#### GENERAL NOTES

#### COORDINATION

EACH CONTRACTOR SHALL COORDINATE ITS CONSTRUCTION OPERATIONS WITH THOSE OF OTHER CONTRACTORS AND ENTITIES TO ENSURE EFFICIENT AND ORDERLY INSTALLATION OF EACH PART O THE WORK. EACH CONTRACTOR SHALL COORDINATE ITS OPERATIONS WITH OPERATIONS, INCLUDED IN DIFFERENT SECTIONS, THAT DEPEND ON EACH OTHER FOR PROPER INSTALLATION, CONNECTION, AND

- SCHEDULE CONSTRUCTION OPERATIONS IN SEQUENCE REQUIRED TO OBTAIN THE BEST RESULTS WHERE INSTALLATION OF ONE PART OF THE WORK DEPENDS ON INSTALLATION OF OTHER COMPONENTS, BEFORE OR AFTER
- ITS OWN INSTALLATION. 2. COORDINATE INSTALLATION OF DIFFERENT COMPONENTS WITH OTHER CONTRACTORS TO ENSURE MAXIMUM PERFORMANCE AND ACCESSIBILITY FOR REQUIRED MAINTENANCE, SERVICE, AND REPAIR.
- MAKE ADEQUATE PROVISIONS TO ACCOMMODATE ITEMS SCHEDULED FOR LATER INSTALLATION.
- EXISTING CONDITIONS AND DESIGN CONSTRAINTS. FAILURE TO MEET THIS REQUIREMENT SHALL NOT BE JUSTIFICATION FOR FAULTY INSTALLATION OR ADDITIONAL COSTS. 5. SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR
- WORK, AND PAY ALL FEES FOR REQUIRED WORK. COMPLY WITH ALL CURRENT LAWS, BUILDING CODES AND REGULATIONS FEDERAL, STATE AND LOCAL AUTHORITIES HAVING JURISDICTION. IN THE EVENT OF CONFLIC BETWEEN THE CONTRACT DOCUMENTS AND THE LOCAL AUTHORITY HAVING JURISDICTION, THE LATTER SHALL RULE ANY CHANGES RESULTING SHALL BE MADE WITHOUT THE CONTRACTOR SHALL REPORT ANY SUCH MODIFICATIONS BEFORE PROCEEDING. SHOULD THE REQUIREMENTS OF TH CONTRACT DOCUMENTS EXCEED THE REQUIREMENTS OF THE CODES, THE CONTRACT DOCUMENTS SHALL GOVERN, PROVIDED THOSE REQUIREMENTS ARE NOT IN CONFLICT WITH THOSE CODES. ALL ITEMS OF EQUIPMENT AND ALL

ESTABLISHED BY UNDERWRITERS' LABORATORIES, INC. (UL),

FACTORY MUTUAL (FM), AMERICAN STANDARD CODES, ASME,

- APPROVED AND SHALL BEAR APPROVAL LABELS. PENETRATIONS OF WALLS AND FLOORS OF FIRE-RATED ASSEMBLIES SHALL COMPLY WITH ASTM, U.L., AND THE AUTHORITIES HAVING JURISDICTION. IF THE DRAWINGS AND SPECIFICATIONS ARE IN CONFLICT THE GREATER AMOUNT OF WORK SHALL BE PRICED. BRING
- THE CONFLICT TO THE ATTENTION OF THE ENGINEER AND REQUEST DIRECTION. 9. DRAWINGS ARE DIAGRAMMATIC AND ARE NOT INTENDED TO SHOW ALL FITTINGS, COMPONENTS AND OFFSETS, ETC. THE CONTRACTOR SHALL PROVIDE ALL FITTINGS, COMPONENTS, OFFSFTS OR OTHER FEATURES REQUIRED FOR THE FULL OPERATIONAL CONDITION OF THIS PROJECT.
- CONFIRM DIMENSIONS AND LOCATIONS IN THE FIELD. DRAWINGS ARE NOT TO BE SCALED AND ARE NOT INTENDED SHOW EXACT LOCATIONS BASED ON SCALING 11. GUARANTEE LABOR AND MATERIALS OF ENTIRE INSTALLATION FOR ONE YEAR. WORK BELOW FLOOR OR OVER CORRIDORS SHALL BE PERFORMED AT THE OWNER'S CONVENIENCE AND MAY BE REQUIRED TO BE DONE DURING EVENINGS AND WEEKENDS. DEMOLITION DAMAGE TO EXISTING
- DEVICES THAT WERE SUPPORTED BY WALLS BEING REMOVED. 12. ELECTRONIC COPIES OF CAD DRAWINGS OF THE CONTRACT DRAWINGS WILL NOT BE PROVIDED BY THE ENGINEER FOR CONTRACTOR'S USE IN PREPARING SUBMITTALS OR AS-BUILT DRAWINGS

MATERIALS/EQUIPMENT WILL BE REPAIRED AT NO ADDITIONAL

# **ACOUSTIC TREATMENT**

- A. IT IS THE INTENT OF THESE DRAWINGS TO SPECIFY AND FOR THE CONTRACTOR TO INSTALL SYSTEMS THAT ARE QUIET AND FRFF OF VIBRATION. EQUIPMENT SHALL BE BALANCED AND VIBRATION ISOLATED TO MEET THE REQUIREMENTS SPECIFIED HEREIN FOR BOTH THE EQUIPMENT ITSELF AND CONDITION WITHIN OCCUPIED SPACES. THIS CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND INSTALLING EQUIPMENT THAT IS QUIET IN OPERATION AS COMPARED TO OTHER AVAILABLE EQUIPMENT OF TS SIZE. CAPACITY, AND TYPE B. EQUIPMENT NOT MEETING THESE REQUIREMENTS SHALL BE
- CORRECTED BY THE CONTRACTOR TO AN ACCEPTABLE LEVEL BUT WITHIN THE REQUIREMENTS OF THE SPECIFICATIONS AT NO COST TO THE OWNER. ARCHITECT OR ENGINEER. C. AIR DISTRIBUTION EQUIPMENT SHALL BE SOUND TESTED AT THE DESIGN OPERATING CONDITIONS AND SHALL NOT EXCEED A MAXIMUM DISCHARGE NC RATING OF 25 OR A RADIATED NC RATING OF 30 AT RATED CFM.

D. UNLESS NOTED OTHERWISE HEREIN OR ON THE DRAWINGS. THE

NOISE LEVEL IN ALL OCCUPIED SPACES SHALL NOT EXCEED "LOWEST VALUE IN THE RANGE" OF THE NOISE CRITERIA CURVES. PUBLISHED IN THE CURRENT FUNDAMENTALS EDITION OF THE ASHRAE GUIDE AND DATA BOOK. THE NOISE CRITERIA CURVES SHALL BE BASED ON ANSI STANDARD S1.6-1967 OCTAVE BANDS AND A SOUND PRESSURE LEVEL IN DECIBELS REFERENCED TO 0.002 MICROBARS. SOUND LEVELS IN OCCUPIED SPACES MUST. MEET THE DESIGN CRITERIA WITH ALL CONSTRUCTION IN PLACE. E. SHOULD A QUESTION ARISE REGARDING THE ACCEPTABLE LEVEL OF NOISE OR VIBRATION IN A PARTICULAR SPACE OR PIECE O EQUIPMENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE SERVICES OF AN APPROVED ACQUISTICAL CONSULTANT TO DETERMINE ACTUAL NOISE/VIBRATION CONDITIONS.

### SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. ELECTRONIC COPIES OF CAD DRAWINGS OF THE CONTRACT DRAWINGS WILL NOT BE PROVIDED BY THE ENGINEER FOR CONTRACTOR'S USE IN PREPARING SUBMITTALS OR AS-BUILT B. COORDINATE PREPARATION AND PROCESSING OF SUBMITTALS WITH PERFORMANCE OF CONSTRUCTION ACTIVITIES. COORDINATE EACH SUBMITTAL WITH FABRICATION, PURCHASING, TESTING, DELIVERY, OTHER SUBMITTALS, AND RELATED ACTIVITIES THAT REQUIRE SEQUENTIAL ACTIVITY. SUBMIT ALL ITEMS REQUIRED FOR EACH

SPECIFICATION SECTION CONCURRENTLY. C. ALLOW TIME FOR SUBMITTAL REVIEW, INCLUDING TIME FOR RESUBMITTALS, AS FOLLOWS. TIME FOR REVIEW SHALL COMMENCE ON ENGINEER'S RECEIPT OF SUBMITTAL. BECAUSE OF FAILURE TO TRANSMIT SUBMITTALS ENOUGH IN ADVANCE OF THE WORK TO PERMIT PROCESSING, INCLUDING RESUBMITTALS.

I. INITIAL REVIEW: ALLOW 7 DAYS FOR INITIAL REVIEW OF REQUIRE SUPPLY AIR ECONOMIZERS. EACH SUBMITTAL EXCLUSIVE OF ALLOW ADDITIONAL TIME IF COORDINATION WITH SUBSEQUENT SUBMITTALS IS REQUIRED. RESUBMITTAL REVIEW: ALLOW 7 DAYS FOR REVIEW OF EACH RESUBMITTAL EXCLUSIVE OF TRAVEL TIME. D. PLACE A PERMANENT LABEL OR TITLE BLOCK ON EACH PAPER COPY SUBMITTAL ITEM FOR PLACE A PERMANENT LABEL OR TITLE

- BLOCK ON EACH PAPER COPY SUBMITTAL ITEM FOR IDENTIFICATION. INDICATE NAME OF FIRM OR ENTITY THAT PREPARED EACH SUBMITTAL ON LABEL OR TITLE BLOCK. E. INCLUDE THE FOLLOWING INFORMATION FOR PROCESSING AND ECORDING ACTION TAKEN: PROJECT NAME.
- NAME OF ARCHITECT. NAME OF ENGINEER.
- NAME OF CONTRACTOR NAME OF SUBCONTRACTOR.
- NAME OF SUPPLIER.
- NAME OF MANUFACTURER F CONTRACTOR'S REVIEW-
- REVIEW EACH SUBMITTAL AND CHECK FOR COORDINATION WITH OTHER WORK OF THE CONTRACT AND FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS. NOTE CORRECTIONS AND FIELD DIMENSIONS. MARK WITH APPROVAL STAMP BEFORE SUBMITTING TO ARCHITECT/ENGINEER. STAMP EACH SUBMITTAL WITH A UNIFORM, APPROVAL STAMP. PROVIDE A STATEMENT CERTIFYING THAT SUBMITTAL HAS BEEN REVIEWED, CHECKED, AND APPROVED FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS AND THE PHYSICAL SPACE LIMITATIONS AT THE SITE, PROVIDE A STATEMENT CERTIFYING THAT SUBMITTAL HAS BEEN REVIEWED. CHECKED, AND APPROVED FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS AND THE PHYSICAL SPACE LIMITATIONS AT THE SITE THE GENERAL CONTRACTOR IS DEFERRING THE ABOVE REQUIREMENTS TO THE SUBCONTRACTOR. THEN SUBCONTRACTOR MUST ALSO REVIEW, STAMP AND CERTIFY THE

ENGINEER'S ACTION ENGINEER WILL NOT REVIEW SUBMITTALS THAT DO NOT BEAR CONTRACTOR'S APPROVAL STAMP AND WILL RETURN THEM. ENGINEER WILL REVIEW EACH SUBMITTAL. NOTE CORRECTIONS OR MODIFICATIONS REQUIRED, AND RETURN IT. ENGINEER WIL PROVIDE SUBMITTAL WITH AN ACTION SHEET TO INDICATE

#### REQUESTS FOR INFORMATION (RFI)

IMMEDIATELY ON DISCOVERY OF THE NEED FOR ADDITIONAL INFORMATION OR INTERPRETATION OF THE CONTRACT DOCUMENTS, CONTRACTOR SHALL PREPARE AND SUBMIT AN RFI IN THE FORM

- 1. ENGINEER WILL RETURN RFIS SUBMITTED TO ENGINEER BY OTHER ENTITIES CONTROLLED CONTRACTOR WITH NO COORDINATE AND SUBMIT RFIS IN A PROMPT MANNER SO AS TO AVOID DELAYS IN CONTRACTOR'S WORK OR WORK OF INCLUDE A PROPOSED SOLUTION AS WELL AS INCLUDE
- DETAILED, LEGIBLE DESCRIPTION OF ITEM NEEDING INFORMATION OR INTERPRETATION, INCLUDE SKETCHES DESCRIPTIONS. MEASUREMENTS. PHOTOS. PRODUCT DATA. SHOP DRAWINGS, COORDINATION DRAWINGS, AND OTHER INFORMATION NECESSARY TO FULLY DESCRIBE ITEMS NEEDING INTERPRETATION.

#### RECORD DRAWINGS

- WITHIN 90 DAYS OF COMPLETION OF THE PROJECT, CONTRACTOR SHALL SUBMIT TO THE ENGINEER, A COMPLETE SET OF "AS BUILT" DRAWINGS PORTRAYING ACTUAL SITE CONDITIONS THE MECHANICAL, ELECTRICAL, PLUMBING AND FIR PROTECTION WORK. SUBMISSION SHALL CONSIST OF ONE SET O PAPER SEPIAS AND ONE SET OF CAD FILES IN AUTOCAD 2003 FORMAT. ENGINEER AND ARCHITECT SEALS AND LOGOS SHALL BE "AS-BUILT DRAWINGS WITHIN 90 DAYS OF COMPLETION OF THE PROJECT,
- CONTRACTOR SHALL SUBMIT TO THE ENGINEER, A COMPLETE SET OF "O&M MANUALS". EQUIPMENT DATA. HVAC AIR AND WATER BALANCING REPORT, AND LIGHTING CONTROL TESTING REPORT FOR COMPLIANCE WITH CURRENT ENERGY CODE CONTRACTOR SHALL PROVIDE A WRITTEN CERTIFICATION THAT ALI NEW MATERIALS AND COMPONENTS DO NOT CONTAIN ASBESTOS

#### REQUIRED SUBMITTALS

PROVIDE FOUR BOUND PRODUCT DATA SUBMITTALS FOR THE NEW EQUIPMENT LISTED BELOW TO THE ARCHITECT/ENGINEER. EACH CONTRACTOR RESPONSIBLE FOR THE WORK SHALL REVIEW AND CONTRACT DOCUMENTS AND THE PHYSICAL SPACE LIMITATIONS.

- . AIR HANDLING UNITS . FAN COIL UNITS
- AIR DISTRIBUTION DEVICES ELECTRICAL TRANSFORMERS
- LIGHTING FIXTURES WIRING DEVICES B. PLUMBING FIXTURES
- AIR AND WATER BALANCE REPORTS 10. CIRCUIT DIRECTORY CARDS

#### <u>MECHANICAL AND SERVICE WATER HEATING COMMISSIONING</u>

- ALL REQUIREMENTS SHALL BE PERFORMED PER THE CURRENTLY ADOPTED ENERGY CONSERVATION CODE IN THE AUTHORIT HAVING JURISDICTION. THE FOLLOWING IS NOT A COMPLETE SYSTEMS ADJUSTING AND BALANCING: HVAC SYSTEMS SHALL E BALANCED IN ACCORDANCE WITH GENERALLY ACCEPTE NGINEERING STANDARDS. AIR AND WATER FLOW RATES SHALL B MEASURED AND ADJUSTED TO DELIVER FINAL FLOW RATES WITHIN TOLERANCES PROVIDED IN THE PRODUCT SPECIFICATIONS. TEST AND BALANCE ACTIVITIES SHALL INCLUDE AIR SYSTEM AND HYDRONIC SYSTEM BALANCING. THE FOLLOWING SYSTEMS ARE
- MECHANICAL SYSTEMS AND SERVICE WATER HEATER SYSTEMS IN BUILDINGS WHERE THE TOTAL MECHANICAL EQUIPMENT CAPACITY IS LESS THAN 480,000 BTUH COOLING CAPACITY AND 600,000 BTUH COMBINED SERVICE WATER HEATING AND SPACE HEATING CAPACITY. SYSTEMS THAT SERVE INDIVIDUAL DWELLING UNITS AND
- AIR SYSTEMS BALANCING: EACH SUPPLY AIR OUTLET AND ZONE TERMINAL DEVICE SHALL BE EQUIPPED WITH MEANS FOR AIR BALANCING. DISCHARGE DAMPERS USED FOR AIR SYSTEM VARIABLE VOLUME FANS WITH MOTORS 10HP AND LARGER. AIF SYSTEMS SHALL BE BALANCED IN A MANNER TO FIRST MINIMIZ THROTTLING LOSSES THEN FOR FANS WITH SYSTEM POWER OF GREATER THAT 1 HP, FAN SPEED SHALL BE ADJUSTED TO MEET OR LESS ARE NOTE REQUIRED TO BE PROVIDED WITH A MEANS FOR AIR BALANCING
- ADBUNIC SASTEM BY WICHIG! INDIVIDITAL HADBUNIC REVIEW AND COOLING COILS SHALL BE FOUIPPED WITH A MEANS FOR BALANCING AND MEASURING FLOW. HYDRONIC SYSTEMS SHALL BE PROPORTIONATELY BALANCED IN A MANNER TO FIRST MINIMIZE THROTTLING LOSSES. THEN THE PUMP IMPELLER SHALI TRIMMED OR PUMP SPEED SHALL BE ADJUSTED TO MEET DESIGN FLOW CONDITIONS, EACH HYDRONIC SYSTEM SHALL HAVE EITHER THE CAPABILITY TO MEASURE PRESSURE ACROSS THE PUMP, OF TEST PORTS AT EACH SIDE OF EACH PUMP. THE FOLLOWING EQUIPMENT IS NOT REQUIRED TO BE EQUIPPED WITH A MEANS FOR BALANCING OR MEASURING FLOW:
- PUMPS WITH PUMP MOTORS OF 5 HP (3.7 KW) OR LESS . Where throttling results in no greater than : PERCENT OF THE NAMEPLATE HORSEPOWER DRAW ABOVE THAT REQUIRED IF THE IMPELLER WERE TRIMMED. FUNCTIONAL PERFORMANCE TESTING. FUNCTIONAL PERFORMANCE TESTING SHALL BE CONDUCTED. EQUIPMENT. EQUIPMENT FUNCTIONAL PERFORMANCE TESTING SHALL DEMONSTRATE THE INSTALLATION AND OPERATION OF
- COMPONENTS, SYSTEMS. AND SYSTEM-TO-SYSTEM NTERFACING RELATIONSHIPS IN ACCORDANCE WITH APPROVED PLANS AND SPECIFICATIONS SUCH THAT OPERATION FUNCTION AND MAINTENANCE SERVICEABILITY FOR FACH OF THE COMMISSIONED SYSTEMS IS CONFIRMED. TESTING SHALL INCLUDE ALL MODES AND SEQUENCE OF OPERATION. INCLUDING UNDER FULL-LOAD, PART-LOAD AND THE OLLOWING EMERGENCY CONDITIONS 1.1. MODES AS DESCRIBED IN THE SEQUENCE OF
- OPERATION. 1.2. REDUNDANT OR AUTOMATIC BACK-UP MODE. PERFORMANCE OF ALARMS.
- 1.4. MODE OF OPERATION UPON A LOSS OF POWER AND RESTORATION OF POWER. EXCEPTION: UNITARY OR PACKAGED HVAC EQUIPMENT THAT DO NOT
- CONTROLS. HVAC AND SERVICE WATER-HEATING CONTROL SYSTEMS SHALL BE TESTED TO DOCUMENT THAT CONTROL COMPONENTS. EQUIPMENT AND SYSTEMS AF CALIBRATED AND ADJUSTED AND OPERATE IN ACCORDANCE WITH APPROVED PLANS AND SPECIFICATIONS. SEQUENCES OF OPERATION SHALL BE FUNCTIONALLY TESTED TO DOCUMENT THEY OPERATE IN ACCORDANCE WITH APPROVED PLANS AND SPECIFICATIONS ECONOMIZERS. AIR ECONOMIZERS SHALL UNDERGO A FUNCTIONAL TEST TO DETERMINE THAT THEY OPERATE IN ACCORDANCE WITH

#### MANUFACTURER'S SPECIFICATIONS. LIGHTING SYSTEM FUNCTIONAL TESTING

A. ALL REQUIREMENTS SHALL BE PERFORMED PER THE CURRENTLY ADOPTED ENERGY CONSERVATION CODE IN THE AUTHORITY

HAVING JURISDICTION. THE FOLLOWING IS NOT A COMPLETE B. OCCUPANT SENSOR CONTROLS. WHERE OCCUPANT CONTROLS ARE PROVIDED, THE FOLLOWING PROCEDURES SHALL RE PERFORMED CERTIFY THAT THE OCCUPANT SENSOR HAS BEEN LOCATED AND AIMED IN ACCORDANCE WITH MANUFACTURER FOR PROJECTS WITH SEVEN OR FEWER OCCUPANT SENSORS, EACH SENSOR SHALL BE TESTED. FOR PROJECTS WITH MORE THAN SEVEN OCCUPANT SENSORS. TESTING SHALL BE DONE FOR EACH UNIQUE COMBINATION OF SENSOR TYPE AND SPACE GEOMETRY. WHERE MULTIPLES OF EACH UNIQUE COMBINATION SENSOR TYPE AND SPACE GEOMETRY ARE PROVIDED, LESS THAN 10 PERCENT, BUT IN NO CASE LESS THAN ONE OF EACH COMBINATION SHALL BE TESTED UNLESS THE CODE OFFICIAL OR DESIGN PROFESSIONAL REQUIRES A HIGHER PERCENTAGE TO BE TESTED. WHERE 30 PERCENT OR MORE OF THE TESTED CONTROLS FAIL, ALL REMAINING IDENTICAL COMBINATIONS SHALL BE TESTED. FOR OCCUPANT SENSOR

CONTROLS TO BE TESTED. VERIFY THE FOLLOWING:

3.1. WHERE OCCUPANT SENSOR CONTROLS INCLUDE STATUS INDICATORS, VERIFY CORRECT OPERATION. 3.2. THE CONTROLLED LIGHTS TURN OFF OR DOWN TO PERMITTED LEVEL WITHIN THE REQUIRED TIME 3.3. FOR AUTO-ON OCCUPANT SENSOR CONTROLS, THE

LIGHTS TURN ON TO THE PERMITTED LEVEL WHEN AN

MCGILL. OR AN APPROVED EQUAL.

ALL ROUND TAKE-OFFS SHALL BE MADE WITH A DAMPE

ALL DUCTWORK SUPPORTS SHALL BE PER TABLE 5-1 OF TH

SMACNA MANUAL WITH ALL SUPPORTS DIRECTLY ANCHORED TO

THE BUILDING STRUCTURE. SUPPORTS SHALL BE ON MAXIMUM

8'- 0" CENTERS WITH ADDITIONAL SUPPORTS AS REQUIRED TO

FLEXIBLE DUCT FABRIC CONNECTIONS SHALL BE INSTALLED ON

THE INLET AND OUTLET CONNECTIONS TO ALL POWERED AIR

MOVING EQUIPMENT WHICH IS NOT CONNECTED WITH FLEXIBLE

DUCT. A MINIMUM OF 1" OF SLACK SHALL BE ALLOWED IN

ALL FLEXIBLE CONNECTIONS TO INSURE VIBRATION ISOLATION

FLEXIBLE FABRIC SHALL BE A MINIMUM OF 3 INCHES WIDE WITH

"GRIP-LOC" SEAM TO 24 GAUGE GALVANIZED METAL SIDE

CONNECTORS A MINIMUM OF 3 INCHES WIDE EACH. FLEXIBLE

CONNECTION ARE TO FABRICATED WITH FLIGEN "ZIPPERLOCK"

#ZLN-4 NEOPRENE COATED 30 OZ. FIBERGLASS WITH 24

GAUGE GALVANIZED IRON SIDE CONNECTORS. OR DURO DYNE

EXCELON "METAL-FAB" VINYL COATED 22 OZ. NYLON WITH 24

GAUGE GALVANIZED IRON SIDE CONNECTORS OR "APPROVED

INSTALL MANUAL SPLITTER DAMPERS IN BRANCH TAKE-OFFS WHERE SHOWN. SPLITTER DAMPERS SHALL BE MINIMUM 16

GAUGE GALVANIZED SHEET METAL AND SHALL BE 3/4 OF TH

WIDTH OF THE SMALLEST TAKE-OFF BUT NO LESS THAN 6"

LONG. DAMPERS SHALL HAVE 1/8" OF CLEARANCE IN THE DUCT IN WHICH THEY ARE INSTALLED. SPLITTER DAMPERS

SHALL BE CONTROLLED BY ONE OR MORE CONTROL RODS IN

ACCORDANCE WITH FIG. 2-5 OF THE SMACNA MANUAL. WHER

SPLITTERS ARE IN CONCEALED INACCESSIBLE LOCATIONS, SUBMIT

SOLDERED JOINTS AND SEAMS AND SHALL BE PAINTED WITH A

UNO, EACH NEW EQUIPMENT SHALL BE PROVIDED WITH A

PRE-FILTER WITH A MINIMUM FILTRATION OF MERV-11 FILTER

FFFICIENCY SHALL BE RATED IN ACCORDANCE WITH ASHRAF

UNO, EACH NEW EQUIPMENT SHALL BE PROVIDED WITH A

BI-POLAR IONIZATION DEVICE(S) THAT MUST MEET UL-2998

STANDARD CERTIFICATION (ENVIRONMENTAL CLAIM VALIDATION

PROCEDURE (ECVP) FOR ZERO OZONE EMISSIONS FOR AIR

STREAM SUPPLY DUCTWORK OR INSIDE THE EQUIPMENT. UNO,

THE POWER TO THE DEVICE(S) SHALL BE COMING FROM THE

FOLIPMENT'S POWER SOLIRCE AND INTERLOCKED WITH THE

EQUIPMENT'S OPERATION. THE NUMBER OF THE DEVICES SHAL

A. FLEXIBLE DUCT SHALL BE USED FOR CONNECTIONS TO AI

REQUIREMENT AND AREA OF COIL FACE COVERAGE.

REQUIRED, PROVIDE RIGID DUCTWORK

BE SELECTED AND DESIGNED PER THE MANUFACTURER

GUIDELINES TO MEET THE DESIGN AIR FLOW CAPACITY

DISTRIBUTION DEVICES WHERE SHOWN ON THE DRAWINGS OR

SPECIFIED HEREIN. MAXIMUM LENGTH SHALL BE 5'-0" FOR AIF

ASSEMBLY CONSISTING OF A GALVANIZED STEEL OR SPIRAL

ALUMINUM HELIX. STAINLESS INNER LINER SHALL BE

COMPOSED OF 3-PLY ALUMINUM FOIL OR HEAVILY COATED

BTU/HR/SF/\*F. THE ASSEMBLY SHALL BE SHEATHED IN A

THE FLEXIBLE DUCT ASSEMBLY SHALL BE SUITABLE FOR A

MINIMUM OF 6" W.C. WORKING PRESSURE AND SHALL B

LISTED CLASS I BY THE UNDERWRITERS LABORATORY AT A FLAME SPREAD OF NOT OVER 25 AND A SMOKE DEVELOPED

RATE OF NOT OVER 50. DUCTS SHALL ALSO COMPLY WITH NFPA

FLEXIBLE DUCTS SHALL BE SUPPORTED IN SUCH A MANNER T

PREVENT SAGS AND KINKS. BENDS IN ANY LENGTH OF FLEXIBLE

DUCT SHALL NOT EXCEED 90° FOR AIR DISTRIBUTION DEVICE.

ALL JOINTS AND CONNECTIONS SHALL BE MADE WITH 1/2" WIDE

STAINLESS STEEL DUCT CLAMPS OR 100% NYLON SELF-LOCKING

FLEX MASTER TYPE 8M OR APPROVED EQUAL (EQUIVALENT TO

PROVIDE ALL TEMPERATURE CONTROLS MODIFICATIONS

MINERAL-FIBER BLANKET INSULATION: MINERAL OR GLASS

FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 553, TYPE II AND ASTM C 1290, TYPE III WITH FACTORY—APPLIED FSK JACKET. EQUIVALENT TO R-6.

PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS,

CERTAINTEED CORP.; SOFTTOUCH DUCT WRAP

KNAUF INSULATION: FRIENDLY FEEL DUCT WE

OWENS CORNING; SOFTR ALL-SERVICE DUCT WRAP.

MINERAL-FIBER ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS

2, GRADE A. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

BUSINESS OF H. B. FULLER COMPANY; CP-127.

BUSINESS OF H. B. FULLER COMPANY; 85-60/85-70.

4. MON-ECO INDUSTRIES, INC.; 22-25.
FOR INDOOR APPLICATIONS, USE ADHESIVE THAT HAS A VOC

CONTENT OF 80 G/L OR LESS WHEN CALCULATED ACCORDING

ASJ ADHESIVE, AND FSK JACKET ADHESIVE: COMPLY WITH

ACKET LAP SEAMS AND JOINTS. PRODUCTS: SUBJECT TO

MPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE

CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC.,

FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A

FOR INDOOR APPLICATIONS, USE ADHESIVE THAT HAS A VOC

CONTENT OF 50 G/L OR LESS WHEN CALCULATED ACCORDING

MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS,

JACKETS, AND SUBSTRATES; COMPLY WITH MIL-PRF-19565C,

CONTENT OF 50 G/L OR LESS WHEN CALCULATED

FOSTER BRAND. SPECIALTY CONSTRUCTION BRANDS. INC., A

BUSINESS OF H. B. FULLER COMPANY; 30-80/30-90.

ACCORDING TO 40 CFR 59. SUBPART D (FPA METHOD 24).

MIL-A-3316C, CLASS 2, GRADE A FOR BONDING INSULATION

A BUSINESS OF H. B. FULLER COMPANY: CP-82.

EAGLE BRIDGES - MARATHON INDUSTRIES; 225.

BUSINESS OF H. B. FULLER COMPANY; 85-50.

4. MON-ECO INDUSTRIES, INC.: 22-25.

VIMASCO CORPORATION: 749.

TO 40 CFR 59, SUBPART D (EPA METHOD 24).

EAGLE BRIDGES - MARATHON INDUSTRIES; 225.

TO 40 CFR 59, SUBPART D (EPA METHOD 24).

DLLOWING

CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS. INC..

FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A

JOHNS MANVILLE: MICROLITE

MANSON INSULATION INC.: ALLEY WR

F. IF IT COMPLIES WITH THESE SPECIFICATIONS, FLEXIBLE

DUCTWORK OF THE FOLLOWING TYPES WILL BE ACCEPTABLE

CLAMPS MANUFACTURED BY PANDUIT CORPORATION OR AN

B. INSULATED FLEXIBLE DUCT SHALL BE A FACTORY FABRICATED

FIBERGLASS WITH A MAXIMUM THERMAL CONDUCTANCE OF

REINFORCED METALIZED VAPOR BARRIER OUTER JACKET.

ISTRIBUTION DEVICE CONNECTIONS. WHERE LONGER RUNS ARE

CLEANERS) THE DEVICE(S) SHALL BE MOUNTED IN THE DOWN

52-76. AIRFLOW SHALL NOT BE GREATER THAN 500 FPM.

N. DUCTWORK WHICH IS EXPOSED TO WEATHER SHALL HAVE

PROPOSED CONTROL ROD DETAILS FOR APPROVAL

SUITABLE EPOXY COATING.

HVAC FILTRATION AND AIR QUALITY

FLEXIBLE DUCTWORK

CONNECTIONS.

WITH THEIR DAMPER AXIS PARALLEL TO AIR FLOW.

EXTRACTOR SPIN-IN COLLAR. SPIN-INS SHALL BE INSTALLED

OCCUPANT ENTERS THE SPACE. 3.4. FOR MANUAL-ON OCCUPANT SENSOR CONTROLS. THE LIGHTS TURN ON ONLY WHEN MANUALLY ACTIVATED. 3.5 THE LIGHTS ARE NOT INCORRECTLY TURNED ON BY MOVEMENT IN ADJACENT AREAS OR BY HVAC OPERATION. TIME-SWITCH CONTROLS. WHERE TIME-SWITCH CONTROLS ARE

CONFIRM THAT THE TIME-SWITCH CONTROL IS PROGRAMMED

WITH ACCURATE WEEKDAY, WEEKEND AND HOLIDAY SCHEDULES. PROVIDE DOCUMENTATION TO THE OWNER OF TIMESWITCH CONTROLS PROGRAMMING INCLUDING WEEKDAY, WEEKEND, SCHEDULES, AND SET-UP AND PREFERENCE PROGRAM SETTINGS

PROVIDED, THE FOLLOWING PROCEDURES SHALL BE PERFORMED:

- VERIFY THE CORRECT TIME AND DATE IN THE TIME SWITCH. VERIFY THAT ANY BATTERY BACK-UP IS INSTALLED AND ENERGIZED. VERIFY THAT THE OVERRIDE TIME LIMIT IS SET TO NOT MORE 6. SIMULATE OCCUPIED CONDITION. VERIFY AND DOCUMENT THE
- 6.1. ALL LIGHTS CAN BE TURNED ON AND OFF BY RESPECTIVE AREA CONTROL SWITCH. 6.2. THE SWITCH ONLY OPERATES LIGHTING IN THE ENCLOSED SPACE IN WHICH THE SWITCH IS LOCATED. SIMULATE UNOCCUPIED CONDITION. VERIFY AND DOCUMENT THE FOLLOWING:

. NONEXEMPT LIGHTING TURNS OFF

FOLLOWING:

- 7.2. MANUAL OVERRIDE SWITCH ALLOWS ONLY THE LIGHTS IN THE ENCLOSED SPACE WHERE THE OVERRIDE SWITCH IS LOCATED TO TURN ON OR REMAIN ON UNTIL THE NEXT SCHEDULED SHUTOFF OCCURS. ADDITIONAL TESTING AS SPECIFIED BY THE REGISTERED DAYLIGHT RESPONSIVE CONTROLS. WHERE DAYLIGHT RESPONSIVE CONTROLS ARE PROVIDED, THE FOLLOWING SHALL BE VERIFIED:
- CONTROL DEVICES HAVE BEEN PROPERLY LOCATED, FIELD CALIBRATED AND SET FOR ACCURATE SETPOINTS AND HRESHOLD LIGHT LEVELS. DAYLIGHT CONTROLLED LIGHTING LOADS ADJUST TO LIGHT LEVEL SET POINTS IN RESPONSE TO AVAILABLE DAYLIGHT THE LOCATIONS OF CALIBRATION ADJUSTMENT EQUIPMENT ARE READILY ACCESSIBLE ONLY TO AUTHORIZED PERSONNEL.

#### MECHANICAL SPECIFICATIONS SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

GENERAL FABRICATION REQUIREMENTS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" BASED ON REQUIRED STATIC-PRESSURE CLASS

B. TRANSVERSE JOINTS: SELECT JOINT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 2-1, DUCT/TRANSVERSE JOINTS," RECTANGULAR MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS — METAL AND FLEXIBLE." C. LONGITUDINAL SEAMS: SELECT SEAM TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 2-2, "RECTANGULAR DUCT/LONGITUDINAL SEAMS." STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS,

MATERIALS INVOLVED. DUCT-SUPPORT INTERVALS. AND OTHER

PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE. ELBOWS, TRANSITIONS, OFFSETS, BRANCH CONNECTIONS, OTHER DUCT CONSTRUCTION: SELECT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," CHAPTER 4, "FITTINGS AND OTHER CONSTRUCTION," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE.

# SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

- GENERAL FABRICATION REQUIREMENTS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," CHAPTER 3, "ROUND, OVAL, AND FLEXIBLE DUCT," BASED ON INDICATED STATIC-PRESSURE CLASS UNLESS OTHERWISE INDICATED. FLAT-OVAL DUCTS: INDICATED DIMENSIONS ARE THE DUCT WIDTH (MAJOR DIMENSION) AND DIAMETER OF THE ROUND REQUIRED FOR A COMPLETE AND FUNCTIONING CONTROLS SYSTEM. SIDES CONNECTING THE FLAT PORTIONS OF THE DUCT (MINOR ALL CONTROLS SHALL MATCH BUILDING STANDARD
- TRANSVERSE JOINTS: SELECT JOINT TYPES AND FABRICATE DUCT INSULATION ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE." FIGURE 3-1. "ROUND DUCT TRANSVERSE JOINTS." FOR STATIC-PRESSURE CLASS. APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE.'
- LONGITUDINAL SEAMS: SELECT SEAM TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 3-2, "ROUND DUCT LONGITUDINAL SEAMS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE.
- TEES AND LATERALS: SELECT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 3-5, "90 DEGREE TEES AND LATERALS," AND FIGURE 3-6, "CONICAL TEES," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT—SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."

### SHEET METAL DUCTWORK

A. GENERAL MATERIAL REQUIREMENTS: COMPLY WITH SMACNA' "HVAC DUCT CONSTRUCTION STANDARDS 🦰 METAL AND FLEXIBLE" FOR ACCEPTABLE MATERIALS, MATERIAL THICKNESSES, AND DUCT CONSTRUCTION METHODS UNLESS OTHERWISE INDICATED. SHEET METAL MATERIALS SHALL B FREE OF PITTING, SEAM MARKS, ROLLER MARKS, STAINS, DISCOLORATIONS, AND OTHER IMPERFECTIONS.

B. GALVANIZED SHEET STEEL: COMPLY WITH ASTM A 653/A SUPPLY AND RETURN DUCTWORK SHALL BE EXTERNALLY INSULATED WITH EXTERNAL BLANKET INSULATION, DUCTWORK SHALL BE INTERNALLY LINED ONLY WHERE SPECIFICALLY INDICATED. DUCTWORK SHALL BE SEALED AS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION AND AS REQUIRED TO LIMIT LEAKAGE. LEAKAGE IN EXCESS OF 5% SHALL NOT BE

UNI-GRIP AS MÄNUFACTURED BY UNITED

- FOR INDOOR APPLICATIONS, USE MASTICS THAT HAVE A VOC ACCEPTABLE. DUCT DIMENSIONS ARE INSIDE CLEAR DIMENSION F. INTERIOR SURFACE OF ALL DUCTWORK SHALL BE SMOOTH WITH NO SHEETMETAL OR OTHER PARTS PROJECTING INTO THE AIR VAPOR-BARRIER MASTIC: WATER BASED: SUÍTABLE FOR INDOO STREAM. ALL SEAMS AND JOINTS SHALL BE EXTERNAL. THE INSIDE OF ALL DUCTWORK SHALL BE THOROUGHLY CLEANED AND ALL FANS OPERATED TO REMOVE ANY DEBRIS PRIOR TO USE ON BELOW AMBIENT SERVICES. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF CONNECTION OF AIR DISTRIBUTION DEVICES. ALL DUCTWORK DIMENSIONS ON THE DRAWINGS ARE CLEAR INSTALL ALL DUCTWORK TIGHT TO STRUCTURE UNLESS WATER-VAPOR PERMEANCE: ASTM E 96/E 96M, PROCEDURE B, OTHERWISE NOTED. THE MECHANICAL CONTRACTOR SHALL COORDINATE WITH ALL OTHER TRADES PRIOR TO THE 0.013 PERM (0.009 METRIC PERM) AT 43-MIL (1.09-MM) DRY FILM THICKNESS. SERVICE TEMPERATURE RANGE: MINUS 20 TO CONSTRUCTION OR INSTALLATION OF DUCTWORK. TRANSVERSE JOINTS SHALL BE SEALED WITH A WATER
- CONTENT: ASTM D 1644, 58 PERCENT BY VOLUME AND 70 BASE ADHESIVE SEALER DESIGNED FOR USE IN MEDIUM PERCENT BY WEIGHT, COLOR: WHITE, WHITE, VELOCITY DUCT SYSTEMS. SEALER SHALL BE EFFECTIVE AGAINST BOTH NEGATIVE AND POSITIVE PRESSURE LOSSES. SEALER SHALL HAVE A FLAME SPREAD RATING OF 25 OR LESS FSK AND METAL JACKET FLASHING SEALANTS: PRODUCTS: AND A SMOKE DEVELOPED RATING OF 50 OR LESS. APPLY SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE UN-THINNED WITH BRUSH, TROWEL OR CAULKING GUN AS PER THE FOLLOWING: THE MANUFACTURER'S RECOMMENDATIONS AND ALLOW TO DRY CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC. FOR A MINIMUM OF 48 HOURS BEFORE AIR IS APPLIED TO A BUSINESS OF H. B. FULLER COMPANY; CP-76. THE SYSTEM. SEALER SHALL BE "IRON GRIP WATER BASE EAGLE BRIDGES - MARATHON INDUSTRIES; 405. DUCT SEALANT #601" AS MANUFACTURED BY HARDCAST, INC., FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 95-44.

4. MON-ECO INDUSTRIES, INC.: 44-05.

- MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES, FIRE- AND WATER-RESISTAN FLEXIBLE, ELASTOMERIC SEALANT. SERVICE TEMPERATURE RANGE: MINUS 40 TO PLUS 250 DEG F (MINUS 40 TO PLUS 121 DEG C). COLOR: ALUMINUM. FÓR INDOOR APPLICATIONS, USE SEALANTS THAT HAVE A VOC CONTENT OF 420 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).
- FSK TAPE: FOIL-FACE, VAPOR-RETARDER TAPE MATCHING FACTORY-APPLIED JACKET WITH ACRYLIC ADHESIVE; COMPLYING WITH ASTM C 1136. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS. PROVIDE ONE OF THE FOLLOWING: ABI, IDEAL TAPE DIVISION: 491 AWF FSK.
- AVERY DENNISON CORPORATION, SPECIALTY TAPES DIVISION; 3. COMPAC CORPORATION; 110 AND 111. 4. VENTURE TAPE; 1525 CW NT, 1528 CW, AND 1528 CW/SQ. WIDTH: 3 INCHES (75 MM)
- THICKNESS: 6.5 MILS (0.16 MM). ADHESION: 90 OUNCES FORCE/INCH (1.0 N/MM) IN WIDTH. ELONGATION: 2 PERCENT. TENSILE STRENGTH: 40 LBF/INCH (7.2 N/MM) IN WIDTH. FSK TAPE DISKS AND SQUARES: PRECUT DISKS OR SQUARES

## SECUREMENTS

GEMCO CD

PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING: ITW INSULATION SYSTEMS; GERRARD STRAPPING AND SEALS. 2. RPR PRODUCTS, INC.; INSUL-MATE STRAPPING, SEALS, AND ALUMINUM: ASTM B 209 (ASTM B 209M), ALLOY 3003, 3005,

3105, OR 5005; TEMPER H-14, 0.020 INCH (0.51 MM) THICK,

1/2 INCH (13 MM) WIDE WITH WING SEAL OR CLOSED SEAL. INSULATION PINS AND HANGERS: CAPACITOR-DISCHARGE-WELD PINS: COPPER— OR ZINC—COATED STEEL PIN, FULLY ANNEALED FOR CAPACITOR-DISCHARGE WELDING. 0.106-INCH- (2.6-MM-) DIAMETER SHANK, LENGTH TO SUIT DEPTH OF INSULATION SUBJECT TO COMPLIANCE WITH INDICATED. PRODUCTS: REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING: AGM INDUSTRIES, INC.; CWP-1.

#### MIDWEST FASTENERS INC. CD 4. NELSON STUD WELDING; TPA, TPC, AND TPS.

INSTALLATION OF MINERAL-FIBER INSULATION BLANKET INSULATION INSTALLATION ON DUCTS AND PLENUMS: SECURE WITH ADHESIVE AND INSULATION PINS. APPLY ADHESIVES ACCORDING TO MANUFACTURER'S RECOMMENDED COVERAGE RATES PER UNIT AREA. FOR 100 PERCENT COVERAGE OF DUCT AND PLENUM SURFACES. APPLY ADHESIVE TO ENTIR CIRCUMFERENCE OF DUCTS AND TO ALL SURFACES OF FITTING AND TRANSITIONS. INSTALL EITHER CAPACITOR—DISCHARG<mark>E—W</mark>ELD PINS AND SPEED WASHERS OR CUPPED—HEAD, CAPACITOR—DISCHARGE—WELD PINS ON SIDES AND BOTTOM OF HORIZONTAL DUCTS AND SIDES OF VERTICAL DUCTS AS

- ON DUCT SIDES WITH DIMENSIONS 18 INCHES (450 MM)
   AND SMALLER, PLACE PINS ALONG LONGITUDINAL CENTERLINE OF DUCT. SPACE 3 INCHES (75 MM) MAXIMUM FROM INSULATION END JOINTS, AND 16 INCHES (400 MM) ON DUCT SIDES WITH DIMENSIONS LARGER THAN 18 IN
- (450 MM), PLACE PINS 16 INCHES (400 MM) O.C. EACH WAY, AND 3 INCHES (75 MM) MAXIMUM FROM INS INSTALL ADDITIONAL PINS TO HOLD INSULATION TIGHTLY AGAINST SURFACE AT CROSS BRACING PINS MAY BE OMITTED FROM TOP SURFACE OF HORIZONTAL,
- RECTANGULAR DUCTS AND PLENUMS.
  DO NOT OVERCOMPRESS INSULATION DURING INSTALLATION. IMPALE INSULATION OVER PINS AND ATTACH SPEED EXCESS PORTION OF PINS EXTENDING BEYOND SPEED ERS OR BEND PARALLEL WITH INSULATION SURFACE COVER EXPOSED PINS AND WASHERS WITH TAPE MATCHING INSULATION FACING.
- DUCTS AND PLENUMS WITH SURFACE TEMPERATURES AMBIENT, INSTALL A CONTINUOUS UNBROKEN VAPO CREATE A FACING LAP FOR LONGITUDINAL SEAMS AND END JOINTS WITH INSULATION BY REMOVING 2 INCHES (50 FROM ONE EDGE AND ONE END OF INSULATION SEGMENT. SECURE LAPS TO ADJACENT INSULATION SECTION WITH 2-INCH (13-MM) OUTWARD-CLINCHING STAPLES, 1 INCH (25 INSTALL VAPOR BARRIER CONSISTING OF FACTORY-OR FIELD-APPLIED JACKET, ADHESIVE, VAPOR-BARRIER MASTIC, AND SEALANT AT JOINTS, SEAMS, AND PROTRUSIONS. REPAIR PUNCTURES TEARS AND PENETRATIONS WITH TAPE OR MASTIC TO MAINTAIN VAPOR-BARRIER SEAL. INSTALL VAPOR STOPS FOR DUCTWORK AND PLENUMS OPERATING BELOW 50 DEG F (10 DEG C) AT 18-F007 (5.5-M) INTERVALS. VAPOR STOPS SHALL CONSIST OF VAPOR-BARRIER MASTIC APPLIED IN A Z-SHAPED PATTERN OVER INSULATION FACE, ALONG BUTT END OF INSULATION, ID OVER THE SURFACE. COVER INSULATION FACE AN
- OVERLAP LINEACED BLANKETS A MINIMUM OF 2 INCHES (50 MM) ON LONGITUDINAL SEAMS AND END JOINTS. AT END JOINTS. SECURE WITH STEEL BANDS SPACED A MAXIMUM OF 18 INCHES (450 MM) O.C. INSTALL INSULATION ON RECTANGULAR DUCT ÈLBOWS ÁND TRANSITIONS WITH A FULL INSULATION SECTION FOR EACH SURFACE. INSTALL INSULATION ON ROUND AND FLAT-OVAL DUCT ELBOWS WITH INDIVIDUALLY MITERED GORES CUT TO FIT THE ELBOW. INSULATE DUCT STIFFENERS, HANGERS, AND FLANGES THAT PROTRUDE BEYOND INSULATION SURFACE WITH 6-INCH- (150-MM-) WIDE STRIPS OF SAME MATERIAL USED TO INSULATE DUCT. SECURE ON ALTERNATING SIDES OF STIFFENER, HANGER, AND FLANGE WITH PINS SPACED 6 INCHES (150 MM) O.C.

SURFACE TO BE INSULATED A WIDTH EQUAL TO TWO TIMES

THE INSULATION THICKNESS. BUT NOT LESS THAN 3 INCHES

A. FIBROUS-GLASS DUCT LINER: COMPLY WITH ASTM C 1071 NFPA 90A. OR NFPA 90B: AND WITH NAIMA AH124. "FIBROUS GLASS DUCT LINER STANDARD." MAXIMUM THERMAL CONDUCTIVITY:

- TYPE I, FLEXIBLE: 0.27 BTU X IN./H X SQ. FT. X DEG F (0.039W/M X K) T 75 DEG F (24 DEG C) MEAN TEMPERATURE. R6 EQUIVALENT. TYPE II, RIGID: 0.23 BTU X IN./H X SQ. FT. X DEG F (0.033 W/M X K)-R6 EQUIVALENT. ANTIMICROBIAL EROSION-RESISTANT COATING: APPLY TO THE SURFACE OF THE LINER THAT WILL FORM THE INTERIOR SURFACE OF THE DUCT TO ACT AS A MOISTURE REPELLENT AND EROSION—RESISTANT COATING. ANTIMICROBIAL COMPOUND SHALL BE TESTED FOR EFFICACY BY AN NRTL AND REGISTERED BY THE EPA FOR USE IN HVAC WATER-BASED LINER ADHESIVE: COMPLY WITH NFPA 90A OR NFPA 90B AND WITH ASTM C 916. FOR INDOOR APPLICATIONS. USE ADHESIVE THAT HAS A VOC CONTENT OF 80 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART (FPA MFTHOD 24).
- SHOP APPLICATION OF DUCT LINER: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 7-11, "FLEXIBLE DUCT LINER INSTALLATION." ADHERE A SINGLE LAYER OF INDICATED THICKNESS OF DUCT LINER WITH 100 PERCENT ADHESIVE COVERAGE AT LINER CONTACT SURFACE AREA. ATTAINING INDICATED THICKNESS WITH MULTIPLE LAYERS OF DUCT LINER IS PROHIBITED.

# CHILLED WATER / CONDENSATE PIPING

- A. STEEL PIPE: ASTM A 53/A 53M, BLACK STEEL WITH PLAIN
- B. CAST-IRON THREADED FITTINGS: ASME B16.4; CLASSES 125 C. MALLEABLE-IRON THREADED FITTINGS: ASME B16.3, CLASSES
- PLUS 180 DEG F (MINUS 29 TO PLUS 82 DEG C). SOLIDS D. MALLEABLE-IRON UNIONS: ASME B16.39: CLASSES 150. 250.
  - CAST-IRON PIPE FLANGES AND FLANGED FITTINGS: ASME B16.1, CLASSES 25, 125, AND 250; RAISED GROUND FACE, AND BOLT HOLES SPOT FACED. WROUGHT-STEEL FITTINGS: ASTM A 234/A 234M, WALL
  - G. WROUGHT CAST- AND FORGED-STEEL FLANGES AND FLANGED

THICKNESS TO MATCH ADJOINING PIPE.

FITTINGS: ASME B16.5 INCLUDING WROUGHT CAST— AND FORGED-STEEL FLANGES AND FLANGED FITTINGS: ASME B16.5, INCLUDING BOLTS, NUTS, AND GASKETS OF THE FOLLOWING MATERIAL GROUP, END CONNECTIONS, AND FACINGS: MATERIAL GROUP: 1.1. END CONNECTIONS: BUTT WELDING. FACINGS: RAISED FACE.

- GROOVED MECHANICAL—JOINT FITTINGS AND COUPLINGS: MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
- ANVIL INTERNATIONAL, INC. CENTRAL SPRINKLER COMPANY; A DIVISION OF TYCO FIRE & BUILDING PRODUCTS. NATIONAL FITTINGS, INC
- S.P. FITTINGS; A DIVISION OF STAR PIPE PRODUCTS. VICTAULIC COMPANY.
- JOINT FITTINGS: ASTM A 536, GRADE 65-45-12 DUCTILE IRON; ASTM A 47/A 47M, GRADE 32510 MALLEABLE IRON; ASTM A 53/A 53M, TYPE F. E. OR S. GRADE B FABRICATED STEEL: OR ASTM A 106, GRADE B STEEL FITTINGS WITH GROOVES SHOULDERS CONSTRUCTED TO ACCEPT GROOVED-COUPLINGS; WITH NUTS, BOLTS, LOCKING PIN, LOCKING TOGGLE, OR LUGS TO SECURE GROOVED PIPE AND FITTINGS. COUPLINGS: DUCTILE— OR MALLEABLE—IRON HOU<mark>SIN</mark>G AND RUBBER GASKET OF CENTRAL CAVITY PRESSURE-RESPONSIVE DESIGN; WITH NUTS, BOLTS, PIN, LOCKING TOGGLE, OR LUGS TO SECURE GROOVED PIPE
- CHILLED-WATER PIPING. ABOVEGROUND, NPS 2 (DN 50) AND SMALLER, SHALL BE THE FOLLOWING: SCHEDULE 40 STEEL PIPE; CLASS 150, MALLEABLE-IRON CAST-IRON FLANGES AND FLANGE FITTI
- AND LARGER, SHALL BE ANY OF THE FOLLOWING: 1. SCHEDULE 40 STEEL PIPE, WROUGHT-STEEL FITTINGS AND WROUGHT-CAST OR FORGED-STEEL FLANGES AND FLANGE FITTINGS, AND WELDED AND FLANGED JOINTS. 2. SCHEDULE 40 STEEL PIPE; GROOVED, MECHANICAL JOINT COUPLING AND FITTINGS; AND GROOVED, MECHANICAL

CHILLED-WATER PIPING, ABOVEGROUND, NPS 2-1/2 (DN 65)

- CONDENSATE—DRAIN PIPING: TYPE M (C) DRAWN—TEMPER COPPER TUBING, WROUGHT—COPPER FITTINGS, AND SOLDERED
- ANGERS AND SUPPORTS: INSTALL THE FOLLOWING PIPE ATTACHMENTS: ADJUSTABLE STEEL CLEVIS HANGERS FOR INDIVIDUAL ORIZONTAL PIPING LESS THAN 20 FEET (6 M) LONG. ADJUSTABLE ROLLER HANGERS AND SPRING HANGERS FOR INDIVIDUAL HORIZONTAL PIPING 20 FEET (6 M) OR LONGER. PIPE ROLLER: MSS SP-58, TYPE 44 FOR MULTIPLE HORIZONTAL PIPING 20 FEET (6 M) OR LONGER, UPPORTED ON A TRAPEZE
- SPRING HANGERS TO SUPPORT VERTICAL RUNS. PROVIDE COPPER-CLAD HANGERS AND SUPPORTS FOR HANGERS AND SUPPORTS IN DIRECT CONTACT WITH COPPER
- INSTALL HANGERS FOR STEEL PIPING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD SIZES: 1. NPS 3/4 (DN 20): MAXIMUM SPAN, 7 FEET (2.1 M); MINIMUM ROD SIZE, 1/4 INCH (6.4 MM). 2. NPS 1 (DN 25): MAXIMUM SPAN, 7 FEET (2.1 MINIMUM ROD SIZE, 1/4 INCH (6.4 MM). 3. NPS 1-1/2 (DN 40): MAXIMUM SPAN, 9 FEET (2.7 M);
- MINIMUM ROD SIZE, 3/8 INCH (10 MM) 4. NPS 2 (DN 50): MAXIMUM SPAN, 10 FEET (3 M); MINIMUM ROD SIZE, 3/8 INCH (10 MM). 5. NPS 2-1/2 (DN 65): MAXIMUM SPAN, 11 FEET (3.4 M) MINIMUM ROD SIZE, 3/8 INCH (10 MM).
- 6. NPS 3 (DN 80): MAXIMUM SPAN, 12 FEET (3.7 M); MINIMUM ROD SIZE, 3/8 INCH (10 MM). NPS 4 (DN 100): MAXIMUM SPAN, 14 FEET (4.3 M); MINIMUM ROD SIZE, 1/2 INCH (13 MM) 8. NPS 6 (DN 150): MAXIMUM SPAN, 17 FEET (5.2 M)
- MINIMUM ROD SIZE, 1/2 INCH (13 MM) MINIMUM ROD SIZE, 5/8 INCH (16 MM). 10. NPS 10 (DN 250): MAXIMUM SPAN, 20 FEET (6.1 M); MINIMUM ROD SIZE, 3/4 INCH (19 MM). 11. NPS 12 (DN 300): MAXIMUM SPAN, 23 FEET (7 M);
- MINIMUM ROD SIZE, 1 INCH (25 MM). INSTALL HANGERS FOR DRAWN-TEMPER COPPER PIPING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD SIZES:

12. NPS 14 (DN 350): MAXIMUM SPAN, 25 FEET (7.6 M);

MINIMUM ROD SIZE, 7/8 INCH (22 MM).

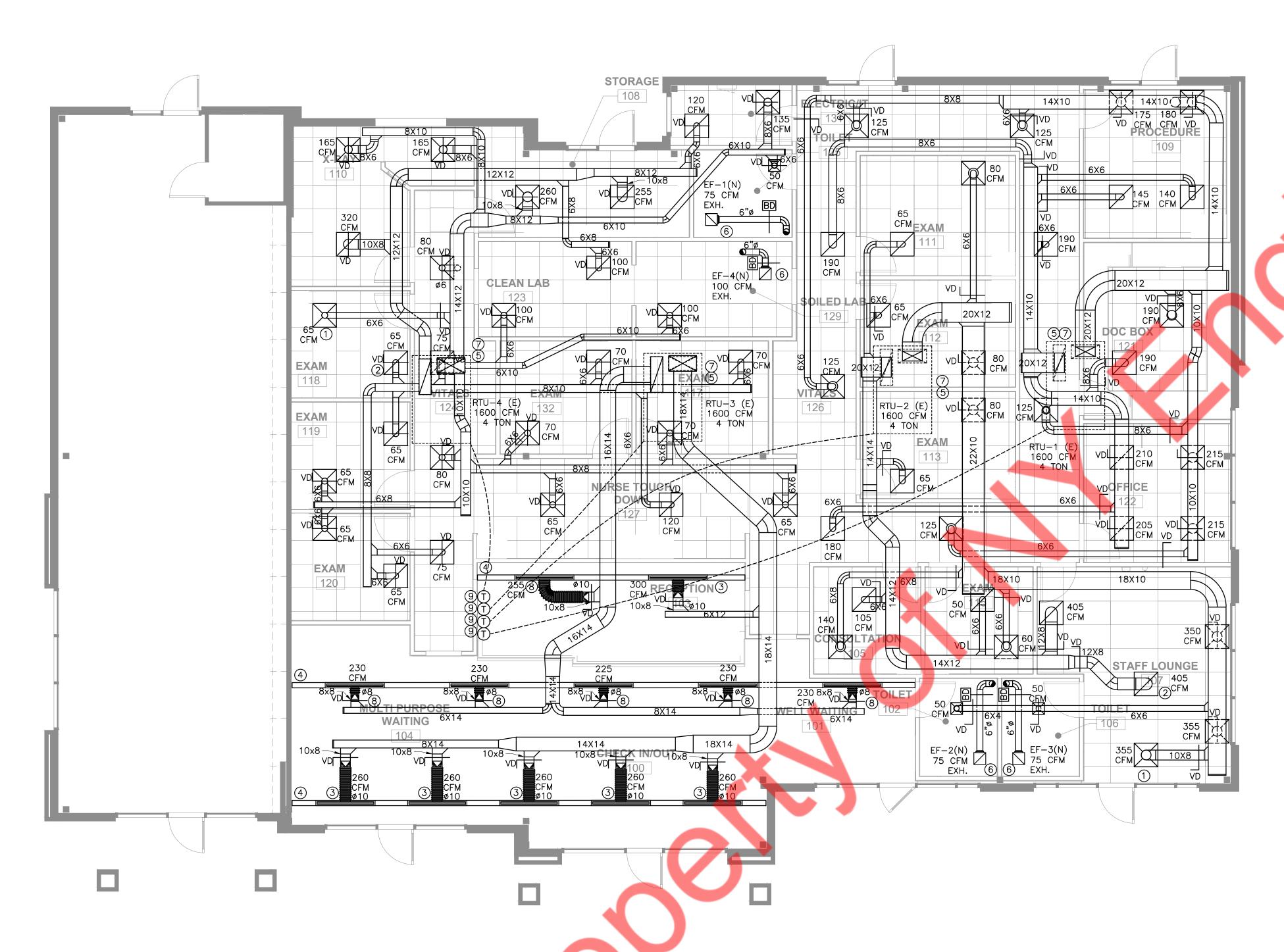
MINIMUM ROD SIZE, 3/8 INCH (10 MM).

- 1. NPS 3/4 (DN 20): MAXIMUM SPAN, 5 FEET (1.5 M); MINIMUM ROD SIZE, 1/4 INCH (6.4 MM) 2. NPS 1 (DN 25): MAXIMUM SPAN, 6 FEET (1.8 M); MINIMUM ROD SIZE, 1/4 INCH (6.4 MM). NPS 1-1/2 (DN 40): MAXIMUM SPAN, 8 FEET (2.4 M); MINIMUM ROD SIZE, 3/8 INCH (10 MM). 4. NPS 2 (DN 50): MAXIMUM SPAN, 8 FEET (2.4 M); MINIMUM ROD SIZE, 3/8 INCH (10 MM). 5. NPS 2-1/2 (DN 65): MAXIMUM SPAN. 9 FEET (2.7 M):
- 6. NPS 3 (DN 80): MAXIMUM SPAN, 10 FEET (3 M); MINIMUM ROD SIZE, 3/8 INCH (10 MM). CHILLED WATER AND BRINE, ABOVE 40 DEG F (5 DEG C):
- NPS 12 (DN 300) AND SMALLER: INSULATION SHALL BE THE FOLLÒWING: MINERAL—FIBER, PREFORMED PIPE, TYPE I, 1-1/2 INCHES (38 MM) THICK. 2. NPS 14 (DN 350) AND LARGER: INSULATION SHALL BE ONE OF THE FOLLÓWING: MINERAL—FIBER PREFORMED PIPE TYPE I, 1-1/2 INCHES (38 MM) THICK.
- CONDENSATE AND EQUIPMENT DRAIN WATER BELOW 60 DEG F (16 DEG C): . ALL PIPE SIZES: INSULATION SHALL BE ONE OF THE FOLLOWING: MINERAL—FIBER, PREFORMED PIPE INSULATION, TYPE I: 1 INCH (25 MM) THICK.

- COLORADO BUILDING DEPARTMENT NOTES
- ALL WORK SHALL COMPLY WITH APPLICABLE SECTIONS OF CITY OF LONE TREE; BASE CODE ICC IBC 2018, AND ALL RULES AND REGULATIONS OF THE DEPARTMENT OF BUILDINGS TO DATE. ALL HEATING AND COOLING LOADS CALCULATED PER
- VENTILATION FOR ALL AREA SHALL COMPLY WITH 2018 INTERNATIONAL MECHANICAL CODE, CHAPTER 4.

ASHRAE/ACCA 183.

- 3. AS PER C408.2.5 OF CITY OF LONE TREE: BASE CODE IC CC 2018, CONSTRUCTION DOCUMENT SHALL REQUIRE THAT ITHIN 90 DAYS AFTER THE DATE OF SYSTEM ACCEPTANCE RECORD DRAWINGS OF THE ACTUAL INSTALLATION BE PROVIDED TO THE BUILDING OWNER OR THE DESIGNATED REPRESENTATIVE OF THE BUILDING OWNER.
- AS PER C408.3.2 OF CITY OF LONE TREE: BASE CODE ICC ECC 2018, CONSTRUCTION DOCUMENT SHALL REQUIRE THA AN OPERATING MANUAL AND A MAINTAINED MANUAL E PROVIDED TO THE BUILDING OWNER WITHIN 90 DAYS AFTER THE DATE OF SYSTEM ACCEPTANCE THE CONTRACTOR SHALL ENGAGE THE SERVICES OF A PROFESSIONAL ENGINEER TO PROVIDE THE REQUIRED SPECIAL INSPECTIONS AND TESTS.
- STS WILL BE CONDUCTED UNDER DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSOI HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS. THE TESTS WILL SHOW COMPLIANCE WITH CITY O LONE TREE; BASE CODE ICC IBC 2018, REQUIREMENTS AS
- THE LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSON HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS AND CONDUCTING SUCH TESTS WILL FILE DOCUMENTATION AND REPORTS OF TESTS THAT THE SYSTEM COMPLIES WITH THE CONSTRUCTION DOCUMENTS AND APPLICABLE LAWS.
- TESTS OF MECHANICAL SYSTEMS SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING SECTIONS OF CITY OF LONE TREE; BASE CODE ICC IMC 2018 CHAPTER 4 AND A. MECHANICAL VENTILATION — SECTION 403.
- THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIES, ETC. SHALL COMPLY WITH THE REFERENCED CODE
- A. STANDARDS OF HEATING CITY OF LONE TREE; BASE CODE ICC IMC 2018. B. DUCT CONSTRUCTION AND INSTALLATION-SECTION 603
- BASE CODE ICC IMC 2018 AIR INTAKES, EXHAUSTS AND RELIEF-SECTION 401 OF CITY OF LONE TREE
- BASE CODE ICC IMC 2018. D. AIR FILTERS -SECTION 605 OF CITY OF LONE TREES BASE CODE ICC IMC 2018
- MANUAL AND AUTOMATIC FIRE AND SMOKE CONTROLS FOR AIR DISTRIBUTION SYSTEMS -SECTION 513 OF CITY OF LONE TREE; BASE CODE ICC IMC 2018.
- MINIMUM TEMPERATURE TO BE MAINTAINED IN OCCUPIED SPACES DURING HEATING SEASON: 68 DEG. FAHRENHEIT.
- 10. 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 CITY LONE TREE: BASE CODE ICC IMC 2018 CHAPTER 4 SECTION 403.3. HVAC SYSTEM SHALL BE BALANCED IN ACCORDANCE WITH GENERALLY ACCEPTED ENGINEERING STANDARDS AS REQUIRED BY CITY OF LONE TREE; BASE CODE ICC IMC 2018
- SMOKE DETECTION SYSTEMS SHALL BE INSTALLED AND SEQUENCED TO FOLLOW CONTROLS OPERATIONS WITH THI REQUIREMENTS OF SECTION 606 CITY OF LONE TREE; BASE ICC IMC 2018, TO CLOSE DAMPERS AND AUTOMATICALLY STOP THE FAN.
- REFER TO ARCHITECTURAL DRAWINGS FOR REQUIRED FIRE-RATED WALL AND SMOKE WALL CONSTRUCTION AND
- 13. 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 CONSIDERED AS EITHER BEING APPROVED OR ACCORDANCE WITH APPLICABLE CODES.
- 14. A COMMISSIONING PLAN SHALL DEVELOPED BY A LICENSEI DESIGN PROFESSIONAL, MECHANICAL ENGINEER OR APPROVEI
- 15. A PRELIMINARY REPORT OF COMMISSIONING TEST PROCEDURES AND RESULTS SHALL BE COMPLETED AND CERTIFIED BY THI LICENSED DESIGN PROFESSIONAL FLECTRICAL ENGINEER MECHANICAL ENGINEER OR APPROVED AGENCY AND PROVIDED TO THE BUILDING OWNER OR OWNER'S AUTHORIZED AGENT AS CITY OF LONE TREE; BASE CODE ICC IECC 2018, C408.2.4
- 16. MECHANICAL SYSTEMS SHALL BE COMMISSIONED PER CITY OF LONE TREE: BASE CODE ICC IECC 2018 C403.2.2. C408.2.1 C408.2.5 FINAL COMMISSIONING REPORT SHALL BE DUE WITHIN 90 DAYS OF RECEIPT OF CERTIFICATE OF OCCUPANCY.



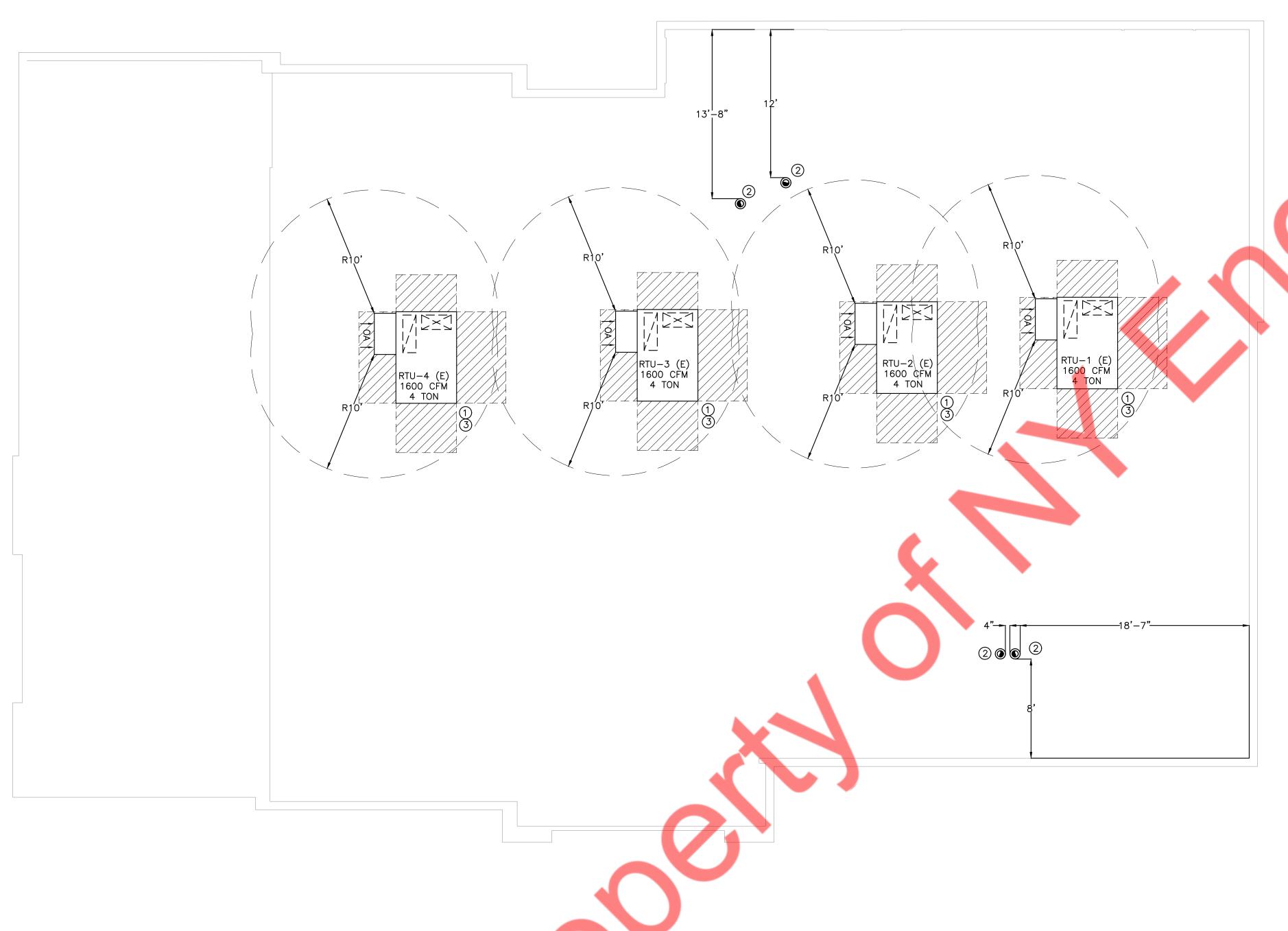
# 1 MECHANICAL FLOOR PLAN SCALE: 3/16" = 1'-0"



- 1. ALL WORK SHALL BE PERFORMED IN A CLEAN AND WORKMANLIKE MANNER. CARE SHALL BE EXERCISED TO MINIMIZE ANY INCONVENIENCE OR DISTURBANCE TO OTHER AREAS OF THE BUILDING WHICH ARE TO REMAIN IN OPERATION. ISOLATE WORK AREAS BY MEANS OF TEMPORARY PARTITIONS AND/OR TARPS TO KEEP DUST AND DIRT WITHIN THE CONSTRUCTION AREA.
- NO PIPING, EQUIPMENT, ETC. SHALL BE REMOVED, DISCONNECTED OR SHUT OWN WITHOUT PRIOR REVIEW WITH THE LANDLORD AND/OR ENGINEER TO CONFIRM THAT AREAS TO REMAIN IN OPERATION WILL NOT BE AFFECTED. IF ANY AREAS NOT WITHIN THE SCOPE OF WORK ARE AFFECTED BY ANY SHUTDOWN, REMOVAL OR DISCONNECTION, SUFFICIENT ADVANCE NOTICE MUST BE GIVEN TO THE LANDLORD INDICATING WHICH AREAS WILL BE AFFECTED, WHEN THE PROPOSED SHUTDOWN WILL OCCUR, AND FOR HOW LONG A PERIOD OF TIME.
- 3. ALL ITEMS REM<mark>ov</mark>ed shall become property of the Landlord and shall be disposed of as per the LANDLORD'S INSTRUCTIONS, UNLESS INDICATED OTHERWISE. ALL ITEMS WHICH ARE NOT TO BE STORED ON SITE BY OWNERS SHALL BE REMOVED FROM THE BUILDING IMMEDIATELY.
- 4. THIS CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS PRIOR TO PROCEEDING WITH ANY WORK. WHERE DISCREPANCIES OCCUR BETWEEN THESE DOCUMENTS AND EXISTING CONDITIONS, THE
- DISCREPANCY SHALL BE REPORTED TO THE LANDLORD AND/OR ENGINEER FOR EXPEDITING AND THE RESOLUTION. CLEAN THE JOB SITE DAILY AND REMOVE FROM THE PREMISES ANY DIRT AND DEBRIS CAUSED BY THE PERFORMANCE OF THE WORK INCLUDED IN THIS CONTRACT.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFEKEEPING OF HIS OWN PROPERTY ON THE JOB SITE. OWNER ASSUMES NO RESPONSIBILITY FOR PROTECTION OF PROPERTIES AGAINST FIRE, THEFT AND ENVIRONMENTAL
- PROVIDE ALL NECESSARY TEMPORARY OR PERMANENT CAPS OR PLUGS FOR PIPING. DO NOT LEAVE PIPING OPEN
- WHERE USED, THE TERM "PROVIDE" SHALL MEAN "FURNISH AND INSTALL" THIS CONTRACTOR SHALL COORDINATE HIS WORK WITH THE LANDLORD AND ALL OTHER TRADES PRIOR TO
- FABRICATION, PURCHASE AND/OR INSTALLATION OF ALL WORK.
- SUBMISSION OF PROPOSAL DIRECTLY OR INDIRECTLY IN CONNECTION WITH THIS WORK SHALL IMPLY THAT THE BIDDER HAS EXAMINED THE JOB SITE UNDER WHICH HE WILL BE OBLIGATED TO OPERATE SHOULD HE BE AWARDED THE WORK UNDER THIS CONTRACT. NO EXTRA CHARGE WILL BE ALLOWED FOR FAILURE OF ANY BIDDER TO EXAMINE THE SITE PRIOR TO BID.
- 11. ALL WORK SHALL CONFORM TO ALL STATE AND LOCAL CODES, RULES AND REGULATIONS AND ORDINANCES.
- 12. CONTRACTOR SHALL SECURE AND PAY ALL FEES AND PERMITS PERTAINING TO THE CONTRACT. 13. ALL EQUIPMENT SHALL BE INSTALLED IN STRICT COMPLIANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
- THE CONTRACTOR SHALL PROVIDE ALL HANGERS AND SUPPORTS REQUIRED FOR A COMPLETE INSTALLATION. 14. CONTRACTOR SHALL BE RESPONSIBLE FOR WORKMEN'S IDENTIFICATION AND BADGING, SAFETY AND FIRE PROTECTION,
- CONTRACTOR'S LIABILITY INSURANCE, BARRICADES, WARNING SIGNS, TRASH REMOVAL, CUTTING AND PATCHING. 15. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL RIGGING, HANDLING AND PROTECTION OF MATERIALS.
- 16. CONTRACTOR SHALL PROVIDE LABOR TO RECEIVE, UNLOAD, STORE, PROTECT AND TRANSFER TO POINT OF INSTALLATION, OWNER FURNISHED ITEMS.
- 17. WHERE CONDUIT, CABLES, DUCTWORK OR PIPING PASSES THROUGH FIRE RATED FLOORS OR WALLS, THE SLEEVES SHALL BE COMPLETELY SEALED WITH A FIRE STOP MATERIAL THAT IS UL LISTED AND ACCEPTED BY THE BUILDING DEPARTMENT AND FIRE DEPARTMENT AS BEING SUITABLE FOR THIS SERVICE.
- 18. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CORING AS IT RELATES TO HIS WORK.
- 19. CONTRACTOR SHALL REFER TO BUILDING MANAGEMENT'S RULES AND REGULATIONS' TO COMPLY WITH BUILDING
- 20. FLEXIBLE DUCTWORK LENGTHS SHALL NOT EXCEED 5'-0". USE INSULATED RIGID ROUND DUCTWORK WHERE REQUIRED. ALL NEW FLEXIBLE DUCTWORK CONNECTIONS TO AIR DEVICES SHOWN ON THE DRAWING SHALL BE SIZED ACCORDING TO THE NECK SIZE SCHEDULE.
- 21. THE ENTIRE AIR SUPPLY SYSTEM SHALL BE BALANCED TO THE AIR QUANTITIES INDICATED ON THIS DRAWING BY AN INDEPENDENT AIR BALANCE CONTRACTOR. THE AIR BALANCE CONTRACTOR SHALL SUBMIT NEBB CERTIFIED AIR BALANCE REPORTS FOR ENGINEERING REVIEW AND TO BUILDING MANAGEMENT. PROVIDE AHU DRIVE ADJUSTMENTS AS
- 22. REFER TO DRAWING MEP FOR SPECIFICATIONS THAT APPLY TO THIS SHEET.
- 23. CONTRACTOR SHALL PROVIDE TO BUILDING OWNER THE AS-BUILT RECORD DRAWINGS AND THE OPERATING AND MAINTENANCE MANUALS WITHIN 90 DAYS OF SYSTEMS ACCEPTANCE. RECORD DRAWINGS SHALL INCLUDE PERFORMANCE DATA FOR EQUIPMENT, DUCT AND PIPE DISTRIBUTION SYSTEMS, AND AIR AND WATER FLOW RATES. 0&M MANUALS SHALL INCLUDE EQUIPMENT AND ASSOCIATED OPTIONS REQUIRING SERVICE, REQUIRED MAINTENANCE ACTIVITIES, CONTACT INFO OF SERVICE AGENCIES, HVAC CONTROLS CALIBRATION INFORMATION AND SET-POINTS, AND DESCRIPTION OF EQUIPMENTS' INTENDED OPERATIONS.
- 24. FOR RETURN AIR PLENUMS, ALL MATERIALS LOCATED WITHIN A RETURN AIR PLENUM SHALL BE RATED AND APPROVED FOR INSTALLATION IN A RETURN AIR PLENUM.

### **MECHANICAL KEYED NOTES:**

- (1) PROVIDE NEW 24" X 24" SUPPLY AIR DEVICE AT LOCATION INDICATED. BALANCE TO CFM INDICATED. SEE SCHEDULE AND DETAILS. TYPICAL.
- (2) PROVIDE NEW 24" X 24" RETURN AIR GRILLE AT LOCATION INDICATED. SEE SCHEDULE AND DETAILS. TYPICAL.
- (3) PROVIDE NEW BLACK "FLOW BAR" SUPPLY SLOT DIFFUSER AT LOCATION INDICATED. COORDINATE WITH ARCHITECT FOR FINAL LOCATION AND DETAIL. BALANCE TO CFM INDICATED. SEE SCHEDULE AND DETAIL. TYPICAL.
- (4) PROVIDE NEW CONTINUOUS PERIMETER LINEAR SLOT FOR FLOW BAR SLOT DIFFUSER. ANY UNUSED SECTION OF SLOT SHALL BE COVERED WITH RETURN AIR HOOD WITH LIGHT SHIELD. COORDINATE WITH ARCHITECT AND REFLECTED CEILING PLAN. TYPICAL.
- (5) PROVIDE NEW SUPPLY DUCTWORK AS SHOWN. SUPPORTED DUCTWORK CLOSE TO STRUCTURE. TYPICAL.
- (6) PROVIDE NEW EXHAUST FAN (EF). ROUTE EXHAUST DUCT OF MENTIONED SIZE THROUGH ROOF. ENSURE EXHAUST OUTLET IS A MINIMUM OF 10 FEET FROM NEAREST FRESH AIR INTAKE. BALANCE TO CFM INDICATED. SEE SCHEDULE AND DETAIL.
- (7) REUSE EXISTING RTUS. CONTRACTOR TO FIELD VERIFY EXACT DUCT PENETRATIONS AND REUSE EXISTING MAIN SA/RA DUCTS.
- (8) PROVIDE NEW BLACK "FLOW BAR" RETURN SLOT DIFFUSER AT LOCATION INDICATED. COORDINATE WITH ARCHITECT FOR FINAL LOCATION AND DETAIL. BALANCE TO CFM INDICATED. SEE SCHEDULE AND DETAIL. TYPICAL.
- (9) PROVIDE NEW THERMOSTAT AT LOCATION INDICATED AT 4' A.F.F.. CONTRACTOR TO FIELD VERIFY AND COORDINATE WITH BUILDING ENGINEER FOR EXACT THERMOSTAT AND LOCATION.



#### MECHANICAL KEYED NOTES:

- 1 REUSE EXISTING RTU AT LOCATION SHOWN.
  COORDINATE WITH STRUCTURAL ENGINEER AND
  ARCHITECT FOR EXACT LOCATION. FIELD VERIFY
  AND COORDINATE TO MAINTAIN ALL BUILDING
  EXHAUST TO BE AT LEAST 10 FEET AWAY FROM
  THE RTU'S OUTSIDE AIR INTAKE OPENING. PROVIDE
  TRANSITION AS REQUIRED TO FIT ROOF TOP UNIT
  OPENING FROM THE EXISTING DUCTWORK. SEE
  SCHEDULE AND DETAILS.
- 2 PROVIDE NEW EXHAUST DUCT AS SHOWN WITH EXHAUST VENT/CAP. FIELD VERIFY AND COORDINATE FOR EXACT LOCATION. FOLLOW MANUFACTURER'S GUIDELINE FOR PROPER INSTALLATION.
- CONTRACTOR TO FIELD VERIFY EXISTING RTU UNIT'S CAPACITY AND WORKING CONDITION. IF EXISTING UNIT IS NOT IN PROPER OPERATING CONDITION, REPLACE THAT UNIT WITH SIMILAR KIND. PROVIDE ALL ACCESSORIES AS REQUIRED.

1 MECHANICAL ROOF PLAN
SCALE: 3/16" = 1'-0"

		<b>RTU SCHEDULE</b>		
MARK	RTU-1 (E)	RTU-2 (E)	RTU-3 (E)	RTU-4 (E)
QUANTITY	1	1	1	1
UNIT TYPE	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
MANUFACTURER	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
MODEL	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
STATUS	EXISTING	EXISTING	EXISTING	EXISTING
MOUNTING	ROOF	ROOF	ROOF	ROOF
NOMINAL CAP. (TR)	4	4	4	4
TOTAL COOLING CAP. (BTUH)	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
SENS. COOLING CAP. (BTUH)	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
EER/IEER	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
HEATING KW	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
SUPPPLY AIRFLOW (CFM)	1600	1600	1600	1600
OUTDOOR AIR (CFM)	200	200	200	200
FAN HP	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
VOLTAGE/PHASE	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
MCA (A)	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
MOCP(A)	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
WEIGHT (LBS ) (APPROX.)	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
THERMOSTAT	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
REMOTE SENSOR	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING
REQUIRED ACCESSORIES	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING	SAME AS EXISTING

#### NOTES:-

1) PROVIDE IECC COMPLIANT THERMOSTAT FOR EACH RTU. THERMOSTAT SHALL BE CALIBRATED TO DISPLAY SPACE TEMPERATURE AT +/- 1°F. THE CONTROL SYSTEM SHALL CONTROL ECONOMIZER, DISCHARGE AIR TEMPERATURE CONTROL, SPACE TEMPERATURE.

#### 2) S.A.E- SAME AS EXSITING.

3) RTU IS AN EXISTING. CONTRACTOR TO FIELD VERIFY EXACT LOCATION AND OPERATING CONDITION, INFORM TO ENGINEER/LANDLORD IF RTU IS NOT OPERATING AT ITS 100% RATED CAPACITY.

4) REPLACE FILTERS WITH NEW ONES.

5) SET OUTSIDE AIR DAMPER AS PER AIRFLOW MENTIONED IN THE TABLE ABOVE.

				MECHA	NICAL FAN DET	AILS				
	FLOW	STATIC PRESSURE		ELECTRIC DATA	4	MAXIMUM	BASIS OF	DESIGN		
TAG	RATE	RATE EXTERNAL		SPEED INDUTIONATE		LOUDNESS		REMARK		
	CFM	IN W.G.	RPM	INPUT WATT	V/PH/HZ	DBA	MANUFACTURER			
EF-1 (N)	75	0.3	847	32	115/1/60	38	соок	GC-146	1,2,3	
EF-2 (N)	75	0.3	847	32	115/1/60	38	соок	GC-146	1,2,3	
EF-3 (N)	75	0.3	847	32	115/1/60	38	соок	GC-146	1,2,3	
EF-4 (N)	100	0.3	847	32	115/1/60	38	соок	GC-146	1,2,3	
NOTES:	•		•							
1 000///0	A NI \A/I		ADED DICC	ONINIECT CVA/ITCLL I	EANL NACHINITED	CDEED CONT	TDOLLED.			

1. PROVIDE FAN WITH BACK DRAFT DAMPER, DISCONNECT SWITCH. FAN-MOUNTED SPEED CONTROLLER.

2. SOLID STATE SPEED CONTROL.3. BALANCE TO SCHEDULED CFM.

4. ALTERNATE MANUFACTURERS ARE ACCEPTABLE PROVIDED THEY MEET THE PERFORMANCE AND SPECIFICATIONS.

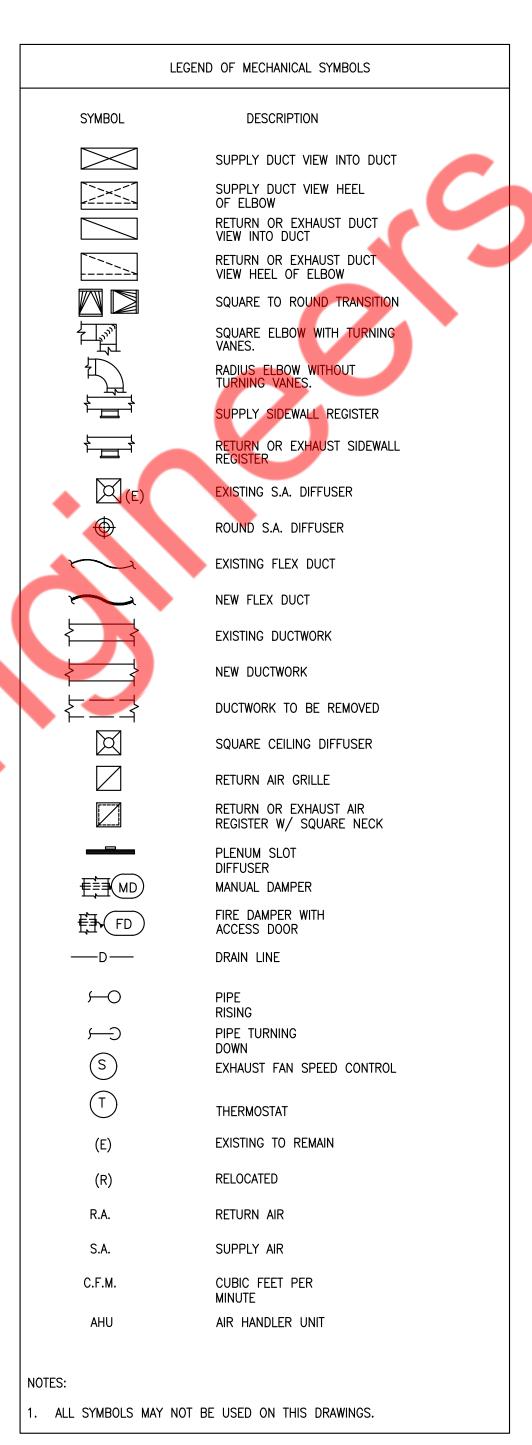
	AIR BALANCE										
UNIT	AREA SERVED	SUPPLY AIR	OUTSIDE AIR	RETURN AIR	EXHAUST AIR						
RTU-1(E)	SEE PLAN	1600 CFM	200 CFM	1400 CFM	-						
RTU-2(E)	SEE PLAN	1600 CFM	200 CFM	1400 CFM	-						
RTU-3(E)	SEE PLAN	1600 CFM	200 CFM	1400 CFM	-						
RTU-4(E)	SEE PLAN	1600 CFM	200 CFM	1400 CFM	-						
EF-1(N)	125 TOILET	-	-	-	75 CFM						
EF-2 (N)	102 TOILET	-	-	-	75 CFM						
EF-3 (N)	106 TOILET	-	-	1	75 CFM						
EF-4 (N)	SOILED LAB				100 CFM						
	TOTAL:	6400 CFM 800 CFM		5600 CFM	325 CFM						
BUILD	ING PRESSURE:			475 CFM	POSITIVE						

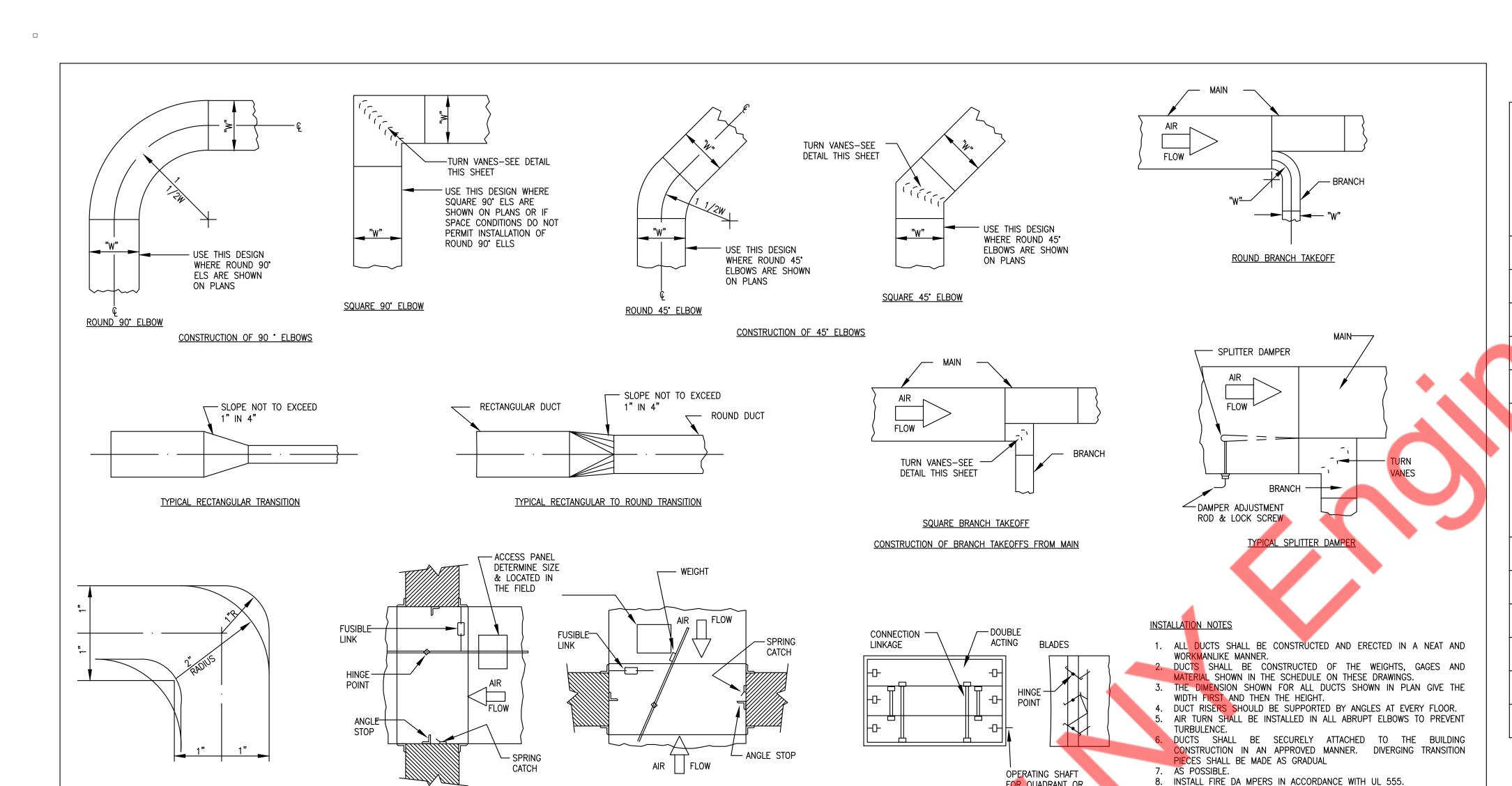
	D	IFFUSER NECK SIZE S	CHEULE
	CFM RANGE	SQUARE NECK SIZE	ROUND NECK SIZE
	0 - 120	6X6	6"Ø
	125 - 220	8X8	8"Ø
	225 - 330	10X10	10"Ø
	335 - 450	12X12	12"Ø
	455 - 530	15X15	14"Ø
ĺ	540 - 700	16X16	16"Ø

		AIR DEVICE S	CHEDULE
MARK	MANUF.+MODEL	TYPE	REMARK
	TITUS OMNI OR EQUAL	CEILING SUPPLY	24X24, 12X12 PLAQUE FACE SUPPLY AIR DIFFUSER. FACE SHALL BE STEEL WITH A STEEL BACK PAN. FACE AND FRAME FINISH SHALL MATCH DECORATIVE CEILING TILES IN AREA. BACK PAN SHALL BE PAINTED BLACK. COORDINATE CEILING MOUNTING TYPE WITH ARCHITECTURAL CEILING TYPE. PROVIDE REMOTE DAMPER OPERATORS IN AREAS WITH INACCESSIBLE CEILINGS.
	TITUS OMNI OR EQUAL	CEILING RETURN /EXHAUST	24x24, 12x12 PLAQUE FACE DIFFUSER. DIFFUSER TO HAVE 6" NECK UNLESS OTHERWISE NOTED. FACE SHALL BE ALUMINUM WITH A STEEL BACK PAN. FACE AND FRAME FINISH SHALL MATCH DECORATIVE CEILING TILES. COORDINATE CEILING MOUNTING TYPE WITH ARCHITECTURAL CEILING TYPE.
	TITUS FLOWBAR (FL-25-HT) OR EQUAL	CEILING SUPPLY DRYWALL	FLOWBAR SUPPLY DIFFUSER IN DRYWALL CEILING. BORDER TYPE 22. ONE 2.5" SLOT. PROVIDE 48" SUPPLY PLENUM AS INDICATED ON FLOOR PLANS.

OUTSIDE AIR ANALYSIS:									
OUTSIDE AIR SHALL BE PROVI	DED IN ACCORD	ANCE	WITH THE	2018	3 INTERNATIONAL	MECHAN	ICAL CODE PER	TABI	_E 403.3.1
	(Rp	×	Pz )	+	( Ra	×	Az )	-	Vbz
WAITING:	(7.5 CFM/PER	X	20 PPL)		(0.06 CFM/SQFT	×	748 SQFT)	=	195 CFM
VITALS/NURSE TOUCH DOWN:	(- CFM/PER	X	2 PPL)	+	(0.06 CFM/SQFT	· ×	1034 SQFT)	=	63 CFN
STORAGE/DOC BOX:	(- CFM/PER	X	– PPL)	+	(0.12 CFM/SQFT	· ×	323 SQFT)	=	21 CFN
CONSULTATION:	(5 CFM/PER	X	2 PPL)	+	(0.06 CFM/SQFT	×	81 SQFT)	=	15 CFN
EXAM/LARGE EXAM ROOMS:	(5 CFM/PER	X	9 PPL)	+	(0.06 CFM/SQFT	×	931 SQFT)	=	106 CFN
OFFICE/RECEPTION:	(5 CFM/PER	X	6 PPL)	+	(0.06 CFM/SQFT	· ×	339 SQFT)	=	51 CFN
STAFF LOUNGE:	(7.5 CFM/PER	X	5 PPL)	+	(0.06 CFM/SQFT	. X	262 SQFT)	=	54 CFN
X-RAY ROOM:	(10 CFM/PER	X	2 PPL)	+	(0.18 CFM/SQFT	. ×	159 SQFT)	=	49 CFN
PROCEDURE:	(10 CFM/PER	X	2 PPL)	+	(0.18 CFM/SQFT	. x	150 SQFT)	=	47 CFN
LABS:	(10 CFM/PER	X	6 PPL)	4	(0.18 CFM/SQFT	×	208 SQFT)	=	98 CFN
ELECTRIC/IT:	(5 CFM/PER	×	0 PPL)	+	(0.06 CFM/SQFT		131 SQFT)	=	8 CFM

PPL) + (0. PPL) + (0.	.18 CFM/SQFT .06 CFM/SQFT	x 208 SQFT) x 131 SQFT)	=	98 CFM 8 CFM
		TOTAL	=	707 CFM
	OVER	ALL: Vbz / Ez	=	Voz
		1036 CFM / 1	=	707 CFM
	TOTAL OUTSIDE	AIR REQUIRED	=	707 CFM
	TOTAL OUTSIDE	E AIR PROVIDED	=	800 CFM



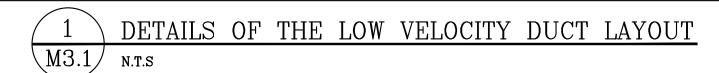


<u>VERTICAL</u>

#### TABLE-DUCT CONSTRUCTION MIN. SHEET METAL THICKNESS

	STATIC PRESSURE									
ROUND DUCT	1/2-INCH WA	TER	1-INCH WATER GAGE							
<12 12 to 14 15 to 17 18	THICKNESS (I	NCHES)	THICKNESS (INCHES)							
	GALVANIZED	ALUMINUM	GALVANIZED	ALUMINUM						
<12	0.013	0.018	0.013	0.018						
12 to 14	0.013	0.018	0.016	0.023						
15 to 17	0.016	0.023	0.019	0.027						
18	0.016	0.023	0.024	0.034						
19 to 20	0.019	0.027	0.024	0.034						
		STATIC PRESSURE								

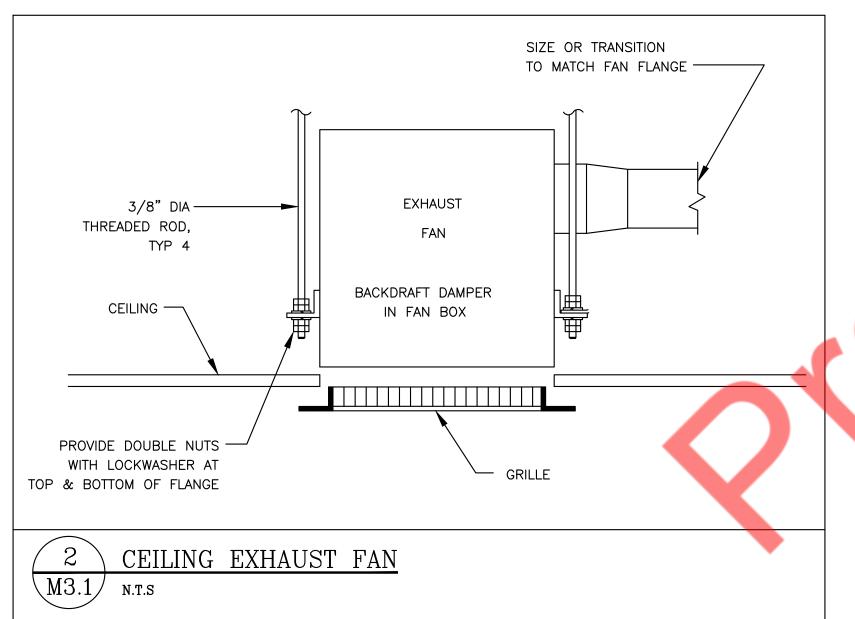
≤ 8  9 to 10  11 to 12  13 to 16	STATIC PRESSURE										
	1/2-INCH WA	TER GAGE	1-INCH WATER GAGE								
DIMENSION (INCHES)	THICKNESS (I	NCHES)	THICKNESS (INCHES)								
	GALVANIZED	ALUMINUM	GALVANIZED	ALUMINUM							
≤ 8	0.013	0.018	0.013	0.018							
9 to 10	0.013	0.018	0.016	0.023							
11 to 12	0.016	0.023	0.019	0.027							
13 to 16	0.019	0.027	0.019	0.027							
17 to 18	0.019	0.027	0.024	0.034							
19 to 20	0.024	0.034	0.024	0.034							

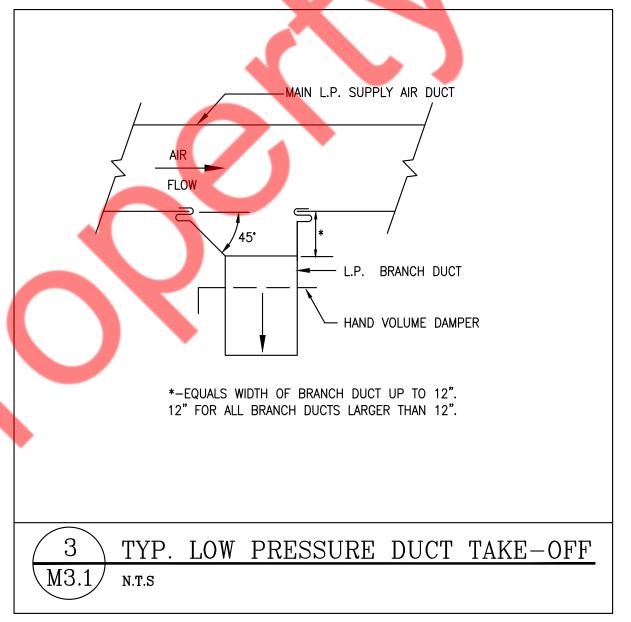


**HORIZONTAL** 

TYPICAL FIRE DAMPER

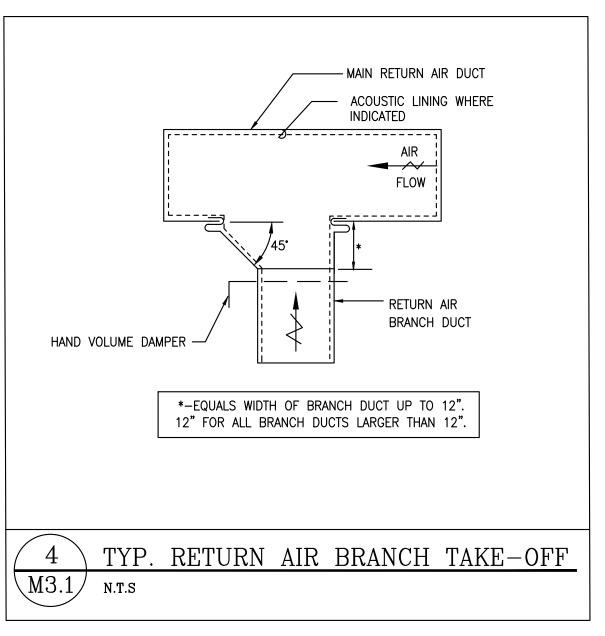
DETAIL OF TURN VANES





FOR QUADRANT OR

TYPICAL VOLUME DAMPER



9. ACCESS PANELS SHOULD BE PLACED BEFORE AND/OR AFTER

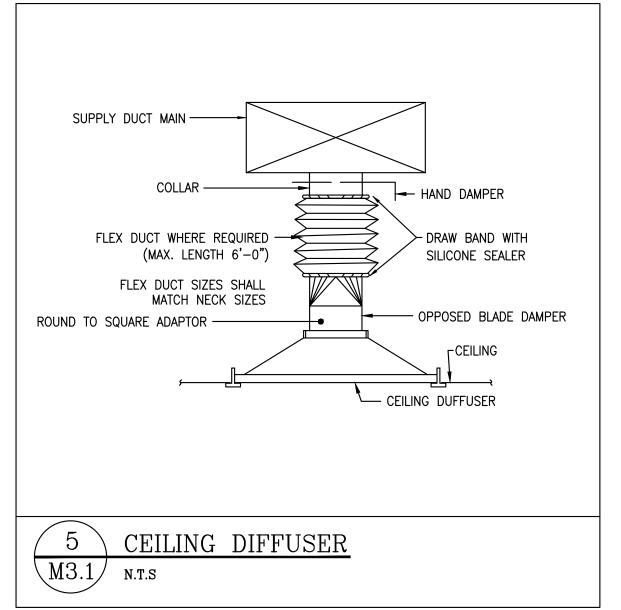
10. DUCT AREA SHOULD NOT BE DECREASED MORE THAN 10 PERCENT

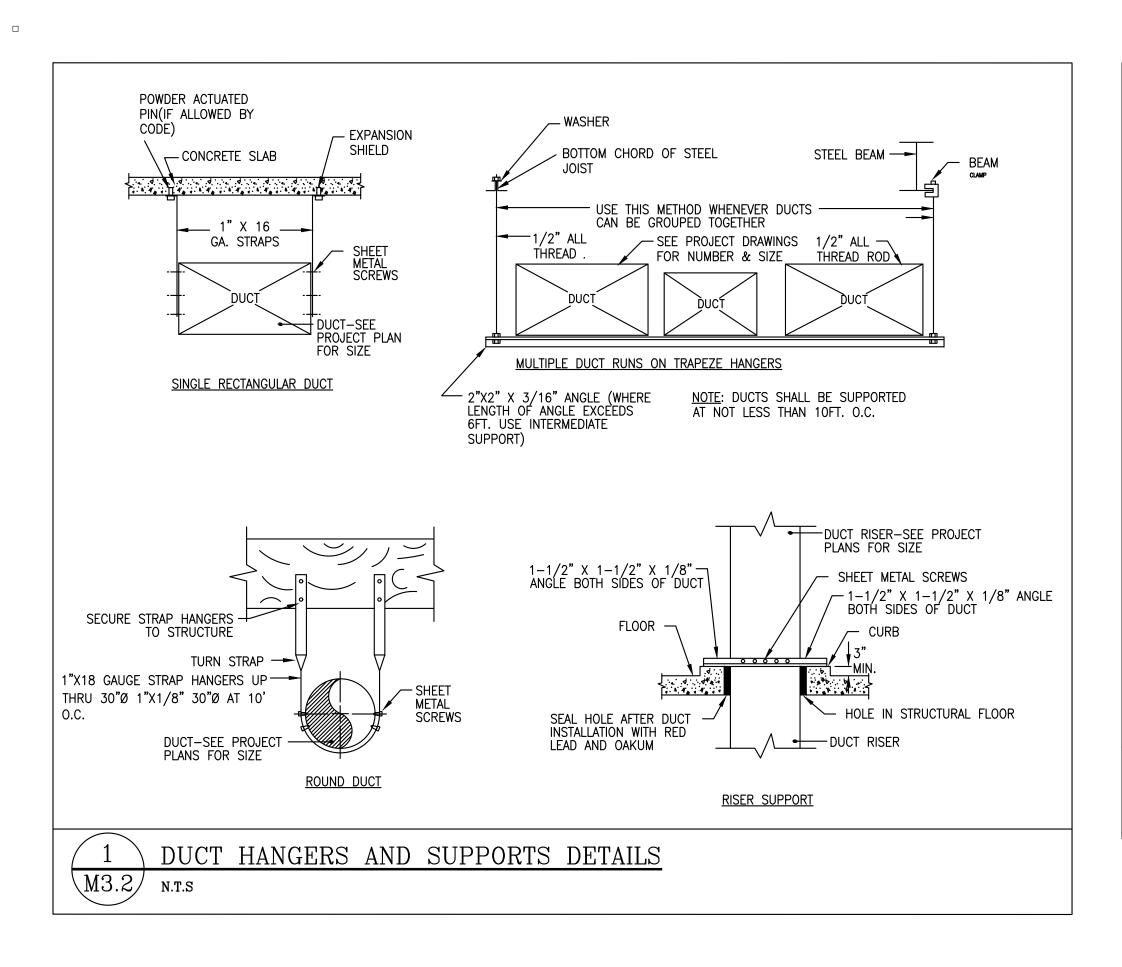
11. FLEXIBLE FABRIC CONNECTIONS (OR EQUAL) SHOULD BE USED ON BOTH INLETS AND OUTLETS OF ALL FANS AND AIR HANDLING UNITS. 12. JOINTS AND SEAMS OF SUPPLY DUCTS SHALL BE FASTENED

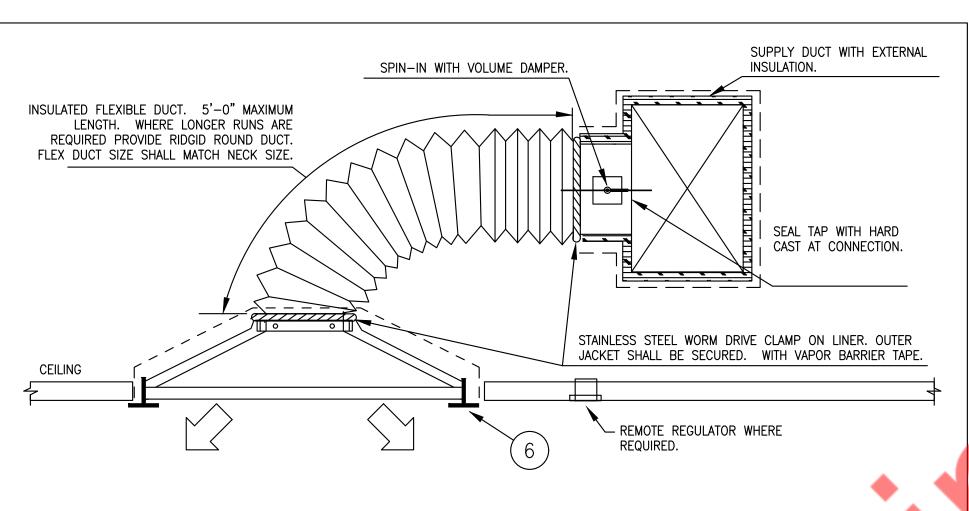
WHEN OBSTRUCTIONS CANNOT BE AVOIDED, AND THEN A STREAMLINED

EQUIPMENT INSTALLED IN THE DUCT.

SECURELY AND MADE AIR TIGHT.







- 1. CEILING DIFFUSER SHALL BE INSTALLED SUCH THAT THE FACE OF DIFFUSER IS FLUSH WITH CEILING. REFER TO AIR DEVICE
- 2. SUPPORT FLEXIBLE DUCT FROM STRUCTURE. FLEXIBLE DUCT SHALL NOT KINK, SAG OR REST ON LIGHT FIXTURE, CEILING SUPPORT "TEES" OR CEILING TILE.

  3. PROVIDE SQUARE TO ROUND TAP AT BRANCH DUCT WHERE FLEXIBLE DUCT SIZE EXCEEDS DIMENSION OF RECTANGULAR DUCT.

  4. FOR UNCONDITIONED CEILING PLENUMS, INSULATE BACK OF CEILING DIFFUSER WITH R-8 DUCT WRAP AND SEAL WITH VAPOR
- 5. METALLIC FLEXIBLE DUCT SHALL BE USED WHERE FLEXIBLE DUCT CONNECTIONS ARE SHOWN ON THE DRAWING TO ALL AIR DEVICES
- INSTALLED IN INACCESSIBLE LOCATIONS SUCH AS ABOVE GYPSUM BOARD OR PLASTER CEILINGS. (REFER TO ARCH. DRAWINGS FOR
- 6. CEILING "TEE" OR DRYWALL TRIM PIECE BY OTHERS.



	LIGHTING		POWER AND TELECOMMUNICATION		ELECTRICAL AI	BBRFVIA	TIONS	1. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE CU
		J	JUNCTION BOX WITH BLANK COVER PLATE, FLUSH IN FLOOR.		AMPERES	EA	EACH	VERSION OF THE NEC, LOCAL JURISDICTION REQUIREMENTS, AND ALL GOVERNING LOCAL CODES, LAWS, AND REGULATIONS.
	"EM" INDICATES FIXTURES WITH INTEGRAL BATTERY PACK FOR EMERGENCY		· · · · · · · · · · · · · · · · · · ·	A/C, AC	AIR CONDITIONING UNIT	EM	EMERGENCY	2. CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH ALL EXICONDITIONS THAT MAY AFFECT THE WORK. NO ADDITIONAL COMPENSATION
	SERVICE, U.O.N.  — LUMINAIRE TYPE : INDICATE BY LIPPERCASE LETTER SEE LIGHTING EXTURE		SIMPLEX RECEPTACLE, +18" AFF OR AS NOTED. SUFFIXE DENOTES FOLLOWING:	AF	AMPERE FRAME/AMP FUSE	EMT	ELECTRICAL METALLIC TUBING	<ul><li>WILL BE CONSIDERED FOR FAILURE TO DO SO.</li><li>3. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, TEST REPORTS,</li></ul>
	SCHEDULE.		A- NEMA 5-15R B- NEMA 6-15R	AFF	ABOVE FINISHED FLOOR	EQUIP	EQUIPMENT	CERTIFICATIONS FOR TEMPORARY AND FINAL CERTIFICATE OF OCCUPANCY
	CIRCUIT NUMBER : INDICATED BY NUMBER		C- NEMA 14-30R D- NEMA 14-50R	AS	AMP SWITCH	ER	EXISTING TO BE RELOCATED	4. FIRE STOP ALL PENETRATIONS OF FIRE RATED CONSTRUCTION IN A COD APPROVED MANNER IN ORDER TO MAINTAIN FIRE RATING. ALL PENETRAT SHALL BE SLEEVED AND SEALED WATERTIGHT.
2	SWITCHING INDICATED BY LOWER CASE LETTERS.	$\Phi_{GFI}$	DUPLEX GFI RECEPTACLE	AIC	AMPS INTERRUPTING CAPACITY	FA	FIRE ALARM	5. SECURE ALL SUPPORTS TO BUILDING STRUCTURE UTILIZING TOGGLE BOIL
ЕМ —	- DENOTES LUMINAIRE ON EMERGENCY CIRCUIT.	φ	DUPLEX CONVENIENCE RECEPTACLE, +18" AFF OR AS NOTED.	AT	AMP TRIP	Е	EXISTING	(HOLLOW MASONRY), EXPANSION SHIELDS OR INSERTS (CONCRETE AN BRICK), MACHINE SCREWS (METAL), BEAM CLAMPS (FRAMEWORK), WOOD
NL —	- DENOTES FIXTURES DESIGNATED AS NIGHTLIGHT, WIRED TO 24 HOURS UNSWITCHED CIRCUIT.	•	DEDICATED DUPLEX CONVENIENCE RECEPTACLE, +18" AFF OR AS NOTED.	ATS	AUTOMATIC TRANSFER SWITCH	FL	FLOOR	SCREWS (WOOD) OR PAN THRU STRAPS (METAL DECK). NAILS, RAWL AND WOOD PLUGS ARE NOT PERMITTED. WHERE REQUIRED BY STRUCTUPROVIDE THRU BOLTS AND FISH PLATES. SUPPORT HORIZONTAL RUNS METALLIC RACEWAYS NOT MORE THAN 10 FT APART. SUPPORT RACEWAY
<b>⊗ ▼</b>	CEILING/WALL MOUNTED SELF POWERED EXIT LIGHT FIXTURE WITH DIRECTIONALARROWS AS INDICATED. SHADED AREA DENOTES FACE(S).	V	TELEPHONE/DATA OUTLET, 4"SQUARE OUTLET BOX WITH SINGLE GANG COLLAR AND BLANK PLATE. PROVIDE 3/4" E.C., U.O.N., UP TO HUNG CEILING AND TERMINATE WITH 90° ELBOW, BUSHING AND DRAG WIRE.	AUTO AWG	AUTOMATIC  AMERICAN WIRE GAUGE	G GFI	GROUND FAULT INTERRUPTER	METALLIC RACEWAYS NOT MORE THAN 10 FT APART. SUPPORT RACEWAY RISERS AT EACH FLOOR LEVEL. RUN EXPOSED RACEWAYS PARALLEL WI AT RIGHT ANGLES TO WALLS.
	ISOLITE ELITE SERIES LED EXIT SIGN	-	QUAD RECEPTACLE	С	CONDUIT	GP	GENERAL PURPOSE	6. LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS. RACEWAYS OVER 10 FT LONG IN WHICH WIRING IS NOT
SERVICE, U.O.N.  LUMINAIRE TYPE: INDICATE BY LIPPERCASE LETTER SEE LIGHT SCHEDULE.  CIRCUIT NUMBER: INDICATED BY NUMBER  SWITCHING INDICATED BY LOWER CASE LETTERS.  DENOTES LUMINAIRE ON EMERGENCY CIRCUIT.  DENOTES FIXTURES DESIGNATED AS NIGHTLIGHT, WIRED TO 24 UNSWITCHED CIRCUIT.  CEILING/WALL MOUNTED SELF POWERED EXIT LIGHT FIXTURE WINDIRECTIONALARROWS AS INDICATED. SHADED AREA DENOTES FACISIOLITE ELITE SERIES LED EXIT SIGN  SWITCHES AND CONTROLS  \$a 20A SPST TOGGLE SWITCH U.O.N. "a" DENOTES LIGHTING FIXTUR RECEPTACLE CONTROLLED.  \$\$a 20A 3—WAY TOGGLE SWITCH U.O.N. "a" DENOTES LIGHTING FIXTUR RECEPTACLE CONTROLLED.  \$\$A CEILING OCCUPANCY SENSOR, NUMBER INDICATES TYPE; SEE OF SENSOR SCHEDULE. 'A' LETTER REFERES TO WIRING DIAGRAM.  WIRING SYSTEMS  POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD IN NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL OF AUTOMOBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL OF AUTOMOBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL OF AUTOMOBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL OF AUTOMOBER. IT SHALL OF AUTOMOBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL OF AUTOMOBER. IT SHALL OF	SWITCHES AND CONTROLS	# <del>\</del>		C/B,CB	CIRCUIT BREAKER	HP	HORSEPOWER	INSTALLED: FURNISH FISH WIRE.
a	20A SPST TOGGLE SWITCH U.O.N. "a" DENOTES LIGHTING FIXTURE/SWITCHED RECEPTACLE CONTROLLED.	V	MOTORS AND CONTROLS	CKT	CIRCUIT	HWH	HOW WATER HEATER	7. VERIFY LOCATIONS OF OUTLETS AND SWITCHES IN FINISHED ROOMS WI ARCHITECTURAL DRAWINGS OF INTERIOR DETAILS AND FINISH. IN CENT OUTLETS AND LOCATING BOXES AND OUTLETS, ALLOW FOR OVERHEAD DUCTS AND MECHANICAL EQUIPMENT, EQUIPMENT, VARIATIONS IN
3 a	20A 3-WAY TOGGLE SWITCH U.O.N. "a" DENOTES LIGHTING FIXTURE CONTROLLED		AC INDOOR UNIT MOTOR AS NOTED WITH LIQUID TIGHT FLEXIBLE CONNECTION	COMM	COMMUNICATION	IC.	INTERRUPTING CAPACITY	FIREPROOFING AND PLASTERING, WINDOW AND DOOR TRIM, PANELING, CEILINGS AND THE LIKE. CORRECT ANY INACCURACY RESULTING FROM FAILURE TO DO SO WITHOUT EXPENSE TO OWNER.
3),	CEILING OCCUPANCY SENSOR, NUMBER INDICATES TYPE; SEE OCCUPANCY	M S <sub>N</sub>	WITH JUNCTION BOX AND MOTOR SWITCH.	CT	CURRENT TRANSFORMER	PP	POWER PANEL	8. CONTRACTOR SHALL PROVIDE A WARRANTY ON ALL MATERIALS, EQUIPMI
	SENSON SCHEDULE. A LETTEN NEI ENES TO WINING DIAGNAM.		AC OUTDOOR UNIT MOTOR AS NOTED WITH CONTROLLER AND DISCONNECT SWITCH WITH WEATHER PROOF.	CU	COPPER	PWR	POWER	AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE.
	WIRING SYSTEMS	WP I	NON FUSED DISCONNECT SWITCH AMPERAGE, AND NUMBER OF POLES	DIA	DIAMETER	R	REMOVE	9. ALL UNUSED MATERIALS AND DEBRIS SHALL BE LEGALLY REMOVED AN DISPOSED OF AWAY FROM THE PREMISES ON A DAILY BASIS.
5 5	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF		AS NOTED.	DISC	DISCONNECT	RE	RELOCATED EXISTING	10. CONTRACTOR SHALL PATCH, PAINT, AND RESTORE EXISTING SURFACES DAMAGED DURING THE COURSE OF THIS CONSTRUCTION TO PRE—EXIST
	2#12 Ø, 2#12 N. & 2#12 G. IN 3/4"C, UNLESS OTHERWISE NOTED.		30A/240V NON FUSED DISCONNECT SWITCH	DN	DOWN	REC	RECEPTACLE	CONDITIONS OR BETTER.
5 7	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF		60A/240V NON FUSED DISCONNECT SWITCH	DP	DISTRIBUTION PANEL	RGS	RIGID GALVANIZED STEEL	11. MINIMUM SIZE OF CONDUIT SHALL BE ¾", AND TYPE SHALL BE ELECT METALLIC TUBING (EMT), UNLESS OTHERWISE NOTED. PROVIDE NYLON
	3#12 ø, 3#12 N. & 3#12 G. IN 3/4"C, UNLESS OTHERWISE NOTED.		100A/240V NON FUSED DISCONNECT SWITCH	DWG	DRAWING	RR	REMOVE & RELOCATE	LINE AND CONDUIT CAP FOR ALL EMPTY CONDUITS.  12. CONNECT CONDUIT TO MOTOR CONDUIT TERMINAL BOXES WITH FLEXIB
	CONDUIT AND WIRE TO BUILDING GROUND.		200A/240V NON FUSED DISCONNECT SWITCH	JB	JUNCTION BOX	SECT	SECTION	CONDUIT (MINIMUM 18 IN. LENGTH AND 50% SLACK). DO NOT TERMIN OR FASTEN RACEWAYS TO MOTOR FOUNDATION.
			COMBINATION MAGNETIC STARTER AND DISCONNECT SWITCH, FURNISHED BY	KCMIL	ONE THOUSAND CIRCULAR MILS	SPDT	SINGLE POLE DOUBLE THROW	13. PULL AND JUNCTION BOXES WHERE INDICATED ON THE DRAWINGS, SH
	UNDERGROUND	<b>4</b>	HVAC/CONTRACTOR, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.	KV	KILOVOLT	SPST	SINGLE POLE SINGLE THROW	CONSIDERED SHOWN AT THEIR APPROXIMATE LOCATION. THE CONTRACT SHALL LOCATE THEM AS FIELD CONDITIONS DICTATE. ADDITIONAL PULL JUNCTION BOXES NOT SHOWN ON DRAWINGS SHALL BE PROVDED WHI
	EXISTING	└ <u> 400</u> 350	FUSED DISCONNECT SWITCH AND FUSE AMPERAGE AS INDICATED. TOP NUMBER DENOTS SWITCH SIZE AND BOTTOM NUMBER DENOTES FUSE.	KVA	KILOVOLT-AMPERES	SPEC	SPECIFICATION	REQUIRED BY APPLICABLE CODE PROVISIONS OR WHERE CALLED FOR FIELD CONDITIONS. PULL AND JUNCTION BOXES SHALL BE SURFACE T
	NEW		DUPLEX PUMP. NUMBER INDICATES HP RATING OF PUMP.	KW	KILOWATTS	SW	SWITCH	UNFINISHED AREAS AND INSTALLED CANCEALED IN FINISHED AREAS, AN COVERS TO PULL & JUNCTION BOXES SHALL BE READILY ACCESSIBLE
		M/M/		LTG	LIGHTING	SWBD	SWITCHBOARD	14. SUPPORT PANEL, JUNCTION AND PULLBOXES INDEPENDENTLY TO BUILD STRUCTURE WITH NO WEIGHT BEARING ON RACEWAYS.
	ELECTRICAL DRAWING LIST	1.5 kW	ELECTRICAL HEATER, NUMBER DENOTES HEATER RATING	MAX	MAXIMUM	SYM	SYMMETRICAL	15. FOR EXACT LOCATION AND MOUNTING HEIGHT OF LIGHTING FIXTURES A SWITCH/RECEPTACLE OUTLETS, REFER TO ARCHITECTURAL REFLECTED
	FLECTRICAL SYMBOLS AND GENERAL NOTES	\$ <sub>os</sub>	WALL MOUNT OCCUPANCY SENSOR SWITCH	MC	MOTOR CONTROLLER	SYS	SYSTEMS	AND POWER PLANS.
		Sī	THERMAL OVERLOAD SWITCH AT MOTOR. PROVIDE THERMAL ELEMENTS AS PER MOTOR RATING.	MCB	MAIN CIRCUIT BREAKER	TELE	TELEPHONE	16. ALL ELECTRICAL ACCESSORIES AND EQUIPMENT INSTALLED OUTSIDE OF EXPOSED TO WEATHER SHALL HAVE NEMA 3R ENCLOSURES AND SHALL TOUR TOUR TOUR TOUR TOUR TOUR TOUR TOUR
3	ELECTRICAL SPECIFICATIONS SHEET 2 OF 2	S <sub>M</sub>	MANUAL MOTOR SWITCH	MLO	MAIN LUGS ONLY	TEMP	TEMPERATURE	TIGHTLY GASKETED FOR A COMPLETE RAINTIGHT INSTALLATION. ALL BU EXTERIOR MOUNTED RECEPTACLES SHALL BE GFCI RATED AND MOUNTE WEATHERPROOF ENCLOSURE.
0	LIGHTING ELECTRICAL PLAN		ANNOTATION	MTD	MOUNTED	TXF	TOILET EXHAUST FAN	17. ALL ACCESS PANEL LOCATIONS SHALL BE REVIEWED BY ARCHITECT PF
)	POWER ELECTRICAL PLAN	$\overline{\langle \chi \rangle}$	KEYED NOTE REFERENCE	MTS	MANUAL TRANSFER SWITCH	TYP	TYPICAL	INSTALLATION.  18. ELECTRICAL CONTRACTOR SHALL COORDINATE THE LOCATION AND INSTA
	ELECTRICAL ROOF PLAN	+24"	INDICATES MOUNTING LIFICUT, OFNITED LINE TO FINISHED FLOOD	N	NEUTRAL NOT IN CONTRACT	UON	UNLESS OTHERWISE NOTED	OF NEW WORK WITH THE GENERAL CONTRACTOR AND OTHER ASSOCIAT TRADES IN A TIMELY MANNER. THE CONTRACTOR IS RESPONSIBLE FOR
		+24	INDICATES MOUNTING HEIGHT, CENTER LINE TO FINISHED FLOOR.	NIC	NOT IN CONTRACT	V	VOLT_AMBERS	VERIFYING ALL DIMENSIONS AND CONDITIONS PRIOR TO CONSTRUCTION TO ALL GENERAL, MECHANICAL, AND ELECTRICAL, DRAWINGS AND
LIGHTING FIXTURE AND OUTLET BOX. HALF S "EM" INDICATES FIXTURES WITH INTEGRAL BA' SERVICE, U.O.N.  LUMINAIRE TYPE: INDICATE BY LIPPERCASE IS SCHEDULE.  CIRCUIT NUMBER: INDICATED BY NUMBER SWITCHING INDICATED BY LOWER CASE LETTE  DENOTES FIXTURES DESIGNATED AS NIGHTLIG UNSWITCHED CIRCUIT.  DENOTES FIXTURES DESIGNATED AS NIGHTLIG UNSWITCHED CIRCUIT.  CEILING/WALL MOUNTED SELF POWERED EXIT DIRECTIONALARROWS AS INDICATED. SHADED A ISOLITE ELITE SERIES LED EXIT SIGN  SWITCHES AND CON  \$a 20A SPST TOGGLE SWITCH U.O.N. "a" DENOTE RECEPTACLE CONTROLLED.  \$\$a 20A 3—WAY TOGGLE SWITCH U.O.N. "a" DENOTE RECEPTACLE CONTROLLED.  \$\$A CEILING OCCUPANCY SENSOR, NUMBER INDICATES SENSOR SCHEDULE. 'A' LETTER REFERES TO  WIRING SYSTEM  WIRING SYSTEM  WIRING SYSTEM  DOWER OR LIGHTING CIRCUITRY HOMERUN WI NUMBER WHERE USED INDICATES CIRCUIT INL 2#12 ø, 2#12 N. & 2#12 G. IN 3/4"C, UN 2#12 ø, 3#12 N. & 3#12 G. IN 3/4"C, UN  CONDUIT AND WIRE TO BUILDING GROUND.  UNDERGROUND  EXISTING  NEW  ELECTRICAL DRAWING  1.1 ELECTRICAL SYMBOLS AND GENERAL NOTES CONDUIT AND WIRE TO BUILDING SHEET 1 OF 2 LIGHTING ELECTRICAL PLAN  2.1 ELECTRICAL SPECIFICATIONS SHEET 1 OF 2 LIGHTING ELECTRICAL PLAN  2.2 ELECTRICAL SPECIFICATIONS SHEET 1 OF 2 LIGHTING ELECTRICAL PLAN  2.3 ELECTRICAL ROOF PLAN  ELECTRICAL ROOF PLAN  ELECTRICAL ROOF PLAN  ELECTRICAL ROOF PLAN  ELECTRICAL RISER DIAGRAM & PANEL SCHE	ELECTRICAL DETAILS	$\frac{1}{\mathbb{E}/2-1}$	DETAIL REFERENCE: DETAIL NUMBER INDICATED ON TOP: DRAWING NUMBER INDICATED ON BOTTOM	NTS	NOT TO SCALE PANEL	VA WP	VOLT AMPERE WEATHER PROOF	SPECIFICATIONS FOR THIS PROJECT.  19. ALL CONDUITS AND EQUIPMENT TO BE CONCEAL ED IN FINISHED SPACE.
				PNL	WATT	WP	PHASE	UNLESS OTHERWISE NOTED. CONDUITS SHALL BE ENCASED IN THE COFLOOR SLAB.
			POWER DISTRIBUTION		WOLL		THASE	20. ALL EQUIPMENT AND MATERIALS INSTALLED IN PLENUM CEILINGS SHALI APPROVED FOR THAT APPLICATION.
			MAJOR ELECTRICAL COMPONENT OR DEVICE. VOLTAGE AND AMPERAGE AS NOTED.					21. OUTLET BOXES AND JUNCTION BOXES ON OPPOSITE SIDES OF FIRE—R WALLS SHALL BE SEPARATED BY A HORIZONTAL DISTANCE OF NOT LES THAN 24 INCHES, UNLESS FIRE—RATED BOXES OR PUTTY PADS ARE U
			DISTRIBUTION PANELBOARD, 120/208V—SURFACE OR FLUSH MOUNTED.					22. COORDINATE ALL FLOOR PENETRATIONS WITH THE STRUCTURAL AND ARCHITECTURAL DRAWINGS. CONFIRM PENETRATION LOCATIONS WITH T ENGINEER AND OWNER BEFORE INSTALLATION.
								23. COORDINATE THE MOUNTING HEIGHT AND LOCATION OF RACEWAYS, COMMUNICATIONS OUTLETS, AND RECEPTACLES WITH THE ARCHITECTUR CASEWORK DRAWINGS AND DETAILS. COORDINATE LOCATIONS OF LIGHT FIXTURES, SWITCHES, AND RELATED DEVICES WITH THE ARCHITECTURAL DRAWINGS AND DETAILS.
								24. REFER TO ARCHITECTURAL PLANS FOR FINAL LOCATIONS OF ALL LUMII AND SWITCHES, AND FOR ALL FINISHED CEILING HEIGHTS.
								25. REFER TO ARCHITECTURAL PLANS FOR FINAL LOCATIONS OF ALL ELEC' DEVICES, AND FOR FINAL CEILING AND WALL HEIGHTS AND LAYOUTS.
								26. LIGHTING FIXTURES PROVIDED WITH EMERGENCY BATTERY PACKS AND INDICATED WITH SWITCH CONTROL SHALL BE WIRED WITH BATTERY
								CHARGING/SENSING CIRCUIT WIRED AHEAD OF SWITCH CONTROL.

### ELECTRICAL SPECIFICATIONS

#### GENERAL:

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

### 2. GENERAL PROVISIONS FOR ELECTRICAL WORK:

- A. DEFINITIONS:
  - 1) "PROVIDE": TO FURNISH, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.
- 2) "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.
- 3) "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE. AND DELIVER COMPLETE WITH RELATED ACCESSORIES.
- 4) "WORK": LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.
- 5) "WIRING": RACEWAY. FITTINGS, WIRE, BOXES, AND RELATED ITEMS.
- 6) "CONCEALED": EMBEDDED IN MASONRY OR OTHER CONSTRUCTION, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS, IN TRENCHES, IN CRAWL SPACES, OR IN ENCLOSURES.
- 7) "EXPOSED": NOT INSTALLED UNDERGROUND OR "CONCEALED" AS DEFINED ABOVE.
- 8) "SIMILAR" OR "EQUAL": EQUAL IN MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT.
- B. TEMPORARY LIGHT AND POWER: PROVIDE TEMPORARY LIGHT AND POWER SYSTEMS AT EARLIEST POSSIBLE DATE WITHIN THE CONSTRUCTION AREAS FOR THE REQUIREMENTS OF ALL TRADES AS HEREIN DESCRIBED. EXTEND SYSTEMS TO NEW CONSTRUCTION AS SOON AS PHYSICALLY POSSIBLE. MAINTAIN SYSTEM DURING WORKING OWNER. PROVIDE ALL REQUIRED MAINTENANCE, INCLUDING LAMPS AND SOCKETS.
- C. QUALITY ASSURANCE
- 1) QUALITY OF MATERIALS: ALL EQUIPMENT SHALL BE NEW SPECIFICATION GRADE, FREE FROM DEFECTS AND LISTED BY APPROVED TESTING AGENCY AND BEARING THEIR LABEL MATERIALS AND EQUIPMENT OF SIMILAR APPLICATION SHALL BE OF SAME MANUFACTURER, EXCEPT AS NOTED.
- 2) GUARANTEE: ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED AS DEFINED IN PARAGRAPH 2.C.
- 3) CURRENT CHARACTERISTICS:
- a. SERVICE: 120/208 VOLT, 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDED NEUTRAL.
- b. DISTRIBUTION: 120/208 VOLT, 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDED NEUTRAL.

- 4) HEIGHTS OF OUTLETS:
- a. FROM FINISHED FLOOR TO CENTERLINE OF OUTLETS FOR:
- RECEPTACLES AND TELEPHONES: 1 FT-6 IN.
- WALL SWITCHES: 4 FT-0 IN.
- WALL FIXTURES: 7 FT-0 IN.
- MOTOR CONTROLLERS: 5 FT-0 IN.
- CLOCKS: 7 FT 6 IN
- b. EXCEPTIONS: AT JUNCTION OF DIFFERENT WALL FINISH MATERIALS, ON MOLDING OR BREAK IN WALL SURFACE, IN VIOLATION OF CODE, OR AS NOTED OR DIRECTED.
- . PRODUCT DELIVERY, STORAGE AND HANDLING
- 1) MOVING OF EQUIPMENT: WHERE NECESSARY, SHIP IN CARTED SECTIONS OF SIZE TO PERMIT PASSING THROUGH AVAILABLE SPACES
- 2) ACCESSIBILITY: FOR OPERATION, MAINTENANCE AND REPAIR, MINOR DEVIATIONS SHALL BE PERMITTED, CHANGES OF MAGNITUDE OR INVOLVING EXTRA COST ARE NOT PERMISSIBLE WITHOUT REVIEW. GROUP CONCEALED ELECTRICAL EQUIPMENT REQUIRING ACCESS WITH EQUIPMENT FREELY ACCESSIBLE THROUGH ACCESS DOORS.
- MATERIALS
- 1) NAMEPLATES: PROVIDE BLACK LAMICOID SHEET WITH 3/4 IN. WHITE LETTERING, FASTENED WITH EPOXY CEMENT FOR EACH DISCONNECT SWITCH, CIRCUIT BREAKER, PANEL, CABINET, TRANSFORMER, ENCLOSURE, MOTOR CONTROLLER AND THE LIKE. NAMEPLATES SHALL DESCRIBE THE NAME AND NUMBER OF EACH COMPONENT.
- 2) CABLE TAGS: TAG EACH CONDUCTOR PASSING THROUGH SPLICE OR PULLBOX WITH A WHITE LINEN TAG, INDICATING POINT OF ORIGIN AND TERMINATION OF THE CIRCUIT.

#### 3) INSERTS AND SUPPORTS:

- a. INSERTS: STEEL, SLOTTED TYPE, FACTORY PAINTED.
- SINGLE ROD: SIMILAR TO GRINNELL FIG. 281.
- MULTI-ROD: SIMILAR TO FEE AND MASON SERIES 9000 WITH END CAPS AND CLOSURE STRIPS.
- CLIP FORM NAILS FLUSH WITH INSERTS.
- MAXIMUM LOADING 75 PERCENT OF RATING.
- b. SUPPORTS FROM BUILDING CONSTRUCTION: INSERTS, BEAM CLAMPS, STEEL FISHPLATES (IN CONCRETE FILL ONLY), CANTILEVER BRACKETS OR OTHER MEANS. SUBMIT FOR REVIEW.
- c. GROUPED LINES AND SERVICES: TRAPEZE HANGERS OF BOLTED ANGLES OR CHANNELS.
- d. WHERE BUILDING CONSTRUCTION IS INADEQUATE: PROVIDE ADDITIONAL FRAMING. SUBMIT FOR REVIEW.
- F. PAINT SHALL BE THE BEST GRADE FOR ITS PURPOSE. DELIVER IN ORIGINAL SEALED CONTAINERS AND APPLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. COLORS SHALL BE AS SELECTED BY ARCHITECT OR ENGINEER. UTILIZE GALVANIZED IRON PRIMER ON PANEL AND PULL BOXES, AFTER FABRICATION. UTILIZE HOT DIPPED GALVANIZED OR DIPPED IN ZINC BASED PRIMER FOR: OUTLET BOXES, JUNCTION BOXES, CONDUIT HANGERS, RODS, INSERTS AND SUPPORTS. ZINC BASED PRIMER WITH FINISH TO MATCH SURROUNDINGS SHALL BE USED FOR MARRED SURFACES OF STEEL EQUIPMENT AND RACEWAYS. A FIELD—APPLIED ZINC BASED PRIME COAT SHALL BE UTILIZED FOR STEEL OR IRONWORK.
- G. BRUSH AND CLEAN WORK PRIOR TO CONCEALING, PAINTING AND ACCEPTANCE. PAINTED EXPOSED WORK SOILED OR DAMAGED; CLEAN AND REPAIR TO MATCH ADJOINING WORK BEFORE FINAL ACCEPTANCE. REMOVE DEBRIS FROM INSIDE AND OUTSIDE OF MATERIAL AND EQUIPMENT.
- H. FINAL LOCATIONS AND MOUNTING ORIENTATIONS OF ALL SWITCHES, RECEPTACLES AND LIGHT FIXTURES SHALL BE VERIFIED WITH ARCHITECT.
- I. ALL ACCESS DOOR LOCATIONS SHALL BE REVIEWED BY ARCHITECT PRIOR TO INSTALLATION.

### 3. SCOPE OF WORK:

- A. SCOPE OF WORK SHALL CONSIST OF PROVIDING LABOR, MATERIALS, EQUIPMENT, SERVICES AND FEES NECESSARY FOR COMPLETE AND SAFE INSTALLATION IN CONFORMING WITH NATIONAL AND LOCAL CODES AND AUTHORITIES HAVING JURISDICTION, AS INDICATED ON DRAWINGS AND HEREIN SPECIFIED.
- B. ALL DRAWINGS, PLANS, DETAILS, SPECIFICATIONS AND SPECIFICATION ADDENDA ARE MADE PART OF THIS CONTRACT AND SHALL APPLY TO ALL WORK UNDER THE CONTRACT UNLESS OTHERWISE AMENDED, MODIFIED, SUPPLIED OR SPECIFIED HEREIN.
- THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OR ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES BY OWNER INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER, DATE IS EARLIER, THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDED THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR
- D. THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH ALL DEPARTMENTS HAVING JURISDICTION, WORK AND PAY ALL FEES THEREFORE. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION AND TESTS OF ANY OR ALL PARTS OF THE WORK IF SO REQUIRED BY AUTHORITIES AND PAY ALL CHARGES FOR SAME. THE CONTRACTOR SHALL PAY ALL COSTS FOR, AND FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH ALL REGULATIONS WHERE THEY APPLY TO THIS WORK.
- CONTRACTOR SHALL PERFORM ALL CONTROLLED INSPECTIONS IN ACCORDANCE WITH THE FLORIDA BUILDING CODE. SECURE ALL REQUIRED PERMITS AND APPROVALS AND TRANSMIT SAME TO OWNER. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FEES.
- CONTRACTOR SHALL MAINTAIN CONTINUITY OF ALL ELECTRICAL SYSTEMS TO ALL AREAS NOT COVERED BY THIS RENOVATION AND SHALL PROVIDE 48 HOUR NOTICE TO LANDLORD OF ANY PLANNED POWER INTERRUPTIONS OR SIGNAL SYSTEM OUTAGES.

#### SHOP DRAWINGS

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

1) PROJECT NAME AND LOCATION

2) NAME OF ARCHITECT AND ENGINEER

4) APPROVAL STAMP OF PRIME CONTRACTOR

SUBMISSIONS:

3) ITEM IDENTIFICATION

- 1) SUBMISSIONS 11 IN. X 17 IN. OR SMALLER: IF THE SUBMISSION IS A CATALOG CUT, THEN THE CONTRACTOR SHALL SUBMIT ONE ORIGINAL AND TWO COPIES. OTHERWISE, HE SHALL SUBMIT THREE COPIES. THE ARCHITECT WILL FORWARD THE ORIGINAL AND ONE COPY (TWO COPIES WHEN NO ORIGINAL IS RECEIVED) TO THE ENGINEER. ALL CATALOG CUTS SHALL BE COMPLETE.
- 2) SUBMISSIONS LARGER THAN 11 IN. X 17 IN.: SUBMIT TWO PRINTS AND ONE PAPER SEPIA TO THE ARCHITECT. THE ARCHITECT WILL FORWARD ONE PRINT AND THE PAPER SEPIA TO THE ENGINEER.
- . SUBMIT SHOP DRAWINGS FOR THE FOLLOWING:
- 1) SAFETY/DISCONNECT SWITCHES
- 2) FUSES
- 3) CIRCUIT BREAKERS
- 4) PANELBOARDS/LOADCENTER (INCLUDING DIMENSIONS, SCHEDULES, AND CATALOG CUTS).
- 5) RACEWAYS
- 6) WIRE AND CABLE
- 7) WALL SWITCHES
- /) WALL SWITCHES
- 8) INSERTION RECEPTACLES
- 9) MOMENTARY CONTACT SWITCHES
- 10) TIME SWITCHES
- 11) LIGHTING FIXTURES
- ASSIST AND PROVIDE ALL NECESSARY INFORMATION, DIAGRAMS, SKETCHES, ETC. TO THE HVAC CONTRACTOR, FOR THE PREPARATION OF COORDINATED SHOP DRAWINGS INDICATING ROUTING OF FEEDERS, CONTROL CONDUITS, RECESSED FIXTURES AND ADJACENT NEARBY PIPING AND DUCTWORK WHERE APPLICABLE, CERTIFIED BY ALL TRADES THAT COORDINATION HAS BEEN ESTABLISHED. SUBMIT FOUR(4) BOOKBOUND OPERATING AND SERVICE MANUALS WHICH SHALL INCLUDE COPIES OF ALL SHOP DRAWING. PROVIDE SHOP DRAWINGS FOR PANELS, FIXTURES, WIRING DEVICES, CONDUIT, CABLE, DISCONNECT SWITCH, RELAYS, CONTRACTORS, AND OTHER SYSTEMS AS DIRECTED BY THE ENGINEER.
- AS-BUILT DRAWINGS AND EQUIPMENT OPERATIONAL INSTRUCTIONS
- A. UPON COMPLETION AND ACCEPTANCE OF WORK, CONTRACTOR SHALL FURNISH WRITTEN INSTRUCTIONS AND EQUIPMENT MANUALS AND DEMONSTRATE TO THE OWNER THE PROPER OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND APPARATUS FURNISHED UNDER THIS CONTRACT.
- B. THESE INSTRUCTIONS SHALL BE TYPED ON 8-1/2 IN. X 11 IN. PAPER AND BOUND IN THREE RING BINDERS WITH CLEAR ACETATE COVERS. CONTRACTOR SHALL GIVE THREE COPIES OF THE INSTRUCTIONS TO THE OWNER AND ONE COPY TO THE ENGINEER.
- C. THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE PROJECT, ARCHITECT AND ENGINEER.
- REPRODUCIBLE "AS-BUILT" DRAWINGS SHALL BE PROVIDED INDICATING THE AS INSTALLED CONDITIONS OF THE WORK.
  "AS-BUILT" DRAWINGS SHALL BE PROVIDED TO THE ARCHITECT AFTER COMPLETION OF THE INSTALLATION.
- 6. LOW-VOLTAGE DISTRIBUTION EQUIPMENT:
  - A. PROVIDE COMPLETE EQUIPMENT INCLUDING: SWITCHES, FUSES, CIRCUIT BREAKERS, PANELS AND TRANSFORMERS.
- B. ALL EQUIPMENT SHALL CONFORM TO NEMA, ANSI AND IEEE STANDARDS.
- C. DISCONNECT SWITCHES SHALL BE FUSED OR NONFUSED AS NOTED. VOLTAGE SHALL BE AS REQUIRED. SWITCHES SHALL BE HEAVY DUTY, EXCEPT AS NOTED, AND HORSEPOWER RATED FOR MOTOR LOADS. TOGGLE TYPE SWITCHES SHALL BE NONFUSED, LOAD BREAK, HAVING MAXIMUM RATINGS OF 20 AMP AT 600 VOLTS AND 30 AMP AT 240 VOLTS. TWO—POLE SWITCHES SHALL BE SIMILAR TO HART AND HEGEMAN NO. 6808F. THREE—POLE SWITCHES SHALL BE SIMILAR TO HART AND HEGEMAN NO. 7810F. KNIFE—BLADE TYPE SWITCHES SHALL BE LOAD BREAK, QUICK—MAKE— QUICK—BREAK, UL CLASS R UP TO 600 AMP. MAXIMUM RATING EXCEPT AS NOTED SHALL BE 800 AMP. ARC QUENCHERS SHALL BE PROVIDED. SWITCHES SHALL BE SIMILAR TO GENERAL ELECTRIC QMR. ALL SWITCH ENCLOSURES SHALL BE DEAD FRONT, NEMA TYPE 1, EXCEPT AS NOTED.

### 7. FUSI

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

- E. CIRCUIT BREAKERS: MOLDED CASE BREAKERS SHALL BE THERMAL—MAGNETIC, QUICK—MAKE—QUICK—BREAK, BOLT—ON TYPE, MANUALLY OPERATED WITH INSULATED TRIP—FREE HANDLE. MULTI—POLE TYPE BREAKERS SHALL CONTAIN INTERNAL TRIP BAR. TERMINALS SHALL BE SUITABLE FOR COPPER OR ALUMINUM CABLE. FURNISH AUXILIARY DEVICES WHERE REQUIRED FOR SHUNT—TRIPPING, OPEN A ND CLOSE MOTOR OPERATOR AND ALARM INDICATION. ENCLOSURES SHALL BE DEAD FRONT, NEMA TYPE 1, EXCEPT AS NOTED. FRAMES, IC AND INTERCHANGEABLE TRIPS SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED:
  - 1) 120 VOLTS, 100-AMP FRAME: 10,000 AMPS, 1 POLE.
  - 2)120/240 VOLTS, 225-AMP FRAME: 22,000 AMPS MINIMUM
- . DISTRIBUTION PANELBOARDS, SWITCH AND FUSE:
  - THREE PHASE, 3 OR 4 WIRE WITH COPPER BUS BARS. ALL THROUGH BUS SHALL BE INSULATED.
- I. NEMA CLASS 1 CONSTRUCTION TO ACCOMMODATE FUSIBLE, INDIVIDUALLY ENCLOSED SWITCHES, FRONT REMOVABLE, SWITCH AND DOOR INTERLOCKS. COVERS TO BE PAD-LOCKABLE.
- J. PANELBOARD SHALL BE CONSTRUCTED OF CODE—GAUGE STEEL, GRAY FINISH OVER RUST INHIBITOR, FOR SURFACE MOUNTING. BOX AND PANEL FRAME SHALL BE FLANGED AND REINFORCED FOR RIGID SUPPORT OF INTERIOR AND ACCURATE ALIGNMENT OF INTERIOR WITH FRONT. TRIMS TO BE FASTENED TO BACK BOX WITH SCREWS.
- K. ALL BRANCH SWITCHES SHALL HAVE INDIVIDUAL ENGRAVED LAMICOID NAMEPLATES (BLACK WITH WHITE CORE).
- DISTRIBUTION PANELBOARD CONSTRUCTION MINIMUM SHORT CIRCUIT RATING 25,000 AMPERES, REMS SYMMETRICAL FOR ALL 120/208V APPLICATIONS. APPLICATIONS.
- M. DISCONNECTS
- 1) DISCONNECT SWITCHES SHALL CONFORM TO NEMA AND UL STANDARDS, AND SHALL BE HORSEPOWER RATED.
- 2) SWITCHING MECHANISM SHALL BE QUICK—MAKE, QUICK—BREAK, SINGLE THROW WITH EXTERNAL OPERATING HANDLE MECHANCIALLY INTERLOCKED WITH ENCLOSURE COVER TO PROVIDE ACCESS TO INTERIOR WHEN DISCONNECT IS IN OFF POSITION ONLY. PROVIDE MEANS TO LOCK OPERATING HANDLE IN THE OPEN AND CLOSED POSITION. DESIGNATE ON THE ENCLOSURE THE OPEN AND CLOSED POSITION OF THE OPERATING HANDLE.
- 3) SWITCHES SHALL BE OF THE DOUBLE STATIONARY CONTACT TYPE.
- 4) SWITCHES SHALL BE EQUIPPED WITH REJECTION TYPE FUSE HOLDERS, FUSIBLE AS SHOWN ON THE DRAWINGS; PROVIDE COMPLETE WITH FUSES AS SCHEDULED.
- G. INSTALLATION
  - 1) DISTRIBUTION PANELBOARD SHALL BE MOUNTED TO STRUCTURAL STEEL CHANNEL (KINDORF) WHICH SHALL BE BOLTED TO THE WALL USING EXPANSION ANCHORS FOR LARGE PANELS.
- H. IDENTIFICATION
  - 1) PROVIDE NAMEPLATE AT EACH SWITCH IDENTIFYING THE LOAD SERVED.
  - 2) NAMEPLATES SHALL BE MOUNTED ON THE FRONT COVER SECURED WITH SELF—TAPPING SCREWS OR NUTS AND BOLTS. NAMEPLATES SHALL BE LAMINATED PHENOLIC, BLACK WITH A MINIMUM OF 1/4" HIGH WHITE LETTERING.
- I. DISTRIBUTION AND SUB-DISTRIBUTION PANELBOARDS SHALL BE A MINIMUM OF 30" WIDE AND 10" DEEP.
- J. POWER PANELBOARDS SHALL BE SIMILAR TO GENERAL ELECTRIC TYPE "OMR", AS MANUFACTURED BY ATLAS SWITCH COMPANY,

ELECTRIC SWITCHBOARD COMPANY OR APPROVED EQUAL.

- K. PANELBOARD SHALL HAVE MAIN CIRCUIT BREAKER OR MAIN LUGS AS INDICATED ON THE DRAWINGS. QUANTITY, POLES AND TRIP RATINGS OF BRANCH CIRCUIT BREAKERS TO BE AS INDICATED ON DRAWINGS.
- L. PANELBOARD SHALL HAVE ENGRAVED WHITE CORE, BLACK LAMACOID NAMEPLATE SCREWED ONTO PANE TRIM WITH DESIGNATION LISTED (PANELBOARD NAME, VOLTAGE, RATING OR MAINS IN AMPS).
- B. MATERIALS
  - 1) RACEWAYS:

GAUGE

- a. RIGID STEEL CONDUIT: FULL-WEIGHT PIPE, GALVANIZED,
- b. ELECTROMETALLIC TUBING (EMT): THIN WALL PIPE, GALVANIZED, THREADLESS.
- c. FLEXIBLE STEEL CONDUIT: CONTINUOUS SINGLE STRIP, GALVANIZED.d. WIREWAYS: WIRE SHALL BE AS NOTED, MINIMUM NO. 16
- screw-on.

  e. Surface Metal Raceway: Size as Noted. Base 0.04 In., Cover 0.25 In. Material Shall be steel. Finish Shall be

STEEL WITH GROUND CONTINUITY. FINISH

ENAMEL. COVERS SHALL BE

BAKED ENAMEL. COVERS SHALL BE SCREW—ON.
2) FITTINGS AND ACCESSORIES:

INSULATED THROAT.

SHALL BE BAKED

- a. RIGID STEEL: NONSPLIT, THREADED, STEEL OR MALLEABLE IRON. ZINC DIE CAST NOT PERMITTED.
- b. ELECTROMETALLIC TUBING: COMPRESSION TYPE. GALVANIZED

RIGID STEEL ELBOWS, 2 IN. OR LARGER.

- c. FLEXIBLE METALLIC CONDUIT: ANGLE WEDGE TYPE WITH
- d. BUSHINGS: METALLIC INSULATED TYPE.

### ELECTRICAL SPECIFICATIONS (CONT.)

#### 3) BOXES:

- a. OUTLET BOXES: EXCEPT AS OTHERWISE REQUIRED BY CONSTRUCTION, DEVICES OR WIRING, BOXES SHALL BE STAMPED STEEL, 4 IN. SQUARE OR OCTAGON FOR FIXTURES. BOXES ABOVE CEILING SHALL BE 1-1/2 IN. DEEP. BOXES IN CEILING OR SLAB SHALL BE 3 IN. DEEP. BOXES IN WALL FOR FIXTURES SHALL BE 2-3/4 IN. DEEP. BOXES IN WALL FOR RECEPTACLES AND SWITCHES SHALL BE 1-1/2 IN. DEEP. FURNISH WITH RAISED COVERS AND FIXTURE STUDS WHERE REQUIRED. WITHOUT FIXTURE OR DEVICE: FURNISH BLANK COVER. OFFSET BACK-TO-BACK OUTLETS WITH MINIMUM 6 IN. SEPARATION.
- b. JUNCTION AND PULL BOXES: GALVANIZED SHEET STEEL WITH SCREW-ON COVERS, EXCEPT AS NOTED. FURNISH WITH INSULATED SUPPORTS FOR CABLES. LOCATIONS SHALL BE AS NOTED OR REQUIRED AND ACCESSIBLE. PROVIDE BARRIERS IN NEW AND RENOVATED BOXES BETWEEN 120/208 VOLT AND 265/460 VOLT WIRING AND BETWEEN EMERGENCY AND NORMAL WIRING. FLOOR BOXES SHALL BE SUITABLE FOR CONDUIT AND DEVICES NOTED. RAISED OUTLETS SHALL BE HUBBELL #B2414 SERIES WITH ABOVE FLOOR FITTING. TELEPHONE: BUSHED HOLE. POWER: DUPLEX RECEPTACLE OR OTHER AS NOTED. INCREASE SIZE TO SUIT AS NECESSARY. FLUSH OUTLETS SHALL BE HUBBELL #B2414 SERIES WITH FLUSH FLOOR FITTING FOR TELEPHONE AND FLUSH DUAL FLAP COVER WITH DUPLEX RECEPTACLE FOR POWER AS NOTED. INCREASE SIZE TO SUIT AS NECESSARY.
- C. PROVIDE RACEWAYS ONLY AS HEREIN SPECIFIED, EXCEPT AS NOTED. RACEWAYS SHALL BE RUN CONCEALED, EXCEPT AS NOTED.

PROVIDE RACEWAY SUPPORT UTILIZING CEILING TRAPEZE, STRAP HANGERS, OR WALL BRACKETS. PROVIDE U-BOLTS AT EACH FLOOR LEVEL OF RISER RACEWAYS AND CONNECTED TO ACCEPTABLE SUPPORTS. PROVIDE RISER CLAMPS AT EACH FLOOR LEVEL OF RISER RACEWAYS AND RESTING ON SLAB. FOR THROUGH-THE-FLOOR SYSTEMS, UTILIZE AN ASSEMBLY SIMILAR TO HUBBELL FIRE RATED POKE-THROUGH-FLOOR BOX SYSTEM. FOR ABOVE FLOOR FITTINGS TELEPHONE SHALL BE BUSHED HOLE AND POWER SHALL BE DUPLEX RECEPTACLE OR OTHER AS NOTED. PROVIDE SEPARATION BARRIER BETWEEN POWER AND TELEPHONE COMPARTMENTS. PROVIDE JUNCTION BOX ON UNDERSIDE OF FLOOR. PACK FITTING TO RESTORE FIRE RATING OF FLOOR.

SECURE ALL RACEWAYS TO SUPPORTS WITH PIPE STRAPS OR U-BOLTS. SPACING OF SUPPORTS SHALL BE A MINIMUM OF 10 FT ON CENTER FOR METALLIC RACEWAY AND AS REQUIRED FOR NONMETALLIC RACEWAY. SPACING SHALL BE 5 FT ON CENTER FOR WIREWAYS AND PER CODE AND AS NOTED FOR OTHERS. MOUNT SUPPORTS TO STRUCTURE MASONRY WITH TOGGLE BOLTS ON HOLLOW MASONRY, EXPANSION SHIELDS OR INSERTS IN CONCRETE AND BRICK, MACHINE SCREWS ON METAL, BEAM CLAMPS ON FRAMEWORK, WOOD SCREWS ON WOOD, AND PAN THROUGH STRAPS IN METAL DECK. NAILS, RAWL PLUGS OR WOOD PLUGS SHALL NOT BE PERMITTED. WHERE REQUIRED BY STRUCTURE, FURNISH THROUGH BOLTS AND FISHPLATES.

EXPOSED RACEWAYS SHALL BE RUN PARALLEL WITH OR AT RIGHT ANGLES TO WALLS. PROVIDE CLEARANCE WITH WATER, STEAM OR OTHER PIPING (MINIMUM 3 IN. SEPARATION FROM STEAM AND HOT WATER PIPES, EXCEPT 1 IN. FROM PIPE COVER AT CROSSINGS AND 18 IN. FOR PARALLEL RUNS). FOR HUNG CEILING OUTLETS, RUN IN HUNG CEILING AND CONNECT TO CEILING SUPPORT CHANNELS. IN MASONRY AND POURED CONCRETE. RUN VERTICALLY ONLY.

MAINTAIN GROUNDING CONTINUITY OF INTERRUPTED METALLIC RACEWAYS WITH GROUND CONDUCTOR, AND IN FLEXIBLE CONDUIT FOR FEEDERS AND MOTOR TERMINAL CONNECTIONS.

EMPTY RACEWAYS OVER 10 FT LONG: PROVIDE FISH OR PULL WIRE, GALVANIZED OR NYLON ROPE.

RIGID STEEL CONDUIT SHALL BE PERMITTED FOR FEEDERS AND BRANCH CIRCUITS. PAINT MALE THREADS OF FIELD-THREADED CONDUIT WITH GRAPHITE-BASE PIPE COMPOUND AND BUTT CONDUIT ENDS. TOUCH UP MARRED SURFACES AND FIELD-CUT THREADS, CRC-COLD GALVANIZED, EMT SHALL BE PERMITTED FOR BRANCH CIRCUITS ONLY, IN DRY LOCATIONS, DRY WALLS, HUNG CEILINGS, HOLLOW BLOCK WALLS AND FURRED SPACES. EMT SHALL NOT BE PERMITTED IN RAISED FLOORS. FLEXIBLE STEEL CONDUIT SHALL BE UTILIZED FOR SHORT CONNECTIONS WHERE RIGID CONDUIT IS IMPRACTICAL. FROM OUTLET BOX TO RECESSED LIGHTING FIXTURE: PROVIDE MINIMUM 4 FT AND MAXIMUM 6 FT LENGTHS. FOR FINAL CONNECTION TO MOTOR TERMINAL BOX, TRANSFORMER AND OTHER VIBRATING EQUIPMENT: PROVIDE WITH POLYVINYL SHEATHING AND GROUND CONDUCTOR. MINIMUM LENGTH: 18 IN. WITH SLACK, CONNECT GROUND CONDUCTOR TO ENCLOSURE OR RACEWAY AT EACH END. FOR EXPANSION JOINT CROSSINGS, CROSS AT RIGHT ANGLES AND ANCHOR ENDS.

CUT CONDUIT ENDS SQUARE. REAM SMOOTH. PAINT MALE THREADS OF FIELD THREADED RACEWAYS WITH GRAPHITE BASE PIPE COMPOUND. DRAW UP TIGHT WITH RACEWAY COUPLING.

ALL COUPLINGS SHALL BE COMPRESSION TYPE. NO SET SCREW FITTINGS.

EXPANSION FITTINGS SHALL BE INSTALLED AT RIGHT ANGLES WITH CLIP JOINT CENTERED IN EXPANSION JOINT. PROVIDE A LENGTH OF RUN IN ACCORDANCE MANUFACTURER'S RECOMMENDATIONS. PRESET FITTINGS SHALL ALLOW FOR TEMPERATURE VARIATION.

RACEWAYS PASSING THROUGH FIRE—RATED CONSTRUCTION: SEAL OPENING WITH FIRE SEALANT.

D. PROVIDE CABLE SUPPORTS IN ACCORDANCE WITH NATIONAL ELECTRIC CODE ARTICLE 300.19. CABLE SUPPORTS SHALL UTILIZE A ONE—PIECE PLUG WITH POZI—GRIP WEDGING PLUG AS MANUFACTIURED BY OZ—GEDNEY. TYPE SF SHALL BE USED FOR ARMORED CABLE.

INSTALL CABLE SUPPORTS AT THE TOP OF A VERTICAL RISE AND PROVIDE INTERMEDIATE ADDITIONAL SUPPORTS AS REQUIRED TO LIMIT SUPPORTED CONDUCTOR LENGTHS TO NOT GREATER THAN THOSE SPECIFIED IN TABLE 300.19(A).

- A. ERECT WALL AND SWITCH OUTLETS IN ADVANCE OF FURRING AND FIREPROOFING. OUTLET BOXES SHALL BE SET SQUARE AND TRUE WITH BUILDING FINISH. SECURE TO BUILDING STRUCTURE BY ADJUSTABLE STRAP IRON OR GROUT IN WITH MASONRY. VERIFY OUTLET LOCATIONS IN FINISHED SPACES WITH ARCHITECTURAL DRAWINGS OF INTERIOR DETAILS AND FINISHES. PROVIDE BARRIERS BETWEEN SWITCHES CONNECTED TO DIFFERENT PHASES FOR VOLTAGES EXCEEDING 150 VOLTS TO GROUND.
- D. PANEL, JUNCTION AND PULL BOXES SHALL BE LOCATED CLEAR OF OTHER TRADES. CONCEAL JUNCTION AND PULL BOXES IN FINISHED SPACES. WHERE NECESSARY, REROUTE RACEWAYS OR MAKE OTHER ARRANGEMENTS FOR CONCEALMENT. BOXES SHALL BE ACCESSIBLE. SUPPORT BOXES FROM BUILDING STRUCTURE, INDEPENDENT OF CONDUIT. PROVIDE FLOOR—TO—CEILING CHANNELS FOR MOUNTING ON DRYWALL AND LIGHTWEIGHT CONSTRUCTION. OUTLET BOXES FOR FIXTURES RECESSED IN HUNG CEILINGS SHALL BE ACCESSIBLE THROUGH OPENING CREATED BY REMOVAL OF FIXTURE. SECURE TO BLACK IRON SUPPORT. MOTOR TERMINAL BOXES: COORDINATE WITH MOTOR BRANCH CIRCUIT CONDUIT AND WIRING; ADD BOX VOLUME WHERE REQUIRED.
- E. FIRE SEALANTS: PROVIDE FOR RACEWAYS AND WIRE PASSING THROUGH FLOOR SLOTS, SLEEVES OR OPENINGS IN FIRE—PARTITIONS ROOMS.
- F. PERFORM CONTINUITY TESTS OF RESISTANCE OF FEEDER CONDUITS FROM SERVICE TO POINT OF FINAL DISTRIBUTION USING 1 CONDUCTOR RETURN. MAXIMUM RESISTANCE SHALL BE

#### . WIRE AND CABLE:

- A. PROVIDE WIRE AND CABLE COMPLETE WITH ACCESSORIES. SIZE REFERENCE SHALL BE AWG EXCEPT AS NOTED.
- B. CONDUCTORS SHALL BE COPPER, ASTM STANDARD SOLID (NO. 10 AND SMALLER) OR STRANDED (NO. 8 AND LARGER).
  GENERAL USE CABLING SHALL BE NO. 12 MINIMUM. AT 120 VOLTS AND OVER 100 FT CIRCUIT LENGTH PROVIDE NO. 10 MINIMUM. AT 265 VOLTS AND OVER 200 FT CIRCUIT LENGTH PROVIDE NO. 10 MINIMUM.
- C. CONTROL AND ALARM CABLING, EXCEPT AS NOTED, SHALL BE NO. 14 MINIMUM. AT 120 VOLTS AND OVER 200 FT CIRCUIT LENGTH PROVIDE NO. 12 MINIMUM. OTHER VOLTAGES AND PHASES: ADJUST CABLE SIZING AS REQUIRED TO MAINTAIN VOLTAGE DROP. INCREASE RACEWAY SIZES FOR LARGER WIRE AS REQUIRED.
- D. INSULATION SHALL BE RUBBER AND THERMOPLASTIC MEETING ASTM AND IPCEA STANDARDS. TYPE THW OR THWN SHALL BE UTILIZED FOR FEEDERS AND BRANCH CIRCUITS EXCEPT AS NOTED. TYPE SFF-2 SHALL BE UTILIZED FOR BRANCH CIRCUITS LOCATED IN WIRING CHANNELS OF CONTINUOUS FLUORESCENT FIXTURES AND IN AMBIENT TEMPERATURES OVER 90 DEG C. FOR UNGROUNDED ISOLATED BRANCH CIRCUITS PROVIDE CROSS-LINKED POLYETHYLENE INSULATION (TYPE XHHW).
- E. ARMORED CABLE (BX) SHALL BE UTILIZED FOR BRANCH CIRCUITS IN DRY HOLLOW LOCATIONS, HUNG CEILINGS, AND BLOCK WALLS. WHEN USED IN LIEU OF WIRING IN CONDUIT, STATE IN PROPOSAL THAT PRICE IS BASED UPON THE USE OF HOSPITAL GRADE 'BX'.
- F. COLOR CODING SHALL BE AS FOLLOWS:

120/208 VOLT SYSTEM: BLACK FOR A PHASE RED FOR B PHASE BLUE FOR C PHASE

1) NEUTRAL WIRE SHALL UTILIZE WHITE OUTER COVERING THROUGHOUT. EQUIPMENT GROUND WIRE SHALL UTILIZE GREEN OUTER COVERING THROUGHOUT.

WHERE COLOR-CODED CABLE IS NOT AVAILABLE, CERTIFY IN WRITING AND REQUEST PERMISSION TO OVERLAP CONDUCTORS WITH 6 IN. OF COLOR TAPING IN ACCESSIBLE LOCATIONS.

- G. PROVIDE FLAMEPROOF LINEN OR FIBER TAGS IN ACCESSIBLE LOCATIONS. FOR FEEDERS INDICATE FEEDER NUMBER, SIZE, PHASE AND POINTS OF ORIGIN AND TERMINATIONS. FOR CONTROL AND ALARM WIRING INDICATE TYPE (CONTROL OR ALARM), SIZE OF WIRE, AND POINTS OF ORIGIN AND TERMINATIONS.
- H. TERMINATIONS, SPLICES AND TAPS UNDER 600 VOLTS: COPPER CONDUCTORS NO. 10 AND SMALLER SHALL UTILIZE COMPRESSION—TYPE OF TWIST—ON SPRING—LOADED CONNECTORS AND CLEAR NYLON—INSULATED COVERING. COPPER CONDUCTORS NO. 8 AND LARGER SHALL UTILIZE MECHANICAL BOLTED PRESSURE OR HYDRAULIC COMPRESSION TYPE USING MANUFACTURER'S RECOMMENDED TOOLING. CABLE LUGS AND CONNECTORS SHALL UTILIZE COMPRESSION TYPE OF SAME METAL AS CONDUCTOR. PROVIDE TO MATCH CABLE, WITH MARKING INDICATING SIZE AND TYPE. COPPER LUG CONNECTIONS TO BUS BARS: USE ANTISEIZE COMPOUND ON TANG.
- I. NOT MORE THAN 3 LIGHTING OR CONVENIENCE OUTLET CIRCUITS SHALL BE INSTALLED IN ONE CONDUIT UNLESS OTHERWISE INDICATED. PULL NO THERMOPLASTIC WIRES AT TEMPERATURES LOWER THAN 32 DEG F. PROVIDE SEPARATE RACEWAYS FOR CONDUCTORS OF 120/208 AND 265/460 VOLT SYSTEMS, EXCEPT 460 VOLT MOTOR BRANCH CIRCUIT WIRING AND RELATED 120 VOLT CONTROL WIRING. THERMOPLASTIC WIRES SHALL NOT BE INSTALLED IN COMPUTER AREA RAISED FLOORS.

K. PERFORM CONTINUITY AND INSULATION TESTS. MEGGER TEST

- LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS.
- 100 PERCENT OF FEEDERS, 10 PERCENT OF BRANCH CIRCUITS
  AND ALL MOTOR BRANCH CIRCUITS OVER 25 HP.

  PERFORM TESTS PRIOR TO CONNECTING FOLIPMENT AND IN

PERFORM TESTS PRIOR TO CONNECTING EQUIPMENT AND IN PRESENCE OF AUTHORIZED REPRESENTATIVES. SUBMIT WRITTEN REPORT OF RESULTS. CORRECT OR REPLACE CABLE TESTING BELOW MANUFACTURER'S STANDARDS.

#### 11. WIRING DEVICES:

- A. WIRING DEVICES SHALL BE SPECIFICATION GRADE UNLESS OTHERWISE SPECIFIED. ALL DEVICES SHALL BE FLUSH MOUNTED, UNLESS OTHERWISE NOTED. PROVIDE COMPLETE MATERIAL AND ACCESSORIES AS NOTED.
- B. LOCAL WALL SWITCHES SHALL BE ROCKER TYPE, QUIET OPERATING, RATED 20 AMP, 120/208 VOLT, AC. SIMILAR TO LEVITON DECORA SERIES A5621 (SINGLE POLE), A5623 (3-WAY) AND A5624 (4-WAY).
- STRAIGHT BLADE RECEPTACLES SHALL BE COMMERCIAL SPECIFICATION GRADE DUPLEX CONVENIENCE 125 VOLTS, 2 POLE, 3 WIRE, U GROUND SLOT, DECORA SERIES BY LEVITON. GROUNDED, EXCEPT AS NOTED.
- 5-20R; LEVITON 689 SERIES (COLOR AS SPECIFIED BY ARCHITECT).
  2) USB CHARGER/ DUPLEX TAMPER-RESISTANT RECEPTACLE:

RESISTANT, 2-POLE, 3-WIRE GROUNDING, 15A, 125V, NEMA

1)SINGLE GANG, RECESSED, DUPLEX RECEPTACLE: TAMPER

- TAMPER RESISTANT,
- E. DEVICE PLATES: SEE ARCHITECT FOR TYPE. FOR RECEPTACLES WITH OTHER THAN 120 VOLT, INSCRIBED VOLTAGE AVAILABLE.
- F. COLORS: COORDINATE COLORS WITH ARCHITECT.
- G. MOUNTING ORIENTATION OF RECEPTACLES (HORIZONTAL OR VERTICAL): COORDINATE WITH ARCHITECT.

#### 12. LIGHTING FIXTURES:

- A. FIXTURES TO BE AS SPECIFIED BY ARCHITECT AND SHALL BE COMPLETELY FACTORY ASSEMBLED, WIRED AND EQUIPPED WITH ALL NECESSARY SOCKETS, BALLASTS, SUPPORTING HARDWAF AND ACCESSORIES. REFER TO DRAWINGS FOR INDIVIDUAL FIXTURE DESCRIPTIONS.
- B. FIXTURE CATALOG NUMBERS USED TO ILLUSTRATE EQUIPMENT TYPE DO NOT NECESSARILY DENOTE REQUIRED MOUNTING EQUIPMENT OR ACCESSORIES. PROVIDE ACCESSORIES TO SUIT.
- C. BALLAST: CLASS P, HIGH POWER FACTOR, LOWEST AVAILABLE NEMA RATED NOISE LEVEL, ET1 AND CBM APPROVED. ENERGY SAVING TYPE. TRIGGER START FOR 24—INCH LAMPS AND RAPID START FOR 48—INCH. TWO LAMP BALLASTS; NO THREE LAMP BALLASTS. BALLASTS SHALL BE ADVANCE MAGNETEK, UNIVERSAL OR EQUAL.
- D. LED DRIVERS SHALL BE ELECTRONIC TYPE, LABELED AS COMPLIANT WITH RADIO FREQUENCY INTERFERENCE (RFI) REQUIREMENTS OF FCC TITLE 47, PART 15 AND COMPLY WITH NEMA SSL 1 "ELECTRONIC DRIVERS FOR LED DEVICES, ARRAYS OR SYSTEMS". LED DRIVERS SHALL HAVE A SOUND RATING OF "A", HAVE A MINIMUM EFFICIENCY OF 85% AND BE RATED FOR A THD OF LESS THAN 20% AT ALL INPUT VOLTAGES.
- E. DIMMABLE LED DRIVERS SHALL BE CAPABLE OF DIMMING WITHOUT LED STROBING OR FLICKER ACROSS THEIR FULL DIMMING RANGE. PROVIDE TYPE OF LED DRIVER AS PER LIGHTING FIXTURE SCHEDULE, DIMMABLE LED DRIVERS SHALL BE 0-10V WHERE NOT INDICATED.
- CONTINUOUS ROW, TWO LAMP STRIP FIXTURES SHALL BE STAGGERED TYPE.
- CONSTRUCTION, LAMPS AND BALLASTS SHALL CONFORM TO THE ENERGY EFFICIENCY REQUIREMENTS OF CONSOLIDATED EDISON CO. AND QUALITY FOR A UTILITY REBATE TO OWNER UNDER CON EDISON'S ENLIGHTENED ENERGY LIGHTING REBATE PROGRAM. CONTRACTOR SHALL COORDINATE REBATE PROGRAM WITH CON EDISON AND ARRANGE FOR CON EDISON TO PERFORM A SURVEY TO INVENTORY ALL EXISTING FIXTURES PRIOR TO DEMOLITION.
- H. EXIT SIGNS SHALL BE PRECISION DIE—CAST ALUMINUM HOUSING WITH LASER—FORMED ACRYLIC LEGEND. EXIT SIGNS SHALL COMPLY WITH UL 924 AND BE MEA APPROVED. AC POWERED WITH PREMIUM LONG—LIFE NICKEL CADMIUM BATTERY WITH STANDARD UL LISTED 3—HOUR RUN TIME. PROVIDE WITH INTEGRAL AUTOMATIC CHARGER IN A SELF CONTAINED POWER PACK. LED INDICATOR WITH PUSH TO
- 3. TELEPHONE CONDUIT SYSTEM:
- A. PROVIDE COMPLETE SYSTEM OF: RACEWAYS AND ACCESSORIES, OUTLET BOXES, SLEEVES AND FISHWIRES.
- B. EQUIPMENT SHALL CONFORM TO REQUIREMENTS OF TELEPHONE
- C. OUTLETS SHALL BE:
- 1) WALL: 4 IN. SQUARE WITH BUSHED COVER PLATE.
- D. PROVIDE FISHWIRES, IN RACEWAYS OVER 10 FT LONG.
- E. CONDUIT SHALL BE 3/4 IN. MINIMUM. FURNISH EMPTY CONDUIT FROM OUTLET BOX TO BUSHED END THRU WALL 6" BELOW THE PLASTER CEILING.
- F. FACE RACEWAYS IN ROOMS SHALL HUBBELL HBL500, HBL750 OR HBL2000 SERIES OR AS ACCEPTABLE.

### 14. GROUNDING AND BONDING:

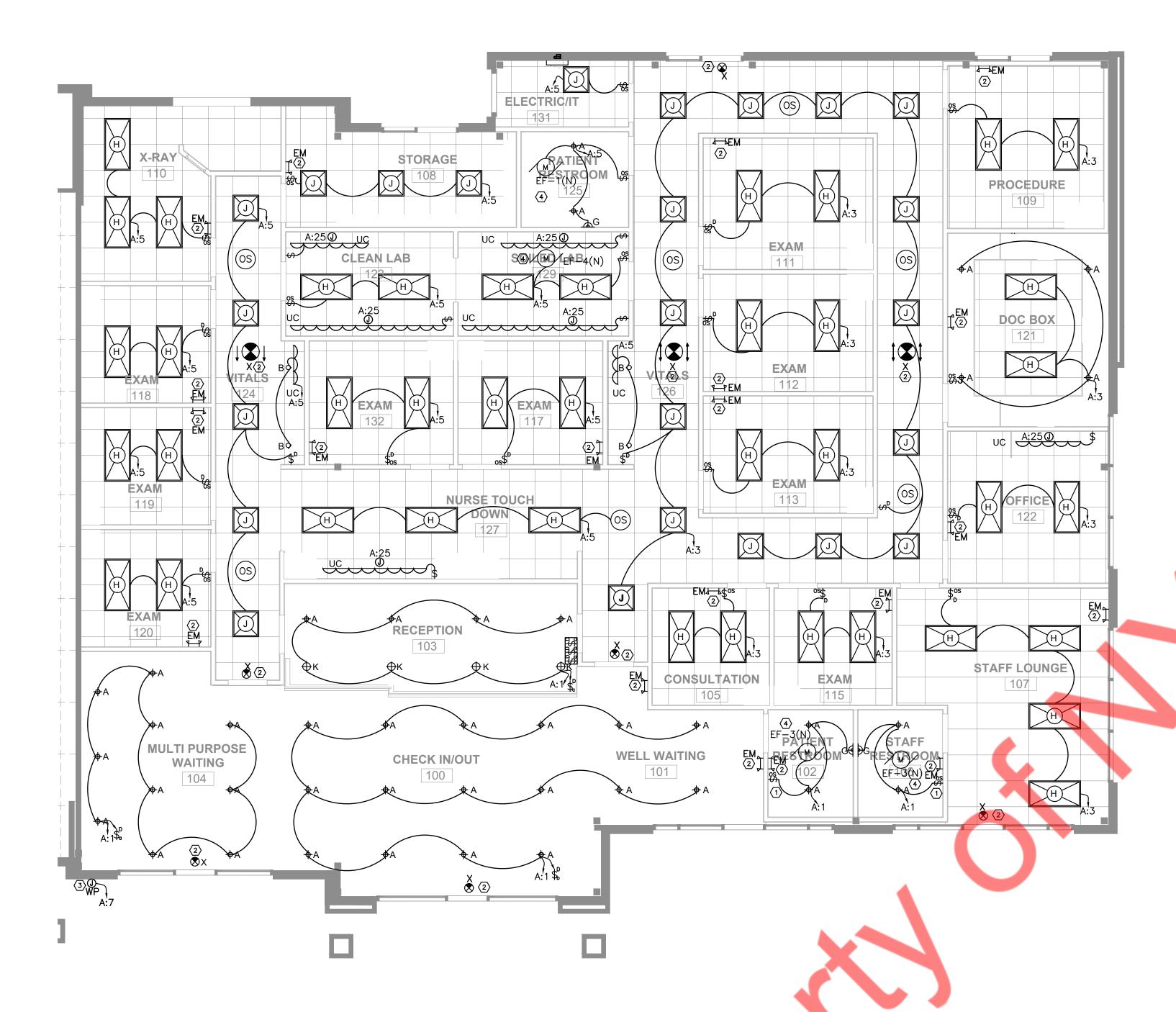
- A. PROVIDE GROUNDING SYSTEM IN ACCORDANCE WITH (2017)
  NATIONAL ELECTRICAL CODE), AND THESE SPECIFICATIONS. THE
  WIRING SYSTEM SHALL BE INSTALLED AS REQUIRED TO PROVIDE A
  CONTINUOUSLY GROUNDED SYSTEM. WHERE FLEXIBLE CONDUIT IS
  USED FOR PART OF A CONDUIT RUN, EXCEPT LIGHTING BRANCH
  CIRCUITS, AN INSULATED GROUNDING CONDUCTOR SHALL BE
  PROVIDED IN THE CONDUIT AND CONNECTED TO GROUNDING
  BUSHINGS AT EACH END OF THE RUN.
- B. USE EXOTHERMIC WELDING PROCESS FOR INACCESSIBLE CONNECTIONS.
- C. EXTEND EXISTING SYSTEM GROUND TO INCLUDE ALL THE ELECTRICAL EQUIPMENT IN THE SCOPE OF WORK.
- D. WHERE FLEXIBLE METALLIC CONDUIT IS USED AN INTERNAL BONDING CONDUCTOR SHALL BE INSTALLED.

- E. IN ADDITION, FURNISH A SEPARATE INSULATED GREEN EQUIPMENT GROUND CONDUCTOR WHERE INDICATED ON DRAWINGS AND FOR THE FOLLOWING BRANCH CIRCUITS:

  1) CIRCUITS SERVING ANY WALL BOX DIMMER.
  - 2) CIRCUITS SERVING ANY ISOLATED GROUND RECEPTACLES.
    TERMINATE GROUND DIRECTLY AT AN EQUIPMENT GROUNDING
    CONDUCTOR TERMINAL OF THE SOURCE AT THE SOURCE, OR
    AS OTHER WISE NOTED ON DRAWINGS.
  - 3) CIRCUITS SERVING ANY DUPLEX OR SIMPLEX COMPUTER RECEPTACLES
  - 4) ANY CIRCUIT SERVED VIA AN ISOLATION TRANSFORMER OR COMPUTER POWER DISTRIBUTION UNIT.

#### 15. PANELBOARDS:

- A. PANELBOARDS SHALL BE OF THE DEAD FRONT TYPE
  MANUFACTURED IN CODE GAUGE AND SIZE BOXES FOR MOUNTING
  AS INDICATED ON PLANS COMPLETE WITH TRIM, DOORS AND LOCKS.
  ALL LOCKS SHALL BE KEYED ALIKE.
- B. CIRCUIT BREAKERS SHALL BE OF THE BOLT—ON THERMAL MAGNETIC MOLDED CASE TYPE, AND SHALL HAVE THE TRIP RATINGS AND NUMBER OF POLES SHOWN IN SCHEDULES ON THE CONTRACT DRAWINGS. FOR BLANK (SPACE) COMPARTMENTS, PROVIDE FULL RATED BUS. MINIMUM GUTTER SPACES SHALL BE 5-3/4". SIDES, TOP AND BOTTOM, INCREASE FOR THROUGH FEEDERS. PROVIDE 25% COPPER GROUND BUS AND 100% COPPER NEUTRAL BUS AND INCREASE NEUTRAL BUS INDICATED.
- C. LOCKING TABS SHALL BE PROVIDED ON ALL CIRCUIT BREAKERS SERVING EMERGENCY LIGHTING, FIRE ALARM SYSTEM, SECURITY SYSTEMS AND OTHER EMERGENCY OR CRITICAL EQUIPMENT AND AS NOTED ON THE CONTRACT DRAWINGS. A TOTAL OF 5 SPARE LOCKING TABS SHALL BE FURNISHED TO THE OWNER.
- D. BUSES SHALL BE HARD DRAWN COPPER OF 98 PERCENT CONDUCTIVITY AND SHALL HAVE CROSS SECTIONAL AREAS LARGE ENOUGH TO LIMIT THE TEMPERATURE RISE, WHEN CARRYING FULL LOAD, TO 35 DEGREES C. ABOVE AN AMBIENT INSIDE THE ENCLOSURE OF 55 DEGREES C. AS DEFINED IN IEEE STANDARD RULES. MAIN BUS CAPACITY SHALL BE AS SHOWN ON THE CONTRACT DRAWINGS.
- E. ENCLOSURES SHALL BE SURFACE OR FLUSH AS INDICATED. TRIMS SHALL BE SECURED TO PANEL WITH MACHINE SCREWS. COVERS SHALL BE HINGED DOOR—IN—DOOR CONSTRUCTION WITH CYLINDER LOCKS AND CATCHES. LOCKS MUST BE COMPATIBLE WITH BUILDING STANDARD KEY SYSTEM AND WHEN NONE EXISTS, THEY SHALL BE SIMILAR TO A YALE NO. 911 KEY.
- F. DISTRIBUTION AND SUB-DISTRIBUTION PANELBOARD SHALL BE A MINIMUM OF 30" WIDE AND 10" DEEP.
- G. ALL STANDARD PANELBOARDS SHALL BE A MINIMUM OF 20" WIDE AND 5 3/4" DEEP.
- H. FURNISH ALL PANELBOARDS WITH FEED-THRU LUGS UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
- ALL NEW PANELBOARDS SHALL BE PROVIDED WITH AN ENGRAVED WHITE CORE LAMACOID NAMEPLATE, WITH 3/4 IN. WHITE LETTERING ON A BLACK BACKGROUND, WITH DESIGNATION LISTED (PANELBOARD NAME), FASTENED WITH EPOXY CEMENT OR OVAL HEAD CHROME PLATED MACHINE SCREWS.
- THE CIRCUIT DIRECTORY SHALL BE TYPEWRITTEN AND PROVIDED INSIDE EACH PANEL DOOR TO INDICATE EQUIPMENT AND/OR AREA SERVED. DIRECTORY HOLDER SHALL BE METAL FRAME WITH CLEAR PLASTIC, TRANSPARENT COVER. THE TYPEWRITTEN LIST INDICATING CIRCUIT NUMBERS, OUTLETS SUPPLIED AND THEIR LOCATIONS SHALL BE PROVIDED.
- K. TIE-BARS SHALL NOT BE USED TO CREATE MULTI-POLE CIRCUITS. MAXIMUM 42 CIRCUITS ALLOWED.
- L. ONLY ONE WIRE SHALL BE INSTALLED UNDER EACH CIRCUIT BREAKER LUG.
- M. SHORT CIRCUIT RATING OF PANELBOARDS SHALL NOT BE LESS THAN AS INDICATED ON THE CONTRACT DRAWINGS OR SPECIFIED HEREIN. WHERE NOT INDICATED OR SPECIFIED THE MINIMUM SHORT CIRCUIT RATING SHALL BE EQUAL TO THE INTERRUPTING CAPACITY OF THE LOWEST RATED CIRCUIT BREAKER IN THE PANELBOARD, BUT IN NO CASE LESS THAN 10,000 AMPERES R.M.S. SYMMETRICAL FOR 208Y/120 VOLT SYSTEM. SERIES RATED PANELBOARDS SHALL BE USED TO ACHIEVE REQUIRED SHORT CIRCUIT RATINGS.
- N. FOR ALL EXISTING PANELBOARDS, CONTRACTOR SHALL PROVIDE NEW CIRCUIT BREAKERS TO REPLACE EXISTING AS REQUIRED AS INDICATED ON DRAWINGS.



LIGHTING PLAN — ELECTRICAL

SCALE: 3/16" = 1'-0"



- 1. VERIFY ALL LUMINAIRE COLORS, TRIMS, LENGTHS, ETC. WITH THE ARCHITECT PRIOR TO PLACING FINAL PURCHASE ORDERS. SUBMISSION PF SHOP DRAWINGS WILL BE INTERPRETED AS HAVING BEEN COORDINATED WITH THE ARCHITECTURAL DRAWINGS.
- 2. PROVIDE ALL LENGTHS, FEEDS, ACCESSORIES, CONNECTORS, WIRING, POWER SUPPLIES, DRIVERS ETC. FOR A COMPLETE INSTALLATION. THE E.C. SHALL VERIFY THE COMPLETE BILL OF MATERIAL WITH MANUFACTURER'S REPRESENTATIVE AND ENSURE ALL EQUIPMENT ARE INCLUDED IN BID PRICE. COORDINATE INSTALLATION WITH ARCHITECTURAL DETAILS.
- 3. VERIFY FINAL LUMINAIRE LOCATIONS WITH OTHER CEILING MOUNTED EQUIPMENTS SUCH AS DIFFUSER WITH ARCHITECTURAL REFLECTED CEILING PLANS.
- 4. VERIFY EXACT MOUNTING HEIGHT AND LOCATIONS OF ALL WALL MOUNTED LUMINAIRE WITH ARCHITECTURAL PLANS AND ELEVATIONS PRIOR TO ROUGH—IN.
- 5. ANY PROPOSED ALTERNATE LUMINAIRES SHALL BE APPROVED BY THE ARCHITECT PRIOR TO FINAL BID PRICING.
- 6. SHOULD THE CONTRACTOR PROPOSE TO FURNISH MATERIALS, EQUIPMENT AND DEVICES OTHER THAN THOSE SPECIFIED AND LISTED, THE CONTRACTOR SHALL SUBMIT A WRITTEN REQUEST FOR SUBSTITUTIONS, TO THE ENGINEERS AT LEAST TEN (10) BUSINESS DAYS PRIOR TO BID OPENING. THE REQUEST SHALL BE AN ALTERNATE TO THE ORIGINAL BID AND SHALL INCLUDE A COMPLETE SPECIFICATIONS CUTSHEET SUBMITTAL AS OUTLINED IN THE SPECIFICATIONS, COMPLETE WITH DESCRIPTIVE (MANUFACTURER, BRAND NAME, CATALOG NUMBER, ETC.) AND TECHNICAL DATA FOR ALL ITEMS. INDICATE ANY ADDITIONS OR DEDUCTIONS TO THE CONTRACT PRICE WITH THE SUBSTITUTION SUBMITTAL AND ON THE BID FORM.
- 7. VERIFY FINAL SELECTION OF LIGHT FIXTURES WITH ARCHITECT.

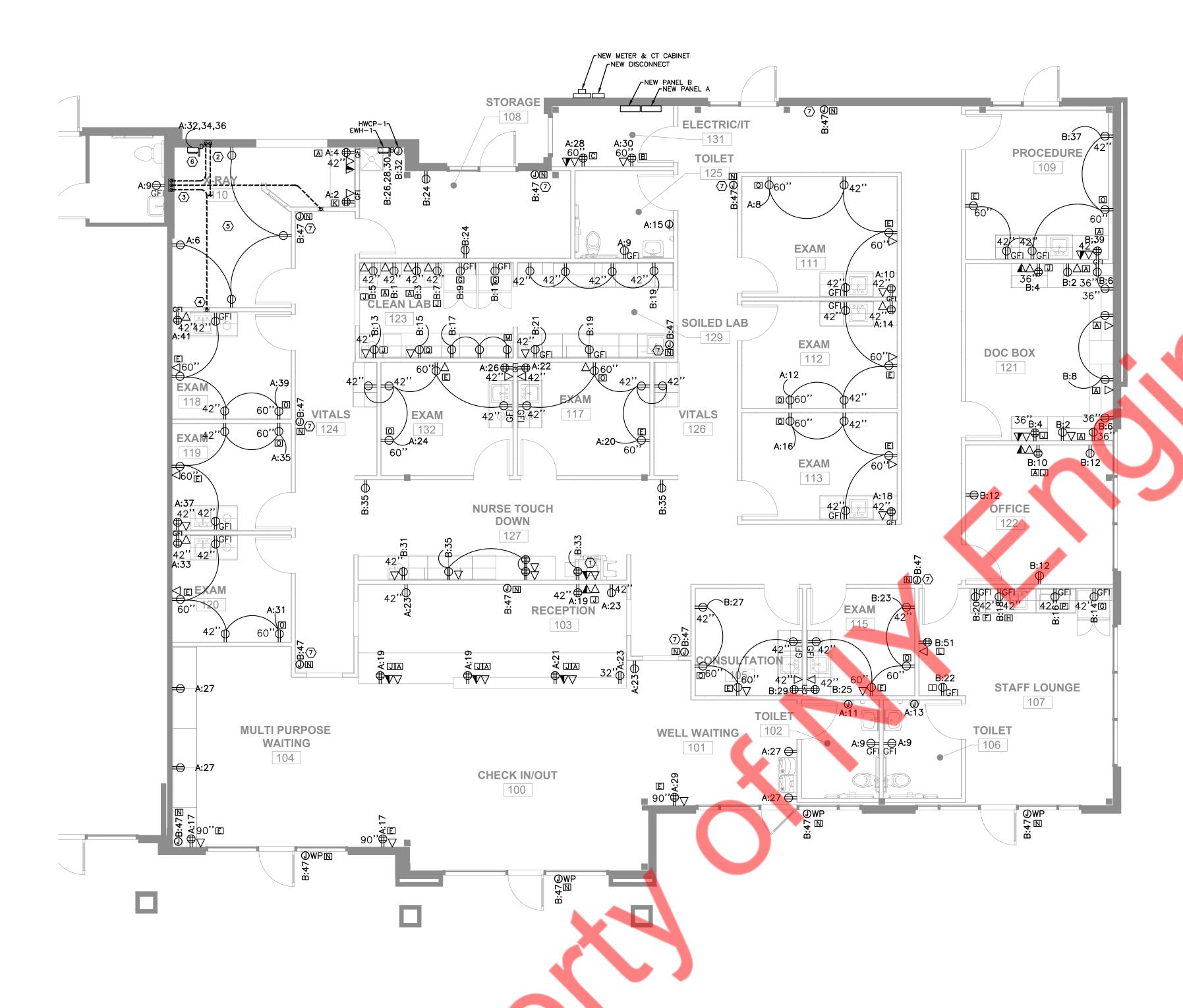
#### LIGHTING PLAN GENERAL NOTES:

- 1. CONTRACTOR IS ADVISED THAT ADJUSTMENTS TO EMERGENCY AND EXIT LIGHT FIXTURE LOCATIONS/QUANTITIES MAY BE REQUIRED BY AHJ UPON FINAL INSPECTION
- 2. ALL NIGHT LIGHT, EMERGENCY AND EXIT LIGHT FIXTURES SHALL BE CONNECTED AHEAD OF SWITCHED LIGHTING CIRCUIT.
- 3. CEILING MOUNTED OCCUPANCY SENSOR SHALL BE CONNECTED AHEAD OF ANY LOCAL SWITCHING OR DIMMING SHOWN IN THAT RESPECTIVE AREA. WHERE MORE THAN ONE CEILING OCCUPANCY IS SHOWN IN A GIVEN SPACE, PROVIDE LOW VOLTAGE WIRING BETWEEN SENSORS FOR INTERCONNECTED OPERATION ON A SINGLE POWER PACK.
- 4. UNLESS OTHERWISE NOTED, LIGHT SWITCHES SHALL BE GANGED TOGETHER UNDER A COMMON FACEPLATE.

#### LIGHTING KEYED NOTES:

- WALL MOUNTED OCCUPANCY SENSOR. SET OFF TIME TO 15 MINUTES FOR RESTROOM, SET DIP SWITCH TO AUTOMATIC ON.
- WIRE ALL EMERGENCY, EXIT AND NIGHT LIGHT AHEAD OF SWITCHING FOR CONTINUOUS OPERATIONS. CONNECT TO ADJACENT LIGHTING CIRCUIT.
- JUNCTION BOX WITH TOGGLE DISCONNECT PER NEC FOR CONNECTION TO BUILDING MOUNTED SIGNAGE. VERIFY EXACT LOCATION AND CONNECT TO SIGN PER MANUFACTURE'S INSTRUCTION.
- EXHAUST FAN SHALL BE CIRCUITED AND CONTROLLED ALONG WITH LIGHTING FIXTURE IN THE SAME ROOM.

	LIGHTING FIXTURE SCHEDULE											
TYPE	DESCRIPTION	MANUFACTURER	MODEL	TYPE	WATTAGE							
Α	4.5" RECESSED LED DOWNLIGHT	ATLANTIC	COM6-SYL30-3K-U/6LEDWD-WH	LED	40W							
В	4" RECESSED LED ADJUSTABLE WALL WASHER	HALO	HC410D010/HM412930/41RWWW	LED	14W							
G	DECORATIVE SCONCE	TECH LIGHTING	NYRA 25 BATH 700BCNYR 25-B-LED930	LED	24.2W							
Н	2X4 RECESSED LED TROFFER	CORELITE CLASS D3X LED	D3X-W0-50L835-LD5-UNV-24-T1-STD	LED	40W							
J	2X4 RECESSED LED TROFFER	CORELITE CLASS D3X LED	D3X-W0-35L835-LD5-UNV-22-T1-STD	LED	30.6W							
K	PENDANT	TECH LIGHTING	700-TD-S-CW-LED927	LED	72W							
UC	LED STRIP LIGHT	GEN LED	CHAC2-F-RBOSWS220-5.0-40-1	LED	5W/LF							



POWER PLAN — ELECTRICAI SCALE: 3/16" = 1'-0"

POWER KEYED NOTES:

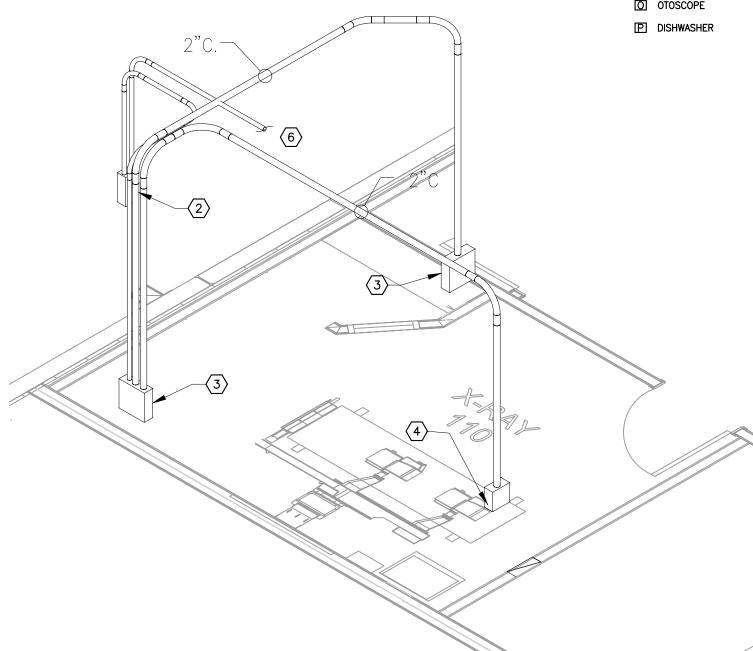
- 1) POWER & DATA OUTLET FOR PRINTER/FAX. E.C. TO VERIFY FINAL LOCATION WIH TENANT PRIOR TO ROUGH-IN.
- 2 PROVIDE FLUSH MOUNTED RECESSED ENCLOSED CIRCUIT BREAKER FOR X-RAY GENERATOR. PROVIDE 150A/2P.
- PROVIDE 12X12X4 JUNCTION BOX WITH SPLIT REMOVABLE COVER PLATE WITH (2) 2" GROMMETED OPENINGS LOCATE COVER 18" AFF TO CENTER.
- PROVIDE 8X8X4 JUNCTION BOX WITH SPLIT REMOVABLE COVER PLATE WITH (2) 2" GROMMETED OPENINGS LOCATE COVER 36" AFF TO CENTER.
- REFER TO X-RAY MANUFACTURER'S DRAWINGS FOR COMPLETE INFORMATION ABOUT THIS ROOM. COORDINATE WITH MANUFACTURER FOR MORE INFORMATION.
- ROUTE 3#3, #8G, 1"C. TO X-RAY DISCONNECT. ROUTE SAME TO RECESSED BOX ON WALL AND LEAVE 3' OF SPARE CONDUCTOR FOR CONNECTION TO GENERATOR. REFER TO PANEL SCHEDULE FOR CIRCUIT.
- 7 PROVIDE JUNCTION BOX AND CONDUIT TO ABOVE ACCESSIBLE CEILING FOR SECURITY CAMERA.

#### DRAWING NOTES:

- MEP SPECIFICATIONS SHALL APPLY TO WORK ON THIS DRAWING UNLESS OTHERWISE NOTED.
- REFER TO ARCHITECT FOR EXACT HEIGHT AND LOCATION OF ALL FLOOR AND WALL OUTLETS.
- ALL DATA/TELEPHONE OUTLETS SHALL BE PROVIDED WITH PULL STRINGS.
- CONTRACTOR SHALL LOCATE ALL ELECTRICAL AND TELEPHONE OUTLETS WITHIN THE LIMITS OF THE TENANT FURNITURE PLAN PROVIDED BY THE ARCHITECT. CONTRACTOR SHALL MARK INTENDED LOCATION OF ALL OUTLETS PRIOR TO INSTALLATION, THEN SHALL NOTIFY TENANT FOR APPROVAL BEFORE PROCEEDING.
- CONTRACTOR SHALL PROVIDE NEW CIRCUIT DIRECTORY CARD AT PANELS. CIRCUITS SHALL BE LABELED TO CORRESPOND TO THE CIRCUITS SHOWN ON THE DRAWINGS. CONTRACTOR SHALL CONNECT CIRCUITS AS REQUIRED TO COMPLY WITH THIS
- 6. CONDUCTORS SHALL BE #12 AWG SOLID COPPER (THWN) IN 1/2" CONDUIT UNLESS OTHERWISE INDICATED.
- 7. ALL OUTLETS TO BE MOUNTED VERTICALLY UNLESS OTHERWISE INDICATED.
- 8. CONTRACTOR SHALL PROVIDE ONE PULL STRING FOR EACH VOICE OR DATA OUTLET SHOWN. WHEN VOICE AND DATA OUTLETS ARE SHOWN ADJACENT, CONTRACTOR SHALL PROVIDE ONE PULL STRING (WITH ONE WALL PENETRATION) FOR THE PAIR, UNLESS NOTED OTHERWISE. VOICE AND DATA LINES SHALL BE PULLED BY OTHERS.
- 9. CONTRACTOR SHALL REFER TO BUILDING MANAGEMENT'S "RULES AND REGULATIONS" TO COMPLY WITH BUILDING STANDARDS.
- 10. GANG TOGETHER, ALL NEW ELECTRICAL, TELEPHONE AND COMPUTER OUTLETS SHOWN ADJACENT TO EACH OTHER.
- 11. VERIFY FINAL LOCATIONS FOR ROUGH—INS WITH FIELD MEASUREMENTS AND WITH THE REQUIREMENTS OF THE ACTUAL EQUIPMENT TO BE CONNECTED.
- 12. COORDINATE THE INSTALLATION OF ELECTRICAL MATERIALS AND EQUIPMENT ABOVE CEILINGS WITH SUSPENSION SYSTEM, MECHANICAL EQUIPMENT AND SYSTEMS AND STRUCTURAL COMPONENTS. COORDINATE ELECTRICAL EQUIPMENT AND MATERIALS INSTALLATION WITH OTHER BUILDING COMPONENTS.
- 13. VERIFY MECHANICAL EQUIPMENT SWITCH AND CONNECTION REQUIREMENTS, ITEM BY ITEM, WITH THE MECHANICAL CONTRACTOR, BEFORE WIRING EQUIPMENT. RESOLVE ALL DISCREPANCIES WITHOUT FURTHER COST TO OWNER.
- 14. ALL WIRING IN PATIENT CARE AREA SHALL BE COMPLIANT WITH NEC 517.13.A AND B. REFER TO SPECIFICATIONS FOR MORE INFORMATION. ALL RECEPTACLES TO BE TAMPER RESISTANT.
- 15. ALL BRANCH CIRCUITS HOME RUNS ASSIGN INDICATED ON THIS PLAN SHALL BE CIRCUITED TO THERE RESPECTIVE PANELS, CIRCUIT NUMBER INDICATED, U.O.N.
- 16. REFER TO DWG. E-0.1 FOR ELECTRICAL GENERAL NOTES, SYMBOL LIST & ABBREVIATIONS.
- 17. REFER TO DWG. E-0.2 & E-0.3 FOR ADDITIONAL ELECTRICAL SPECIFICATIONS.
- 18. CONTRACTOR TO COORDINATE WITH ARCHITECT FOR EXACT HEIGHT OF OUTLETS.

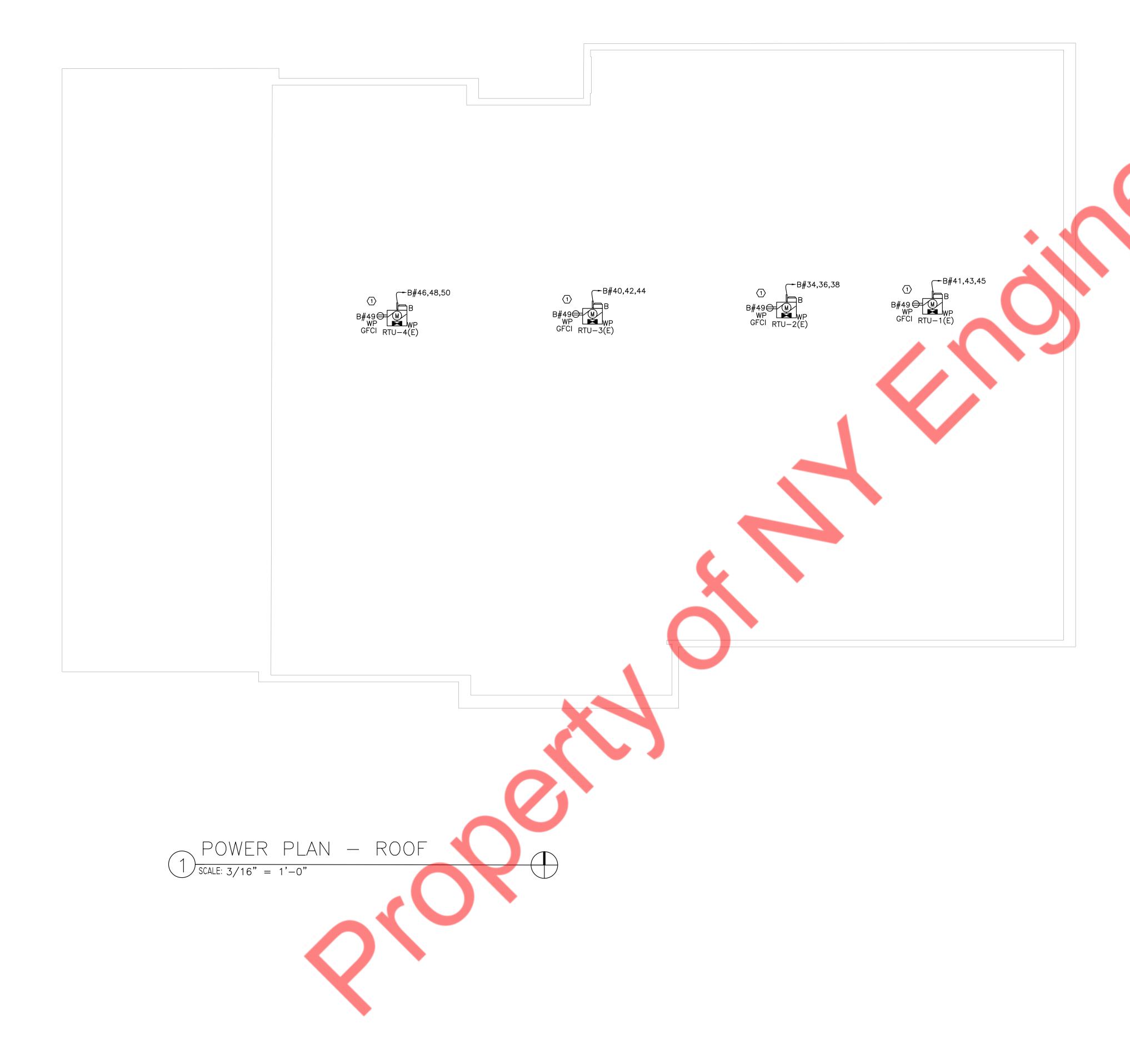
#### **EQUIPMENT LEGEND:**

- A PERSONAL COMPUTER B FILE SERVER
- C PHONE EQUIPMENT
- D COPIER/PRINTER E LED TV
- MICROWAVE
- G REFRIGERATOR
- ⊞ COFFEE MAKER
- J DESKTOP PRINTER
- TIME CLOCK
- M CPC MACHINE N SECURITY CAMERA
- O OTOSCOPE



X-RAY ROOM ISOMETRIC  $2) \frac{1}{\text{SCALE: } 1/4" = 1'-0"}$ 





#### POWER KEYED WORK NOTES:

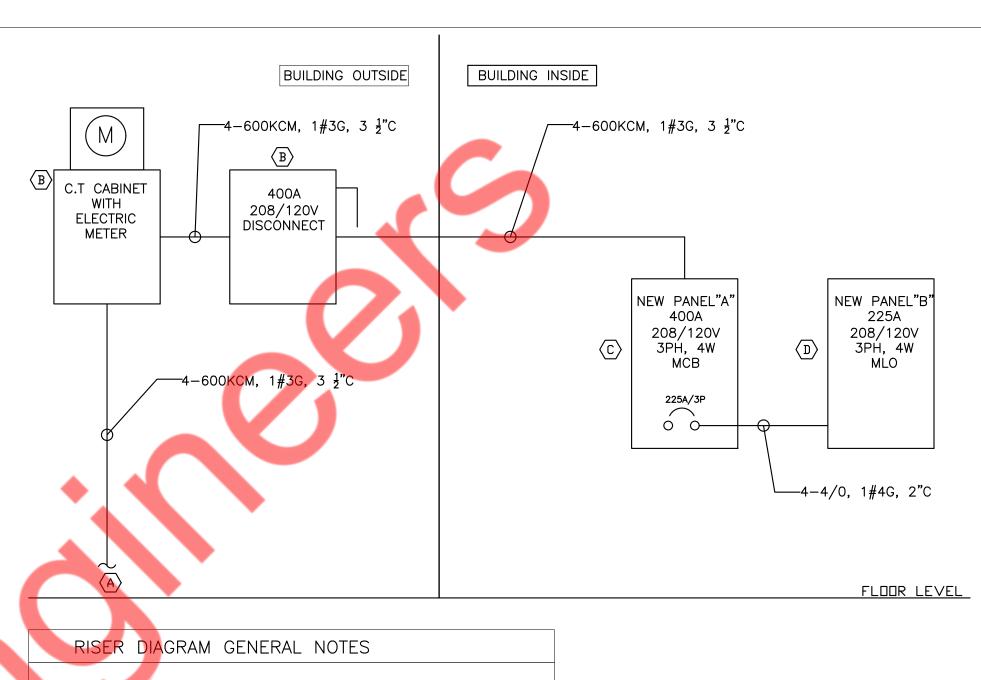
E.C TO VERIFY THE EXACT LOCATION AND ELECTRICAL POWER REQUIREMENT OF EXISTING MECHANICAL EQUIPMENTS IN FIELD. PROVIDE THE ELECTRICAL CONNECTION AS PER MECHANICAL EQUIPMENTS REQUIREMENT IN FIELD. INFORM ENGINEER ON RECORD FOR ANY DISCREPANCY. REUSE AND TIE EXISTING CONNECTIONS IN NEW PANEL IF POSSIBLE

PANEL:	A (NEW	<u>')</u>										MOUNTING: SURFACE		
208Y/120	VOLTS,	3 PHASE,			4	WIRE						PANEL LOCATION: ELE. ROOM	<u> </u>	
MCB 400A BUS: 400A				400A	MIN,						FED FROM: MAIN SERV	'ICE		
NOTE:														
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER A	PHASE (K\ B	/A) C	MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	Cł N(
1	20	LIGHTING - 100, 101, 103, 104, 102, 106	L	0.90	2#12, #12G, 3/4"C	1.90			2#12, #12G, 3/4"C	1.00	E	X-RAY 110 - EQUIPMENT	20	2
3	20	LIGHTING - 105, 115, 107, 122, 121, 109, 111, 112, 113, 126	L	0.90	2#12, #12G, 3/4"C		1.90		2#12, #12G, 3/4"C	1.00	R	X-RAY 110 - PERSONAL COMPUTER	20	
5	20	LIGHTING - 110, 118, 119, 120, 124, 127, 132, 117, 129, 123, 108, 125, 131	L	0.90	2#12, #12G, 3/4"C			1.62	2#12, #12G, 3/4"C	0.72	R	X-RAY 110 - RECEPTACLES	20	6
7	20	EXTERIOR SIGNAGE	L	1.00	2#12, #12G, 3/4"C	1.72			2#12, #12G, 3/4"C	0.72	R	EXAM 111 RECEPTACLES	20	8
9	20	RESTROOM RECEPTACLES	R	0.72	2#12, #12G, 3/4"C		1.72		2#12, #12G, 3/4"C	1.00	R	EXAM 111 PERSONAL COMPUTER	20	1
11	20	HAND DRYER 102	R	1.20	2#12, #12G, 3/4"C			1.92	2#12, #12G, 3/4"C	0.72	R	EXAM 112 RECEPTACLES	20	1
13	20	HAND DRYER 106	R	1.20	2#12, #12G, 3/4"C	2.20			2#12, #12G, 3/4"C	1.00	R	EXAM 112 PERSONAL COMPUTER	20	1
15	20	HAND DRYER 125	R	1.20	2#12, #12G, 3/4"C		1.92		2#12, #12G, 3/4"C	0.72	R	EXAM 113 RECEPTACLES	20	1
17	20	LED TV	R	1.00	2#12, #12G, 3/4"C			2.00	2#12, #12G, 3/4"C	1.00	R	EXAM 113 PERSONAL COMPUTER	20	1
19	20	PERSONAL COMPUTER & PRINTER	R	1.00	2#12, #12G, 3/4"C	1.90			2#12, #12G, 3/4"C	0.90	R	EXAM 117 RECEPTACLES	20	2
21	20	PERSONAL COMPUTER & PRINTER	R	1.00	2#12, #12G, 3/4"C		2.00		2#12, #12G, 3/4"C	1.00	R	EXAM 117 PERSONAL COMPUTER	20	2
23	20	RECEPTION AREA RECEPTACLES	R	0.72	2#12, #12G, 3/4"C			1.62	2#12, #12G, 3/4"C	0.90	R	EXAM 132 RECEPTACLES	20	2
25	20	STRIP LIGHTING UC	L	0.50	2#12, #12G, 3/4"C	1.50			2#12, #12G, 3/4"C	1.00	R	EXAM 132 PERSONAL COMPUTER	20	2
27	20	WAITING AREA RECEPTACLES	R	0.72	2#12, #12G, 3/4"C		1.08		2#12, #12G, 3/4"C	0.36	R	ELE./IT PHONE EQUIPMENT	20	2
29	20	LED TV WELL WAITING	R	0.50	2#12, #12G, 3/4"C			0.86	2#12, #12G, 3/4"C	0.36	Е	ELE./IT FILE SERVER	20	3
31	20	EXAM 120 RECEPTACLES	R	0.72	2#12, #12G, 3/4"C	14.05				13.33	0			3
33	20	EXAM 120 PERSONAL COMPUTER	R	1.00	2#12, #12G, 3/4"C		14.33		3#3,#8G, 1"C	13.33	0	XRAY-MACHINE	100/3P	3
35	20	EXAM 119 RECEPTACLES	R	0.72	2#12, #12G, 3/4"C			14.05		13.33	0			3
37	20	EXAM 119 PERSONAL COMPUTER	R	1.00	2#12, #12G, 3/4"C	18.49				17.49	0			3
39	20	EXAM 118 RECEPTACLES	R	0.72	2#12, #12G, 3/4"C		18.21		4#4/0,#4G, 2"C	17.49	0	TO PANEL B	225/3P	4
41	20	EXAM 118 PERSONAL COMPUTER	R	1.00	2#12, #12G, 3/4"C			18.49		17.49	0			4
		TOTAL LOAD (KVA)				41.76	41.16	40.56			_			

PANEL:	B (NEW)											MOUNTING: SURFACE		
208Y/120	VOLTS,	3 PHASE,			4	WIRE						PANEL LOCATION: ELE. ROOM	_	
	T				1	In anni								
MLO	225A			BUS:	225A	MIN,						FED FROM: PANEL A		_
NOTE:						DED DUA	CE ////A				1	_		
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHA		C C	MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO
1	20	CLEAN LAB 123-PERSONAL COMPUTER	E	1.00	2#12, #12G, 3/4"C	2.00			2#12, #12G, 3/4"C	1.00	E	DOC BOX 121 - PERSONAL COMPUTER	20	2
3	20	CLEAN LAB 123-PERSONAL COMPUTER	E	1.00	2#12, #12G, 3/4"C	2.0	00		2#12, #12G, 3/4"C	1.00	E	DOC BOX 121 - PERSONAL PRINTER	20	4
5	20	CLEAN LAB 123-PRINTER	E	1.00	2#12, #12G, 3/4"C			1.90	2#12, #12G, 3/4"C	0.90	R	DOC BOX 121 - RECEPTACLES	20	6
7	20	CLEAN LAB 123-PRINTER	E	1.00	2#12, #12G, 3/4"C	2.00			2#12, #12G, 3/4"C	1.00	R	DOC BOX 121 - PERSONAL COMPUTER	20	8
9	20	CLEAN LAB 123-REFERIGERATOR	Е	1.00	2#12, #12G, 3/4"C	2.0	00		2#12, #12G, 3/4"C	1.00	R	OFFICE 122 - PERSONAL COMPUTER	20	10
11	20	CLEAN LAB 123-REFERIGERATOR	E	1.00	2#12, #12G, 3/4"C			1.54	2#12, #12G, 3/4"C	0.54	R	OFFICE 122 - RECEPTACLES	20	12
13	20	CLEAN LAB 123-PRINTER	E	1.00	2#12, #12G, 3/4"C	2.00			2#12, #12G, 3/4"C	1.00	Е	STAFF LOUNGE 107 - REFRIGERATOR	20	14
15	20	CLEAN LAB 123-PERSONAL COMPUTER	E	1.00	2#12, #12G, 3/4"C	2.0	00		2#12, #12G, 3/4"C	1.00	E	STAFF LOUNGE 107 - DISHWASHER	20	16
17	20	CLEAN LAB 123-RECEPTACLES	R	0.54	2#12, #12G, 3/4"C			1.54	2#12, #12G, 3/4"C	1.00	Е	STAFF LOUNGE 107 - COFFEE MAKER	20	18
19	20	SOILED LAB 129 RECEPTACLES	R	0.90	2#12, #12G, 3/4"C	1.90			2#12, #12G, 3/4"C	1.00	E	STAFF LOUNGE 107 - MICROWAVE	20	20
21	20	SOILED LAB 129 PRINTER	E	1.00	2#12, #12G, 3/4"C	2.0	00		2#12, #12G, 3/4"C	1.00	Е	STAFF LOUNGE 107 - WATER COOLER	20	22
23	20	EXAM 115 RECEPTACLES	R	0.72	2#12, #12G, 3/4"C			1.08	2#12, #12G, 3/4"C	0.36	R	STORAGE AREA RECEPTACLES	20	24
25	20	EXAM 115 PERSONAL COMPUTER	E	1.00	2#12, #12G, 3/4"C	4.33				3.33	Н			26
27	20	CONSULTATION 105 RECEPTACLES	R	0.72	2#12, #12G, 3/4"C	4.0	05		3#10, #10G, 3/4"C	3.33	Н	EWH-1	30/3P	28
29	20	CONSULTATION 105 -PERSONAL COMPUTER	E	1.00	2#12, #12G, 3/4"C			4.33		3.33	H			30
31	20	NURSE TOUCH DOWN 127 - PRINTER	E	1.00	2#12, #12G, 3/4"C	1.50			2#12, #12G, 3/4"C	0.50	R	HWCP-1	20	32
33	20	NURSE TOUCH DOWN 127 - PRINTER	E	1.00	2#12, #12G, 3/4"C	2.9	90			1.90	Н			34
35	20	NURSE TOUCH DOWN 127 - RECEPTACLES	R	1.00	2#12, #12G, 3/4"C			2.90	3#12, #12G, 3/4"C	1.90	Н	RTU-2 (E )	20/3P	36
37	20	PROCEDURE 109 RECEPTACLES	R	0.90	2#12, #12G, 3/4"C	2.80				1.90	Н			38
39	20	PROCEDURE 109 PERSONAL COMPUTER	E	1.00	2#12, #12G, 3/4"C	2.9	92			1.92	H			40
41			Н	1.92				3.84	3#12, #12G, <mark>3/4</mark> "C	1.92	Н	RTU-3 (E )	20/3P	42
43	20/3P	RTU-1 (E )	Н	1.92	3#12, #12G, 3/4"C				- W	1.92	Н			44
45			Н	1.92						1.92	Н			46
47	20	SECURITY CAMERA	R	1.00	2#12, #12G, 3/4"C				3#12, #12G, 3/4"C	1.92	Н	RTU-4 (E )	20/3P	48
49	20	ROOF TOP RECEPTACLES	R	0.72	2#12, #12G, 3/4"C					1.92	Н			50
51	20	TIME CLOCK	R	1.00	2#12, #12G, 3/4"C							SPARE	20	52
53	20	SPARE										SPARE	20	54
		TOTAL LOAD (KVA)	•			16.53 17.	.87	17.13						

### ABBREVIATIONS:

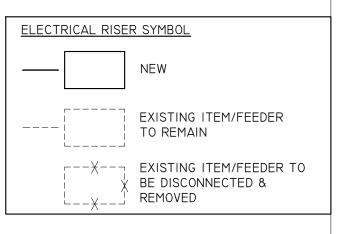
L = LIGHTING , R = RECEPTACLE , H = HVAC , E = EQUIPMENT. , M = MISCELLANEOUS

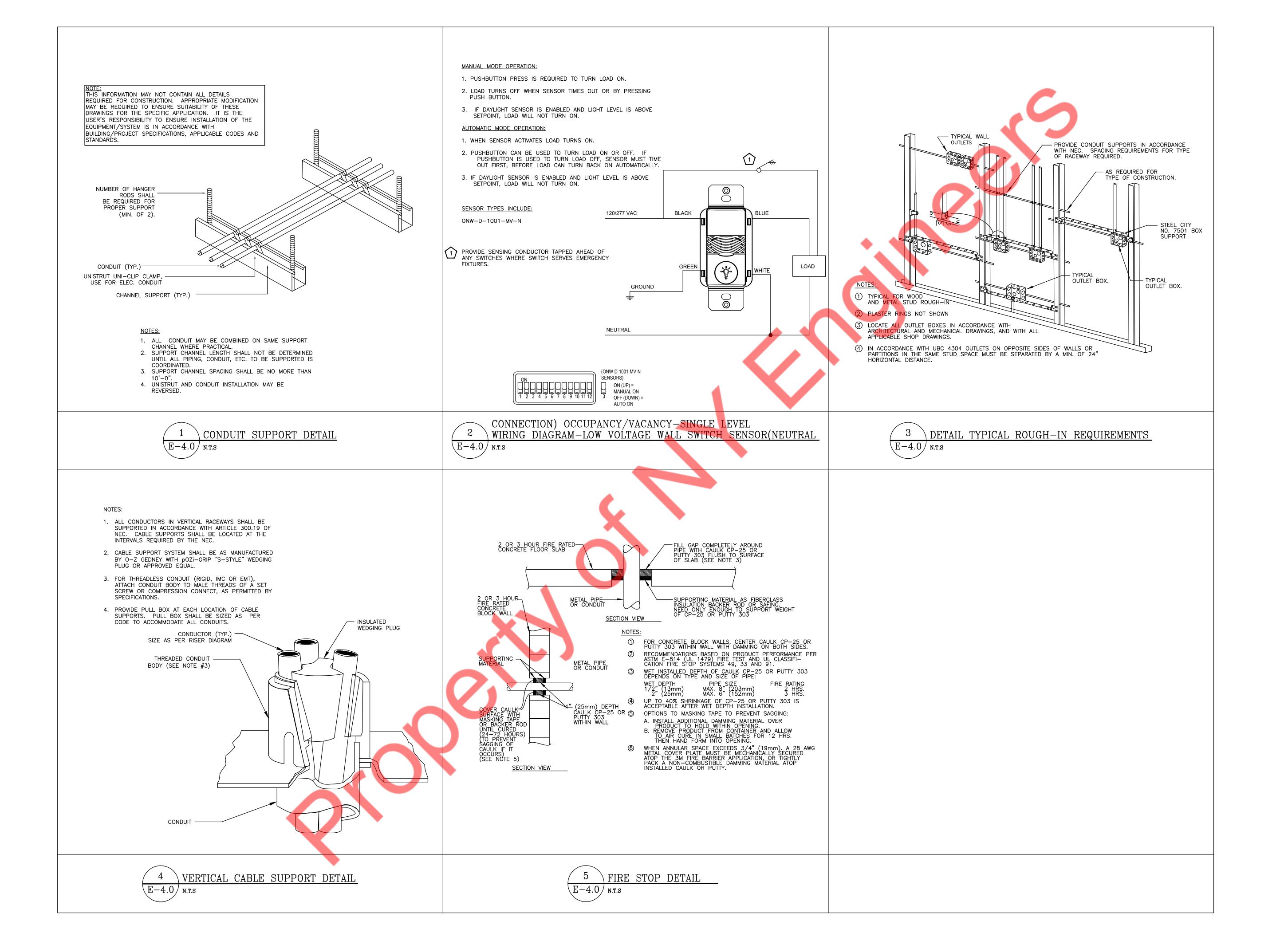


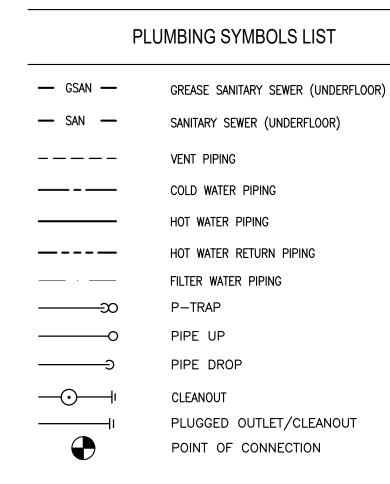
1. ELECTRICAL CONTRACTOR TO COORDINATE FAULT CURRENT (Isc)
RATING WITH UTILITY COMPANY AND CALCULATE ACTUAL AIC
REQUIRED PRIOR TO BID.

# RISER DIAGRAM KEYED WORK NOTES

- A. NEW 400A, 120V/208V 3PH, 4W SERVICE FROM UTILITY COMPANY. E.C. TO CO-ORDINATE WITH UTILITY/OWNER FOR MORE DETAILS.
- B. NEW 400A, 120V/208V 3PH METER, CT CABINET AND DISCONNECT SWITCH. E.C. TO CO-ORDINATE WITH OWNER /UTILITY COMPANY FOR EXACT LOCATION.
- C. NEW 400A, 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "A". E.C. TO COORDINATE EXACT LOCATION OF PANEL WITH ARCHITECT/OWNER.
- D. NEW 225A, 120/208V, 3—PHASE, 4—WIRE ELECTRICAL PANEL "B". E.C. COORDINATE EXACT LOCATION OF PANEL WITH ARCHITECT/OWNER.







#### PLUMBING ABBREVIATIONS CO CLEANOUT COLD WATER HOT WATER HOT WATER RETURN SANITARY VENT LAVATORY WATER CLOSET TYPICAL DOWN REFRIGERATOR FLOOR DRAIN FD-1SQUARE FEET SQ. FT. BACK FLOW PREVENTER DRINKING FOUNTAIN EWH-1 ELECTRIC WATER HEATER ET-1 EXPANSION TANK HOT WATER CIRCULATION PUMP HWCP-1

# P1.0 PLUMBING SYMBOLS & SPECIFICATIONS

PLUMBING DRAWING LIST

- P2.0 PLUMBING SANITARY FLOOR PLAN
- P2.1 PLUMBING WATER AND GAS FLOOR PLAN
- P3.0 PLUMBING DETAILS (1 OF 2)
- P3.1 PLUMBING DETAILS (2 OF 2)
- P4.0 PLUMBING RISERS, DETAILS & SCHEDULES

### BUILDING DEPARTMENT PLUMBING NOTES

- 1. ALL PLUMBING SYSTEMS (SANITARY, WASTE, VENT, WATER) AND ASSOCIATED EQUIPMENT SHALL BE INSTALLED. OPERATED AND MAINTAINED IN ACCORDANCE WITH THE REQUIREMENTS OF 2018 INTERNATIONAL PLUMBING CODE.
- 2. INSTALLATION OF UNDERGROUND PIPING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC 702.2
- 3. PROTECTION OF PIPING AND PLUMBING SYSTEM COMPONENTS AS PER SECTION PC 305.
- 4. TRENCHING, EXCAVATION AND BACKFILL AS PER SECTION PC
- 5. RODENT PROOFING AS PER PC 304
- 6. MATERIALS USED IN PLUMBING SYSTEMS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC 303, PC 605, PC 702, PC 902,PC 1102.

7. EQUIPMENT CONNECTIONS AND JOINING OF PIPING SHALL BE

- IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTERS 4, 5, 6. 7 AND 9.
- 8. DEEP SEAL TRAPS FOR FLOOR DRAINS SHALL BE PROVIDED AS PER PC 1002, AND CLEAN-OUTS SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC 708
- 9. DRAINAGE PIPE CLEANOUTS AS PER SECTION PC 708.
- 10. VERTICAL AND HORIZONTAL PIPING SHALL BE SUPPORTED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC 308
- 11. WATER SUPPLY SYSTEMS SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTER 6 SECTION PC 601-603, 604, 606, 607, 608, 610
- 12. THE SANITARY DRAINAGE SYSTEM SHALL BE SIZED AND INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTER 7 SECTION PC 701, 704, 705, 706, 707, 708,
- 13. VENT PIPING FOR THE SANITARY DRAINAGE SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTER 9 SECTIONS PC 901 THROUGH PC 912 THROUGH PC 917
- 14. INSPECTION AND TESTING OF PLUMBING SYSTEMS SHALL BE IN ACCORDANCE WITH SECTION PC 107.
- 15. GAS PIPING INSTALLATION SHALL BE IN ACCORDANCE WITH INTERNATIONAL FUEL GAS CODE CHAPTER 4.

#### PLUMBING SPECIFICATIONS:

1.01 SCOPE

- 1. BASIC PLUMBING REQUIREMENTS, MATERIALS AND METHODS
- A. PROVIDE ALL MATERIAL, TOOLS, SUPERVISION AND LABOR
- B. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING AND NEW CONDITIONS AND MATERIALS WITHIN THE CONSTRUCTION AREA. ANY DAMAGE CAUSED BY THE
- C. OBTAIN ALL PERMITS, PAY ALL PERMIT FEES AND SCHEDULE ALL REQUIRED INSPECTIONS. COPIES OF ALL PERMITS AND INSPECTION CERTIFICATES SHALL BE FORWARDED TO THE OWNER

CONTRACTOR SHALL BE REPAIRED TO THE OWNER'S SATISFACTION.

- E. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING BID TO DETERMINE CONDITIONS AND THE EXTENT OF THE WORK. BY COMMENCING WORK, THE CONTRACTOR ACKNOWLEDGES HIS CONFIRMATION OF ALL CONDITIONS AS ACCEPTABLE WITH REFERENCE TO HIS CONTRACT, SCOPE OF WORK AND BID PRICE SUCH THAT NO ADDITIONAL COMPENSATION SHALL BE FORTHCOMING FOR UNFORESEEN EXISTING CONDITIONS.
- F. IN ALL AREAS SUBJECT TO FREEZING CONDITIONS, THE CONTRACTOR SHALL PROVIDE FREEZE PROTECTION FOR ALL DOMESTIC WATER PIPING INSTALLED UNDER HIS CONTRACT.
- G. ALL ELECTRICAL REQUIREMENTS SHALL BE COORDINATED WITH THE CONTRACTOR FOR ELECTRICAL WORK. THIS CONTRACTOR IS RESPONSIBLE FOR ALL LOW VOLTAGE WIRING FOR EQUIPMENT INSTALLED UNDER HIS CONTRACT. THE CONTRACTOR FOR ELECTRICAL WORK IS RESPONSIBLE FOR LINE VOLTAGE POWER WIRING ONLY.
- BY THE ARCHITECT.
- I. MINOR DETAILS NOT SHOWN OR SPECIFIED. BUT NECESSARY FOR THE PROPER AND ACCEPTABLE CONSTRUCTION. INSTALLATION OR OPERATION OF ANY PART OF THE WORK AS DETERMINED BY THE ENGINEER SHALL BE INCLUDED AS IF SPECIFIED OR INDICATED ON THE DRAWINGS.
- J. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL REQUIREMENTS FOR THE INSTALLATION, CONNECTION, EXTENSION OR MODIFICATION TO ALL UTILITY SERVICES WITH RESPECTIVE PROVIDERS INCLUDING PAYMENT OF ALL ASSOCIATED
- K. THE CONTRACTOR IS RESPONSIBLE FOR ALL PAINTING ASSOCIATED WITH CUTTING AND PATCHING. ALL PAINTING IN AREAS WITH COMPLETE FINISH RENOVATIONS SHALL BE PROVIDED BY THE GENERAL CONTRACTOR.

#### 1.02 SUBMITTALS

- A. SUBMITTAL REQUIREMENTS SHALL BE COORDINATED WITH THE AS LISTED BELOW.
- 1. PIPE AND FITTINGS VALVES
- HANGERS AND SUPPORTS
- PLUMBING PIPING LAYOUT
- PLUMBING FIXTURES
- WATER HEATERS & ACCESSORIES
- ALL SCHEDULED PLUMBING EQUIPMENT
- RETURNED REJECTED. C. THE ENGINEER'S REVIEW OF SUBMITTALS IS A COURTESY WHICH
- INDICATED BY THE SHOP DRAWINGS STAMP.
- RATE SCHEDULE.
- E. SUBMIT PROOF OF APPROVAL AND/OR CONFIRMATION OF ARCHITECT.
- F. SUBMIT TO THE OWNER'S MAINTENANCE PERSONNEL OPERATION SERVICE/SUPPLY COMPANY.
- G. FOR ALL BELOW GRADE PIPING WHERE ACTUAL INSTALLATION DEVIATES FROM CONSTRUCTION DRAWINGS, THE CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS INDICATING BELOW GRADE
- H. RECORD AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE OWNER/TENANT AFTER COMPLETION OF THE WORK SHOWING ANY

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

- INCLUDING ALL MISCELLANEOUS AND INCIDENTAL ITEMS REQUIRED FOR COMPLETE AND OPERABLE PLUMBING INSTALLATIONS AS SHOWN OR DESCRIBED ON THE DRAWINGS AND IN THESE
- AND SHOWN ON THESE DRAWINGS. 1.06 DRAWINGS
- FOR RECORD.
- D. THE GENERAL CONDITIONS OF THE CONTRACT AND ALL DIVISION 1 REQUIREMENTS APPLY TO THE WORK OF THIS SECTION.
- H. COLOR AND FINISH SELECTIONS FOR ALL MATERIALS, INCLUDING PAINTING OF PIPING, SHALL BE AS DIRECTED AND/OR APPROVED

- ARCHITECT AND AUTHORITIES HAVING JURISDICTION. UNLESS OTHERWISE DIRECTED, CONTRACTOR SHALL PROVIDE SUBMITTALS

- TESTS
- MIXING VALVES
- B. SUBMITTALS FROM SUPPLIERS OR MANUFACTURERS WHICH DO NOT BEAR THE STAMP OF THE SUBMITTING CONTRACTOR INDICATING THAT THE CONTRACTOR HAS REVIEWED THE SUBMITTAL FOR CONFORMANCE WITH THE PROJECT REQUIREMENTS WILL BE
- DOES NOT RELIEVE THE CONTRACTOR FROM CONFORMING WITH THE CONSTRUCTION DOCUMENTS, REGARDLESS OF THE ACTION
- D. REVIEW OF SHOP DRAWINGS BY THE ENGINEER SHALL BE LIMITED TO THE INITIAL REVIEW, AND A SECOND REVIEW OF ANY REQUIRED RESUBMITTED DATA. IF THE ENGINEER IS REQUIRED TO REVIEW SHOP DRAWINGS FOR A THIRD (OR MORE) SUBMISSION OF THE SAME ITEM, THE CONTRACTOR SHALL BE LIABLE FOR COMPENSATING THE ENGINEER FOR THESE SUBSEQUENT REVIEWS AS PER THE ENGINEER'S CURRENT HOURLY
- SATISFACTORY TEST RESULTS TO THE OWNER AND THE
- AND MAINTENANCE DATA FOR ALL SYSTEM COMPONENTS, SERVICING REQUIREMENTS, INSPECTION DATA, REPLACEMENT PART NUMBERS AND AVAILABILITY AND CONTACT INFORMATION FOR
- PIPE LOCATIONS DIMENSIONED TO NEAREST COLUMN LINES.
- ALTERATIONS, ADDITIONS AND/OR DELETIONS TO THE SYSTEM(S) INSTALLED.

### 1.03 SUBSTITUTIONS

- B. THE CONTRACTOR ASSUMES ALL RESPONSIBILITY FOR COORDINATING THE WORK OF OTHER TRADES WHICH MAY BE

- A. FURNISH: TO PURCHASE, PROCURE, ACQUIRE AND DELIVER, COMPLETE WITH RELATED ACCESSORIES.
- B. INSTALL: TO ERECT, MOUNT AND CONNECT, COMPLETE WITH RELATED ACCESSORIES.

#### C. PROVIDE: TO FURNISH AND INSTALL.

1.05 DEFINITIONS

D. PLUMBING CONTRACTOR, THE CONTRACTOR, THIS CONTRACTOR: THE CONTRACTOR FOR PLUMBING WORK WHICH IS SPECIFIED HEREIN

- A. THE DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO ILLUSTRATE THE GENERAL ARRANGEMENT AND ROUTING OF PIPING AND GENERAL LOCATIONS OF EQUIPMENT. PRECISE LOCATIONS OF EQUIPMENT, RISERS AND STACKS, AND ROUTING AND ELEVATION OF ALL PIPING SYSTEMS SHALL BE COORDINATED IN THE FIELD WITH THE ARCHITECT, ARCHITECTURAL DRAWINGS, THE WORK OF OTHER TRADES, EXISTING AND NEW BUILDING CONDITIONS AND/OR THE PREFERENCES OF THE OWNER/TENANT AS CONSTRUCTION PROCEEDS. ALL PIPING SHALL BE INSTALLED CONCEALED IN FINISHED SPACES, UNLESS NOTED OTHERWISE.
- B. PROVIDE ALL NECESSARY INCIDENTAL MATERIALS AND ACCESSORIES REQUIRED TO MAKE THE WORK COMPLETE IN ALL RESPECTS, EVEN IF NOT PARTICULARLY SHOWN OR SPECIFIED
- C. REFER TO PLUMBING EQUIPMENT/FIXTURE SCHEDULE ON THE DRAWINGS FOR ALL FIXTURE AND EQUIPMENT SPECIFICATIONS.

D. REFER TO FIXTURE CONNECTION SIZE SCHEDULE FOR ALL FIXTURE

ROUGHING SIZE REQUIREMENTS. E. VERIFY ALL INDICATED CONDITIONS BEFORE STARTING WORK AND REPORT ANY DISCREPANCIES. THE DRAWINGS REFLECT CONDITIONS WHICH CAN BE REASONABLY INTERPRETED FROM THE EXISTING

VISIBLE CONDITIONS OR FROM DRAWINGS AND INFORMATION

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

# A. SANITARY AND VENT PIPING:

FURNISHED BY THE OWNER.

- 1. ABOVE GROUND AND UNDERGROUND SANITARY PIPING SHALL BE PVC SCHEDULE 40, COMPLY TO ASTM D2665, ASTM F891 AND CSA B181.2 STANDARDS.
- 2. SLOPE OF DRAINAGE SYSTEM SHALL BE 1/8" PER FOOT OF RUN FOR PIPE OVER 3" (I.D.) AND 1/4" PER FOOT OF RUN FOR PIPE 3" AND SMALLER (I.D.). VENT PIPING SHALL BE PITCHED TO DRAIN.
- 3. PVC OR OTHER COMBUSTIBLE PLASTIC PIPING SHALL NOT BE INSTALLED IN CEILING PLENUM SPACES.

### B. DOMESTIC WATER PIPING:

- ABOVE GRADE WATER PIPING SHALL BE TYPE 'L' HARD-DRAWN COPPER TUBE.
- 2. FITTINGS IN DOMESTIC WATER PIPING SHALL BE WROUGHT COPPER OR CAST BRASS.
- 3. JOINTS SHALL BE MADE WITH LEAD-FREE SOLDER.
- 4. THE ENTIRE DOMESTIC WATER DISTRIBUTION SYSTEM SHALL BE INSULATED INCLUDING ALL VALVES, FITTINGS, ETC.
- 5. COMPLY WITH NSF 61 FOR MATERIALS FOR WATER-SERVICE PIPING AND SPECIALTIES FOR DOMESTIC WATER.
- 6. ALL DOMESTIC WATER PIPING ABOVE GRADE SHALL BE INSULATED WITH FIRE-RETARDANT, FACTORY-APPLIED JACKET PROVIDE COLD WATER PIPING WITH FACTORY-APPLIED VAPOR BARRIER. INSULATION REQUIREMENT SHOULD COMPLY WITH INTERNATIONAL ENERGY CONSERVATION CODE 2018, SECTION C403.11.3 REFER BELOW TABLE.

#### MINIMUM PIPE INSULATION THICKNESS NOMINAL PIPE OR TUBE INSULATION CONDUCTIVITY SIZE (INCHES) **OPERATING TEMPERATURE** CONDUCTIVITY | MEAN RATING RANGE AND BTU?IN./ TEMPERATURE, . USAGE (°F) |< 1½| < 4 | < 8 | (H?FT2?°F) 1.5 1.5 2 2 2 141-200 0.25 - 0.29125 1.0 | 1.0 | 1.5 | 1.5 | 1.5 105-140 0.21 - 0.280.5 | 0.5 | 1.0 | 1.0 | 1.0 40-60 0.21 - 0.2775

- 7. WATER DISTRIBUTION SYSTEM AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2018 C404.7, HAVING ONE OR MORE RECIRCULATION PUMPS THAT PUMP WATER FROM A HEATED-WATER SUPPLY PIPE BACK TO THE HEATED-WATER SOURCE THROUGH A COLD-WATER SUPPLY PIPE SHALL BE A DEMAND RECIRCULATION WATER SYSTEM. PUMPS SHALL HAVE CONTROLS THAT COMPLY WITH BOTH OF THE FOLLOWING:
- THE CONTROL SHALL START THE PUMP UPON RECEIVING A IGNAL FROM THE ACTION OF A USER OF A FIXTURE OR APPLIANCE, SENSING THE PRESENCE OF A USER OF A FIXTURE OR SENSING THE FLOW OF HOT OR TEMPERED WATER TO A FIXTURE FITTING OR APPLIANCE. b. THE CONTROL SHALL LIMIT THE TEMPERATURE OF THE WATER ENTERING THE COLD-WATER PIPING TO 104°F (40°C).
- AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2018, C404.6.1 HEATED-WATER CIRCULATION SYSTEMS SHALL BE PROVIDED WITH A CIRCULATION PUMP. THE SYSTEM RETURN PIPE SHALL BE A DEDICATED RETURN PIPE OR A COLD WATER SUPPLY PIPE. CONTROLS FOR CIRCULATING HOT WATER SYSTEM PUMPS SHALL START THE PUMP BASED ON THE IDENTIFICATION OF A DEMAND FOR HOT WATER WITHIN THE OCCUPANCY. THE CONTROLS SHALL AUTOMATICALLY TURN OFF THE PUMP WHEN THE WATER IN THE CIRCULATION LOOP IS AT THE DESIRED TEMPERATURE AND WHEN THERE IS NO DEMAND FOR HOT
- 9. HW SYSTEM PIPING IS DESIGNED AS PER MAXIMUM ALLOWED PIPE LENGTH METHOD AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2018 C404.5.1. THE HW PIPE LENGTH FROM THE NEAREST SOURCE OF HEATED WATER TO THE TERMINATION OF THE FIXTURE SUPPLY PIPE SHALL BE AS PER FOLLOWING TABLE.

NOMINAL PIPE SIZE		PIPING LENGTH (FEET)
(INCHES)	PUBLIC LAV	OTHER FIXTURES
<i>1</i> <sub>2</sub> "	2'	43'
3/4"	0.5'	20'
1"	0.5'	13'
11/4"	0.5'	8'
1½"	0.5'	6'
2" OR LARGER	0.5'	4'

- 10. SEAL ALL JOINTS BETWEEN SEGMENTS OF INSULATION.
- 11. PROVIDE SHIELDS BETWEEN HANGERS AND INSULATION.
- 12. AS PER INTERNATIONAL ENERGY CONSERVATION CODE 2018 C404.6.3. THE CONTROLS ON PUMPS THAT CIRCULATE WATER BETWEEN A WATER HEATER AND A HEATED—WATER STORAGE TANK SHALL LIMIT OPERATION OF THE PUMP FROM HEATING CYCLE STARTUP TO NOT GREATER THAN 5 MINUTES AFTER THE END OF THE CYCLE.

#### C. HANGERS AND SUPPORTS:

- HANGERS SHALL BE STANDARD STEEL, MALLEABLE OR WROUGHT IRON, AS MANUFACTURED BY GRINNELL OR APPROVED EQUAL, SUITABLE FOR THE TYPE OF CONSTRUCTION. PIPING SHALL NOT BE HUNG FROM OTHER
- SECTIONS OF INDIVIDUAL PIPE RUNS SHALL BE SUPPORTED BY CLEVIS HANGERS.
- 3. ALL EQUIPMENT SHALL BE PROVIDED WITH APPROVED SUPPORTS.
- 4. PROVIDE SEISMIC RESTRAINTS IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL CODES AND STANDARDS AND THE REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION.
- 5. SUPPORTS SHALL BE PROVIDED IN STRICT ACCORDANCE THE RECOMMENDATIONS OF THE PIPING MANUFACTURER

#### D. VALVES:

- 1. PROVIDE GATE VALVES, BUTTERFLY OR BALL VALVES FOR SHUT-OFF DUTY ON MAIN AND BRANCH SUPPLY LINES. FOR ALL PIPE RUNS 2" AND SMALLER, PROVIDE BALL FOR ALL PIPE RUNS LARGER THAN 2" AND SMALLER THAN 4", PROVIDE GATE VALVES. PIPING 4" AND LARGER, PROVIDE BUTTERFLY VALVES FOR SHUT-OFF DUTY.
- WITH THE FLUSHOMETER-EQUIPPED WATER CLOSETS AND URINALS SHALL HAVE STOP VALVES TO CONTROL SUPPLY TO THE WHERE SUPPLIES ARE EXPOSED PROVIDE CHROME-PLATED STOPS WITH CHROME-PLATED ESCUTCHEONS ON PIPING PENETRATIONS.
- ALL PLUMBING FIXTURES AND EQUIPMENT TO HAVE SHUT-OFF VALVES ON SUPPLY LINES.
- ALL BRANCH LINES TO HAVE SHUT-OFF VALVES.
- ALL VALVES SHALL BE ACCESSIBLE. PROVIDE ACCESS DOORS WHERE REQUIRED FOR VALVE ACCESS.
- 6. PROVIDE GLOBE VALVES FOR THROTTLING/BALANCING OF THE HOT WATER CIRCULATING SYSTEM.

# GAS PIPING:

- 1. GAS PIPING SHALL BE SIZED IN ACCORDANCE WITH PIPE SIZING TABLES OR SIZING EQUATIONS IN ACCORDANCE WITH SECTION 402.4.
- 2. INDIVIDUAL OUTLETS TO GAS RANGES SHALL NOT BE LESS THAN 34 INCHES NPS.
- METALLIC PIPE SHALL COMPLY WITH SECTIONS 403.4.1 THROUGH 403.4.4.

4. PIPING SYSTEM INSTALLATION SHALL COMPLY WITH

REQUIREMENTS OF INTERNATIONAL FUEL GAS CODE 2018

SLEEVE. THE ANNULAR SPACE BETWEEN THE GAS PIPING

SECTION 404. 5. AS PER INTERNATIONAL FUEL GAS CODE SECTION 404.4; UNDERGROUND PIPING, WHERE INSTALLED BELOW GRADE THROUGH THE OUTER FOUNDATION OR BASEMENT WALL OF A BUILDING, SHALL BE ENCASED IN A PROTECTIVE PIPE

AND THE SLEEVE SHALL BE SEALED.

- 6. PIPING INSTALLED UNDERGROUND BENEATH BUILDINGS IS PROHIBITED EXCEPT WHERE THE PIPING IS ENCASED IN A CONDUIT OF WROUGHT IRON OR STEEL PIPE DESIGNED TO WITHSTAND THE SUPERIMPOSED LOADS. THE CONDUIT SHALL BE PROTECTED FROM CORROSION IN ACCORDANCE WITH SECTION 404.11 AND SHALL BE INSTALLED IN ACCORDANCE WITH SECTION 404.11.1 OR 404.11.2 OF INTERNATIONAL FUEL GAS CODE.
- 7. AS PER INTERNATIONAL FUEL GAS CODE 2018 SECTION 404.12; UNDERGROUND PIPING SYSTEMS SHALL BE INSTALLED A MINIMUM DEPTH OF 12 INCHES BELOW GRADE.
- 8. THE GAS PIPING IS ENCASED IN A CONDUIT OF WROUGHT IRON OR STEEL PIPE TO WITH STAND THE SUPERIMPOSED
- 9. SHUTOFF VALVES SHALL BE LOCATED IN PLACES SO AS TO PROVIDE ACCESS FOR OPERATION AND SHALL BE INSTALLED SO AS TO BE PROTECTED FROM DAMAGE.

- F. INSTALL PIPING TO CONSERVE BUILDING SPACE. DO NOT INTERFERE WITH USE OF BUILDING SPACE AND THE WORK OF OTHER TRADES. ALL PIPING RUN IN CEILING SHALL BE INSTALLED TIGHT TO THE STRUCTURE ABOVE.
- G. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE, JOINTS OR CONNECTED EQUIPMENT. PROVIDE PIPE ANCHORS, GUIDES AND EXPANSION JOINTS OR LOOPS IN ALL HOT WATER AND HOT WATER CIRCULATING MAIN SUPPLY PIPING AND SEGMENTS OF SUCH PIPE THAT EXCEED 30'-0" IN
- AND COMPONENTS SHALL BE CONCEALED ABOVE OR WITHIN FINISHED SURFACES.
- ONE-PIECE REDUCING FITTINGS. BUSHINGS ARE NOT ACCEPTABLE. USE FLANGED FITTINGS AT THE BASE OF
- J. VENT PENETRATIONS THROUGH THE ROOF SHALL BE FLASHED.
- K. IF WATER PRESSURE EXCEEDS 80 PSI, A WATER PRESSURE REDUCING VALVE SHALL BE INSTALLED IN WATER PIPING AT CONNECTION TO MAIN.
- M. PIPE BACKFLOW PREVENTER DRAINS TO FLOOR DRAIN OR OTHER APPROVED INDIRECT WASTE SOURCE.
- ACCESS TO ALL VALVES AND OTHER SYSTEM COMPONENTS ENCLOSED IN WALLS AND CEILINGS. ACCESS DOORS SHALL BE FURNISHED BY THIS CONTRACTOR, INSTALLED BY
- ALL FIXTURES REQUIRING VACUUM BREAKERS SHALL BE EQUIPPED WITH INTEGRAL VACUUM BREAKERS.
- ANY PENETRATIONS THROUGH FIRE RATED PARTITIONS, FLOORS, OR CEILINGS SHALL BE STEEL SLEEVED AND SEALED WITH 3M BRAND UL RATED FIRE BARRIER CAULK R APPROVED EQUAL.
- WHEN THE WATER PIPING SYSTEM IS COMPLETE, THOROUGHLY FLUSH ALL DIRT, SEDIMENT, SOLDER, ETC. OUT OF THE SYSTEM, REMOVING ALL STRAINERS, VALVE STEM SEATS, ETC., REQUIRED TO ACCOMPLISH THE
- S. INSTALL SLEEVES FOR ALL PIPES WHICH PASS THROUGH WALLS, FLOORS, AND CEILINGS. WHERE PIPES ARE TO BE INSULATED, THE SLEEVE SHALL BE LARGE ENOUGH TO ACCOMMODATE INSULATION. SLEEVES SHALL BE FLUSH WITH FINISHED SURFACES AT BOTH ENDS. ON FINISHED

#### 2.01 GENERAL

- SHALL BE DONE BY A CONTRACTOR CERTIFIED BY THE ROOFING MANUFACTURER AS REQUIRED TO MAINTAIN ANY EXISTING ROOF WARRANTIES.
- U. EXTERIOR INSTALLATIONS TO BE WEATHER PROOF IN ALL
- V. EXTERIOR MATERIALS AND EQUIPMENT SHALL BE PAINTED TO PREVENT CORROSION, COLOR PER ARCHITECT.
- X. REAM PIPE AND TUBE ENDS. REMOVE BURRS. BEVEL
- Y. REMOVE SCALE AND FOREIGN MATERIAL, FROM INSIDE AND OUTSIDE, BEFORE ASSEMBLY.
- AA. COORDINATION WITH THE WORK OF OTHER TRADES IS REQUIRED. PROVIDE OFFSETS IN PIPING SYSTEMS OR MINOR DEVIATIONS TO THE INDICATED PIPE ROUTING IN ORDER TO COORDINATE THE PLUMBING WORK WITH THE WORK OF ALL OTHER TRADES AND THE GENERAL
- AB. NO DOMESTIC WATER PIPING SHALL BE INSTALLED IN UNHEATED SPACES.
- AC. PRIOR TO DISCONNECTING AND CONNECTING NEW WORK TO EXISTING SYSTEMS, THE PLUMBING CONTRACTOR SHALL NOTIFY THE PROPERTY MANAGER AND OFFER A PROPOSED SCHEDULE OF WORK. ESB WILL AUTHORIZE CONNECTIONS AND COORDINATE NECESSARY SHUT DOWNS AND DRAIN DOWNS AS REQUIRED. SHUT DOWNS AND DRAIN DOWNS MAY BE PERFORMED BY THE PLUMBING CONTRACTOR ONLY AFTER RECEIVING ESB AUTHORIZATION, AND SHOULD BE PERFORMED UNDER SUPERVISION OF ESB PERSONNEL. THREE (3) DAYS ADVANCE NOTICE TO THE PROPERTY MANAGER IS REQUIRED.
- AD. THE PLUMBING CONTRACTOR IS ADVISED THAT DUE TO THE NATURE OF THE OPERATIONS AND TENANT REQUIREMENTS, CONNECTIONS TO EXISTING SYSTEMS MAY HAVE TO BE MADE AFTER REGULAR WORKING HOURS. THE PROPERTY MANAGER WILL ADVISE THE PLUMBING CONTRACTOR OF THE TIME CONSTRAINTS UPON RECEIPT AND APPROVAL OF THE PLUMBING CONTRACTOR'S REQUEST FOR SHUT DOWN AND CONNECTION TO EXISTING

- LENGTH.
- H. IN ALL AREAS WITH FINISHED SURFACES, SYSTEM PIPING
- REDUCTIONS IN PIPE SIZES SHALL BE MADE WITH

- L. PROVIDE DIELECTRIC FITTINGS BETWEEN DISSIMILAR METALS.
- PROVIDE ACCESS DOORS/PANELS FOR SERVICE AND
- HE GENERAL CONTRACTOR.
- FLUSHING.
- R. AT ALL INDIRECT WASTE DRAINS, MAINTAIN AIR GAP AS REQUIRED BY CODE.
- SURFACES IN EXPOSED AREAS PROVIDE ESCUTCHEONS

# 2. INSTALLATION

COMPATIBLE WITH FINISH.

- T. ALL WORK WHICH REQUIRES DISRUPTION OF THE ROOFING
- RESPECTS.
- W. COORDINATE THE PLUMBING WORK WITH ALL OTHER AFFECTED WORK AND THE CONSTRUCTION SCHEDULE.
- PLAIN AND FERROUS END PIPE.
- Z. PREPARE PIPING CONNECTIONS TO EQUIPMENT WITH FLANGES AND UNIONS.
- BUILDING CONDITIONS.
- SYSTEMS.

AE. WHEN CONNECTING TO EXISTING STACKS AND RISERS,

PROVISION IS TO BE MADE FOR FUTURE CONNECTIONS BY

PROVIDING CAPPED AND VALVED OUTLETS ON DOMESTIC

WATER RISERS AND PLUGGED OUTLETS ON THE SANITARY

AND VENT STACKS.

- 2.02 ABOVE GRADE
- A. INSTALL PLUMBING PIPING IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICES TO ENSURE THAT PIPING COMPLIES WITH REQUIREMENTS AND SERVES INTENDED PURPOSES.
- B. ROUTE PIPING IN AN ORDERLY MANNER, PLUMB AND PARALLEL TO BUILDING STRUCTURE. MAINTAIN GRADIENT. SLOPE PIPING AND ARRANGE SYSTEMS TO DRAIN. IN DOMESTIC WATER SYSTEMS, PROVIDE DRAIN VALVES AT MAIN SHUT-OFF VALVES AND ALL LOW POINTS IN PIPING.
- C. USE EXISTING CONNECTIONS AT MAINS WHERE AVAILABLE FOR NEW BRANCH PIPING. LOCATE ALL RISERS AND PIPING BEFORE CONSTRUCTION COMMENCES AND TAKE CARE NOT TO DAMAGE SAME. ANY DAMAGE OCCURRING TO THE EXISTING PIPING WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

#### TESTING

- A. AT THE COMPLETION OF THE PLUMBING WORK, COMPLETELY TEST THE ENTIRE INSTALLATION OF ALL SYSTEMS FOR PROPER OPERATION AND COMPLIANCE WITH APPLICABLE CODES AND LOCAL REQUIREMENTS. CORRECT ALL DEFICIENCIES FOUND.
- B. TESTING OF THE INSTALLED SYSTEMS SHALL BE MADE BY THE CONTRACTOR IN THE PRESENCE OF A REPRESENTATIVE
- C. THE CONTRACTOR SHALL NOT COVER UP OR PERMANENTLY CONCEAL PIPING, DEVICES OR ANY PORTION OF NEWLY CONSTRUCTED PLUMBING SYSTEM(S) UNTIL SUCH SYSTEM, OR PORTION OF THE SYSTEM, HAS BEEN TESTED IN THE PRESENCE OF A REPRESENTATIVE OF THE OWNER AND INSPECTED BY THE LOCAL INSPECTOR AND APPROVED IN WRITING, EXCEPT PIPING PASSING THROUGH FLOORS, WALLS, PARTITIONS, OR BEAMS, FOR DISTANCES EQUAL TO THE THICKNESS OF SUCH FLOOR, WALL, PARTITION OR BEAM.
- D. THIS CONTRACTOR SHALL NOTIFY THE VARIOUS DEPARTMENTS, BUREAUS AND INDIVIDUALS AT LEAST TWO WEEKS IN ADVANCE OF THE TIME THAT THE TESTS ARE TO BE CONDUCTED.
- E. ALL DEFECTIVE PARTS SHALL BE REPLACED OR CORRECTED BY THIS CONTRACTOR AND AN EXTRA TEST OR TESTS SHALL BE MADE UNTIL THE OPERATION IS SATISFACTORY. ALL ARRANGEMENTS AND EXPENSES NECESSARY TO CONDUCT ALL TESTS REQUIRED BY THESE SPECIFICATIONS AND THE VARIOUS AGENCIES HAVING JURISDICTION OVER THE WORK INSTALLED UNDER THIS CONTRACT SHALL BE MADE BY THIS CONTRACTOR. NO EXTRA COMPENSATION WILL BE ALLOWED FOR THESE TESTS, THE COST THEREOF BEING INCLUDED IN
- F. WHERE ANY EVIDENCE OF STOPPAGE IS FOUND IN PIPING OR EQUIPMENT, THIS CONTRACTOR SHALL DISCONNECT, CLEAN, REPAIR AND RECONNECT ALL OBSTRUCTED PIPING OR EQUIPMENT AND SHALL ALSO PAY FOR ALL NECESSARY CUTTING AND REPAIRS TO ADJOINING WORK.
- G. ALL PIPING AND EQUIPMENT SHALL BE THOROUGHLY CLEANED INSIDE AND OUT, OF DIRT, CUTTINGS, OILS AND OTHER FOREIGN SUBSTANCES AND SHALL BE LEFT CLEAN.
- H. ALL REQUIRED TESTS SHALL BE WITNESSED BY LOCAL AUTHORITIES AND THE OWNER'S REPRESENTATIVE.

J. ALL EQUIPMENT WILL BE FACTORY TESTED.

THE LUMP SUM BID FOR THIS CONTRACT.

- I. CONTRACTOR SHALL IDENTIFY TO THE OWNER'S REPRESENTATIVE ANY LEAKS OR DAMAGE THAT OCCURS AS A RESULT OF SYSTEM TESTING. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO LIMIT ANY POTENTIAL DAMAGE. CORRECTIVE ACTION REQUIRED AS A RESULT OF TESTING SHALL BE PERFORMED IMMEDIATELY AND AT THE
- CONTRACTOR'S EXPENSE. K. REPORT IN WRITING TO AUTHORITIES HAVING JURISDICTION. THE ARCHITECT AND THE OWNER THE RESULTS OF ALL

HYDROSTATICALLY TO 125 PSIG.

ADJACENT TENANT OR ESB SPACES.

M. REFILL ENTIRE POTABLE HOT AND COLD WATER SUPPLY

N. THOROUGHLY FLUSH PIPING SYSTEM WITH FRESH WATER

IMMEDIATELY PRIOR TO FINAL ACCEPTANCE.

SYSTEM WITH CHLORINE SOLUTION (HTH OLIN CHEMICAL

### TESTING.

L. TESTING REQUIREMENTS

a. TEST ALL DOMESTIC WATER PIPING

b. HYDROSTATIC TEST PRESSURES SHALL REMAIN

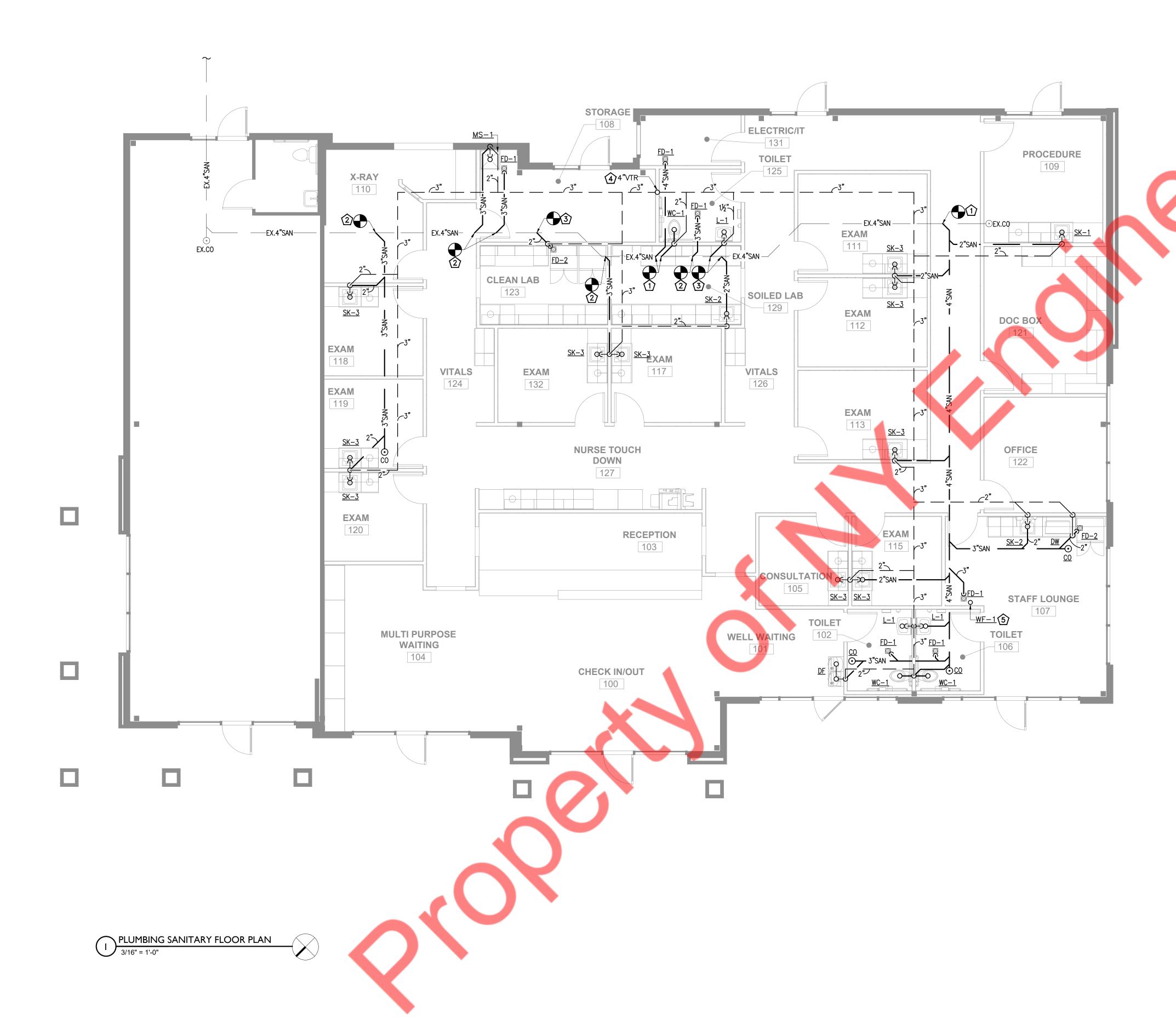
RESPONSIBLE FOR ALL DAMAGE DUE TO TEST

FAILURES AND LEAKAGE IN THE TEST AREA AND

- CONSTANT WITH NO VARIATION FOR 120 MINUTES. c. TESTS SHALL BE WITNESSED BY THE BUILDING ENGINEER. d. THE PLUMBING CONTRACTOR WILL BE HELD
- CORP.) AT A STRENGTH TO MEET STANDARDS OF THE DEPARTMENT OF HEALTH, AND FOR A PERIOD OF RETENTION AS STIPULATED.

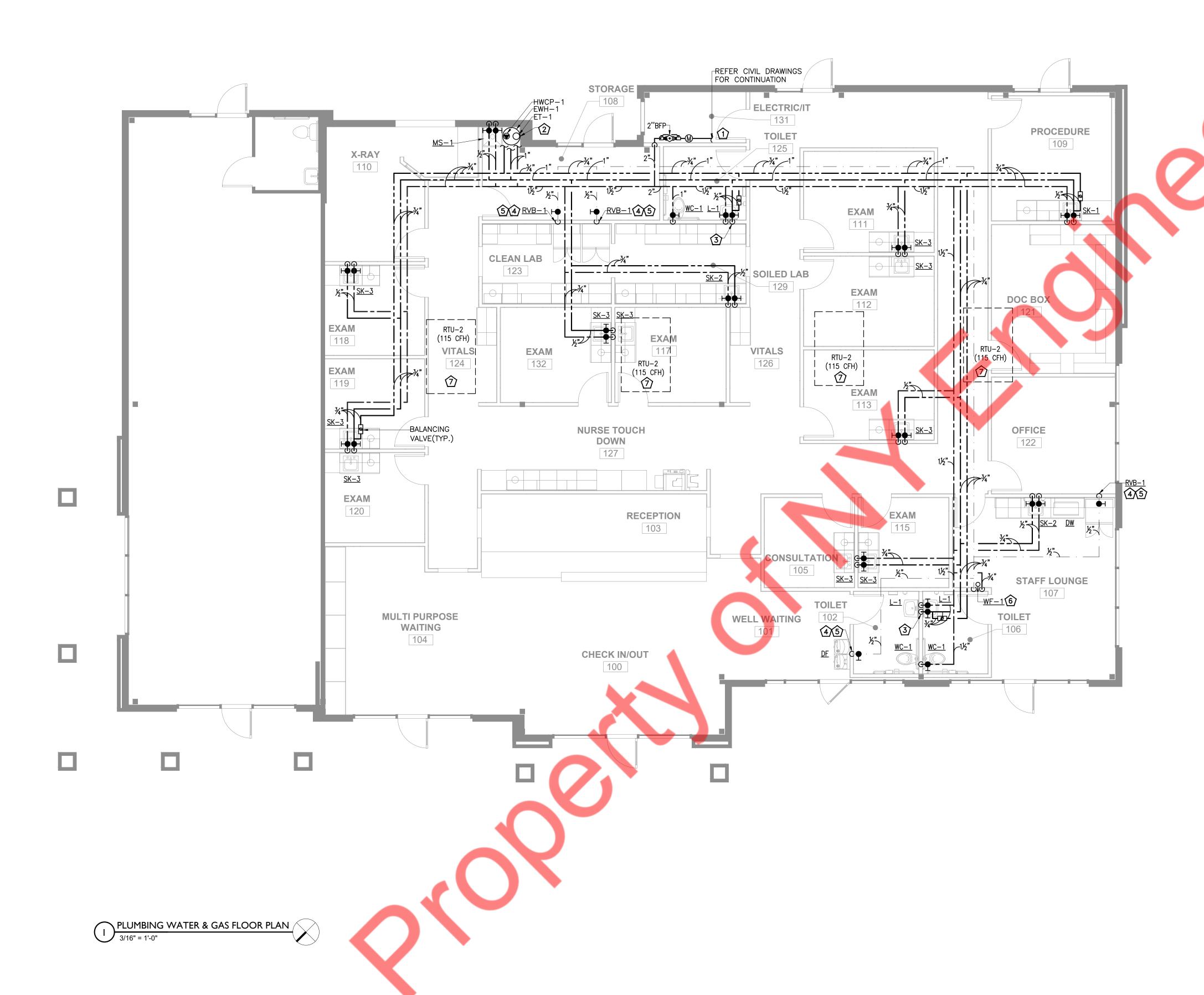
# WARRANTY

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





- 1. PROVIDE ACCESS PANELS FOR WATER HAMMER ARRESTOR, CLEANOUTS & SHUT-OFF VALVES AS REQUIRED.
- 2. REFER RISER DIAGRAMS FOR ALL PIPE SIZES.
- 3. WATER HEATER DRAIN SPILLS TO THE NEAREST FLOOR DRAIN
- . CONTRACTOR TO FIELD VERIFY FEASIBILITY OF SLAB PENETRATION AS PER STRUCTURAL REQUIREMENT.
- SANITARY KEYED NOTES:
- CONNECT NEW 4" SANITARY LINE TO EXISTING 4" SANITARY WASTE LINE OF ADEQUATE SIZE. CONTRACTOR TO FIELD VERIFY SIZE, ROUTING AND INVERT ON SITE.
- CONNECT NEW 3" SANITARY LINE TO EXISTING 4" SANITARY WASTE LINE OF ADEQUATE SIZE. CONTRACTOR TO FIELD VERIFY SIZE, ROUTING AND INVERT ON SITE.
- CONNECT NEW 2" SANITARY LINE TO EXISTING 4" SANITARY WASTE LINE OF ADEQUATE SIZE. CONTRACTOR TO FIELD VERIFY SIZE, ROUTING AND INVERT ON SITE.
- NEW 4" VENT THRU ROOF.CONTRACTOR TO FIELD VERIFY SIZE, ROUTING ON SITE.
- ROUTE DRAIN LINE FROM WATER FILTER TO ADJACENT FLOOR DRAIN WITH APPROVED AIR GAP.



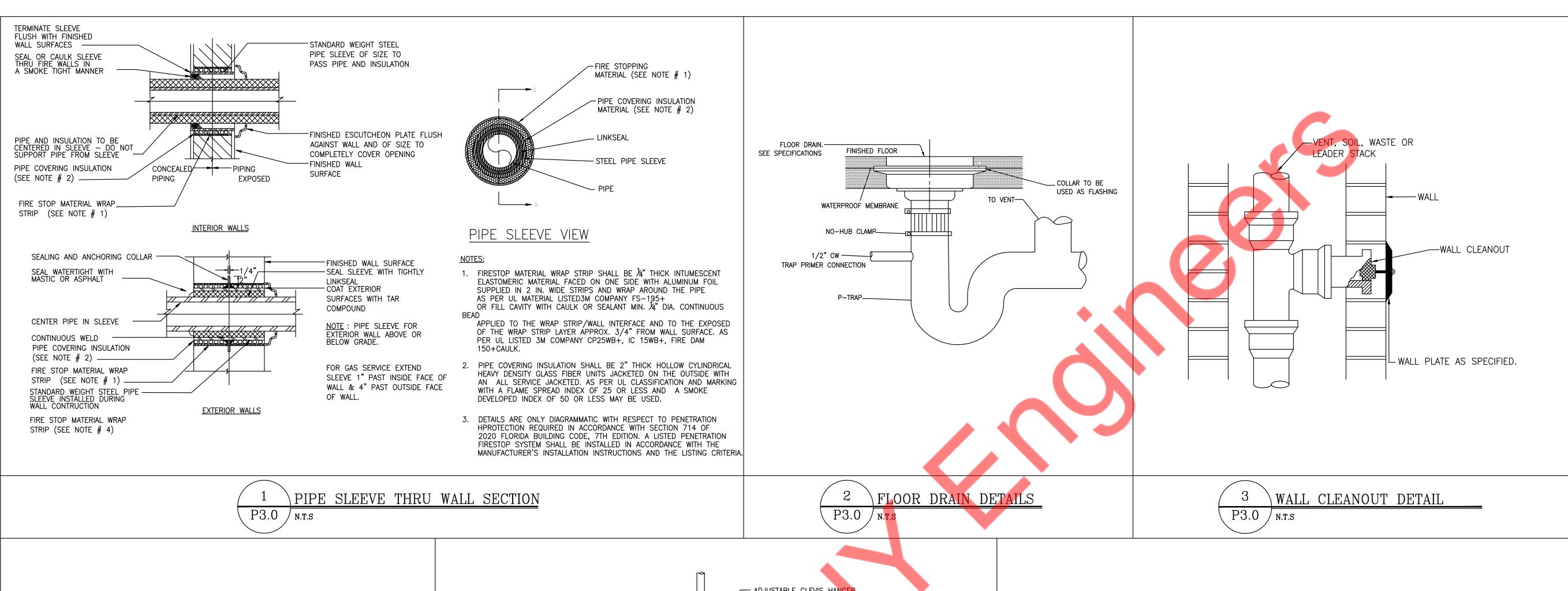


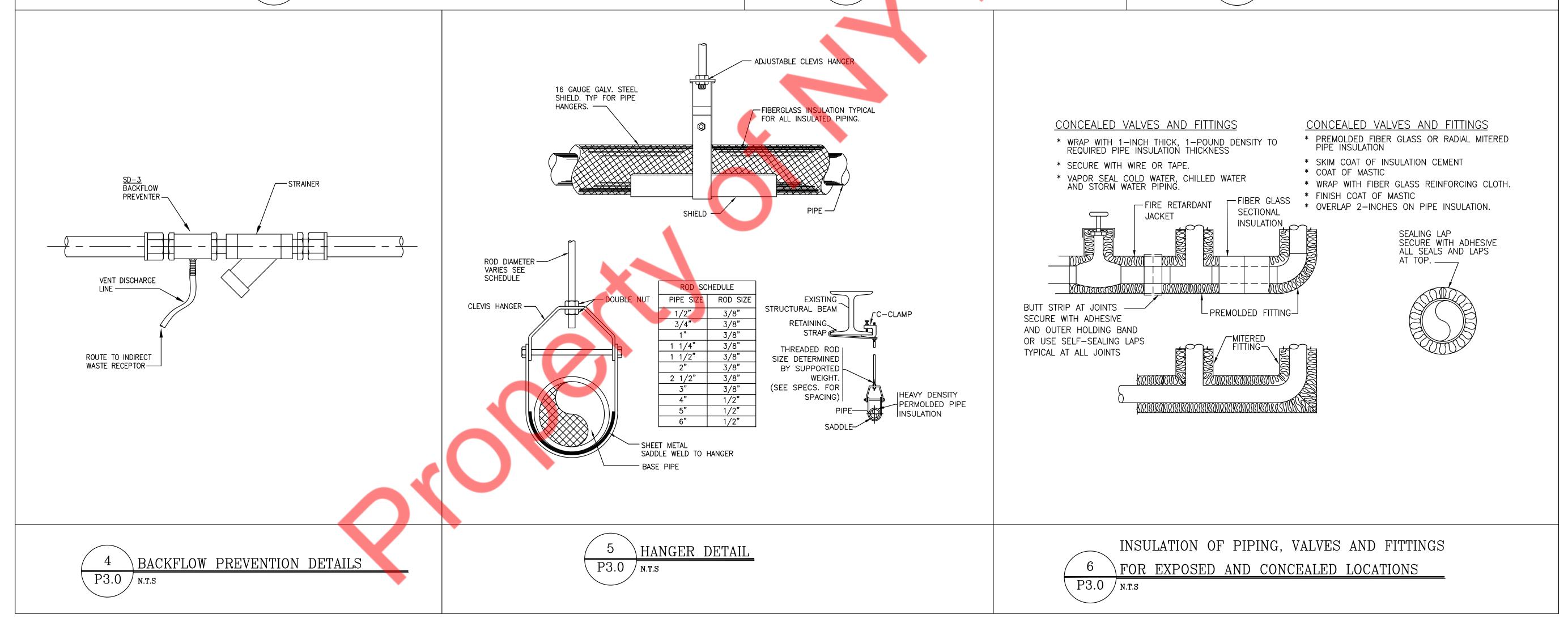
#### GENERAL NOTES

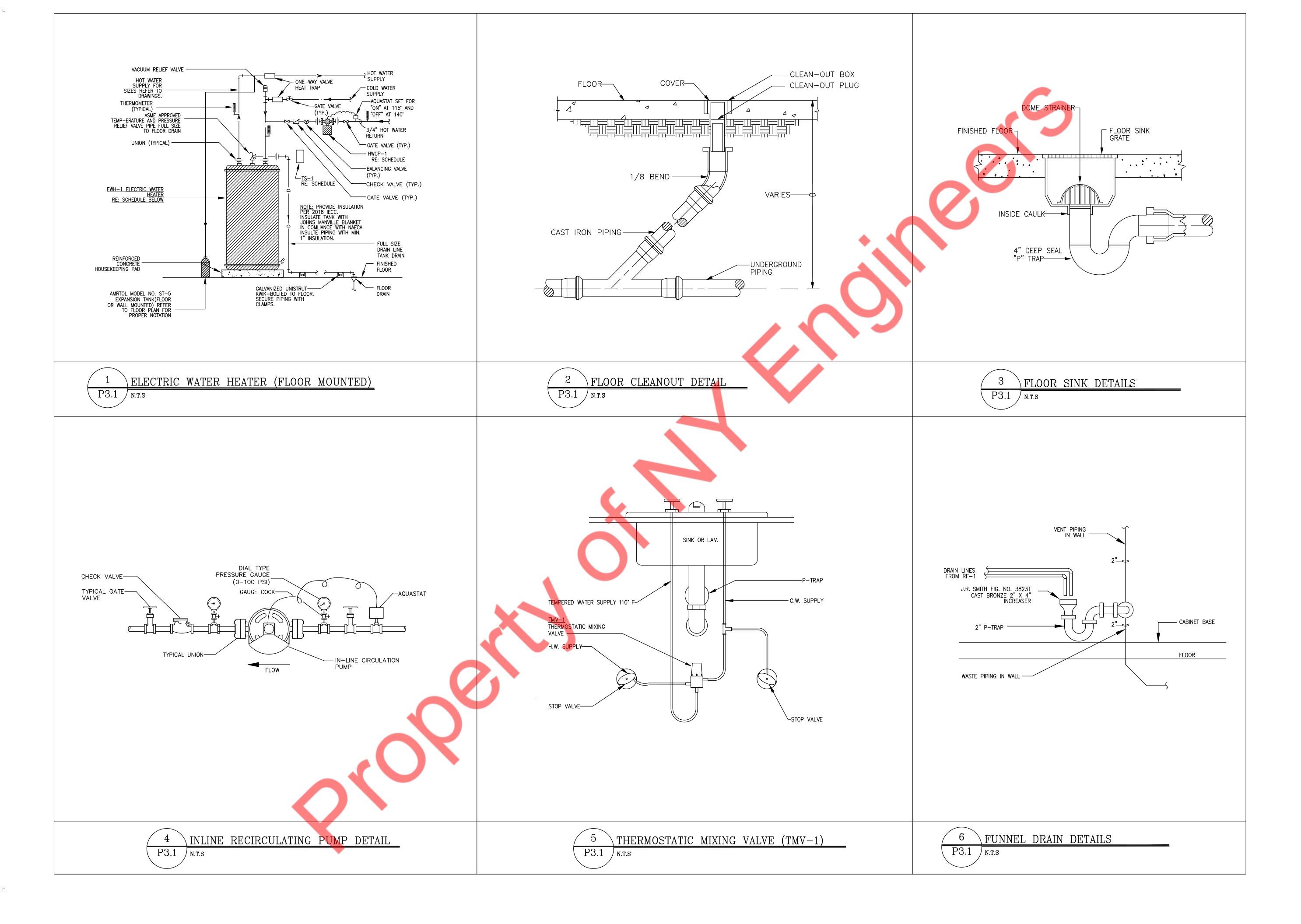
- . CW/HW PIPING TO BE PROVIDED WITH INSULATION AS PER 2018 INTERNATIONAL ENERGY CODE CODE (REFER SHEET P1.1)
- PROVIDE BRANCH PRV IF PRESSURE EXCEEDS 80 PSI.
- . Contractor to field verify feasibility of slab Penetration as per structural requirement.
- 4. PROVIDE ACCESS PANELS FOR WATER HAMMER ARRESTOR, CLEANOUTS & SHUT-OFF VALVES AS REQUIRED.
- 5. REFER RISER DIAGRAMS FOR ALL PIPE SIZES.

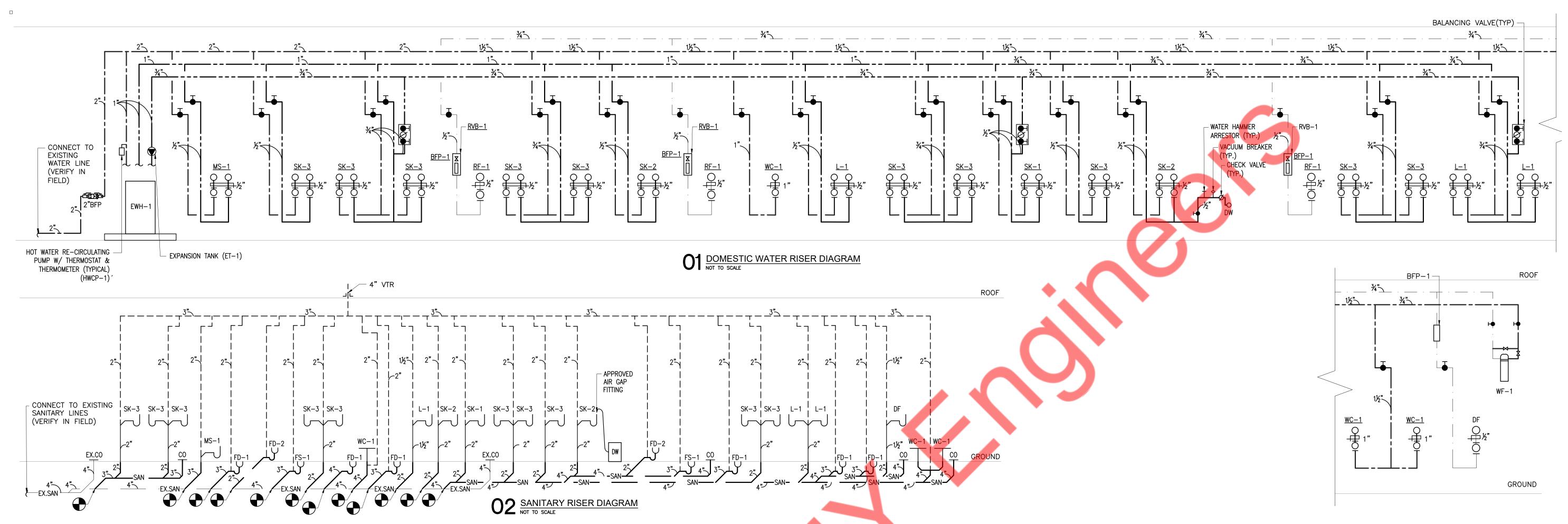
#### WATER AND GAS PIPING KEYED NOTES:

- CONNECT NEW 2" CW PIPING WITH SHUT OFF VALVE AND TIE-INTO THE EXISTING WATER LINE IN SPACE. CONTRACTOR TO FIELD VERIFY SIZE, ROUTING, WATER SUBMETER AND BACKFLOW PREVENTER REQUIREMENTS WITH LANDLORD.
- (2) ROUTE T&P RELIEF TO DRAIN IN NEAREST FLOOR DRAIN.
- PROVIDE ASSE 1070 OR SIMILAR APPROVED TEMPERING VALVE FOR LAVATORIES AND HAND SINK. SET AT TEMPERATURE TO A MAXIMUM 110 °F.
- REFRIGERATOR BY OTHERS PLUMBING CONTRACTOR TO PROVIDE COLD WATER CONNECTION CONSISTING OF 1/2" X 3/8" ANGLE PATTERN COMPRESSION STOP 12" A.F.F. (RVB—1) WITH AQUA PURE MODEL NO. AP717.
- CONNECT NEW 1/2" VALVED COLD WATER FOR NEW DRINKING FOUNTAIN AND REFRIGERATOR WITH INTEGRAL CHECK VALVE OR PROVIDE WATTS SD-3 BACKFLOW PREVENTOR.
- 6 CONTRACTOR TO VERIFY WATER FILTRATIONS SYSTEM LOCATION IN FIELD/SITE.
- CONTRACTOR TO FIELD VERIFY RTU-2(E) AND ENSURE GAS PIPING IS IN GOOD CONDITION. REPLACE PIPING IF REQUIRED.









				Ē	PLUN	<u>MBIN</u>	NG FIXTURE AND CONNECTION SCHEDULE	
SYMBOL	DESCRIPTION				NECTIO		- REMARKS	WATER CONSERVATION
<u>WC-1</u>	WATER CLOSET HANDICAPPED	TRAP	4"	SV 2"	1"	HW ·	AMERICAN STANDARD NO. 3461.001 "MADERA FLO WISE" 1.28 GPF 16-1/2" HEIGHT VITREOUS CHINA, FLOOR MOUNTED, FLUSHMETER WATER CLOSET WITH ELONGATED BOWL, SLOAN 111-1.28 HIGH EFFICIENCY (1.28 GPF) FLUSH VALVE WITH SCREW DRIVER STOP AND PROTECTIVE CAP ON STOP. CHURCH 9500C WHITE FRONT SEAT WITH CONCEALED STAINLESS STEEL SELF-SUSTAINING AND EXTERNAL CHECK HINGE. WATER CLOSET SHALL BE SUITABLE FOR HANDICAPPED.	1.28 G./FLUSH
<u>L-1</u>	LAVATORY HANDICAPPED	1 1/4"	2"	2"	1/2"	1/2"	KOHLER NO. K-2032 "PINOIR" (20-3/4" X 18-1/4") VITREOUS CHINA, WALL-MOUNTED LAVATORY WITH K-2057 SHROUD. CHICAGO NO. 116.212.AB.1 DECK MOUNTED SINGLE HOLE, E2805 VANDAL RESISTANT .5 GPM HY TRONIC DAUL BEAM INFRARED SENSOR 6 VOLT LITHIUM CRP2 BATTERY CONCEALED INTERNAL TEMPERATURE CONTROL MIXER, VANDAL RESISTANT SPRAY OUTLET. MCGUIRE # 8872 CAST BRASS P-TRAP WITH CLEANOUT PLUG, McGUIRE # 155A CAST BRASS P.O. PLUG WITH OPEN GRID STRAINER AND 17 GAUGE TAILPIECE, McGUIRE # 2165LK SUPPLIES WITH RISER AND WALL ESCUTCHEON. ANGLE SUPPLY AND P-TRAP SHALL BE INSULATED WITH TRAP WRAP BY TRUEBRO PRODUCTS, INC. OR APPROVED EQUAL. ANGLE SUPPLY TO BE LOCATED OUTSIDE OF THE SHROUD TO THE RIGHT SIDE.	0.5 GPM
<u>SK-1</u>	SINK HANDICAPPED PROCEDURE ROOM	1 1/2"	2"	2"	1/2"	1/2"	ELKAY NO. ELUHAD141455 SINGLE COMPARTMENT STAINLESS STEEL UNDERMOUNT SINK, 18 GAUGE SELF TYPE 304 (16-1/2" X 16-1/2" X 5-3/8" DEEP) JACLO 560-ESF CONTEMPO GOOSE NECK ADA SENSOR FAUCET WITH 5-3/4" SPOUT REACH. COLOR TO BE DETERMINED BY ARCHITECT. PROVIDE TMV-1 AS REQUIRED CHICAGO NO. 1017, ANGLE SUPPLIES WITH STOP, 1/2" CHROME-PLATED BRASS NIPPLES TO WALL, McGUIRE NO. 151-A CRUMB CUP STRAINER, NO. 8912 (1 1/2") ADJUSTABLE SEMI-CAST CHROME-PLATED BRASS P-TRAP WITH TUBING WASTE TO WALL AND CHROME-PLATED CAST WALL FLANGE WITH SET SCREW SUPPLIES, AND P-TRAP SHALL BE INSULATED WITH TRAP WRAP BY PLUMBEREX SPECIALTY PRODUCTS, INC OR APPROVED EQUAL.	
<u>SK-2</u>	SINK HANDICAPPED BREAK ROOM & LAB	1-1/2"	2"	2"	1/2"	1/2"	ELKAY NO. ECTSRAD25226TBG "CROSSTOWN" SINGLE COMPARTMENT STAINLESS STEEL UNDERMOUNT SINK, 18 GAUGE (25" X 22" X 6" DEEP) WITH THREE FAUCET HOLE PUNCHINGS, LOCATE DRAIN LEFT REAR CHICAGO NO. 201-AHA8-317ABCP FAUCET WITH 317 WRIST BLADE HANDLES RIGID/ SWING GOOSENECK SPOUT WITH E3-2 AERATOR, AND TMV-1. CHICAGO NO. 1017, ANGLE SUPPLIES WITH STOP, 1/2" CHROME-PLATED BRASS NIPPLES TO WALL, McGUIRE NO. 151-A CRUMB CUP STRAINER, NO. 8912 (1 1/2") ADJUSTABLE SEMI-CAST CHROME-PLATED BRASS P-TRAP WITH TUBING WASTE TO WALL AND CHROME-PLATED CAST WALL FLANGE WITH SET SCREW SUPPLIES, AND P-TRAP SHALL BE INSULATED WITH TRAP WRAP BY PLUMBEREX SPECIALTY PRODUCTS, INC OR APPROVED EQUAL.	
<u>SK-3</u>	SINK HANDICAPPED  EXAM ROOM	1-1/2"	2"	2"	1/2"	1/2"	ELKAY NO. ELUHAD121255 SINGLE COMPARTMENT STAINLESS STEEL UNDERMOUNT SINK, 18 GAUGE (14-1/2" X 14-1/2" X 5-3/8" DEEP) JACLO 560-ESF CONTEMPO GOOSE NECK ADA SENSOR FAUCET WITH 5-3/4" SPOUT REACH. COLOR TO BE DETERMINED BY ARCHITECT., AND TMV-1. CHICAGO NO. 1017, ANGLE SUPPLIES WITH STOP, 1/2" CHROME-PLATED BRASS NIPPLES TO WALL, McGUIRE NO. 151-A CRUMB CUP STRAINER, NO. 8912 (1 1/2") ADJUSTABLE SEMI-CAST CHROME-PLATED BRASS P-TRAP WITH TUBING WASTE TO WALL AND CHROME-PLATED CAST WALL FLANGE WITH SET SCREW SUPPLIES, AND P-TRAP SHALL BE INSULATED WITH TRAP WRAP BY PLUMBEREX SPECIALTY PRODUCTS, INC OR APPROVED EQUAL.	
MS-1	SERVICE SINK	3"	3"	2"	1/2"	1/2"	STERN WILLIAMS MODEL No. SB-902-BP-2 -LB OR APPROVED EQUAL WHITE (24"x24") SERVICE SINK WITH 10" HIGH WALLS, 3" STAINLESS STEEL COMBINATION DOME STRAINER AND LINT BASKET OUTLET, ACID RESISTANT, MOLDED STONE (COLOR AS SPECIFIED BY ARCHITECT). REMOVABLE VINYL-COATED RIM GUARD No. V-70-24. SINK FITTING CHICAGO 897-RCF OR T&S No. B-0665-BSTR ROUGH CHROME PLATED BRASS FINISH, RIGID SPOUT, WALL BRACE, INTEGRAL STOPS, PAIL HOOK, HOSE END, VACUUM BREAKER AND VANDAL PROOF SCREWS. PROVIDE 30" HOSE (MINIMUM) WITH STAINLESS STEEL BRACKET (EQUAL TO STERN - WILLIAMS No. T-35) AND STAINLESS STEEL MOP HANGER (EQUAL TO STERN - WILLIAMS No. T-40). PROVIDE 12" HIGH, 20 GAUGE TYPE 316 STAINLESS STEEL SPLASH GUARDS ON ALL WALLS ADJACENT TO THE SERVICE SINK. PROVIDE AND INSTALL INTERNAL WALL SUPPORTS IN ACCORDANCE WITH THE ARCHITECTS REQUIREMENTS FOR THE WALL BRACE ATTACHMENTS.	
<u>TS-1</u>	TIME SWITCH	-	-	-	3/4"	-	TORK ELECTROMECHANICAL 24 HOUR TIME SWITCH POWERED BY A SELF STARTING SYNCHRONOUS MOTOR. INSTALL ON WALL ADJACENT TO CIRCULATING PUMP. COORDINATE WITH ELECTRICAL AND PROVIDE FOR 120/1/60 HZ POWER REQUIREMENT.	
TMV-1	THERMOSTATIC MIXING VALVE	-	-	-	1/2"	-	SYMMONS NO #7-210-CK THERMOSTATIC MIXING VALVE CONSTRUCTION SHALL BE ROUGH BRASS AND BRONZE WITH BRASS AND STAINLESS STEEL FLOW CONTROL COMPONENTS, WITH INTEGRAL CHECKS AND VALVES. 360 DEGREES HANDLE ADJUSTMENT FOR TEMPERATURE SELECTION. @ 110 F. MAX (SINK/LAVATORY)	
BFP-1	BACKFLOW PREVENTER	-	-	-	SEE PLAN	-	WATTS No. SD-3. 1/4" BACKFLOW PREVENTER WITH 316 STAINLESS STEEL BODY.	
FD-1	FLOOR DRAIN	3"	3"	3"	1/2"	-	J.R. SMITH FIGURE No. 2631C-12 OR APPROVED EQUAL 12"x12" PAINTED CAST IRON FLOOR DRAIN WITH SEDIMENT BUCKET, 1/2" GRATE, SIZE AS NOTED ON PLANS, CLAMPING UNIT, TRAP PRIMER TAP AND DEEP SEAL TRAP.	
RVB-1	REFRIGERATOR VALVE BOX	-	-	-	1/2"	-	GUY GRAY #BIM-875 10-3/4" X 9" 16GA. STEEL WITH EPOXY FINISH, 3/8" O.D. SWEAT CONNECTION PROVIDE FILTER WHEN MAKING FINAL CONNECTION, AQUA-PURE #AP717	
<u>WF-1</u>	WATER FILTER	-	-	-	3/4"	-	AQUA PURE MODEL NO AP101T WITH APS117 CARTRIDGE.	
BFP	BACKFLOW PREVENTER	-	-	-	2"	-	NEW 2" RPZ WATTS MODEL LF-009	
<u>FD-2</u>	FUNNEL DRAIN	2"	2"	2"	-	-	J.R. SMITH FIGURE No. 3823T CAST BRONZE 2"x 4" FUNNEL DRAIN.	

			WATER H	EATER S	CHEDUL		
MARK	SERVICE	STORAGE IN GALLONS	RECOVERY AT 100° RISE	ELECTRICAL	ELEMENT WATTS	NUMBER OF ELEMENTS	MAKE AND MODEL
EWH-1	ELEC. WATER HEATER	50	41 GPH	208V./3ø/60Hz	5KW/ELEMENT 10KW TOTAL	2	A.O. SMITH MODEL NO. DEL-50, DUAL ELEMENT, SIMULTANEOUS OPERATION

		E	'UMP	SCHE	DULE	<u>-</u>		
MARK	LOCATION	SERVICE	GPM	HEAD FT.	MIN. EFF.	HP	VOLTS/Ø/Hz	MAKE AND MODEL
HWCP-1	CEILING	DOMESTIC HOT WATER	2	6		0.12	120/1ø/60	GRUNDFOS PRODUCT UP 15-18 B5 1" FLANGED, INLINE TYPE

			<u>E</u> >	<u>(PAN</u>	ISION -	TANKS	<u>S</u>			
UNIT	NUMBER	MANUFACTURER & MODEL NUMBER	SERVICE		ACCEPTANCE VOLUME (GAL)		DIMENSI DIAMETER (INCH)		OPERATING WEIGHT (LBS)	NOTES
ET-1	1	AMTROL	ST-5	2	0.9	150	8	12.5	25	1

RIAL SCHEDULE
PIPING MATERIAL
SCHEDULE 40 PVC
SCHEDULE 40 PVC
SCHEDULE 40 PVC
COPPER, TYPE "L" HARD DRAWN
BLACK STEEL SCHEDULE 40

NO HUB COUPLING SHALL HAVE A SHIELD CONSTRUCTED OF 304 CORRUGATED STAINLESS STEEL WITH A MINIMUM THICKNESS OF 016 COUPLING SIZE 1-1/2" - 4" SHALL HAVE FOUR (4) BANDS: APPROVED MANUFACTURES HUSKY SD 4000 AND MISSION NO TWO BANDS ARE ACCEPT.