTATIC MIXING VALVE SCHEDULE									
TAG	QUANTITY	LOCATION	SERVICE	CAPACITY (GPM)	PRESSURE DROP (PSI)	MINIMUM FLOW (GPM)	MAKE	REMARKS	
TMV-1	1	WATER HEATER HW LINE	HOT WATER	15	5	0.1	ACORN MV17-2	-BRASS VALVE BODY -ASSE CERTIFIED	

BACKFLOW PREVENTER DEVICE SCHEDULE									
TAG	QUANTITY	LOCATION	SERVICE	SIZE	SERIES	APPROVAL	MAKE	REMARKS	
BFP	1	UTILITY ROOM 105	DOMESTIC WATER CONNECTION	1"	LF009	ASSE 1013, AWWA C511	WATTS	-REDUCED PRESSURE BACKFLOW PREVENTER -LEAD FREE CAST COPPER SILICON ALLOY BODY	

ELECTRIC TYPE HOT WATER HEATER WITH STORAGE										
TAG	TOTAL NO. OF HEATERS	TEMP. SET POINT DEG. F.	TANK CAPACITY (GALLONS)	POWER INPUT	ELECTRICAL DATA V/PH/Hz	RECOVERY CAP. (GPM/GPH) @ RISE	STORAGE WATER TEMP.	TYPE	MANUFACTURER & MODEL NO.	REMARKS
WH-1	1	140	65	15 KW	208V/30/60Hz	68 GPH @ 90°F	140°F	ELECTRIC STORAGE TANK TYPE WATER HEATER (SHELF MOUNTED)	(AO SMITH) MODEL: DSE-65A	-DIMENSIONS 26.5"D X 57.25"H -SHELF MOUNTED ELECTRIC WATER HEATER PROVIDE DRIP PAN -PROVIDE EXPANSION TANK (ET-1), HOT WATER & RE-CIRCULATION PUMP (RCP-1). -MAINTAIN CLEARANCE AS PER MANUFACTURER RECOMMENDATION -CSA CERTIFIED

RE-CIRCULATION PUMP SCHEDULE																	
TAG	QUANTITY	SERVICE	LOCATION	PERFORMANCE DATA/PUMP			PUMP CONSTRUCTION DATA			MOTOR DATA/PUMP				WEIGHT (LBS)	MFGR MODEL	REMARKS	
				GPM	TDH (FT)	WATER TEMP. (°F)	PUMP TYPE	IMPELLER MATERIAL	MHP PER PUMP	STARTER TYPE	V/PH/Hz	RPM	F.L.A.				SERVICE FACTOR
RCP-1	1	HWR CIRC. SYSTEM	UTILITY ROOM	2	10	110	INLINE	NORYL	125 WATTS	AQUA STAT	115/1/60	2800	1.10	1.0	10	BELL & GOSSETT NBF-25	INLINE ON HW RETURN LINE AT WATER HEATER WITH NEMA 1 RATED MOTOR

CONSULTANTS
NY ENGINEERS
 NEARBY ENGINEERS
 382 NE 191ST STREET SUITE 4967A,
 MIAMI, FL 33179
 PH-914.257.3455
 WWW.NY-ENGINEERS.COM

ARCHITECT/ENGINEER SEAL:

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF NEW JERSEY. LICENSE NO. 066549160. EXPIRATION DATE: 04/30/2026

CONTRACTOR'S NOTES:
 WRITTEN DIMENSIONS HOLD PREFERENCE OVER SCALED DIMENSIONS. DO NOT SCALE THE DRAWINGS. THE CONTRACTORS MUST VISIT JOB SITE TO VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE SUBMITTING BIDS. REPORT ANY DISCREPANCIES OF ANY CONDITIONS WHICH MAY INTERFERE WITH THE PROPER EXECUTION OF THE CONTRACT TO THE TENANT'S REPRESENTATIVE. REPORT DISCREPANCIES DURING BIDDING PROCESS AND BEFORE START OF CONSTRUCTION. CHANGE ORDERS NEED TO BE APPROVED BY STRONG PLATES CONSTRUCTION MANAGER FOR ISSUES ARISING FROM THE FIELD CONDITIONS OR CONFLICTS BETWEEN THE PLANS AND THE EXISTING CONDITIONS PRIOR TO THE COMMENCEMENT OF WORK.

DATE	ISSUE
02.27.25	CLIENT/LL REVIEW SET
03.11.25	CLIENT COMMENTS
03.14.25	PERMIT SUBMISSION
04.21.25	CLIENT COMMENTS
05.06.25	CLIENT COMMENTS

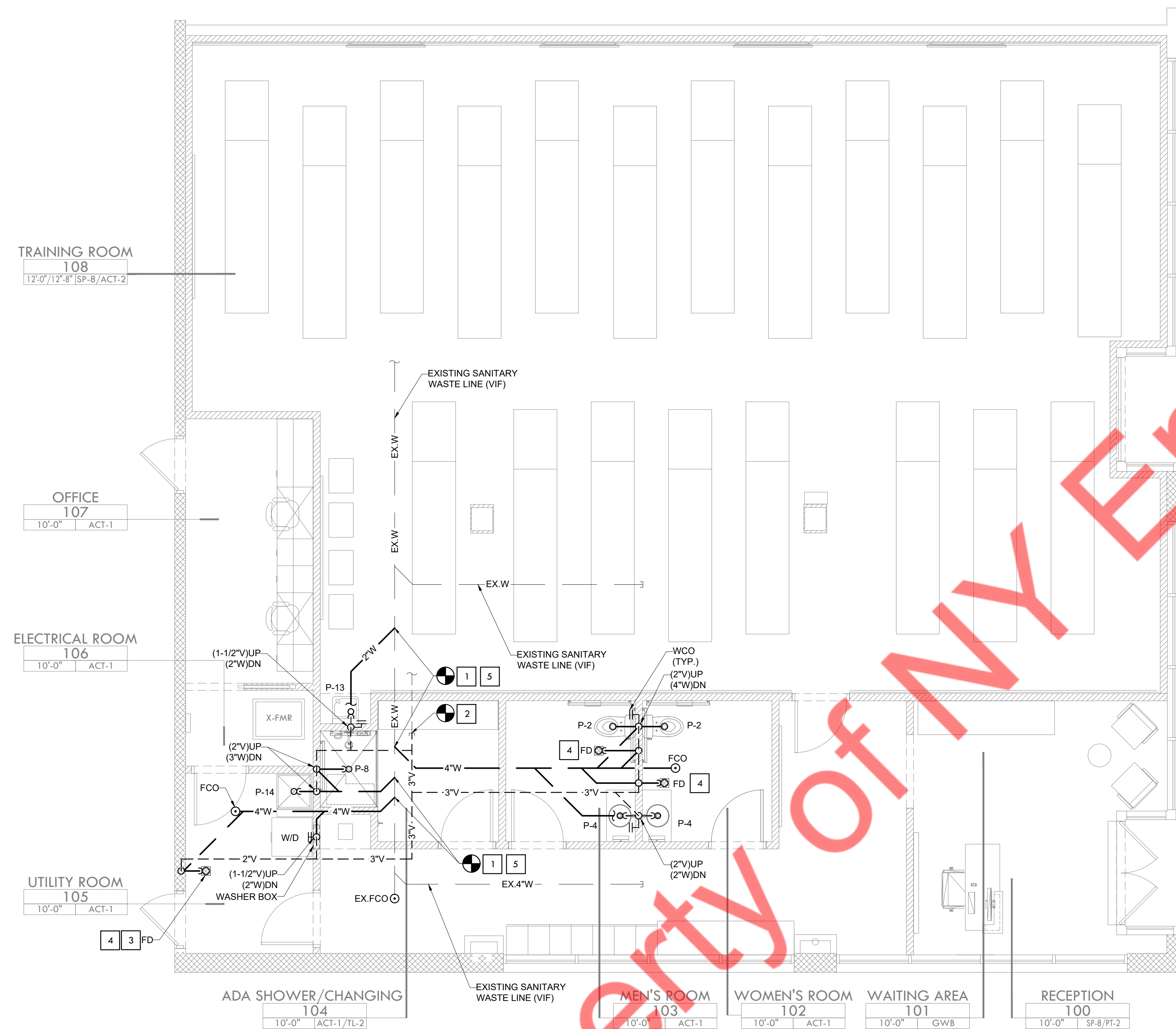


LOCATION:

PROJECT INFORMATION:
 PROJECT NUMBER: 12366-25
 DRAWN BY: NYE
 REVIEWED BY: NYE
 AREA: 3,134 SQ. FT.

TITLE:
 PLUMBING SYMBOLS, ABBREVIATIONS, NOTES & SCHEDULE

SHEET NUMBER:



GENERAL NOTES:

1. ANY CHANGES AND/OR UPGRADES TO TENANT'S EXISTING PLUMBING SYSTEMS SHALL COMPLY WITH ALL CODES AND ALL CRITERIA. EXISTING SYSTEMS SHALL POSSESS THE CAPACITY TO HANDLE ANY AND ALL CHANGES IN LOAD.
2. ALL WATER LINES SHALL BE COPPER - PVC IS NOT PERMITTED. THERE SHALL BE NO PIPING JOINTS OF FITTINGS INSTALLED IN WATER PIPING BELOW THE FLOOR SLAB.
3. PLUMBING IS NOT PERMITTED IN ANY DEMISING PARTITIONS. FURROUT THE WALL AS NECESSARY.
4. EXHAUST AND PLUMBING VENTS SHALL BE LOCATED A MINIMUM OF 10'-0" AWAY FROM ANY OUTSIDE AIR INTAKE, AND 5'-0" FROM ANY DEMISING WALL VERTICAL PLANE.
5. ALL FLOOR DRAINS ARE REQUIRED TO HAVE TRAP PRIMERS.
6. ANY UNUSED PLUMBING EQUIPMENT, PIPING, ETC., WITHIN OR SERVING THE PREMISES MUST BE COMPLETELY REMOVED TO POINT OF ORIGIN. DO NOT ABANDON IN PLACE.
7. ALL FLOOR PENETRATIONS MUST BE CORE BORED, SLEEVED, GROUTED, SEALED AND MADE WATERPROOF. SLEEVES MUST EXTEND A MINIMUM OF 4" AFF.
8. IF NOT ALREADY EXISTING, INSTALL A SHUT OFF VALVE ON DOMESTIC WATER LINE INSIDE SPACE.
9. TENANT IS REQUIRED TO INSTALL A WATERPROOF MEMBRANE IN ALL WET AREAS OF THE SPACE. TENANT SHALL USE A 30 MIL POLYETHYLENE CLEAVAGE MEMBRANE (EQUAL TO NOBLESEAL TS) INSTALLED PER MANUFACTURERS' RECOMMENDATIONS AND ANSI A108. MEMBRANE MUST BE EXTENDED UP THE WALL A MINIMUM OF 6" OR EQUAL TO THE HEIGHT OF THE FLOOR BASE.
10. NO ROOF PENETRATIONS PERMITTED WITHIN ROOF WATER PLY, REFER TO ROOF PLAN FOR LOCATIONS.
11. REFER TO RISER DIAGRAM FOR ALL WASTE AND VENT SIZES.
12. VERIFY WITH THE LOCAL BUILDING AUTHORITY THAT CONDENSATE DRAINAGE CAN BE ROUTED TO THE MOP SINK.
13. THE SUSPENSION OF ANY ITEMS FROM BASE BUILDING STRUCTURE BY MEANS OF DRILLING, WELDING, SHOOTING ARE PROHIBITED. CONTRACTOR TO MAKE SURE ALL THE EQUIPMENTS AND PIPES TO BE SUPPORTED BY MEANS OF THE BEAM CLAMPS.
14. ALL SANITARY PIPING CONNECTING TO AND DOWNSTREAM OF TOILETS SHALL BE 4" OR LARGER.
15. NO 90° HORIZONTAL TURNS SHALL BE USED IN THE SANITARY PIPING SYSTEM. ALL HORIZONTAL TURNS SHALL BE MADE WITH 45° ELBOWS WITH PIPE IN BETWEEN THE TWO ELBOWS.
16. ROUTE HW WATER LOOP DOWN IN WALL TO FIXTURE. MINIMIZE DISTANCE FROM THE LOOP TO HOT WATER DISCHARGE.
17. COORDINATE OVERALL PIPING DIAMETER (INCLUDING INSULATION) WITH WALL DEPTH.
18. NOTIFY ARCHITECT IF OVER ALL PIPE DIAMETER EXCEEDS WALL DEPTH.
19. ALL UNDERGROUND SANITARY WASTE AND VENT PIPING SHALL BE PVC, DWV SOLID WALL SCHEDULE 40 WITH SOCKET-TYPE. SOLVENT WELDED JOINTS IN SIZES UP TO 12" / 14" AND LARGER PIPING SHALL BE PVC, DWV SOLID WALL SCHEDULE 80 WITH SOCKET TYPE. SOLVENT WELDED JOINT. ALL PVC PIPING SHALL BE INSTALLED IN ACCORDANCE TO ASTM 02321. HUBLESS CAST IRON IS THE APPROVED SUBSTITUTE MATERIAL FOR DRAIN. CONTRACTOR TO CO-ORDINATE WITH THE AHJ FOR THE MATERIAL AS PER THE LOCAL AHJ.
20. ALL HORIZONTAL SANITARY, WASTE, & STORM PIPING SHALL BE SLOPED AT 1/8" PER FOOT, UNLESS OTHERWISE NOTED OR REQUIRED BY CODE, IN DIRECTION OF FLOW.
21. ALL PLUMBING SHUTOFF VALVE SHALL BE COORDINATED WITH MECHANICAL EQUIPMENT AND SHALL BE EASILY ACCESSIBLE EASILY ACCESSED FOR FUTURE OPERATION.

SANITARY AND VENT KEYED NOTES:

1. EXTEND AND CONNECT NEW 2" / 4" SANITARY PIPING TO THE EXISTING SANITARY LINE IN THE SPACE. CONTRACTOR SHALL VERIFY THE EXISTING SANITARY PIPE SIZE, LOCATION, INVERT, DIRECTION OF FLOW & TIE-IN CONNECTION PRIOR TO BID.
2. CONNECT NEW 3" VENT LINE TO EXISTING STUB-OUT IN THE SPACE. CONTRACTOR TO FIELD VERIFY EXISTING VENT STUB-OUT LOCATION AND SIZE, REROUTE IF REQUIRED. BASE BID ACCORDINGLY.
3. ROUTE INDIRECT WASTE FROM BFP TO ADJACENT FLOOR DRAIN (FD) WITH APPROVED AIR GAP.
4. PROVIDE THE TRAP PRIMER FOR ALL THE FLOOR DRAINS.
5. CONTRACTOR TO COORDINATE WITH THE LANDLORD /BASE BUILDING ENGINEER PRIOR TO THE NEW CONNECTION TO THE EXISTING BASE BUILDING SYSTEM.

CONSULTANTS

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

ARCHITECT/ENGINEER SEAL:

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 LICENSE NO. 046626459100
 EXPIRATION DATE: 04/30/2026

CONTRACTOR'S NOTES:

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03.11.25	CLIENT COMMENTS
03.14.25	PERMIT SUBMISSION
04.21.25	CLIENT COMMENTS
05.06.25	CLIENT COMMENTS

DATE	REVISION
05/06/25	CLIENT COMMENTS
04/21/25	CLIENT COMMENTS
03/11/25	CLIENT COMMENTS



LOCATION:

PROJECT INFORMATION:

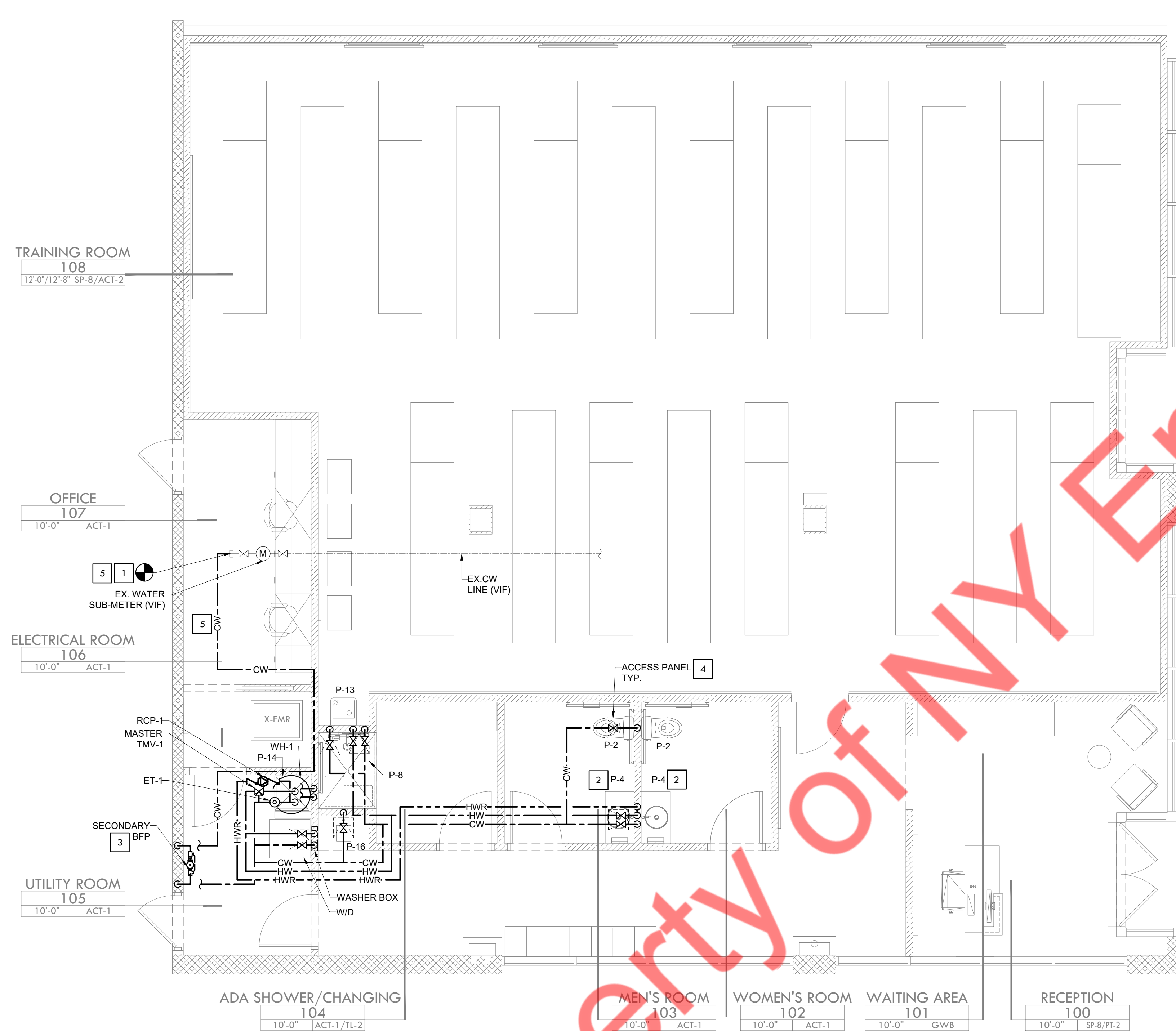
PROJECT NUMBER: 12366-25
 DRAWN BY: NYE
 REVIEWED BY: NYE
 AREA: 3,134 SQ. FT.

TITLE:

PLUMBING SANITARY AND VENT FLOOR PLAN

SHEET NUMBER:

P-1.0



GENERAL NOTES

1. ANY CHANGES AND/OR UPGRADES TO TENANT'S EXISTING PLUMBING SYSTEMS SHALL COMPLY WITH ALL CODES AND ALL CRITERIA. EXISTING SYSTEMS SHALL POSSESS THE CAPACITY TO HANDLE ANY AND ALL CHANGES IN LOAD.
2. ALL WATER LINES SHALL BE COPPER - PVC IS NOT PERMITTED. THERE SHALL BE NO PIPING JOINTS OF FITTINGS INSTALLED IN WATER PIPING BELOW THE FLOOR SLAB.
3. PLUMBING IS NOT PERMITTED IN ANY DEMISING PARTITIONS, FURROUT THE WALL AS NECESSARY.
4. EXHAUST AND PLUMBING VENTS SHALL BE LOCATED A MINIMUM OF 10'-0" AWAY FROM ANY OUTSIDE AIR INTAKE, AND 5'-0" FROM ANY DEMISING WALL VERTICAL PLANE.
5. ALL FLOOR DRAINS ARE REQUIRED TO HAVE TRAP PRIMERS.
6. ANY UNUSED PLUMBING EQUIPMENT, PIPING, ETC., WITHIN OR SERVING THE PREMISES MUST BE COMPLETELY REMOVED TO POINT OF ORIGIN. DO NOT ABANDON IN PLACE.
7. ALL FLOOR PENETRATIONS MUST BE CORE BORED, SLEEVED, GROUDED, SEALED AND MADE WATERPROOF. SLEEVES MUST EXTEND A MINIMUM OF 4" AFF.
8. IF NOT ALREADY EXISTING, INSTALL A SHUT OFF VALVE ON DOMESTIC WATER LINE INSIDE SPACE.
9. TENANT IS REQUIRED TO INSTALL A WATERPROOF MEMBRANE IN ALL WET AREAS OF THE SPACE. TENANT SHALL USE A 30 MIL POLYETHYLENE CLEAVAGE MEMBRANE (EQUAL TO NOBLESEAL TS) INSTALLED PER MANUFACTURERS RECOMMENDATIONS AND ANSI A108. MEMBRANE MUST BE EXTENDED UP THE WALL A MINIMUM OF 6" OR EQUAL TO THE HEIGHT OF THE FLOOR BASE.
10. NO ROOF PENETRATIONS PERMITTED WITHIN ROOF WATER PLY. REFER TO ROOF PLAN FOR LOCATIONS.
11. REFER TO RISER DIAGRAM FOR ALL WASTE AND VENT SIZES.
12. VERIFY WITH THE LOCAL BUILDING AUTHORITY THAT CONDENSATE DRAINAGE CAN BE ROUTED TO THE MOP SINK.
13. THE SUSPENSION OF ANY ITEMS FROM BASE BUILDING STRUCTURE BY MEANS OF DRILLING, WELDING, SHOOTING ARE PROHIBITED. CONTRACTOR TO MAKE SURE ALL THE EQUIPMENTS AND PIPES TO BE SUPPORTED BY MEANS OF THE BEAM CLAMPS.
14. ALL SANITARY PIPING CONNECTING TO AND DOWNSTREAM OF TOILETS SHALL BE 4" OR LARGER.
15. NO 90° HORIZONTAL TURNS SHALL BE USED IN THE SANITARY PIPING SYSTEM. ALL HORIZONTAL TURNS SHALL BE MADE WITH 45° ELBOWS WITH PIPE IN BETWEEN THE TWO ELBOWS.
16. ROUTE HW WATER LOOP DOWN IN WALL TO FIXTURE. MINIMIZE DISTANCE FROM THE LOOP TO HOT WATER DISCHARGE.
17. COORDINATE OVERALL PIPING DIAMETER (INCLUDING INSULATION) WITH WALL DEPTH.
18. NOTIFY ARCHITECT IF OVER ALL PIPE DIAMETER EXCEEDS WALL DEPTH.
19. ALL UNDERGROUND SANITARY WASTE AND VENT PIPING SHALL BE PVC, DWV SOLID WALL SCHEDULE 40 WITH SOCKET-TYPE, SOLVENT WELDED JOINTS IN SIZES UP TO 12" / 14" AND LARGER PIPING SHALL BE PVC, DWV SOLID WALL SCHEDULE 80 WITH SOCKET TYPE, SOLVENT WELDED JOINT. ALL PVC PIPING SHALL BE INSTALLED IN ACCORDANCE TO ASTM 02321. HUBLESS CAST IRON IS THE APPROVED SUBSTITUTE MATERIAL FOR DRAIN. CONTRACTOR TO CO-ORDINATE WITH THE AHJ FOR THE MATERIAL AS PER THE LOCAL AHJ.
20. ALL HORIZONTAL SANITARY, WASTE, & STORM PIPING SHALL BE SLOPED AT 1/8" PER FOOT, UNLESS OTHERWISE NOTED OR REQUIRED BY CODE, IN DIRECTION OF FLOW.
21. ALL PLUMBING SHUTOFF VALVE SHALL BE COORDINATED WITH MECHANICAL EQUIPMENT AND SHALL BE EASILY ACCESSIBLE EASILY ACCESSED FOR FUTURE OPERATION.

WATER SUPPLY KEYED NOTES

1. CONNECT NEW 1" CW LINE WITH EXISTING WATER METER TO THE EXISTING COLD WATER LINE STUB-OUT IN THE SPACE. CONTRACTOR TO FIELD VERIFY EXISTING WATER METER AND WATER STUB-OUT LOCATION AND SIZE.
2. PROVIDE APPROVED ASSE 1070 THERMOSTATIC MIXING VALVE SET TO 110°F AT LAVATORY.
3. CONTRACTOR TO COORDINATE WITH LANDLORD/AHJ REQUIREMENT OF SECONDARY BFP. PROVIDE APPROVED ASSE 1013 BFP (WATTS LF009M2QT OR EQUIVALENT) AS SHOWN ON THE PLAN IF REQUIRED. INSTALLED BFP AS PER LOCAL AHJ. BASE BID ACCORDINGLY.
4. PROVIDE 12" X 12" ACCESS PANEL FOR VALVES.
5. NO TAP OFF TO BE TAKEN BEFORE SECONDARY BFP.

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 LICENSE NO. 046626489100
 EXPIRATION DATE: 04/30/2026

CONTRACTOR'S NOTES:

WRITTEN DIMENSIONS HOLD PREFERENCE OVER SCALED DIMENSIONS. DO NOT SCALE THE DRAWINGS. THE CONTRACTORS MUST VISIT JOB SITE TO VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE SUBMITTING BIDS. REPORT ANY DISCREPANCIES OF ANY CONDITIONS WHICH MAY INTERFERE WITH THE PROPER EXECUTION OF THE CONTRACT TO THE TENANT'S REPRESENTATIVE. REPORT DISCREPANCIES DURING BIDDING PROCESS AND BEFORE START OF CONSTRUCTION. CHANGE ORDERS NEED TO BE APPROVED BY STRONG PLATES CONSTRUCTION MANAGER FOR ISSUES ARISING FROM THE FIELD CONDITIONS OR CONFLICTS BETWEEN THE PLANS AND THE EXISTING CONDITIONS PRIOR TO THE COMMENCEMENT OF WORK.

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03.11.25	CLIENT COMMENTS
03.14.25	PERMIT SUBMISSION
04.21.25	CLIENT COMMENTS
05.06.25	CLIENT COMMENTS
05/06/25	CLIENT COMMENTS
04/21/25	CLIENT COMMENTS
03/11/25	CLIENT COMMENTS
DATE	REVISION



LOCATION:

PROJECT INFORMATION:

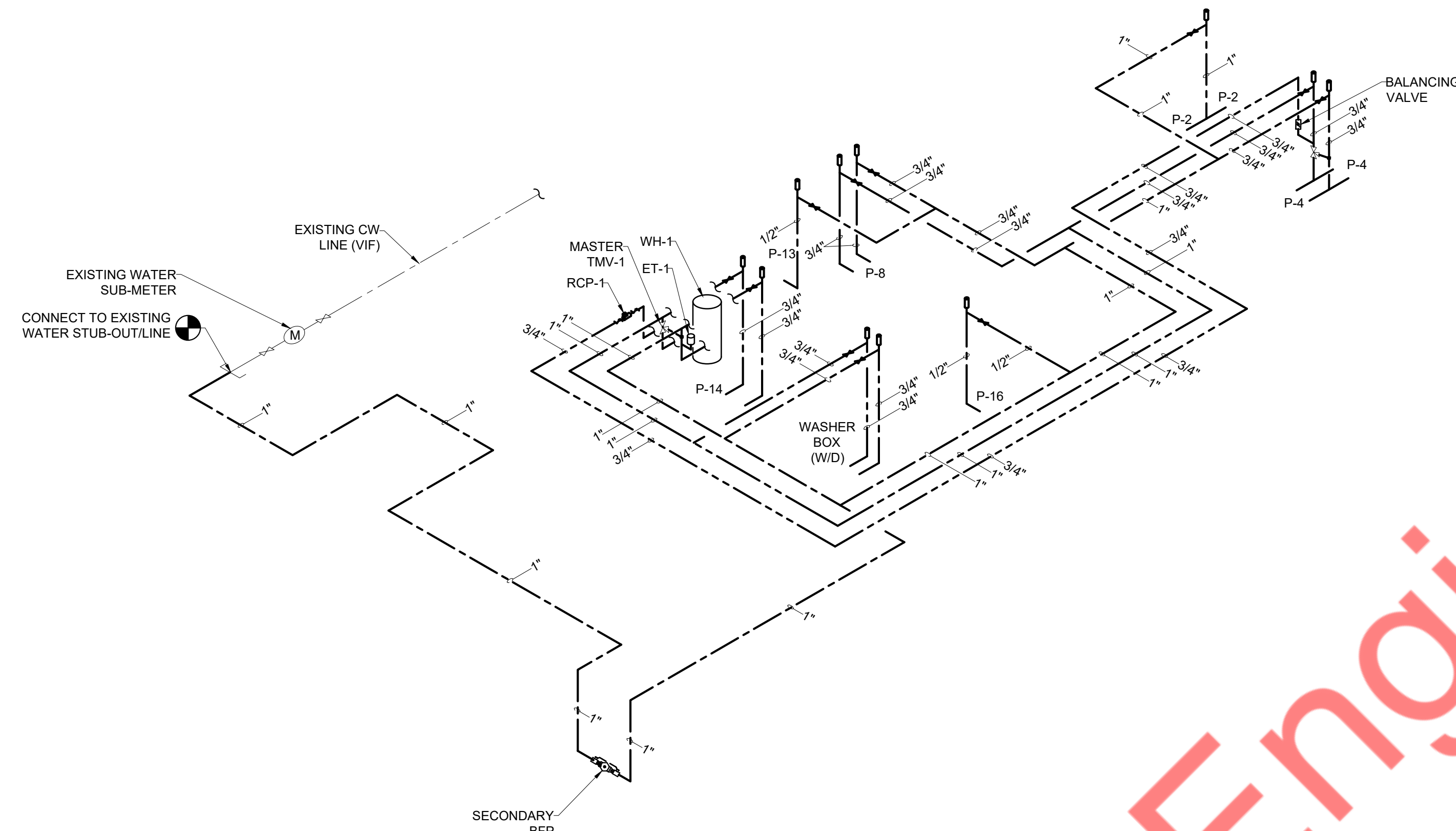
PROJECT NUMBER: 12366-25
 DRAWN BY: NYE
 REVIEWED BY: NYE
 AREA: 3,134 SQ. FT.

TITLE:

PLUMBING WATER SUPPLY FLOOR PLAN

SHEET NUMBER:

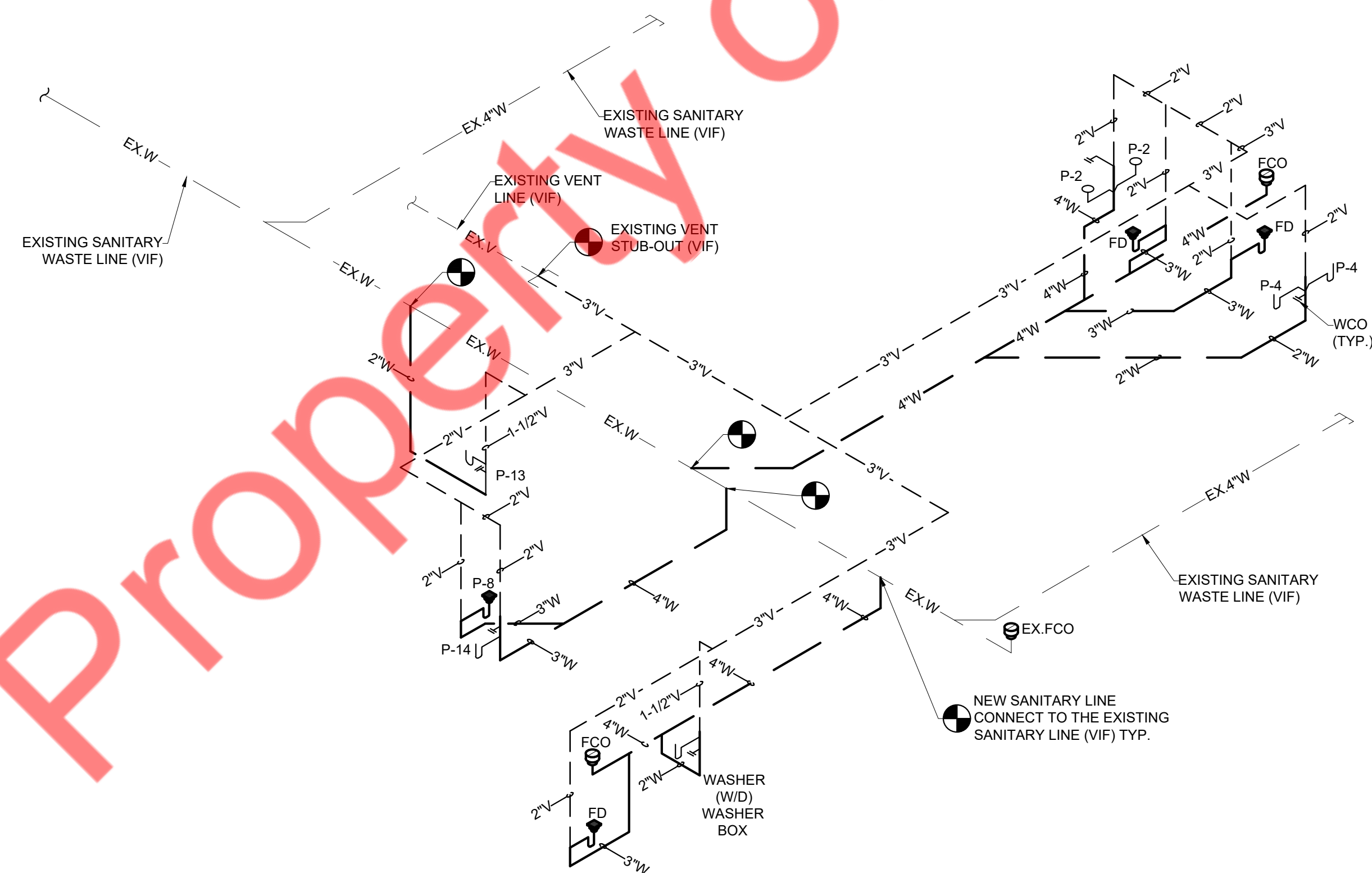
P-2.0



2

SCALE
N.T.S.

DOMESTIC WATER ISOMETRIC DIAGRAM



1

SCALE
N.T.S.

SANITARY AND VENT ISOMETRIC DIAGRAM

CONSULTANTS

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

ARCHITECT/ENGINEER SEAL:

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LICENSE NO. 24626459100.
EXPIRATION DATE: 04/30/2026

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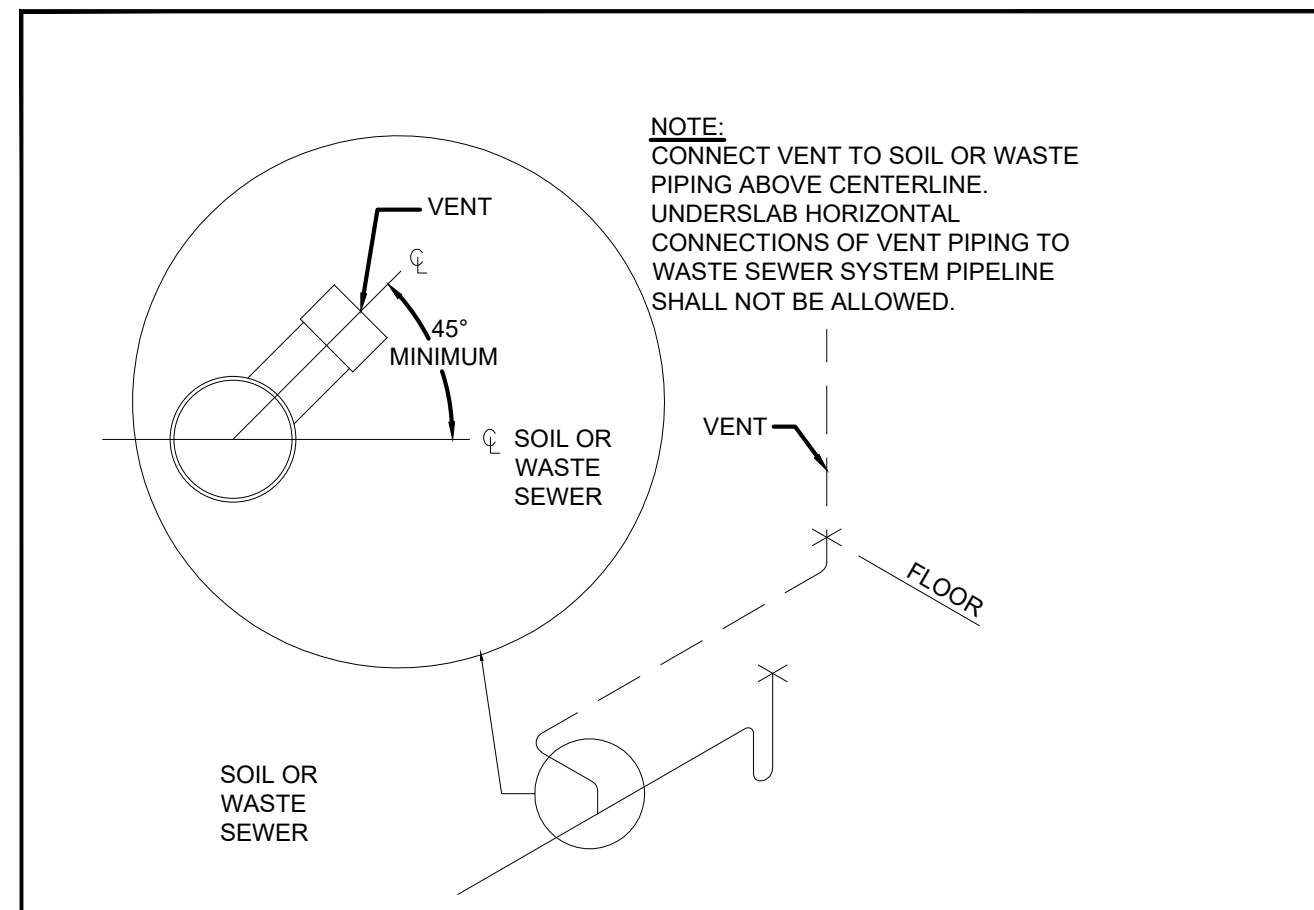
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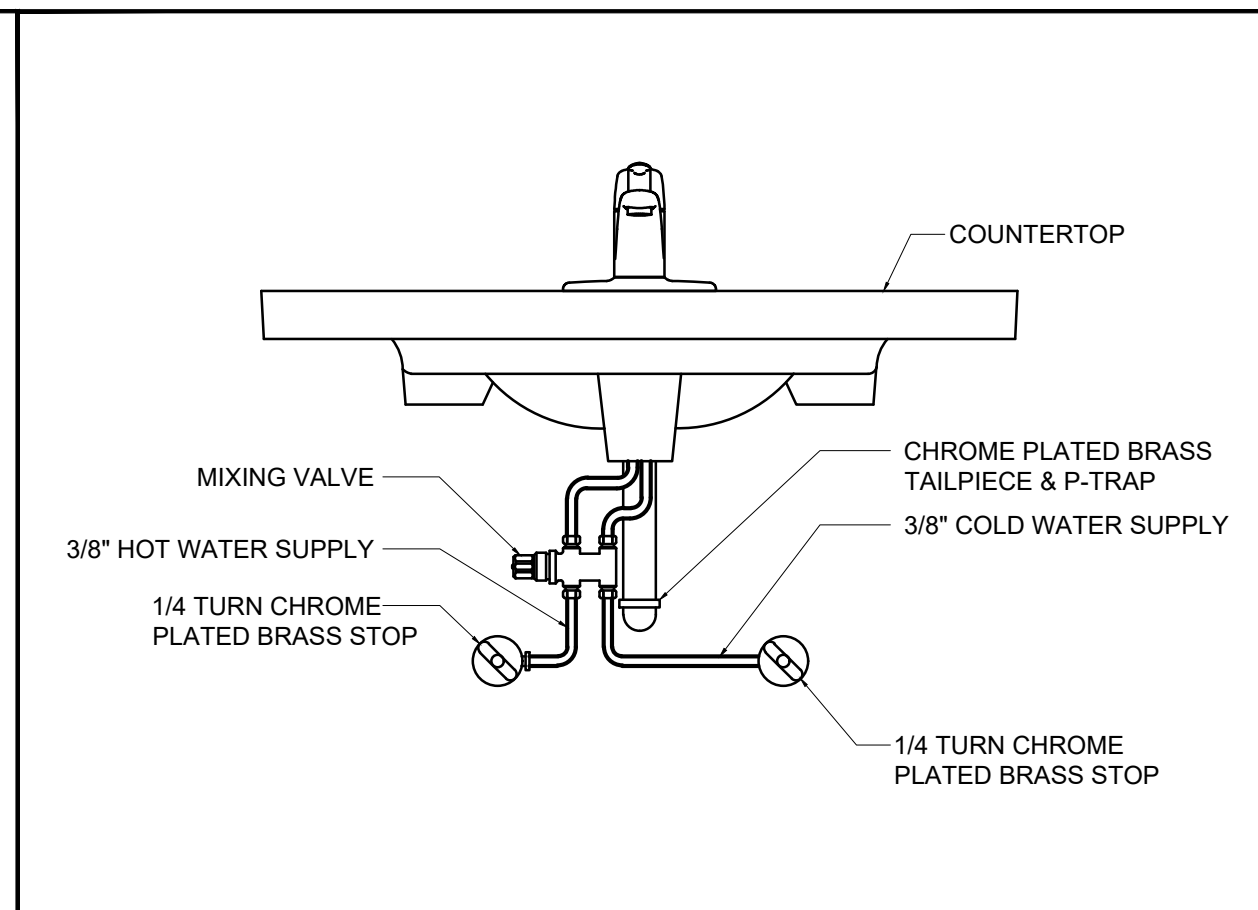
PLUMBING RISER DIAGRAMS

SHEET NUMBER:

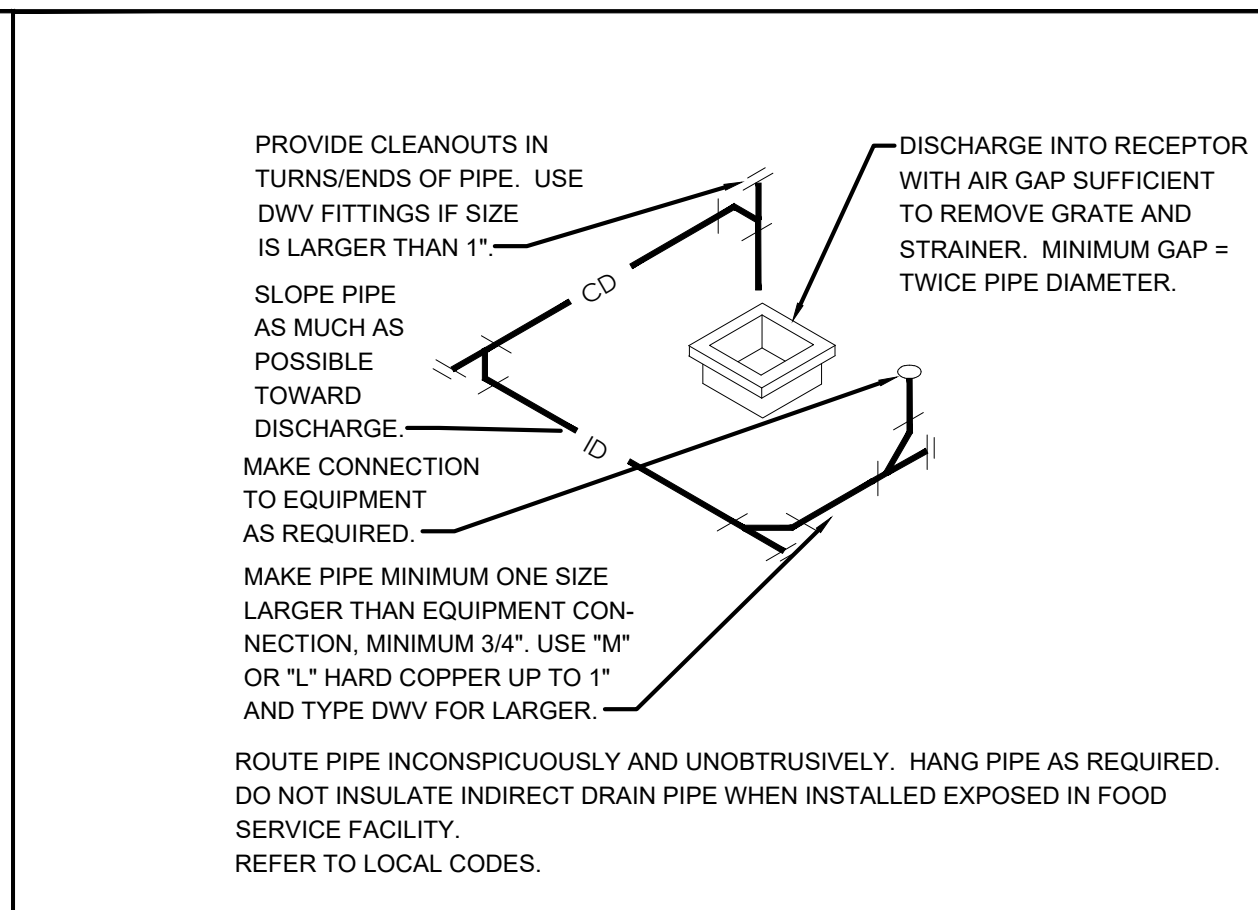
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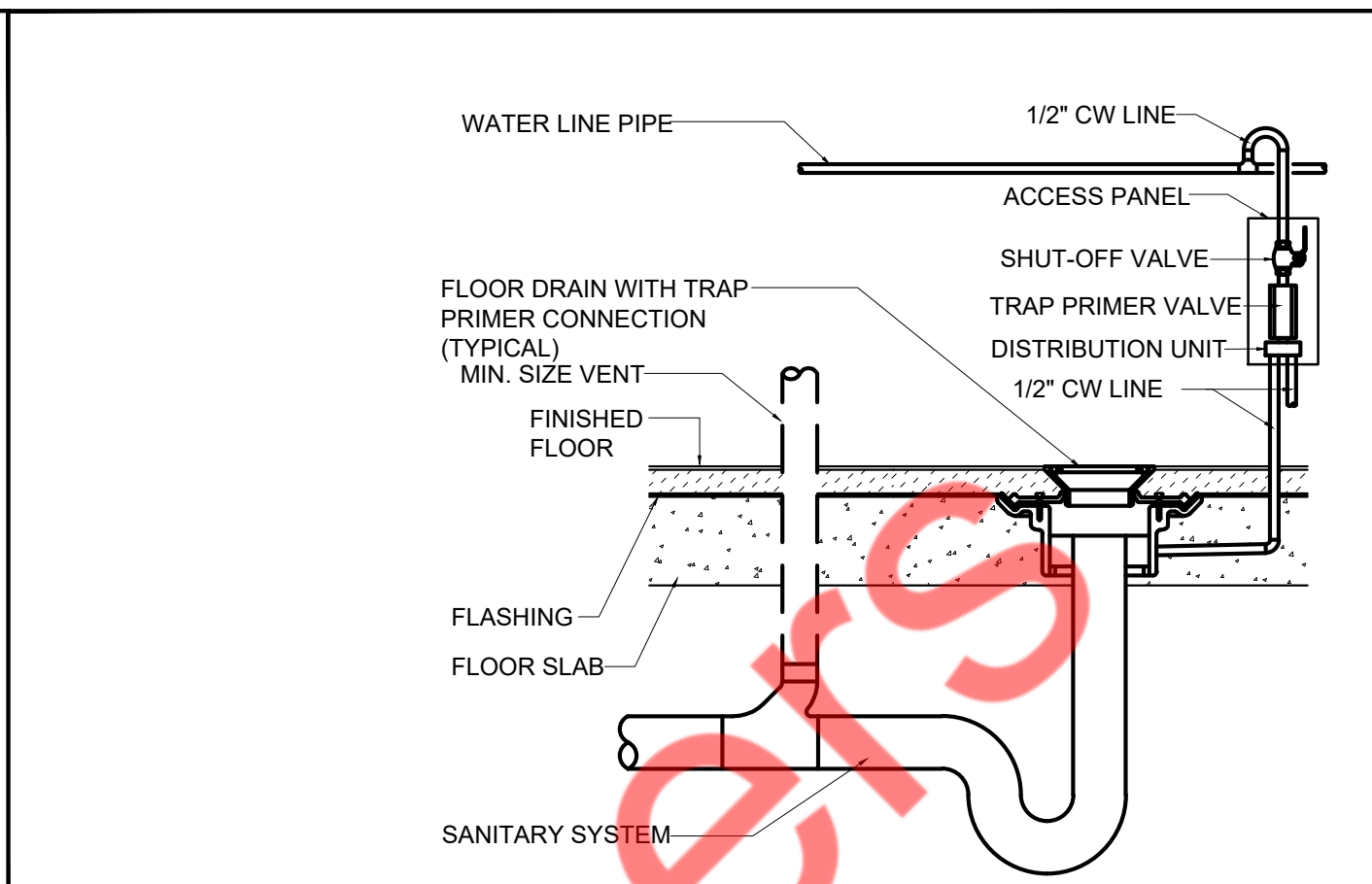
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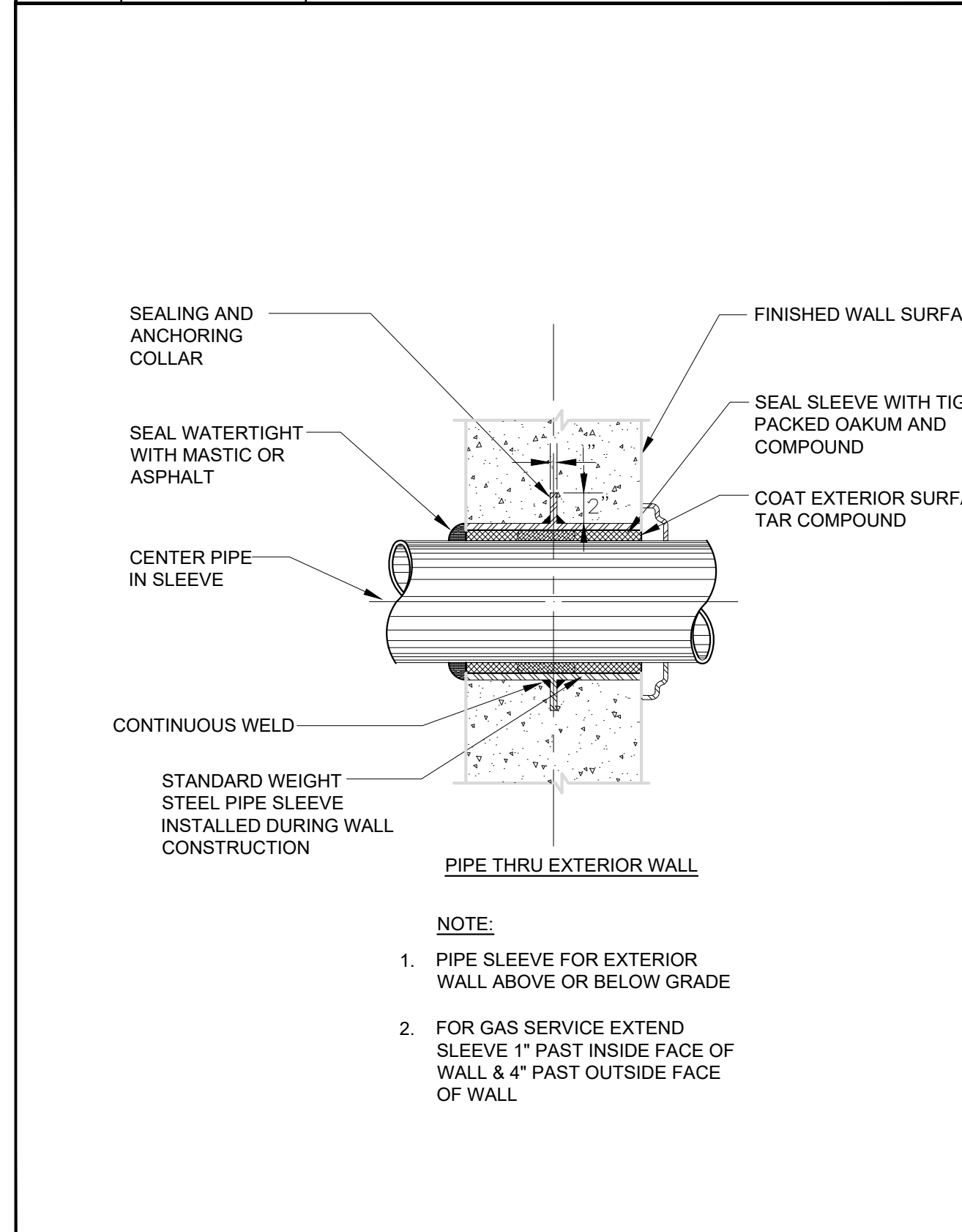
2 SCALE N.T.S. MIXING VALVE DETAILS



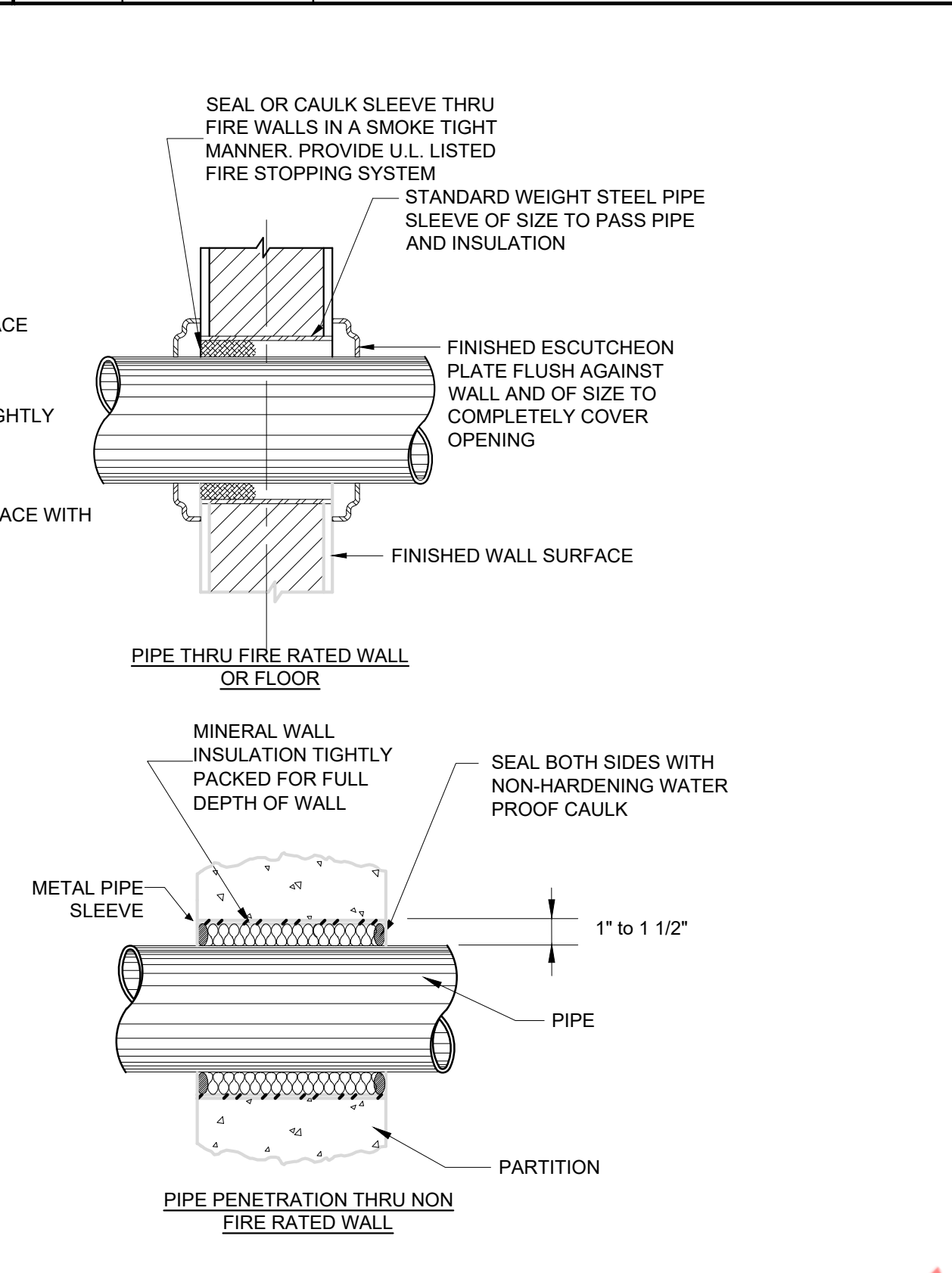
3 SCALE N.T.S. INDIRECT CONDENSATE DRAIN DETAILS



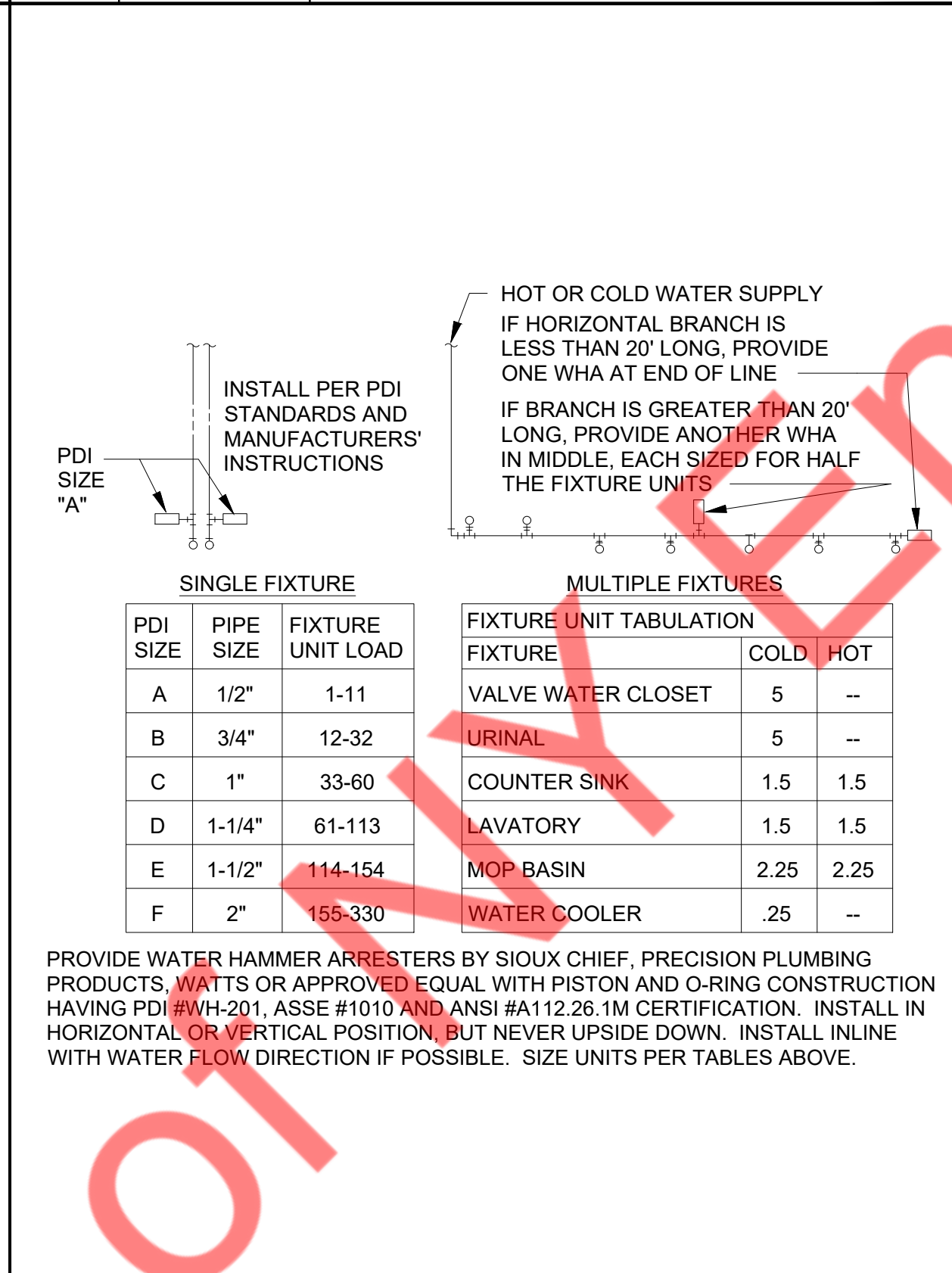
4 SCALE N.T.S. FLOOR DRAIN WITH TRAP PRIMER



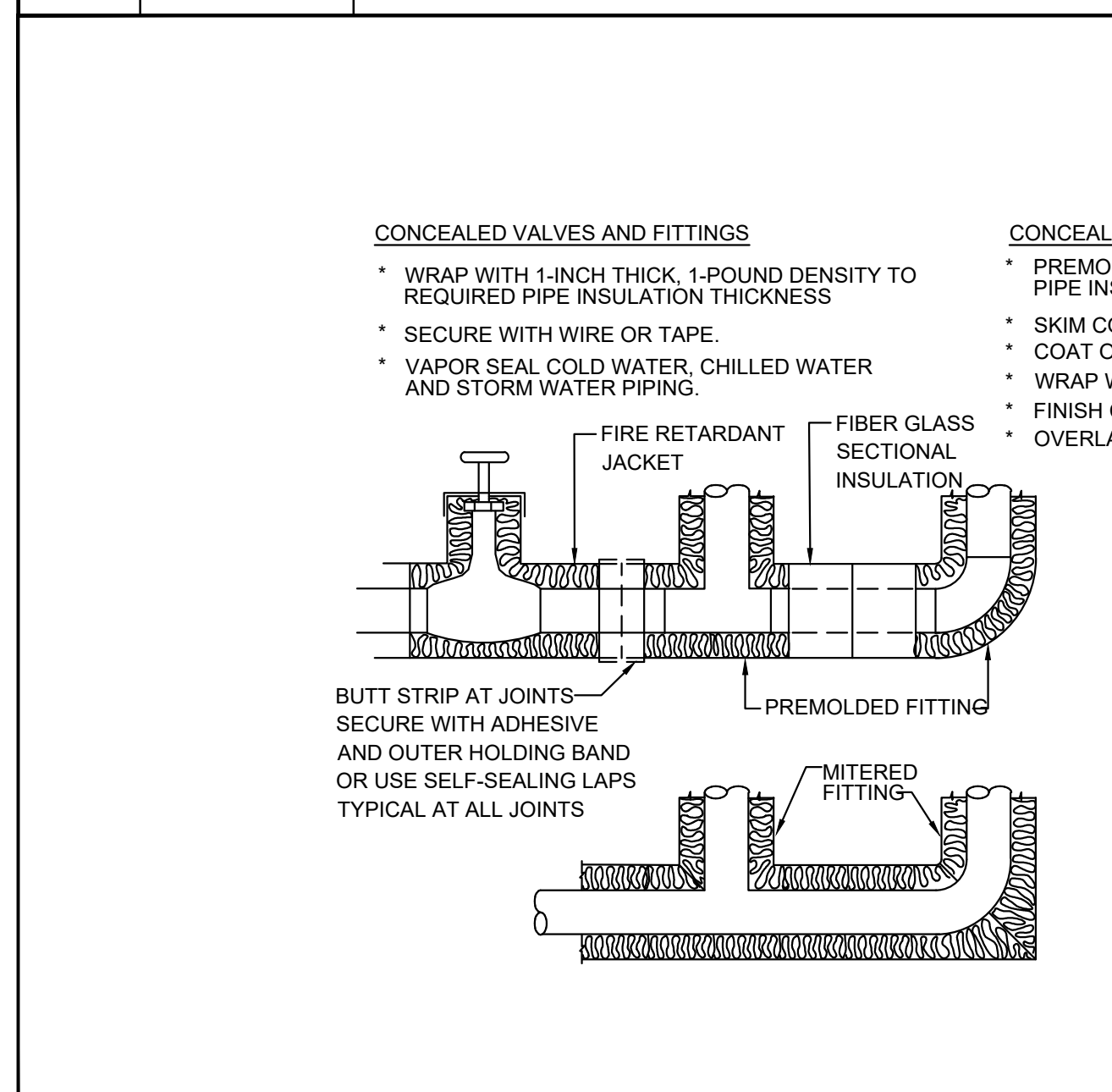
5 SCALE N.T.S. PIPE SLEEVE THROUGH WALL SECTION



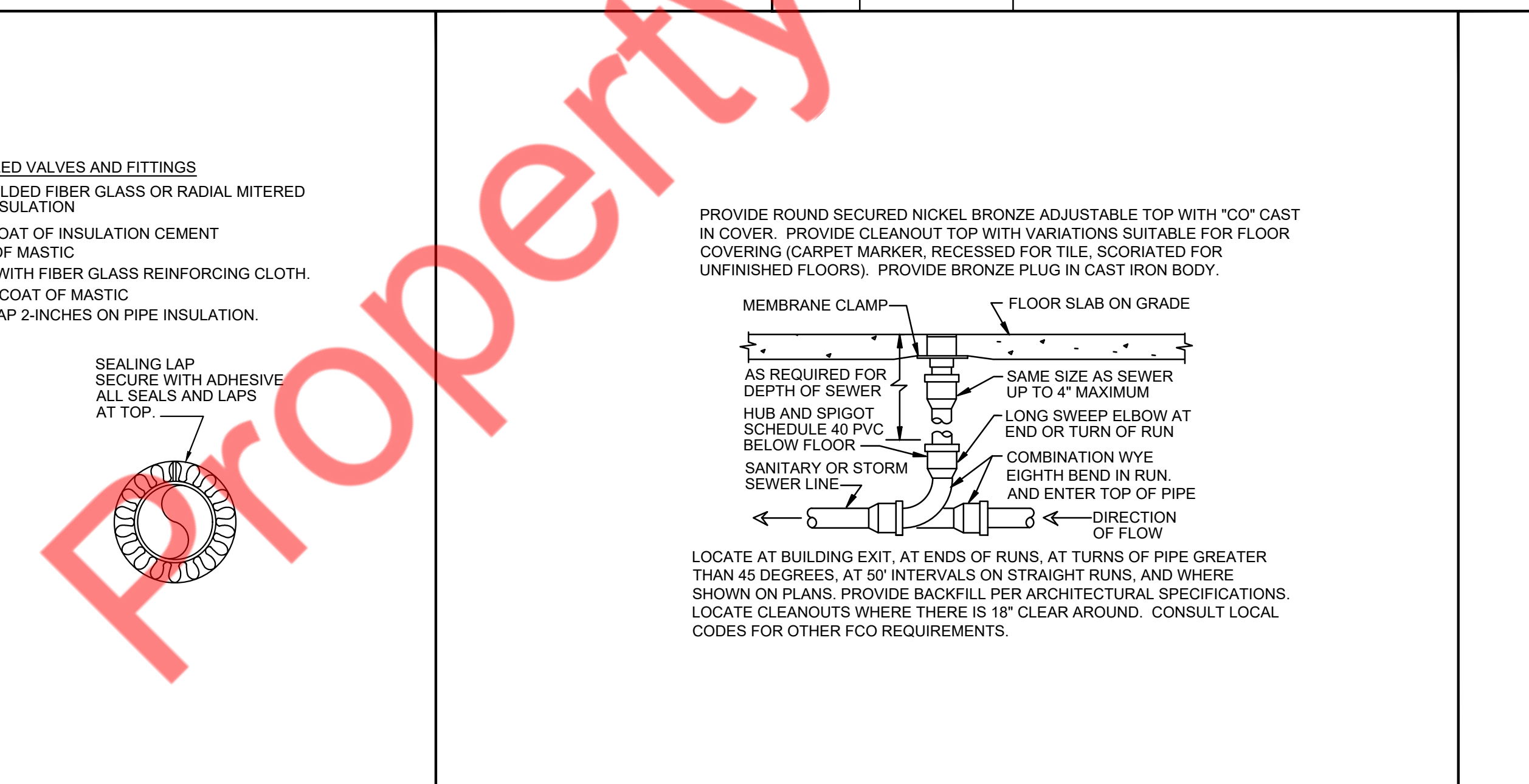
6 SCALE N.T.S. WATER HAMMER ARRESTOR



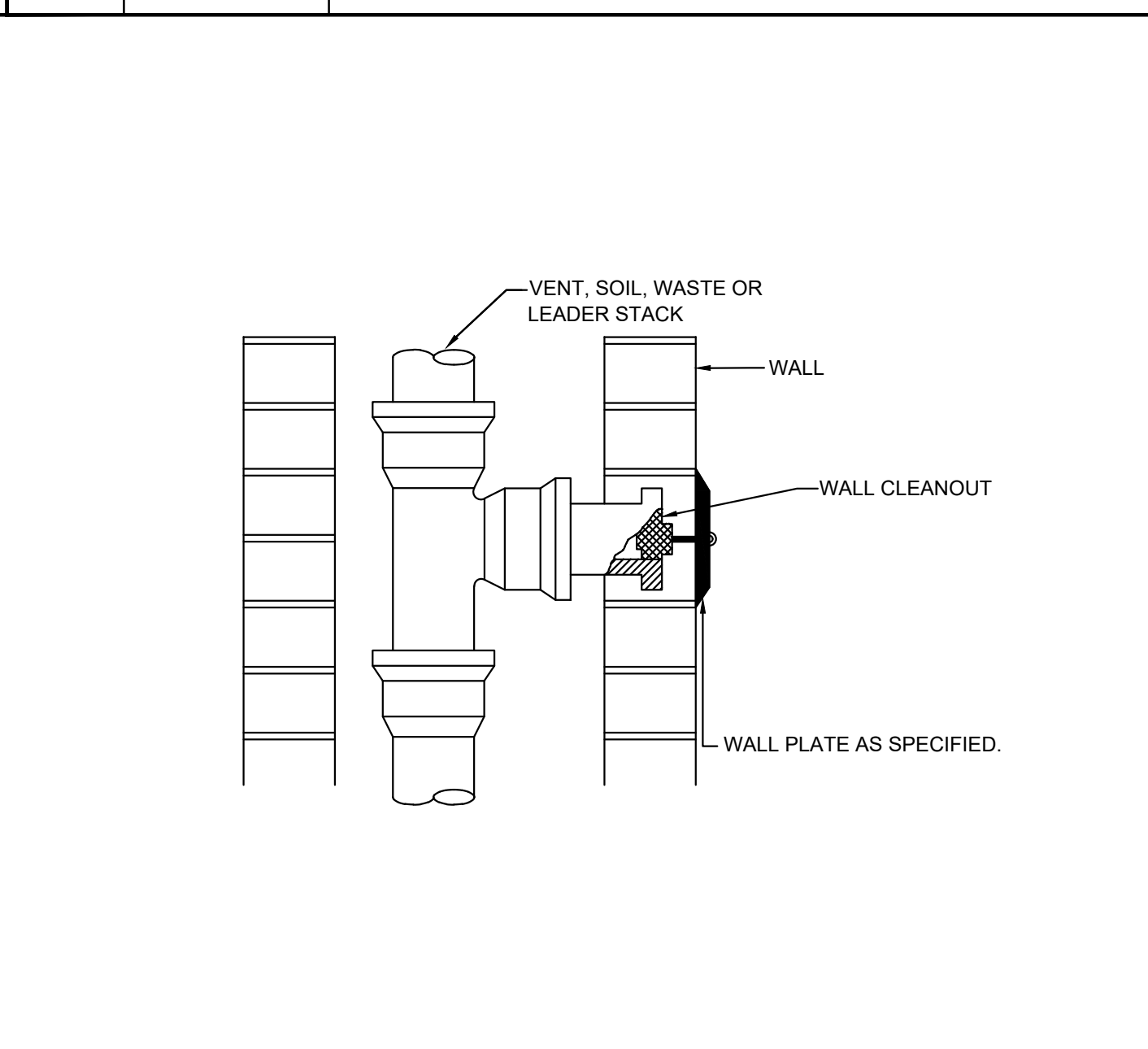
7 SCALE N.T.S. TYPICAL BACKFLOW PREVENTER DETAIL



8 SCALE N.T.S. PIPE INSULATION DETAIL



9 SCALE N.T.S. FLOOR CLEAN OUT DETAIL



10 SCALE N.T.S. WALL CLEAN OUT DETAIL

CONSULTANTS
NY ENGINEERS
 NEARBY ENGINEERS
 382 NE 191ST STREET SUITE 49674,
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 PH-914.257.3455
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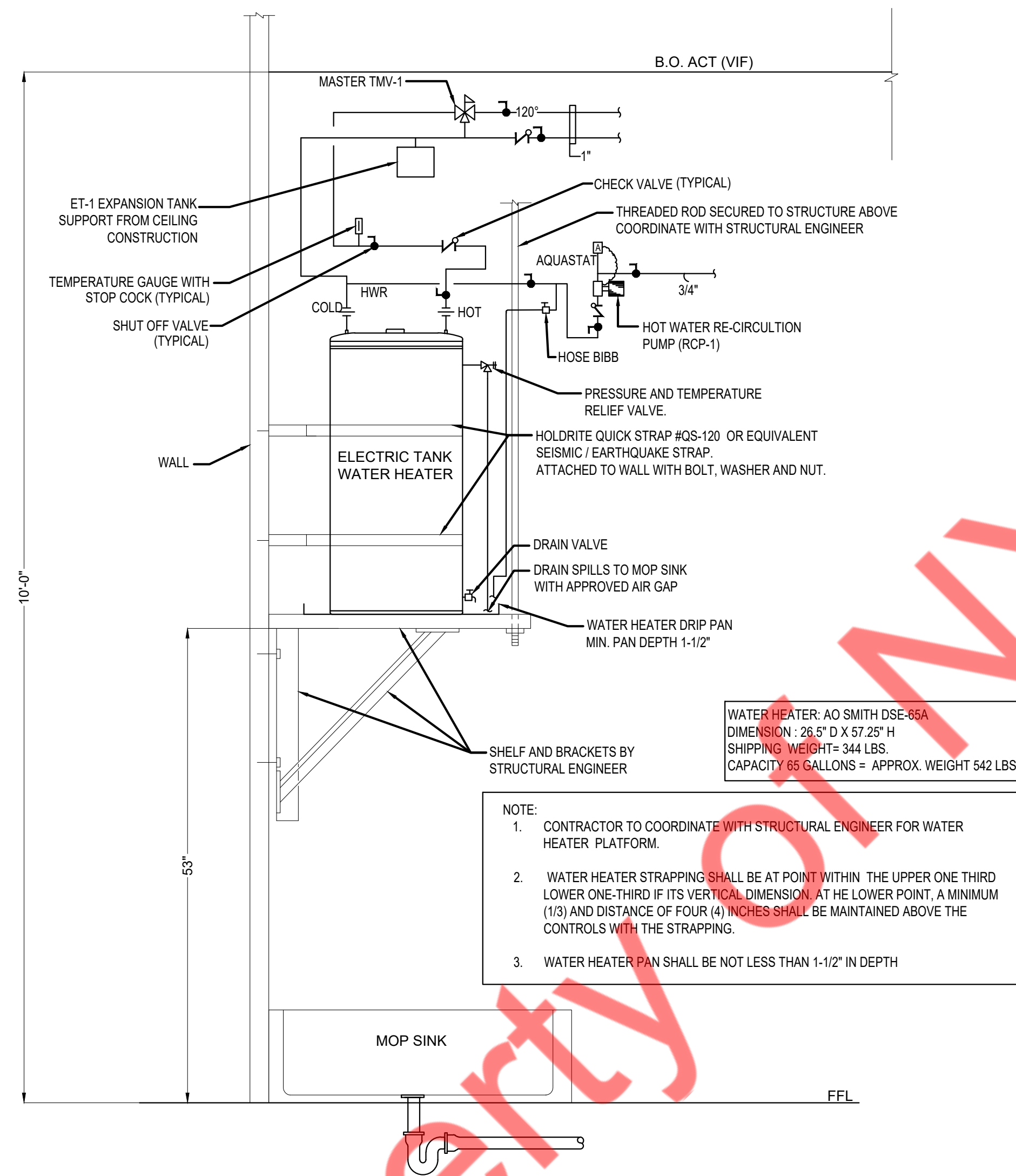
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 REVIEWED BY: NYE
 AREA: 3,134 SQ. FT.

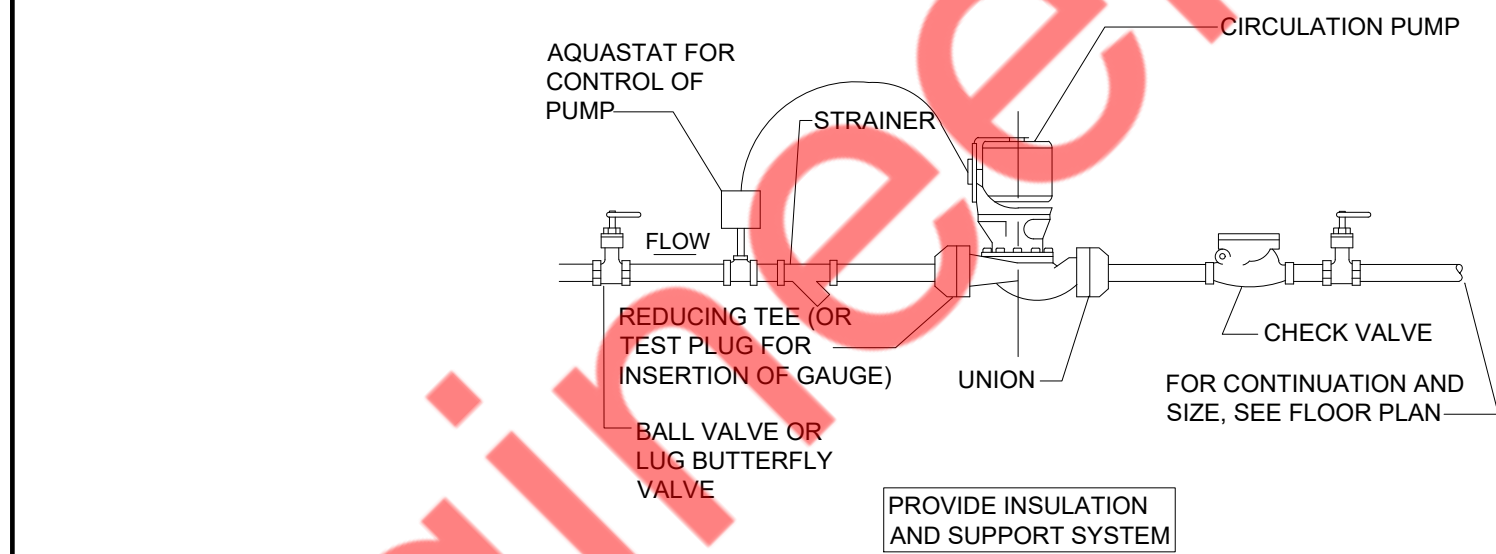
TITLE:
 PLUMBING DETAILS SHEET (01 OF 02)

SHEET NUMBER:

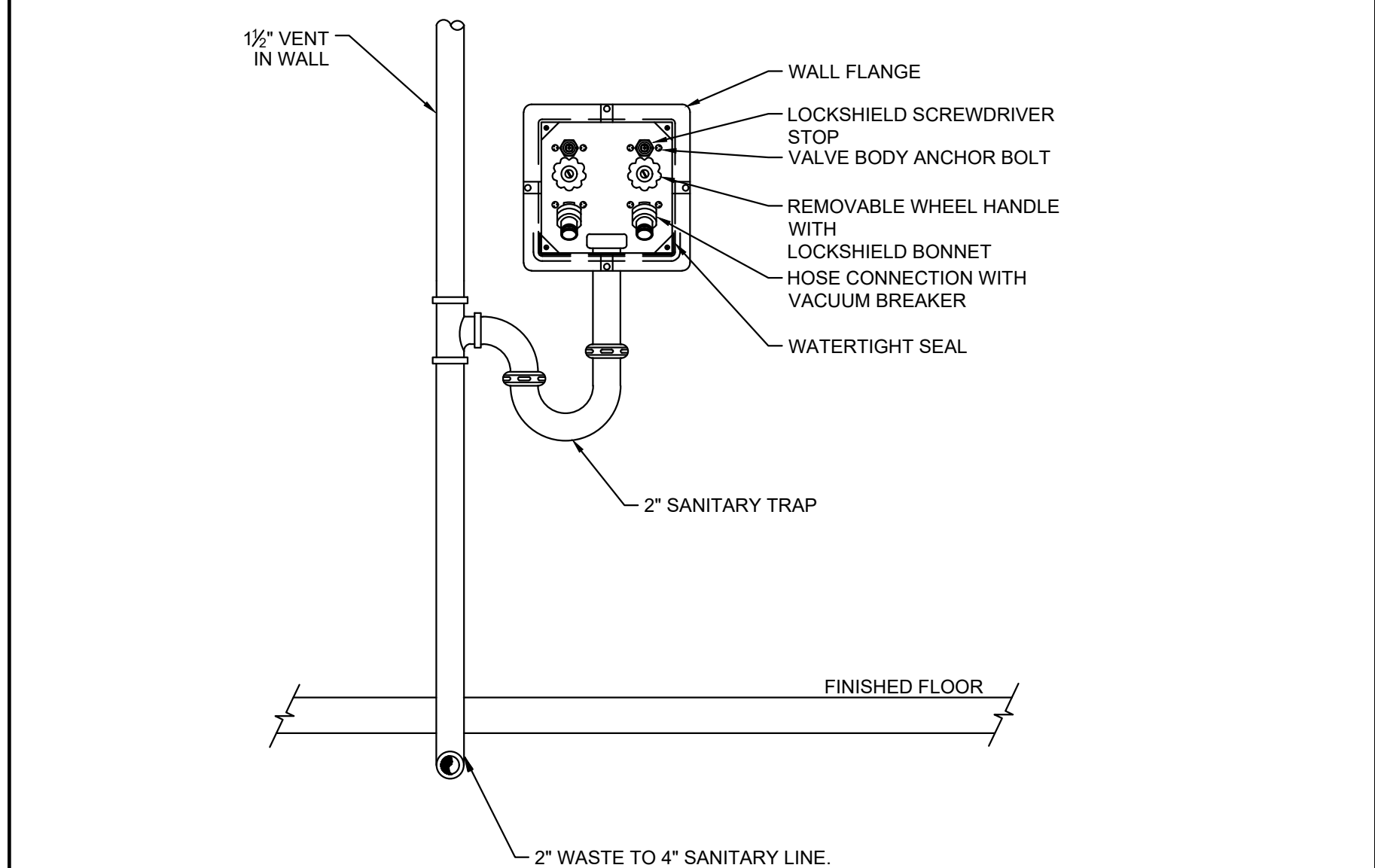
P-4.0



1	SCALE	ELECTRIC WATER HEATER DETAILS
	N.T.S.	



2	SCALE	INLINE RE-CIRCULATION PUMP DETAIL
	N.T.S.	



3	SCALE	TYPICAL WASHER BOX DETAIL
	N.T.S.	

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LOCATION:

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 REVIEWED BY: NYE
 AREA: 3,134 SQ. FT.

TITLE:
 PLUMBING DETAILS SHEET (02 OF 02)

SHEET NUMBER:

P-5.0

ELECTRICAL SYSTEM AND EQUIPMENT

METHOD OF COMPLIANCE
 PRESCRIPTIVE X PERFORMANCE _____ ENERGY COST BUDGET _____

PROVIDE A STANDARD RISER DIAGRAM WHICH INDICATES DESIGNATED POINTS FOR CHECK METERING.
 PROVIDE A STANDARD PANEL SCHEDULE DESCRIPTION WHICH IDENTIFIES DIFFERENT ENDUSE LOADS.

STANDARD RISER DIAGRAM IS ON SHEET - E-0.4
 STANDARD PANEL SCHEDULES ARE ON - E-0.4

LIGHTING SCHEDULE

LAMP TYPE REQUIRED IN FIXTURE	SEE LIGHTING FIXTURE SCHEDULE ON SHEET E-1.0
NUMBER OF LAMPS IN FIXTURE	SEE LIGHTING FIXTURE SCHEDULE ON SHEET E-1.0
BALLAST TYPE USED IN THE FIXTURE	SEE LIGHTING FIXTURE SCHEDULE ON SHEET E-1.0
NUMBER OF BALLASTS IN FIXTURE	SEE LIGHTING FIXTURE SCHEDULE ON SHEET E-1.0
TOTAL WATTAGE PER FIXTURE	SEE LIGHTING FIXTURE SCHEDULE ON SHEET E-1.0

TOTAL INTERIOR WATTAGE SPECIFIED VS. ALLOWED
 COMMERCIAL STORE (GYMNASIUM 3134 SQ. FT.): GROSS AREA OF 0.76 W/SQ. FT.
 PER **ASHRAE STANDARD 90.1-2019**

<u>ALLOWABLE</u>	<u>SPECIFIED</u>
SEE COMCHECK COMPLIANCE FORM ON SHEET E-0.1	

TOTAL EXTERIOR WATTAGE SPECIFIED VS. ALLOWED
 NOT APPLICABLE (TENANT FIT-UP)

EQUIPMENT SCHEDULES WITH MOTORS (NOT USED FOR MECHANICAL SYSTEMS)

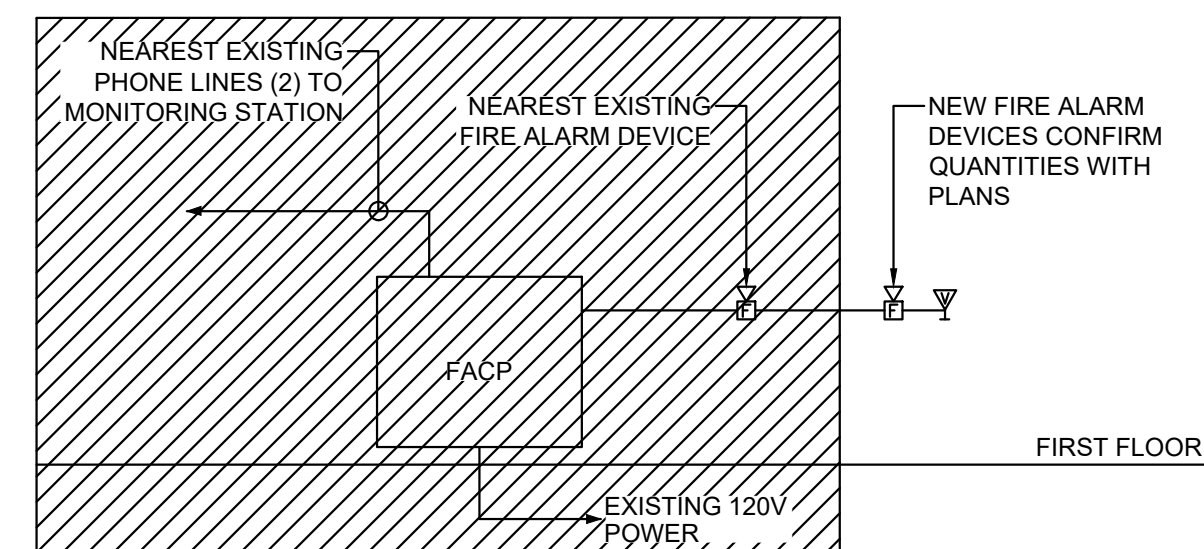
MOTOR HORSEPOWER	NONE
NUMBER OF PHASES	N/A
MINIMUM EFFICIENCY	N/A
MOTOR TYPE	N/A
# OF POLES	N/A

ELECTRICAL DESIGNER STATEMENT

I HEREBY CERTIFY THAT THE DESIGN OF THIS BUILDING COMPLIES WITH THE MECHANICAL SYSTEMS, SERVICE SYSTEMS AND EQUIPMENT REQUIREMENTS OF THE **ASHRAE STANDARD 90.1-2019**.

SIGNED _____ DATE 05/02/2025

NAME:
TITLE: PROJECT ENGINEER



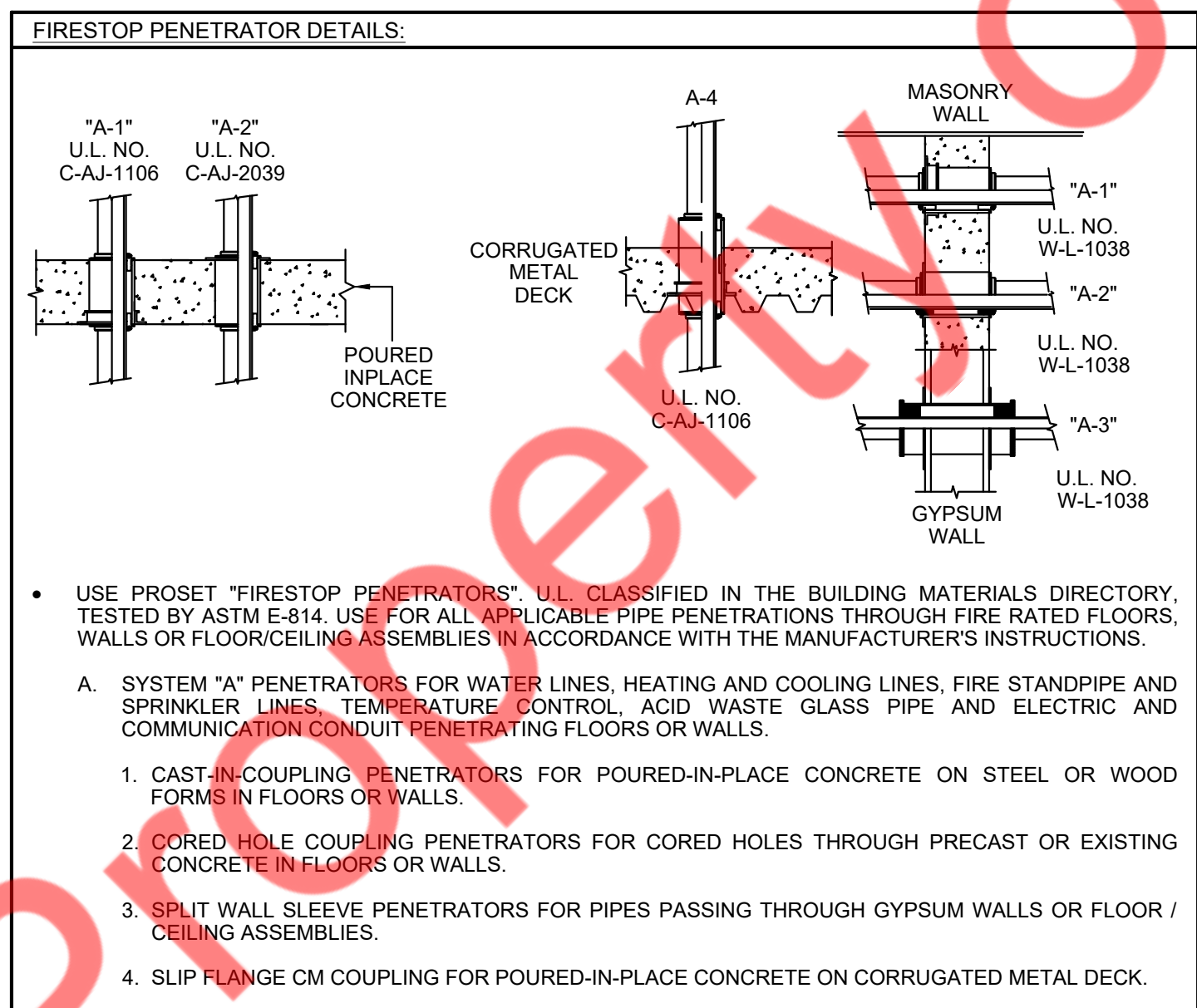
1 PARTIAL FIRE ALARM RISER
 Scale: N.T.S.

FIRE ALARM GENERAL NOTES:

- ALL WORK TO THE FIRE ALARM SYSTEM SHALL COMPLY WITH ALL LOCAL FIRE CODES, LAWS, REGULATIONS, ORDINANCES, AND THE REQUIREMENTS OF NEW JERSEY FIRE ALARM CODE 2019(NFPA 72, 2019) EDITION.
- ALL NEW FIRE ALARM DEVICES SHALL BE ADA APPROVED. COORDINATE COLOR WITH ARCHITECT AND BASE BUILDING. DEVICES TO MATCH BASE BUILDING SYSTEM MANUFACTURER. PROVIDE ANY ADDITIONAL POWER AMPLIFIERS REQUIRED FOR INSTALLATION OF NEW ADA APPROVED DEVICES.
- ALL FIRE ALARM DEVICES, INCLUDING SPEAKERS, VISUALS, SMOKE DETECTORS, ETC., SHALL BE CONNECTED TO THE BASE BUILDING FIRE ALARM SYSTEM BY A LICENSED FIRE ALARM CONTRACTOR. COORDINATE CONNECTIONS WITH SYSTEM MANUFACTURER.
- ALL DEVICES SHALL BE 110 CANDELA, UNLESS OTHERWISE NOTED.
- THE ENTIRE LENS OF WALL MOUNTED VISUAL FIRE ALARM DEVICES SHALL BE MOUNTED AT LEAST 80" AFF.
- COORDINATE FIRE ALARM SYSTEM SHUTDOWNS AND REPROGRAMMING WITH LANDLORD.
- ALL FIRE ALARM DEVICES SHALL BE WHITE UNLESS OTHERWISE NOTED OR REQUIRED.
- EVACUATION SIGNAL SHALL BE 3 PULSE TEMPORAL.
- THE FIRE ALARM SYSTEM APPLIANCE LAYOUT INDICATED ON SHEET E-3.0 INDICATES NEW DEVICE PLACEMENT REQUIREMENTS FOR THIS TENANT UPFIT. NEW DEVICES SHALL BE INSTALLED INTO THE BASE BUILDING FIRE ALARM SYSTEM. PROVIDE ALL PROGRAMMING REQUIRED TO MAKE THE NEW DEVICES FUNCTIONAL AND ANY PROGRAMMING OR NEW EQUIPMENT REQUIRED TO MAKE ALL OF THE VISIBLE NOTIFICATION APPLIANCES ON THE FLOOR FLASH IN SYNCHRONIZATION.

ELECTRICAL GENERAL NOTES:

- ALL WORK THIS DIVISION SHALL COMPLY WITH ALL LOCAL BUILDING CODES, LAWS, REGULATIONS, ORDINANCES, AND THE REQUIREMENTS OF THE 2021 NEW JERSEY UCC BUILDING SUBCODE ADOPTS WITH AMENDMENTS INTERNATIONAL BUILDING CODE 2021 (IBC 2021). ALL WORK SHALL COMPLY WITH BASE BUILDING SPECIFICATIONS. OBTAIN A COPY OF SPECIFICATIONS FROM BUILDING MANAGER IF NECESSARY.
- THE CONTRACTOR SHALL KEEP A RECORD OF THE CHANGES WHICH ARE IN CONFLICT WITH THESE DRAWINGS AND SPECIFICATIONS. AT THE COMPLETION OF HIS WORK HE SHALL SUBMIT "AS BUILT" PRINTS TO THE OWNER.
- DRAWINGS ARE GENERALLY DIAGRAMMATIC AND DO NOT NECESSARILY SHOW EVERY FITTING AND DETAIL. ALL WORK SHALL BE INSTALLED SO THAT JUNCTION BOXES AND COMPONENTS WILL BE ACCESSIBLE FOR SERVICE.
- ALL SYSTEMS, EQUIPMENT, COMPONENTS, WORK, ETC. PROVIDED UNDER THIS DIVISION SHALL BE COVERED BY A ONE YEAR GUARANTEE STARTING AT THE TIME OF FINAL ACCEPTANCE OF THE WORK BY THE OWNER. ANY DEFECTS IN THE WORK, SYSTEMS, EQUIPMENT, OR COMPONENTS FOUND DURING THIS YEAR SHALL BE CORRECTED AT NO CHARGE. THE GUARANTEE SHALL INCLUDE PROVIDING ALL NECESSARY CUTTING, PATCHWORK, REPAINTING, ETC. TO MAKE THE WORK COMPLETE AND NEW.
- ALL CONDUIT MUST BE CONCEALED IN THE WALLS OR ABOVE THE CEILING UNLESS OTHERWISE NOTED. MINIMUM CONDUIT SIZE IS 1/2".
- ALL CONDUCTORS SHALL BE COPPER WITH TYPE "THW" OR "THHN" INSULATION AND THE MINIMUM WIRE SIZE SHALL BE #12 A.W.G. WITH A 167 DEGREE TEMPERATURE RATING.
- ALL WORK MUST BE PERFORMED IN A NEAT AND WORKMANLIKE MANNER ACCORDING TO GENERALLY ACCEPTED PRINCIPALS OF FIRST CLASS WORKMANSHIP.
- FASTEN ALL RECESSED LIGHTING FIXTURES TO STRUCTURE OR GRID PER N.E.C. 410.36.
- RECESSED INCANDESCENT FIXTURES SHALL BE SUPPORTED IN COMPLIANCE WITH N.E.C. 410.36.
- ALL PENETRATIONS THRU RATED WALLS, FLOORS AND CEILINGS SHALL BE FIRE STOPPED PER N.E.C. 300.21.
- PROVIDE ALL GROUNDING AS REQUIRED BY N.E.C.
- DEVICE MOUNTING HEIGHTS ARE TO BE MEASURED TO THE DEVICE CENTERLINE.
- ALL SWITCHES FOR FANS, LIGHTS, ETC. WHICH ARE SHOWN TO BE MOUNTED IN THE SAME GENERAL AREA SHALL SHARE A MULTI-GANG COVER PLATE AS REQUIRED.
- ALL CONDUIT SHALL BE 1/2" EMT WITH 2#12, 1#12G AWG CONDUCTORS UNLESS OTHERWISE NOTED.
- PROVIDE #12AWG GND. FOR ALL MECHANICAL EQUIPMENT UNLESS SHOWN OTHERWISE. ALL EQUIPMENT SHALL BE GROUNDED AT THE PANEL WHICH FEEDS THE EQUIPMENT.
- COORDINATE RECEPTACLE NEMA TYPE AND VOLTAGE WITH COPIERS AND EQUIPMENT.
- PROVIDE A NEW DIRECTORY FOR ALL PANELS. CORRECTLY LABEL ALL CIRCUITS, SPARES AND SPACES IN ACCORDANCE WITH N.E.C. 408.4(A).
- PROVIDE A SEPARATE GREEN, INSULATED, #12AWG EQUIPMENT GROUNDING CONDUCTOR ROUTED WITH THE BRANCH CIRCUIT HOMERUN CONDUCTORS.
- WHERE WORK BY THE GENERAL CONTRACTOR (WALL REMOVAL, NEW OR RELOCATED WALL OPENING, ETC.) RESULTS IN THE REMOVAL, RELOCATION OF REFEEDING OF ELECTRICAL DEVICES OR LIGHTING FIXTURES, THE ELEC. CONTRACTOR SHALL DISCONNECT OR RECONNECT AS REQUIRED ALL ACTIVE DEVICES REMAINING ON THAT CIRCUIT SYSTEM.
- DEVICE BOXES IN RATED WALLS SHALL MEET STANDARD BUILDING CODE SECTION 706.4.
- ALL ELECTRICAL MATERIALS, DEVICES, APPLIANCES, AND EQUIPMENT SHALL BE LABEL LISTED BY A APPROVED THIRD PARTY TESTING AGENCY.
- DEDICATED RECEPTACLES TO RECEIVE VISUAL DESIGNATION.
- OUTLET BOX SHALL NOT BE MOUNTED BACK TO BACK.
- BLANK FACEPLATES ARE NOT ALLOWED, U.N.O. ANY EXISTING OUTLET OR TELE/DATA LOCATION NOT USED OR SHOWN WITHIN THE SCOPE OF WORK IN THESE PLANS SHOULD BE REMOVED, PATCHED, AND REPAIRED.
- MULTIWIRE BRANCH CIRCUITS SHALL BE PROVIDED WITH A MEANS THAT WILL SIMULTANEOUSLY DISCONNECT ALL UNGROUNDED CONDUCTORS PER N.E.C. 210.4(B).
- MULTIWIRE BRANCH CIRCUITS SUPPLYING POWER TO PERMANENTLY CONNECTED FREESTANDING PARTITIONS SHALL BE PROVIDED WITH A MEANS TO DISCONNECT SIMULTANEOUSLY ALL UNGROUNDED CONDUCTORS AT THE PANEL BOARD WHERE THE BRANCH CIRCUIT ORIGINATES PER N.E.C. 605.8.
- ARC-FLASH HAZARD WARNING SHALL BE PROVIDED ON ALL EQUIPMENT IN AFFECTED ELECTRICAL ROOMS PER N.E.C. 110.16.
- PROVIDE PLASTIC NAMEPLATE ON ALL PANELS (NEW AND EXISTING) INDICATING PANEL NAME AND SOURCE PER N.E.C. 408.4(B).
- ALL WIRING TERMINATIONS ARE ASSUMED TO BE 75DEG C RATED, UNLESS NOTED OTHERWISE. ALL WIRING UNDER 100A IS BASED ON A 60DEG C TERMINATION.



ELECTRICAL SYMBOL LEGEND

SYMBOL	DESCRIPTION	ON CENTER MTG. HT.
	CONCEALED CONDUIT IN CEILING OR WALL	
	CONCEALED CONDUIT IN FLOOR OR UNDERGROUND	
	CIRCUIT HOMERUN TO PANEL; EACH ARROWHEAD 1 CIRCUIT	
	NO. OF CONDUCTORS IN CONDUIT; EACH CROSSHATCH = 1 WIRE	
	FLEXIBLE CONDUIT OR S.O. CORD	
	EXPOSED CONDUIT	
	CONDUIT STUBBED UP OR TURNED DOWN	
	PLYWOOD BACKBOARD	
	SURFACE MOUNTED RACEWAY	
	MULTI OUTLET SURFACE MOUNTED RACEWAY	
	WALL MOUNTED SINGLE RECEPTACLE OUTLET	18"
	WALL MOUNTED DUPLEX RECEPTACLE OUTLET	18"
	WALL MOUNTED DUPLEX RECEPTACLE OUTLET ABOVE COUNTER	AS REQUIRED
	WALL MOUNTED G.F.C.I. DUPLEX RECEPTACLE OUTLET	18"
	WALL MOUNTED G.F.C.I. DUPLEX RECEPTACLE OUTLET - ABOVE COUNTER	AS REQUIRED
	WALL MOUNTED ISOLATED GROUND DUPLEX RECEPTACLE OUTLET	18"
	WALL MOUNTED DOUBLE DUPLEX RECEPTACLE OUTLET	18"
	WALL MOUNTED SPECIAL PURPOSE RECEPTACLE, (SEE EQUIPMENT SCHEDULE OR NOTES)	18"
	WALL MOUNTED 125 / 250V NEMA RECEPTACLE (SEE EQUIPMENT SCHEDULE OR NOTES)	AS REQUIRED
	FLOOR MOUNTED QUAD RECEPTACLE	
	CEILING FLOOR MOUNTED DUPLEX RECEPTACLE	
	JUNCTION BOX	
	WALL MOUNTED COMBINATION DATA/VOICE OUTLET, PROVIDE JUNCTION BOX WITH 3/4" CONDUIT TO ABOVE CEILING.	18"
	FLOOR MOUNTED COMBINATION DATA/VOICE OUTLET, PROVIDE JUNCTION BOX WITH 3/4" CONDUIT TO ABOVE CEILING.	
	WALL MOUNTED VOICE OUTLET, PROVIDE JUNCTION BOX WITH 3/4" CONDUIT TO ABOVE CEILING.	18"
	WALL MOUNTED DATA OUTLET, PROVIDE JUNCTION BOX WITH 3/4" CONDUIT TO ABOVE CEILING.	
	CEILING MOUNTED DATA OUTLET, PROVIDE JUNCTION BOX WITH 3/4" CONDUIT TO ABOVE CEILING.	
	WIRELESS ACCESS POINT, CEILING MOUNTED (BY OTHERS)	
	SPEAKER LOCATION (BY OTHERS)	
	FIRE ALARM ADA APPROVED VISUAL ALARM - WALL MOUNTED.	80" AFF
	FIRE ALARM ADA APPROVED VISUAL ALARM - CEILING MOUNTED	
	FIRE ALARM ADA APPROVED AUDIO/VISUAL ALARM - WALL MOUNTED	80" AFF
	FIRE ALARM ADA APPROVED AUDIO/VISUAL ALARM - CEILING MOUNTED	
	FIRE ALARM PULL STATION	48" AFF
	SMOKE DETECTOR - CEILING MOUNTED	
	DUCT MOUNTED SMOKE DETECTOR	
	277/480 VOLT OR 120/208 VOLT PANELBOARD AS NOTED ON PLAN DRAWINGS	
	RECESSED MOUNTED 120/208 VOLT PANELBOARD	
	TRANSFORMER	
	LIGHT FIXTURE (REFER LIGHTING FIXTURE SCHEDULE ON LIGHTING PLAN)	
	EXIT SIGN - CEILING, WALL, MT.	
	LIGHT FIXTURE ON EMERGENCY CIRCUIT	
	WALL MOUNTED S.P.S.T. TOGGLE SWITCH	42"
	WALL MOUNTED 3-WAY TOGGLE SWITCH	42"
	WALL MOUNTED 4-WAY TOGGLE SWITCH	42"
	WALL MOUNTED DIMMER SWITCH (WATTAGE AS REQUIRED)	42"
	WALL MOUNTED TIMER SWITCH	42"
	WALL MOUNTED MANUAL OVERRIDE SWITCH (TO OVERRIDE CIRCUIT DESIGNATED AT LIGHTING CONTACTOR PANEL)	42"
	WALL MOUNTED OCCUPANCY SENSOR, PASSIVE IR MOUNT AT 48" AFF.	48"
	CEILING MOUNTED OCCUPANCY SENSOR	
	TIME CLOCK	
	LIGHTING CONTACTORS	
	MOTOR RATED TOGGLE SWITCH	AS REQUIRED
	COMBINATION MOTOR STARTER/DISCONNECT SWITCH	
	DISCONNECT SWITCH (FRAME/POLES/FUSE-IF REQUIRED)	
	MOTOR LOAD	

ELECTRICAL ABBREVIATIONS:

F.B.O.	FURNISHED BY OTHERS
AFF/AFG	ABOVE FINISHED FLOOR/ABOVE FINISHED GRADE
BC	BELOW CEILING
AC	ABOVE COUNTER
WP	WEATHER PROOF
E. EX/RE/N	EXISTING/RELOCATED/NEW
GFCI	GROUND FAULT INTERRUPTING CIRCUIT
E.C.	EMPTY CONDUIT (PROVIDE PULLSTRING IN ALL EMPTY CONDUIT)
FPMR	FUSE PER MANUFACTURER'S RECOMMENDATION
IG	ISOLATED GROUND
SW	SHOW WINDOW

NOTES:

- COORDINATE LOCATION AND SPECIFIC MOUNTING HEIGHT WITH ARCHITECT.
- MOUNTING HEIGHTS SHALL BE AS INDICATED IN THE LEGEND UNLESS OTHERWISE NOTED ON THE PLANS

PRE-CONSTRUCTION DEMOLITION NOTES:

- REFER TO THE ARCHITECTURAL DEMOLITION PLANS FOR SCOPE RELATED TO THE LAYOUT OF WALLS, CEILINGS, ETC... TO BE REMOVED.
- COORDINATE ALL POWER SHUT-DOWNS AND FIRE ALARM SYSTEM MODIFICATIONS, WHERE APPLICABLE, WITH THE ONSITE FACILITIES MANAGEMENT TEAM.
- REMOVE ALL EXISTING DEVICES (RECEPTACLES, DATA OUTLETS, FIRE ALARM DEVICES, SWITCHES, EMPTY JUNCTION BOXES, ETC...) ASSOCIATED WITH ANY WALLS OR OTHER PARTITIONS IDENTIFIED TO BE REMOVED. REMOVE ALL ASSOCIATED CONDUIT AND WIRING BACK TO ITS SOURCE. RE-LABEL ALL NEW SPARE BREAKERS AS "SPARE IN THE APPROPRIATE PANEL SCHEDULES.
- REMOVE ALL EXISTING DEVICES (RECEPTACLES, DATA OUTLETS, FIRE ALARM DEVICES, SWITCHES, EMPTY JUNCTION BOXES, ETC...) ON EXISTING TO REMAIN WALLS, BOTH INTERIOR AND PERIMETER, UNLESS SPECIFICALLY SHOWN AS EXISTING TO REMAIN ON SHEETS ELSEWHERE IN THIS SET. REMOVE ALL ASSOCIATED CONDUIT AND WIRING BACK TO ITS SOURCE. RE-LABEL ALL NEW SPARE BREAKERS AS "SPARE" IN THE APPROPRIATE PANEL SCHEDULES.
- NO BLANK COVERPLATES SHALL BE ALLOWED. REFER TO ARCHITECTURAL SET FOR DETAILS CONCERNING PATCHING OF EXISTING OPENINGS BASED ON THE PARTITION TYPE IT CURRENTLY RESIDES.
- REMOVE ALL EXISTING LIGHT FIXTURES AND EXIT SIGNS FROM THE SCOPE OF WORK AREA UNLESS SPECIFICALLY IDENTIFIED AS "EXISTING TO REMAIN" (E) OR "EXISTING TO BE RELOCATED" (R). REMOVE ALL ASSOCIATED CONDUIT AND WIRING BACK TO ITS SOURCE. RE-LABEL ALL NEWLY SPARED BREAKERS AS "SPARE" IN THE APPROPRIATE PANEL SCHEDULES.
- FOR ANY MECHANICAL EQUIPMENT BEING REMOVED, REMOVE ALL WIRING, CONDUIT, AND ASSOCIATED DISCONNECTS BACK TO ITS SOURCE. COORDINATE EXACT UNITS BEING REMOVED WITH DIVISION 22 & 23. RE-LABEL ALL NEW SPARE BREAKERS AS "SPARE IN THE APPROPRIATE PANEL SCHEDULES.
- REFER TO THE FIRE ALARM FLOOR PLANS FOR EXACT FIRE ALARMS DEVICES TO EITHER BE REMOVED, RELOCATED, OR LEFT IN PLACE.
- REMOVE ALL ABANDONED EMPTY CONDUIT AND JUNCTION BOXES FROM THE CEILING SPACE.
- ANY EXISTING FLOOR BOX, ABANDONED CONDUIT PENETRATION, ETC... THROUGH THE SLAB WITHIN THE SCOPE OF WORK AREA NOT SPECIFICALLY IDENTIFIED TO REMAIN SHALL BE REMOVED AND THE FLOOR PATCHED TO A LIKE NEW CONDITION.
- COORDINATE WITH THE TENANT AND/OR LANDLORD EXACTLY WHICH DEVICES AND EQUIPMENT ARE REQUIRED TO BE TURNED OVER TO THE OWNER ONCE REMOVED.
- PROVIDE ADEQUATE PROTECTION OF ANY EXISTING TO REMAIN DEVICE OR FIXTURE SUCH THAT IT IS NOT DAMAGED DURING THE CONSTRUCTION PROCESS.

COMcheck Software Version COMcheckWeb

Interior Lighting Compliance Certificate

Project Information

Energy Code: 90.1 (2019) Standard
 Project Title: Strong Pilates_Garwood,NJ
 Project Type: Alteration

Construction Site: _____ Owner/Agent: _____ Designer/Contractor: _____

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts
1-Gymnasium	3134	0.76	2382
		Total Allowed Watts =	2382

Proposed Interior Lighting Power

Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	A Lamps / Fixture	B # of Fixture	C Watt. (C X D)	D
Gymnasium (3134 sq.ft.)				
LED: L01: CEILING MOUNTED DOWNLIGHT: Other:	1	22	6	143
LED: L04A: PENDANT LIGHT: Other:	1	2	80	160
Track Lighting: L07: TRACK LIGHTING: Wattage based on total luminaires	0	0	1925	1925
LED: L05: LED BACK-LIT PANEL: Other:	1	6	18	108
LED: L08: EXHAUST FAN LIGHT COMBO: Other:	1	1	18	18
		Total Proposed Watts =	2354	

Interior Lighting PASSES

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting alteration project represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 90.1 (2019) Standard requirements in COMcheck Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

MICHAEL TOBIAS
 Name - Title _____ Signature _____ Date 05/02/25

Project Title: Strong Pilates_Garwood,NJ Report date: 05/02/25

CONSULTANTS

NY ENGINEERS

NEARBY ENGINEERS
 382 NE 191ST STREET SUITE 4967.4
 MIAMI, FL 33179
 PH-914.257.3455
 WWW.NY-ENGINEERS.COM

ARCHITECT/ENGINEER SEAL:

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF NEW JERSEY. LICENSE NO. 24626489100. EXPIRATION DATE: 04/30/2026

CONTRACTOR'S NOTES:

WRITTEN DIMENSIONS HOLD PREFERENCE OVER SCALED DIMENSIONS. DO NOT SCALE THE DRAWINGS. THE CONTRACTORS MUST VISIT JOB SITE TO VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE SUBMITTING BIDS. REPORT ANY DISCREPANCIES OF ANY CONDITIONS WHICH MAY INTERFERE WITH THE PROPER EXECUTION OF THE CONTRACT TO THE TENANT'S REPRESENTATIVE. REPORT DISCREPANCIES DURING BIDDING PROCESS AND BEFORE START OF CONSTRUCTION. CHANGE ORDERS NEED TO BE APPROVED BY STRONG PILATES CONSTRUCTION MANAGER FOR ISSUES ARISING FROM THE FIELD CONDITIONS OR CONFLICTS BETWEEN THE PLANS AND THE EXISTING CONDITIONS PRIOR TO THE COMMENCEMENT OF WORK.

DATE	ISSUE
02.27.25	CLIENT/LL REVIEW SET
03.11.25	CLIENT COMMENTS
03.14.25	PERMIT SUBMISSION
04.21.25	CLIENT COMMENTS
05.06.25	CLIENT COMMENTS
05/06/25	CLIENT COMMENTS
04/21/25	CLIENT COMMENTS
03/11/25	CLIENT COMMENTS
DATE	REVISION



LOCATION: _____

PROJECT INFORMATION:

PROJECT NUMBER: 12366-25
 DRAWN BY: NYE
 REVIEWED BY: NYE
 AREA: 3,134 SQ. FT.

TITLE:

ELECTRICAL SYMBOL LIST, ABBREVIATIONS & GENERAL NOTES

SHEET NUMBER:

E-0.1

ELECTRICAL GENERAL

1.0 GENERAL

1.01 SCOPE

A. DIVISION 26 INCLUDES ALL SPECIFICATIONS IN THE 26000 SERIES AND THE ACCOMPANYING ELECTRICAL DRAWINGS. PROVIDE ALL LABOR, MATERIALS AND EQUIPMENT AND ALL NECESSARY OPERATIONS TO PROVIDE THE COMPLETE SCOPE OF THE ELECTRICAL SYSTEMS INTENDED UNDER THIS DIVISION. DIVISION 26 IS NOT A STAND-ALONE DOCUMENT, BUT A PART OF THE COMPLETE PROJECT DOCUMENTS.

B. ATTENTION IS CALLED TO THE FACT THAT THERE ARE MANY INTERFACES BETWEEN THE WORK REQUIRED IN THIS DIVISION AND THE WORK REQUIRED IN OTHER DIVISIONS. PROVIDE THE NECESSARY INTERFACES AND COORDINATION WITH OTHER DIVISIONS TO PROVIDE A COMPLETE PROJECT.

1.02 EXISTING CONDITIONS

A. ATTENTION IS CALLED TO THE FACT THAT THE WORK IS TO BE PERFORMED WITHIN AN EXISTING, OPERATIONAL FACILITY. PRIOR TO THE SUBMISSION OF BIDS, EACH BIDDER SHALL VISIT THE PROJECT SITE, THOROUGHLY INVESTIGATE AND BE FAMILIAR WITH ALL EXISTING CONDITIONS, WHICH WILL AFFECT THEIR WORK, ESPECIALLY THE WORK TO BE PERFORMED ABOVE THE EXISTING CEILINGS.

B. WHEN THIS PROJECT IS FINISHED, THE WORK UNDER THIS DIVISION SHALL BE COMPLETE IN EVERY RESPECT, COMPLETELY INTEGRATED WITH ALL THE EXISTING SYSTEMS, AND LEFT IN PERFECT OPERATING CONDITION. THE ELECTRICAL SERVICE TO THE BUILDING SHALL NOT BE INTERRUPTED AT ANY TIME WITHOUT WRITTEN COORDINATION OF THE BUILDING'S OWNER. ALL EXISTING ELECTRICAL EQUIPMENT REMOVED DURING THE PROJECT SHALL BE REMOVED FROM THE SITE AFTER INSPECTION OF THE BUILDING'S OWNER. ALL EXISTING ELECTRICAL SYSTEMS REQUIRED TO BE OPERATING AT THE PROJECT'S COMPLETION OR REQUIRED TO REMAIN IN USE DURING THE PROJECT SHALL BE RELOCATED, REPAIRED, REROUTED OR OTHERWISE MADE TO FIT WITH PROPER WORKMANSHIP TECHNIQUES AND LEFT IN SAFE WORKING ORDER.

C. CONNECT NEW WORK TO EXISTING WORK IN A NEAT AND WORKMANLIKE MANNER. WHERE AN EXISTING STRUCTURE MUST BE CUT OR EXISTING UTILITIES INTERFERE, SUCH OBSTRUCTIONS SHALL BE BYPASSED, REMOVED, REPLACED OR RELOCATED, REPAIRED, REROUTED OR OTHERWISE DAMAGED SHALL BE REPLACED OR REPAIRED TO ITS PRIOR CONDITION.

D. PRIOR TO THE START OF ANY DEMOLITION OR CONSTRUCTION, SECURE THE SERVICES OF A QUALIFIED, EPA CERTIFIED ASBESTOS ABATEMENT AGENCY TO CHECK THE EXISTING INSULATION, ETC. FOR ASBESTOS. SHOULD ASBESTOS BE FOUND, DO NOT PROCEED WITH DEMOLITION OR CONSTRUCTION; NOTIFY THE ARCHITECT IN ANY CASE IN WRITING OF THE AGENCY'S FINDINGS.

1.03 CODES AND REGULATIONS

A. ALL WORK UNDER THIS DIVISION SHALL COMPLY WITH ALL LOCAL BUILDING CODES, LAWS, REGULATIONS, ORDINANCES AND THE REQUIREMENTS OF THE 2021 NEW JERSEY UCC BUILDING SUBCODE ADOPTS WITH AMENDMENTS INTERNATIONAL BUILDING CODE 2021 (IBC 2021).

B. WHERE CONFLICTS OF INSTALLATION REQUIREMENTS OCCUR BETWEEN THE AFORESAID CODES, REGULATIONS OR THE CONTRACT DOCUMENTS, THE MOST RESTRICTIVE SHALL GOVERN.

C. OBTAIN ALL PERMITS AND LICENSES AND PAY ALL FEES REQUIRED BY LOCAL AUTHORITIES. ARRANGE FOR ALL NECESSARY INSPECTIONS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION AND PROVIDE WRITTEN CERTIFICATES OF APPROVAL TO THE PROJECT OWNER OR HIS DESIGNATED REPRESENTATIVE.

1.04 DEFINITIONS

A. CONTRACT DOCUMENTS: THE COMPLETE SET OF PROJECT DRAWINGS AND SPECIFICATIONS.

B. PROVIDE: FURNISH, INSTALL AND CONNECT.

C. WORK: ALL MATERIALS INSTALLED, INCLUDING ALL LABOR TO PROVIDE COMPLETE SYSTEM.

D. WIRING OR WIRED: ALL WIRE OR CABLE INSTALLED IN CONDUIT FROM PANELBOARD TO EQUIPMENT AND CONNECTED AT BOTH ENDS WITH ALL REQUIRED BOXES, CONNECTORS, COUPLINGS, ETC.

E. CONDUIT: RIGID STEEL CONDUIT INTERMEDIATE METAL CONDUIT (I.M.C.), ELECTRICAL METALLIC TUBING (EMT) PLASTIC CONDUIT (PVC), ELECTRICAL NON-METAL TUBING (ENT), OR FLEXIBLE STEEL CONDUIT.

1.05 DRAWINGS AND SPECIFICATIONS

A. THE DRAWINGS AND SPECIFICATIONS TOGETHER ARE TO BE CONSIDERED AS THE CONTRACT DOCUMENTS. ANY WORK SHOWN IN ONE AND NOT SHOWN IN THE OTHER, OR IMPLIED BY EITHER, SHALL BE PROVIDED TO GIVE A COMPLETE PROJECT.

B. SHOULD ANY CONFLICTS EXIST BETWEEN THE DRAWINGS AND SPECIFICATIONS OR THERE IS AN ITEM SHOWN/CALLED FOR WHICH IS NOT CLEARLY DEFINED, IMMEDIATELY SUBMIT A REQUEST FOR CLARIFICATION. NO ADDITIONAL MONIES WILL BE GRANTED LATER WHEN A CONFLICT IS RESOLVED OR AN ITEM IS MORE CLEARLY DEFINED.

C. THE DRAWINGS ARE SCHEMATIC AND ARE NOT INTENDED TO SHOW THE EXACT LOCATION OUTLETS, ETC. OR THE ROUTING OF CONDUIT.

D. THE EXACT LOCATION OF EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS (MECHANICAL EQUIPMENT, ELEVATORS, LIGHTS, ETC.) SHALL BE AS LOCATED BY OTHER DIVISIONS OF THE CONTRACT DOCUMENTS. REFER TO THE ARCHITECTURAL, STRUCTURAL AND MECHANICAL DOCUMENTS FOR DIMENSIONS AND DETAIL. BUILDING AND PROVIDE WORK DESCRIBED IN THIS DIVISION SO THAT IT CONFORMS TO THE DETAILS OF THE PROJECT. THE RIGHT IS RESERVED TO RELOCATE ANY RECEPTACLE, SWITCH OR OUTLET AT A MAXIMUM OF 10'-0" BEFORE IT IS PERMANENTLY INSTALLED WITHOUT INCURRING ADDITIONS TO THE CONTRACT AMOUNT.

1.06 SITE VISIT

A. VISIT THE SITE AND BECOME FAMILIAR WITH ALL ASPECTS OF THE SITE AND EXISTING CONDITIONS BEFORE SUBMITTING CONTRACT PRICE.

B. NO ALLOWANCE WILL BE MADE FOR LACK OF KNOWLEDGE OF EXISTING CONDITIONS.

1.07 DEVIATIONS

A. NO DEVIATIONS FROM THE CONTRACT DOCUMENTS SHALL BE MADE WITHOUT THE FULL KNOWLEDGE AND WRITTEN CONSENT OF THE ARCHITECT.

B. IF THE EXISTING CONDITIONS MAKE IT DESIRABLE TO MODIFY THE CONTRACT DOCUMENTS IN REGARD TO ANY ITEM, PROVIDE A WRITTEN REQUEST TO THE ARCHITECT.

2.0 PRODUCTS

2.01 STANDARDS FOR MATERIALS AND WORKMANSHIP

A. ALL MATERIALS USED SHALL BE NEW AND SHALL BE STAMPED WITH THE LABEL OF UNDERWRITERS LABORATORIES, INC. (UL).

B. ALL MATERIALS SHALL MEET THE STANDARDS OF THE FOLLOWING ASSOCIATIONS AND INSTITUTES WHERE APPLICABLE:

- 1. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
2. AMERICAN SOCIETY OF TESTING MATERIALS (ASTM)
3. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
4. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
5. INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)

C. MANUFACTURERS NAMES AND CATALOG NUMBERS SPECIFIED HEREIN ARE INTENDED TO DESCRIBE THE MATERIAL AND SET THE STANDARD OF QUALITY. ALL BIDS SHALL BE BASED ON MATERIAL SPECIFIED. REQUESTS FOR APPROVAL OF MATERIAL NOT SPECIFIED SHALL BE CONSIDERED IF THE REQUEST IS IN WRITTEN FORM AND SUBMITTED TO THE ARCHITECT NO LATER THAN FOURTEEN (14) DAYS BEFORE BID DATE. ALL REQUESTS SHALL CONFORM WITH THE PROVISIONS OF THE GENERAL AND SUPPLEMENTARY CONDITIONS.

D. SAMPLES OF MATERIALS REQUESTED TO BE SUBSTITUTED SHALL BE FURNISHED UPON THE REQUEST OF THE ARCHITECT.

2.02 SHOP DRAWINGS AND SUBMITTAL

A. THE ENGINEER'S REVIEW OF SHOP DRAWINGS OR SUBMITTALS IS A CURSORY

REVIEW TO CHECK FOR GENERAL COMPLIANCES OF SUBMITTALS WITH THE DESIGN INTENT OF THE CONTRACT DOCUMENTS. THE ENGINEER'S REVIEW DOES NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY OF COMPLYING WITH THE CONTRACT DOCUMENTS. THE CORRECTION OF THE WORK TO STRICT COMPLIANCE WITH THE CONTRACT DOCUMENTS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

B. THE FOLLOWING ITEMS SHALL BE SUBMITTED FOR REVIEW:

- 1. CONDUIT AND WIRE
2. DEVIATORS
3. COVERPLATES
4. METERING EQUIPMENT
5. PANELBOARDS
6. TRANSFORMERS
7. FUSES
8. OVERCURRENT DEVICES
9. DISCONNECT SWITCHES
10. LIGHTING FIXTURES
11. LIGHTING CONTROL SYSTEM
12. WIRING SYSTEM
13. FIRE ALARM SYSTEM
14. EMERGENCY SYSTEM
15. MOTOR STARTERS
16. SURGE SUPPRESSION DEVICES

C. ALL SHOP DRAWINGS AND SUBMITTALS SHALL BE SUBMITTED IN COMPLIANCE WITH THE REQUIREMENTS OF THE GENERAL AND SUPPLEMENTARY CONDITIONS. ALL SUBMITTALS ARE TO BE RECEIVED ELECTRONICALLY IN .PDF FORMAT ONLY.

D. ALL SUBMITTALS SHALL BEAR THE NAME OF THE MANUFACTURER TO BE USED, ALONG WITH ALL ASSOCIATED OPTIONS AND SPECIFIC INPUT/OUTPUT REQUIREMENTS CLEARLY MARKED.

E. ALL SHOP DRAWINGS AND SUBMITTALS SHALL INCLUDE A STAMPED INDICATION SIGNIFYING THAT THE SUBMITTAL HAS BEEN REVIEWED FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS BY THE CONTRACTOR. THIS STAMPED INDICATION ALSO REPRESENTS THE FACT THAT THE CONTRACTOR HAS CHECKED THIS SUBMITTAL FOR ITS INTERACTION WITH ALL OTHER DIVISIONS AND CERTIFIES BY HIS SIGNATURE OR INITIALS THAT ALL INFORMATION HAS TAKEN PLACE. THE STAMP SHALL INCLUDE THE DATE, NAME OF THE CONTRACTING FIRM, THE SIGNATURE OF THE CONTRACTOR, CERTIFICATION OF COMPLIANCE AND APPROVAL. THIS STAMP SHALL BE ON THE SUBMITTAL BEFORE THE ENGINEER WILL REVIEW IT.

F. THE ENGINEER WILL REVIEW AN INDIVIDUAL SUBMITTAL NOT MORE THAN TWICE. IF THE SUBMITTAL IS REJECTED AGAIN ON THE SECOND REVIEW, THE CONTRACTOR WILL BEAR ALL RESPONSIBILITY FOR PAYING FOR THE ENGINEER'S TIME FOR ADDITIONAL REVIEWS. SUCH PAYMENTS TO THE ENGINEER SHALL BE WITHHELD FROM THE NEXT MONTHLY PAY APPLICATION.

2.03 RECORD (AS-BUILT) DRAWINGS AND MAINTENANCE MANUALS

A. AT JOB COMPLETION, SUBMIT TO THE ARCHITECT, AN ELECTRONIC SET OF THE LATEST PLANS, IN .PDF FORMAT, SHOWING ALL DEVIATIONS FROM THE CONTRACT DOCUMENTS. THE DRAWINGS SHALL ALSO HAVE DIMENSIONS LOCATING ALL UNDERGROUND CONDUITS.

B. AT JOB COMPLETION, SUBMIT TO THE ARCHITECT, THREE (3) HARDCOPY SETS OF MAINTENANCE AND INSTRUCTION MANUALS FOR ALL EQUIPMENT FURNISHED ON THE PROJECT. ALSO PROVIDE AN ELECTRONIC COPY IN .PDF FORMAT. COORDINATE FIELD DELIVERY METHOD WITH THE ARCHITECT.

3.0 EXECUTION

3.01 COORDINATION

A. COORDINATE ALL SPACE REQUIREMENTS WITH ALL OTHER DIVISIONS BEFORE INSTALLING ANY WORK. INSTALL WORK SUCH THAT ADEQUATE SPACE WILL BE ALLOTTED FOR ALL OTHER WORK FROM OTHER DIVISIONS TO BE INSTALLED AND ALSO WILL ALLOW ROOM FOR FUTURE ACCESS FOR REPAIR AND MAINTENANCE.

B. ANY WORK INSTALLED WITHOUT PROPER COORDINATION SHALL BE RELOCATED AT THE ARCHITECT'S DIRECTION WITHOUT INCREASING THE CONTRACT PRICE.

C. DURING THE BIDDING PROCESS OR THE PRICING FOR A GUARANTEED MAXIMUM PRICE, COORDINATE WITH ALL OTHER DIVISIONS FOR THE TOTAL AMOUNT OF WORK REQUIRED IN DIVISION 26. ANY WORK SHOWN OR IMPLIED IN ANOTHER DIVISION REQUIRING WORK IN DIVISION 26 SHALL BE INCLUDED IN THE CONTRACT PRICE REGARDLESS OF WHETHER OR NOT IT IS ADDRESSED IN DIVISION 26.

3.02 PROTECTION OF MATERIALS

A. ALL EQUIPMENT SHALL HAVE THE ORIGINAL FINISH WHEN THE BUILDING IS TURNED OVER TO THE OWNER.

B. PROTECT EQUIPMENT DURING CONSTRUCTION FROM DIRT, WATER, CHEMICAL, MECHANICAL DAMAGE, ETC. PROTECT ALL CONDUIT OPENINGS SO THAT NO FOREIGN MATERIAL WILL ENTER THE CONDUIT.

3.03 TESTS, DEMONSTRATION AND INSTRUCTIONS

A. FUNCTIONAL TESTING:

1. TEST ALL SYSTEMS DESCRIBED IN THIS DIVISION IN THE PRESENCE OF THE OWNER OR A DESIGNATED REPRESENTATIVE UPON COMPLETION OF THE WORK. DEMONSTRATE THAT THE INSTALLATION IS IN ACCORDANCE WITH CONTRACT DOCUMENTS.

2. FOR ALL NEW LIGHTING AND LIGHTING CONTROL SYSTEMS WITHIN THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL OBTAIN THE SERVICES OF A LICENSED PROFESSIONAL ENGINEER (REGISTERED TO THE STATE THIS PROJECT IS WITHIN) TO PERFORM SYSTEM COMMISSIONING IN COMPLIANCE WITH LOCAL ENERGY CONSERVATION CODES. THE CONTRACTOR SHALL DEMONSTRATE IN THE PRESENCE OF THE COMMISSIONING AGENT THAT THE INSTALLATION OF SUCH SYSTEMS ARE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

B. ANY WORK FOUND NOT TO BE IN COMPLIANCE WITH THE CONTRACT DOCUMENTS SHALL BE REPAIRED OR REPLACED WITHOUT INCURRING ANY ADDITIONS TO THE CONTRACT PRICE.

C. PROVIDE TO THE OWNER AND SYSTEM COMMISSIONING AGENT, ALL INSTRUCTION ON MAINTENANCE AND OPERATION OF ALL SYSTEMS AND EQUIPMENT PROVIDED UNDER THIS DIVISION. PROVIDE ALL NECESSARY TOOLS AND PERSONNEL TO THOROUGHLY PRESENT THESE INSTRUCTIONS. THE DOCUMENTATION SHALL INCLUDE THE FOLLOWING, AT MINIMUM:

- 1. SUBMITTAL DATA INDICATING ALL SELECTED OPTIONS.
2. OPERATION AND MAINTENANCE MANUAL FOR ALL EQUIPMENT AND SYSTEMS. INCLUDE ROUTINE MAINTENANCE ACTIONS AND CLEANING PROCEDURES.
3. A SCHEDULE FOR INSPECTING AND RECALIBRATING, WHERE APPLICABLE.
4. A NARRATIVE OF HOW EACH SYSTEM IS INTENDED TO OPERATE, INCLUDING ANY RECOMMENDED SET POINTS WHERE ADJUSTMENT IS AVAILABLE.

D. AT PROJECT COMPLETION, PRIOR TO OBTAINING CERTIFICATE OF OCCUPANCY, PRESENT AT FINAL INSPECTION TO THE JURISDICTION'S AHJ A SIGNED AND DATED STATEMENT OF SYSTEM COMMISSIONING FOR LIGHTING AND LIGHTING CONTROL SYSTEMS. THE FORMAT OF THE STATEMENT OF SYSTEM COMMISSIONING SHALL BE IN THE FORM REQUIRED BY THE STATE'S ENERGY CONSERVATION CODES AND/OR AHJ REQUIREMENTS. THE DOCUMENT SHALL BE SIGNED BY THE CONTRACTOR'S LICENSED PROFESSIONAL ENGINEER REPRESENTATIVE.

3.04 GUARANTEE

A. ALL SYSTEMS, EQUIPMENT, COMPONENTS, WORK, ETC. PROVIDED UNDER THIS DIVISION SHALL BE COVERED BY A ONE YEAR GUARANTEE STARTING AT THE TIME OF FINAL ACCEPTANCE OF THE WORK BY THE OWNER. ANY DEFECTS IN THE WORK, SYSTEMS, EQUIPMENT OR COMPONENTS FOUND DURING THIS YEAR SHALL BE CORRECTED AT NO CHARGE. THE GUARANTEE SHALL INCLUDE PROVIDING ALL NECESSARY CUTTING, PATCHWORK, REPAINTING, ETC. TO MAKE THE WORK COMPLETE AND NEW.

B. PRESENT THIS GUARANTEE AND ANY ADDITIONAL WARRANTIES OR GUARANTEES ON EQUIPMENT OR SYSTEMS TO THE ARCHITECT. ALL EQUIPMENT OR SYSTEM GUARANTEES ARE IN ADDITION TO THE GENERAL GUARANTEE.

END OF SECTION

SECTION 261000

ELECTRICAL BASIC MATERIALS & METHODS

1.0 GENERAL

1.01 DESCRIPTION

A. ALL WORK SPECIFIED IN THIS SECTION SHALL COMPLY WITH THE PROVISIONS OF SECTION 260010.

B. THIS SECTION DESCRIBES THE BASIC ELECTRICAL MATERIALS AND INSTALLATION METHODS THAT ARE ACCEPTABLE AND APPLICABLE TO DIVISION 26.

2.0 PRODUCTS

2.01 CONDUIT

A. GALVANIZED RIGID STEEL CONDUIT SHALL BE LOW CARBON, HOT-DIPPED GALVANIZED BOTH INSIDE AND OUT WITH THREADED JOINTS.

B. INTERMEDIATE METAL CONDUIT (IMC) SHALL BE STEEL, GALVANIZED BOTH INSIDE AND OUT WITH THREADED JOINTS.

C. ELECTRICAL METALLIC TUBING (EMT) SHALL BE STEEL, GALVANIZED BOTH INSIDE AND OUT.

D. PLASTIC CONDUIT (PVC) SHALL BE SCHEDULE 40 PVC HEAVY WALL TYPE. CONDUCTOR SHALL BE PROVIDED. ELECTRICAL NON-METALLIC TUBING (ENT) SHALL BE OF SUCH MATERIAL THAT IT IS RESISTANT TO MOISTURE, CHEMICAL WEATHER, AND PHOSPHERES AND IS FLAME RETARDANT. A GROUNDING ELECTRODE CONDUCTOR SHALL BE PROVIDED.

E. FLEXIBLE METAL CONDUIT SHALL BE FLEXIBLE STEEL CONDUIT TUBING AND SHALL MEET UNDERWRITERS LABORATORIES STANDARD FOR FLEXIBLE STEEL CONDUIT.

F. LIQUID-TIGHT FLEXIBLE METAL CONDUIT AND LIQUID-TIGHT NON-METALLIC CONDUITS SHALL BE LIQUID-TIGHT AND SUNLIGHT RESISTANT.

G. STEEL CONDUIT APPROVED MANUFACTURERS ARE ALLIED, TRIANGLE AND REPUBLIC.

H. PVC AND ENT CONDUIT APPROVED MANUFACTURERS ARE CARLON AND TRIANGLE.

2.02 CONDUIT FITTINGS

A. RIGID CONDUIT AND IMC CONDUIT FITTINGS SHALL BE ZINC-COATED, FERROUS METAL AND TAPER THREADED TYPE.

B. EMT FITTINGS SHALL BE ZINC-COATED STEEL AND HEXNUT COMPRESSION OR SET-SCREW TYPE. EMT CONNECTORS SHALL HAVE INSULATED THROATS.

C. PVC FITTINGS, ELBOWS AND CEMENT SHALL BE PRODUCED BY THE SAME MANUFACTURER. ALL JOINTS SHALL BE SOLENT WELDED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

D. CONDUIT CONNECTIONS TO SWITCHBOARDS, MOTOR CONTROL CENTERS, TRANSFORMERS, PANEL CABINETS, AND PULL BOXES SHALL HAVE GROUNDING WEDGE LUGS BETWEEN THE BUSHING AND THE BOX OR LOCKNUTS DESIGNED TO BITE INTO THE METAL.

E. EACH CONDUIT END SHALL BE PROVIDED WITH EITHER AN INSULATED THROAT CONNECTOR OR SEPARATE LOCKNUT AND INSULATED BUSHING. BUSHING SHALL BE INSTALLED BEFORE ANY WIRE IS FULLED.

F. CONDUIT FITTINGS APPROVED MANUFACTURERS ARE RACO, STEEL CITY, OZ, GEDNEY, THOMAS & BETTS AND APPLETON.

G. EXPANSION FITTINGS SHALL BE PROVIDED IN ALL CONDUIT WHICH CROSSES AND EXPANSION JOINT.

2.03 CONDUCTORS

A. CONDUCTORS SHALL BE COPPER OF 98% CONDUCTIVITY. 600 VOLT INSULATION SIZES SPECIFIED ARE AWG GAUGE FOR NO. 4/0 AND SMALLER AND CIRCULAR MILS (CMC) FOR ALL SIZES LARGER THAN NO. 4/0. CONDUCTORS NO. 10 AND SMALLER SHALL BE SOLID AND TYPE "THHN" OR "THWN" INSULATION. NO. 8 AND LARGER SHALL BE STRANDED AND TYPE "THW" OR "XHHW" INSULATION.

2.04 OUTLETS

A. OUTLET BOXES AND COVERS SHALL BE OF SUCH FORM AND DIMENSIONS AS TO BE ADAPTED TO THEIR SPECIFIED USAGE. LOCATIONS, SIZE AND QUANTITY OF CONDUIT, AND SIZE AND QUANTITY OF CONDUCTORS ENTERING THE BOXES, IN SPECIAL "FIRE RATED" PARTITIONS, OUTLETS SHALL COMPLY WITH ASTM NO. E119.

B. FLUSH CEILING OUTLETS FOR SURFACE OR PENDANT MOUNTED LIGHTING FIXTURES SHALL BE ONE-PIECE 4" SQUARE OR OCTAGONAL PRESSED STEEL BOXES. BOXES FOR DEVICES IN UNFINISHED MASONRY WALLS OR STUD WALLS SHALL BE PRESSED STEEL SQUARE CORNER, SECTIONAL SWITCH BOXES, OR SHALL BE 4" SQUARE BOX WITH A SQUARE CORNERED TILE WALL COVER. SET FLUSH WITH MASONRY CONSTRUCTION. BOXES IN CONCRETE CEILING SLAB SHALL BE OCTAGONAL, SHALLOW CONCRETE BOXES. WELDED BOXES ARE NOT ACCEPTABLE.

2.05 DISCONNECT SWITCHES

A. DISCONNECT SWITCHES SHALL BE "HEAVY-DUTY" TYPE, ENCLOSED SWITCHES OF QUICK-MAKE, QUICK-BREAK CONSTRUCTION. SWITCHES SHALL BE UL LISTED FOR 600 VOLTS AND 100 AMPERES.

B. PADLOCKING PROVISIONS SHALL BE PROVIDED FOR PADLOCKING IN THE OFF POSITION.

C. SWITCHES SHALL BE FURNISHED IN NEMA 1 GENERAL PURPOSE ENCLOSURE UNLESS NOTED OTHERWISE. SWITCHES LOCATED ON THE EXTERIOR OF THE BUILDING OR IN "WET" LOCATIONS SHALL HAVE NEMA 3R ENCLOSURES.

D. FUSED DISCONNECT SWITCHES SHALL HAVE REJECTION TYPE FUSE CLIPS WITH DUAL ELEMENT, CURRENT LIMITING FUSES OF RATINGS SHOWN.

E. DISCONNECT SWITCHES SHALL BE MOUNTED TO STRUCTURE. DISCONNECT SWITCHES SHALL NOT BE MOUNTED TO MECHANICAL EQUIPMENT OR DUCTWORK.

2.06 NAMEPLATES

A. NAMEPLATES SHALL HAVE 3/8" HIGH ENGRAVED LETTERS.

B. 120 OR 208 VOLTS: WHITE CORE LAMINATED BAKELITE WITH BLACK FINISH.

C. 277 OR 480 OR HIGHER VOLTS: WHITE CORE LAMINATED BAKELITE WITH RED FINISH.

D. NAMEPLATE SHALL INDICATE THE PANEL NAME AND THE NAME OF THE DEVICE OR EQUIPMENT WHERE THE POWER SUPPLY/FEEDER ORIGINATES.

2.07 WALL SWITCHES

A. WALL SWITCHES SHALL BE PLASTIC, TOTALLY ENCLOSED, QUIET TYPE, SELF-GROUNDING, 277 VOLTS AND 20A RATING AND SHALL MATCH EXISTING IF POSSIBLE AND EQUAL THE FOLLOWING:

SINGLE POLE: HUBBELL NO. CS1221, OR EQUAL BY LEVITON, P&S OR COOPER, DOUBLE POLE: HUBBELL NO. CS1222, OR EQUAL BY LEVITON, P&S OR COOPER, THREE-WAY: HUBBELL NO. CS1223, OR EQUAL BY LEVITON, P&S OR COOPER, FOUR-WAY: HUBBELL NO. CS1224, OR EQUAL BY LEVITON, P&S OR COOPER.

E. PROVIDE JUNCTION BOXES OR PULL BOXES WHERE SHOWN AND WHERE NECESSARY TO AVOID EXCESSIVE RUNS OR TOO MANY BENDS BETWEEN OUTLETS. THE CONDUIT SIZES SHOWN MAY INCREASE IF DESIRED TO FACILITATE THE PULLING OF CABLES.

F. ALL CONDUIT SHALL BE CONCEALED UNLESS INDICATED OTHERWISE. INSTALL EXPOSED CONDUIT PARALLEL WITH OR AT RIGHT ANGLES TO THE BUILDING WALLS AND SUPPORT FROM WALLS OR CEILINGS AT INTERVALS REQUIRED BY CODE WITH APPROVED GALVANIZED IRON CLAMPS OR HANGERS. CONCEALED

D. KEY SWITCHES SHALL BE HUBBELL NO. HBL1221L 20A SERIES OR APPROVED EQUAL BY P&S OR LEVITON.

2.08 WALL MOUNTED OCCUPANCY SWITCHES

A. THE PASSIVE INFRARED SENSOR SHALL BE A COMPLETELY SELF-CONTAINED CONTROL SYSTEM THAT REPLACES A STANDARD TOGGLE SWITCH. SENSOR SHALL HAVE GROUND WIRE FOR SAFETY. SWITCHING MECHANISM SHALL BE A LATCHING AIR GAP RELAY, COMPATIBLE WITH ELECTRONIC BALLASTS, COMPACT FLUORESCENT AND INDUCTIVE LOADS, TRIAC AND OTHER HARMONIC GENERATING DEVICES SHALL NOT BE ALLOWED.

B. SENSOR SHALL COVER UP TO 1000 SQ. FT. FOR WALKING MOTION, WITH A FIELD OF VIEW OF 180 DEGREES.

C. SENSOR SHALL HAVE SYSTEM WHICH PROVIDES SUPERIOR 180 DEGREE COVERAGE.

D. SENSOR SHALL OPERATE AT 120 VAC OR 277 VAC.

E. SENSOR SHALL HAVE NO MINIMUM LOAD REQUIREMENT AND SHALL BE CAPABLE OF SWITCHING FROM 0 TO 500 WATT INCANDESCENT; 0 TO 800 WATTS FLUORESCENT OR 1/6 HP @ 120 VAC, 60 HZ; AND 0 TO 1200 WATTS FLUORESCENT OR 1/3 HP @ 277 VAC, 60 HZ.

F. FOR ACCURACY AND CONSISTENCY, SENSOR SHALL HAVE A DIP SWITCH CONTROLLED, DIGITAL TIME DELAY ADJUSTABLE FROM 15 SECONDS TO 30 MINUTES.

G. SENSOR SHALL HAVE STANDARD 5 YEAR WARRANTY AND SHALL BE UL AND CUL LISTED.

H. SENSOR SHALL BE AS SPECIFIED ON THE LIGHTING FLOOR PLAN SHEET, OR APPROVED EQUAL BY ENGINEER.

2.09 RECEPTACLES

A. DUPLEX RECEPTACLES SHALL BE PLASTIC, TWO-POLE, THREE WIRE, SELF-GROUNDING, SIDE WIRED, 125 VOLTS AND 15A RATING AND SHALL MATCH EXISTING IF POSSIBLE AND BE EQUAL TO THE FOLLOWING: DUPLEX RECEPTACLES SHALL BE HUBBELL NO. CR5262 SERIES, OR EQUAL BY LEVITON, P&S OR COOPER. ISOLATED GROUND TYPE SHALL BE HUBBELL NO. CR5252IG SERIES, OR EQUAL BY LEVITON, P&S OR COOPER.

B. SINGLE RECEPTACLES SHALL BE TWO-POLE, THREE WIRE, SELF-GROUNDING, SIDE WIRED, 125 VOLTS AND 20A RATING AND SHALL BE EQUAL TO THE FOLLOWING: SINGLE RECEPTACLES SHALL BE HUBBELL NO. HBL5361 SERIES, OR EQUAL BY LEVITON, P&S OR COOPER. ISOLATED GROUND TYPE TO BE HUBBELL NO. IG-5361 SERIES, OR EQUAL BY LEVITON, P&S OR COOPER.

C. GROUND FAULT CIRCUIT INTERRUPT (GFI) RECEPTACLES SHALL BE HUBBELL GFR5352, OR EQUAL BY P&S, LEVITON OR COOPER.

D. COLOR SHALL BE AS SELECTED BY THE ARCHITECT.

2.10 COVERPLATES

A. COVERPLATES FOR FLUSH MOUNTED DEVICES SHALL BE STANDARD SIZE (COLOR OR FINISH TO BE SELECTED BY THE ARCHITECT), HUBBELL "P" SERIES OR EQUAL BY LEVITON, P&S OR COOPER.

B. TELEPHONE OUTLET COVERPLATES SHALL HAVE SAME FINISH AS ABOVE AND HAVE A BUSHED HOLE IN THE CENTER.

C. COVERPLATES FOR EXTERIOR DEVICES SHALL BE SELF-CLOSING, DIE CAST ALUMINUM HUBBELL WP8M OR EQUAL BY LEVITON, P&S OR COOPER.

2.11 PLYWOOD BACKBOARDS

A. PROVIDE PLYWOOD BACKBOARDS WHERE SHOWN. BACKBOARDS SHALL BE MINIMUM 3/4" THICK AND SIZED AS SHOWN OR TO ACCOMMODATE EQUIPMENT INDICATED TO BE MOUNTED THEREON.

B. SECURE PLYWOOD TO THE BUILDING STRUCTURE AND PAINT WITH TWO COATS OF GRAY PAINT.

2.12 SMOKE AND FIRE STOP FITTINGS

A. SMOKE AND FIRE STOP FITTINGS SHALL BE UL LISTED FOR THAT PURPOSE. THE FITTINGS USED TO SEAL CONDUIT EITHER ON THE OUTSIDE OF THE CONDUIT BUSBAR OR FOR DEVICES IN UNFINISHED MASONRY WALLS OR STUD WALLS. INTUMESCENT MATERIAL, WHICH EXPANDS TO FILL ALL VOIDS, SMOKE AND FIRE STOP FITTINGS SHALL BE O.Z./GEDNEY "FIRE-SEAL" OR DOW CORNING SILICONE RTV FOAM WITH AN HOURLY FIRE-RATING EQUAL TO OR HIGHER THAN THE RATING OF THE FLOOR, CEILING OR WALL THROUGH WHICH THE CABLE OR CONDUIT PASSES. THE SEALS FOR CONDUIT SHALL BE OF THE FLANGED TYPE.

2.13 FUSES

A. PROVIDE ALL FUSES. ALL FUSES SHALL BE OF THE SAME MANUFACTURER. ALL FUSES SHALL BE OF THE HIGH INTERRUPTING RATINGS (200,000 AMPS) CURRENT LIMITING TYPE AND MANUFACTURED BY BUSSMANN. FUSES SHALL BE PROVIDED FOR EACH FUSE CUTOFF AND THE SPECIFIED QUANTITY OF FUSES SHALL BE FURNISHED FOR SPARES.

B. CIRCUITS 0 TO 600 AMPERE SHALL BE PROTECTED BY REJECTION TYPE, CURRENT LIMITING BUSSMANN LOWPEAK DUAL ELEMENT FUSES LPN-RK (250 VOLTS) OR LPS-RK (800 VOLTS). ALL DUAL-ELEMENT FUSES SHALL HAVE SEPARATE OVERLOAD AND SHORT-CIRCUIT CLEARING CHAMBER. THE FUSE MUST HOLD 500% OF RATED CURRENT FOR A MINIMUM OF 10 SECONDS AND BE LISTED BY UNDERWRITERS LABORATORIES, INC. WITH AN INTERRUPTING RATING OF 200,000 AMPERES RMS SYMMETRICAL. THE FUSES SHALL BE UL CLASS RK-1.

C. CIRCUITS 601 TO 6000 AMPERE SHALL BE PROTECTED BY CURRENT LIMITING BUSSMANN HI-CAP TIME-DELAY FUSES KRP-C. FUSES SHALL EMPLOY "0" RINGS AS POSITIVE SEALS BETWEEN THE END BELLS AND THE GLASS MOUNTING. THE FUSES MUST BE REPEATEDLY TESTED TO THE FOLLOWING: TIME-DELAY AND MUST HOLD 500% OF RATED CURRENT FOR @ MINIMUM OF 4 SECONDS, CLEAR 20 TIMES RATED CURRENT IN 0.1 SECONDS OR LESS AND BE LISTED BY UNDERWRITERS LABORATORIES, INC. WITH AN INTERRUPTING RATING OF 200,000 AMPERES RMS SYMMETRICAL. THE FUSES SHALL BE UL CLASS L.

D. FURNISH AND TURN OVER TO THE OWNER A MINIMUM OF ONE (1) SET OF SPARE FUSES (SET CONSISTING OF THREE FUSES) FOR EACH TYPE AND RATING OF FUSE USED. WHEN THE NUMBER OF FUSE SETS OF THE SAME TYPE AND RATING ACTUALLY INSTALLED EXCEEDS FIVE (5) SETS, FURNISH AN ADDITIONAL SPARE SET OF FUSES FOR EACH FIVE (5) OR FRACTION THEREOF.

E. PROVIDE A CABINET IN WHICH TO STORE ALL SPARE FUSES, BUSSMANN CATALOG NO. 5FC.

F. ACCEPTABLE MANUFACTURERS ARE BUSSMANN OR EQUAL BY LITTLEFUSE.

3.0 EXECUTION

3.01 CONDUIT

A. RIGID STEEL (OR IMC) SHALL BE USED FOR SERVICE ENTRANCE AND ALL FEEDERS AND BRANCH CIRCUITS WHERE EXPOSED TO DAMAGE.

B. EMT SHALL BE USED FOR BRANCH CIRCUITS, FIRE ALARM AND TELEPHONE WHEN NOT UNDERGROUND OR IN CONCRETE IN CONTACT WITH THE EARTH.

C. SCHEDULE 40 PVC MAY BE USED FOR ALL UNDERGROUND FEEDERS, SERVICE ENTRANCE CONDUCTORS WHEN ENCASED IN 4" OF CONCRETE ON ALL SIDES, OR UNDER THE LOWEST FLOOR SLAB.

D. CONDUIT SHALL BE CONTINUOUS FROM OUTLET TO OUTLET. FROM OUTLET TO CABINET, JUNCTION BOX AND PULL BOX, CONDUIT SHALL ENTER AND BE SECURED TO ALL SUCH DEVICES IN SUCH A MANNER THAT EACH SYSTEM WILL BE ELECTRICALLY CONTINUOUS FROM SERVICE TO ALL OUTLETS SUCH THAT A GOOD GROUND IS PROVIDED. ALL CONDUIT FROM CABINETS AND JUNCTION BOXES SHALL TERMINATE IN APPROVED OUTLET BOXES OR CONDUIT FITTINGS. CONDUIT CONNECTIONS TO ANY BOX WHICH HAS NO THREADED HUB SHALL BE DOUBLE LOCKNUTTED.

E. PROVIDE JUNCTION BOXES OR PULL BOXES WHERE SHOWN AND WHERE NECESSARY TO AVOID EXCESSIVE RUNS OR TOO MANY BENDS BETWEEN OUTLETS. THE CONDUIT SIZES SHOWN MAY INCREASE IF DESIRED TO FACILITATE THE PULLING OF CABLES.

F. ALL CONDU

3.04 OUTLETS

- A. PROVIDE GALVANIZED STEEL OR CAST TYPE BOXES FOR ALL OUTLETS.
B. WHERE OUTLET BOXES ARE USED TO SUPPORT LIGHTING FIXTURES, THE OUTLET BOX SHALL BE ANCHORED TO THE STRUCTURAL MEMBERS OF THE BUILDING PER NEC 314.27.
C. OUTLET BOXES SHALL BE FLUSH MOUNTED UNLESS THEY ARE SPECIFICALLY SHOWN AS BEING USED WITH EXPOSED CONDUIT OR ARE LOCATED ABOVE A CEILING.
D. WHERE OUTLETS ARE SUPPLIED FROM CONDUIT RUN IN OR BELOW FLOOR SLABS, THE CONDUIT SHALL BE STUBBED UP AT THE LOCATION SHOWN AND THE WALL BUILT UP AROUND THE CONDUIT.
E. CUTS FOR OUTLET BOXES IN MASONRY WALLS SHALL BE MADE SO THAT THE COVERPLATE WILL COMPLETELY COVER THE CUT. THE MOUNTING HEIGHT OF SWITCH, RECEPTACLE AND OTHER OUTLETS MAY BE VARIED SLIGHTLY WITH THE ARCHITECTS APPROVALS, SO THAT THE OUTLET BOX, TOP OR BOTTOM, WILL OCCUR AT A MASONRY JOINT.
F. THE EDGE OF ALL OUTLET BOXES SHALL BE FLUSH WITH THE SURFACE IN WHICH THEY ARE RECESSED. THE DEVICES THAT FIT INTO THE OUTLET BOXES SHALL BE SCREWED TIGHT BEFORE THE COVERPLATE IS INSTALLED AND THE COVERPLATE SHALL NOT BE USED AS A MEANS OF TIGHTENING THE DEVICES IN PLACE.
G. WHERE OUTLETS ARE SHOWN AS BEING ADJACENT AND DIFFERENT MOUNTING HEIGHTS ARE SPECIFIED FOR EACH, THEY SHALL BE MOUNTED ONE DIRECTLY OVER THE OTHER, ON THE CENTERLINE OF THE GROUP.

3.05 NAMEPLATES

- A. PROVIDE SPECIFIED NAMEPLATES ON THE MAIN SWITCHBOARD, DISTRIBUTION PANELS, FEEDER SWITCHES, FEEDER BREAKERS, PANELBOARDS MOTOR CONTROL CENTERS, DISCONNECT SWITCHES, CONTACTORS, STARTERS, TRANSFORMERS, START—STOP PUSH BUTTONS AND MOTOR SWITCHES.
B. PROVIDE NAMEPLATES ON EVERY DEVICE IN THE MAIN SWITCHBOARD, DISTRIBUTION PANELS AND MOTOR CONTROL CENTERS.
C. NAMEPLATES FOR SURFACE MOUNTED EQUIPMENT SHALL BE INSTALLED ON THE EXTERIOR OF EQUIPMENT WITH SHEETMETAL SCREWS. NAMEPLATES FOR FLUSH OR RECESSED MOUNTED EQUIPMENT SHALL BE INSTALLED ON THE INSIDE OF THE PANEL DOOR OR COVER WITH EPOXY CEMENT.

3.06 WALL SWITCHES AND RECEPTACLES

- A. WHERE MORE THAN ONE DEVICE IS INDICATED AT A LOCATION, THE DEVICES SHALL BE GANG—MOUNTED IN COMBINED MULTI-GANG BOXES AND COVERED JOINTLY BY A COMMON COVERPLATE. PROVIDE BARRIERS AS REQUIRED BY THE DEVICES AND VOLTAGES BEING USED.

3.07 COVERPLATES

- A. ALL JUNCTION BOXES, OUTLET BOXES, MULTI—GANG SWITCH BOXES, UTILITY BOXES, ETC., SHALL BE COVERED WITH A COVERPLATE. THE COVERPLATE SHALL BE A FINISHED PLATE AS SPECIFIED UNLESS DESIGNATED OTHERWISE.
B. COVERPLATES SHALL BE MOUNTED VERTICALLY UNLESS DESIGNATED OTHERWISE.

3.08 GROUNDING

- A. GROUND CONNECTIONS SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.
B. PROVIDE AN INSULATED GREEN BONDING JUMPER FROM THE GROUNDING LUG OF ALL RECEPTACLES TO A STEEL CITY "GEE" CLIP OR A MACHINE SCREW PER NEC 250.8 IN THE OUTLET BOX. THE GROUND WIRE INSTALLED BEHIND THE DEVICE MOUNTING SCREWS WILL NOT BE ACCEPTABLE.
C. PROVIDE 1 #6-3/4" CONDUIT FROM THE SYSTEM GROUND TO THE TELEPHONE COMPANY MAIN DISTRIBUTION FRAME OR SERVICE CABINET AND TO EACH TELEPHONE BACKBOARD.

3.09 TELEPHONE CONDUIT SYSTEM

- A. TELEPHONE SERVICE SHALL INCLUDE WOOD BACKBOARDS AND EQUIPMENT CABINETS WITH SERVICE ENTRANCE CONDUIT AS SHOWN.
B. TELEPHONE SERVICE ENTRANCE CABLE, ALL BRANCH CABLING AND TELEPHONE INSTRUMENTS SHALL BE PROVIDED BY THE TELEPHONE EQUIPMENT VENDOR.
C. PROVIDE AN OUTLET AND CONDUIT SYSTEM FOR THE TELEPHONES AS SHOWN TO HAVE THE SAME PRESSURE FOR WIRING BY OTHERS. PROVIDE A SEPARATE LINE IN ALL TELEPHONE CONDUIT. TERMINATE ALL CONDUIT AT A UNIFORM HEIGHT WITH SMOOTH INSULATED BUSHINGS AT THE TELEPHONE WOOD BACKBOARDS.
D. TELEPHONE WALL OUTLETS SHALL BE PRESSED STEEL SECTIONAL SWITCH BOXES, WALL MOUNTED AT THE LOCATIONS INDICATED. COVERPLATE SHALL HAVE A BUSHED HOLE.
E. TELEPHONE FLOOR OUTLETS SHALL BE FLOOR BOXES AS SPECIFIED AT THE LOCATIONS INDICATED.

3.10 CONNECTION TO EQUIPMENT

- A. EQUIPMENT FURNISHED BY THE OWNER OR UNDER OTHER SECTIONS, SUCH AS MECHANICAL EQUIPMENT, ELEVATORS, ESCALATORS, SIGNS, KITCHEN EQUIPMENT, ETC., WILL BE INSTALLED BY OTHERS. PROVIDE ELECTRICAL SERVICE AND MAKE THE ELECTRICAL CIRCUIT CONNECTION TO THIS EQUIPMENT.
B. PROVIDE PVC INSULATED FLEXIBLE CORD SETS FOR ALL CORD AND PLUG CONNECTED BUILDING APPLIANCES AND EQUIPMENT. CORDS SHALL BE SIZED IN ACCORDANCE WITH ELECTRICAL CIRCUITS INDICATED. MULTIPLE CONDUCTOR CORDS SHALL BE "SO" CABLE WITH PVC JACKET AND GREEN INSULATED GROUND CONDUCTOR.

3.11 CORING, CUTTING AND PATCHING

- A. SET SLEEVES FOR CONDUIT ACCURATELY BEFORE THE CONCRETE FLOORS ARE POURED, OR SET BOXES ON THE FORMS SO AS TO LEAVE OPENINGS IN THE FLOORS IN WHICH THE REQUIRED SLEEVES CAN BE SUBSEQUENTLY LOCATED. FILL IN THE VOIDS AROUND THE SLEEVES WITH CONCRETE.
B. SHOULD THE PERFORMANCE OF THIS PRELIMINARY WORK BE NEGLECTED AND SHOULD CUTTING BE REQUIRED IN ORDER TO INSTALL CONDUIT, THEN THE EXPENSE OF THE CUTTING AND RESTORING OF SURFACES TO THEIR ORIGINAL CONDITIONS SHALL BE ACCOMPLISHED WITHOUT INCURRING ADDITIONS TO THE CONTRACT.

3.12 EQUIPMENT ANCHORING

- A. ALL ITEMS OF ELECTRICAL EQUIPMENT, SUCH AS SWITCHBOARDS, MOTOR CONTROL CENTERS, TRANSFORMERS, STANDBY GENERATOR, ETC., SHALL BE SECURELY ANCHORED TO THE BUILDING STRUCTURE. THE ANCHORING SHALL BE PROVIDED BY UTILIZING A MINIMUM SIZE OF 3/8" STEEL ANCHOR BOLTS IN THE FLOORS AND TO THE ITEM OF EQUIPMENT. A MINIMUM OF TWO (2) ANCHOR BOLTS SHALL BE PROVIDED ON EACH SIDE OF EACH ITEM OF EQUIPMENT WITH THE FOLLOWING EXCEPTIONS:
EXCEPTION NO. 1: IF THE EQUIPMENT MANUFACTURER INCLUDES MORE THAN TWO (2) ANCHOR HOLES PER SIDE IN THE BASE OR BASE FRAME OF THE EQUIPMENT ITEM, THEN THERE SHALL BE ONE ANCHOR FOR EACH ANCHOR HOLE.
EXCEPTION NO. 2: IF THE EQUIPMENT MANUFACTURER RECOMMENDS A PARTICULAR QUANTITY GREATER THAN TWO (2) PER SIDE, THEN THAT QUANTITY OF ANCHORS SHALL BE PROVIDED.

Table with 2 columns: EQUIPMENT CLASS 3 (SINGLE-EQUIPMENT) and EQUIPMENT CLASS 3(THREE-PHASE). Rows include KVA, kVA, and % values for various equipment sizes.

SECTION 262000 SERVICE AND DISTRIBUTION

1.0 GENERAL

- 1.01 DESCRIPTION
A. ALL WORK SPECIFIED IN THIS SECTION SHALL COMPLY WITH THE PROVISIONS OF SECTION 260010.

- B. PROVIDE A COMPLETE ELECTRICAL DISTRIBUTION SYSTEM. THE SYSTEM SHALL INCLUDE THE SERVICE ENTRANCE, MAIN SWITCHBOARD, FEEDERS, TRANSFORMERS, DISTRIBUTION PANELS, PANELBOARDS, BUSWAY, REMOTE CONTROL SWITCHES, CONTACTORS, ETC., TO PROVIDE A COMPLETE SYSTEM.
C. ALL DISTRIBUTION SWITCHGEAR (BRANCH CIRCUIT PANELBOARDS, SWITCHBOARD, DISTRIBUTION PANELBOARDS, TRANSFORMERS, BUSWAY, ETC.) SHALL BE THE UL LISTED RESPONSIBILITY OF ONE MANUFACTURER. ALL COMPONENT PARTS OF THE ABOVE LISTED ITEMS SHALL BE OF THE SAME MANUFACTURER EXCEPT WHERE A WRITTEN REQUEST FOR DEVIATION FROM THIS REQUIREMENT HAS BEEN APPROVED PRIOR TO BID DATE.
D. SHOP DRAWINGS FOR EQUIPMENT SPECIFIED IN THIS SECTION SHALL SHOW THAT ALL SPECIFIED REQUIREMENTS HAVE BEEN INCORPORATED.
E. ALL FLOOR MOUNTED DISTRIBUTION EQUIPMENT SHALL BE MOUNTED ON A 4" HIGH CONCRETE PAD.

1.02 ELECTRICAL SERVICE (EXISTING)

1.03 METERING (EXISTING)

2.0 PRODUCTS

2.01 BRANCH CIRCUIT PANELBOARDS

- A. PANELBOARDS (PANELS) SHALL BE GENERAL PURPOSE ENCLOSURES AND SHALL BE SURFACE OR FLUSH MOUNTED AS INDICATED. PANELS SHALL BE OF THE AUTOMATIC CIRCUIT BREAKER TYPE, FACTORY ASSEMBLED BY THE MANUFACTURER OF THE CIRCUIT BREAKERS. PANELS SHALL BE FOR THE VOLTAGE INDICATED WITH THE QUANTITY OF POLES AND AMPACITY OF CIRCUIT BREAKERS SHOWN.
B. BOXES AND TRIM SHALL BE MADE FROM CODE GAUGE STEEL. BOXES SHALL BE SUFFICIENT SIZE TO PROVIDE A MINIMUM GUTTER SPACE OF 4" ON ALL SIDES. BOXES SHALL BE MINIMUM 20" WIDTH AND 8 1/4" DEPTH.
C. HINGED DOOR COVERING ALL DEVICE HANDLES SHALL BE INCLUDED IN ALL PANEL TRIM. DOORS SHALL HAVE FLUSH-TYPE CYLINDER LOCK AND CATCH, EXCEPT THAT DOORS OVER 48" IN HEIGHT SHALL HAVE AUXILIARY FASTENERS AT TOP AND BOTTOM OF DOOR IN ADDITION TO FLUSH-TYPE CYLINDER LOCK AND CATCH. DOOR HINGES SHALL BE CONCEALED. ALL LOCKS SHALL BE KEYS ALIKE. DIRECTORY FRAME AND CARD HAVING A TRANSPARENT COVER SHALL BE FURNISHED EACH PANEL DOOR.
D. TRIMS FOR FLUSH PANELS SHALL OVERLAP THE BOX BY AT LEAST 3/4" ALL AROUND. SURFACE TRIMS SHALL HAVE THE SAME WIDTH AND HEIGHT AS THE BOX. TRIMS SHALL BE MOUNTABLE BY A SCREWDRIVER WITHOUT THE NEED FOR SPECIAL TOOLS. AFTER INSTALLATION, TRIM MOUNTING MECHANISM OR HARDWARE SHALL NOT BE ACCESSIBLE WHEN PANEL DOOR IS CLOSED AND LOCKED.
E. ALL EXTERIOR AND INTERIOR STEEL SURFACES OF THE TRIM SHALL BE CLEANED AND FINISHED WITH GRAY PAINT OVER A RUST-INHIBITING PHOSPHATIZED COATING.
F. ALL INTERIORS SHALL BE COMPLETELY FACTORY ASSEMBLED WITH PROTECTIVE DEVICES, WIRE CONNECTORS, ETC. ALL WIRE CONNECTORS, EXCEPT SCREW TERMINALS, SHALL BE OF THE ANTI-TURN SOLDERLESS TYPE AND ALL SHALL BE SUITABLE FOR COPPER OR ALUMINUM WIRE.

2.02 TRANSFORMERS

- A. BRANCH CIRCUIT AND DISTRIBUTION TRANSFORMERS SHALL BE THE DRY TYPE AND SHALL HAVE THE RATINGS INDICATED.
B. SINGLE PHASE TRANSFORMERS SHALL BE 480 VOLT PRIMARY AND 120/208 VOLT SECONDARY. THREE PHASE TRANSFORMERS SHALL BE 480 VOLT DELTA PRIMARY AND 120/208 VOLT GROUNDING TYPE SECONDARY. TRANSFORMERS 25 KVA AND LARGER SHALL HAVE A MINIMUM OF 4 1/2% CAPACITY PRIMARY TAPS.
C. TRANSFORMERS SHALL HAVE A U.L. RECOGNIZED 220 DEGREE INSULATION SYSTEM AND SHALL BE DESIGNED SO THAT UNDER FULL LOAD, THE AVERAGE CONDUCTOR TEMPERATURE RISE DOES NOT EXCEED 115 DEGREE C. RISE ABOVE 40 DEGREE C. AMBIENT AND THE ENCLOSURE DOES NOT EXCEED A 50 DEGREE C. RISE AT ANY POINT.
D. TRANSFORMER COILS SHALL BE OF THE CONTINUOUS WOUND CONSTRUCTION AND SHALL BE IMPREGNATED WITH NON-HYDROSCOPIC, THERMOSETTING VARNISH. ALL CORES TO BE CONSTRUCTED OF HIGH GRADE, NON-AGING SILICON STEEL WITH HIGH MAGNETIC PERMEABILITY AND LOW HYSTERESIS AND EDDY CURRENT LOSSES. MAGNETIC FLUX DENSITIES SHALL BE KEPT WELL BELOW THE SATURATION POINT. THE CORE LAMINATIONS SHALL BE CLAMPED TOGETHER WITH STRUCTURAL STEEL ANGLES. THE COMPLETED CORE AND COIL SHALL THEN BE BOLTED TO THE BASE OF THE ENCLOSURE BUT ISOLATED THEREFROM BY MEANS OF RUBBER VIBRATION-ABSORBING MOUNTS. THERE SHALL BE NO METAL-TO-METAL CONTACT BETWEEN THE CORE AND COIL AND THE ENCLOSURE ON TRANSFORMERS 500 KVA AND SMALLER. THE VIBRATION ISOLATING SYSTEM SHALL BE DESIGNED TO PROVIDE A PERMANENT FASTENING OF THE CORE AND COIL TO THE ENCLOSURE. SOUND ISOLATING SYSTEMS REQUIRING THE COMPLETE REMOVAL OF ALL FASTENING DEVICES WILL NOT BE ACCEPTABLE. SOUND LEVELS SHALL BE GUARANTEED BY THE MANUFACTURER NOT TO EXCEED THE FOLLOWING: 25 TO 50 KVA - 45 DB; 51 TO 150 KVA - 50 DB; BALLASTS FOR HIGH INTENSITY DISCHARGE (HID) LAMPS SHALL BE CONSTANT WATTAGE DB; 151 TO 300 KVA - 55 DB; 301 TO 500 KVA - 60 DB.

END OF SECTION

SECTION 263000 LIGHTING

1.0 GENERAL

- 1.01 DESCRIPTION
A. ALL WORK IN THIS SECTION SHALL COMPLY WITH THE PROVISIONS OF SECTION 260010.
B. PROVIDE ALL LIGHTING FIXTURES AND LAMPS AS SPECIFIED HEREIN AND AS SHOWN.
C. ALL LAMPS SHALL BE OPERATING AT THE TIME OF THE FINAL INSPECTION AND FOR A PERIOD OF SIX (6) MONTHS AFTER THE FINAL ACCEPTANCE OF THE PROJECT BY THE OWNER.
D. CONFIRM EXACT LOCATIONS OF ALL LIGHTING FIXTURES BY COORDINATION WITH THE ARCHITECTS REFLECTED CEILING PLANS AND MECHANICAL EQUIPMENT ABOVE OR ON THE CEILING.
E. CONFIRM ALL CEILING TYPES BEFORE ORDERING LIGHTING FIXTURES.
F. EACH LIGHTING FIXTURE SHALL HAVE BEEN TESTED AND CERTIFIED FOR PROPER OPERATION BY THE FIXTURE MANUFACTURER FOR THE TYPE MOUNTING AND CEILING OWIN, WHICH IT IS INSTALLED.

2.0 PRODUCTS

2.01 LIGHTING FIXTURES

- A. EACH LIGHTING FIXTURE SHALL BE AS SPECIFIED IN THE LIGHTING FIXTURE SCHEDULE CORRESPONDING WITH ITS FIXTURE TYPE INDICATION (LETTER).
B. MOST LIGHTING OUTLETS ARE LETTERED OR GROUPS OF OUTLETS ARE INDICATED BY A LETTER.
C. EACH LIGHTING FIXTURE SHALL HAVE A MANUFACTURER'S LABEL AFFIXED AND SHALL COMPLY WITH THE REQUIREMENTS OF ALL AUTHORITIES HAVING JURISDICTION.
D. THE LIGHTING FIXTURES THAT ARE INDICATED BY THE LETTERS SHALL BE AS INDICATED ON THE LIGHTING FIXTURE SCHEDULE.
E. ALL INCANDESCENT LAMPS, EXCEPT QUARTZ TUBES, SHALL BE RATED FOR 130 VOLT OPERATION.
F. HIGH INTENSITY DISCHARGE (HID) LAMPS SHALL BE AS SPECIFIED IN THE LIGHTING FIXTURE SCHEDULE.

2.02 LAMPS

- A. THE TYPE LAMPS SHALL BE AS SPECIFIED FOR EACH LIGHTING FIXTURE IN THE LIGHTING FIXTURE SCHEDULE.
B. THE LAMP CATALOG NUMBER IS THE CATALOG NUMBER IS GENERALLY FOR PENNSYLVANIA LIGHTING AND IS GIVEN AS A STANDARD OF THE QUALITY AND PERFORMANCE REQUIRED. EQUAL LAMPS BY GENERAL ELECTRIC OR PHILIPS WILL BE ACCEPTABLE WHEN A LAMP MANUFACTURER'S NAME IS USED ALONG WITH THE CATALOG NUMBER IN THE LIGHTING FIXTURE SCHEDULE. IT IS CONSIDERED UNEQUALLED BY ANY OTHER LAMP AND SHALL NOT BE SUBSTITUTED FOR THE LAMP PERFORMANCE WITH ENERGY CONSERVING LAMPS. SYMMETRICAL LAMPS FURNISHED UNDER THIS SECTION SHALL BE DESIGNATED OTHERWISE. THE BREAKERS FURNISHED SHALL BE DETERMINED BY THE SPECIFICATIONS AND BY THE MINIMUM UL LABELED RMS SYMMETRICAL AMPERES INTERRUPTING CAPACITY AT CIRCUIT VOLTAGE. ALL CIRCUIT BREAKERS SHALL BE BOLTED ON AND RIGIDLY BRACED.
M. PANELS HAVING SUB-FEED LUGS FOR FEEDING THROUGH SHALL HAVE 8" MINIMUM EXTRA GUTTER SPACE AT THE LUG END AND ON ONE SIDE.
N. EACH PANEL AS A COMPLETE UNIT SHALL HAVE A SHORT-CIRCUIT CURRENT RATING EQUAL TO OR GREATER THAN THE EQUIPMENT RATING INDICATED.
O. PANELS SHALL BE AS MANUFACTURED BY SAME MANUFACTURER INSTALLED IN THE BASE BUILDING.

2.03 BALLASTS

- A. BRANCH CIRCUIT AND DISTRIBUTION TRANSFORMERS SHALL BE THE DRY TYPE AND SHALL HAVE THE RATINGS INDICATED.
B. BALLAST SHALL OPERATE LAMPS AT A FREQUENCY OR 25 KHZ OR HIGHER WITH LESS THAN 2% FLICKER.
C. BALLAST SHALL OPERATE AT AN INPUT VOLTAGE OF 108-132 VAC (120V LINE) OR 249 -305 VAC(277V LINE) AT AN INPUT FREQUENCY OF 60HZ. LIGHT OUTPUT SHALL REMAIN CONSTANT FOR LINE VOLTAGE FLUCTUATION OF +/- 5%.
D. BALLAST SHALL COMPLY WITH EMI AND RFI LIMITS SET BY THE FCC (CFR 47 PART 18) FOR NON-RESIDENTIAL APPLICATIONS AND NOT INTERFERE WITH NORMAL ELECTRICAL EQUIPMENT.
E. BALLAST SHALL WITHSTAND TRANSIENTS AS SPECIFIED BY ANSI C.62.41 FOR LOCATION CATEGORY A3 IN THE NORMAL MODE AND LOCATION CATEGORY A1 IN THE COMMON MODE.
F. BALLAST SHALL MEET APPLICABLE ANSI STANDARDS.
G. BALLAST SHALL HAVE A MINIMUM POWER FACTOR OF 0.99.
H. BALLAST SHALL NOT BE POTTED OR WEIGH MORE THAN 1.3 POUNDS.
I. BALLAST SHALL HAVE LESS THAN 10% TOTAL HARMONIC DISTORTION.
J. BALLAST SHALL HAVE LESS THAN 6% THIRD HARMONIC DISTORTION.
K. BALLAST HEIGHT SHALL BE LESS THAN OR EQUAL TO 1.5 INCHES.
L. BALLAST SHALL HAVE A POKE-IN WIRETRAP CONNECTOR.
M. BALLAST SHALL MEET SOUND RATING "A".
N. BALLAST MUST BE UNDERWRITERS LABORATORIES (UL) LISTED CLASS P, TYPE 1 OUTDOOR.
O. BALLAST SHALL PROVIDE NORMAL RATED LAMP LIFE AS STATED BY LAMP MANUFACTURERS.
P. RAPID START BALLASTS ARE SERIES WIREWOUND AND SHALL MAINTAIN FULL CATHODE HEAT DURING OPERATION.
Q. RAPID START BALLAST SHALL HAVE LESS THAN A 1.5 LAMP CURRENT CREST FACTOR (LCCF) AND INSTANT START BALLASTS HAVE LESS THAN A 1.7 LCCF.
R. INSTANT START BALLAST SHALL HAVE PARALLEL LAMP OPERATION.
S. BALLAST FACTOR STANDARD IS 875+0.025 ON ALL NORMAL LIGHT OUTPUT PRODUCTS.
T. BALLASTS FOR "PL" FLUORESCENT LAMPS SHALL BE COORDINATED WITH LAMPS AND 2-PIN OR 4-PIN CONFIGURATION BALLASTS SHALL BE PROVIDED TO MATCH LAMPS. MANUFACTURER FOR "PL" FLUORESCENT FIXTURES SHALL BE

- G. TRANSFORMERS THAT ARE OF THE FLOOR-MOUNTED TYPE SHALL BE MOUNTED ON KORFVIB VIBRATION ELIMINATORS OF THE PAD TYPE.
H. TRANSFORMERS SHALL BE AS MANUFACTURED BY SAME MANUFACTURER INSTALLED IN THE BASE BUILDING.

3.0 EXECUTION

3.01 INSTALLATION

- A. PROVIDE A TYPEWRITTEN DIRECTORY UNDER PLASTIC FOR ALL PANELBOARDS WITH SPARES MARKED IN PENICIL. CIRCUIT IDENTIFICATION SHALL INCLUDE SUFFICIENT DETAIL TO ALLOW EACH CIRCUIT TO BE DISTINGUISHED FROM ALL OTHERS. INCLUDE SPECIFIC TENANT SUITE NUMBERS IN MULTI-TENANT BUILDINGS IN THE CIRCUIT DESCRIPTION. PROVIDE A LABEL ON EACH BREAKER IN A SWITCHBOARD OR DISTRIBUTION PANELBOARD WITH THE SAME LEVEL OF CIRCUIT IDENTIFICATION DETAILS.
B. PROVIDE ALL NECESSARY HARDWARE TO LEVEL AND SECURE THE SWITCHGEAR AS REQUIRED BY THE MANUFACTURER'S INSTRUCTIONS. MAKE ALL ELECTRICAL CONNECTIONS FOR SUPPLY AND LOAD CIRCUITS AND LEAVE IN OPERATING CONDITION.
C. CLEAN ENCLOSURE OF ALL SWITCHGEAR OF ALL FOREIGN MATTER, INCLUDING DUST.
D. REMOVE ALL RUST MARKS AND REPAINT TO LEAVE SWITCHGEAR IN NEW CONDITION.

END OF SECTION

SECTION 263000 LIGHTING

1.0 GENERAL

- 1.01 DESCRIPTION
A. ALL WORK IN THIS SECTION SHALL COMPLY WITH THE PROVISIONS OF SECTION 260010.
B. PROVIDE ALL LIGHTING FIXTURES AND LAMPS AS SPECIFIED HEREIN AND AS SHOWN.
C. ALL LAMPS SHALL BE OPERATING AT THE TIME OF THE FINAL INSPECTION AND FOR A PERIOD OF SIX (6) MONTHS AFTER THE FINAL ACCEPTANCE OF THE PROJECT BY THE OWNER.
D. CONFIRM EXACT LOCATIONS OF ALL LIGHTING FIXTURES BY COORDINATION WITH THE ARCHITECTS REFLECTED CEILING PLANS AND MECHANICAL EQUIPMENT ABOVE OR ON THE CEILING.
E. CONFIRM ALL CEILING TYPES BEFORE ORDERING LIGHTING FIXTURES.
F. EACH LIGHTING FIXTURE SHALL HAVE BEEN TESTED AND CERTIFIED FOR PROPER OPERATION BY THE FIXTURE MANUFACTURER FOR THE TYPE MOUNTING AND CEILING OWIN, WHICH IT IS INSTALLED.

2.0 PRODUCTS

2.01 LIGHTING FIXTURES

- A. EACH LIGHTING FIXTURE SHALL BE AS SPECIFIED IN THE LIGHTING FIXTURE SCHEDULE CORRESPONDING WITH ITS FIXTURE TYPE INDICATION (LETTER).
B. MOST LIGHTING OUTLETS ARE LETTERED OR GROUPS OF OUTLETS ARE INDICATED BY A LETTER.
C. EACH LIGHTING FIXTURE SHALL HAVE A MANUFACTURER'S LABEL AFFIXED AND SHALL COMPLY WITH THE REQUIREMENTS OF ALL AUTHORITIES HAVING JURISDICTION.
D. THE LIGHTING FIXTURES THAT ARE INDICATED BY THE LETTERS SHALL BE AS INDICATED ON THE LIGHTING FIXTURE SCHEDULE.

2.02 LAMPS

- A. THE TYPE LAMPS SHALL BE AS SPECIFIED FOR EACH LIGHTING FIXTURE IN THE LIGHTING FIXTURE SCHEDULE.
B. THE LAMP CATALOG NUMBER IS THE CATALOG NUMBER IS GENERALLY FOR PENNSYLVANIA LIGHTING AND IS GIVEN AS A STANDARD OF THE QUALITY AND PERFORMANCE REQUIRED. EQUAL LAMPS BY GENERAL ELECTRIC OR PHILIPS WILL BE ACCEPTABLE WHEN A LAMP MANUFACTURER'S NAME IS USED ALONG WITH THE CATALOG NUMBER IN THE LIGHTING FIXTURE SCHEDULE. IT IS CONSIDERED UNEQUALLED BY ANY OTHER LAMP AND SHALL NOT BE SUBSTITUTED FOR THE LAMP PERFORMANCE WITH ENERGY CONSERVING LAMPS. SYMMETRICAL LAMPS FURNISHED UNDER THIS SECTION SHALL BE DESIGNATED OTHERWISE. THE BREAKERS FURNISHED SHALL BE DETERMINED BY THE SPECIFICATIONS AND BY THE MINIMUM UL LABELED RMS SYMMETRICAL AMPERES INTERRUPTING CAPACITY AT CIRCUIT VOLTAGE. ALL CIRCUIT BREAKERS SHALL BE BOLTED ON AND RIGIDLY BRACED.
M. PANELS HAVING SUB-FEED LUGS FOR FEEDING THROUGH SHALL HAVE 8" MINIMUM EXTRA GUTTER SPACE AT THE LUG END AND ON ONE SIDE.
N. EACH PANEL AS A COMPLETE UNIT SHALL HAVE A SHORT-CIRCUIT CURRENT RATING EQUAL TO OR GREATER THAN THE EQUIPMENT RATING INDICATED.
O. PANELS SHALL BE AS MANUFACTURED BY SAME MANUFACTURER INSTALLED IN THE BASE BUILDING.

2.03 BALLASTS

- A. BRANCH CIRCUIT AND DISTRIBUTION TRANSFORMERS SHALL BE THE DRY TYPE AND SHALL HAVE THE RATINGS INDICATED.
B. BALLAST SHALL OPERATE LAMPS AT A FREQUENCY OR 25 KHZ OR HIGHER WITH LESS THAN 2% FLICKER.
C. BALLAST SHALL OPERATE AT AN INPUT VOLTAGE OF 108-132 VAC (120V LINE) OR 249 -305 VAC(277V LINE) AT AN INPUT FREQUENCY OF 60HZ. LIGHT OUTPUT SHALL REMAIN CONSTANT FOR LINE VOLTAGE FLUCTUATION OF +/- 5%.
D. BALLAST SHALL COMPLY WITH EMI AND RFI LIMITS SET BY THE FCC (CFR 47 PART 18) FOR NON-RESIDENTIAL APPLICATIONS AND NOT INTERFERE WITH NORMAL ELECTRICAL EQUIPMENT.
E. BALLAST SHALL WITHSTAND TRANSIENTS AS SPECIFIED BY ANSI C.62.41 FOR LOCATION CATEGORY A3 IN THE NORMAL MODE AND LOCATION CATEGORY A1 IN THE COMMON MODE.
F. BALLAST SHALL MEET APPLICABLE ANSI STANDARDS.
G. BALLAST SHALL HAVE A MINIMUM POWER FACTOR OF 0.99.
H. BALLAST SHALL NOT BE POTTED OR WEIGH MORE THAN 1.3 POUNDS.
I. BALLAST SHALL HAVE LESS THAN 10% TOTAL HARMONIC DISTORTION.
J. BALLAST SHALL HAVE LESS THAN 6% THIRD HARMONIC DISTORTION.
K. BALLAST HEIGHT SHALL BE LESS THAN OR EQUAL TO 1.5 INCHES.
L. BALLAST SHALL HAVE A POKE-IN WIRETRAP CONNECTOR.
M. BALLAST SHALL MEET SOUND RATING "A".
N. BALLAST MUST BE UNDERWRITERS LABORATORIES (UL) LISTED CLASS P, TYPE 1 OUTDOOR.
O. BALLAST SHALL PROVIDE NORMAL RATED LAMP LIFE AS STATED BY LAMP MANUFACTURERS.
P. RAPID START BALLASTS ARE SERIES WIREWOUND AND SHALL MAINTAIN FULL CATHODE HEAT DURING OPERATION.
Q. RAPID START BALLAST SHALL HAVE LESS THAN A 1.5 LAMP CURRENT CREST FACTOR (LCCF) AND INSTANT START BALLASTS HAVE LESS THAN A 1.7 LCCF.
R. INSTANT START BALLAST SHALL HAVE PARALLEL LAMP OPERATION.
S. BALLAST FACTOR STANDARD IS 875+0.025 ON ALL NORMAL LIGHT OUTPUT PRODUCTS.
T. BALLASTS FOR "PL" FLUORESCENT LAMPS SHALL BE COORDINATED WITH LAMPS AND 2-PIN OR 4-PIN CONFIGURATION BALLASTS SHALL BE PROVIDED TO MATCH LAMPS. MANUFACTURER FOR "PL" FLUORESCENT FIXTURES SHALL BE

- ADVANCE, ROBERSON, LIGHTOLIER OR LUTRON.
U. BALLASTS FOR HIGH INTENSITY DISCHARGE (HID) LAMPS SHALL BE CONSTANT WATTAGE AUTOTRANSFORMER (CWA) TYPE OR EQUAL TYPE WITH MINIMUM POWER FACTOR OF 0.9.

2.04 DIFFUSERS

- A. UNLESS SPECIFIED OTHERWISE, ALL PRISMATIC DIFFUSERS FOR FLUORESCENT LIGHTING FIXTURES SHALL BE PRISMATIC ACRYLIC K3H K12 WITH A THICKNESS OF 0.125", MEASURED FROM THE BACK SIDE TO THE PEAK OF THE PRISM.
B. ALL WRAPAROUND LENSES SHALL BE VIRGIN ACRYLIC, ONE-PIECE AND INJECTION MOLDED.

2.05 EMERGENCY BATTERY LIGHTING

- A. LIGHTING FIXTURES INDICATED ON THE DRAWINGS TO BE PROVIDED WITH AN EMERGENCY BATTERY BALLAST SHALL PROVIDE EMERGENCY LIGHTING BY USING A STANDARD FLUORESCENT LAMP OR LAMPS AND AN EMERGENCY BATTERY BALLAST. THE BALLAST SHALL CONSIST OF A FIELD REPLACEABLE HIGH TEMPERATURE, MAINTENANCE FREE NICKEL CADMIUM BATTERY CHARGER AND ELECTRONIC CIRCUITRY CONTAINED IN ONE METAL CASE PROVIDE A SOLID STATE CHARGING INDICATOR LIGHT TO MONITOR THE CHARGER AND BATTERY. DOUBLE POLE TEST SWITCH AND INSTALLATION HARDWARE. THE BATTERY BALLAST SHALL PROVIDE POWER TO THE FLUORESCENT LAMP UPON FAILURE OF THE NORMAL SUPPLY TO THE FIXTURE.
B. THE TEST BUTTON AND INDICATOR LIGHT SHALL BE INTEGRAL IN THE FIXTURE REFLECTOR AND SHALL BE POSITIONED WITHIN OR ON THE SURFACE OF THE FIXTURE SO AS TO BE ACCESSIBLE AND IDENTIFIABLE.
C. UNDER NORMAL MODE THE BATTERY BALLAST SHALL KEEP THE BATTERIES AT FULL CHARGE. UPON LOSS OF NORMAL POWER THE BATTERY BALLAST SHALL OPERATE THE FLUORESCENT LAMP OR LAMPS FOR 90 MINUTES.
D. BATTERY RECHARGE TIME SHALL NOT EXCEED 16 HOURS TO FULLY RECHARGE AND SHALL NOT EXCEED 225 MILLIAMPERES CHARGING CURRENT.
E. THE LUMEN OUTPUT OF THE LAMP OR LAMPS POWERED BY BATTERY UNIT SHALL BE NOT LESS THAN 1,100 LUMENS INITIALLY FOR A FOUR-FOOT FLUORESCENT LAMP.
F. THE BATTERY BALLAST SHALL MEET OR EXCEED ALL THE REQUIREMENTS SET FORTH IN UL924 "EMERGENCY LIGHTING AND POWER EQUIPMENT" AND SHALL BE LISTED FOR INSTALLATION WITH THE ARCHITECTS REFLECTED CEILING PLAN TO PROVIDE THE RIGHT TRIM FOR THE TYPE OF CEILING THE FIXTURE IS TO BE INSTALLED IN.

2.06 LIGHT FIXTURE TRIM

- A. EACH RECESSED LIGHTING FIXTURE SHALL HAVE A TRIM TO MATCH THE TYPE OF CEILING (PLASTER, EXPOSED GRID, CONCEALED SPLINE, EXPOSED PANEL, ETC.) IN WHICH IT IS BEING INSTALLED. REGARDLESS OF CATALOG NUMBER GIVEN, COORDINATION WITH THE ARCHITECTS REFLECTED CEILING PLAN TO PROVIDE THE RIGHT TRIM FOR THE TYPE OF CEILING THE FIXTURE IS TO BE INSTALLED IN.
B. EACH LIGHTING FIXTURE RECESSED IN A PLASTERED CEILING OF ANY TYPE SHALL HAVE A PLASTER FRAME.
C. EACH RECESSED LIGHTING FIXTURE SHALL HAVE A TRIM TO MATCH THE TYPE OF CEILING (PLASTER, EXPOSED GRID, CONCEALED SPLINE, EXPOSED PANEL, ETC.) IN WHICH IT IS BEING INSTALLED. REGARDLESS OF CATALOG NUMBER GIVEN, COORDINATION WITH THE ARCHITECTS REFLECTED CEILING PLAN TO PROVIDE THE RIGHT TRIM FOR THE TYPE OF CEILING THE FIXTURE IS TO BE INSTALLED IN.

2.07 RECESSED INCANDESCENT FIXTURES

- A. ALL RECESSED INCANDESCENT FIXTURES SHALL COMPLY WITH ARTICLE 410-110, C OF THE N.E.C.

2.08 FLUORESCENT FIXTURES

- A. ALL INDOOR FLUORESCENT FIXTURES UTILIZING DOUBLE ENDED LAMPS OR THAT ARE SUPPLIED FROM MULTI-WIRE BRANCH CIRCUITS, SHALL HAVE A DISCONNECTING MEANS THAT COMPLIES WITH ARTICLE 410.130, G OF THE N.E.C.

2.09 LED LIGHTING FIXTURES

- A. LED LAMPS FOR INTERIOR USE SHALL BE 3500K, CRI 80 (MIN.), UNLESS NOTED OTHERWISE. COLOR TEMPERATURE CHROMATICITY OVER THE LIFETIME OF THE PRODUCT SHALL BE WITHIN 0.007 ON THE CIE 1976 (U-V) DIAGRAM.
B. SYSTEM SHALL BE RATED AT A MINIMUM FOR 50,000 HOURS (MIN.) AT 70% LUMEN MAINTENANCE (L80).
C. SYSTEM SHALL COMPLY WITH THE FOLLOWING:
D. LED DRIVERS SHALL BE ELECTRONIC, THERMALLY PROTECTED AND HAVE AN INPUT VOLTAGE AT 120/277VAC, 60HZ WITH A POWER FACTOR OF >0.90.
E. LED BOARDS AND DRIVERS SHALL BE PROVIDED WITH PLUG-IN CONNECTIONS FOR TOOL-LESS REPLACEMENT OF COMPONENTS.
F. COMPATIBILITY OF DIMMING SWITCHES FOR CONTROL OF DIMMABLE LED DRIVERS SHALL BE CONFIRMED WITH LED FIXTURE MANUFACTURER.

3.0 EXECUTION

3.01 SUPPORT OF LIGHTING FIXTURES

- A. ALL LIGHTING SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE. THE FIXTURES SHALL BE SUPPORTED IN A MANNER THAT WILL INSURE THE FIXTURE WEIGHT BEING EQUALLY DISTRIBUTED FROM EACH SUPPORT AND THE FIXTURE REMAINING IN A LEVEL POSITION.
B. FLUORESCENT FIXTURES INSTALLED RECESSED IN A SUSPENDED CEILING SYSTEM SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE WITH TWO (2) 12 GAUGE WIRES ON DIAGONAL CORNERS OF THE FIXTURE. IN ADDITION, THE FIXTURE SHALL BE CLIPPED TO MEMBERS OF THE CEILING SUSPENSION SYSTEM.
C. FLUORESCENT FIXTURES INSTALLED IN OR ON ANY CEILING OTHER THAN A SUSPENDED CEILING SYSTEM SPECIFICALLY MENTIONED ABOVE SHALL BE SUPPORTED WITH CONCEALED STEEL RODS. RODS SHALL BE 1/4" DIAMETER MINIMUM AND SHALL BE LOCATED WHERE RECOMMENDED BY THE FIXTURE MANUFACTURER. PROVIDE A MINIMUM OF TWO (2) SUPPORTS FOR EACH 4 OR 8' FIXTURE CHASSIS. SUPPORTS SHALL BE MAXIMUM OF 48 CENTERS. FOR INCANDESCENT FIXTURES, STEEL HANGING WIRE MAY BE USED BY ATTACHING THE WIRE TO THE FIXTURE MOUNTING FRAME.
D. PENDANT MOUNTED INCANDESCENT FIXTURES SHALL BE STEM SUPPORTED BY A FIXTURE STUD MOUNTED IN THE OUTLET BOX. SUSPENDED FLUORESCENT FIXTURES SHALL HAVE MOUNTING STEMS LOCATED AS PER THE MANUFACTURER'S RECOMMENDATIONS, BUT IN NO CASE SHALL HAVE LESS THAN TWO (2) STEMS PER CHASSIS.

3.02 AIMING OF ADJUSTABLE LIGHT FIXTURES

- A. ALL FIXTURES WITH LAMP POSITION, TILT, SHUTTERS, ROTATION OR OTHER TYPES OF ADJUSTMENTS DURING THE FINAL INSPECTION, FIXTURES SERVING AREAS WHERE DAY LIGHTING IS PREDOMINANT WILL BE ADJUSTED AFTER SUNSET.

3.03 LIGHTING FIXTURES IN MILLWORK

- A. SPECIAL ATTENTION SHALL BE GIVEN TO LIGHTING FIXTURES INDICATED TO BE MOUNTED WITHIN, UNDER, ON OR OTHERWISE INCORPORATED INTO MILLWORK OR CABINETRY.
B. REFER TO THE ARCHITECTURAL DRAWINGS AND DETAILS FOR SPECIFIC DIMENSIONS. THIS COORDINATION SHALL OCCUR PRIOR TO ORDERING FIXTURES TO ASSURE FIXTURES WILL FIT THE SPACE LIMITATIONS OF THE MILLWORK.
C. THIS REQUIREMENT IS INTENDED TO PRECLUDE INCURRING ADDITIONS TO THE CONTRACT DUE TO FIXTURES BEING TOO SMALL OR TOO LARGE FOR THE SPACE.

3.04 FINAL PREPARATION

- A. ALL PLASTIC COVERS SHALL BE REMOVED FROM FLUORESCENT FIXTURES.
B. CLEAN ALL LENS AND REFLECTORS FROM DEBRIS, FINGERPRINTS, DUST, ETC.

END OF SECTION

SECTION 269200 MOTOR CONTROLS AND WIRING

1.0 GENERAL

1.01 SCOPE

- A. ALL WORK SPECIFIED IN THIS SECTION SHALL COMPLY WITH THE PROVISIONS OF SECTION 260010.
B. ALL MOTORS SHALL BE PROVIDED UNDER DIVISION 22 AND 23.
C. A MOTOR STARTER SHALL BE PROVIDED UNDER THIS SECTION FOR EACH MOTOR EXCEPT FOR THOSE SPECIFIED IN DIVISION 22 OR 23 TO BE FURNISHED WITH INTEGRAL STARTERS. MOTOR STARTERS SHALL BE INSTALLED EITHER IN A MOTOR CONTROL CENTER OR SEPARATELY MOUNTED ADJACENT TO THE MOTOR SERVED.
D. MOTOR POWER WIRING IS DEFINED AS THOSE CONDUCTORS BETWEEN THE ENERGY SOURCE AND THE MOTOR. THIS POWER WIRING SHALL BE TERMINATED AT THE MOTOR TERMINALS.
E. ALL CONTROL WIRING REQUIRED FOR AUTOMATIC STARTING AND STOPPING OF MOTORS SHALL BE PROVIDED UNDER DIVISION 22 OR 23 UNLESS SPECIFICALLY SHOWN ON THE ELECTRICAL DRAWINGS.
F. POWER WIRING SHALL BE CONNECTED THROUGH ALL LINE VOLTAGE CONTROL DEVICES SUCH AS FIRESTATS AND THERMOSTATS.

2.0 PRODUCTS

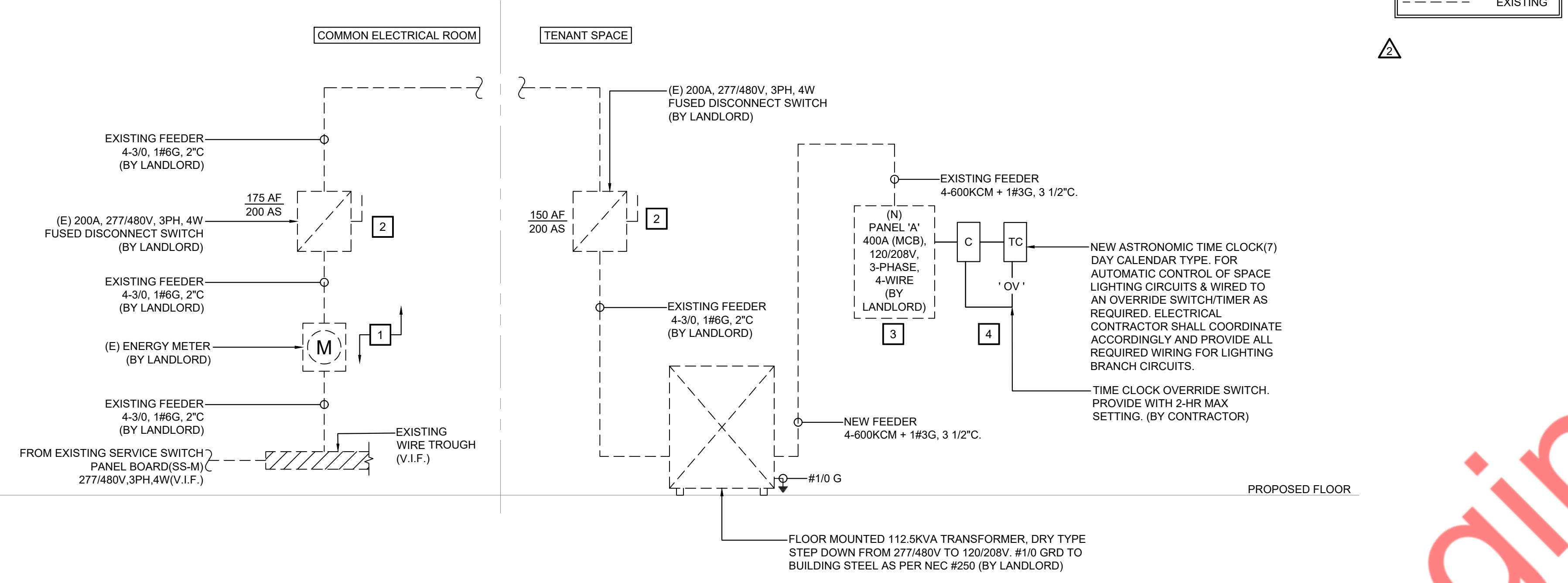
2.01 MOTOR STARTERS

- A. STARTERS FOR MOTORS 1/3 HORSEPOWER OR SMALLER SHALL BE MANUAL UNLESS REMOTE OR AUTOMATIC STARTING IS REQUIRED. IN WHICH CASE THE STARTERS SHALL BE MAGNETIC, FULL VOLTAGE, NON-REVERSING, SINGLE-SPEED, UNLESS OTHERWISE INDICATED. ALL OTHER STARTERS SHALL BE MAGNETIC.
B. EACH STARTER FOR A THREE-PHASE MOTOR SHALL BE FURNISHED WITH THREE (3) OVERLOAD RELAYS SIZED FOR THE FULL LOAD RUNNING CURRENT OF THE MOTOR ACTUALLY PROVIDED. PROVIDE AN EXTERNAL "HAND-OFF-AUTO" SELECTOR SWITCH WITH GREEN "RUNNING" LIGHT, PROVIDE A RED PILOT LIGHT TO INDICATE MOTOR "STOPPED". EACH PILOT LIGHT SHALL HAVE A LEGEND PLATE INDICATING REASON FOR SIGNAL.
C. EACH OVERLOAD RELAY SHALL HAVE A NORMALLY OPEN ALARM CONTACT WHICH WILL CLOSE ONLY WHEN ACTUATED BY AN OVERLOAD (NOT TO BE CONFUSED WITH N.O. OR N.C. AUXILIARY CONTACTS). THESE CONTACTS SHALL BE PROPERLY WIRED TO THEIR RESPECTIVE BLUE PILOT LIGHT PROVIDED ON THE STARTER FRONT COVER AND HAVING A "TRIPPED" LEGEND PLATE.
D. INDIVIDUALLY MOUNTED MOTOR STARTERS SHALL BE IN A NEMA TYPE 1 GENERAL PURPOSE ENCLOSURE IN UNFINISHED AREAS AND SHALL BE FLUSH MOUNTED IN ALL FINISHED AREAS. ALL STARTERS MOUNTED IN EXTERIOR AREAS SHALL HAVE A NEMA 3R ENCLOSURE. EACH STARTER SHALL HAVE A LAMINATED NAMEPLATE TO INDICATE DIVISION 22 OR 23 UNIT NUMBER, FUNCTION AND CIRCUIT NUMBER.
E. A CONTROL POWER TRANSFORMER SHALL BE PROVIDED AT EACH MOTOR STARTER FOR CONNECTION TO THE CONTROLS PROVIDED UNDER DIVISION 22 OR 23. THE CONTROL POWER TRANSFORMER SHALL BE MOUNTED INSIDE THE MOTOR STARTER ENCLOSURE. ALL CONTROL TRANSFORMERS AT 50 VA OR GREATER SHALL HAVE PRIMARY FUSING. COORDINATE ALL CONTROL EQUIPMENTS WITH DIVISION 22 OR 23 AND EQUIPMENT MANUFACTURERS.

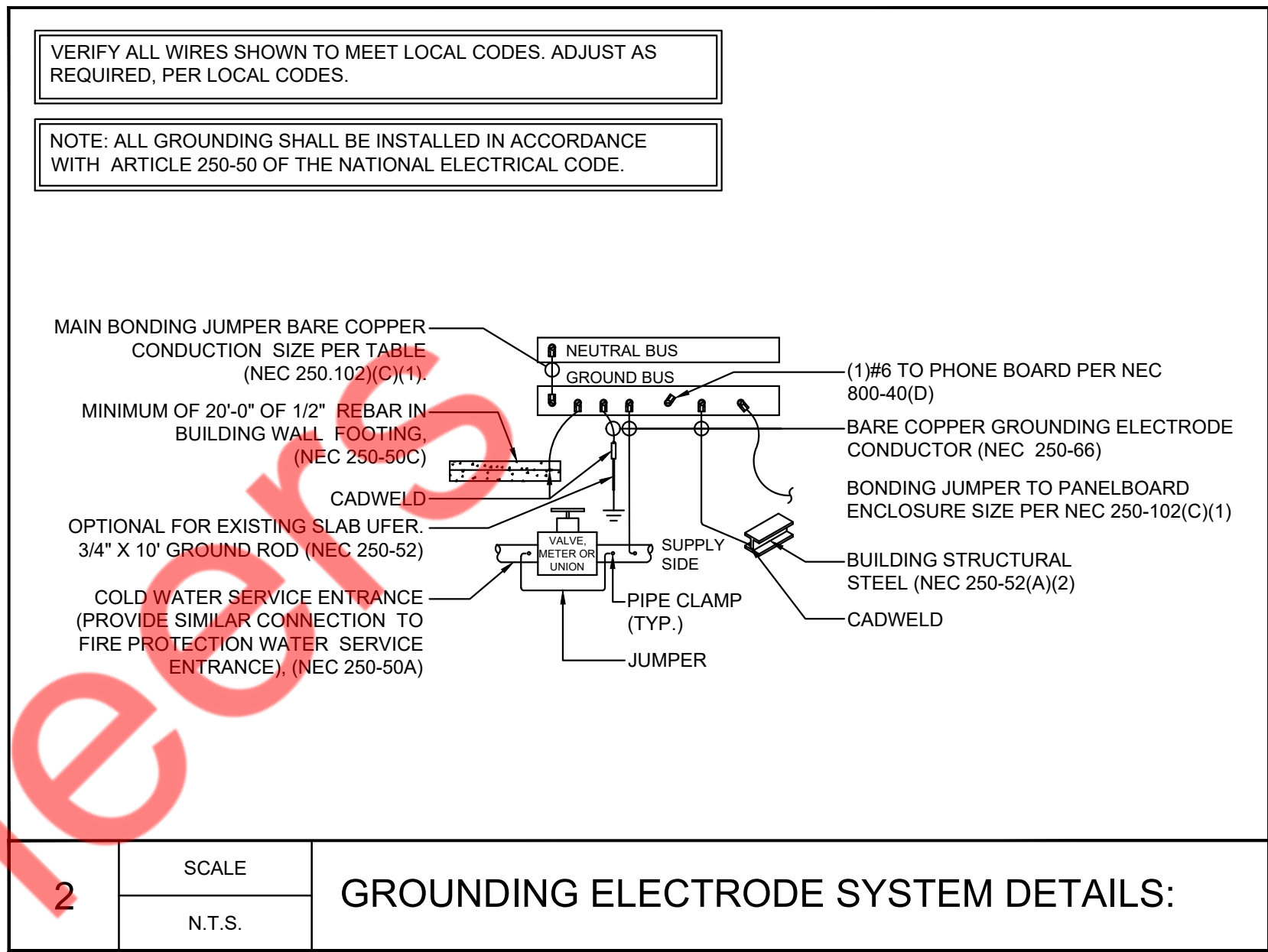
- F. ALL MOTOR STARTERS, PUSH BUTTONS AND PILOT LIGHTS SHALL BE OF THE SAME MANUFACTURER AS THE SWITCHBOARD AND SHALL BE GENERAL ELECTRIC, SQUARE D, SIEMENS I.T.E., JOSLYN CLARK CONTROLS OR WESTINGHOUSE.
G. COMBINATION STARTERS SHALL CONSIST OF A CIRCUIT BREAKER AND A MOTOR STARTER MOUNTED IN A COMMON NEMA TYPE 1 GENERAL PURPOSE ENCLOSURE.
H. THE MOTOR STARTER COMPONENTS SHALL BE AS SPECIFIED IN PARAGRAPH 2.01 FOR MOTOR STARTERS.
I. THE CIRCUIT BREAKER COMPONENT SHALL BE A MINIMUM 22,000 RMS INTERRUPTING CAPACITY AND SHALL BE AS REQUIRED IN SECTION 262000.

2.02 COMBINATION STARTERS

- A. COMBINATION STARTERS SHALL CONSIST OF A CIRCUIT BREAKER AND A MOTOR STARTER MOUNTED IN A COMMON NEMA TYPE 1 GENERAL PURPOSE ENCLOSURE.
B. THE MOTOR STARTER COMPONENTS SHALL BE AS SPECIFIED IN PARAGRAPH 2.01 FOR MOTOR STARTERS.
C. THE CIRCUIT BREAKER COMPONENT SHALL BE A MINIMUM 22,000 RMS INTERRUPTING CAPACITY AND SHALL BE



LEGEND:
 - - - - - NEW
 _____ EXISTING



VERIFY ALL WIRES SHOWN TO MEET LOCAL CODES. ADJUST AS REQUIRED, PER LOCAL CODES.
 NOTE: ALL GROUNDING SHALL BE INSTALLED IN ACCORDANCE WITH ARTICLE 250-50 OF THE NATIONAL ELECTRICAL CODE.

- GENERAL NOTES:
- PROPER CLEARANCE MUST BE MAINTAINED ABOVE ELECTRICAL EQUIPMENT PER N.E.C. FIELD VERIFY EXACT MOUNTING SPACE AVAILABLE IN ELECTRICAL ROOM/AREA PRIOR TO INSTALLATION OF ELECTRICAL EQUIPMENT.
 - MAKE ALL FINAL ELECTRICAL CONNECTIONS FOR A COMPLETE ELECTRICAL DISTRIBUTION SYSTEM. ALL CONNECTIONS/DISCONNECTIONS TO LANDLORDS/UTILITIES SERVICE EQUIPMENT SHALL BE AS DIRECTED BY LANDLORDS/UTILITIES SITE REPRESENTATIVE. TENANT GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TERMINATION/DETERMINATION EXPENSES.
 - SYSTEM SHALL BE GROUNDED TO THE MAIN BUILDING'S GROUNDING SYSTEM.
 - DISCONNECT SWITCHES AND PANELS SHALL BE INSTALLED ON PLYWOOD BACKBOARDS.
 - TENANT CONTRACTOR MUST VERIFY ELECTRICAL SERVICE, SUB-FEED WIRING AND PANELS PRIOR TO START OF TENANT'S ELECTRICAL WORK. TENANT GENERAL CONTRACTOR SHALL MAKE APPLICATION TO THE LOCAL UTILITY FOR CONTINUED METERED ELECTRIC SERVICE IN THE TENANT'S NAME. TENANT GENERAL CONTRACTOR SHALL CONFIRM ALL LOCAL UTILITY GUIDELINES AND REQUIREMENTS PRIOR TO BID. SHALL INCLUDE THE COSTS OF THESE REQUIREMENTS IN THE BID, AND SHALL COMPLY WITH THEM DURING CONSTRUCTION. AVAILABLE FAULT CURRENT AT SERVICE EQUIPMENT SHALL BE LEGIBLY MARKED IN THE FIELD WITH THE MAXIMUM AVAILABLE FAULT CURRENT PER NATIONAL ELECTRICAL CODE (NEC) OF ARTICLE 110.24.
 - CONTRACTOR SHALL COORDINATE SHORT CIRCUIT RATING (ISC) WITH UTILITY & AHJ, PRIOR TO COMMENCING ANY WORK. TYPICAL FOR ALL ELECTRICAL EQUIPMENT.
 - CONTRACTOR SHALL VERIFY INCOMING SERVICE AMPERAGE, WIRE SIZING AND DISTRIBUTION.
 - CONTRACTOR SHALL COORDINATE WITH BASE BUILDING FOR THE EXACT LOCATION OF THE EXISTING SWITCH GEAR AND EXACT POWER DISTRIBUTION.
 - CONTRACTOR SHALL VERIFY OPERABLE CONDITION INFIELD OF ALL EXISTING TO REMAIN ELECTRICAL DEVICES/EQUIPMENTS AND REPLACE WITH NEW IF FOUND INOPERABLE.
 - DRAWING ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK. ALL CONDUIT ROUTING AND OFFSETS, DROPS AND RISES OF RUNS ARE NOT SHOWN ON THE PLANS AND ARE SHOWN DIAGRAMMATICALLY IN THE RISERS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF CONDUIT TO AVOID OBSTRUCTIONS. COORDINATION WITH EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES, IS REQUIRED. MAINTAIN HEADROOM AND SPACE CONDITIONS.

ELECTRICAL PANEL SCHEDULE												
PANELBOARD PANEL TYPE	NEMA TYPE ENCLOSURE	VOLTAGE MAINS MOUNTING	120 / 208 V		PHASE		3 WIRE		BUS RATING			
			400A	400A	400A	400A	10 KAIC					
CKT. NO.	EQT. TAG	CKT. TAG	POLE	WIRE SIZE	BKR. SURFACE	TOTAL WATTS	PHASE	TOTAL WATTS	DESCRIPTION	CKT. TAG	EQT. TAG	CKT. NO.
1		(N)	2	8	45	4,680	A	4,680	AHU#1	(N)		2
3		(N)	2	8	45	4,680	B	4,680	AHU#2	(N)		4
5		(N)	2	8	45	4,680	C	1,000	HAND DRYER	(N)/GFCI		6
7		(N)	2	8	45	4,680	A	1,000	HAND DRYER	(N)/GFCI		8
9		(N)	1	12	20	150	B	200	MOTORIZED DAMPER	(E)		10
11		(E)	3	10	30	1,921	C	1,921	EDH#1	(E)		12
13		(E)	3	10	30	1,921	A	1,921	EDH#2	(E)		14
15		(E)	3	10	30	1,921	B	1,921	EDH#2	(E)		16
17		(E)	2	8	45	2,704	C	2,704	ACCU#1	(E)		18
19		(E)	2	8	45	2,704	A	2,704	ACCU#2	(E)		20
21		(E)	2	8	45	2,704	B	2,704	RECEPTACLE FOR CONDENSATE PUMP	(E)		22
23		(E)	2	8	45	2,704	C	540	ROOF RECEPTACLE	(E)		24
25		(N)	3	4	60	5,000	A	2,496	DRYER & WASHER	(N)/GFCI		26
27		(N)	3	4	60	5,000	B	2,496	DRYER & WASHER	(N)/GFCI		28
29		(N)	3	4	60	5,000	C	1,500	DOWN FOR MORE SIGN	(N)	TC	30
31		(N)	1	12	20	720	A	1,500	ILLUMINATED STRONG SIGN	(N)	TC	32
33		(N)	1	12	20	900	B	1,500	STRONG ENTRY SIGN	(N)	TC	34
35		(N)	1	12	20	1,600	C	1,500	BURN NOW BRAG LATER SIGN	(N)	TC	36
37		(N)	1	12	20	400	A	1,500	STOREFRONT SIGN	(N)	TC	38
39		(N)	1	12	20	720	B	100	RCP-1	(N)		40
41		(N)	1	12	20	720	C	360	IT/DATA RACK	(N)		42
43		(N)/G	1	12	20	360	A	200	TIME CLOCK	(N)		44
45		(N)	1	12	20	360	B	800	WATER DISPENSER	(N)		46
47		(N)	1	12	20	720	C	180	CHANGING ROOM GFI REC.	(N)		48
49		(N)	1	12	20	360	A	405	LIGHTING	(N)	TC/a	50
51		TC/d	1	12	20	500	B	405	LIGHTING	(N)	TC/b	52
53		TC/e	1	12	20	500	C	405	LIGHTING	(N)	TC/c	54
55		(N)	1	12	20	1,115	A	300	CEILING FAN	(N)		56
57		(N)	1	12	20	100	B	360	OFFICE DESK REC.	(N)		58
59		(N)	1	12	20	900	C	20	SPARE	(N)		60
61		(N)	1	12	20	20	A	20	SPARE	(N)		62
63		(N)	1	12	20	20	B	20	SPARE	(N)		64
65		(N)	1	12	20	20	C	20	SPARE	(N)		66

ELECTRICAL LOAD SUMMARY					
DESCRIPTION	NEC CONNECTED KW	VOLT	PHASE	NEC DEMAND FACTOR	NEC DEMAND KW
LIGHTING - 120V	2.1	120	1	1.25	2.6
TRACK LIGHTS	1.2	120	1	TRACK LENGTH	1.5
RECEPTACLES	11.3	120	1	>10KW=10+(0.5*(KW-10))	10.6
STOREFRONT SIGN	1.5	120	1	1.25	1.9
S/W OUTLETS	1.6	120	1	1.25	2.0
EXH. FANS	0.3	120	1	1.00	0.3
AHU	28.1	208	1	1.00	28.1
DRYER/WASHER	5.0	208	1	1.00	5.0
INTERIOR SIGN	6.0	120	1	1.00	6.0
ACCU	16.2	208	1	1.00	16.2
HOT WATER HEATER	15.0	208	3	1.00	15.0
EDH	11.5	208	3	1.00	11.5
TOTALS	100.1				101.0

NOTES:
 * USE GREATER VALUE OF THE TWO CATEGORIES.
 ** 125% OF THE LARGEST MOTOR OR COMPRESSOR IN SYSTEM APPLIED ONLY ON ONE UNIT.
 *** N.E.C. ARTICLE 220-12 REQUIREMENT (200 VA PER FOOT OF SHOW WINDOW) MINUS ACTUAL SHOW WINDOW LIGHTING KVA.

N.E.C. DEMAND kVA x 1,000 = 101,040
 SYSTEM VOLTAGE x 1.732 = 58,311
 480 x 1.732 = 831

121.5 AMPS USE (EXISTING) 200AMP FEEDER FROM EXISTING BASE BUILDING PANEL (BY LANDLORD)

- KEYED NOTES: #
- ELECTRICAL CONTRACTOR SHALL COORDINATE WITH BASE BUILDING/LANDLORD/OWNER/UTILITY COMPANY FOR EXACT POWER DISTRIBUTION AND LOCATION OF ELECTRICAL METER & DISCONNECT SWITCH FOR THE PROJECT SPACE PRIOR TO COMMENCING ANY WORK. BASE BID ACCORDINGLY.
 - EXISTING 200 A 277/480V, 3PH, 4W FUSED DISCONNECT SWITCH. LANDLORD'S CONTRACTOR SHALL COORDINATE THE EXACT LOCATION WITH ARCHITECT/OWNER PRIOR TO ROUGH IN. BASE BID ACCORDINGLY.
 - EXISTING 400 A (MCB) 120/208V, 3PH, 4W ELECTRICAL PANEL - 'A'. LANDLORD'S CONTRACTOR SHALL COORDINATE THE EXACT LOCATION WITH ARCHITECT/OWNER PRIOR TO ROUGH IN. BASE BID ACCORDINGLY.
 - NEW TIME CLOCK WITH CONTACTOR. ELECTRICAL CONTRACTOR SHALL COORDINATE THE EXACT LOCATION AND REQUIREMENT WITH ARCHITECT/OWNER PRIOR TO ROUGH IN. BASE BID ACCORDINGLY.

- VERIFY THE FOLLOWING PRIOR TO BID/ PRICING:
- EXISTING CONDUIT AND FEEDERS SIZE BETWEEN TENANT SPACE AND LANDLORD SWITCHBOARD.
 - EXISTING MAIN SERVICE DISCONNECT RATING.
 - EXISTING METER.
- IF THE EXISTING SERVICE DISCONNECT AND FEEDERS ARE RATED FOR LESS THAN THE RATING SHOWN ON THIS RISER, NOTIFY THE PROJECT MANAGER AND ENGINEER IMMEDIATELY PRIOR TO SUBMITTING BID/ PRICING PACKAGE SO DRAWINGS CAN BE REVISED AND UPDATED ACCORDINGLY

CONSULTANTS
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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 LICENSE NO. 0662489100
 EXPIRATION DATE: 04/30/2026

CONTRACTOR'S NOTES:
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03.11.25	CLIENT COMMENTS
03.14.25	PERMIT SUBMISSION
04.21.25	CLIENT COMMENTS
05.06.25	CLIENT COMMENTS

DATE	REVISION
05/06/25	CLIENT COMMENTS
04/21/25	CLIENT COMMENTS
03/11/25	CLIENT COMMENTS

STRONG

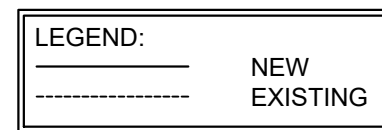
LOCATION:

PROJECT INFORMATION:
 PROJECT NUMBER: 12366-25
 DRAWN BY: NYE
 REVIEWED BY: NYE
 AREA: 3,134 SQ. FT.

TITLE:
ELECTRICAL RISER DIAGRAM AND PANEL SCHEDULES

SHEET NUMBER:

E-0.4

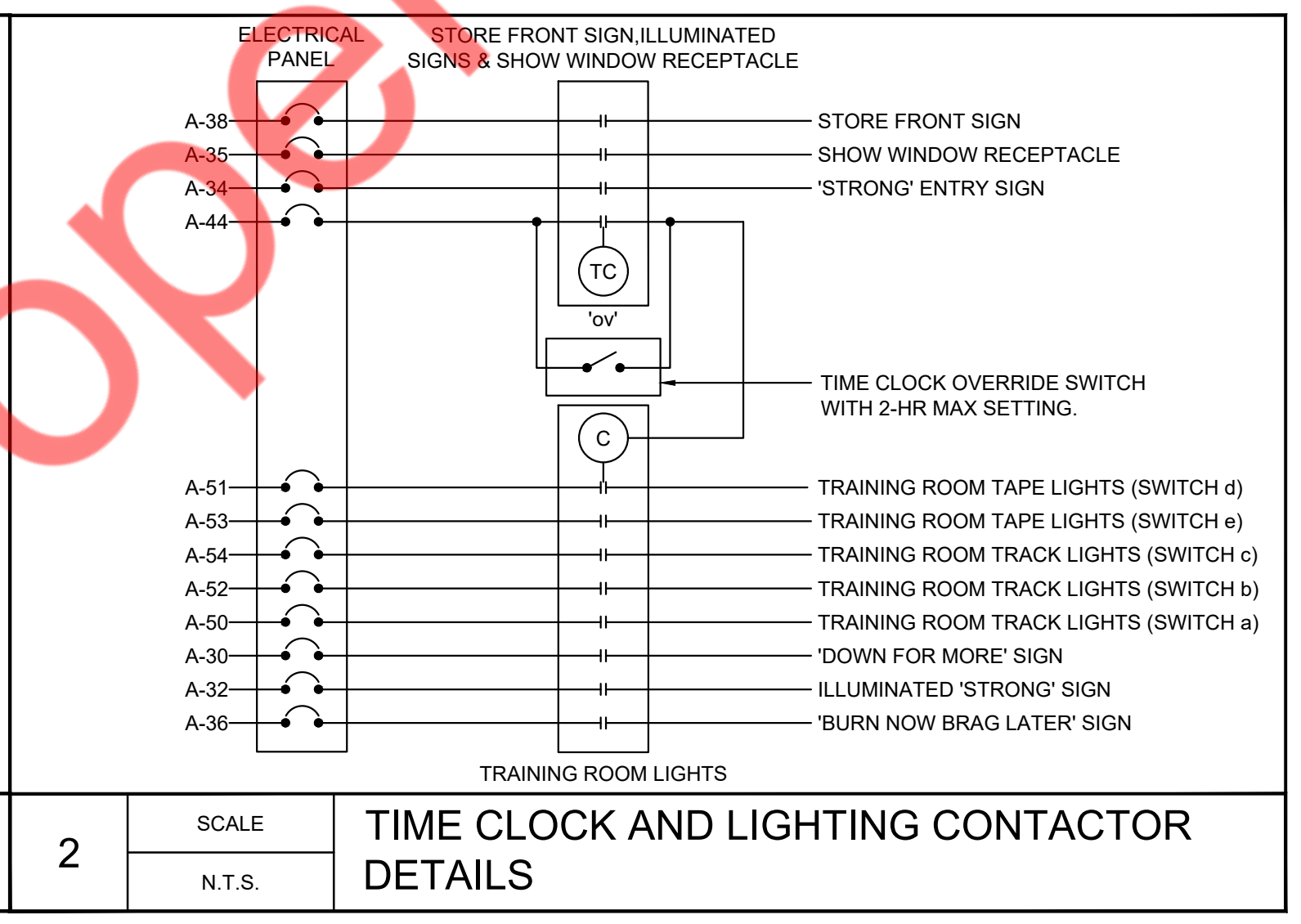
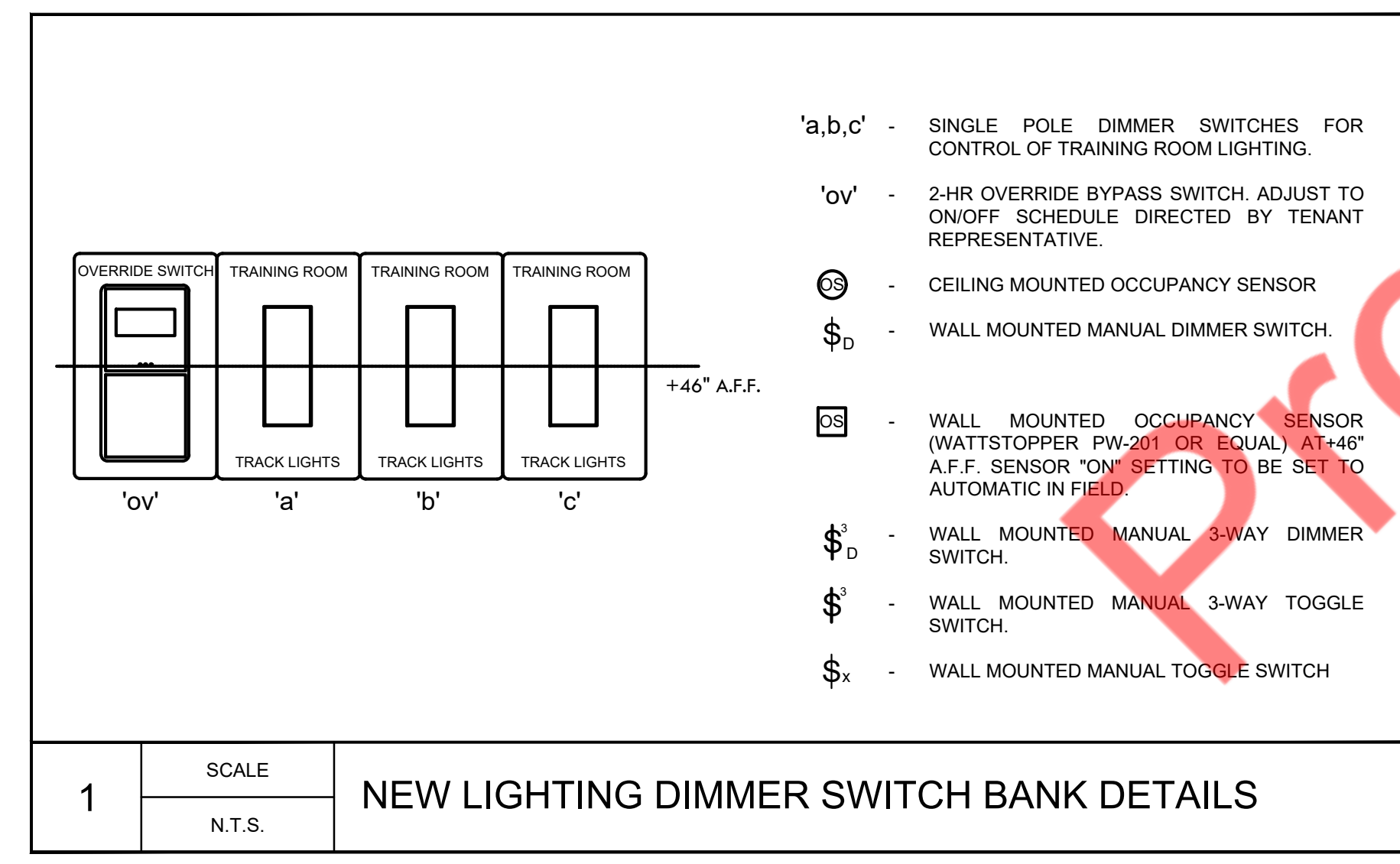
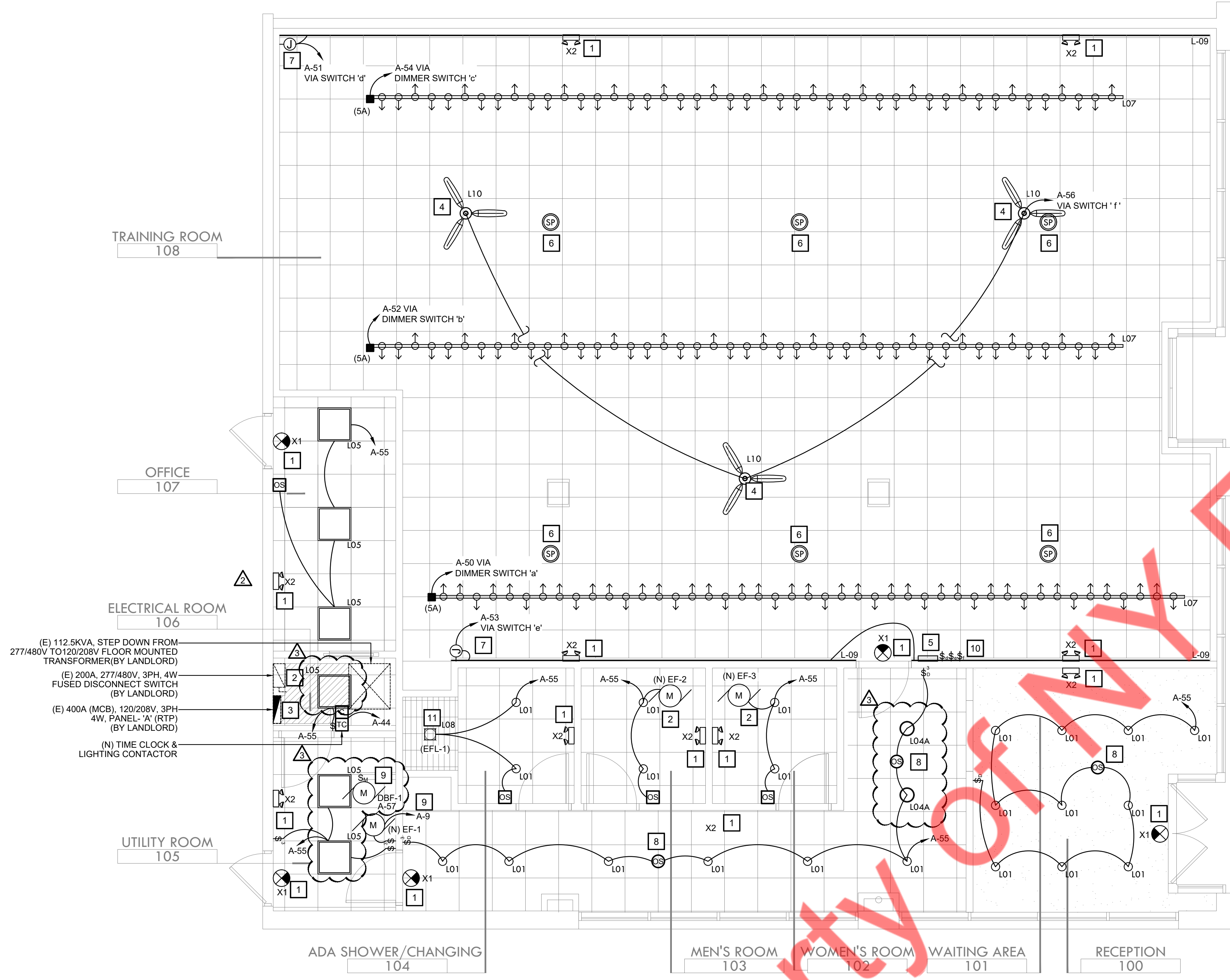


GENERAL NOTES:

- COORDINATE EXACT LOCATION AND MOUNTING HEIGHTS WITH ARCHITECTURAL PLANS. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS, DETAILS, AND LIGHTING NOTES FOR FURTHER INFORMATION OF DEVICE PLACEMENT AND OTHER RELEVANT INFORMATION.
- HATCHED AREA IS NOT IN SCOPE OF WORK.
- 'E' DENOTES EXISTING FIXTURE/DEVICE TO REMAIN. 'R' DENOTES EXISTING FIXTURE/DEVICE TO BE RELOCATED.
- SEE LIGHTING FIXTURE SCHEDULE FOR LIGHTING POWER DENSITY INFORMATION.
- PROVIDE AN UNSWITCHED 'HOT' FROM BUILDING EMERGENCY DISTRIBUTION, TO ALL IDENTIFIED EGRESS FIXTURES SHOWN.
- ALL SWITCHES FOR LIGHTS, SHADES, ETC. WHICH ARE SHOWN TO BE MOUNTED IN THE SAME GENERAL AREA SHALL BE GANGED TOGETHER AND SHARE A MULTIGANG COVER PLATE WHERE POSSIBLE.
- REFER TO SHEET E-0.4 & E-2.0 FOR LOCATION OF ELECTRICAL DISTRIBUTION PANELS.
- ALL EXIT SIGNS ARE TYPE 'X1' UNLESS OTHERWISE NOTED.
- WALL MOUNTED OCCUPANCY SENSORS W/ SINGLE OVERRIDE SHALL BE LUTRON #MS-OPS6M2-DV-WH. WALL MOUNTED OCCUPANCY SENSORS W/ DUAL OVERRIDE SHALL BE LUTRON #MS-OPS6-DDV-WH OR APPROVED EQUAL.
- THE CEILING MOUNTED OCCUPANCY SENSOR IS TO BE LUTRON LOS-CDT-2000-WH OR APPROVED EQUAL. PROVIDE POWER PACK AS REQUIRED TO COMPLETE SYSTEM. CONNECT TO THE SUPPLY SIDE OF THE SWITCH IN THIS SPACE. DEVICE SHALL CONTROL ALL SWITCHES IN THIS SPACE (I.E. SWITCHES SHALL BE ON THE LOAD SIDE OF THE SENSOR).
- ALL CONTROL CABLING PROVIDED AS A PART OF ANY LIGHTING CONTROL SYSTEM SHALL BE PLENUM RATED.
- CIRCUIT HOMERUN DESIGNATIONS ARE NOTED FOR DESIGN INTENT ONLY BASED ON FIELD OBSERVATIONS OF EXISTING PANEL SCHEDULES. WHERE AVAILABLE. CONTRACTOR TO CONFIRM ALL SPARE CIRCUIT BREAKERS AND THOSE MADE AVAILABLE DUE TO DEMOLITION.
- DIMMING SWITCHES SHALL BE LUTRON DIVA #DVVCL-153PH-WH OR APPROVED EQUAL WALL MOUNTED DIMMING SWITCHES.
- COORDINATE FINAL SWITCH LOCATIONS THROUGHOUT THE PROJECT AREA WITH OWNER AND ARCHITECT PRIOR TO ROUGH-IN.

KEYED NOTES: #

- EXIT/EMERGENCY LIGHT. CONNECT (ALWAYS HOT) TO LOCAL LIGHTING CIRCUIT AHEAD OF SWITCHING.
- NEW EXHAUST FAN INTERLOCKED WITH LIGHT SWITCH. SEE MECHANICAL DRAWINGS FOR MORE INFORMATION AND SPECIFICATIONS.
- NEW TIME CLOCKS/LIGHTING CONTACTOR FOR AUTOMATIC CONTROL OF SPACE LIGHTING CIRCUITS & WIRED TO AN OVERRIDE SWITCH/TIMER AS REQUIRED. ELECTRICAL CONTRACTOR SHALL COORDINATE ACCORDINGLY AND PROVIDE ALL REQUIRED WIRING FOR LIGHTING BRANCH CIRCUITS.
- FOR CEILING FANS. ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT ELECTRICAL REQUIREMENTS WITH EQUIPMENT VENDOR/OWNER PRIOR TO ROUGH-IN. BASE BID ACCORDINGLY.
- NEW MASTER DIMMER SWITCH BANK LOCATION. ELECTRICAL CONTRACTOR TO COORDINATE THE FINAL LOCATION OF DIMMER SWITCH BANK WITH ARCHITECT/OWNER. DIMMER SWITCHES SHALL BE RATED FOR TOTAL LOAD OF SWITCHED CIRCUIT AND LAMP TYPE AS REQUIRED. DIMMERS SHALL BE PROVIDED WITH AN ON/OFF SWITCH. SEE DETAIL IN THIS SHEET FOR ADDITIONAL INFORMATION.
- FOR SPEAKERS. ELECTRICAL CONTRACTOR SHALL COORDINATE FINAL LOCATION. QUANTITY WITH ARCHITECT /OWNER, AND EXACT ELECTRICAL REQUIREMENTS WITH SYSTEM VENDOR PRIOR TO ROUGH-IN PER THE SITE CONDITIONS. BASE BID ACCORDINGLY.
- J-BOX FOR LIGHT FIXTURE CONTRACTOR SHALL COORDINATE EXACT LOCATION AND POWER REQUIREMENT WITH THE VENDOR PRIOR TO ROUGH-IN. BASE BID ACCORDINGLY.
- OCCUPANCY SENSOR IN THE CORRIDOR AND RECEPTION AREA SHALL BE INTERCONNECTED TO CONTROL ALL LIGHTING FIXTURES WITHIN THE CORRIDOR AREA.
- NEW EXHAUST FAN OPERATED THROUGH MOTOR/WALL SWITCH. SEE MECHANICAL DRAWINGS FOR MORE INFORMATION AND SPECIFICATION.
- NEW SWITCH 'F' FOR CEILING FAN. ELECTRICAL CONTRACTOR TO COORDINATE WITH THE VENDOR FOR EXACT ELECTRICAL REQUIREMENT, PROVIDE MOTOR RATED SWITCH AS REQUIRED. BASE BID ACCORDINGLY.
- NEW EXHAUST FAN LIGHT COMBO FOR ADA SHOWER/CHANGING ROOM. TIE TO THE MOTION SENSOR CIRCUIT SERVING THE AREA. COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT REQUIREMENT.



LIGHT FIXTURE SCHEDULE

SYMBOL	TAG	MANUF.	DESCRIPTION	MODEL	WATTS	COLOR/ FINISH	LOCATION	PROV. BY	INSTALL BY	REMARKS
○	L01	HALO COMMERCIAL	CEILING MOUNTED DOWNLIGHT	HCC6 LED 6" CYLINDER DOWNLIGHT SERIES	6.5W	BLACK	RESTROOM PREP AREA	GC	GC	
○	L02	ACCESS LIGHTING	CIRCULAR PENDANT	3600 LED LAMP PULSON LED 6"	10W	MATTE BLACK	RESTROOM PREP AREA	GC	GC	
○	L03	SPECTRUM LIGHTING	PENDANT	POMME SBTANSEN MR 3.5" Ø	11W	MATTE BLACK	BEAUTY BAR PREP AREA	GC	GC	
○	L04A	SHAPER	PENDANT	845 CIRCULAR MODERN LOOP SERIES 2" Ø	80W	MATTE BLACK	RECEPTION	GC	GC	SELECT 36" Ø WHEN SPACE IS ADEQUATE
○	L04B	ACCESS LIGHTING	PENDANT	ANELLO LED 3" 5000K LED MR LAMP	42W	MATTE BLACK	RECEPTION	GC	GC	ALTERNATE TO L04A
□	L05	ARCHIPELAG O LIGHTING	LED BACK-LIT PANEL	LBP22 2'X2'	18W	MATTE BLACK	OFFICE	GC	GC	
□	L06	LUMENS	WALL SCONCE	2-COLOR LED OUTDOOR SCONCE	11W	BLACK		GC	GC	TO BE USED INDOORS
—	L07	LIGHTOLOGY	TRACK LIGHTING	TRUTRACK MAGNETIC 2-CIRCUIT TUBO SMALL TRACK HEAD	15W	BLACK	TRAINING FLOOR	GC	GC	SELECT OPTIONS BASED ON HEIGHT & CEILING TYPE
□	L08	PANASONIC	EXHAUST FAN LIGHT COMBO	FV-08-VRE2 80 CFM 1.0 SONE SINGLE SPEED	18.5W		RESTROOM/ SHOWER	GC	GC	
—	L09	ASPECT LED	LED CHANNEL FROSTED WIDE CHANNEL 6.5 FT.	SKU AL-TRK-WS-FI	120V 3000K		TRAINING FLOOR	GC	GC	REFER TO MIRROR WALL DETAIL 4/A-1.0 FOR MORE INFORMATION
○	X1	ULINE	CLEAR EDGE LIT ACRYLIC EXIT SIGN	H-8562				GC	GC	WALL
○	X2	EMERGENCY LIGHTING	WALL-MOUNTED EMERGENCY LIGHTS	MERU				GC	GC	WALL

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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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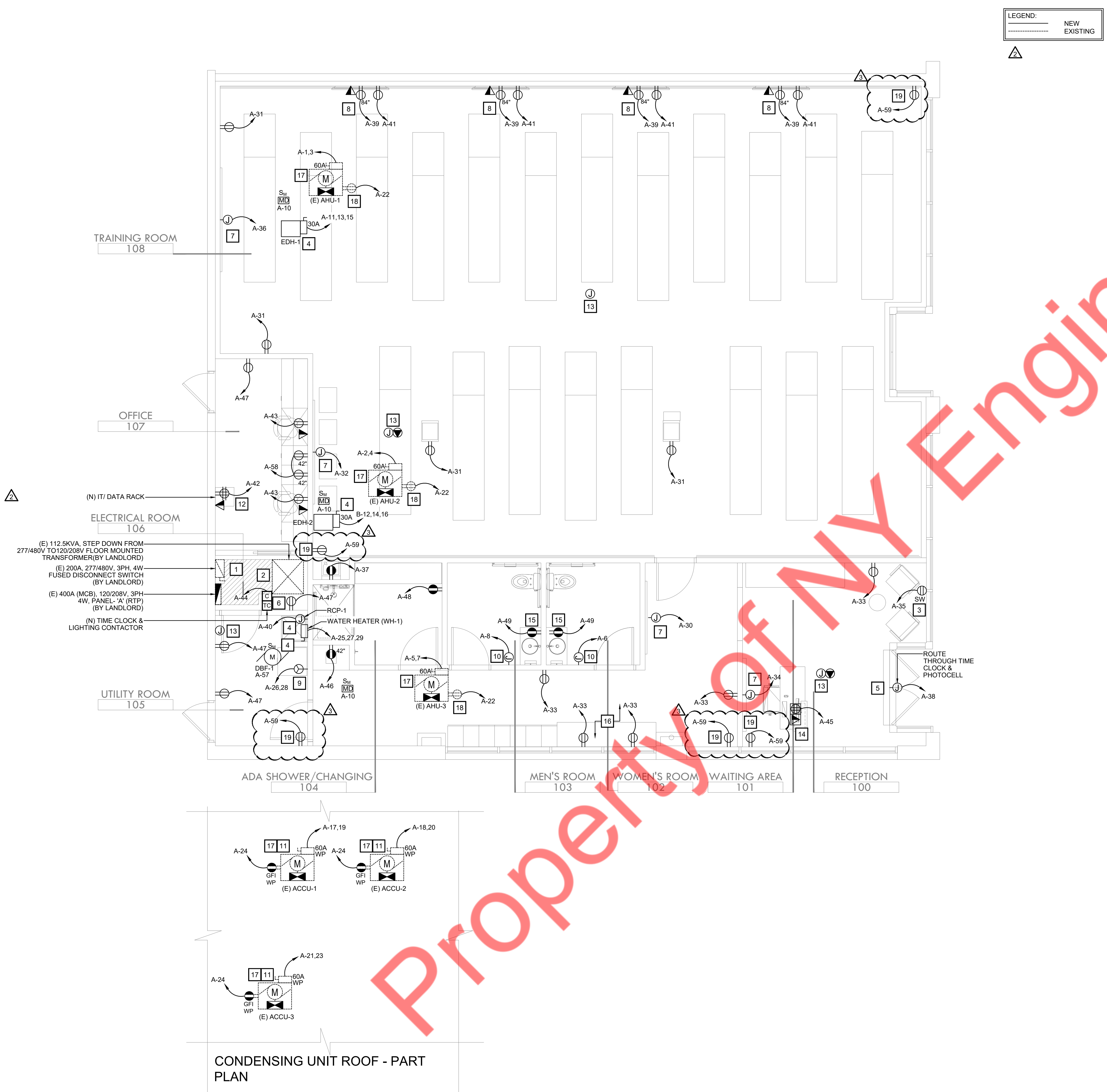


LOCATION:

PROJECT INFORMATION:
PROJECT NUMBER: 12366-25
DRAWN BY: NYE
REVIEWED BY: NYE
AREA: 3,134 SQ. FT.

TITLE:
ELECTRICAL LIGHTING PLAN

SHEET NUMBER:



LEGEND:
 _____ NEW
 _____ EXISTING

GENERAL NOTES:

- ELECTRICAL CONTRACTOR SHALL VERIFY ALL CONNECTION REQUIREMENTS FOR ALL EQUIPMENT SUPPLIED BY OTHERS PRIOR TO ROUGH-IN. COORDINATE NEMA PLUG CONFIGURATION FOR EQUIPMENT AND PROVIDE MATCHING RECEPTACLE WHERE APPLICABLE.
- COORDINATE MECHANICAL AND PLUMBING EQUIPMENT REQUIREMENTS WITH OTHER TRADES.
- COORDINATE EXACT LOCATION, QUANTITIES, AND INSTALLATION REQUIREMENTS OF EQUIPMENT IN MILLWORK.
- ALL EXTERIOR DISCONNECTS SHALL BE WEATHERPROOF.
- PROVIDE GROUNDING IN ACCORDANCE WITH NEC 250. PROVIDE A #6 CU GROUND TO ANY NEW METAL GAS PIPING SYSTEMS. FINAL CONNECTION TO ALL HARD-WIRED EQUIPMENT SHALL BE MADE WITH LIQUID-TITE FLEXIBLE CONDUIT.
- ALL CIRCUITS SHALL HAVE AN INSULATED GROUND WIRE SIZED PER NEC 250 BUT NOT SMALLER THAN #12 AWG.
- ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL DISCONNECT SWITCHES, CONDUIT, AND WIRE FOR EQUIPMENT. INSTALL UNDER SUPERVISION OF EQUIPMENT SUPPLIER.
- ALL DEDICATED CIRCUITS TO HAVE ORANGE RECEPTACLES EXCEPT MIRRORS. AND ALL WIRES ARE DIRECT HOME RUNS.
- ELECTRICAL CONTRACTOR SHALL PROVIDE ROUGH-IN FOR ALL LOW VOLTAGE CABLING. COORDINATE WITH LOW VOLTAGE CONTRACTOR.
- ELECTRICAL CABLES INTO THE CEILING SPACE BELOW THE PREMISES MUST BE PIPED WITH HARD CONDUIT TIGHT TO THE DECK AND J-BOXES OR TRANSFER BOXES AT THE CORE.
- ALL SLAB AND WALL PENETRATION TO USE FM APPROVED FIRE CAULK.
- ALL BUILDING CORE ELECTRIC ROOMS AND PANELBOARDS SHALL BE CLEANED OF ALL DUST AND DEBRIS UPON COMPLETION OF WORK.
- ALL ELECTRICAL OUTLETS WITHIN THE LEASED PREMISE WILL BE PROPERLY LABELED TO REFLECT ELECTRICAL PANEL AND BREAKER NUMBERS FROM ELECTRICAL ROOM.
- ELECTRICAL AND DATA RUNS UNDER THE TENANT'S SLAB SHALL BE IN HARD CONDUIT, INSTALLED TIGHT TO DECK.
- ALL CIRCUITS INSIDE ELECTRIC ROOM, MECHANICAL ROOM AND CORE AREAS SHALL BE IN CONDUIT.
- ELECTRICAL SWITCHES TO MATCH WHITE TO WHITE AND GRAY TO BLUE/GRAY. COORDINATE WITH ARCHITECT
- WIRELESS ACCESS POINT AND SPEAKERS SHALL BE PROVIDED BY TENANT.

KEYED NOTES: [#]

- ELECTRICAL CONTRACTOR SHALL COORDINATE THE LOCATION OF ELECTRICAL PANELS IN COMPLIANCE WITH NEC ARTICLE 110.26(A) AND (B). ELECTRICAL CONTRACTOR SHALL FIELD VERIFY THAT THE PANELS ARE UNOBSTRUCTED AND THE AREA WHERE THE PANELS ARE PLACED SHALL NOT BE USED AS A STORAGE SPACE.
- EXISTING FLOOR MOUNTED 112.5KVA PRIMARY 480/277V STEP DOWN SECONDARY 208/120V DRY TYPE TRANSFORMER FOR THE PROJECT SPACE. LANDLORD'S CONTRACTOR SHALL COORDINATE EXACT LOCATION AND MOUNTING TYPE WITH ARCHITECT/OWNER IN FIELD PRIOR TO ROUGH-IN. BASE BID ACCORDINGLY.
- PROVIDE NEW SHOW WINDOW CEILING MOUNTED RECEPTACLE AS PER NEC 210.62 AS REQUIRED. ELECTRICAL CONTRACTOR TO COORDINATE WITH ARCHITECT/OWNER FOR EXACT HEIGHT AND LOCATION PRIOR TO ROUGH-IN
- ALL MECHANICAL AND PLUMBING EQUIPMENT SHALL BE PROVIDED WITH THE REQUIRED ROUGH-INS, MOC, AND WIRE SIZE REQUIREMENTS. THE ELECTRICAL CONTRACTOR MUST COORDINATE WITH THE MANUFACTURER FOR THE EXACT TYPE OF ROUGH-INS AND WIRE SIZE BEFORE THE COMMENCEMENT OF WORK.
- JUNCTION BOX FOR STOREFRONT. PROVIDE WP/NEMA 3R RATED ACCESSIBLE J-BOX WITH SERVICE DISCONNECT SWITCH FOR TENANT SIGN. COORDINATE EXACT LOCATION AND ELECTRICAL CONNECTION REQUIREMENT WITH SIGN VENDOR PRIOR TO START OF WORK. BASE BID ACCORDINGLY.
- NEW TIME CLOCK/LIGHTING CONTACTOR FOR AUTOMATIC CONTROL OF SPACE LIGHTING CIRCUITS & WIRED TO AN OVERRIDE SWITCH/TIMER AS REQUIRED. ELECTRICAL CONTRACTOR SHALL COORDINATE ACCORDINGLY AND PROVIDE ALL REQUIRED WIRING FOR LIGHTING BRANCH CIRCUITS.
- JUNCTION BOX FOR INTERIOR SIGN'S. ELECTRICAL CONTRACTOR TO COORDINATE EXACT ELECTRICAL REQUIREMENT, LOCATION & MOUNTING HEIGHT WITH THE VENDOR/ARCHITECT/OWNER IN FIELD. BASE BID ACCORDINGLY.
- PROVIDE POWER AND CAT6E DATA POINT CONNECTIONS FOR TELEVISION AT LOCATION SHOWN. ELECTRICAL CONTRACTOR TO COORDINATE EXACT ELECTRICAL REQUIREMENT, LOCATION & MOUNTING HEIGHT WITH THE VENDOR/ARCHITECT/OWNER IN FIELD PRIOR TO ROUGH-IN. BASE BID ACCORDINGLY.
- FOR WASHER/DRYER. ELECTRICAL CONTRACTOR SHALL VERIFY EXACT POWER REQUIREMENTS WITH THE OWNER/ARCHITECT/MANUFACTURER PRIOR TO ROUGH-IN. PROVIDE THE OUTLET AS PER EQUIPMENT CUTSHEET. BASE BID ACCORDINGLY.
- CONTRACTOR SHALL PROVIDE POWER PROVISION FOR HAND DRYER. COORDINATE EXACT POWER REQUIREMENTS IN COORDINATION WITH OWNER/EQUIPMENT VENDOR IN FIELD SPACE. BASE BID ACCORDINGLY.
- CONTRACTOR TO VERIFY IN THE FIELD IF ANY RECEPTACLE IS PRESENT WITHIN 25FT OF HVAC UNIT. FACTORY-MOUNTED POWERED CONVENIENCE OUTLET. FIELD VERIFY THAT OUTLET IS POWERED. WIRE ALL WITH THIS NOTE TO CIRCUIT SHOWN IF THEY ARE NOT POWERED. IF FACTORY-MOUNTED POWERED CONVENIENCE OUTLET IS NOT PROVIDED, A 120V 20A GFI WEATHERPROOF RECEPTACLE SHALL BE PROVIDED WITHIN 25 FT OF ALL HVAC EQUIPMENT. FIELD COORDINATE EXACT LOCATION OF HVAC EQUIPMENT AND ADD ADDITIONAL RECEPTACLES IF REQUIRED.
- FOR NEW IT RACK. CONTRACTOR TO COORDINATE EXACT LOCATION, MOUNTING HEIGHT WITH SYSTEM VENDOR/OWNER IN FIELD. BASE BID ACCORDINGLY.
- JUNCTION BOX FOR WIFI/WAP/CAT. PROVIDE POWER WITH NO DATA DROPOUTS. COORDINATE EXACT QUANTITY, LOCATION AND ELECTRICAL REQUIREMENT WITH LOW VOLTAGE VENDOR PRIOR TO ROUGH-IN. BASE BID ACCORDINGLY.
- POWER AND DATA FOR DEVICES ON RECEPTION DESK. ELECTRICAL CONTRACTOR TO COORDINATE EXACT LOCATION, POWER REQUIREMENT WITH MILLWORK/VENDOR /OWNER PRIOR TO ROUGH-IN. BASE BID ACCORDINGLY.
- POWER PROVISION FOR ILLUMINATED MIRROR'S. ELECTRICAL CONTRACTOR TO COORDINATE EXACT LOCATION/ MOUNTING HEIGHT/POWER REQUIREMENT WITH ARCHITECT/OWNER IN FIELD PRIOR TO ROUGH-IN. BASE BID ACCORDINGLY.
- ELECTRICAL CONTRACTOR TO COORDINATE EXACT LOCATION/ MOUNTING HEIGHT OF RECEPTACLE WITH ARCHITECT/OWNER IN FIELD PRIOR TO ROUGH-IN. BASE BID ACCORDINGLY.
- EXISTING HVAC UNITS TO REMAIN. UTILIZE EXISTING DISCONNECT IF IT'S IN OPERABLE CONDITION, OTHERWISE PROVIDE NEW. REUSE EXISTING FEEDER IF POSSIBLE. RECONNECT IT TO NEW ELECTRICAL PANEL. EXTEND FEEDER, CONDUIT AS NEEDED OTHERWISE PROVIDE NEW FEEDER AS REQUIRED. ELECTRICAL CONTRACTOR TO COORDINATE EXACT ELECTRICAL REQUIREMENT & LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
- DEDICATED RECEPTACLE FOR CONDENSATE PUMP. ELECTRICAL CONTRACTOR TO COORDINATE EXACT LOCATION AND POWER REQUIREMENT WITH MECHANICAL CONTRACTOR/MANUFACTURER PRIOR TO ROUGH-IN. BASE BID ACCORDINGLY.
- FOR CAMERAS/ SPEAKERS (SONOS) ELECTRICAL CONTRACTOR TO COORDINATE EXACT ELECTRICAL REQUIREMENT, LOCATION/ MOUNTING HEIGHT OF RECEPTACLE WITH ARCHITECT/VENDOR/OWNER IN FIELD PRIOR TO ROUGH-IN. BASE BID ACCORDINGLY.

CONSULTANTS
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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05/06/25	CLIENT COMMENTS
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03/11/25	CLIENT COMMENTS



LOCATION:

PROJECT INFORMATION:
 PROJECT NUMBER: 12366-25
 DRAWN BY: NYE
 REVIEWED BY: NYE
 AREA: 3,134 SQ. FT.

TITLE:
 ELECTRICAL POWER PLAN

SHEET NUMBER:

E-2.0

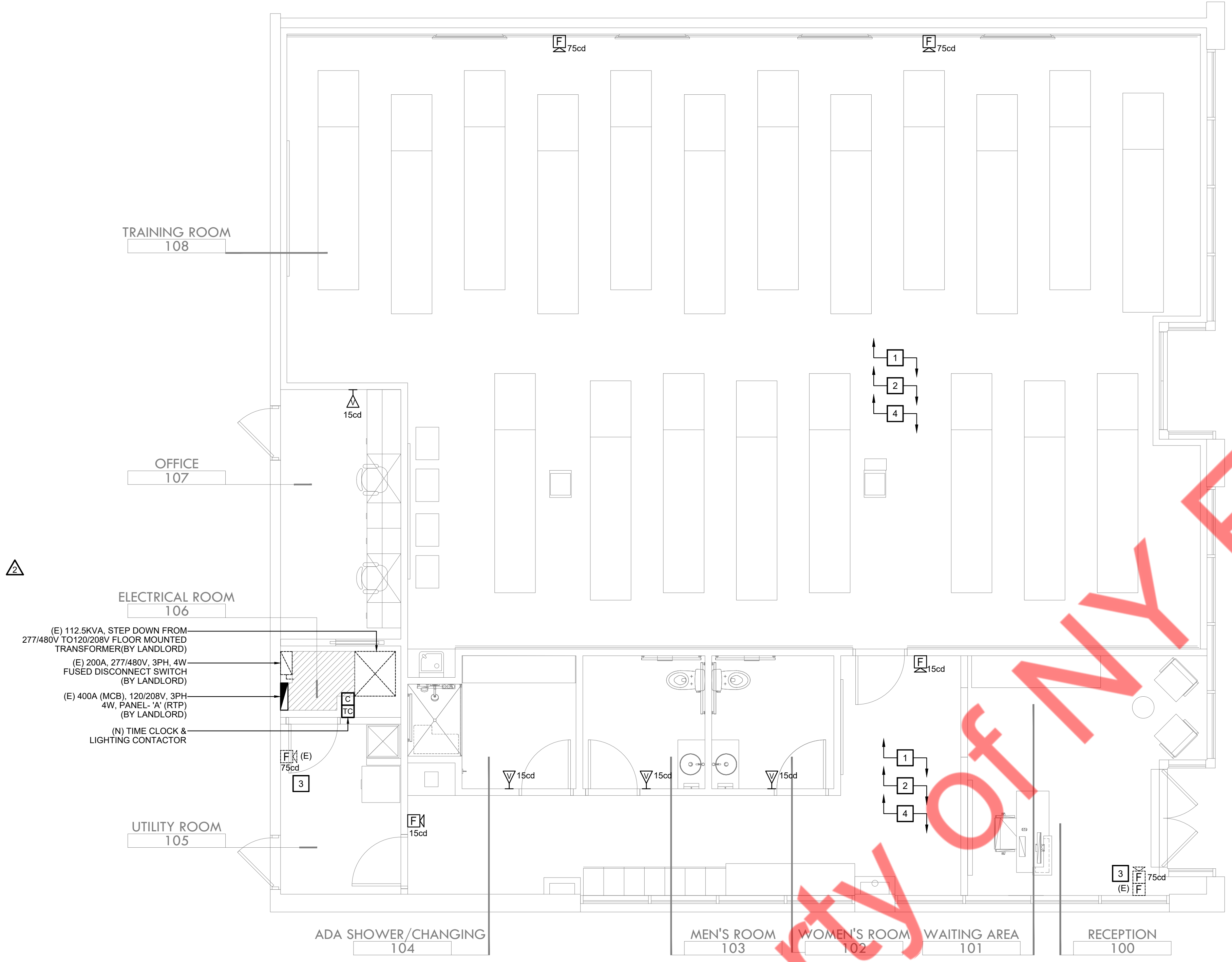
LEGEND:
 ——— NEW
 - - - - - EXISTING

GENERAL NOTES:

- COORDINATE ALL DEVICE LOCATIONS AND MOUNTING HEIGHTS WITH THE ARCHITECT & FURNITURE VENDOR PRIOR TO INSTALLATION.
- HATCHED AREA NOT IN THIS SCOPE OF WORK.
- 'E' DENOTES EXISTING DEVICE TO REMAIN, 'R' DENOTES EXISTING DEVICE TO BE RELOCATED.
- ALL FIRE ALARM CABLING SHALL BE IN EMT WHERE EXPOSED. ANY FIRE ALARM CABLING ABOVE THE CEILING SHALL BE PLENUM RATED.
- FOR EXISTING AND/OR RELOCATED DEVICES ADJUST STROBE LEVELS TO APPROPRIATE RATING SHOWN. IF ADJUSTABILITY IS UNAVAILABLE REPLACE WITH NEW.
- FIRE ALARM SOUND LEVELS AND INTELIGIBILITY SHALL COMPLY WITH CHAPTER 9 OF THE APPLICABLE STATE BUILDING CODE.
- VERIFY PROPER FUNCTIONALITY OF ALL EXISTING AND RELOCATED FIRE ALARM DEVICES, INCLUDING THEIR HOUSING, LENSES, ETC. PROVIDE REPLACEMENTS AS REQUIRED IF ANY ARE NOT OPERATING AS INTENDED OR HAVE ABOVE NORMAL WEAR OR DEFECTS.
- FIRE ALARM CONTRACTOR SHALL COORDINATE ALL THE FIRE ALARM DEVICE LOCATION WITH THE REFLECTED CEILING PLAN AND CONFIRM IN THE FIELD WITH ARCHITECT/OWNER.
- ALL DEVICES SHALL BE COMPATIBLE WITH AND MAINTAIN THE UL LISTING OF EXISTING FA SYSTEM.
- G.C. SHALL FIELD VERIFY EXACT REQUIREMENTS FOR FIRE ALARM SYSTEM PRIOR TO BID. SUPPLY AND INSTALL ALL NECESSARY EQUIPMENT AS REQUIRED.
- REFER TO DRAWING, E-0.1 FOR FIRE ALARM NOTES, SYMBOL LIST, ABBREVIATIONS.
- FINAL CONDUIT/CABLE ROUTING SHALL BE DETERMINED IN-FIELD, AND PRIOR TO THE COMMENCEMENT OF WORK, COORDINATED WITH OTHER TRADE CONTRACTORS AND THE OWNER.
- CONFIRM REQUIRED DEVICES AND SEQUENCE OF OPERATION WITH FIRE ALARM CONTRACTOR.

KEYED NOTES: #

- ALL NEW DEVICES SHALL BE CONNECTED TO BASE BUILDING'S EXISTING FIRE ALARM CONTROL PANEL (FACP). CONTRACTOR SHALL COORDINATE THE EXACT LOCATION AND OPERABLE CONDITION IN FIELD IN COORDINATION WITH ARCHITECT/OWNER. BASE BID ACCORDINGLY.
- ALL NEW DEVICES SHALL BE COMPATIBLE WITH AND MAINTAIN THE UL LISTING OF THE EXISTING FA SYSTEM. CONNECT ALL NEW FIRE ALARM SYSTEM DEVICES TO EXISTING FIRE ALARM CONTROL PANEL AS REQUIRED. BASE BID ACCORDINGLY.
- EXISTING FIRE ALARM PULL & HORN/STROBE TO REMAIN. CONTRACTOR TO FIELD VERIFY THE OPERABLE CONDITION, PROVIDE NEW IF FOUND INOPERABLE. BASE BID ACCORDINGLY.
- FIRE ALARM CONTRACTOR SHALL COORDINATE THE EXACT LOCATION OF TAMPER AND WATER FLOW SWITCHES IN FIELD. COORDINATE THE EXACT QUANTITY OF TAMPER AND WATER FLOW SWITCHES WITH SPRINKLER CONTRACTOR IN FIELD. BASE BID ACCORDINGLY.



- (E) 112.5KVA, STEP DOWN FROM 277/480V TO 120/208V FLOOR MOUNTED TRANSFORMER (BY LANDLORD)
- (E) 200A, 277/480V, 3PH, 4W FUSED DISCONNECT SWITCH (BY LANDLORD)
- (E) 400A (MCB), 120/208V, 3PH 4W, PANEL- 'A' (RTP) (BY LANDLORD)
- (N) TIME CLOCK & LIGHTING CONTACTOR

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

ARCHITECT/ENGINEER SEAL:

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF NEW JERSEY.
 LICENSE NO. 04626459100
 EXPIRATION DATE: 04/30/2026

CONTRACTOR'S NOTES:
 WRITTEN DIMENSIONS HOLD PREFERENCE OVER SCALED DIMENSIONS. DO NOT SCALE THE DRAWINGS. THE CONTRACTORS MUST VISIT JOB SITE TO VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE SUBMITTING BIDS. REPORT ANY DISCREPANCIES OF ANY CONDITIONS WHICH MAY INTERFERE WITH THE PROPER EXECUTION OF THE CONTRACT TO THE TENANT'S REPRESENTATIVE. REPORT DISCREPANCIES DURING BIDDING PROCESS AND BEFORE START OF CONSTRUCTION. CHANGE ORDERS NEED TO BE APPROVED BY STRONG PLATES CONSTRUCTION MANAGER FOR ISSUES ARISING FROM THE FIELD CONDITIONS OR CONFLICTS BETWEEN THE PLANS AND THE EXISTING CONDITIONS PRIOR TO THE COMMENCEMENT OF WORK.

DATE	ISSUE
02.27.25	CLIENT/LL REVIEW SET
03.11.25	CLIENT COMMENTS
03.14.25	PERMIT SUBMISSION
04.21.25	CLIENT COMMENTS
05.06.25	CLIENT COMMENTS

DATE	REVISION
05/06/25	CLIENT COMMENTS
04/21/25	CLIENT COMMENTS
03/11/25	CLIENT COMMENTS



LOCATION:

PROJECT INFORMATION:
 PROJECT NUMBER: 12366-25
 DRAWN BY: NYE
 REVIEWED BY: NYE
 AREA: 3,134 SQ. FT.

TITLE:
FIRE ALARM PLAN

SHEET NUMBER:

E-3.0

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