

**VIRGINIA BUILDING DEPARTMENT NOTES**

ALL WORK SHALL COMPLY WITH APPLICABLE SECTIONS OF VIRGINIA BEACH BUILDING CODE; BASE CODE ICC IBC 2018, AND ALL RULES AND REGULATIONS OF THE DEPARTMENT OF BUILDINGS TO DATE.

- ALL HEATING AND COOLING LOADS CALCULATED PER ASHRAE/ACCA 183.
- VENTILATION FOR ALL AREA SHALL COMPLY WITH 2018 INTERNATIONAL MECHANICAL CODE, CHAPTER 4.
- AS PER C408.2.5 OF VIRGINIA BEACH BUILDING CODE; BASE CODE ICC IECC 2018, CONSTRUCTION DOCUMENT SHALL REQUIRE THAT, WITHIN 90 DAYS AFTER THE DATE OF SYSTEM ACCEPTANCE, RECORD DRAWINGS OF THE ACTUAL INSTALLATION BE PROVIDED TO THE BUILDING OWNER OR THE DESIGNATED REPRESENTATIVE OF THE BUILDING OWNER.
- AS PER C408.3.2 OF VIRGINIA BEACH BUILDING CODE; BASE CODE ICC IECC 2018, CONSTRUCTION DOCUMENT SHALL REQUIRE THAT AN OPERATING MANUAL AND A MAINTAINED MANUAL BE PROVIDED TO THE BUILDING OWNER WITHIN 90 DAYS AFTER THE DATE OF SYSTEM ACCEPTANCE. THE CONTRACTOR SHALL ENGAGE THE SERVICES OF A PROFESSIONAL ENGINEER TO PROVIDE THE REQUIRED SPECIAL INSPECTIONS AND TESTS.
- TESTS WILL BE CONDUCTED UNDER DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSON HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS. THE TESTS WILL SHOW COMPLIANCE WITH VIRGINIA BEACH BUILDING CODE; BASE CODE ICC IBC 2018, REQUIREMENTS AS OUTLINES IN SECTION.
- THE LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSON HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS AND CONDUCTING SUCH TESTS WILL FILE DOCUMENTATION AND REPORTS OF TESTS THAT THE SYSTEM COMPLIES WITH THE CONSTRUCTION DOCUMENTS AND APPLICABLE LAWS.
- TESTS OF MECHANICAL SYSTEMS SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING SECTIONS OF VIRGINIA BEACH BUILDING CODE; BASE CODE ICC IMC 2018 CHAPTER 4 AND CHAPTER 5:
  - MECHANICAL VENTILATION - SECTION 403.
- THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIES, ETC. SHALL COMPLY WITH THE REFERENCED CODE OR STANDARD:
  - STANDARDS OF HEATING - NASHVILLE BUILDING CODE; BASE CODE ICC IMC 2018.
  - DUCT CONSTRUCTION AND INSTALLATION-SECTION 603 OF VIRGINIA BEACH BUILDING CODE; BASE CODE ICC IMC 2018.
  - AIR INTAKES, EXHAUSTS AND RELIEF-SECTION 401 OF VIRGINIA BEACH BUILDING CODE; BASE CODE ICC IMC 2018.
  - AIR FILTERS -SECTION 605 OF VIRGINIA BEACH BUILDING CODE; BASE CODE ICC IMC 2018.
  - MANUAL AND AUTOMATIC FIRE AND SMOKE CONTROLS FOR AIR DISTRIBUTION SYSTEMS -SECTION 513 OF VIRGINIA BEACH BUILDING CODE; BASE CODE ICC IMC 2018.
- MINIMUM TEMPERATURE TO BE MAINTAINED IN OCCUPIED SPACES DURING HEATING SEASON: 68 DEG. FAHRENHEIT.
- A STATEMENT SHALL BE FILED BY THE OWNER OR TENANT IN POSSESSION THAT THE VENTILATION SYSTEM WILL BE KEPT IN CONTINUOUS OPERATION AT ALL TIMES DURING THE NORMAL OCCUPANCY OF THE STRUCTURE AS REQUIRED BY VIRGINIA BEACH BUILDING CODE; 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 VIRGINIA BEACH BUILDING CODE; BASE CODE ICC IMC 2018 SECTION 408.2.2.
- SMOKE DETECTION SYSTEMS SHALL BE INSTALLED AND SEQUENCED TO FOLLOW CONTROLS OPERATIONS WITH THE REQUIREMENTS OF SECTION 606 VIRGINIA BEACH BUILDING CODE; BASE CODE 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 LOCATION.
- THESE PLANS ARE APPROVED ONLY FOR THE WORK INDICATED ON THE APPLICATION SPECIFICATION SHEET. ALL OTHER MATTERS SHOWN ARE NOT TO BE RELIED UPON OR TO BE CONSIDERED AS EITHER BEING APPROVED OR IN ACCORDANCE WITH APPLICABLE CODES.

**APPLICABLE CODES**

- 2018 VIRGINIA BUILDING CODE, (ADOPTED FROM 2018 IBC)
- 2018 VIRGINIA BUILDING CODE, ENERGY CONSERVATION, (ADOPTED FROM 2018 IECC)
- 2018 VIRGINIA BUILDING CODE, PLUMBING, (ADOPTED FROM 2018 IPC)
- 2018 VIRGINIA BUILDING CODE, MECHANICAL, (ADOPTED FROM 2018 IMC)
- 2018 VIRGINIA BUILDING CODE, FUEL GAS CODE, (ADOPTED FROM 2018 IFGC)

**THERMOSTATIC CONTROLS**

**C403.4.1 THERMOSTATIC CONTROLS**  
 THE SUPPLY OF HEATING AND COOLING ENERGY TO EACH ZONE SHALL BE CONTROLLED BY INDIVIDUAL THERMOSTATIC CONTROLS CAPABLE OF RESPONDING TO TEMPERATURE WITHIN THE ZONE WHERE HUMIDIFICATION OR DEHUMIDIFICATION OR BOTH IS PROVIDED. AT LEAST ONE HUMIDITY CONTROL DEVICE SHALL BE PROVIDED FOR EACH HUMIDITY CONTROL SYSTEM.  
**EXCEPTION:** INDEPENDENT PERIMETER SYSTEMS THAT ARE DESIGNED TO OFFSET ONLY BUILDING ENVELOPE HEAT LOSSES, GAINS OR BOTH SERVING ONE OR MORE PERIMETER ZONES ALSO SERVED BY AN INTERIOR SYSTEM PROVIDED:

THE PERIMETER SYSTEM INCLUDES AT LEAST ONE THERMOSTATIC CONTROL ZONE FOR EACH BUILDING EXPOSURE HAVING EXTERIOR WALLS FACING ONLY ONE ORIENTATION (WITHIN +/-45 DEGREES) (0.8 RAD) FOR MORE THAN 90 CONTIGUOUS FEET (15 240 MM); AND THE PERIMETER SYSTEM HEATING AND COOLING SUPPLY IS CONTROLLED BY THERMOSTATS LOCATED WITHIN THE ZONES SERVED BY THE SYSTEM.

**C403.4.1.2 DEADBAND**  
 WHERE USED TO CONTROL BOTH HEATING AND COOLING, ZONE THERMOSTATIC CONTROLS SHALL BE CAPABLE OF PROVIDING A TEMPERATURE RANGE OR DEADBAND OF AT LEAST 5°F (2.8°C) WITHIN WHICH THE SUPPLY OF HEATING AND COOLING ENERGY TO THE ZONE IS CAPABLE OF BEING SHUT OFF OR REDUCED TO A MINIMUM.

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

**C403.4.1.3 SET POINT OVERLAP RESTRICTION**  
 WHERE A ZONE HAS A SEPARATE HEATING AND A SEPARATE COOLING THERMOSTATIC CONTROL LOCATED WITHIN THE ZONE, A LIMIT SWITCH, MECHANICAL STOP OR DIRECT DIGITAL CONTROL SYSTEM WITH SOFTWARE PROGRAMMING SHALL BE PROVIDED WITH THE CAPABILITY TO PREVENT THE HEATING SET POINT FROM EXCEEDING THE COOLING SET POINT AND TO MAINTAIN A DEADBAND IN ACCORDANCE WITH SECTION C403.2.4.1.2.

**C403.4.2 OFF-HOUR CONTROLS**  
 EACH ZONE SHALL BE PROVIDED WITH THERMOSTATIC SETBACK CONTROLS THAT ARE CONTROLLED BY EITHER AN AUTOMATIC TIME CLOCK OR PROGRAMMABLE CONTROL SYSTEM.  
**EXCEPTIONS:**  
 ZONES THAT WILL BE OPERATED CONTINUOUSLY.  
 ZONES WITH A FULL HVAC LOAD DEMAND NOT EXCEEDING 6,000 BTUH (2 KW) AND HAVING A READILY ACCESSIBLE MANUAL SHUTOFF SWITCH.

**C403.4.2.1 THERMOSTATIC SETBACK CAPABILITIES**  
 THERMOSTATIC SETBACK CONTROLS SHALL HAVE THE CAPABILITY TO SET BACK OR TEMPORARILY OPERATE THE SYSTEM TO MAINTAIN ZONE TEMPERATURES DOWN TO 55°F (13°C) OR UP TO 85°F (29°C).

**C403.4.2.2 AUTOMATIC SETBACK AND SHUTDOWN CAPABILITIES**  
 AUTOMATIC TIME CLOCK OR PROGRAMMABLE CONTROLS SHALL BE CAPABLE OF STARTING AND STOPPING THE SYSTEM FOR SEVEN DIFFERENT DAILY SCHEDULES PER WEEK AND RETAINING THEIR PROGRAMMING AND TIME SETTING DURING A LOSS OF POWER FOR AT LEAST 10 HOURS. ADDITIONALLY, THE CONTROLS SHALL HAVE A MANUAL OVERRIDE THAT ALLOWS TEMPORARY OPERATION OF THE SYSTEM FOR UP TO 2 HOURS; A MANUALLY OPERATED TIMER CAPABLE OF BEING ADJUSTED TO OPERATE THE SYSTEM FOR UP TO 2 HOURS; OR AN OCCUPANCY SENSOR.

**C403.4.2.3 AUTOMATIC AND OPTIMUM START CAPABILITIES (MANDATORY)**  
 AUTOMATIC START CONTROLS SHALL BE PROVIDED FOR EACH HVAC SYSTEM. THE CONTROLS SHALL BE CONFIGURED TO AUTOMATICALLY ADJUST THE DAILY START TIME OF THE HVAC SYSTEM IN ORDER TO BRING EACH SPACE TO THE DESIRED OCCUPIED TEMPERATURE IMMEDIATELY PRIOR TO SCHEDULED OCCUPANCY.

INDIVIDUAL HEATING AND COOLING SYSTEMS WITH SETBACK CONTROLS AND DIRECT DIGITAL CONTROL SHALL HAVE OPTIMUM START CONTROLS. THE CONTROL ALGORITHM SHALL, AS A MINIMUM, BE A FUNCTION OF THE DIFFERENCE BETWEEN SPACE TEMPERATURE AND OCCUPIED SET POINT, THE OUTDOOR TEMPERATURE AND THE AMOUNT OF TIME PRIOR TO SCHEDULED OCCUPANCY. MASS RADIANT FLOOR SLAB SYSTEMS SHALL INCORPORATE FLOOR TEMPERATURE INTO THE OPTIMUM START ALGORITHM.

**STANDARD HVAC ABBREVIATIONS**

AAV	AUTOMATIC AIR VENT	HD	HEAD	RO	REVERSE OSMOSIS
ACCESS	ACCESSORIES	HOA	HAND/OFF/AUTOMATIC	RPM	REVOLUTIONS PER MINUTE
AD	ACCESS DOOR	HP	HORSEPOWER	RS	REFRIGERANT SUCTION
AFF	ABOVE FINISHED FLOOR	HPR	HIGH PRESSURE RETURN	SA	SUPPLY AIR
AMP	AMPERE	HTG	(STEAM CONDENSATE) HEATING	SAT	SUPPLY AIR TEMPERATURE
AP	ACCESS PANEL	HUMIDISTAT	HUMIDISTAT	SC	SHADING COEFFICIENT
APD	AIR PRESSURE DROP	HSTAT	HEATING	SCD	SMOKE CONTROL DAMPER
ARI	AIR CONDITIONING AND REFRIGERATION INSTITUTE	HWR	HEATING HOT WATER RETURN	SD	SMOKE DETECTOR
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS	HWS	HEATING HOT WATER SUPPLY	SENS	SENSIBLE HEAT
BAS	BUILDINGS AUTOMATION SYSTEM	HZ	HERTZ	SP	STATIC PRESSURE
BD	BACKDRAFT DAMPER	IO	INPUT/OUTPUT	TAB	TESTING, ADJUSTING, BALANCE
BHP	BRAKE HORSEPOWER	IAQ	INDOOR AIR QUALITY	TDH	TOTAL DYNAMIC HEAD
BTU	BRITISH THERMAL UNIT	IN HG	INCHES OF MERCURY	TDS	TOTAL DISSOLVED SOLIDS
BTUH	BRITISH THERMAL UNIT PER HOUR	IN WG	INCH WATER COLUMN	TSP	TOTAL STATIC PRESSURE
CD	CEILING DIFFUSER	IN WG	INCH WATER GAUGE	TSTAT	THERMOSTAT
CFH	CUBIC FEET PER HOUR	IPLV	INTEGRATED PART LOAD VALUE	UL	UNDERWRITERS LABORATORY
CFM	CUBIC FEET PER MINUTE	INST	INSTALLED	VAV	VARIABLE AIR VOLUME
CFM	CUBIC FEET PER MINUTE	KW	KILOWATT	VFD	VARIABLE FREQUENCY DRIVE
CHWR	CHILLED WATER RETURN	KWH	KILOWATT HOUR	WB	WET-BULB (TEMPERATURE)
CHWS	CHILLED WATER SUPPLY	LAT	LEAVING AIR TEMPERATURE	WG	WATER GAGE
CI	CAST IRON	LBS/HR	POUNDS PER HOUR	WPD	WATER SIDE PRESSURE DROP
CLG	COOLING	LF	LINEAR FOOT (FEET)	WIRE	WIRED
CO	CARBON MONOXIDE	LPR	LOW PRESSURE RETURN	CU	CONDENSING UNIT
CO2	CARBON DIOXIDE	LPS	(STEAM CONDENSATE) LOW PRESSURE STEAM		
COP	COEFFICIENT OF PERFORMANCE	LWT	LOW PRESSURE WATER TEMPERATURE		
CV	CONSTANT VOLUME	MAX	MAXIMUM		
CWR	CONDENSER WATER RETURN	MBH	1000 BTUH		
CWS	CONDENSER WATER SUPPLY	MCA	MINIMUM BRANCH CIRCUIT AMPACITY		
DB	DECIBELS	MERV	MINIMUM EFFICIENCY REPORTING VALUE		
DB	DRY-BULB TEMPERATURE	MIN	MINIMUM		
DC	DISCONNECT	MOD	MOTOR OPERATED DAMPER		
DDC	DIRECT DIGITAL CONTROLS	MPR	MEDIUM PRESSURE RETURN		
DEG	DEGREE DELTA(CHANGE IN TEMPERATURE)	MPS	MEDIUM PRESSURE STEAM		
DIA	DIAMETER	MRI	MAGNETIC RESONANCE IMAGING		
DIW	DEIONIZED WATER	MVD	MANUAL VOLUME DAMPER		
DP	DEW POINT TEMPERATURE	NA	NOT APPLICABLE		
DX	DIRECT EXPANSION	NC	NOISE CRITERIA		
EA	EXHAUST AIR	NC	NORMALLY CLOSED		
EAT	ENTERING AIR TEMPERATURE	NO	NORMALLY OPEN		
EER	ENERGY EFFICIENCY RATIO	NTS	NOT TO SCALE		
EG	EXHAUST GRILLE	OA	OUTSIDE AIR		
EMERG	EMERGENCY POWER	OCP	OVER CURRENT PROTECTION		
ESP	EXTERNAL STATIC PRESSURE	PD	PRESSURE DROP		
EWT	ENTERING WATER TEMPERATURE	PPM	PARTS PER MILLION		
EX	EXISTING	PRS	PRESSURE REGULATING (VALVE) STATION		
F	FAHRENHEIT	PRV	PRESSURE REGULATING VALVE		
F&T	FLOAT AND THERMOSTATIC	PSI	POUNDS PER SQUARE INCH - ABSOLUTE		
FA	FREE AREA	PSIA	POUNDS PER SQUARE INCH - ABSOLUTE		
FD	FIRE DAMPER	PSIG	POUNDS PER SQUARE INCH - GAGE		
FLA	FULL LOAD AMPERES	RA	RETURN AIR		
FPM	FEET PER MINUTE	RAT	RETURN AIR TEMPERATURE		
FPS	FEET PER SECOND	RH	RELATIVE HUMIDITY		
FT	FEET	RL	REFRIGERANT LIQUID LINE		
FURN	FURNISHED	RUN	RUN LOAD AMPERE		
GA	GAUGE	ERV	ENERGY RECOVERY VENTILATOR		
GAL	GALLONS	AHU	AIR HANDLING UNIT		
GPM	GALLONS PER MINUTE				
ARD	AUTOMATIC ROUND DAMPER				
BPD	BYPASS DAMPER				

**INSULATION - GENERAL REQUIREMENTS**  
**A. ALL INSULATION MATERIALS, INCLUDING JACKETS, FACING, ADHESIVE, COATINGS, AND ACCESSORIES ARE TO BE FIRE HAZARD RATED AND LISTED BY UNDERWRITERS LABORATORIES, INC. USING STEINER TUNNEL TEST METHOD FOR FIRE HAZARD CLASSIFICATION OF BUILDING MATERIALS, STANDARD UL 723 (ASTM E-84), (ASA A2.5-1963). FLAMESPREAD: MAXIMUM 25. FUEL CONTRIBUTED AND SMOKE DEVELOPED: MAXIMUM 50. FLAMEPROOFING TREATMENTS SUBJECT TO DETERIORATION FROM MOISTURE OR HUMIDITY ARE NOT ACCEPTABLE.**  
**B. DEFINITIONS:**  
 1) EXPOSED: INDOOR DUCTS, PIPING OR EQUIPMENT LOCATED IN MECHANICAL EQUIPMENT ROOMS AND IN AREAS WHICH WILL BE VISIBLE WITHOUT REMOVING CEILINGS OR OPENING ACCESS PANELS.  
 2) CONCEALED: INDOOR DUCTS, PIPING OR EQUIPMENT WHICH IS NOT EXPOSED.  
 3) OUTDOOR: DUCTS, PIPING OR EQUIPMENT WHICH IS EXPOSED TO THE WEATHER.  
**PIPING INSULATION**  
 PIPING SERVING AS PART OF A HEATING OR COOLING SYSTEM SHALL BE THERMALLY INSULATED IN ACCORDANCE WITH TABLE C403.11.3.

**MECHANICAL LEGEND**

SYMBOL	DESCRIPTION
<b>MECHANICAL MISCELLANEOUS</b>	
	CONNECT TO EXISTING (FIELD VERIFY EXISTING UTILITY SERVICE TYPE, PRIOR TO MAKING CONNECTION)
<b>PLAN-VIEW LINE TYPES</b>	
	WORK SHOWN FADED INDICATES EXISTING WORK TO REMAIN OR NEW WORK BY OTHERS AS APPLICABLE
	WORK SHOWN BOLD-CONTINUOUS INDICATES NEW WORK
<b>PIPING LINE TYPES</b>	
	REFRIGERANT LIQUID
	REFRIGERANT SUCTION
	CONDENSATE DRAIN
	SUPPLY MAIN OR BRANCH
	RETURN MAIN OR BRANCH
<b>HVAC LEGEND</b>	
	DRAWING KEY NOTE SYMBOL
	NEW RECTANGULAR DUCTWORK AND SIZE
	NEW ROUND DUCTWORK AND SIZE
	BALANCING/VOLUME DAMPER
	FLEX DUCT
	THERMOSTAT
	TEMPERATURE SENSOR
	MOTORIZED DAMPER
	NEW SUPPLY AIR DIFFUSER AND CFM
	NEW RETURN GRILLE AND CFM
	NEW EXHAUST GRILLE AND CFM
	NEW EXHAUST FAN (CEILING MOUNTED)
	DUCT SMOKE DETECTOR
	SUPPLY DUCT UP THROUGH ROOF
	RETURN/EXHAUST DUCT UP THROUGH ROOF
	FIRE DAMPER
	BACKDRAFT DAMPER
	ZONE DAMPER

**THERMOSTAT CONTROLS HONEYWELL LCBS CONNECT - NOTES**

- ALL CONSTANT VOLUME HVAC APPLICATIONS WITH ROOFTOP PACKAGE UNITS AND/OR SEPARATED OUTDOOR CONDENSING UNITS AND INDOOR AIR HANDLERS THAT ARE COMMONLY REFERRED TO AS "SPLIT SYSTEMS" ARE SPECIFIED TO BE CONTROLLED USING HONEYWELL LIGHT COMMERCIAL BUILDING SOLUTION (LCBS) CONNECT PLATFORM.
- EACH HVAC SYSTEM SHALL INCLUDE THE HONEYWELL YCRL6438SR100 COMBINED CONTROLLER AND WALL MODULE.
- EACH HVAC SYSTEM SHALL INCLUDE UP TO THE MAXIMUM OF 4 REMOTE ROOM TEMPERATURE SENSORS LOCATED IN SUITES THAT WILL PROVIDE OPTIMAL TEMPERATURE AVERAGING PER THE TOTAL NUMBER OF SUITES WITHIN THAT GIVEN SYSTEM. THE HONEYWELL WALL SENSORS INCLUDE TEMPERATURE, HUMIDITY, AND CO2. THE MINIMUM REQUIREMENT IS THE TR40 SYLK WALL MODULE.
- EACH WALL MODULE FOR THE CORRESPONDING HVAC SYSTEM WILL BE LOCATED WITHIN THE SECURITY CLOSET. EACH WALL MODULE WILL HAVE THE INTERNAL SENSOR DISABLED OR THE AUTHORITY PERCENTAGE TO A MAXIMUM OF 10%.
- EACH HVAC SYSTEM SHALL HAVE A DISCHARGE AND RETURN/MIXED AIR SENSOR INSTALLED TO MONITOR THE OVERALL SYSTEM PERFORMANCE IN THE COOLING AND HEATING MODES. THE HONEYWELL C7041B2005/U AND C7041R2000 ARE EXAMPLES TO SPECIFY. THE USE OF COMPARABLE 20K TEMPERATURE SENSORS IS ACCEPTABLE.
- EACH MY SALON SUITE BUILDING WILL REQUIRE INTERNET ACCESS AND ROUTER (SUPPLIED BY OTHERS) TO ALLOW CONNECTION BETWEEN THE ROUTER AND THE HONEYWELL GATEWAY.
- EACH MY SALON SUITE BUILDING WILL REQUIRE AN INTERNET GATEWAY TO ACCESS THE HONEYWELL LCBS CLOUD PORTAL. THE HONEYWELL GATEWAY PART NUMBER IS LGW1000
- EACH MY SALON SUITE BUILDING WILL HAVE A DEDICATED ONLINE ACCOUNT PAGE. THE ENROLLMENT PROCESS INTO THE HONEYWELL LCBS PORTAL WILL REQUIRE CREDENTIALS BE PROVIDED TO THE FRANCHISEE OR THEIR DESIGNATE. NOTE ENROLLMENT INTO THE HONEYWELL LCBS PORTAL CAN ONLY BE DONE BY AN AUTHORIZED HONEYWELL CONTRACTOR.

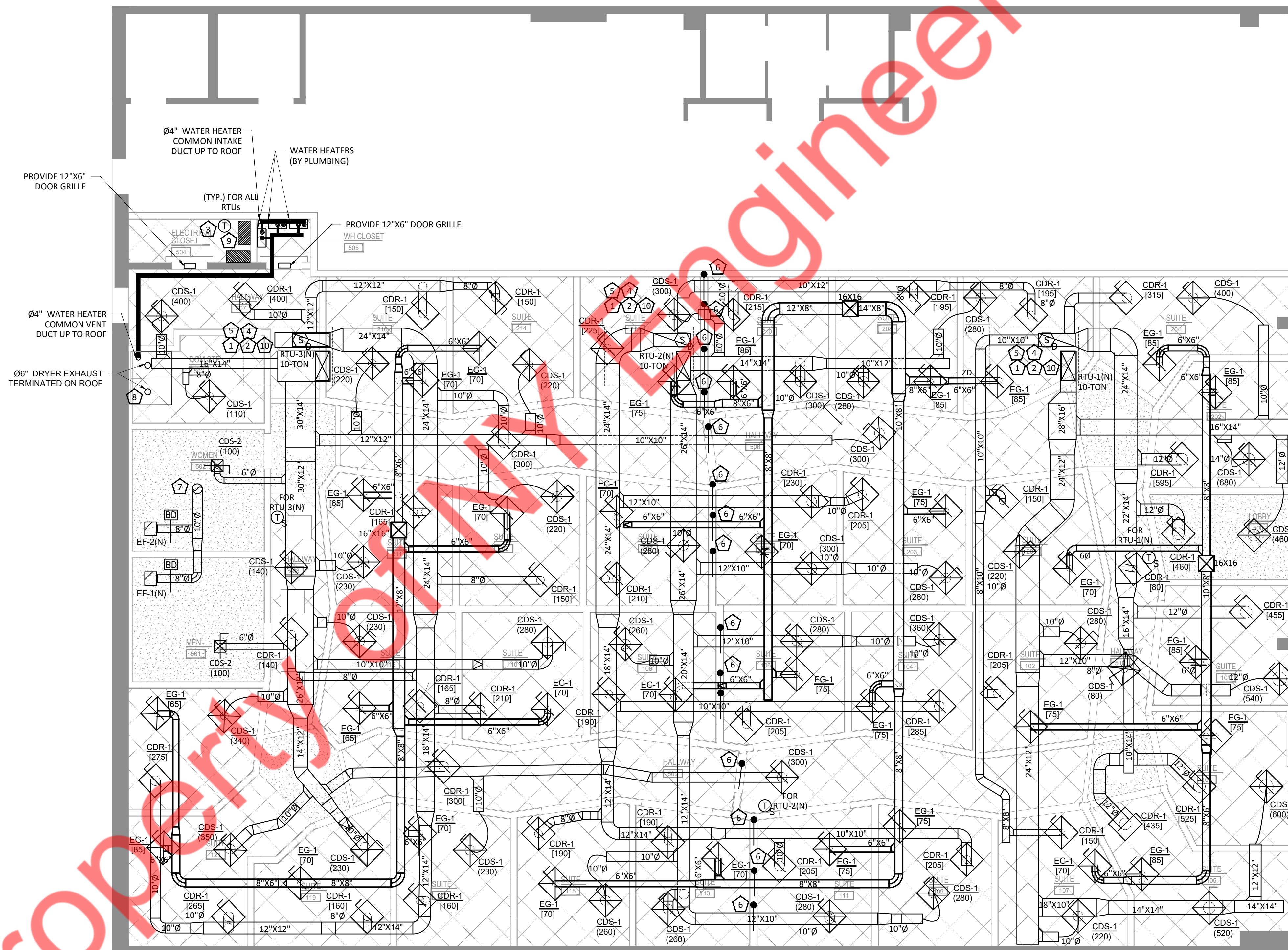
**KEY NOTES**

- 1 CONTRACTOR TO INSTALL NEW SMOKE DETECTORS. COMPATIBLE REMOTE ANNUNCIATOR/TEST SWITCH FURNISHED BY EC.MC TO INSTALL SMOKE DETECTOR IN RETURN DUCT, PRIOR TO ANY OUTDOOR AIR CONNECTIONS.MC TO PROVIDE INTERLOCK WIRING BETWEEN SMOKE DETECTOR AND UNIT TO SHUT DOWN UNIT UPON DETECTION OF SMOKE. EC SHALL PROVIDE WIRING FOR FINAL CONNECTION TO CENTRAL FIRE ALARM SYSTEM, IF APPLICABLE, AND WIRING TO REMOTE ANNUNCIATOR/TEST SWITCH.
- 2 ROOFTOP UNIT SUPPLY/RETURN DROPS DOWN THROUGH ROOF. REFER TO HVAC ROOF PLAN FOR CONTINUATION.
- 3 PROVIDE THERMOSTAT/HUMIDISTAT AND MOUNT ON WALL 4 FT. A.F.F.
- 4 INTERNALLY LINE FIRST 10 FT. OF SUPPLY AND RETURN AIR DUCTWORK WITH JOHN'S MANVILLE, OR EQUIVALENT, 1 INCH THICK SPIRACOUS TIC FIBERGLASS DUCT LINER. DUCT SIZES SHOWN ARE CLEAR INSIDE DIMENSIONS.
- 5 ROUTE DUCTWORK IN JOIST SPACE WHERE POSSIBLE.
- 6 PROVIDE FIRE DAMPERS AT THE FIRE RATED WALLS. COORDINATE WITH ARCHITECT FOR ALL FIRE-RATE WALLS/PARTITIONS.
- 7 INSTALL NEW CEILING MOUNTED EXHAUST FAN IN LOCATION AS SHOWN & TERMINATE WITH 10"Ø METAL EXHAUST DUCT WITH GOOSE NECK & BIRD SCREEN.
- 8 INSTALL NEW CEILING MOUNTED EXHAUST FAN IN LOCATION AS SHOWN & TERMINATE WITH 6"Ø METAL EXHAUST DUCT WITH GOOSE NECK & BIRD SCREEN.
- 9 PROVIDE HONEYWELL LCBS TYPE THERMOSTAT CONTROL PANEL. CONTRACTOR TO PROVIDE EXACT LOCATION AND COORDINATE ALL CLEARANCES PRIOR TO START OF CONSTRUCTION.
- 10 20"X20" DUCT BYPASS DAMPER.COORDINATION ACTIVATION SUCH THAT BYPASS DAMPERS OPENS WHEN ZONE DAMPERS CLOSE.CONNECT BYPASS DAMPER BETWEEN MAIN SUPPLY AND RETURN DUCT OF EACH RTU.

**GENERAL NOTES**

- A. THE DRAWINGS ARE DIAGRAMMATIC IN NATURE. EXACT LOCATIONS OF DEVICES AND ROUTING OF DUCTWORK SHALL BE DETERMINED BY CONTRACTOR AFTER COORDINATION WITH ALL OTHER TRADES AND FIELD DETERMINATION OF FINAL CONSTRUCTION DETAILS. MINOR ADJUSTMENTS TO DUCT ROUTING AND CONFIGURATION TO AVOID CONFLICT WITH BUILDING STRUCTURE OR OTHER TRADES SHALL BE INCLUDED IN CONTRACTOR'S PRICE. CONTRACTOR SHALL OBTAIN ENGINEERS APPROVAL IN WRITING FOR ANY MODIFICATIONS TO SYSTEM DESIGN PRIOR TO INSTALLATION.
- B. ALL EXPOSED MATERIALS AND EQUIPMENT SHALL BE INSTALLED AND SUPPORTED IN A FIRST-CLASS AND WORKMANLIKE FASHION. DUCTWORK SHALL RUN PARALLEL AND/OR PERPENDICULAR TO MAIN BUILDING STRUCTURE. ANY WORK THAT IS NOT DONE IN A FIRST-CLASS OR WORKMANLIKE FASHION, IN THE ARCHITECTS OPINION, SHALL BE REDONE AT THE CONTRACTORS EXPENSE.
- C. ALL DUCT JOINTS, SEAMS AND CONNECTIONS SHALL BE SECURELY FASTENED AND SEALED. DUCTS SHALL BE SUPPORTED WITH APPROVED HANGERS AT INTERVALS NOT EXCEEDING TEN FEET. DUCT COVERINGS AND LININGS SHALL HAVE A FLAME-SPREAD INDEX NOT MORE THAN 25 AND A SMOKE DEVELOPED INDEX NOT MORE THAN 50.
- D. PROVIDE VOLUME DAMPERS AT ALL ROUND BRANCH DUCT TAKE-OFFS THAT ARE ACCESSIBLE. PROVIDE TURNING VANES AT ALL 90 DEGREE SQUARE ELBOWS IN SUPPLY AIR DUCTS. PROVIDE 45 DEGREE HEEL AT ALL RECTANGULAR SUPPLY AND RETURN BRANCH DUCT TAKE-OFFS.
- E. OUTDOOR AIR INTAKES SHALL BE 10'-0" MINIMUM AWAY FROM ANY EXHAUST AND PLUMBING VENT OUTLET.
- F. WIRE UP ALL LOW VOLTAGE (24V) THERMOSTATS.
- G. CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL PIPES, DUCTWORK, UNITS, ETC. WITH ALL OTHER TRADES AND SHIFT LOCATION OR OFFSET WHERE NECESSARY. PROVIDE TRANSITIONS IN DUCTWORK TO AVOID CONFLICT WITH EXISTING DUCTWORK AND OTHER STRUCTURES.
- H. CONTRACTOR SHALL COORDINATE ALL AIR DEVICES WITH ELECTRICAL AND ARCHITECTURAL REFLECTED CEILING PLANS.
- I. COORDINATE LOCATION OF ALL EXTERIOR LOUVER OR OUTLET WITH ARCHITECTURAL ELEVATION PLAN.
- J. COORDINATE ROOF WORK WITH BUILDING OWNER'S ROOFING CONTRACTOR TO ASSURE THAT THE ROOF WARRANTY IS NOT VOIDED.
- K. INSTALL DUCTWORK AS HIGH AS POSSIBLE.
- L. EXHAUST AIR DUCTS SHALL BE EQUIPPED WITH BACKDRAFT DAMPERS.
- M. ALL DUCT OPENINGS AND OTHER AIR DISTRIBUTION OPENINGS SHALL BE COVERED DURING CONSTRUCTION EXCEPT FOR TESTING AND INSPECTION.
- N. PROVIDE BUILDING OWNER OR REPRESENTATIVE WITH DETAILED OPERATING AND MAINTENANCE INSTRUCTIONS AND WARRANTIES /WRITTEN GUARANTEE FOR EACH SYSTEM. O&M INSTRUCTIONS SHALL REGULATIONS.
- O. ALL DUCT ELBOWS SHALL BE LONG RADIUS OR MITERED.
- P. PROVIDE HONEYWELL LCBS CONNECT TYPE THERMOSTAT CONTROLS. MODEL NUMBER : YCRL6438SR100
- Q. USE OF COMBUSTIBLE MATERIALS IS NOT ALLOWED IN THE RETURN AIR PLENUM. MATERIALS USED IN THE PLENUM SHALL HAVE FLAME SPREAD RATING NOT TO EXCEED 25, AND SMOKE DEVELOPED RATING NOT TO EXCEED 50 WHEN TESTED IN ACCORDANCE WITH ASTM E 84. ALL EXPOSED WIRING IN THE PLENUM SHALL BE PLENUM RATED.
- R. INDOOR DUCT AND PLENUM INSULATION SCHEDULE;
  1. CONCEALED, RECTANGULAR, ROUND AND FLAT-OVAL, SUPPLY-RETURN, OUTDOOR AND EXHAUST AIR DUCT AND AIR PLENUM INSULATION.
  2. FLEXIBLE ELASTOMERIC, MINERAL-FIBER BLANKET, MINERAL-FIBER BOARD OR POLYOLEFIN WITH MINIMUM INSTALLED THERMAL RESISTANCE AS FOLLOWS:
 

UNCONDITIONED SPACES:	R-6
WITHIN BUILDING ENVELOPE ASSEMBLY:	R-8
EXTERIOR OF BUILDING:	R-8
- S. ALL DUCTS SHALL BE CONSTRUCTED WITH CLASS 0 OR CLASS 1 DUCT MATERIAL AND SHALL COMPLY WITH UL 181. FIBROUS DUCT CONSTRUCTION SHALL CONFIRM TO THE SMACNA FIBROUS GLASS DUCT CONSTRUCTION STANDARDS OR NAHMA FIBROUS GLASS DUCT CONSTRUCTION STANDARDS AND IMC-2018, SECTION 603. THE MORE STRINGENT REQUIREMENT OF ANY CODES SHALL APPLY.
- T. ALL RECTANGULAR SUPPLY AND RETURN DUCTWORK SHALL BE LISTED AND LABELED IN ACCORDANCE WITH UL 181 AND INSTALLED IN ACCORDANCE WITH THE TERMS OF THEIR LISTING, THE MANUFACTURER'S INSTRUCTION AND SMACNA HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE. FACTORY-MADE AIR DUCTS SHALL BE INSTALLED WITH NOT LESS THAN 4 INCHES OF SEPARATION FROM EARTH, EXCEPT WHERE INSTALLED AS A LINER INSIDE OF CONCRETE, TILE OR METAL PIPE AND SHALL BE PROTECTED FROM PHYSICAL DAMAGE.
- U. GYPSUM BOARD DUCTS SHALL BE LIMITED TO RETURN AIR SYSTEMS ONLY.
- V. FACTORY-MADE FLEXIBLE AIR DUCTS AND CONNECTORS SHALL BE NOT MORE THAN 5 FEET IN LENGTH AND SHALL NOT BE USED IN LIEU OF RIGID ELBOW OR FITTINGS. FLEXIBLE AIR DUCTS SHALL BE PERMITTED TO BE USED AS AN ELBOW AT A TERMINAL DEVICE.
- W. PROVIDE FIRE OR FIRE+SMOKE DAMPER WHEREVER DUCTS ARE CROSSING FIRE/SMOKE RATED WALLS/BARRIERS/PARTITIONS. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR FIRE RATINGS OF THE WALLS.



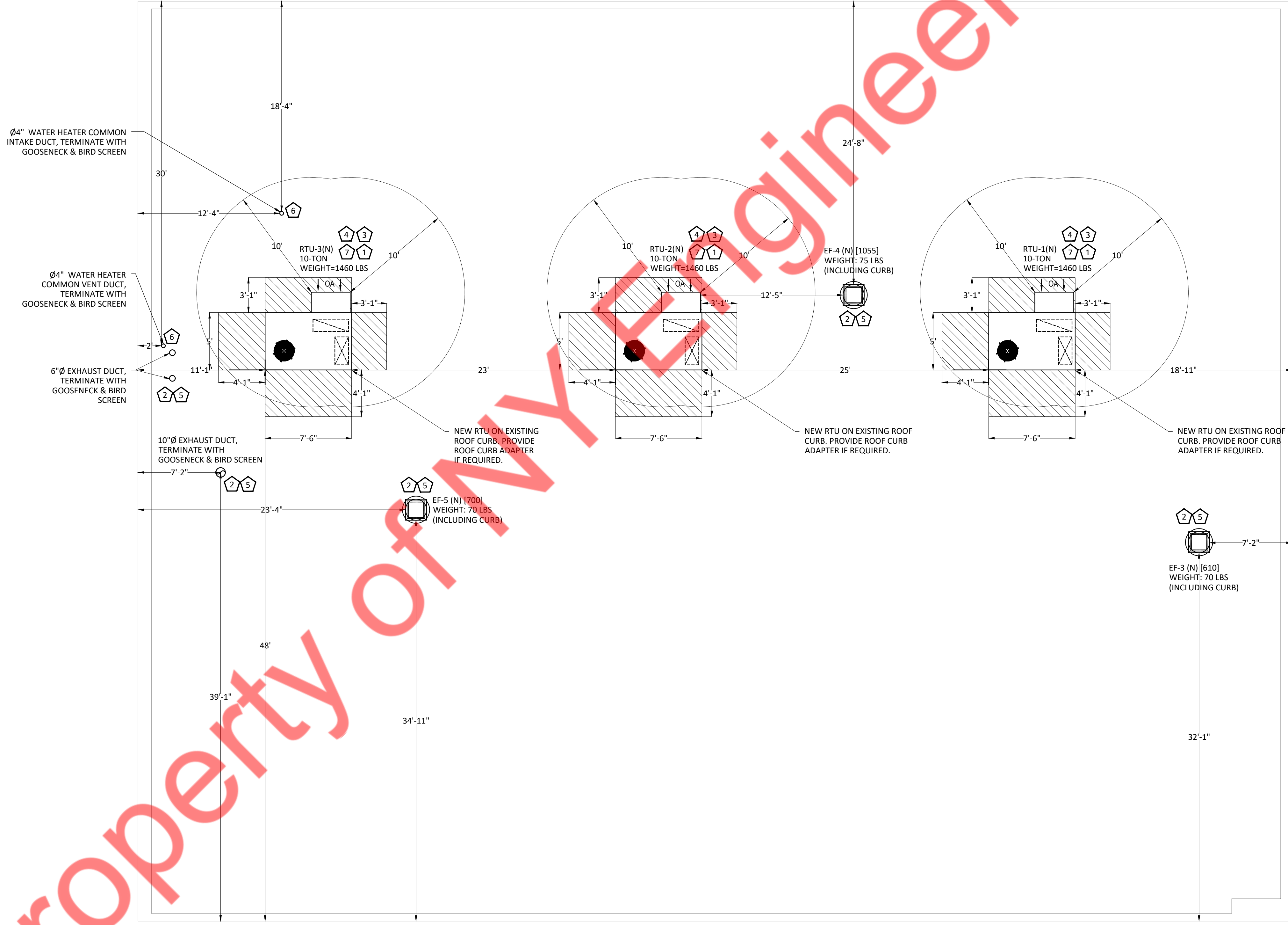
1 MECHANICAL FLOOR PLAN  
SCALE: 3/16" = 1'-0"

**KEY NOTES**

- 1 ROOF TOP UNITS TO BE PROVIDED BY LANDLORD.
- 2 EXHAUST DUCTS TO BE TERMINATED ON THE ROOF WITH GOOSE NECK & BIRD SCREEN.
- 3 CONTRACTOR TO CONNECT CONDENSATE DRAIN FROM ALL RTUS TO NEAREST ROOF DRAIN OR DOWN SPOUTS.
- 4 COORDINATE FINAL LOCATION OF EQUIPMENT WITH STRUCTURAL DRAWINGS/ENGINEER.
- 5 EXHAUST TERMINATION TO BE 10' AWAY FROM ANY OUTDOOR INTAKE OPENING.
- 6 AIR INTAKE & VENTS FROM THE HOT WATER HEATERS BELOW. TERMINATE AT LEAST 36" ABOVE ROOF WITH ALL REQUIRED ACCESSORIES RECOMMENDED BY MANUFACTURER.
- 7 CONTRACTOR TO FIELD VERIFY EXACT LOCATIONS OF EXISTING RTUS. NEW RTUS TO BE INSTALLED ON EXISTING RTU ROOF CURBS. PROVIDE CURB ADAPTERS AS AND IF REQUIRED.

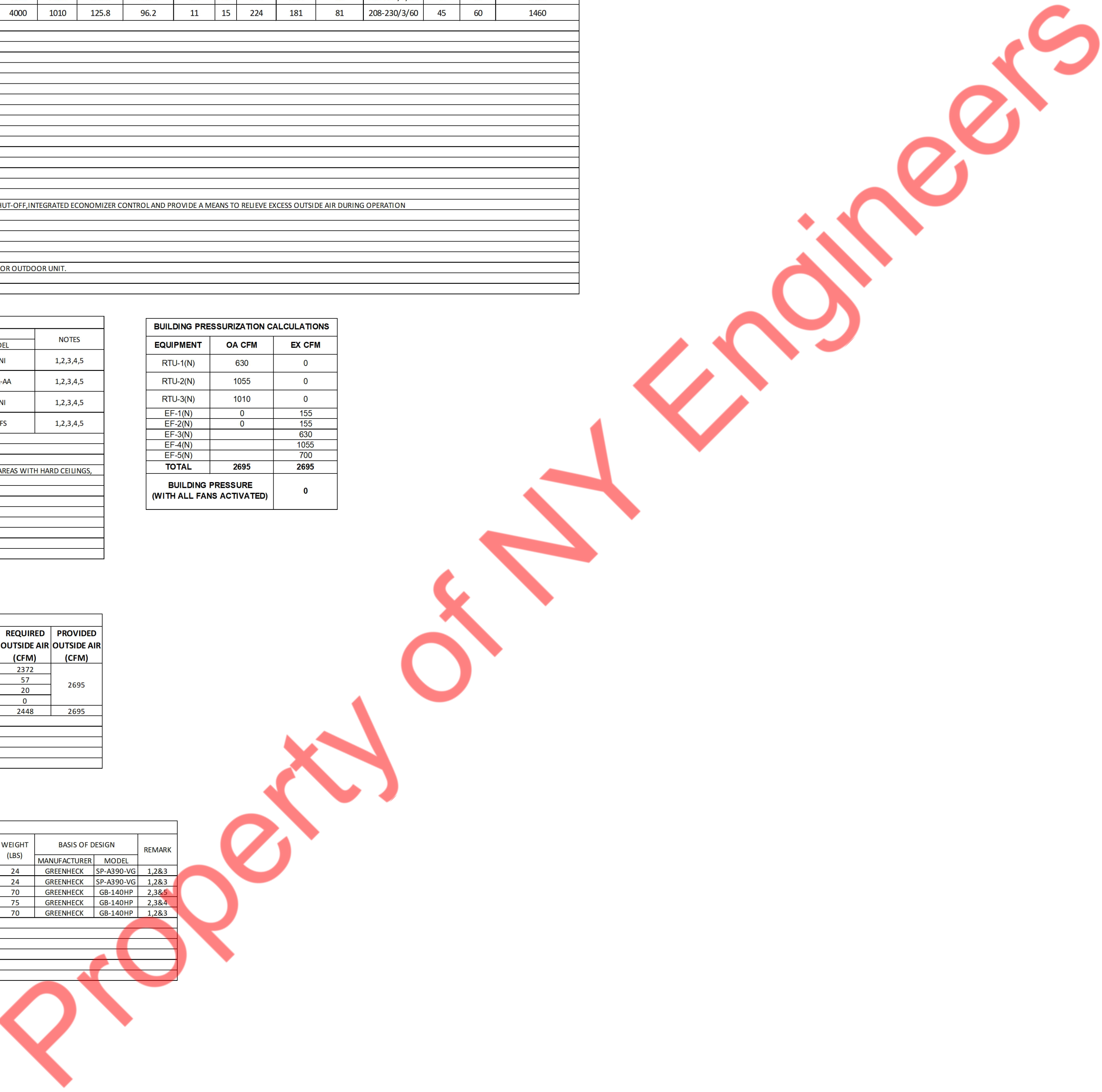
**GENERAL NOTES**

- 1. ALL ROOFTOP UNITS ARE NEW. PROVIDE FLEXIBLE CONNECTORS ON SUPPLY AND RETURN DUCT CONNECTIONS. SET OUTSIDE AIR AS INDICATED ON ROOFTOP UNIT SCHEDULES. MECHANICAL CONTRACTOR SHALL SCRIBE INTO UNIT POSITION OF OUTSIDE AIR DAMPER AND LABEL OUTSIDE AIR VOLUME AND PERCENT OF OUTSIDE AIR. TRANSITION AND CONNECT SUPPLY AND RETURN DUCTWORK FROM BELOW. COORDINATE ROUTING THROUGH STRUCTURAL TRUSSES AND OFFSET AS REQUIRED IN CURB SPACE.
- 2. COORDINATE FINAL LOCATION OF EQUIPMENT WITH STRUCTURAL ENGINEER.
- 3. CONTRACTOR TO FIELD VERIFY EXACT LOCATIONS OF EXISTING PENETRATIONS FOR DUCT & ADJUST THE LOCATION OF ROOF CURB AND RTUS ACCORDINGLY.
- 4. DUCTWORK SHALL BE DETERMINED BY CONTRACTOR AFTER COORDINATION WITH ALL OTHER TRADES AND FIELD DETERMINATION OF FINAL CONSTRUCTION DETAILS. MINOR ADJUSTMENTS TO DUCT ROUTING AND CONFIGURATION TO AVOID CONFLICT WITH BUILDING STRUCTURE OR OTHER TRADES SHALL BE INCLUDED IN CONTRACTOR'S PRICE. CONTRACTOR SHALL OBTAIN ENGINEERS APPROVAL IN WRITING FOR ANY MODIFICATIONS TO SYSTEM DESIGN PRIOR TO INSTALLATION.
- 5. OUTDOOR AIR INTAKES SHALL BE 10'-0" MINIMUM AWAY FROM ANY EXHAUST AND PLUMBING VENT OUTLET.
- 6. CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL ROOFTOP EQUIPMENT WITH ALL OTHER TRADES.
- 7. ALL ROOF CURB OPENINGS, PRIOR TO EQUIPMENT INSTALLATION, SHALL BE COVERED DURING CONSTRUCTION.
- 8. PROVIDE BUILDING OWNER OR REPRESENTATIVE WITH DETAILED OPERATING AND MAINTENANCE INSTRUCTIONS AND WARRANTIES /WRITTEN GUARANTEE FOR EACH SYSTEM. O&M INSTRUCTIONS SHALL.
- 9. GUARDS SHALL BE PROVIDED WHERE APPLIANCES, EQUIPMENT, FANS OR OTHER COMPONENTS THAT REQUIRE SERVICE AND ROOF HATCH OPENINGS ARE LOCATED WITHIN 10 FEET OF A ROOF EDGE OR OPEN SIDE OF A WALKING SURFACE AND SUCH EDGE OR OPEN SIDE IS LOCATED MORE THAN 30 INCHES ABOVE THE FLOOR, ROOF OR GRADE BELOW. THE GUARD SHALL EXTEND NOT LESS THAN 30 INCHES BEYOND EACH END OF SUCH APPLIANCE, EQUIPMENT, FANS, COMPONENTS AND ROOF HATCH OPENINGS AND THE TOP OF THE GUARD SHALL BE LOCATED NOT LESS THAN 42 INCHES ABOVE THE ELEVATED SURFACE ADJACENT TO THE GUARD. THE GUARD SHALL BE CONSTRUCTED SO AS TO PREVENT THE PASSAGE OF A 21-INCH-DIAMETER SPHERE AND SHALL COMPLY WITH THE LOADING REQUIREMENTS FOR GUARDS SPECIFIED IN THE INTERNATIONAL BUILDING CODE.



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





Property of NY Engineers

ROOF TOP UNIT SCHEDULE																		
PLAN MARK	UNIT	UNIT MODEL	STATUS	NOMINAL CAPACITY	ESP (IN WG)	SUPPLY AIRFLOW (CFM)	OUTSIDE AIRFLOW (CFM)	COOLING				HEATING			ELECTRICAL REQUIREMENTS			UNITS WEIGHT (LBS)
								TOTAL COOLING MBH	SENSIBLE COOLING MBH	EER	IEER	INPUT MBH	OUTPUT MBH	THERMAL EFFICIENCY %	V/PH/Hz	MCA (A)	MCB (A)	
RTU-1 ( N )	GAS HEAT	CARRIER-48FCCEM12A2A5-0A0A (OR EQUIVALENT)	NEW	10 TONS	1	4000	630	125.8	96.2	11	15	224	181	81	208-230/3/60	45	60	1460
RTU-2 ( N )	GAS HEAT	CARRIER-48FCCEM12A2A5-0A0A (OR EQUIVALENT)	NEW	10 TONS	1	4000	1055	125.8	96.2	11	15	224	181	81	208-230/3/60	45	60	1460
RTU-3 ( N )	GAS HEAT	CARRIER-48FCCEM12A2A5-0A0A (OR EQUIVALENT)	NEW	10 TONS	1	4000	1010	125.8	96.2	11	15	224	181	81	208-230/3/60	45	60	1460

**NOTES -**

A. PROVIDE FULL PERIMETER 14" HIGH ROOF CURB.

B. PROVIDE DUCT MOUNTED SMOKE DETECTOR IN RETURN SIDE.

C. PROVIDE 2" MERV-8 FILTERS.

D. PROVIDE HINGED PANELS FOR FILTER ACCESS, FAN MOTOR ACCESS, COMPRESSOR ACCESS AND CONTROL COMPARTMENT ACCESS.

E. CONTRACTOR TO PROVIDE 7-DAY PROGRAMMABLE THERMOSTAT FOR RTU WITH HUMIDITY CONTROL. PROVIDE HUMIDIFIER.

F. HAIL GUARD.

G. PROVIDE NON FUSED DISCONNECT SWITCH.

H. PROVIDE WITH TUBE & FIN COIL SYSTEM.

I. PROVIDE WITH DRAIN PAN OVERFLOW SWITCH.

J. PROVIDE WITH STANDARD CAP AND PHASE MONITOR SYSTEM.

K. PROVIDE MULTISTAGE AIR VOLUME.

L. PROVIDE WITH GFCI FLD WIRED.

N. UNIT TO BE PROVIDED WITH LOW AMBIENT OPERATION CAPABILITIES

O. PROVIDE LOW-LEAK ECONOMIZER WITH FDD (FAULT DETECTION & DIAGNOSTICS)

P. PROVIDED HOT GAS BYPASS SYSTEM, THEN CAPACITY OF HOT GAS BYPASS SHALL BE LIMITED TO 50% OF TOTAL UNIT CAPACITY.

Q. PROVIDE RELIEF DAMPER WITH RELIEF HOOD.

R. AIR ECONOMIZERS TO MEET THE REQUIREMENTS FOR DESIGN CAPACITY, CONTROL SIGNALS, VENTILATION CONTROLS, HIGH-LIMIT SHUT-OFF, INTEGRATED ECONOMIZER CONTROL AND PROVIDE A MEANS TO RELIEVE EXCESS OUTSIDE AIR DURING OPERATION

S. RTU SHOULD BE PROVIDED WITH 100% MODULATING ENTHALPY ECONOMIZER WITH WEATHER HOOD.

RTU NOTES:

1. INSTALL AS PER MANUFACTURERS SPECIFICATIONS AND MAINTAIN ALL SERVICES CLEARANCES.

2. PROVIDE CONDENSATE DRAIN "P" TRAP MINIMUM 3" DEEP OR TWICE THE TOTAL STATIC PRESSURE WHICHEVER IS GREATER.

3. COMPRESSOR SHALL HAVE A MINIMUM 5 YEAR WARRANTY ALL OTHER EQUIPMENTS SHALL HAVE MINIMUM 1 YEAR WARRANTY.

4. RTU IS BASED ON AHRI STANDARD CONDITIONS OF 80°F DB, 67°F INDOOR ENTERING AIR TEMPERATURE AND 95°F DB ENTERING AIR FOR OUTDOOR UNIT.

5. MUST MEET THE EER'S MINIMUM EFFICIENCY CODE REQUIREMENTS.

6. PROVIDE CARRIER - HOT GAS REHEAT WITH ASSOCIATED CONTROLS AND SENSORS FOR DEHUMIDIFICATION CONTROL.

AIR TERMINAL DEVICES SCHEDULE						
TAG	SIZE	DESCRIPTION	BASIS OF DESIGN			NOTES
			MANUFACTURER	MATERIAL	MODEL	
CDS-1	24X24	SQUARE 4-WAY PLAQUE DIFFUSER	TITUS	ALUMINIUM	OMNI	1,2,3,4,5
CDS-2	12X12	LAY-IN CEILING DIFFUSER	TITUS	ALUMINIUM	TMSA-AA	1,2,3,4,5
CDS-3	12X12	SQUARE 4-WAY PLAQUE DIFFUSER	TITUS	ALUMINIUM	OMNI	1,2,3,4,5
CDR-1	24X24	DRYWALL CEILING MOUNT DIFFUSER	TITUS	ALUMINIUM	350FS	1,2,3,4,5

**NOTES:**

1. PROVIDE STANDARD WHITE FINISH FOR ALL AIR DEVICES UNLESS NOTED OTHERWISE ON PLAN.

2. COORDINATE FINAL COLOR/FINISH WITH ARCHITECT/OWNER.

3. PROVIDE FRAME FOR MOUNTING AIR DEVICE IN LAY-IN GRID CEILING UNLESS REFLECTED CEILING PLAN INDICATES HARD CEILING. IN AREAS WITH HARD CEILINGS.

4. UNLESS OTHERWISE NOTED, BRANCH DUCTS SERVING AIR DEVICES SHALL BE SAME SIZE AS NECK OF AIR DEVICE.

5. AIR DEVICE SHALL BE OF GALVANIZED FINISH WHEN INSTALLED ON EXPOSED DUCTWORK.

6. PROVIDE MODEL ASD-AIR SCOOP DEVICE.

FOR ROUND NECK DIFFUSERS:

6" DIA: 0-100 CFM

8" DIA: 101-200CFM

10" DIA: 201-400 CFM

12" DIA: 401-600 CFM

BUILDING PRESSURIZATION CALCULATIONS		
EQUIPMENT	OA CFM	EX CFM
RTU-1(N)	630	0
RTU-2(N)	1055	0
RTU-3(N)	1010	0
EF-1(N)	0	155
EF-2(N)	0	155
EF-3(N)		630
EF-4(N)		1055
EF-5(N)		700
<b>TOTAL</b>	<b>2695</b>	<b>2695</b>
<b>BUILDING PRESSURE (WITH ALL FANS ACTIVATED)</b>		<b>0</b>

OUTSIDE AIR CALCULATIONS								
CLASSIFICATION	OCCUPANCY AS PER IMC 2018 /1000 SQ.FT.	SPACE AREA (SQ.FT)	FINAL OCCUPANCY				REQUIRED OUTSIDE AIR (CFM)	PROVIDED OUTSIDE AIR (CFM)
			Az	Pz	Ra	Rp		
SALON SUITE	25	3765	96	0.12	20	2372	2695	
HALLWAY	-	944	2	0.06	-	57		
LOBBY	10	84	3	0.06	5	20		
LAUNDRY/CLOSET	0	54	0	0	0	0	2695	
TOTAL	-	4847	101	-	-	2448		

**NOTES**

1. REQUIRED OUTDOOR VENTILATION AIR VALUES TAKEN FROM 2018 IMC.

VENTILATION BREATHING ZONE FORMULA  $Vbz = Rp * Pz + Ra * Az$

$Pz = OCCUPANCY * AREA$

EXHAUST FAN SCHEDULE													
TAG	TYPE	QUANTITY	FLOW RATE CFM	STATIC PRESSURE EXTERNAL IN W.G.	ELECTRIC DATA				DBA	WEIGHT (LBS)	BASIS OF DESIGN		REMARK
					SPEED RPM	AMPS	V/PH/Hz	SONES			MANUFACTURER	MODEL	
EF-1 ( N )	CEILING	1	155	0.5	1217	1.5	115/60/1	4	46	24	GREENHECK	SP-A390-VG	1,2,3
EF-2 ( N )	CEILING	1	155	0.5	1217	1.5	115/60/1	4	46	24	GREENHECK	SP-A390-VG	1,2,3
EF-3 ( N )	ROOF MOUNTED	1	630	1	1390	5.8	115/60/1	11	60	70	GREENHECK	GB-140HP	2,3,4
EF-4 ( N )	ROOF MOUNTED	1	1055	1	1716	9.8	115/60/1	14.6	65	75	GREENHECK	GB-140HP	2,3,4
EF-5 ( N )	ROOF MOUNTED	1	700	1	1452	7.2	115/60/1	12.1	61	70	GREENHECK	GB-140HP	1,2,3

**NOTES:**

1. INTERCONNECT WITH RTU-3(N) IN ROOM.

2. PROVIDE ACCESS DOOR TO SERVICE UNIT IF IN HARD CEILING.

3. INSTALL AS PER MANUFACTURERS RECOMMENDATION.

4. INTERCONNECT WITH RTU-2(N) IN ROOM.

5. INTERCONNECT WITH RTU-1(N) IN ROOM.

DIVISION 23 MECHANICAL SPECIFICATIONS

23 05 01 COMMON REQUIREMENTS FOR HVAC

ALL MECHANICAL WORK AND TESTS SHALL BE DONE IN STRICT ACCORDANCE WITH THE LATEST STATE, COUNTY, AND LOCAL REGULATIONS, LAWS, AND ORDINANCES WHICH MAY BE APPLICABLE.

BEFORE SUBMITTING A BID, EXAMINE DOCUMENTS OF ALL OTHER TRADES, VISIT THE SITE AND GET ACQUAINTED WITH ALL CONDITIONS THAT MAY IN ANY WAY AFFECT THE EXECUTION OF THIS CONTRACT. TAKE MEASUREMENTS AND BE RESPONSIBLE FOR EXACT SIZE AND LOCATIONS OF ALL OPENINGS REQUIRED. VERIFY INSTALLATION MAY BE MADE IN COMPLETE ACCORDANCE WITH ALL PERTINENT CODES AND REGULATIONS. IN THE EVENT OF DISCREPANCY, IMMEDIATELY NOTIFY THE PROFESSIONAL ENGINEER OF RECORD. DO NOT PROCEED WITH THE INSTALLATION IN AREAS OF DISCREPANCY UNTIL ALL SUCH DISCREPANCIES HAVE BEEN FULLY RESOLVED.

IT IS NOT THE INTENT OF THE DRAWINGS THAT EXISTING CONDITIONS BE ACCURATELY SHOWN. EXISTING MECHANICAL WORK IS SHOWN TO LIMITED EXTENT ON DRAWINGS AND IS SHOWN FOR GENERAL REFERENCE ONLY. LOCATIONS AND INFORMATION WERE DERIVED FROM CURSORY SITE VISUAL OBSERVATIONS OR FROM DOCUMENTS THAT WERE PREPARED FOR PREVIOUSLY INSTALLED WORK WHEN AVAILABLE.

THE WORK COVERED BY THESE SPECIFICATIONS SHALL CONSIST OF PROVIDING ALL NEW MATERIAL, LABOR, EQUIPMENT, AND SERVICES NECESSARY FOR A COMPLETE MECHANICAL INSTALLATION AS SPECIFIED HEREIN. WORK IN THIS SECTION INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING ITEMS:

- PACKAGED ROOF TOP UNITS
- TOILET EXHAUST FANS
- LOW VOLTAGE THERMOSTATS
- DUCT
- DAMPERS
- DIFFUSERS, REGISTERS, AND LOUVERS

WHENEVER THE WORDS "CONTRACTOR" APPEAR ON MECHANICAL DRAWINGS OR IN THESE SPECIFICATIONS, IT SHALL REFER TO THE MECHANICAL SUB-CONTRACTOR. WHENEVER THE WORD "PROVIDE" APPEARS IN THESE DOCUMENTS, IT SHALL BE INTERPRETED TO MEAN "FURNISH AND INSTALL".

COORDINATE ALL WORK WITH THE OWNER TO MINIMIZE INTERRUPTION OF BUILDING OPERATION.

COORDINATE THE INSTALLATION OF MECHANICAL ITEMS WITH THE SCHEDULES FOR WORK OF ALL OTHER TRADES TO PREVENT UNNECESSARY DELAYS IN THE TOTAL WORK.

THIS CONTRACTOR SHALL VERIFY AND SATISFY HIMSELF THAT ALL EQUIPMENT FURNISHED WILL PROPERLY FIT IN THE SPACE PROVIDED, THAT IT WILL FUNCTION PROPERLY, AND THAT ALL PARTS OF EQUIPMENT REQUIRING SERVICE ARE READILY ACCESSIBLE.

ALL PIPING SHALL BE RUN PARALLEL OR PERPENDICULAR TO BUILDING WALLS AND FRAMING SYSTEM. ALL VERTICAL RUNS SHALL BE HELD AGAINST WALLS, COLUMNS, ETC., AS POSSIBLE TO PERMIT MAKING OF PIPE JOINTS.

CONTRACTOR SHALL PROVIDE A GUARANTEE IN WRITTEN FORM STATING THAT ALL WORK SHALL BE FREE OF DEFECTS OR ERRORS, AND ALL EQUIPMENT, MATERIALS, OR PARTS FOR A PERIOD OF ONE YEAR FROM THE DATE OF OWNER'S FINAL ACCEPTANCE AND SHALL REPAIR, REVISE OR REPLACE AT NO COST TO THE OWNER ANY SUCH DEFECTS OCCURRING WITHIN THE GUARANTEE PERIOD.

CONTRACTOR SHALL ALSO STATE IN WRITTEN FORM THAT ANY ITEMS OR OCCURRENCES ARISING DURING THE GUARANTEE PERIOD WILL BE ATTENDED TO IN A TIMELY MANNER AND WILL IN NO CASE EXCEED THREE (3) WORKING DAYS FROM DATE OF NOTIFICATION BY OWNER.

PROVIDE A COMPLETE INSTALLATION IN CONFORMANCE WITH THE FOLLOWING STANDARDS.

- AGA: AMERICAN GAS ASSOCIATION
- ASHRAE: AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS
- NFPA: NATIONAL FIRE PROTECTION ASSOCIATION
- SMACNA: SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION.
- STATEWIDE BUILDING CODE
- INTERNATIONAL MECHANICAL CODE

CONTRACTOR SHALL DO ALL CUTTING AND PATCHING REQUIRED FOR INSTALLATION OF THIS WORK. ALL OPENINGS IN WALLS, FLOORS OR CEILINGS SHALL BE PROPERLY SEALED AND RESTORED IN KIND. FLASH AND COUNTERFLASH AT ROOF OPENINGS.

ALL EQUIPMENT SHALL BE LISTED AND LABELED, UNLESS OTHERWISE APPROVED.

ALL WIRING SHALL MEET THE REQUIREMENTS LISTED IN THE ELECTRICAL SPECIFICATIONS. ALL CONTROL AND INTERLOCK WIRING AND CONDUIT (120V OR 24V) SHALL BE BY THE MECHANICAL CONTRACTOR.

EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE CONDITIONS OF LISTING AND THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND THIS CODE.

CLEANING: THIS CONTRACTOR SHALL REMOVE FROM THE PREMISES ALL ACCUMULATION OF DIRT, DEBRIS, WASTE MATERIALS AND RUBBISH CAUSED BY HIS EMPLOYEES OR WORK, AT LEAST ONCE A WEEK, EXCEPT THAT COMBUSTIBLE MATERIALS SHALL BE REMOVED DAILY.

DURING PROGRESS OF THE WORK, MAINTAIN ON DRAWINGS AT THE SITE, AN ACCURATE RECORD OF THE INSTALLATION OF THE MECHANICAL SYSTEM, INDICATING ALL ITEMS WHICH HAVE BEEN CHANGED OR ADDED.

APPLY FOR AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED BY LOCAL AUTHORITY, FOR THE APPROVAL OF WORK.

A CERTIFICATE OF FINAL INSPECTION AND APPROVAL SHALL BE SUBMITTED WITH THE CONTRACTOR'S REQUEST FOR FINAL PAYMENT. NO FINAL PAYMENT WILL BE APPROVED WITHOUT THIS CERTIFICATE.

GUARANTEE ALL WORKMANSHIP, MATERIAL, AND EQUIPMENT AND REPLACE ANY FOUND DEFECTIVE WORK WITHOUT COST TO THE OWNER, FOR A PERIOD OF ONE YEAR AFTER FINAL ACCEPTANCE.

EXISTING CONDITIONS

DO NOT REUSE REMOVED MECHANICAL MATERIALS UNLESS SPECIFICALLY INDICATED ON DRAWINGS. EXISTING SYSTEMS MAY BE UTILIZED ONLY TO THE EXTENT INDICATED ON DRAWINGS.

IF REQUIRED TO ACCOMMODATE CONSTRUCTION RELATED ACTIVITIES TEMPORARILY REMOVE, STORE IN PROTECTED LOCATION ON SITE, AND REINSTALL CONFLICTING MECHANICAL EQUIPMENT, OR DEVICES THAT ARE TO REMAIN OR TO BE RELOCATED.

WHERE THE TERM "DEMOLITION" IS USED HEREIN, INTERPRET IT TO MEAN "DEMOLITION" OR "SELECTIVE DEMOLITION" WHERE APPLICABLE.

PROVIDE MECHANICAL DEMOLITION WORK AS REQUIRED TO ACCOMMODATE PROJECT DEMOLITION AND AS REQUIRED TO ACCOMMODATE NEW CONSTRUCTION. DISCONNECT AND REMOVE WORK TO BE ABANDONED, AND AS REQUIRED TO ACCOMMODATE WORK OF OTHER TRADES, IN AREAS AFFECTED BY THIS PROJECT.

LEGALLY DISPOSE OF MATERIALS TO SALVAGED OR RETAINED.

23 05 03 SUBMITTALS FOR MECHANICAL SYSTEMS

DESIGN BASIS MANUFACTURERS OF MATERIAL AND EQUIPMENT ARE SPECIFIED AND PLANS ARE DETAILED ACCORDING TO THIS MATERIAL. CONTRACTOR SHALL BASE HIS BID ON FURNISHING AND INSTALLING THIS MAKE OF MATERIAL AND EQUIPMENT.

AN ACCEPTABLE MANUFACTURER'S NAME AND MODEL NUMBER OF A PRODUCT MAY BE PROVIDED IN THESE DOCUMENTS. THIS IS THE EQUIPMENT INCLUDED DURING THE DESIGN PROCESS AND FORMS THE BASIS OF A STANDARD OF QUALITY. WHERE MORE THAN ONE MAKE OF MATERIAL OR EQUIPMENT IS SPECIFIED, THE CONTRACTOR SHALL STATE IN HIS BID WHICH MAKE HE PROPOSES TO FURNISH AND INSTALL. SHOP DRAWING APPROVAL SHALL BE OBTAINED PRIOR TO SHIPMENT OF EQUIPMENT.

VERIFY THE MODEL NUMBER OR PRODUCT IS STILL ACCURATE AND MEETS ALL REQUIREMENTS SHOWN ON THE DRAWINGS. IF THERE IS A DISCREPANCY BETWEEN THE REQUIREMENTS AND THE PRODUCT OR MODEL NUMBER, THE STRICTER OF THE TWO SHALL GOVERN.

SUBMIT SHOP DRAWINGS AND/OR PRODUCT DATA (ELECTRONIC COPIES) ON THE FOLLOWING ITEMS FOR REVIEW BEFORE FABRICATION OR SHIPMENT:

- PACKAGED ROOF TOP UNITS
- TOILET EXHAUST FANS
- LOW VOLTAGE THERMOSTATS
- DUCT
- DAMPERS
- DIFFUSERS, REGISTERS, AND LOUVERS

MAINTENANCE MANUALS: THE MANUALS SHALL INCLUDE WIRING DIAGRAMS, MAINTENANCE AND OPERATING INSTRUCTIONS, PARTS LISTINGS, AND COPIES OF OTHER SUBMITTALS INDICATED FOR INCLUSION.

REVIEW AND CORRECTIONS OR COMMENTS MADE ON SHOP DRAWINGS, PRODUCT DATA: CATALOGS, CUT SHEETS, CHARTS, AND OTHER ITEMS DURING CONSTRUCTION PHASE SUBMITTAL REVIEW DO NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH REQUIREMENTS OF THE CONTRACT DOCUMENTS, FOR PROVIDING A COMPLETE AND FUNCTIONING PROJECT, NOR SHALL THEY RELIEVE CONTRACTOR FROM RESPONSIBILITY FOR DEVIATIONS OR ERRORS OF ANY SORT.

THIS REVIEW IS FOR THE LIMITED PURPOSE OF CHECKING FOR CONFORMANCE WITH INFORMATION GIVEN AND THE DESIGN CONCEPT EXPRESSED IN THE CONTRACT DOCUMENTS. CONTRACTOR REMAINS RESPONSIBLE FOR DETERMINING THE ACCURACY AND COMPLETENESS OF OTHER DETAILS SUCH AS DIMENSIONS AND QUANTITIES, FOR SUBSTANTIATING INSTRUCTIONS FOR INSTALLATIONS, VERIFYING MATERIALS REQUIRED, OBTAINING FIELD MEASUREMENTS AND RELATED CRITERIA, COORDINATING WORK WITH OTHER DISCIPLINES AND PERFORMING WORK IN COMPLIANCE WITH THE CONTRACT DOCUMENTS.

ANY CHANGES TO ITEMS SPECIFIED MUST BE SUBMITTED IN WRITING AS A SUBSTITUTION, WITH COMPLETE DOCUMENTATION OF PRICE DIFFERENTIAL AND EQUIPMENT DETAILS. ANY SUBSTITUTIONS PROVIDED SHALL BE REVIEWED AT MARQUE ENGINEERING'S HOURLY RATES. REVIEW SHALL BE PAID FOR BY THE CONTRACTOR TO MARQUE ENGINEERING AT NO COST TO THE OWNER. BY USING PRE-APPROVED SUBSTITUTIONS, THE CONTRACTOR ACCEPTS ALL RESPONSIBILITY AND ASSOCIATED COSTS FOR ALL REQUIRED MODIFICATIONS TO THE CONTRACT DOCUMENTS TO INCLUDE BUT NOT LIMITED TO MATERIAL OR EQUIPMENT COSTS FOR THEIR OR OTHER TRADES, AND ENSURING THAT SUBSTITUTED MATERIALS AND EQUIPMENT TO BE FURNISHED FIT INTO SPACE AVAILABLE.

EXTENSIVE REVISIONS NECESSITATED TO THE CONTRACT DOCUMENTS, OR SUBSTITUTION ACTIONS RELATED TO ANY SPECIFIED PRODUCT NOT ABLE TO BE PROVIDED DUE TO A FAILURE TO COMMENCE WORK, RELEASE PRODUCT OR COORDINATE CONSTRUCTION ACTIVITIES SHALL BE PROVIDED AT MARQUE ENGINEERING'S HOURLY RATES. COSTS SHALL BE BORN BY THE CONTRACTOR AT NO COST TO THE OWNER.

23 05 29 HANGERS AND SUPPORTS

SUPPORT ALL PIPING, DUCTWORK AND EQUIPMENT BY HANGERS OR BRACKETS. FURNISH STRUCTURAL STEEL MEMBERS WHERE REQUIRED TO SUPPORT PIPING AND EQUIPMENT. NO PORTION OF PIPING OR VALVES SHALL BE SUPPORTED BY EQUIPMENT.

DUCTWORK - SUPPORT BY MEANS OF HANGERS AS FOLLOWS:

DUCT WIDTH 30 OR LESS  
HANGER SIZE (16 GAUGE)  
TYPE MAX. SPACING 8

A PAIR OF HANGERS SHALL BE LOCATED AT EVERY TRANSVERSE JOINT AND ELSEWHERE ACCORDING TO THE TABLE.

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

ALL SYSTEMS AND EQUIPMENT SHALL BE CAREFULLY ADJUSTED TO PROVIDE COMFORTABLE AND UNIFORM CONDITIONS IN EACH AND EVERY SPACE TO THE OWNER'S SATISFACTION. PROVIDE ANY REQUIRED DRIVES TO SATISFY QUANTITIES INDICATED. PROVIDE A CERTIFIED AIR BALANCE OF THE DIFFUSERS AND AIR HANDLERS.

AIR SYSTEM:

AIR BALANCE AND TESTING SHALL NOT BEGIN UNTIL THE SYSTEM HAS BEEN COMPLETED AND IS IN FULL WORKING ORDER. CONTRACTOR SHALL PUT ALL HEATING, VENTILATING AND AIR CONDITIONING SYSTEM AND EQUIPMENT INTO FULL OPERATION AND SHALL CONTINUE THE OPERATION OF SAME DURING EACH WORKING DAY OF TESTING AND BALANCING. CONTRACTOR SHALL SUBMIT WITHIN 30 DAYS AFTER RECEIPT OF CONTRACT, COPIES OF SUBMITTAL DATA FOR THE TESTING AND BALANCING OF THE AIR CONDITIONING, HEATING, AND VENTILATING SYSTEMS. THE AIR BALANCE AND TESTING AGENCY SHALL PROVIDE PROOF OF HAVING SUCCESSFULLY COMPLETED AT LAST FIVE PROJECTS OF SIMILAR SIZE AND SCOPE.

CONTRACTOR SHALL PROCURE THE SERVICES OF AN INDEPENDENT AIR BALANCE AND TESTING AGENCY, APPROVED BY THE ENGINEER, AND A MEMBER OF AAEC OR NEBB, WHICH SPECIALIZES IN THE BALANCING AND TESTING OF HEATING VENTILATION AND AIR CONDITIONING SYSTEMS, TO BALANCE, ADJUST AND TEST AIR MOVING EQUIPMENT AND AIR DISTRIBUTION OR EXHAUST SYSTEMS AS HEREIN SPECIFIED.

ALL WORK BY THIS AGENCY SHALL BE DONE UNDER THE DIRECT SUPERVISION OF A QUALIFIED HEATING AND VENTILATING ENGINEER EMPLOYED BY THIS AGENCY. ALL INSTRUMENTS USED BY THIS AGENCY SHALL BE ACCURATELY CALIBRATED AND MAINTAINED IN GOOD WORKING ORDER.

23 07 13 DUCT INSTALLATION

INSULATE ALL SUPPLY, DIFFUSER PLENUMS, AND OUTSIDE AIR DUCTWORK OF ALL UNITS WITH OWENS CORNING "ALL SERVICE DUCT WRAP" TYPE 150 GLASS FIBER INSULATION UNLESS OTHERWISE NOTED. INSULATION SHALL BE 1-1/2" THICK (2" THICK FOR SUPPLY AND RETURN IN TRUSS SPACE). 1.5 PCF. DENSITY WITH FRK JACKET .002 THICK REINFORCED ALUMINUM FOIL VAPOR BARRIER. INSULATION SHALL CONFORM TO NFPA 90A AND 90B PER ASTM E-84 FOR FLAME SPREAD AND SMOKE DEVELOPED RATING.

INSULATE ALL EXTERIOR SUPPLY AND RETURN DUCTWORK WITH RIGID FIBERGLASS BOARD INSULATION WITH OUTDOOR JACKET. INSULATION SHALL BE 2" THICK WITH A 'K' VALUE OF 0.23 AT 75 F. INSTALL ON DUCTWORK USING IMPALE ANCHORS AND WIRES. SEAL VAPOR BARRIER WITH VAPOR BARRIER ADHESIVE.

PROVIDE INSULATION ON ALL CONCEALED SUPPLY, RETURN DUCTWORK. ALL LINERS, INSULATION AND ADHESIVES SHALL HAVE A FLAME SPREAD INDEX NOT MORE THAN 25 AND A SMOKE DEVELOPED INDEX OF NOT MORE THAN 50.

RIGID FIBERGLASS DUCTWORK INSULATION: GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 612, TYPE IB, WITHOUT FACING AND WITH VAPOR BARRIER ALL-SERVICE JACKET MANUFACTURED FROM KRAFT PAPER, REINFORCING SCRIM, ALUMINUM FOIL, AND VINYL FILM. INSULATION SHALL HAVE A MINIMUM R VALUE AS REQUIRED BY CODE.

FLEXIBLE FIBERGLASS DUCTWORK INSULATION: GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 553, TYPE II, WITHOUT FACING AND WITH VAPOR BARRIER ALL-SERVICE JACKET MANUFACTURED FROM KRAFT PAPER, REINFORCING SCRIM, ALUMINUM FOIL, AND VINYL FILM. INSULATION SHALL HAVE A MINIMUM R VALUE AS REQUIRED BY CODE.

VAPOR BARRIER MATERIAL FOR DUCTWORK: PAPER-BACKED ALUMINUM-FOIL, EXCEPT AS OTHERWISE INDICATED; STRENGTH AND PERMEABILITY RATING EQUIVALENT TO FACTORY-APPLIED VAPOR BARRIERS ON ADJOINING DUCTWORK INSULATION, WHERE AVAILABLE; WITH FOLLOWING ADDITIONAL CONSTRUCTION CHARACTERISTICS: HIGH PUNCTURE RESISTANCE: LOW VAPOR TRANSMISSION (FOR DUCTS IN EXPOSED AREAS: MECH. ROOMS, ETC.) MODERATE PUNCTURE RESISTANCE: MEDIUM VAPOR TRANSMISSION (FOR DUCTS IN CONCEALED AREAS).

INSTALLATION IS NOT PERMITTED ABOVE DRYWALL CEILINGS AND INACCESSIBLE CEILINGS.

23 09 93 SEQUENCE OF OPERATION

PACKAGED ROOFTOP UNIT

STARTUP  
THE UNIT SHALL OPERATE ON A 7 DAY/NIGHT PROGRAMMABLE THERMOSTAT. DURING STARTUP, THE FAN SHALL RUN WITH THE DAMPERS IN THE FULL RECIRCULATION POSITION. PROVIDE EQUIPMENT CHANGE/OVER SEQUENCE WITH OPTIMUM START FUNCTION. WHEN THE RETURN AIR TEMPERATURE REACHES OCCUPIED SETPOINT (ADJUSTABLE), THE MINIMUM OUTSIDE AIR DAMPER SHALL OPEN TO THE CONTROLLED MINIMUM OUTDOOR AIR POSITION.

SUPPLY FAN CONTROL

THE SUPPLY FAN SPEED SHALL BE CONSTANT AND SET TO THE REQUIRED CFM.

SPACE TEMPERATURE CONTROL

PROVIDE LOCAL WALL MOUNTED ROOM TEMPERATURE THERMOSTAT WITH DIGITAL DISPLAY OF ROOM TEMPERATURE AND SETPOINT (+/- DEG. F. ADJUSTABLE), AND OVERRIDE FEATURE. PROVIDE REMOTE SENSOR TO MONITOR SPACE TEMPERATURE AND MAINTAIN THERMOSTAT SETPOINT.

MINIMUM OUTSIDE AIR CONTROL

DURING OCCUPIED MODE THE MINIMUM OUTSIDE AIR DAMPER SHALL BE OPEN. PROVIDE MOTORIZED OUTDOOR AIR DAMPER.

ECONOMIZER CONTROL

DRY BULB CONTROLLED ECONOMIZER: OPERATED TO AUTOMATICALLY USE OUTDOOR AIR FOR "FREE COOLING" WHEN OUTDOOR AIR TEMPERATURE IS AT ACCEPTABLE LEVELS. AUTOMATICALLY MODULATED OUTDOOR AND RETURN AIR DAMPERS MAINTAIN PROPER DISCHARGE AIR TEMPERATURE INTO THE CONDITIONED SPACE. ADJUSTABLE MINIMUM POSITION CONTROL IS STANDARD. ECONOMIZER SHALL HAVE POWERED OR BAROMETRIC RELIEF, AS SCHEDULED.

COOLING CONTROL

COOLING SHALL BE CONTROLLED TO MAINTAIN SPACE TEMPERATURE SETPOINT. ON A CALL FOR COOLING THE HEATING SHALL BE OFF. ON A FURTHER CALL FOR COOLING, ENABLE THE ECONOMIZER MODE. ON A FURTHER CALL FOR COOLING, DISABLE THE ECONOMIZER MODE AND THE MECHANICAL COOLING SHALL BE STAGED ON.

HEATING CONTROL

HEATING SHALL BE CONTROLLED TO MAINTAIN SPACE TEMPERATURE SETPOINT. ON A CALL FOR HEATING, THE MECHANICAL COOLING SHALL BE OFF. ON A FURTHER CALL FOR HEATING, THE ECONOMIZER MODE SHALL BE DISABLED. ON A FURTHER CALL FOR HEATING THE GAS HEATING SHALL BE STAGED ON.

HOT GAS REHEAT

PROVIDE HOT GAS REHEAT COIL WITHIN UNIT FOR HUMIDITY CONTROL. HOT GAS REHEAT MODE WILL ALLOW LATENT CAPACITY REDUCTION FOR SOLE HUMIDITY CONTROL.

SMOKE DETECTOR

WHEN THE SMOKE DETECTOR IS ALARMED, THE SYSTEM SHALL BE ALARMED AND THE AIR HANDLER SHALL FAIL SAFE WITH MANUAL RESET. ELECTRICAL CONTRACTOR SHALL FURNISH, HVAC CONTRACTOR SHALL MOUNT & ELECTRICAL CONTRACTOR SHALL WIRE A UL LISTED PHOTOELECTRIC SMOKE DETECTOR PER LOCAL CODE AUTHORITY HAVING

JURISDICTION.

UNOCCUPIED MODE DURING THE UNOCCUPIED MODE OF OPERATION, THE RTU SHALL GO INTO NIGHT SETBACK MODE. AT NIGHT SETBACK SHUTDOWN THE RTU SHALL GO TO FAIL SAFE POSITION. FAIL SAFE POSITION IS DEFINED BY THE FOLLOWING: THE SUPPLY FAN IS OFF. THE OUTDOOR AIR INTAKE DAMPER IS CLOSED, THE HEATING IS OFF AND THE MECHANICAL COOLING IS OFF. THE SUPPLY FAN SHALL CYCLE IN CONJUNCTION WITH EITHER THE HEATING OR COOLING SYSTEM TO MAINTAIN A MINIMUM/MAXIMUM SPACE TEMPERATURE DEPENDING ON THE SEASON.

LOW VOLTAGE THERMOSTATS SHALL BE PROVIDED AND WIRED BY THE HVAC CONTRACTOR. ELECTRICAL CONTRACTOR SHALL PROVIDE 4" SQUARE X 1-1/2" DEEP WALL OUTLET BOXES (WITH SINGLE-GANG RINGS) FOR ALL THERMOSTATS/SENSORS. ELECTRICAL CONTRACTOR SHALL PROVIDE ONE 3/4" EMPTY CONDUIT FROM EACH THERMOSTAT/SENSOR LOCATION, TURNED OUT ABOVE ACCESSIBLE CEILINGS (IN JOIST SPACE OR AGAINST OVERHEAD SLAB/DECK). HVAC/TEMPERATURE CONTROL CONTRACTOR SHALL PROVIDE ALL OTHER NECESSARY CONDUIT, RACEWAY AND WIRING RELATED WORK. CONDUIT SHALL BE IDENTIFIED IN CEILING CAVITY AND SHALL BE PROVIDED WITH SWEEP BENDS, BUSHINGS AND DRAGLINE.

EXHAUST FANS SHALL BE TIED TO LIGHT SWITCH, WHICH SHALL BE FURNISHED, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR. WHEN ACTIVATED, EXHAUST FAN MOTOR DAMPER SHALL OPEN AND FAN SHALL START.

ALL DUCT SMOKE DETECTORS WILL BE FURNISHED BY ELECTRICAL CONTRACTOR, INSTALLED BY THE HVAC CONTRACTOR, AND WIRED BY THE ELECTRICAL CONTRACTOR PER LOCAL CODES. HVAC CONTRACTOR WILL INTERLOCK FAN WITH SMOKE DETECTOR.

MOTOR OPERATED DAMPERS: ALL FRESH AIR INTAKES AND EXHAUST LOUVERS SHALL HAVE MOTOR OPERATED DAMPERS. DAMPERS SHALL BE LOW LEAK WITH BLADE AND EDGE SEALS. MOTOR OPERATED DAMPERS SHALL BE PROVIDED, INSTALLED AND WIRED BY THE MECHANICAL CONTRACTOR UNLESS OTHERWISE NOTED. PROVIDE ALL NECESSARY TRANSFORMERS, CONTACTORS, CONTROLS AND WIRING FOR INTERLOCKING EQUIPMENT TO MOTOR OPERATED DAMPERS.

23 22 00 CONDENSATE DRAIN PIPING

INSTALL TRAP AT EVAPORATOR COIL DRAIN. EXTEND DRAIN LINE FROM COIL TRAP TO DRAIN. PIPING SHALL BE STANDARD WEIGHT, PVC PIPE AND FITTINGS AND WITH JOINTS OF PVC SOLVENT CEMENT. PROVIDE CLEANOUTS THROUGHOUT RUN AND AT TOPS OF TRAPS.

23 30 00 AIR DISTRIBUTION SYSTEM

CEILING AIR DIFFUSERS: SQUARE HOUSING, CORE OF SQUARE CONCENTRIC LOUVERS, SQUARE OR ROUND DUCT CONNECTION.

EXTRUDED ALUMINUM CONTINUOUS SLOT, SINGLE OR MULTIPLE. LINEAR:

DIFFUSER MOUNTINGS: SURFACE MOUNT; DIFFUSER SHALL HAVE ROLLED EDGE BELOW FINISHED CEILING FOR SURFACE MOUNTING OR DIFFUSER SHALL BE FURNISHED WITH ACCESSORY PLASTER FRAME.

LAY-IN: DIFFUSER HOUSING SIZED TO FIT BETWEEN CEILING EXPOSED SUSPENSION TEE BARS AND REST ON TOP SURFACE OF TEE BAR.

DIFFUSER ACOUSTIC PERFORMANCE: NC LESS THAN OR EQUAL TO 30

DIFFUSER ACCESSORIES: PLASTER RING; PERIMETER RING DESIGNED TO ACT AS PLASTER STOP AND DIFFUSER ANCHOR.

DIFFUSER FINISHES: WHITE ENAMEL; SEMI-GLOSS WHITE ENAMEL PRIME FINISH.

CEILING AND WALL REGISTERS & GRILLES: STEEL CONSTRUCTION; MANUFACTURER'S STANDARD STAMPED SHEET STEEL FRAME AND ADJUSTABLE BLADES.

REGISTER AND GRILLE FINISHES: WHITE ENAMEL; SEMI-GLOSS WHITE ENAMEL PRIME FINISH.

REGISTER AND GRILLE ACOUSTIC PERFORMANCE: NC LESS THAN OR EQUAL TO 30

23 31 13 METAL DUCTS

CONSTRUCTION, INSTALLATION AND SUPPORT OF ALL DUCTWORK SHALL CONFORM TO THE LATEST EDITION OF SMACNA "HVAC DUCT CONSTRUCTION STANDARD -METAL AND FLEXIBLE".

ASSEMBLE AND INSTALL DUCTWORK IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICES TO ACHIEVE AIR-TIGHT (5% LEAKAGE FOR SYSTEMS RATED 3" AND UNDER; 1% FOR SYSTEMS RATED OVER 3") AND NOISELESS (NO OBJECTIONABLE NOISE) SYSTEMS. INSTALL EACH RUN WITH MINIMUM NUMBER OF JOINTS. ALIGN DUCTWORK ACCURATELY AT CONNECTIONS, WITHIN 1/8" MISALIGNMENT TOLERANCE AND WITH INTERNAL SURFACES SMOOTH.

SUPPORT VERTICAL DUCTS AT EVERY FLOOR. SUPPORT DUCT WITH APPROVED HANGERS AT INTERVALS NOT EXCEEDING 10 FEET.

DUCTS SHALL BE GALVANIZED SHEET METAL OF STANDARD GAUGES. DUCTWORK SHALL HAVE A MINIMUM THICKNESS OF 24 GAUGE. ALL DUCT ELBOWS SHALL BE EITHER FULL RADIUS OR WITH TURNING VANES.

WHERE DUCTWORK IS INDICATED TO BE EXPOSED IN OCCUPIED SPACES, PROVIDE MATERIALS WHICH ARE FREE FROM VISUAL IMPERFECTIONS INCLUDING PITTING, SEAM MARKS, ROLLER MARKS, STAINS AND DISCOLORATIONS, AND OTHER IMPERFECTIONS, INCLUDING THOSE WHICH WOULD IMPAIR PAINTING.

EXPOSED DUCTWORK WHICH IS TO BE PAINTED SHALL HAVE PAINT GRIP APPLIED.

PROVIDE VOLUME DAMPERS IN ALL BRANCH DUCTS OR AS REQUIRED FOR BALANCING TO REQUIRED AIR FLOWS.

PROVIDE RADIUS TYPE FITTINGS FABRICATED OF MULTIPLE SECTIONS WITH MAXIMUM 15 DEG. CHANGE OF DIRECTION PER SECTION, UNLESS DETAILED OTHERWISE. USE 45 DEG. LATERALS AND 45 DEG. ELBOWS FOR BRANCH TAKEOFF CONNECTIONS. WHERE 90 DEG. BRANCHES ARE INDICATED, PROVIDE CONICAL TYPE TEES.

PROVIDE DUCT SEALANT AND/OR CEMENT WHICH IS NON-HARDENING, NON-MIGRATING MASTIC OR OF LIQUID ELASTIC SEALANT, TYPE APPLICABLE FOR FABRICATION/INSTALLATION DETAIL, AS COMPOUNDED AND RECOMMENDED BY MANUFACTURER SPECIFICALLY FOR SEALING JOINTS AND SEAMS IN DUCTWORK.

FLEXIBLE DUCTS SHALL EITHER BE SPIRAL-WOUND SPRING STEEL WITH FLAMEPROOF VINYL SHEATHING OR CORRUGATED ALUMINUM. THE MAXIMUM LENGTH OF FLEX DUCT ON THE SUPPLY EQUALS 5 FEET. FLEX IS NOT ALLOWED FOR RETURN, RELIEF OR EXHAUST APPLICATIONS.

FLEXIBLE DUCTS SHALL CONFORM TO THE REQUIREMENTS OF UL 181 FOR CLASS 0 OR CLASS 1 FLEXIBLE AIR DUCTS AND SHALL BE SO IDENTIFIED.

WHERE INSTALLED IN UNCONDITIONED SPACES OTHER THAN RETURN AIR PLENUMS, PROVIDE 1" THICK 1-1/2 LB. CONTINUOUS FLEXIBLE FIBERGLASS SHEATH WITH VINYL VAPOR BARRIER JACKET.

SHOP FABRICATE DUCTWORK IN 4, 8, 10 OR 12-FT LENGTHS, OR REQUIRED TO COMPLETE RUNS.

FABRICATE DUCTWORK WITH DUCT LINER IN EACH SECTION OF DUCT WHERE INDICATED. LAMINATE LINER TO INTERNAL SURFACES OF DUCT IN ACCORDANCE WITH INSTRUCTIONS BY MANUFACTURERS OF LINING AND ADHESIVE, AND FASTEN WITH MECHANICAL FASTENERS. DUCT LINER TO BE 3-LB DENSITY FOR ACOUSTIC REQUIREMENTS 1" THICK OR AS NOTED. SIZE OF DUCTWORK SHOWN ON THE DRAWINGS IS FREE NET AREA, OUTSIDE DIMENSION OF DUCTS WILL NEED TO BE INCREASED IF LINED DUCT IS USED.

DUCT LINER SHALL BE OF FIBROUS GLASS OF THICKNESS INDICATED. 3-LB DENSITY. ALL LINERS, INSULATION AND ADHESIVES SHALL HAVE A FLAME SPREAD INDEX NOT MORE THAN 25 AND A SMOKE DEVELOPED INDEX OF NOT MORE THAN 50.

23 33 13 DAMPERS

DAMPERS WITH LOCKING DEVICE, WHERE ACCESSIBLE, SHALL BE RUSKIN MD-35. OPPOSED BLADE FOR RECTANGULAR DUCTS 12 INCHES AND ABOVE, AND MODEL MD-25 PARALLEL BLADE FOR DUCTS 10 INCHES AND BELOW, AND MODEL MDRS-25 FOR ROUND DUCTS. INSTALL PER MANUFACTURER'S INSTRUCTIONS. SINGLE BLADE ROUND DAMPERS WITH LOCKING DEVICE SHALL BE IN SPIN-IN COLLARS.

FIRE DAMPERS SHALL BE RUSKIN MODEL IBD, STYLE B WITH BLADE PACKAGE OUT OF AIR STREAM. HORIZONTAL, INSTALL WHERE INDICATED ON DRAWINGS AND AS REQUIRED BY AUTHORITY HAVING LOCAL JURISDICTION.

ELECTRIC MOTORIZED DAMPER SHALL BE SIZED TO OPERATE WITH SUFFICIENT RESERVE POWER TO PROVIDE SMOOTH MODULATING ACTION OR TWO-POSITION ACTION. INSTALL PER MANUFACTURER'S INSTRUCTIONS.

23 74 13 - ROOFTOP UNITS  
GAS FIRED ROOFTOP UNIT WHICH MEETS ASHRAE 90.1 MINIMUM ENERGY EFFICIENCY REQUIREMENT. GAS HEATING WITH ELECTRIC COOLING. CAPACITIES SHALL BE AS LISTED. PROVIDE 2" PLEATED FILTER, ROOF CURB, PREWIRED CONTROL CENTER, ELECTRONIC PILOT, GAS VALVE, SAFETY LIMIT, MAX COOLING COIL PRESSURE DROP SHALL BE AS LISTED WHEN WET. SEE SCHEDULE ON DRAWING.

## GENERAL ELECTRICAL NOTES

- ANY AND ALL "BUILDING STANDARDS" AND/OR "BUILDING SPECIFICATIONS" SHALL BE CONSIDERED AN INTEGRAL PART OF THESE DOCUMENTS AND THE CONTRACTOR SHALL BE RESPONSIBLE TO OBTAIN A COPY OF THESE REQUIREMENTS/THIS DOCUMENT AND COMPLY WITH ALL REQUIREMENTS AND STANDARDS CONTAINED WITHIN.
- THESE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND ARE INTENDED TO CONVEY THE SCOPE OF WORK AND INDICATE GENERAL ARRANGEMENT OF LIGHTING FIXTURES, DEVICES, CONTROLS, ELECTRICAL FIXTURES, MOTORS, PANELBOARDS, EQUIPMENT, ETC. THE LOCATIONS OF ALL ITEMS SHOWN ON THESE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED AT THE PROJECT. ALL LOCATIONS OF WORK EXPOSED TO VIEW ARE SUBJECT TO APPROVAL OF THE ARCHITECT PRIOR TO INSTALLATION.
- THE ELECTRICAL CONTRACTOR SHALL VERIFY EXISTING CONDITIONS TO INSURE THAT ALL NEW WORK WILL FIT INTO THE EXISTING STRUCTURE IN THE MANNER INTENDED AND AS SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/OWNERS REPRESENTATIVE PRIOR TO ANY ROUGH-INS, FABRICATIONS, OR PERFORMING ANY WORK IN THE AREA INVOLVING DIFFERENCES. NOTIFICATION SHALL BE IN THE FORM OF A DRAWING OR SKETCH INDICATING FIELD MEASUREMENTS AND NOTES RELATED TO THE AREA.
- ANY DISCREPANCIES BETWEEN DRAWINGS AND SPECIFICATIONS SHALL BE PROMPTLY BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION DURING THE BIDDING PERIOD. NO ALLOWANCE SHALL SUBSEQUENTLY BE MADE TO THE CONTRACTOR BY REASON OF HIS FAILURE TO HAVE BROUGHT SAID DISCREPANCIES TO THE ATTENTION OF THE ENGINEER DURING THE BIDDING PERIOD OR OF ANY ERROR ON THE CONTRACTOR'S PART.
- ALL EQUIPMENT SHALL BE INSTALLED IN A NEAT, PROFESSIONAL AND WORKMANLIKE MANNER, RECTILINEAR TO BUILDING STRUCTURE.
- ALL COMPONENTS SHOWN ON THE RISER/ONE-LINE DIAGRAMS BUT NOT ON THE PLAN OR VICE VERSA, SHALL BE INCLUDED AS IF SHOWN ON BOTH.
- REVIEW ALL TRADES' CONTRACT DOCUMENTS TO DETERMINE SPECIFIC MOUNTING LOCATIONS FOR ELECTRICAL EQUIPMENT. COORDINATE EXACT MOUNTING LOCATIONS WITH THE ARCHITECT.
- REFER TO ARCHITECTURAL ELEVATIONS TO DERIVE EXACT LOCATIONS OF ALL RECEPTACLES, OUTLETS/JACKS, SWITCHES, ETC. LUMINAIRES AND CEILING MOUNTED EQUIPMENT SHALL BE COORDINATED WITH THE ARCHITECTURAL REFLECTED CEILING PLANS.
- EXACT LOCATION OF MECHANICAL EQUIPMENT THAT REQUIRE ELECTRICAL CONNECTION ARE SHOWN ON THE MECHANICAL DRAWINGS. FIELD VERIFY EXACT LOCATIONS WITH MECHANICAL CONTRACTOR PRIOR TO ANY ROUGH-INS.
- ALL CIRCUITING SHALL BE RUN CONCEALED UNLESS SPECIFIED OTHERWISE.
- ALL RACEWAYS RUNNING THROUGH BUILDING EXPANSION JOINTS SHALL BE EQUIPPED WITH EXPANSION FITTINGS.
- CONDUIT HOME RUNS SHOWN ON THE DRAWING WITH MORE THAN (3) CURRENT CARRYING CONDUCTORS ARE SHOWN DIAGRAMMATICALLY. THIS CONTRACTOR SHALL NOT INSTALL MORE THAN (3) CURRENT CARRYING CONDUCTORS IN A RACEWAY UNLESS NATIONAL ELECTRIC CODE (N.E.C.), ARTICLE 310.15 DERATING FACTORS ARE APPLIED.
- ALL LIGHTING AND GENERAL POWER BRANCH CIRCUITS SHALL INCLUDE A SEPARATE NEUTRAL CONDUCTOR, UNLESS SPECIFICALLY NOTED OTHERWISE.
- THE ELECTRICAL CONTRACTOR SHALL REFER TO THE ELECTRICAL SPECIFICATIONS FOR ACCEPTABLE CONDUIT TYPES/LOCATIONS. ALL CONDUIT SIZES ON THE DRAWINGS ARE BASED ON THE LATEST EDITION OF THE N.E.C. CONDUIT FILL TABLES FOR ELECTRICAL METALLIC TUBING (E.M.T). CONDUIT SIZES SHALL BE REVISED TO THE SIZE REQUIRED, RELATIVE TO THE ACTUAL CONDUIT TYPE TO BE INSTALLED.
- IT IS NOT INTENDED THAT THE PLANS INDICATE ALL THE NECESSARY BENDS, OFFSETS, PULL BOXES AND OBSTRUCTIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL HIS WORK TO CONFORM TO THE STRUCTURE, MAINTAIN HEADROOM AND KEEP OPENINGS AND PASSAGEWAYS CLEAR. REFER TO THE ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS AS REQUIRED.
- IT IS NOT INTENDED THAT THE PLANS INDICATE ALL CONDUIT ROUTES, PULL BOXES, ETC. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING ACTUAL CONDUIT ROUTING, QUANTITY AND LOCATION OF PULL BOXES WITHIN ACCESSIBLE LOCATIONS.
- PROVIDE SCREW-COVER PULL BOXES IN CONDUIT RUNS AS REQUIRED TO LIMIT THE NUMBER OF BENDS TO NO MORE THAN THREE (3) OR 270 DEGREES TOTAL. SIZE PULL BOXES IN ACCORDANCE WITH NEC, ARTICLE 314.28. DOCUMENT ON RECORD DRAWINGS, SIZE AND LOCATION OF PULL BOXES USED IN FEEDER CONDUIT RUNS.
- ALL OUTLET BOXES IN WALLS SHALL HAVE A MINIMUM OF ONE (1) DEDICATED VERTICAL CONDUIT ENTERING AT THE TOP OF THE BOX. HORIZONTAL CONDUIT CONNECTIONS SHALL ONLY BE PERMITTED UNDER WINDOWS OR UNLESS OTHERWISE NOTED ON DRAWINGS.
- WHERE MULTIPLE DEVICES ARE INDICATED IN A COMMON LOCATION, GANG INTO A SINGLE COVER PLATE.
- ALL EXISTING PANELS SHALL BE PROVIDED WITH ENGRAVED NAMEPLATES AS DESIGNATED ON PANEL SCHEDULES SECURED TO PANEL FACE AND NEW ENGRAVED NAMEPLATES DENOTING ORIGIN OF FEEDER FROM WHICH PANEL IS SERVED.

## SYMBOL LEGEND

	FLUORESCENT LIGHTING FIXTURE AND OUTLET BOX. HALF SHADED FIXTURE OR "EM" INDICATES FIXTURES WITH INTEGRAL BATTERY PACK FOR EMERGENCY SERVICE, U.O.N.
	LUMINAIRE TYPE : INDICATE BY UPPERCASE LETTER SEE LIGHTING EXTURE 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 HOURS UNSWITCHED CIRCUIT.
	CEILING/WALL MOUNTED SELF POWERED EXIT LIGHT FIXTURE WITH DIRECTIONAL ARROWS AS INDICATED. SHADED AREA DENOTES FACE(S). ISOLITE ELITE SERIES LED EXIT SIGN
	COMBINATION OF EXIT SIGN AND EMERGENCY BUG-EYE FIXTURE.
	EMERGENCY BATTERY UNIT WITH ATTACHED EMERGENCY FIXTURES AND OUTLET BOX.
	LIGHT SWITCH. SINGLE POLE, 20A
	"a" CONTROL OF SPECIFIED LUMINAIRES "3" 3-WAY TYPE "OS" LINE VOLTAGE MULTI TECHNOLOGY WALL SWITCH OCCUPANCY SENSOR WITH MANUAL ON/OFF SWITCH. "VS" LINE VOLTAGE MULTI TECHNOLOGY WALL SWITCH VACANCY SENSOR WITH MANUAL ON/OFF SWITCH. "M" MOMENTARY SWITCH.
	WALL MOUNTED OCCUPANCY SENSOR SWITCH.
	MANUAL OVERRIDE SWITCH
	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF 1#12 Ø, 1#12 N. & 1#12 G. IN 3/4"Ø, UNLESS OTHERWISE NOTED.
	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF 2#12 Ø, 2#12 N. & 2#12 G. IN 3/4"Ø, UNLESS OTHERWISE NOTED.
	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF 3#12 Ø, 3#12 N. & 3#12 G. IN 3/4"Ø, UNLESS OTHERWISE NOTED.
	30A/240V NON UNFUSED DISCONNECT SWITCH
	60A/240V NON UNFUSED DISCONNECT SWITCH
	100A/240V NON UNFUSED DISCONNECT SWITCH
	200A/240V NON UNFUSED DISCONNECT SWITCH
	JUNCTION BOX WITH BLANK COVER PLATE, FLUSH IN FLOOR.
	JUNCTION BOX WITH BLANK COVER PLATE, WALL MOUNTED, +18" AFF OR AS NOTED.
	DUPLEX CONVENIENCE RECEPTACLE, +18" AFF OR AS NOTED.
	DEDICATED DUPLEX RECEPTACLE, +18" AFF OR AS NOTED.
	DOUBLE DUPLEX RECEPTACLE - 20A-1P, 125V, NEMA 5-20R.
	DUPLEX CONVENIENCE GFCI RECEPTACLE, +18" AFF OR AS NOTED.
	DUPLEX CEILING MOUNTED RECEPTACLE.
	DUPLEX FLOOR MOUNTED RECEPTACLE.
	TELEPHONE/DATA OUTLET, 4" SQUARE OUTLET BOX WITH SINGLE GANG COLLAR AND BLANK PLATE. PROVIDE 3/4" E.C., U.O.N., UP TO HUNG CEILING AND TERMINATE WITH 90° ELBOW, BUSHING AND DRAG WIRE.
	VOICE OUTLET
	UNIT MOTOR AS NOTED WITH CONTROLLER AND DISCONNECT SWITCH WITH WEATHER PROOF.
	MOTORIZED DAMPER.
	MANUAL MOTOR SWITCH
	PHOTOCELL IN NEMA 3R ENCLOSURE.
	ELECTRICAL HEATER, NUMBER DENOTES HEATER RATING

## ABBREVIATIONS

A	AMPERES	EF	EXHAUST FAN
AFF	ABOVE FINISHED FLOOR	EM	EMERGENCY
AS	AMP SWITCH	EMT	ELECTRICAL METALLIC TUBING
AIC	AMPS INTERRUPTING CAPACITY	EQUIP	EQUIPMENT
AT	AMP TRIP	ER	EXISTING TO BE RELOCATED
AWG	AMERICAN WIRE GAUGE	FDR	FEEDER
C	CONDUIT	FIXT	FIXTURE
C/B,CB	CIRCUIT BREAKER	FL	FLOOR
CKT	CIRCUIT	G	GROUND
CLG	CEILING	GFI	GROUND FAULT INTERRUPTER
CU	COPPER	GP	GENERAL PURPOSE
DWG	DRAWING	HP	HORSEPOWER
KCMIL	ONE THOUSAND CIRCULAR MILS	HZ	HERTZ
KVA	KILOVOLT-AMPERES	IC	INTERRUPTING CAPACITY
KW	KILOWATTS	PP	POWER PANEL
LTG	LIGHTING	REC	RECEPTACLE
MAX	MAXIMUM	NIC	NOT IN CONTRACT
MCB	MAIN CIRCUIT BREAKER	NTS	NOT TO SCALE
MIN	MINIMUM	P	POLES
N	NEUTRAL	PNL	PANEL
TYP	TYPICAL	IG	ISOLATED GROUND
UON	UNLESS OTHERWISE NOTED	W	WATT
V	VOLT/VOLTAGE	EX	EXIT
WP	WEATHER PROOF	VA	VOLT AMPERE

## SYMBOL LEGEND

	CEILING MOUNTED QUAD RECEPTACLE
	SPECIAL POWER RECEPTACLE
	USB
	INTERCOM

## COMMUNICATIONS

	DATA OUTLET
	DOOR CONTACT, PROVIDE 3/4" CONDUIT WITH PULL STRING TO ACCESSIBLE CEILING SPACE
	CARD READER, PROVIDE 3/4" CONDUIT WITH PULL STRING TO ACCESSIBLE CEILING SPACE
	SECURITY KEYPAD, PROVIDE 3/4" CONDUIT WITH PULL STRING TO ACCESSIBLE CEILING SPACE
	INTERCOM AND SPEAKER, PROVIDE 3/4" CONDUIT WITH PULL STRING TO ACCESSIBLE CEILING SPACE
	DOOR ACCESS PUSH BUTTON, PROVIDE 3/4" CONDUIT WITH PULL STRING TO ACCESSIBLE CEILING SPACE

# Electrical Systems Specifications

## 1.0 GENERAL

1.1 THE WORK SHALL INCLUDE ALL LABOR, MATERIAL, EQUIPMENT, TRANSPORTATION, CONSTRUCTION FACILITIES AND INCIDENTALS NECESSARY FOR THE COMPLETE AND PROPERLY WORKING INSTALLATION OF THE ELECTRICAL SYSTEMS INDICATED ON THE DRAWINGS AND SPECIFICATIONS. COMPLY WITH THE LATEST EDITION IN FORCE OF THE NFPA CODES INCLUDING THE NATIONAL ELECTRICAL CODE AND ALL APPLICABLE LOCAL, STATE, AND FEDERAL CODES.

1.2 THE CONTRACTOR SHALL VISIT THE JOB SITE TO VERIFY EXISTING CONDITIONS THAT MAY INFLUENCE THE BID OR WORK. NO ALLOWANCES SHALL BE MADE FOR THE FAILURE OF THE CONTRACTOR TO ACCOMMODATE ANY EXISTING CONDITIONS IN THE BID. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN CLARIFICATION OF ANY CONFLICT IN THE DRAWINGS, SPECIFICATIONS OR DESIGN PRIOR TO THE BID SUBMITTAL IN WRITING WITH THE ENGINEER.

1.3 MAKE APPLICATION AND PAY FOR PERMITS AND INSPECTIONS REQUIRED BY MUNICIPAL AND STATE AUTHORITIES.

1.4 DRAWINGS ARE DIAGRAMMATIC. LIGHTING AND OUTLET LOCATIONS ARE APPROXIMATE. REFER TO ARCHITECTURAL, MECHANICAL AND STRUCTURAL PLANS REGARDING AVAILABLE SPACE AND CHECK FIELD CONDITIONS BEFORE MAKING ELECTRICAL INSTALLATIONS. CIRCUIT EQUIPMENT AS SHOWN ON THE DRAWINGS, MAKING REVISIONS ONLY WITH THE EXPRESSED CONSENT OF THE ARCHITECT/ENGINEER.

1.5 ANY VARIANCE OR EXCEPTIONS TO THE DRAWINGS OR SPECIFICATIONS MUST BE REQUESTED AND APPROVED IN WRITING. VERBAL APPROVALS WILL BE PROVIDED IF THE ENGINEER DETERMINES IT TO BE JUSTIFIED AND MUST BE CONFIRMED IN WRITING TO BE FINAL.

1.6 MATERIALS AND WORKMANSHIP SHALL COMPLY WITH CURRENT ELECTRICAL AND MECHANICAL ENGINEERING PRACTICES. PROVIDE NEW, STANDARD PRODUCTS LISTED BY UL. SIMILAR ITEMS OF MATERIAL SHALL BE OF THE SAME TYPE AND MANUFACTURE. ALL EXPOSED CONDUIT AND DEVICES SHALL BE TRUE TO LINE, PLUMB AND ADEQUATELY SECURED IN PLACE. ALL WIRING DEVICES, FIXTURES AND PANELBOARDS SHALL BE PROTECTED FROM MOISTURE, PLASTER AND DUST DURING STORAGE AND BUILDING CONSTRUCTION. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES SHALL BE LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.

1.7 THE WORK SHALL BE INSPECTED FOR COMPLIANCE WITH THE DRAWINGS AND SPECIFICATIONS BY THE OWNER'S REPRESENTATIVE.

## 2.0 SUBMITTALS

2.1 SUBMIT SIX COPIES OF DESCRIPTIVE BROCHURES FOR ALL LIGHTING FIXTURES AND DETAILED SHOP DRAWINGS OF PANEL, SERVICE ENTRANCE DISTRIBUTION PANEL OR OTHER FABRICATED EQUIPMENT TO THE ARCHITECT PRIOR TO ORDERING AND IN A TIMELY MANNER. NO SUCH EQUIPMENT SHALL BE MANUFACTURED UNTIL APPROVED BY THE ENGINEER AND WHERE APPLICABLE, THE SERVING UTILITY.

2.2 SUBMIT SIX COPIES OF OPERATING AND MAINTENANCE MANUALS. MANUALS SHALL BE ASSEMBLED IN A BINDER WITH A CLEAR TABLE OF CONTENTS, MANUFACTURERS STANDARD PRODUCT DATA, MANUFACTURERS CURRENT PRINTED OPERATING AND MAINTENANCE INSTRUCTIONS, LIST OF AVAILABLE SPARE PARTS AND ALL WARRANTY MANUALS.

## 3.0 WARRANTY

3.1 THE CONTRACTOR SHALL GUARANTEE ALL MATERIAL FURNISHED BY HIM AND ALL WORKMANSHIP UNDER THIS CONTRACT FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE OF WORK UNDER THIS CONTRACT. ANY DEFECTS DEVELOPING WITHIN THIS PERIOD TRACEABLE TO MATERIAL FURNISHED AS A PART OF THIS CONTRACT OR WORKMANSHIP PERFORMED HEREUNDER SHALL BE MADE GOOD PROMPTLY AT THIS CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL ACCEPT THIS CONDITION AND FULLY UNDERSTAND ITS PROVISIONS PRIOR TO THIS CONTRACT BEING AWARDED AND NO CLAIM FOR EXTRA COMPENSATION WILL BE ALLOWED FOR CORRECTION OF FAULTY WORK OR REPLACING DEFECTIVE MATERIAL.

3.2 THE WORK SHALL COMPLY WITH UTILITY COMPANY PUBLISHED STANDARDS. COMPLY WITH NFPA 70.

## 4.0 COORDINATION

4.1 IN GENERAL, COORDINATE WORK THOROUGHLY WITH OTHER TRADES, THE OWNER AND UTILITY COMPANIES TO PROVIDE EFFICIENT FLOW OF WORK AND TIMELY COMPLETION OF THE CONTRACT.

4.2 COORDINATE CHASES, SLOTS, INSERTS, SLEEVES, AND OPENINGS FOR ELECTRICAL PORTS, RACEWAYS, AND CABLE WITH GENERAL CONSTRUCTION WORK.

4.3 SEQUENCE, COORDINATE, AND INTEGRATE INSTALLING ELECTRICAL MATERIALS AND EQUIPMENT FOR EFFICIENT FLOW OF THE WORK. COORDINATE INSTALLATION OF LARGE EQUIPMENT THAT REQUIRES POSITIONING BEFORE CLOSING IN THE BUILDING.

4.4 COORDINATE ELECTRICAL SERVICE CONNECTIONS TO COMPONENTS FURNISHED BY UTILITY COMPANIES.

4.5 COORDINATE INSTALLATION AND CONNECTION OF EXTERIOR UNDERGROUND AND OVERHEAD UTILITIES AND SERVICES, INCLUDING PROVISION FOR SERVICE ENTRANCES AND ELECTRICITY-METERING COMPONENTS.

4.6 COORDINATE LOCATION OF ACCESS PANELS AND DOORS FOR ELECTRICAL ITEMS THAT ARE CONCEALED BY FINISHED SURFACES.

4.7 WHERE ELECTRICAL IDENTIFICATION DEVICES ARE APPLIED TO FIELD-FINISHED SURFACES, COORDINATE INSTALLATION OF IDENTIFICATION DEVICES WITH COMPLETION OF FINISHED SURFACE.

## 5.0 PRODUCTS

5.1 RACEWAYS:  
EMT: ELECTRICAL METALLIC TUBING; ANSI C80.3, ZINC-COATED STEEL, WITH SET-SCREW FITTINGS.  
FMC: FLEXIBLE METAL CONDUIT; ZINC-COATED STEEL.  
IMC: INTERMEDIATE METAL CONDUIT; ANSI C80.6, ZINC-COATED STEEL, WITH THREADED FITTINGS.  
LFMC: LIQUIDTIGHT FLEXIBLE METAL CONDUIT; ZINC-COATED STEEL WITH SUNLIGHT-RESISTANT AND MINERAL-OIL-RESISTANT PLASTIC JACKET.  
RMC: RIGID METAL CONDUIT; GALVANIZED RIGID STEEL; ANSI C80.1.  
RNC: RIGID NONMETALLIC CONDUIT; NEMA TC2, SCHEDULE 40 PVC, WITH NEMA TC3 FITTINGS.  
RACEWAY FITTINGS: SPECIFICALLY DESIGNED FOR RACEWAY TYPE WITH WHICH USED.

5.2 OUTLET BOXES:  
GALVANIZED STEEL BOXES AT LEAST 1-1/2" DEEP AND 4" SQUARE SHALL BE PROVIDED IN FINISHED AREAS FOR EACH WALL SWITCH, RECEPTACLE, TELEPHONE AND LIGHTING FIXTURE LOCATION. BOXES SURFACE MOUNTED IN DRY LOCATIONS MAY BE 4 X 2 SIZE PROVIDING NOT MORE THAN CODE NUMBER OF WIRES ENTER.

5.3 CONDUCTORS, CABLES, AND CONNECTIONS:  
CONDUCTORS, NO. 10 AWG AND SMALLER: SOLID OR STRANDED COPPER.  
CONDUCTORS, LARGER THAN NO. 10 AWG: STRANDED COPPER.  
INSULATION: THERMOPLASTIC, RATED 600 V, 75 DEG C MINIMUM, TYPE THW, THHN-THWN, XHHW-XHHN OR USE DEPENDING ON APPLICATION.  
CONDUCTORS SHALL BE MINIMUM #12 AWG EXCEPT LOW VOLTAGE CONTROL WIRE MAY BE #16 PLASTIC INSULATED.  
CABLE: TYPE MC WITH GROUND WIRE.  
WIRE CONNECTORS AND SPLICES: UNITS OF SIZE, AMPACITY RATING, MATERIAL, TYPE, AND CLASS SUITABLE FOR SERVICE INDICATED.

5.4 SUPPORTING DEVICES MATERIAL:  
COLD-FORMED STEEL, WITH CORROSION-RESISTANT COATING.  
METAL ITEMS FOR USE OUTDOORS OR IN DAMP LOCATIONS:  
HOT-DIP GALVANIZED STEEL.  
SLOTTED-STEEL CHANNEL: FLANGE EDGES TURNED TOWARD WEB, AND 9/16-INCH- (14-MM-) DIAMETER SLOTTED HOLES AT A MAXIMUM OF 2 INCHES (50 MM) O.C., IN WEBS. STRENGTH RATING TO SUIT STRUCTURAL LOADING.  
SLOTTED CHANNEL FITTINGS AND ACCESSORIES: RECOMMENDED BY THE MANUFACTURER FOR USE WITH THE TYPE AND SIZE OF CHANNEL WITH WHICH USED.  
MATERIALS: SAME AS CHANNELS AND ANGLES, EXCEPT METAL ITEMS MAY BE STAINLESS STEEL.

5.5 RACEWAY AND CABLE SUPPORTS:  
MANUFACTURED CLEVIS HANGERS, RISER CLAMPS, STRAPS, THREADED C-CLAMPS WITH RETAINERS, CEILING HANGERS, WALL BRACKETS, AND SPRING-STEEL CLAMPS OR QUICK-TYPE HANGERS.  
PIPE SLEEVES: ASTM A 53, TYPE E, GRADE A, SCHEDULE 40, GALVANIZED STEEL, PLAIN ENDS.  
CABLE SUPPORTS FOR VERTICAL CONDUIT: FACTORY-FABRICATED ASSEMBLY CONSISTING OF THREADED BODY AND INSULATING WEDGING PLUG FOR NON-ARMORED ELECTRICAL CABLES IN RISER CONDUITS. PLUGS HAVE NUMBER AND SIZE OF CONDUCTOR GRIPPING HOLES AS REQUIRED TO SUIT INDIVIDUAL RISERS. BODY CONSTRUCTED OF MALLEABLE-IRON CASTING WITH HOT-DIP GALVANIZED FINISH.  
EXPANSION ANCHORS: CARBON-STEEL WEDGE OR SLEEVE TYPE. TOGGLE BOLTS: ALL-STEEL SPRINGHEAD TYPE.  
VERIFY THAT DEVICES BELOW ARE PERMISSIBLE IN PROJECT.  
POWDER-DRIVEN THREADED STUDS: HEAT-TREATED STEEL.

5.6 WIRING DEVICES:  
CONVENIENCE RECEPTACLES, HUBBELL #5362, #CF362 GROUND FAULT INTERRUPTER RECEPTACLE, OR APPROVED EQUAL, 20AMP, 125 VOLT GROUNDING TYPE WITH HUBBELL IVORY, PLASTIC PLATES IN FINISHED AREA.  
PROVIDE HUBBELL #5222 OR APPROVED EQUAL COVER FOR WEATHERPROOF RECEPTACLE OUTLET.  
CLOCK RECEPTACLES SHALL BE HUBBELL #5235 COMPLETE WITH COVER PLATE.  
SWITCHES SHALL BE HUBBELL #1221 SINGLE-POLE, HUBBELL #1223 THREE-WAY OR APPROVED EQUAL, WHERE INDICATED WITH PLATE TO MATCH RECEPTACLES.  
TELEPHONE WALL OUTLETS SHALL BE EQUIPPED WITH ONE-HOLE WALL PLATES TO MATCH RECEPTACLES.

5.7 PANELBOARDS:  
PANELBOARDS SHALL BE TYPE AS SHOWN ON PLANS, WITH THERMAL MAGNETIC QUICK-BREAK, QUICK-MAKE, FULL SIZE BREAKERS AND SPACES AS INDICATED ON THE DRAWINGS. EQUAL TO SQUARE D, TYPE "QO" LOAD CENTERS. BREAKERS SHALL HAVE 10,000 AIC RATING UNLESS NOTED OTHERWISE ON THE DRAWINGS. DISTRIBUTION PANELBOARDS SHALL BE BOLT ON TYPE, WITH THERMAL MAGNETIC, QUICK-BREAK, QUICK-MAKE, FULL SIZE BREAKERS AND SPARES AS INDICATED ON THE DRAWINGS. EQUAL TO SQUARE D, TYPE NQOB. BREAKERS SHALL HAVE 10,000 AIC RATING UNLESS NOTED OTHERWISE ON THE DRAWINGS.  
FRONTS OF CABINETS SHALL BE FLUSH OR SURFACE MOUNTED AS SHOWN ON DRAWINGS WITH A DIRECTORY CARD NEATLY TYPED OR PRINTED, WHICH IDENTIFIES THE LOADS SERVED. EXTERIOR PANELS SHALL HAVE RAIN-TIGHT ENCLOSURES EQUIPPED WITH A DOOR LOCK.  
MANUFACTURERS SHALL BE SQUARE D, GENERAL ELECTRIC, CUTLER-HAMMER, SIEMENS.

5.8 SAFETY SWITCHES:  
SHALL BE NEMA, HEAVY DUTY, QUICK-MAKE, QUICK BREAK. SWITCHES EXPOSED OUTDOORS SHALL HAVE NEMA 3R RAIN-TIGHT ENCLOSURES.  
MANUFACTURERS SHALL BE SQUARE D, GENERAL ELECTRIC, CUTLER-HAMMER, SIEMENS.

5.9 FUSES:  
SHALL BE BUSSMANN FUSETRON, DUAL-ELEMENT AND LOW-PEAK TYPES OR TYPE INDICATED ON DRAWINGS. PROVIDE 3 SPARE FUSES OF EACH TYPE AND RATING USED TO THE OWNER AS SPARES.

5.10 LIGHTING FIXTURES:  
PROVIDE UL LISTED FIXTURES COMPLETE WITH LAMPS AS INDICATED ON DRAWINGS AND WITH PROPER TRIMS AND SUPPORT BRACKETS. LAMPS SHALL BE GE, OSRAM, SYLVANIA OR PHILLIPS OF PROPER SIZE, TYPE VOLTAGE AND COLOR AS INDICATED ON THE DRAWINGS. REFER TO FIXTURE SCHEDULE ON DRAWINGS FOR DESCRIPTION.

5.11 MOTOR AND CONTROL WIRING:  
PROVIDE WIRE TO AND CONNECT MOTORS INDICATED ON THE DRAWINGS THAT ARE NOT PRE-WIRED BY THE SUPPLIER OF THE EQUIPMENT CONTROL WIRING AND CONDUIT FOR HVAC RELATED EQUIPMENT SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.

5.12 ELECTRICAL IDENTIFICATION:  
IDENTIFICATION DEVICE COLORS: USE THOSE PRESCRIBED BY ANSI A13.1, NFPA 70, AND THESE SPECIFICATIONS.  
TAPE MARKERS FOR CONDUCTORS: VINYL OR VINYL-CLOTH, SELF-ADHESIVE, WRAPAROUND TYPE WITH PREPRINTED NUMBERS AND LETTERS.  
COLOR-CODING CABLE TIES: TYPE 6/6 NYLON, SELF-LOCKING TYPE. COLORS TO SUIT CODING SCHEME.  
UNDERGROUND WARNING TAPE: PERMANENT, BRIGHT-COLORED, CONTINUOUS-PRINTED, VINYL TAPE COMPOUNDED FOR PERMANENT DIRECT-BURIAL INSTALLATION. WITH THE FOLLOWING FEATURES: NOT LESS THAN 6 INCHES WIDE BY 4 MILS THICK (150 MM WIDE BY 0.102 MM THICK).  
EMBEDDED CONTINUOUS METALLIC STRIP OR CORE WITH A PRINTED LEGEND THAT INDICATES TYPE OF UNDERGROUND LINE.  
ENGRAVED-PLASTIC LABELS, SIGNS, AND INSTRUCTION PLATES: ENGRAVED STOCK, MELAMINE PLASTIC LAMINATE PUNCHED OR DRILLED FOR MECHANICAL FASTENERS 1/16-INCH MINIMUM THICKNESS FOR SIGNS UP TO 20 SQ. INCH AND 1/8-INCH MINIMUM THICKNESS FOR LARGER SIGNS. ENGRAVED LEGEND IN BLACK LETTERS ON WHITE BACKGROUND.  
WARNING AND CAUTION SIGNS: PREPRINTED; COMPLY WITH 29 CFR 1910.145, CHAPTER XVII, COLORS, LEGEND, AND SIZE APPROPRIATE TO EACH APPLICATION.  
INTERIOR UNITS: ALUMINUM, BAKED-ENAMEL-FINISH, PUNCHED OR DRILLED FOR MECHANICAL FASTENERS.  
EXTERIOR UNITS: WEATHER-RESISTANT, NON-FADING, PREPRINTED, CELLULOSE-ACETATE BUTYRATE WITH 0.0396-INCH (1-MM), GALVANIZED-STEEL BACKING, 1/4-INCH (6-MM) GROMMETS IN CORNERS FOR MOUNTING.  
FASTENERS FOR NAMEPLATES AND SIGNS: SELF-TAPPING, STAINLESS-STEEL SCREWS OR NO. 10/32 STAINLESS-STEEL MACHINE SCREWS WITH NUTS AND FLAT AND LOCK WASHERS.

5.13 SERVICE ENTRANCE EQUIPMENT:  
THE CONTRACTOR SHALL FURNISH AND INSTALL ALL SERVICE ENTRANCE EQUIPMENT AS INDICATED BY THE DRAWINGS AND REQUIRED TO COMPLETE THE ELECTRICAL SYSTEM FROM THE POINT OF SERVICE BY THE POWER COMPANY.  
THE SERVICE SHALL BE UNDERGROUND TO THE ENTRANCE EQUIPMENT AND METERING BY THE POWER COMPANY OR AS OTHERWISE INDICATED. THE SERVICE NEUTRAL SHALL BE GROUNDED WITH CODE SIZE CONDUCTOR.  
ALL METERING PROVISIONS AND OTHER SERVICE WORK SHALL MEET REQUIREMENTS OF THE POWER COMPANY. THE CONTRACTOR SHALL PAY ALL CHARGES FOR SERVICE TO THE POWER COMPANY.  
MANUFACTURERS SHALL BE SQUARE D, GENERAL ELECTRIC, CUTLER-HAMMER, SIEMENS.

5.14 GROUNDING:  
PROVIDE GROUNDING CONDUCTOR OF SIZE INDICATED ON DRAWINGS IN ACCORDANCE WITH THE NEC AND ALL LOCAL CODES. BOND THE DATA MANUFACTURER PIPE SYSTEM TO THE MAIN ELECTRICAL GROUNDING SYSTEM.

## 6.0 EXECUTION

6.1 ELECTRICAL EQUIPMENT INSTALLATION:  
CONVENIENCE MAINTENANCE: IF MOUNTING HEIGHTS OR OTHER LOCATION CRITERIA ARE NOT INDICATED, ARRANGE AND INSTALL COMPONENTS AND EQUIPMENT TO PROVIDE MAXIMUM POSSIBLE HEADROOM.

6.2 MATERIALS AND COMPONENTS: INSTALL LEVEL, PLUMB, AND SQUARE. RECEPTACLES SHALL BE BUILDING SYSTEMS AND COMPONENTS, UNLESS OTHERWISE INDICATED.

6.3 EQUIPMENT: INSTALL TO FACILITATE SERVICE, MAINTENANCE, AND REPAIR OR REPLACEMENT OF COMPONENTS. CONNECT FOR EASE OF DISCONNECTING, WITH MINIMUM INTERFERENCE WITH OTHER INSTALLATIONS.

6.4 RIGHT OF WAY: GIVE TO RACEWAYS AND PIPING SYSTEMS INSTALLED AT A REQUIRED SLOPE.

6.5 RACEWAY APPLICATION:  
OUTDOOR INSTALLATIONS:  
EXPOSED: IMC, RMC, RNC.  
CONCEALED: IMC, RMC, RNC.  
UNDERGROUND, SINGLE RUN: RNC, RMC.  
UNDERGROUND, GROUPED: RNC.  
CONNECTION TO VIBRATING EQUIPMENT: LFMC.  
BOXES AND ENCLOSURES: NEMA 250, TYPE 3R OR TYPE 4, UNLESS OTHERWISE INDICATED.  
INDOOR INSTALLATIONS:  
EXPOSED: EMT EXCEPT IN WET OR DAMP LOCATIONS, USE IMC. CONCEALED IN WALLS OR CEILINGS: EMT.  
IN CONCRETE SLAB: RNC, IMC, RMC.  
BELOW SLAB ON GRADE OR IN CRAWLSPACE: RNC, IMC, RMC.  
CONNECTION TO VIBRATING EQUIPMENT: FMC, EXCEPT IN WET OR DAMP LOCATIONS: LFMC.

6.6 BOXES AND ENCLOSURES: NEMA 250, TYPE 1, UNLESS OTHERWISE INDICATED.

6.7 RACEWAY AND CABLE INSTALLATION:  
CONCEAL RACEWAYS AND CABLES, UNLESS OTHERWISE INDICATED, WITHIN FINISHED WALLS, CEILINGS, AND FLOORS. KEEP LEGS OF RACEWAY BENDS IN THE SAME PLANE AND KEEP STRAIGHT LEGS OF OFFSETS PARALLEL. USE RMC ELBOWS WHERE RNC TURNS OUT OF SLAB. INSTALL PULL WIRES IN EMPTY RACEWAYS. USE NO. 14 AWG ZINC-COATED STEEL OR WOVEN POLYPROPYLENE OR MONOFILAMENT PLASTIC LINE WITH NOT LESS THAN 200-LB (90-KG) TENSILE STRENGTH. LEAVE AT LEAST 12 INCHES (300 MM) OF SLACK AT EACH END OF CONDUIT. INSTALL TELEPHONE AND SIGNAL SYSTEM RACEWAYS: 2-INCH TRADE SIZE AND SMALLER, IN MAXIMUM LENGTHS OF 150 FEET (45 M) AND WITH A MAXIMUM OF TWO 90-DEG BENDS OR EQUIVALENT. ADD PULL BOXES WHERE NECESSARY TO ACCOMPLISH THIS.

CONNECT MOTORS AND EQUIPMENT SUBJECT TO VIBRATION, NOISE TRANSMISSION, OR MOVEMENT WITH A MAXIMUM OF 72-INCHES FLEXIBLE CONDUIT. INSTALL LFMC IN WET OR DAMP LOCATIONS. INSTALL SEPARATE GROUND CONDUCTOR ACROSS FLEXIBLE CONNECTIONS.  
SET FLOOR BOXES LEVEL AND TRIM AFTER INSTALLATION TO FIT FLUSH TO FINISHED FLOOR SURFACE.

7.0 WIRING METHODS FOR POWER, LIGHTING, AND CONTROL CIRCUITS:

7.1 FEEDERS:  
EXPOSED FEEDERS: INSULATED SINGLE CONDUCTORS IN RACEWAY. CONCEALED FEEDERS IN CEILINGS OR WALLS: INSULATED SINGLE CONDUCTORS IN RACEWAY.  
CONCEALED FEEDERS IN CONCRETE, BELOW FLOORS ON GRADE OR IN CRAWLSPACES: INSULATED SINGLE CONDUCTORS IN RACEWAY. UNDERGROUND FEEDERS: INSULATED SINGLE CONDUCTORS IN RACEWAY.

7.2 BRANCH CIRCUITS:  
EXPOSED BRANCH CIRCUITS: INSULATED SINGLE CONDUCTORS IN RACEWAY, METAL-CLAD CABLE.  
CONCEALED BRANCH CIRCUITS IN CEILINGS OR WALLS: INSULATED SINGLE CONDUCTORS IN RACEWAY, METAL-CLAD CABLE.  
CONCEALED BRANCH CIRCUITS IN CONCRETE OR BELOW FLOORS ON GRADE: INSULATED SINGLE CONDUCTORS IN RACEWAY. UNDERGROUND BRANCH CIRCUITS: INSULATED SINGLE CONDUCTORS IN RACEWAY.

7.3 REMOTE-CONTROL SIGNALING AND POWER-LIMITED CIRCUITS, SUPPORT INDIVIDUAL INSULATED CONDUCTORS IN RACEWAY UNLESS OTHERWISE INDICATED.

7.4 WIRING INSTALLATION:  
MAKE SPLICES AND TAPS THAT ARE COMPATIBLE WITH CONDUCTOR MATERIAL AND THAT POSSESS EQUIVALENT OR BETTER MECHANICAL AND INSULATION RATINGS THAN UN-SPLICED CONDUCTORS.

7.5 ELECTRICAL SUPPORTING DEVICE APPLICATION  
DAMP LOCATIONS AND OUTDOORS: HOT-DIP GALVANIZED MATERIALS OR NONMETALLIC, SLOTTED CHANNEL SYSTEM COMPONENTS.  
DRY LOCATIONS: STEEL MATERIALS.  
STRENGTH OF SUPPORTS: ADEQUATE TO CARRY PRESENT AND FUTURE LOADS, TIMES A SAFETY FACTOR OF AT LEAST FOUR WITH 200-LB (90-KG) MINIMUM DESIGN LOAD FOR EACH SUPPORT ELEMENT.

7.6 SUPPORT INSTALLATION:  
SUPPORT PARALLEL RUNS OF HORIZONTAL RACEWAYS TOGETHER ON TRAPEZE- OR BRACKET-TYPE HANGERS. SIZE SUPPORTS FOR MULTIPLE RACEWAY OR CABLE RUNS SO CAPACITY CAN BE INCREASED BY A 25 PERCENT MINIMUM IN THE FUTURE.  
SUPPORT INDIVIDUAL HORIZONTAL SINGLE RACEWAYS WITH SEPARATE, MALLEABLE-IRON PIPE HANGERS OR CLAMPS EXCEPT USE SPRING-STEEL FASTENERS FOR 1-1/2 INCH AND SMALLER SINGLE RACEWAYS ABOVE SUSPENDED CEILINGS AND FOR FASTENING RACEWAYS TO SLOTTED CHANNEL AND ANGLE SUPPORTS.  
SECURE ELECTRICAL ITEMS AND THEIR SUPPORTS TO BUILDING STRUCTURE, USING THE FOLLOWING METHODS UNLESS OTHER FASTENING METHODS ARE INDICATED:  
WOOD: WOOD SCREWS OR SCREW-TYPE NAILS.  
GYPSUM BOARD: TOGGLE BOLTS. SEAL AROUND SLEEVES WITH JOINT COMPOUND, BOTH SIDES OF WALL.  
MASONRY: TOGGLE BOLTS ON HOLLOW BLOCK AND EXPANSION BOLTS ON SOLID BLOCK. SEAL AROUND SLEEVES WITH MORTAR, BOTH SIDES OF WALL.  
NEW CONCRETE: CONCRETE INSERTS WITH MACHINE SCREWS AND BOLTS.  
EXISTING CONCRETE: EXPANSION BOLTS OR THREADED STUDS DRIVEN BY POWDER CHARGE AND PROVIDED WITH LOCK WASHERS.  
STRUCTURAL STEEL: SPRING-TENSION CLAMPS OR THREADED STUDS DRIVEN BY POWDER CHARGE AND PROVIDED WITH LOCK WASHERS.  
COMPLY WITH AWS D1.1 FOR FIELD WELDING.  
LIGHT STEEL FRAMING: SHEET METAL SCREWS.  
FASTENERS FOR DAMP, WET, OR WEATHER-EXPOSED LOCATIONS: STAINLESS STEEL.  
LIGHT STEEL: SHEET-METAL SCREWS.  
FASTENERS: SELECT SO LOAD APPLIED TO EACH FASTENER DOES NOT EXCEED 25 PERCENT OF ITS PROOF-TEST LOAD.

7.7 SLEEVES:  
INSTALL SLEEVES FOR CABLE AND RACEWAY PENETRATIONS OF CONCRETE SLABS AND WALLS UNLESS CORE-DRILLED HOLES ARE USED. INSTALL SLEEVES FOR CABLE AND RACEWAY PENETRATIONS OF MASONRY AND FIRE-RATED GYPSUM WALLS AND OF ALL OTHER FIRE-RATED FLOOR AND WALL ASSEMBLIES. INSTALL SLEEVES DURING ERECTION OF CONCRETE AND MASONRY WALLS.

7.8 IDENTIFICATION MATERIALS AND DEVICES  
SELF-ADHESIVE IDENTIFICATION PRODUCTS: CLEAN SURFACES BEFORE APPLYING.  
TAG AND LABEL CIRCUITS DESIGNATED TO BE EXTENDED IN THE FUTURE. IDENTIFY SOURCE AND CIRCUIT NUMBERS IN EACH CABINET, PULL AND JUNCTION BOX, AND OUTLET BOX.  
COLOR-CODING MAY BE USED FOR VOLTAGE AND PHASE IDENTIFICATION.  
INSTALL CONTINUOUS UNDERGROUND PLASTIC MARKERS DURING TRENCH BACKFILLING. FOR EXTERIOR UNDERGROUND POWER CONTROL, SIGNAL, AND COMMUNICATION LINES LOCATED DIRECTLY ABOVE POWER AND COMMUNICATION LINES. LOCATE 6 TO 8 INCHES BELOW FINISHED GRADE. IF WIDTH OF MULTIPLE LINES INSTALLED IN A COMMON TRENCH OR CONCRETE ENVELOPE DOES NOT EXCEED 16 INCHES, OVERALL, USE A SINGLE LINE MARKER.  
INSTALL WARNING, CAUTION, AND INSTRUCTION SIGNS WHERE REQUIRED TO COMPLY WITH 29 CFR 1910.145, CHAPTER XVII, AND WHERE NEEDED TO ENSURE SAFE OPERATION AND MAINTENANCE OF ELECTRICAL SYSTEMS AND OF ITEMS TO WHICH THEY CONNECT. INDOORS INSTALL ENGRAVED PLASTIC-LAMINATED INSTRUCTION SIGNS WITH APPROVED LEGEND WHERE INSTRUCTIONS ARE NEEDED FOR SYSTEM OR EQUIPMENT OPERATION. INSTALL METAL-BACKED BUTYRATE SIGNS FOR OUTDOOR ITEMS.  
INSTALL ENGRAVED-LAMINATED EMERGENCY-OPERATING SIGNS WITH WHITE LETTERS ON RED BACKGROUND WITH MINIMUM 3/8-INCH- (9-MM-) HIGH LETTERING FOR EMERGENCY INSTRUCTIONS ON POWER TRANSFER, LOAD SHEDDING, AND OTHER EMERGENCY OPERATIONS.

7.9 UTILITY COMPANY CONNECTION:  
INSTALL UTILITY COMPANY METERING EQUIPMENT ACCORDING TO UTILITY COMPANY'S WRITTEN REQUIREMENTS. PROVIDE GROUNDING AND EMPTY CONDUITS AS REQUIRED BY UTILITY COMPANY.

7.10 FIRESTOPPING:  
APPLY FIRESTOPPING TO CABLE AND RACEWAY SLEEVES AND OTHER PENETRATIONS OF FIRE-RATED FLOOR AND WALL ASSEMBLIES TO RESTORE ORIGINAL UNDISTURBED FIRE-RESISTANCE RATINGS OF ASSEMBLIES. FIRESTOPPING INSTALLATION IS SPECIFIED IN DIVISION 7 SECTION THROUGH-PENETRATION FIRESTOP SYSTEMS."

7.11 DEMOLITION:  
MAINTAIN ALL SERVICES, POWER, SOUND, TELEPHONE, ETC. TO EXISTING BUILDINGS OR AREAS. ANY INTERRUPTIONS OF SERVICES REQUIRED FOR "CUT-OVER" OR CONNECTIONS OF NEW CABLES, ETC. SHALL BE DONE AT A TIME THAT IS CONVENIENT TO THE OWNER AND SHALL BE APPROVED IN WRITING PRIOR TO THE INTERRUPTION. PROTECT EXISTING ELECTRICAL EQUIPMENT AND INSTALLATIONS INDICATED TO REMAIN. IF DAMAGED OR DISTURBED IN THE COURSE OF THE WORK, REMOVE DAMAGED PORTIONS AND INSTALL NEW PRODUCTS OF EQUAL CAPACITY, QUALITY, AND FUNCTIONALITY.

ACCESSIBLE WORK: REMOVE EXPOSED ELECTRICAL EQUIPMENT AND INSTALLATIONS, INDICATED TO BE DEMOLISHED, IN THEIR ENTIRETY. ABANDONED WORK: CUT AND REMOVE BURIED RACEWAY AND WIRING, INDICATED TO BE ABANDONED IN PLACE, 2 INCHES BELOW THE SURFACE OF ADJACENT CONSTRUCTION. CAP RACEWAYS AND PATCH SURFACE TO MATCH EXISTING FINISH.  
REMOVE, STORE, CLEAN, REINSTALL, RECONNECT, AND MAKE OPERATIONAL COMPONENTS INDICATED FOR RELOCATION.

7.12 CUTTING AND PATCHING:  
CUT, CHANNEL, CHASE, AND DRILL FLOORS, WALLS, PARTITIONS, CEILINGS, AND OTHER SURFACES REQUIRED TO PERMIT ELECTRICAL INSTALLATIONS. PERFORM CUTTING BY SKILLED MECHANICS OF TRADES INVOLVED. REPAIR, REFINISH AND TOUCH UP DISTURBED FINISH MATERIALS AND OTHER SURFACES TO MATCH ADJACENT UNDISTURBED SURFACES.

7.13 AS BUILT DRAWINGS:  
MAINTAIN ONE SET OF PRINTS ON THE JOB SHOWING LOCATIONS OF UNDERGROUND CONDUITS AND DUCTS. PROVIDE THE ARCHITECT WITH ONE SET OF SUCH "AS-BUILTS" ACCURATE, NEAT AND LEGIBLE DRAWINGS ON COMPLETION OF THE WORK.





- ELECTRICAL GENERAL NOTES:**
1. SEE ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT FIXTURE LOCATIONS AND ORIENTATIONS.
  2. REFER TO ARCHITECTURAL ELEVATIONS AND SECTIONS FOR ADDITIONAL LIGHTING FIXTURE MOUNTING DETAILS AND INFORMATION.
  3. THIS LIGHTING PLAN IS FOR TENANT ONLY. EXTERIOR LIGHTING IS EXISTING AND CONNECTED TO "HOUSE" UTILITIES.
  4. VERIFY ALL MOUNTING HEIGHTS AND PENDENT LENGTHS WITH ARCHITECT AND ENGINEER PRIOR TO ORDERING FIXTURES.
  5. ALL SWITCHES IN SUITES TO BE MOMENTARY TYPE SWITCHES.
  6. PROVIDE CEILING MOUNTED OCCUPANCY SENSOR FOR AUTOMATIC CONTROL OF ROOM LIGHTING. SENSOR SHALL OVERRIDE WALL CONTROL AND TURN OFF ROOM LIGHTS IF ROOM UNOCCUPIED FOR MORE THAN 20 MINUTES. PROVIDE ADDITIONAL SENSORS, RELAY PACKS, CONTROL WIRING, ETC. AS REQUIRED FOR COMPLETE COVERAGE OF ROOM AND CIRCUITS/SWITCH LEGS SHOWN. CONTROLS SHALL BE "MANUAL ON/AUTOMATIC OFF WITH THE EXCEPTION OF RESTROOMS, PUBLIC CORRIDORS, AND LOBBIES. THESE AREAS SHALL BE FULLY AUTOMATIC ON/AUTOMATIC OFF IN ACCORDANCE WITH IECC 2018.
  7. PROVIDE LEVITON DECORA 15 AMP SINGLE POLE AC QUIET SWITCHES OR EQUIVALENT, TYPICAL ALL LIGHTING SWITCHES.
  8. PROVIDE LEVITON DSL06-1LZ 300-WATT LED DECORA ROCKER SLIDE UNIVERSAL DIMMER OR EQUIVALENT, TYPICAL ALL DIMMER SWITCHES.

- ELECTRICAL LIGHTING PLAN KEYED WORK NOTES:**
1. TORK#2107 OR EQUIVALENT PHOTO CELL WITH DELAY OF UP TO TWO MINUTES TO PREVENT FALSE SWITCHING. WITH MOBILE LIGHTING LEVEL SELECTOR. GASKETED HEAVY DUTY DIE CAST ZINC HOUSING AND BASE. CO-ORDINATE TIME CLOCK SCHEDULE WITH OWNER. TO BE USED FOR NEW ADDITION.
  2. INSTALL JUNCTION BOX AND DIMMER SWITCH FOR CHANDELIER CONTROL. PROVIDE ALL NECESSARY WIRING.
  3. INSTALL JUNCTION BOX ABOVE CEILING FOR INSTALLATION OF CHANDELIER. INSTALL 24 INCH CEILING TILE BRIDGE LOCKING BOX SLIDER BRACKET WITH 4 IN. SQUARE TABS, GARVIN INDUSTRIES SKU#CTB-24LK. PROVIDE ALL NECESSARY WIRING.
  4. CONNECT ALL EMERGENCY EGRESS AND NIGHT LIGHTING FIXTURES TO NEAREST LIGHTING BRANCH CIRCUIT AHEAD OF ALL SWITCHING AND CONTROLS PER STATE AND LOCAL CODES. EXIT SIGNS SHALL NOT EXCEED 5 WATTS PER FACE.
  5. EXIT SIGNS SHALL BE PROVIDED AS PER LOCAL FIRE CODE REQUIREMENTS. CONNECT EXIT SIGN TO THE NEAREST LIGHTING CIRCUIT AHEAD OF SWITCH AND CONTROLS FOR CONTINUOUS OPERATION.
  6. E.C. SHALL CO-ORDINATE WITH ARCHITECT/OWNER FOR EXACT LOCATION OF ELECTRICAL PANELS PROVIDED BY LANDLORD.
  7. LOCATION FOR ELECTRONIC TIME CLOCK. CO-ORDINATE WITH ARCHITECT/OWNER FOR EXACT LOCATION OF TIME CLOCK

LEGEND	DETAIL	MODEL
[P]	LIGHTING POWER PACK	BZ-150
[P]	RECEPTACLE POWER PACK	BZ-250
[D]	DIMMER SWITCH	H703PTW
[OCC]	CEILING OCCUPANCY SENSOR	CL-205-1
[OS]	WALL MOUNTED OCCUPANCY SENSOR SWITCH	MSA-102
[M]	MOMENTARY SWITCH	LVSW-101

- LIGHT FIXTURE SCHEDULE NOTES:**
1. COORDINATE FINAL FIXTURE MAKE AND MODEL AND DIMMING WITH ARCHITECT.

**LIGHTING CONTROLS:**

AREA	CONTROLS
SUITES	LIGHTING IN THESE AREAS SHALL BE CONTROLLED VIA CEILING MOUNTED OCCUPANCY SENSOR ALONG WITH MOMENTARY OVERRIDE SWITCH.
LOBBY, DOM SUITE, ELECTRICAL CLOSET	SWITCH FOR MANUAL ON/OFF OF FIXTURES. FIXTURES DESIGNATED '---E' (EMERGENCY) TO REMAIN ENERGIZED AT ALL TIMES.
MEN, WOMEN, WH CLOSET	WALL MOUNTED OCCUPANCY SENSOR
HALLWAY	CEILING MOUNTED OCCUPANCY SENSOR. NO SWITCH CONTROL.

- LIGHTING CONTROLS NOTES:**
1. AUTOMATIC LIGHTING CONTROLS: OCCUPANCY SENSOR SHALL BE CAPABLE OF TURNING OFF LIGHTS WITHIN 20 MINUTES OF ALL OCCUPANT LEAVING THE SPACE AND SHALL BE MANUAL ON.
  2. ALL ILLUMINATED EXIT SIGN TO HAVE A MAX WATTAGE OF 5 PER SIDE.
  3. ALL EMERGENCY LIGHT SHALL OPERATE IN EMERGENCY CONDITION.

**1 ELECTRICAL LIGHTING PLAN**  
 SCALE: 3/16" = 1'-0"

MY SALON SUITES LIGHTING SCHEDULE 2022

LIGHT FIXTURE		LAMP					
CALL OUT	DESCRIPTION	PRE-APPROVED MANUFACTURER CATALOG #	HEIGHT	DESCRIPTION	PRE-APPROVED MANUFACTURER CATALOG #	WATTAGE (Corrected Load)	VOLTAGE
A	RECESSED 2X4 LED FLAT PANEL FOR T-GRID CEILING, WHITE FINISH, 3500K, DIMMABLE VIA 0-10V	ABB_FLP24-050V05	1.34"	LED	LED	53 watts	120 volts
AE	RECESSED 2X4 LED FLAT PANEL FOR T-GRID CEILING, WHITE FINISH, 3500K, DIMMABLE VIA 0-10V WITH 90 MINUTE EMERGENCY BATTERY BACK UP	ABB_FLP24-050V05EM	1.34"	LED	LED	53 watts	120 volts
B	RECESSED 2X2 LED FLAT PANEL FOR T-GRID CEILING, WHITE FINISH, 3500K, DIMMABLE VIA 0-10V	ABB_FLP22-028V05	1.34"	LED	LED	38 watts	120 volts
BE	RECESSED 2X2 LED FLAT PANEL FOR T-GRID CEILING, WHITE FINISH, 3500K, DIMMABLE VIA 0-10V WITH 90 MINUTE EMERGENCY BATTERY BACK UP	ABB_FLP22-028V05EM	1.34"	LED	LED	38 watts	120 volts
D	Ø1 LAMP 30" DIAMETER X 12" HEIGHT ROUND DRUM PENDANT WHITE SHADE WITH GRAY SPOTS ON FABRIC AND FIELD ADJUSTABLE ØP-NICKLE SYSTEM	SEASCAPES_THA0330X30X12-30-WHITE-GRAZ	48"	LED	TCP-89889 TCP-L8A1902500K	30 watts	120 volts
D Alt:	Ø1 LAMP 30" DIAMETER X 12" HEIGHT ROUND PENDANT WHITE SHADE WITH GRAY SPOTS ON FABRIC AND FIELD ADJUSTABLE ØP-NICKLE SYSTEM	SEASCAPES_THA0330X30X12-30-WHITE-GRAZ	48"	LED	TCP-50971 TCP-L8D5E1281130K	5 watts	120 volts
C	Ø7 INCANDESCENT HOUSING WITH CLEAR SPECULAR REFLECTOR AND WHITE FLANGE	ELITE_BB0CAT-7W (HOUSING) ELITE_AE03CAL-7W (TRIM)	6.14"	LED	TCP-46187 TCP-LED11P38035K9FL	20 watts	120 volts
CA (CALIFORNIA SPEC)	Ø7 INCANDESCENT HOUSING WITH GURA BASE 800 LUMEN 3500K TRIM WHITE FINISH	GREC_R02L2W (GURA HOUSING) GREC_CTR0000-3500-72 (GURA TRIM)	6.14"	LED	LED	12 watts	120 volts
FM2	2" LED DIFFUSER ENCLOSED LINEAR LUMINAIRE	MERCURY_LSA-2-2900-350K-HTA-UGS-LIN	3.58"	LED	LED	26 watts	120 volts
FM	4" LED DIFFUSER ENCLOSED LINEAR LUMINAIRE	MERCURY_LSA-4-4000-350K-HTA-UGS-LIN	3.58"	LED	LED	34 watts	120 volts
FM-EM	4" LED DIFFUSER ENCLOSED LINEAR LUMINAIRE w/EM	MERCURY_LSA-4-4000-350K-HTA-UGS-LINEM	3.58"	LED	LED	34 watts	120 volts
EA	UNIVERSAL MOUNT EXIT SIGN PLASTIC WHITE FINISH WITH RED LETTERS 90 MINUTE BATTERY BACK UP	ELITE_EL3602W	8.58"	LED	LED	3 watts	120 volts
EB-W	2 HEADED SURFACE MOUNTED EMERGENCY LIGHT WHITE FINISH 90 MINUTE BATTERY BACK UP	ELITE_ELMLED803W	3.34"	LED	LED	2 watts	120 volts
EB-B	2 HEADED SURFACE MOUNTED EMERGENCY LIGHT BLACK FINISH 90 MINUTE BATTERY BACK UP	ELITE_ELMLED801B	3.34"	LED	LED	2 watts	120 volts
EE	EXTERIOR RATED SURFACE MOUNTED EMERGENCY LIGHT WITH 90 MINUTE BATTERY BACK UP BRONZE FINISH	ELITE_ELM807BZ-SGT	9.10"	LED	LED	12 watts	120 volts
EX	LED ADJUSTABLE RECESSED OR SURFACE MOUNTED SINGLE SIDED EXT SIGN RED LETTERS ON CLEAR GLASS 90 MINUTE BATTERY BACK UP	CONTECH_REXA-SE-EM-CL-E	3.10"	LED	LED	3 watts	120 volts
EX1	LED ADJUSTABLE RECESSED OR SURFACE MOUNTED DOUBLE SIDED EXT SIGN RED LETTERS ON CLEAR GLASS 90 MINUTE BATTERY BACK UP	CONTECH_REXA-DE-EM-CL-E	3.10"	LED	LED	3 watts	120 volts
EY	WHITE PLASTIC UNIVERSAL MOUNT EXIT SIGN WITH 2 HEADED EM LIGHT RED LETTERS 90 MINUTE BATTERY BACK UP	ELITE_ELX703-B/W	8.316"	LED	LED	2 watts	120 volts
W	Ø1 LIGHT WALL MOUNTED INCANDESCENT WALL SCONCE ON RUBBER BRONZE FINISH WITH frosted GLASS	MURRAY_FEISS_WM122000B	15.78"	LED	TCP-89889 TCP-L8A1902500K	9 watts	120 volts

Prepared by: Capital Light

Issue Date: 10/01/17

Page 1 of 1

	EXISTING	FURNISHED BY			INSTALLED BY			REMARKS
		LANDLORD	OWNER/FRANCHISEE	OWNER'S VENDOR	TENANT CONTRACTOR	LANDLORD	OWNER/FRANCHISEE	
ELECTRICAL RESPONSIBILITY SCHEDULE								
MAIN OVERCURRENT DEVICE	X							
SERVICE ENTRANCE CONDUIT	X							
SERVICE ENTRANCE FEEDERS	X							
METER REQUIREMENTS				X			X	SET UP ELECTRIC SERVICE IN TENANT'S NAME. PROVIDE LABELS FOR EXISTING METER SOCKETS.
ELECTRICAL PANELS		X					X	
WIRING				X			X	
TRANSFORMER								
SIGN PHOTOCELL				X			X	
SIGN J-BOX				X			X	
FIRE ALARM SYSTEM AND DEVICES				NA			NA	
LIGHT FIXTURES				X			X	CAPITOL LIGHT / RON AMARA PH: (860) 526-4001; RON.AMARA@CAPITOLLIGHT.COM
RECEPTACLES				X			X	CAPITOL LIGHT / RON AMARA PH: (860) 526-4001; RON.AMARA@CAPITOLLIGHT.COM
SECURITY SYSTEM			X			X		CONTRACTOR TO INSTALL CONDUIT AND J-BOXES AS REQUIRED. COORDINATE INSTALLATION WITH VENDOR KEVIN RICHARDS (AFA) 407.496.2546
JUNCTION BOX			X			X		CONTRACTOR TO INSTALL CONDUIT AND J-BOXES AS REQUIRED. COORDINATE INSTALLATION WITH VENDOR KEVIN RICHARDS (AFA) 407.496.2546
WIRING AND DEVICES			X			X		CONTRACTOR TO INSTALL CONDUIT AND J-BOXES AS REQUIRED. COORDINATE INSTALLATION WITH VENDOR KEVIN RICHARDS (AFA) 407.496.2546
CONDUIT				X			X	
DATA WIRING			X				X	
INTERNET		X					X	

Lighting Symbols

TYPE	SYMBOL	DESCRIPTION
A		2x4 LED LIGHT FIXTURE
AE		EMERGENCY / NIGHT LIGHT W/ BATTERY PACK
B		
BE		
C		RECESSED CAN LIGHT
CA		RECESSED CAN LIGHT - CALIFORNIA
D		
D1		
F		LED STRIP LIGHT
EA		EXIT LIGHT
EB		COMBINATION EXIT / EMERGENCY LIGHT WITH BATTERY BACK UP
		EXHAUST FAN

Power Symbols

	ABOVE CEILING MOUNTED JUNCTION BOX FOR FUTURE CHANDELIER
	JUNCTION BOX
	SWITCH AT 46" A.F.F.
	MOMENTARY SWITCH AT 46" A.F.F.
	DIMMER SWITCH AT 46" A.F.F.
	OCCUPANCY SENSOR
	POWER PACK - SEE SWITCHING DIAGRAM
	4-PLEX OUTLET (110V) @ 15" A.F.F. UNO
	1 QUAD BOX FOR STYLIST STATION - ONE DEDICATED BLACK DUPLEX FOR TOOL POWER STRIP IN STATION. ONE WHITE DUPLEX FOR MIRROR LIGHT PLUG AND USB / DUPLEX PLUG. BOTH WITHIN THE MILLWORK.
	DUPLEX OUTLET (110V) @ 15" A.F.F. UNO
	SINGLE SWITCH OUTLET
	GROUND FAULT INTERRUPT OUTLET (110V)
	220V OUTLET
	CEILING MOUNTED DOOR CONTACT
	PUSH BUTTON ACCESS CONTROL FOR ENTRY / EXIT TIED TO MAGLOCKS
	ALARM KEYPAD
	CARD READER
	ELECTRICAL PANEL
	TELEPHONE MOUNTING BOARD W/ 4-PLEX OUTLET
	INTERCOM SYSTEM HEIGHT 4'-8" AFF (2 GANG-BOX)

WATTSTOPPER SENSORS OCCUPANCY & VACANCY



PASSIVE INFRARED CEILING SENSORS

CI-200 SERIES

360° coverage

User-adjustable time delay and sensitivity

Low-profile design

Built-in light level sensor



Isolated relay for use with HVAC or other control systems

ASIC enhances reliability and helps eliminate false triggers

Automatic or manual-on operation when used with a BZ-150 Power Pack

Description

Wattstopper's CI-200 Series Passive Infrared (PIR) Ceiling Sensors provide 360° coverage to detect occupancy in the controlled area. These low-profile sensors reliably control lighting in a variety of applications.

Operation

The CI-200 Series Sensors are 24 VDC and control lighting through Wattstopper power packs. Utilizing the latest PIR technology, they turn lighting on when a difference is detected between the infrared energy from a human being in motion and the background space within the controlled area. After the area is vacated for a user-adjustable time delay, lighting automatically turns off.

Features

- ASIC technology reduces components and enhances reliability
- Pulse Count Processing eliminates false off without reducing sensitivity
- Detection Signature Analysis eliminates false triggers and provides immunity to RFI and EMI
- Low-profile design ensures a clean and uncluttered ceiling appearance
- User-adjustable time delay from 15 seconds to 30 minutes by two-minute increments

Coverage

Coverage from the CI-200 Series Sensors can reach up to 1200 square feet using the Extended Range Lens, and 500 square feet using the High Density Lens (circular pattern) for walking motion. For typical desktop-level activity, coverage can reach up to 300 square feet.

Applications

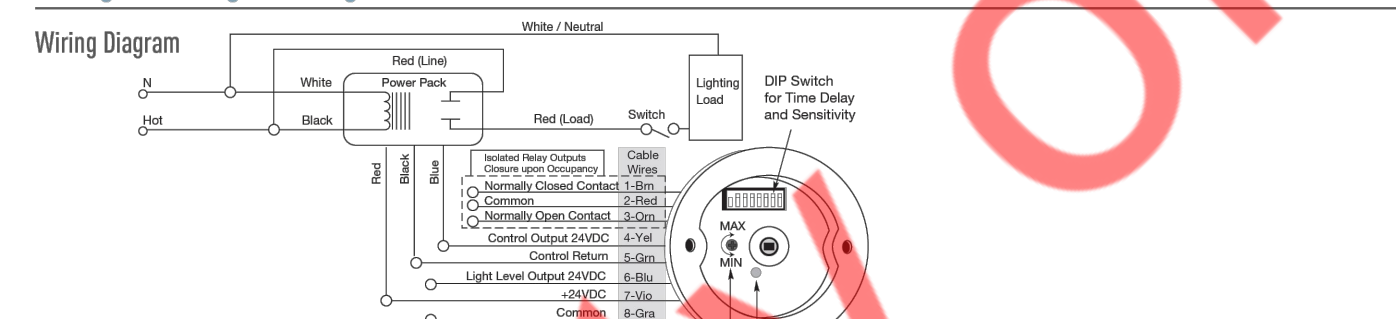
Applications include open office spaces, computer rooms, conference rooms, classrooms and warehouses. Areas with high ceilings or with two-level lighting can also be controlled. Due to low initial cost and the great energy saving potential, the sensors offer fast paybacks.

- Sensitivity is programmed through a DIP switch which has four settings ranging from minimum to maximum
- Light-level output can create bi-level lighting for added convenience and energy savings
- Isolated relay can be used to interface with HVAC, EMS or an additional lighting load
- LED indicates occupancy detection

Specifications

- Dual-element, temperature compensated pyroelectric sensor
- CI-200 contains isolated relay with N/O and N/C outputs; rated for 1 Amp at 24 VDC/VAC
- Adjustable digital time delay: 15 seconds to 30 minutes with ± 2% tolerance
- Integrated light level sensor: 4-190 footcandles (43-2,045 lux)
- Mounting options: ceiling tile, round mud ring
- Max. CI-200s per power pack: B = 5, BZ = 7
- Max. CI-205s per power pack: B = 10, BZ = 7
- Dimensions: 3.3" x 2.2" (84 mm x 56 mm) diameter x depth; extends approximately .36" (9 mm) from ceiling
- UL and cUL listed
- Five year warranty

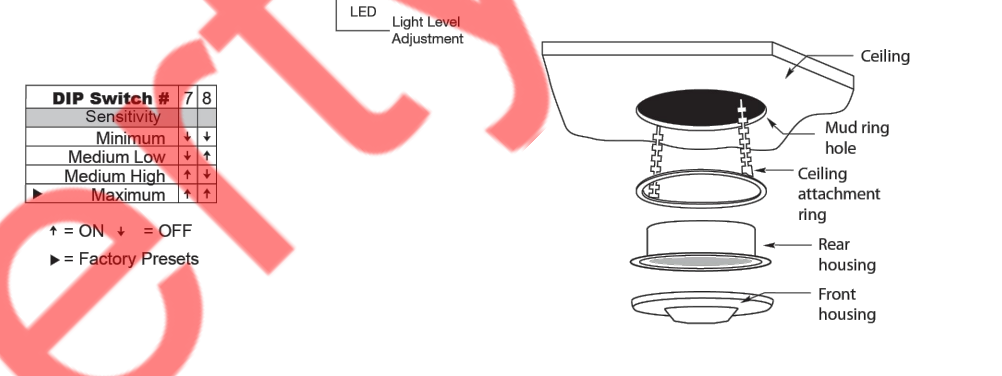
Wiring, Mounting & Settings



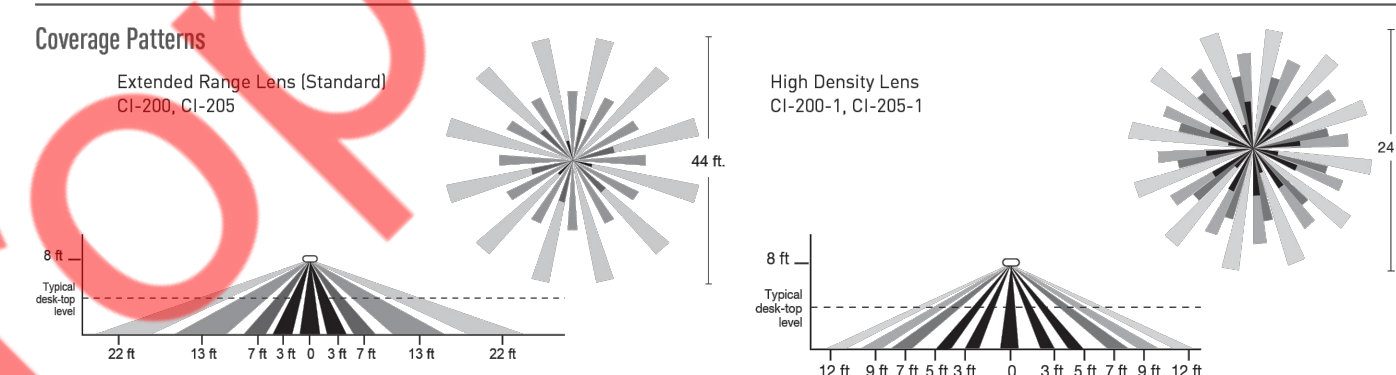
DIP Switch Settings

DIP Switch #	1	2	3	4	5
Time delay	15 seconds	2 minutes	4 minutes	8 minutes	15 minutes
	2 minutes	4 minutes	8 minutes	15 minutes	30 minutes
	4 minutes	8 minutes	15 minutes	30 minutes	Service

Mounting



Coverage

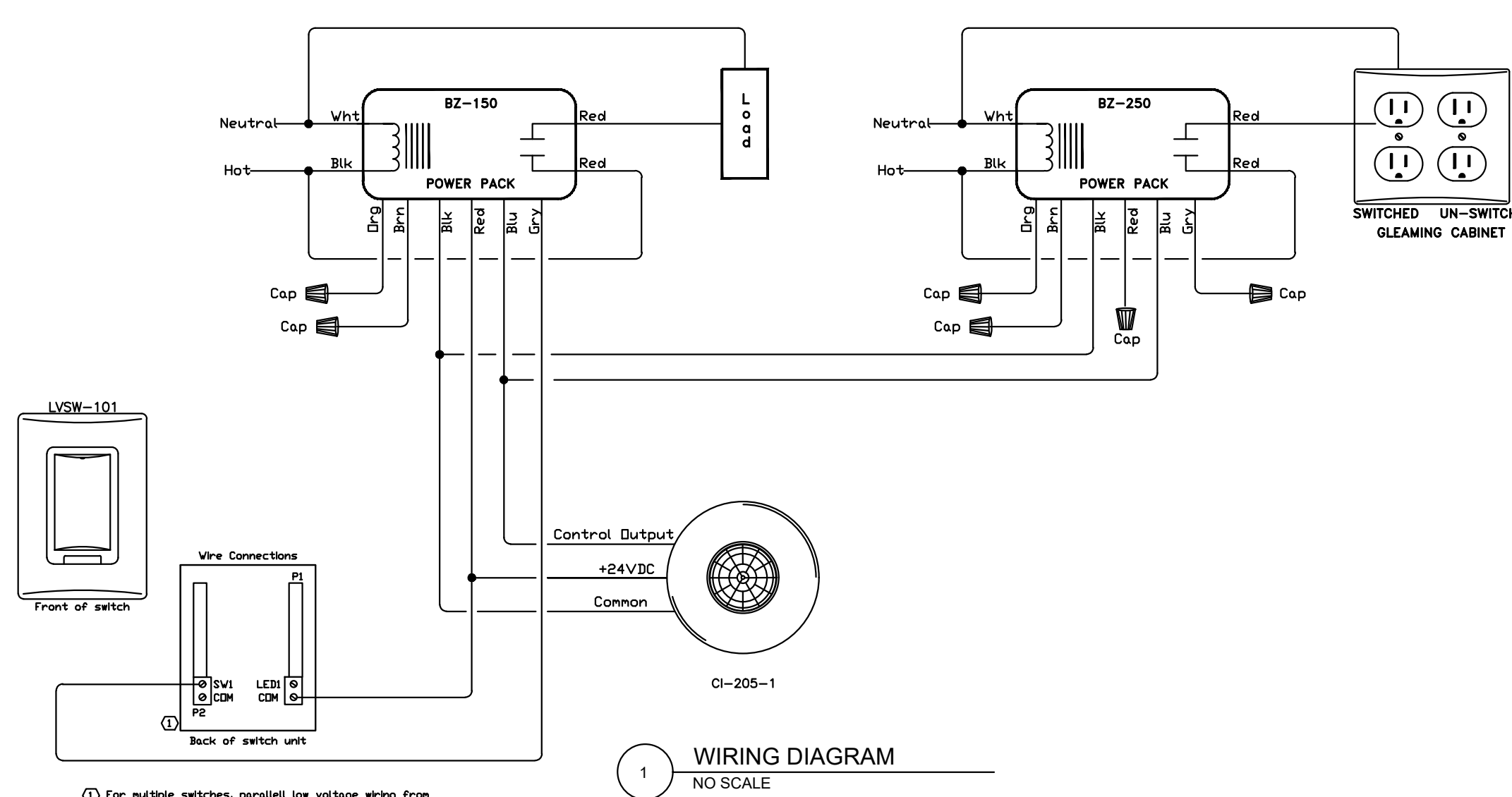


Ordering Information

Catalog #	Voltage	Current	Coverage	Features
CI-200	24 VDC	20 mA	360°; up to 1200 ft² (111.5 m²)	Isolated relay, light level
CI-200-1	24 VDC	20 mA	360°; up to 500 ft² (46.5 m²)	Isolated relay, light level
CI-205	24 VDC	11 mA	360°; up to 1200 ft² (111.5 m²)	
CI-205-1	24 VDC	11 mA	360°; up to 500 ft² (46.5 m²)	
MB-1	Industrial Mounting Bracket			
MB-2	Wattstopper Mounting Bracket for HID fixtures			

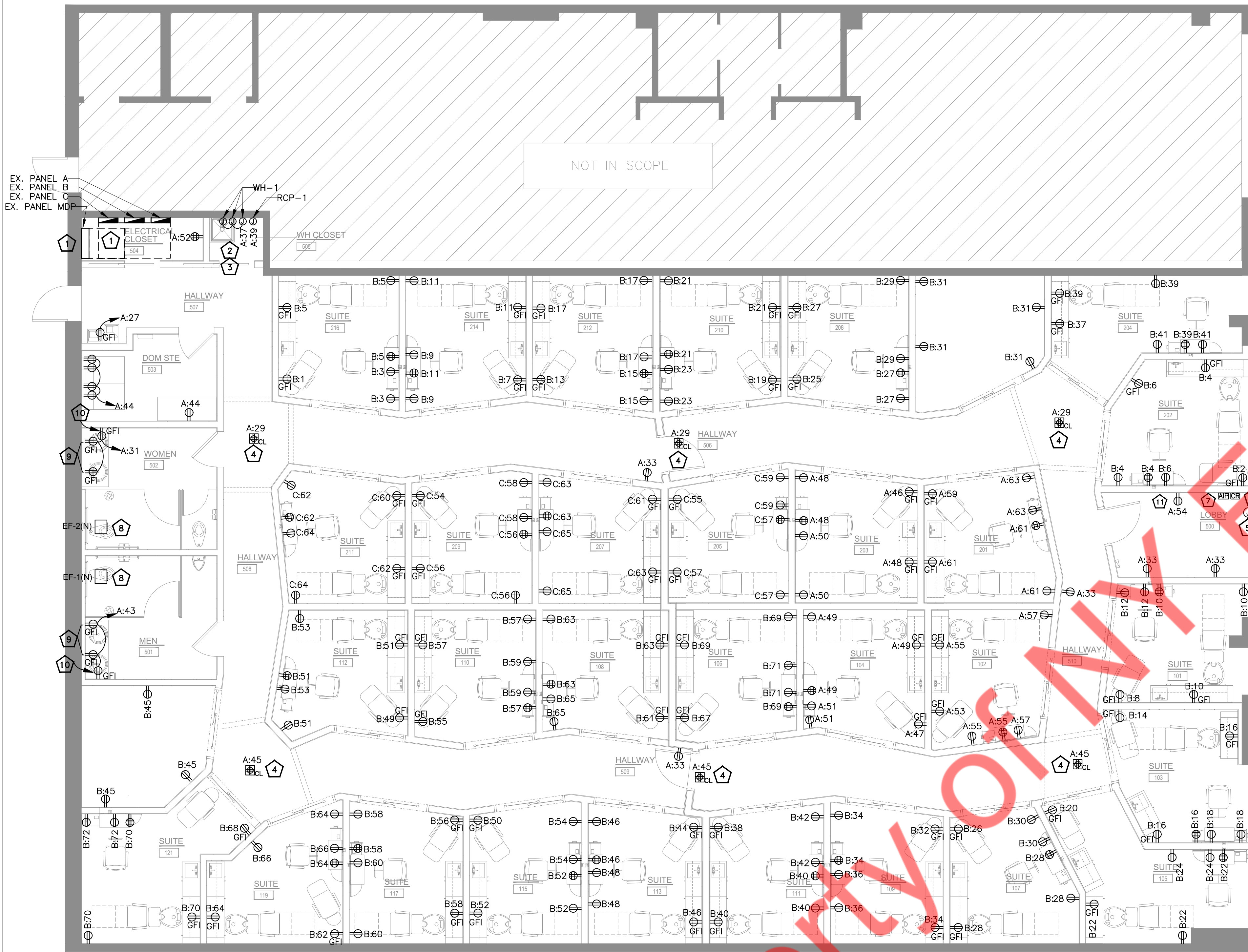
All units are white and use Wattstopper power packs. Current consumption can be slightly higher when only one sensor per power pack is used.

PROJECT: \_\_\_\_\_ LOCATION/TYPE: \_\_\_\_\_



For multiple switches, parallel the voltage wiring from the switches to the powerpack and occupancy sensor.

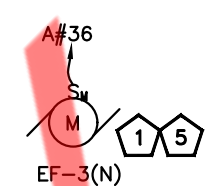
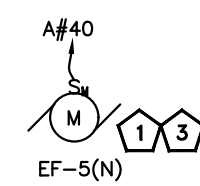
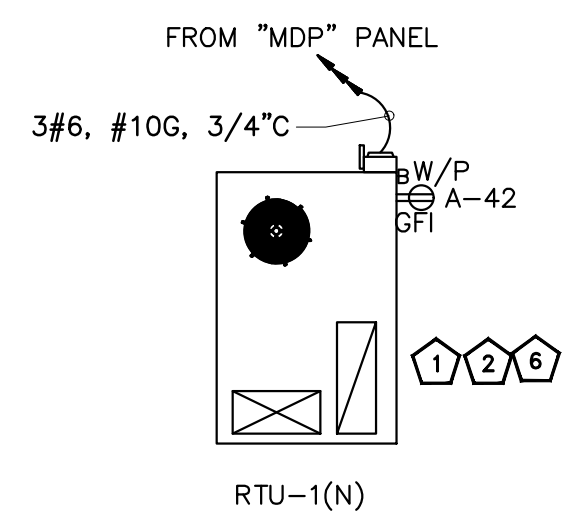
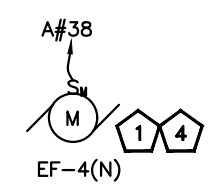
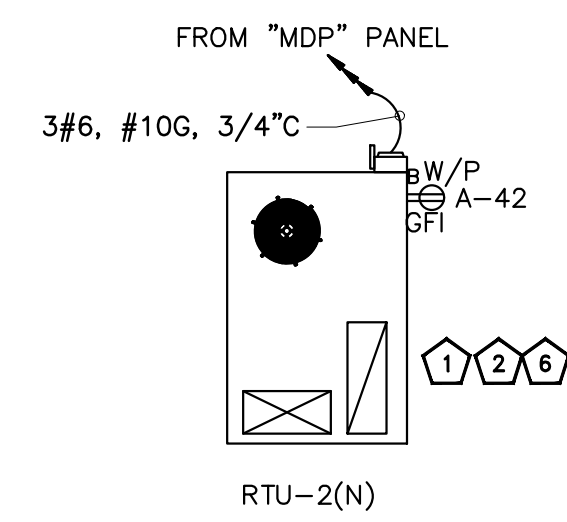
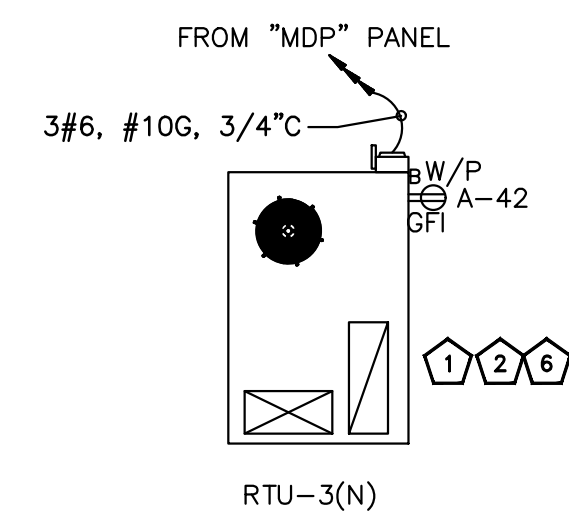
1 WIRING DIAGRAM NO SCALE



- ELECTRICAL GENERAL NOTES:**
- CIRCUITING WORK SHOWN ON DRAWINGS IS FOR SCHEMATIC GENERAL GRAPHIC REPRESENTATION ONLY. DETERMINE SPECIFICS IN FIELD (POINT-TO POINT ROUTING, HOME-RUN LOCATIONS, METHODS OF CONCEALMENT, ETC.).
  - REFER TO EQUIPMENT COORDINATION SCHEDULES FOR REQUIREMENTS ASSOCIATED WITH EQUIPMENT CIRCUITING, CONNECTIONS, ANCILLARY DEVICES AND EQUIPMENT, ETC. COORDINATE LOCATION AND REQUIREMENTS FOR ALL EQUIPMENT WITH RESPECTIVE EQUIPMENT SUPPLIERS AND INSTALLERS PRIOR TO ORDERING ANY RELATED MATERIALS OR COMMENCING WITH ANY RELATED ROUGH-IN WORK.
  - REFER TO ARCHITECTURAL ELEVATIONS FOR INTENDED LOCATIONS AND MOUNTING HEIGHTS FOR EQUIPMENT AND OUTLETS, ETC. PRIOR TO COMMENCING WITH ANY RELATED ROUGH-IN WORK.
  - PROVIDE RECEPTACLES IN ROOMS USED FOR MEETINGS, CONFERENCES, COMPLIANT WITH NFPA 70 (NATIONAL ELECTRICAL CODE (NEC)), INCLUDING ARTICLE 210.71. E.T.C PROVIDE RACEWAY AND PATHWAY SYSTEMS FOR ALL TECHNOLOGY WORK. INCLUDE OUTLET BOXES, CONDUITS, RACEWAYS, J-HOOKS, CABLE TRAY, AS REQUIRED FOR COMPLETE OPERATIONAL SYSTEMS. COORDINATE ALL RELATED WORK (INCLUDING ASSOCIATED POWER) WITH OWNER (INCLUDING OWNER'S PROJECT MANAGER), FIELD CONDITIONS, FURNITURE INSTALLER(S), TECHNOLOGY INSTALLER(S) AND WORK OF OTHER TRADES AND SUPPLIERS/INSTALLERS AS APPLICABLE. TERMINATE ALL CONDUITS FROM OUTLET BOXES TO NEAREST ACCESSIBLE CEILING DOWNSIDE OR TO OVERHEAD STRUCTURAL SPACE FOR AREAS WITH NO CEILINGS. PROVIDE CONDUITS WITH SWEEP BENDS, FULL STRINGS, PLASTIC BUSHINGS AND IDENTIFICATION AT OVERHEAD ENDS. PROVIDE BLANK WALL PLATES TO MATCH WIRING DEVICE WALL PLATES.
  - INSTALL RECEPTACLE(S) INDICATED ABOVE STOREFRONT WINDOWS WITHIN 18 INCHES OF THE TOP OF STOREFRONT WINDOWS, AND INSTALL COMPLIANT WITH NEC, INCLUDING ARTICLE 210.62.
  - PROVIDE GFCI PROTECTION FOR PERSONNEL FOR ALL SINGLE-PHASE RECEPTACLES RATED 150 VOLTS TO GROUND OR LESS, 50 AMPERES OR LESS AND THREE-PHASE RECEPTACLES RATED 150 VOLTS TO GROUND OR LESS, 100 AMPERES OR LESS INSTALLED IN/FOR THE FOLLOWING LOCATIONS/APPLICATIONS: BATHROOMS, KITCHENS, ROOFTOPS, OUTDOORS, SINKS (WHERE RECEPTACLES ARE INSTALLED WITHIN 6 FEET FROM THE TOP INSIDE EDGE OF THE BOWL OF THE SINK), INDOOR WET LOCATIONS, VENDING MACHINES AND AREAS, ELECTRIC WATER COOLERS, DRYER ROOMS WITH ASSOCIATED FACILITIES, SHOWERS, GARAGES, SERVICE BAYS, AND SIMILAR AREAS OTHER THAN VEHICLE EXHIBITION HALLS AND SHOWROOMS. PROVIDE GFCI RECEPTACLES AT LOCATIONS THAT ARE AND WILL REMAIN READILY ACCESSIBLE. ELSEWHERE PROVIDE GFCI PROTECTION AT THE RESPECTIVE SOURCE CIRCUIT BREAKER.
  - SEPARATE DEVICE BOXES BY A MINIMUM OF 6 INCHES WHERE INSTALLED BACK-TO-BACK WITHIN DEMISING WALLS TO MAINTAIN REQUIRED FIRE AND SOUND RATING (TYPICAL OF ALL DEVICE BOXES INSTALLED ON DEMISING WALLS). ADDITIONALLY, PROVIDE LISTED FIRE-RATED WRAPS AROUND ALL RECESSED OUTLET, DEVICE AND EQUIPMENT BOXES IN FIRE/SMOKE RATED WALLS, CEILINGS AND FLOORS TO MEET OR EXCEED THE RESPECTIVE FIRE/SMOKE RATING OF THE SURFACE.
  - SEAL ALL PENETRATIONS THROUGH FIRE-RATED AND/OR SMOKE-RATED MEMBRANES (FLOORS, WALLS, CEILINGS, ETC.) USING SEALANT PRODUCTS THAT MEET OR EXCEED THE RATING OF THE RESPECTIVE MEMBRANE.
  - PROVIDE FACTORY-PAINTED OR FIELD-PAINTED TRIMS AND DOORS TO MATCH WALL FINISH COLOR FOR ALL PANELBOARDS AND SIMILAR EQUIPMENT THAT ARE INSTALLED RECESSED IN FINISHED WALLS. IF FIELD-PAINTED, PAINT ALL SIDES AND EDGES WITH TWO COATS OF PAINT BEFORE INSTALLATION, AND LET DRY BEFORE INSTALLING THEM.
  - INSTALL SWITCHES AND/OR RECEPTACLES GANGED WHEREVER POSSIBLE FOR INSTANCES WHERE THEY ARE SHOWN TOGETHER. THIS INCLUDES LOCATIONS ABOVE COUNTERS AND WORK SURFACES WHERE APPLICABLE.
  - REFER TO ELECTRICAL DETAILS AND SPECIFICATIONS FOR ADDITIONAL ELECTRICAL WORK ASSOCIATED WITH ELEVATOR(S).
  - INSTALL WALL-MOUNTED SWITCHES, CONTROLS, RECEPTACLES, OUTLETS, ETC. AT LEAST 6 INCHES FROM WALL CORNERS.
  - CONCEAL ALL CONDUIT DROPS AND RISES WITHIN WALLS, AND PROVIDE FLUSH-MOUNTED WALL OUTLET BOXES UNLESS OTHERWISE NOTED.
  - REVIEW DOCUMENTS OF OTHER TRADES, INCLUDING ARCHITECTURAL, PRIOR TO SUBMITTING A BID. PROVIDE ELECTRICAL WORK FOR EQUIPMENT, DEVICES, ETC. OF OTHER TRADES AS REQUIRED TO RENDER THEM FULLY OPERATIONAL.
  - COORDINATE ALL SIGNAGE REQUIREMENTS WITH OWNER (INCLUDING OWNER'S PROJECT MANAGER), SIGNAGE SUPPLIERS AND INSTALLERS, AND ARCHITECT TO DETERMINE SPECIFICS REGARDING LOCATIONS, POWER, CONTROL, AND OTHER PERTINENT INFORMATION. PROVIDE POWER (ON DEDICATED CIRCUIT(S)) FOR SIGNAGE REQUIREMENTS. PROVIDE POWER CONNECTIONS, PROVIDE OCCLL AND TIME-BASED CONTROL CONFIGURED AS DIRECTED BY OWNER. PROVIDE ALL ELECTRICAL WORK, INCLUDING DISCONNECTING MEANS, COMPLIANT WITH ARTICLE 600 OF NFPA 70. COMPLY WITH LANDLORD REQUIREMENTS WHERE APPLICABLE.

- ELECTRICAL POWER KEYED NOTES:**
- EXISTING 120/208V, 3 PHASE, 4 WIRE, ELECTRICAL PANELS FOR SPACE. E.C. SHALL CO-ORDINATE WITH ARCHITECT/OWNER FOR EXACT LOCATION OF PANELS. ELECTRICAL PANELS ARE PROVIDED BY LANDLORD. E.C. SHALL PHYSICALLY VERIFY AND COORDINATE ADEQUATE WORKING SPACE FOR ELECTRICAL PANEL PER NEC 110.26.
  - ELECTRICAL POWER PROVISION FOR WATER HEATER (WH). E.C. SHALL CO-ORDINATE WITH MANUFACTURER/OWNER FOR EXACT POWER REQUIREMENT AND LOCATION RESPECTIVELY, PRIOR TO ROUGH-IN.
  - ELECTRICAL POWER PROVISION FOR WATER RECIRCULATION PUMP (RCP). E.C. SHALL CO-ORDINATE WITH MANUFACTURER/OWNER FOR EXACT POWER REQUIREMENT AND LOCATION RESPECTIVELY, PRIOR TO ROUGH-IN.
  - QUAD RECEPTACLE FOR WIFI ABOVE CEILING.
  - JUNCTION BOX FOR DOOR CONTACT, CO-ORDINATE EXACT LOCATION AND POWER REQUIREMENT WITH MANUFACTURER.
  - PROVIDE POWER OUTLET FOR CARD READER, CO-ORDINATE WITH ARCHITECT FOR EXACT LOCATION AND MOUNTING HEIGHT.
  - PROVIDE POWER OUTLET FOR AIRPHONE, CO-ORDINATE WITH ARCHITECT FOR EXACT LOCATION AND MOUNTING HEIGHT.
  - E.C. TO COORDINATE WITH MECHANICAL CONTRACTOR FOR INTERCONNECTING OF EF-1(N), EF-2(N), EF-5(N), WITH RTU-3(N). PROVIDE NECESSARY WIRING AND CONTROL AS REQUIRED.
  - E.C. SHALL INSTALL OUTLETS TO BE MOUNTED BELOW SINK/COUNTER FOR SOAP DISPENSER PLUG IN. TYPICAL MOUNTING HEIGHT ROUGHLY 28" - SEE SOAP DISPENSER AND FAUCET MANUFACTURER RECOMMENDATIONS
  - E.C. SHALL PROVIDE GFI OUTLET TO BE INSTALLED HORIZONTALLY ABOVE COUNTER - CENTER AT 42"
  - PROVIDE 120V RECEPTACLE AND TELEVISION OUTLET FOR WALL MOUNTED TELEVISION. COORDINATE LOCATION AND MOUNTING HEIGHT WITH OWNER/EQUIPMENT INSTALLER PRIOR TO ROUGH-IN.

**1 ELECTRICAL POWER PLAN**  
SCALE: 3/16" = 1'-0"



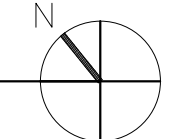
- ELECTRICAL POWER KEYED NOTES:**
- 1 E.C. SHALL COORDINATE FOR EXACT LOCATION OF MECHANICAL EQUIPMENTS WITH MECHANICAL DRAWINGS.
  - 2 E.C. SHALL COORDINATE DISCONNECT AND FUSE REQUIREMENT FOR MECHANICAL UNIT WITH MECHANICAL CONTRACTOR AND EQUIPMENT MANUFACTURER PRIOR TO ROUGH-IN AND PROVIDE AS REQUIRED. LOCATE AS REQUIRED TO MAINTAIN NEC CLEARANCES.
  - 3 E.C. TO COORDINATE WITH MECHANICAL CONTRACTOR FOR INTERCONNECTING OF EF-1(N), EF-2(N), EF-5(N), WITH RTU-3(N). PROVIDE NECESSARY WIRING AND CONTROL AS REQUIRED.
  - 4 E.C. TO COORDINATE WITH MECHANICAL CONTRACTOR FOR INTERCONNECTING OF EF-4(N) WITH RTU-2(N). PROVIDE NECESSARY WIRING AND CONTROL AS REQUIRED.
  - 5 E.C. TO COORDINATE WITH MECHANICAL CONTRACTOR FOR INTERCONNECTING OF EF-3(N), WITH RTU-1(N). PROVIDE NECESSARY WIRING AND CONTROL AS REQUIRED.
  - 6 ROOF TOP UNITS TO BE FED FROM THE EXISTING BREAKERS IN THE EXISTING MDP PANEL . E.C. TO VERIFY BREAKER RATINGS AND THEIR OPERABLE CONDITIONS IN THE FIELD AND PROVIDE CONNECTIONS ACCORDINGLY

Property of NY Engineers

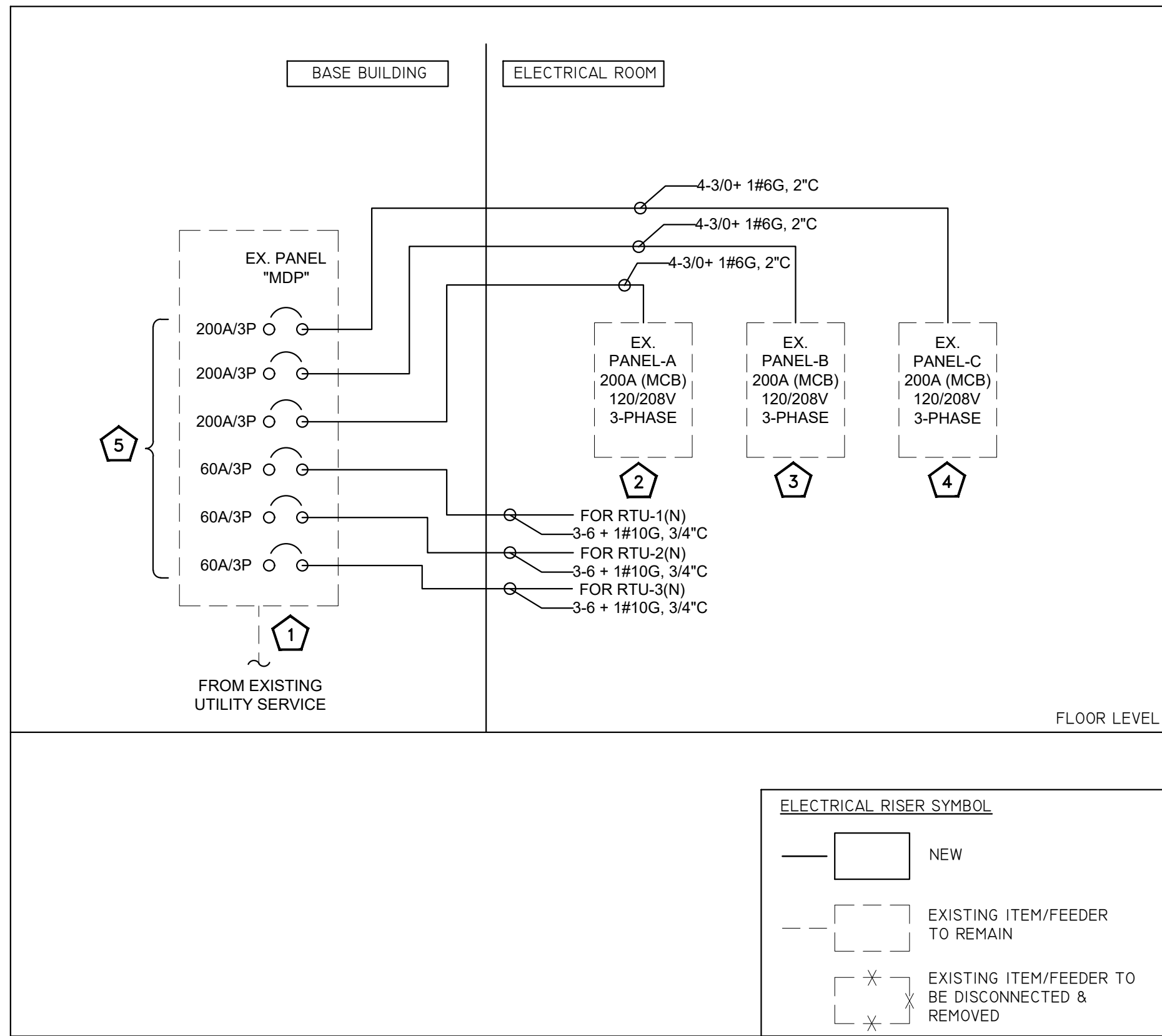


- GENERAL SYSTEMS PLAN NOTES:**
- A (GENERAL NOTE)**
1. INSTALLATION SHALL CONFORM TO ALL APPLICABLE NATIONAL, STATE AND LOCAL CODES.
  2. CONDUIT LAYOUTS SHOWN ON THE PLANS ARE DIAGRAMMATIC AND DO NOT INDICATE THE ROUTING REQUIRED. CONTRACTOR SHALL ROUTE CONDUITS AS REQUIRED BY THE CONDITIONS OF THE PROJECT.
  3. DEVICE LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE. REFER TO ARCHITECTURAL PLANS FOR EXACT DEVICE LOCATIONS.
  4. ALL CONDUITS SHALL CONTAIN A CODE SIZE EQUIPMENT GROUND CONDUCTOR.
  5. ALL CONDUCTORS SHALL BE COPPER THHN OR XHHW-2 RATED FOR 90 DEGREES CELSIUS.
  6. UNLESS SPECIFICALLY NOTED OTHERWISE, CONTRACTOR SHALL PROVIDE FINAL CONNECTIONS TO ALL UTILIZATION EQUIPMENT SHOWN ON PLANS. VERIFY FINAL CONNECTION AND PROVIDE APPROPRIATE WIRING METHOD.
  7. REFER TO SHEET E-5.0 FOR TYPICAL DEVICE MOUNTING LOCATION DETAIL FOR DEVICES IN SUITES.
- B (TELECOM NOTES):**
1. ALL VOICE/DATA WIRING SHALL BE CAT6 RATED. 1 HOME RUN TO EACH LOCATION.
  2. ALL DATA WIRING SHALL TERMINATE AT 12-PORT CAT6 PATCH PANEL.
  3. ALL VOICE WIRING SHALL TERMINATE AT 66 PUNCH SOWN BLOCK.
  4. ALL WIRING SHALL BE CLEARLY MARKED ON BOTH ENDS WITH PRINTED WIRE NUMBERS.
  5. ALL VOICE/DATA JACKS SHALL BE CLEARLY LABELED WITH MACHINE PRINTED LABELS.
  6. LOW VOLTAGE WIRING SHALL BE COLOR CODED PER INDUSTRY STANDARDS.
  7. TELEPHONE SYSTEM MUST BE CAPABLE OF 4 VOICE LINES, 2 FAX LINES AND A DEDICATED HIGH SPEED INTERNET CONNECTION.
  8. WIRING SHALL TERMINATE AT PHONE/DATA BOARD(TTB).
  9. DIVISION 16 CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLETE INSTALLATION OF COMMUNICATION SERVICES WITHIN SPACE.
- C (ACCESS CONTROL NOTE):**
1. ACCESS CONTROL WILL BE INSTALLED UNDER SEPARATE CONTRACT. COMPONENTS SHOWN ON PLAN ARE FOR REFERENCE ONLY. DIVISION 16 CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF DEVICES WITH SYSTEM VENDER.

- # GENERAL SYSTEMS PLAN KEYED NOTES:**
- 1 PROVIDE A 48" X 96" X 3/4" FIRE-RETARDANT PLYWOOD BACKBOARD (TMB) FOR TELECOMMUNICATIONS EQUIPMENT. PROVIDE GROUND BAR MOUNTED ON BACKBOARD WITH #6 BARE COPPER EQUIPMENT GROUNDING CONDUCTOR CONNECTED TO POWER SYSTEM'S GROUNDING ELECTRODE SYSTEM.
  - 2 CONTRACTOR SHALL PROVIDE 1" EMPTY CONDUIT WITH PULL STRING FOR THE DATA SYSTEM FROM TELEPHONE UTILITY COMPANY MAIN POINT OF CONNECTION TO BACKBOARD (TMB). VERIFY EXACT POINT OF CONNECTION LOCATION AT SITE.
  - 3 PROVIDE OUTDOOR CARD READER AS SHOWN ON PLAN. E.C. SHALL COORDINATE WITH LV VENDOR FOR EXACT LOCATION AND DETAILS. BASE BID ACCORDINGLY.



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- RISER DIAGRAM GENERAL NOTES:**
- ELECTRICAL CONTRACTOR TO COORDINATE FAULT CURRENT (Isc) RATING WITH UTILITY COMPANY AND AHJ PRIOR TO COMMENCING ANY WORK.
  - E.C. TO VERIFY EXACT POWER DISTRIBUTION IN FIELD. INFORM ENGINEER ON RECORD FOR ANY DISCREPANCY.
  - E.C. TO VERIFY AND OPERABLE CONDITIONS OF ALL EXISTING PANELS. FEEDER DISCONNECT, SWITCH ETC. IN FIELD. REPLACE IF FOUND IN OPERABLE. BASE BID ACCORDINGLY.
- RISER DIAGRAM KEYED WORK NOTES:**
- EXISTING 600A, 120/208V, 3 PHASE, 4 WIRE ELECTRICAL PANEL "MDP" SHALL REMAIN. E.C. TO FIELD VERIFY EXACT RATING, LOCATION, OPERATING CONDITION AND POWER DISTRIBUTION. REPORT ENGINEER ON RECORD FOR ANY DISCREPANCIES BEFORE COMMENCING ANY WORK.
  - EXISTING 200A, 120/208VOLTS, 3 PHASE, 4 WIRE PANEL "A" PROVIDED BY LANDLORD. E.C. TO VERIFY EXACT RATING, LOCATION AND OPERABLE CONDITION OF THE PANEL IN FIELD. REPORT ENGINEER ON RECORD FOR ANY DISCREPANCIES BEFORE COMMENCING ANY WORK.
  - EXISTING 200A, 120/208VOLTS, 3 PHASE, 4 WIRE PANEL "B" PROVIDED BY LANDLORD. E.C. TO VERIFY EXACT RATING, LOCATION AND OPERABLE CONDITION OF THE PANEL IN FIELD. REPORT ENGINEER ON RECORD FOR ANY DISCREPANCIES BEFORE COMMENCING ANY WORK.
  - EXISTING 200A, 120/208VOLTS, 3 PHASE, 4 WIRE PANEL "C" PROVIDED BY LANDLORD. E.C. TO VERIFY EXACT RATING, LOCATION AND OPERABLE CONDITION OF THE PANEL IN FIELD. REPORT ENGINEER ON RECORD FOR ANY DISCREPANCIES BEFORE COMMENCING ANY WORK.
  - E.C. TO VERIFY RATINGS AND OPERABLE CONDITIONS OF THE EXISTING BREAKERS FEEDING SUBPANELS AND ROOF TOP UNIS IN FIELD. INFORM ENGINEER ON RECORD FOR ANY DISCREPANCY PRIOR TO BID.

**1** RISER DIAGRAM  
SCALE: N.T.S.

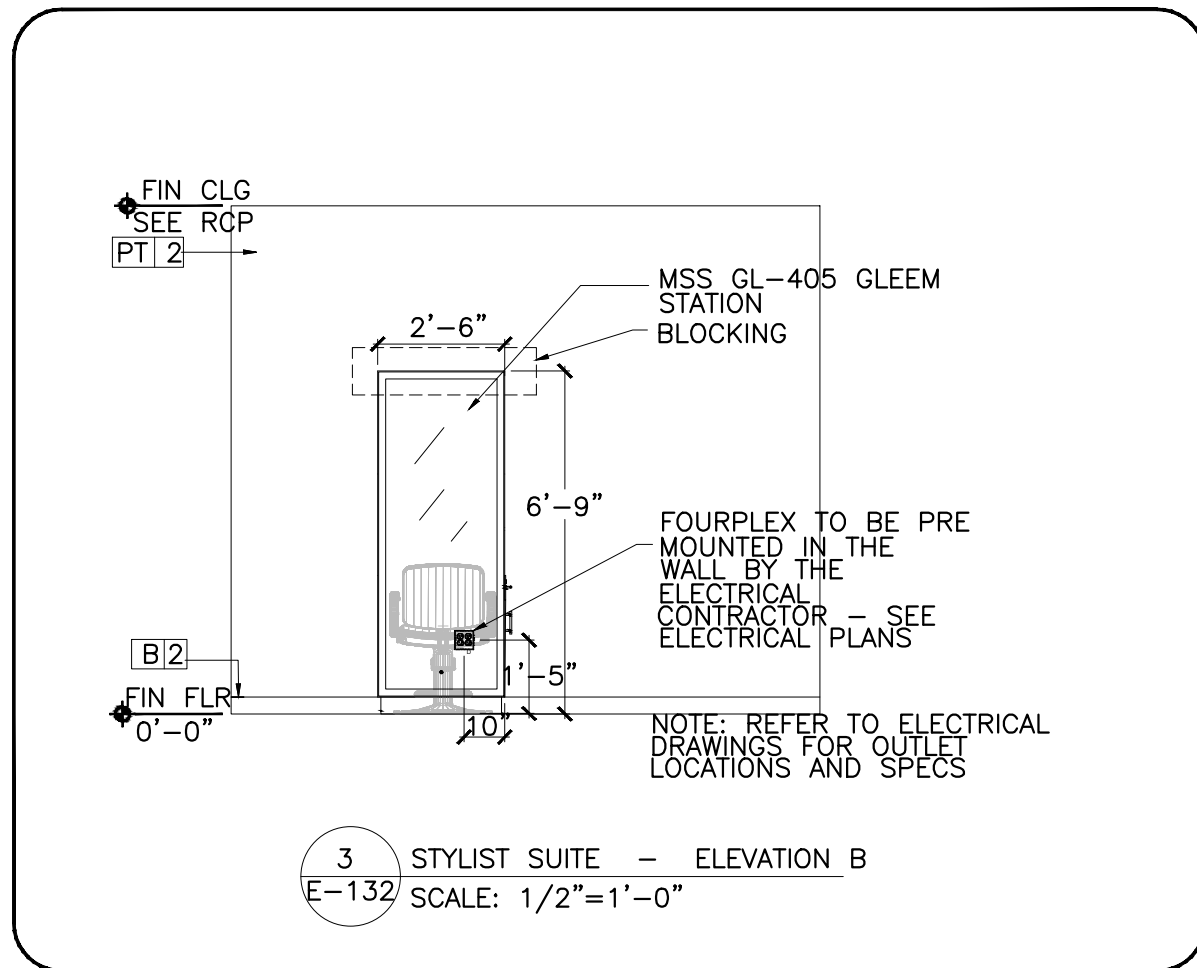
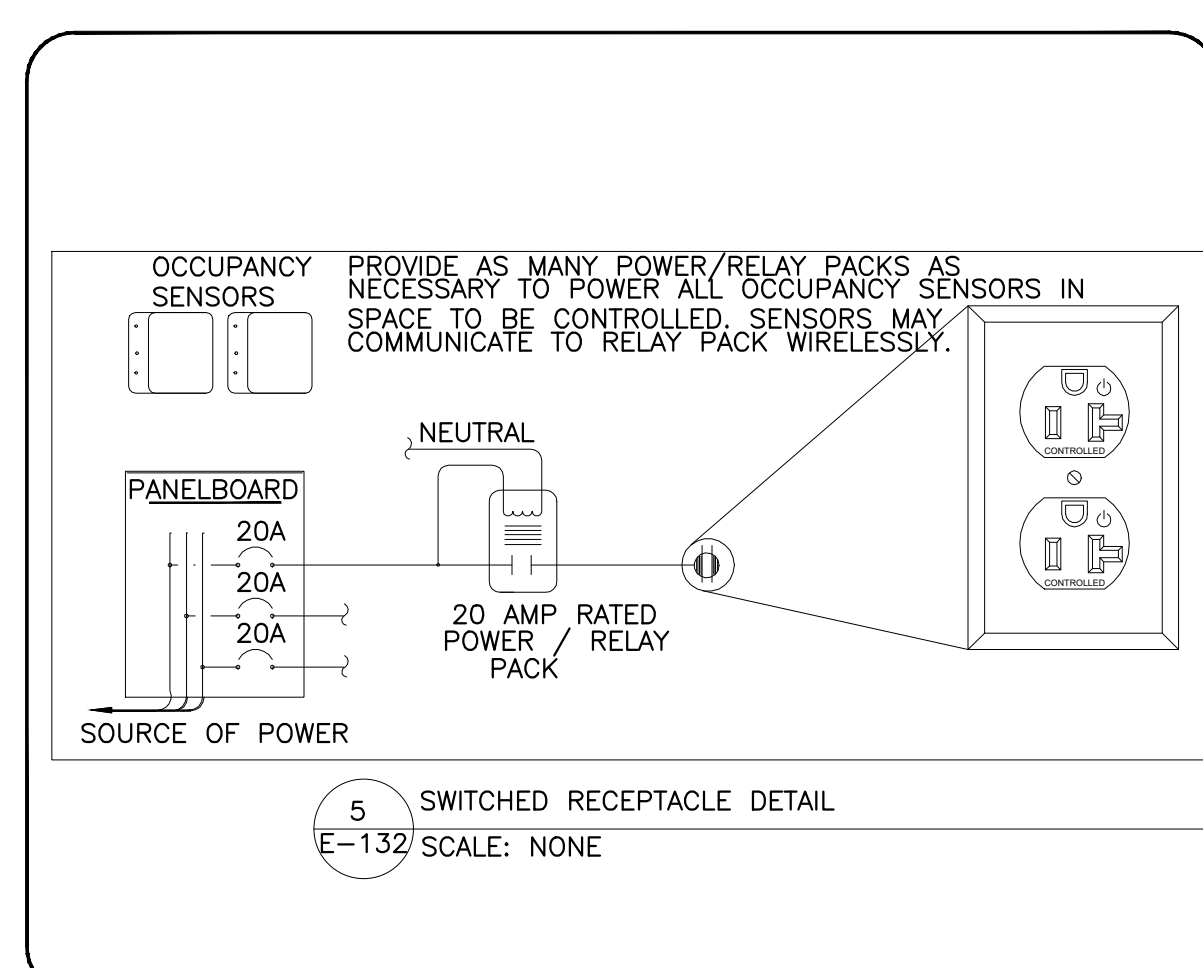
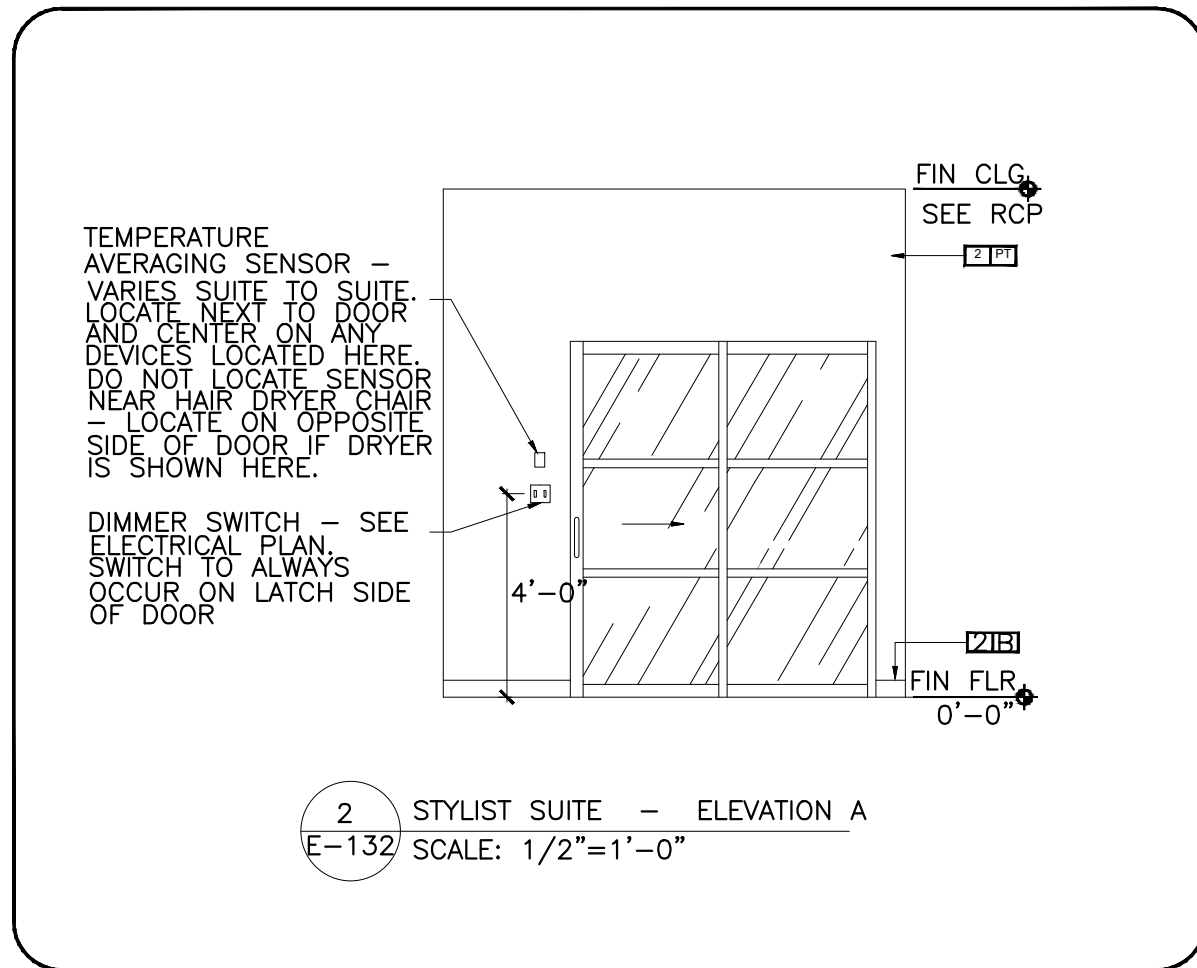
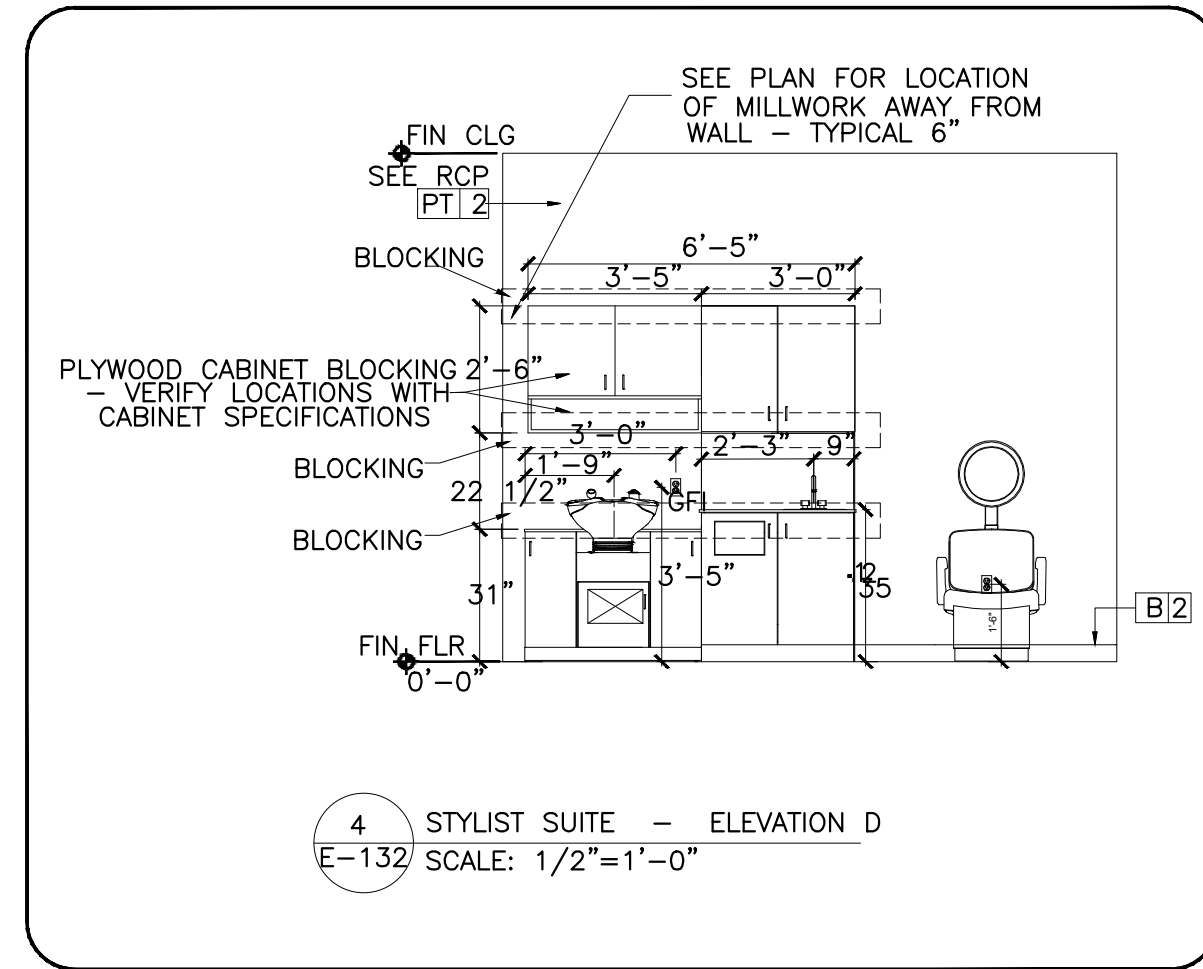
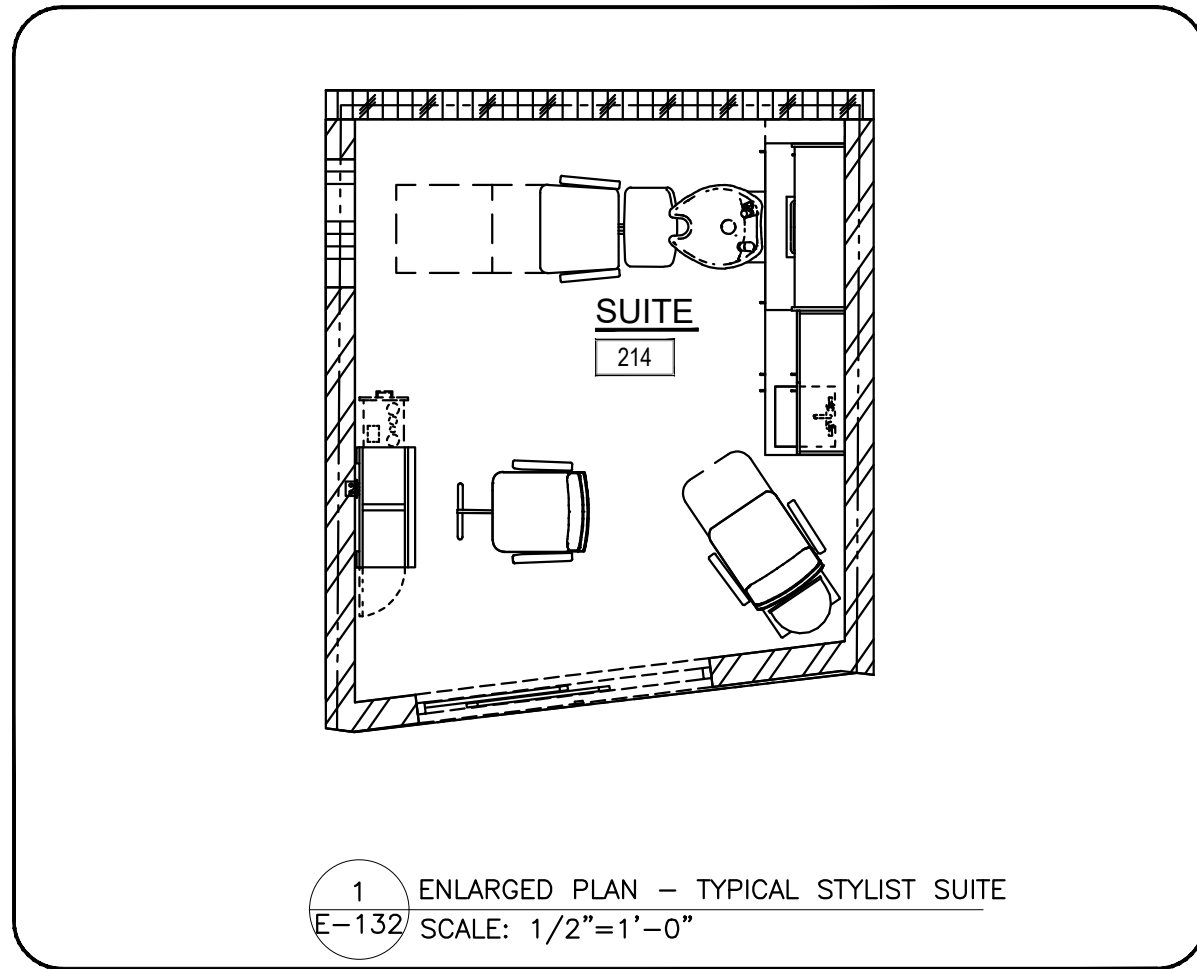
PANEL: A (EXISTING)		MOUNTING: SURFACE													
120/208	VOLTS	3	PHASE												
MCB	200A	BUS:	225A												
NOTE:		4	WIRE												
		MINIMUM													
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)			MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.	
						A	B	C							
1	20	LTG-LOBBY, CLOSET, TOILET	L	0.80	2#12, 1#12, 3/4" C	0.80						SPARE	20	2	
3	20	LTG-SUITE	L	0.80	2#12, 1#12, 3/4" C	0.80	0.80					SPARE	20	4	
5	20	LTG-SUITE	L	0.80	2#12, 1#12, 3/4" C			0.80				SPARE	20	6	
7	20	LTG-SUITE	L	0.80	2#12, 1#12, 3/4" C	0.80						SPARE	20	8	
9	20	LTG-SUITE	L	0.80	2#12, 1#12, 3/4" C		0.80					SPARE	20	10	
11	20	LTG-HALLWAY	L	0.80	2#12, 1#12, 3/4" C			0.80				SPARE	20	12	
13	20	LTG-HALLWAY	L	0.80	2#12, 1#12, 3/4" C	0.80						SPARE	20	14	
15	20	J.B. FOR CHANDELIER	L	0.80	2#12, 1#12, 3/4" C		0.80					SPARE	20	16	
17	20	J.B. FOR CHANDELIER	L	0.80	2#12, 1#12, 3/4" C			0.80				SPARE	20	18	
19	20	J.B. FOR CHANDELIER	L	0.80	2#12, 1#12, 3/4" C	0.80						SPARE	20	20	
21	20	J.B. FOR CHANDELIER	L	0.80	2#12, 1#12, 3/4" C		0.80					SPARE	20	22	
23	20	J.B. FOR DOOR CONTACT	R	0.80	2#12, 1#12, 3/4" C			0.80				SPARE	20	24	
25	20	TC (TIME CLOCK)	L	0.10	2#12, 1#12, 3/4" C	0.10						SPARE	20	26	
27	20	WATER FOUNTAIN	E	1.00	2#12, 1#12, 3/4" C		1.00					SPARE	20	28	
29	20	QUAD FOR WIFI	R	1.00	2#12, 1#12, 3/4" C			1.00				SPARE	20	30	
31	20	RESTROOM WOMEN	R	0.54	2#12, 1#12, 3/4" C	0.54						SPARE	20	32	
33	20	HALLWAY & LOBBY GEN RECEPTACLES	R	0.90	2#12, 1#12, 3/4" C	0.90						SPARE	20	34	
35	20	EXTERIOR SIGNAGE	R	1.00	2#12, 1#12, 3/4" C			1.69		2#12, 1#12, 3/4" C	0.69	M	EF-3 (N)	20	36
37	20	WATER HEATER (WH-1)	R	0.36	2#12, 1#12, 3/4" C	1.53				2#12, 1#12, 3/4" C	1.17	M	EF-4 (N)	20	38
39	20	RECIRCULATION PUMP (RCP)	R	0.10	2#12, 1#12, 3/4" C		0.96			2#12, 1#12, 3/4" C	0.86	M	EF-5 (N)	20	40
41	20	SPARE			2#12, 1#12, 3/4" C							R	WP/GFCI SERVICE RECEPTACLE AT ROOF	20	42
43	20	RESTROOM MEN	R	0.54	2#12, 1#12, 3/4" C	1.44				2#12, 1#12, 3/4" C	0.90	R	DOM STE AREA RECEPTACLES	20	44
45	20	QUAD FOR WIFI	R	1.00	2#12, 1#12, 3/4" C		2.00			2#12, 1#12, 3/4" C	1.00	E	SUITE HAIR DRYER	20	46
47	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4" C			2.00		2#12, 1#12, 3/4" C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	48
49	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C	2.00				2#12, 1#12, 3/4" C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	50
51	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C		1.36			2#12, 1#12, 3/4" C	0.36	R	IT	20	52
53	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4" C			1.18		2#12, 1#12, 3/4" C	0.18	R	TV	20	54
55	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C	1.00							SPARE	20	56
57	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C		1.00						SPARE	20	58
59	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4" C			1.00					SPARE	20	60
61	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C	1.00							SPARE	20	62
63	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C			1.00					SPARE	20	64
65	20	SPARE						0.00					SPARE	20	66
67	20	SPARE						0.00					SPARE	20	68
69	20	SPARE						0.00					SPARE	20	70
71	20	SPARE						0.00					SPARE	20	72
						<b>10.81</b>	<b>11.42</b>	<b>10.25</b>							

PANEL: B (EXISTING)		MOUNTING: SURFACE													
120/208	VOLTS	3	PHASE												
MCB	200A	BUS:	225A												
NOTE:		4	WIRE												
		MINIMUM													
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)			MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.	
						A	B	C							
1	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4" C	2.00				2#12, 1#12, 3/4" C	1.00	E	SUITE HAIR DRYER	20	2
3	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C		2.00			2#12, 1#12, 3/4" C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	4
5	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C			2.00		2#12, 1#12, 3/4" C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	6
7	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4" C	2.00				2#12, 1#12, 3/4" C	1.00	E	SUITE HAIR DRYER	20	8
9	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C		2.00			2#12, 1#12, 3/4" C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	10
11	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C			2.00		2#12, 1#12, 3/4" C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	12
13	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4" C	2.00				2#12, 1#12, 3/4" C	1.00	E	SUITE HAIR DRYER	20	14
15	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C		2.00			2#12, 1#12, 3/4" C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	16
17	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C			2.00		2#12, 1#12, 3/4" C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	18
19	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4" C	2.00				2#12, 1#12, 3/4" C	1.00	E	SUITE HAIR DRYER	20	20
21	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C		2.00			2#12, 1#12, 3/4" C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	22
23	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C			2.00		2#12, 1#12, 3/4" C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	24
25	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4" C	2.00				2#12, 1#12, 3/4" C	1.00	E	SUITE HAIR DRYER	20	26
27	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C		2.00			2#12, 1#12, 3/4" C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	28
29	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C			2.00		2#12, 1#12, 3/4" C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	30
31	20	GENERAL RECEPTACLE	R	0.72	2#12, 1#12, 3/4" C	1.72				2#12, 1#12, 3/4" C	1.00	E	SUITE HAIR DRYER	20	32
33	20				2#12, 1#12, 3/4" C		1.00			2#12, 1#12, 3/4" C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	34
35	20				2#12, 1#12, 3/4" C			1.00		2#12, 1#12, 3/4" C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	36
37	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4" C	2.00				2#12, 1#12, 3/4" C	1.00	E	SUITE HAIR DRYER	20	38
39	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C		2.00			2#12, 1#12, 3/4" C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	40
41	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C			2.00		2#12, 1#12, 3/4" C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	42
43	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4" C	2.00				2#12, 1#12, 3/4" C	1.00	E	SUITE HAIR DRYER	20	44
45	20	GENERAL RECEPTACLE	R	0.54	2#12, 1#12, 3/4" C		1.54			2#12, 1#12, 3/4" C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	46
47	20							1.00		2#12, 1#12, 3/4" C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	48
49	20					1.00				2#12, 1#12, 3/4" C	1.00	E	SUITE HAIR DRYER	20	50
51	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C		2.00			2#12, 1#12, 3/4" C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	52
53	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C			2.00		2#12, 1#12, 3/4" C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	54
55	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4" C	2.00				2#12, 1#12, 3/4" C	1.00	E	SUITE HAIR DRYER	20	56
57	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C		2.00			2#12, 1#12, 3/4" C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	58
59	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C			2.00		2#12, 1#12, 3/4" C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	60
61	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4" C	2.00				2#12, 1#12, 3/4" C	1.00	E	SUITE HAIR DRYER	20	62
63	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C		2.00			2#12, 1#12, 3/4" C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	64
65	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C			2.00		2#12, 1#12, 3/4" C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	66
67	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4" C	2.00				2#12, 1#12, 3/4" C	1.00	E	SUITE HAIR DRYER	20	68
69	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C		2.00			2#12, 1#12, 3/4" C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	70
71	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4" C			2.00		2#12, 1#12, 3/4" C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	72
						<b>22.72</b>	<b>22.54</b>	<b>22.00</b>							

**2** PANEL SCHEDULE  
SCALE: N.T.S.

ABBREVIATIONS USED IN PANEL SCHEDULE:

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



1 DETAILS  
SCALE: N.T.S.

PANEL: C (EXISTING)		MOUNTING: SURFACE													
120/208	VOLTS	3	PHASE												
MCB	200A	BUS: 225A	MINIMUM												
WIRE		4													
PANEL LOCATION: ELECTRICAL CLOSET		FED FROM: EX. MDP													
NOTE:															
CKT NO.	TRIP AMPS	DESCRIPTION OF LOAD	LOAD TYPE	LOAD (KVA)	MINIMUM BRANCH CIRCUIT	PER PHASE (KVA)			MINIMUM BRANCH CIRCUIT	LOAD (KVA)	LOAD TYPE	DESCRIPTION OF LOAD	TRIP AMPS	CKT NO.	
						A	B	C							
1	20	TELEPHONE	R	0.36	2#12, 1#12, 3/4"C	0.36						SPARE	20	2	
3	20	SPARE				0.00						SPARE	20	4	
5	20	SPARE						0.00				SPARE	20	6	
7	20	SPARE				0.00						SPARE	20	8	
9	20	SPARE						0.00				SPARE	20	10	
11	20	SPARE							0.00			SPARE	20	12	
13	20	SPARE				0.00						SPARE	20	14	
15	20	SPARE						0.00				SPARE	20	16	
17	20	SPARE							0.00			SPARE	20	18	
19	20	SPARE				0.00						SPARE	20	20	
21	20	SPARE						0.00				SPARE	20	22	
23	20	SPARE							0.00			SPARE	20	24	
25	20	SPARE				0.00						SPARE	20	26	
27	20	SPARE						0.00				SPARE	20	28	
29	20	SPARE							0.00			SPARE	20	30	
31	20	SPARE				0.00						SPARE	20	32	
33	20	SPARE						0.00				SPARE	20	34	
35	20	SPARE							0.00			SPARE	20	36	
37	20	SPARE				0.00						SPARE	20	38	
39	20	SPARE						0.00				SPARE	20	40	
41	20	SPARE							0.00			SPARE	20	42	
43	20	SPARE				0.00						SPARE	20	44	
45	20	SPARE						0.00				SPARE	20	46	
47	20	SPARE							0.00			SPARE	20	48	
49	20	SPARE				0.00						SPARE	20	50	
51	20	SPARE						0.00				SPARE	20	52	
53	20	SPARE							0.00			SPARE	20	54	
55	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4"C	2.00			1.00	2#12, 1#12, 3/4"C	1.00	E	SUITE HAIR DRYER	20	54
57	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4"C					2#12, 1#12, 3/4"C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	56
59	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4"C					2#12, 1#12, 3/4"C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	58
61	20	SUITE HAIR DRYER	E	1.00	2#12, 1#12, 3/4"C	2.00			2.00	2#12, 1#12, 3/4"C	1.00	E	SUITE HAIR DRYER	20	60
63	20	SUITE GLEAM CABINET & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4"C					2#12, 1#12, 3/4"C	1.00	R	SUITE GLEAM CABINET & GEN. RECEPTACLE	20	62
65	20	SUITE MINI FRIDGE & GEN. RECEPTACLE	R	1.00	2#12, 1#12, 3/4"C					2#12, 1#12, 3/4"C	1.00	R	SUITE MINI FRIDGE & GEN. RECEPTACLE	20	64
67	20	SPARE							1.00			SPARE	20	66	
69	20	SPARE				0.00						SPARE	20	68	
71	20	SPARE						0.00				SPARE	20	70	
						4.36	4.00	4.00				SPARE	20	72	

2 PANEL SCHEDULE  
SCALE: N.T.S.

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SECTION 220100 - PLUMBING GENERAL PROVISIONS

- 1.1 SUMMARY
- A. THIS SECTION SUPPLEMENTS ALL SECTIONS OF THE SPECIFICATIONS FOR DIVISION 22 AND SHALL APPLY TO ALL PHASES OF WORK HEREINAFTER SPECIFIED, SHOWN ON THE CONTRACT DOCUMENTS, OR REQUIRED TO PROVIDE A COMPLETE INSTALLATION OF APPROVED PLUMBING SYSTEMS.
- B. THIS SECTION INCLUDES ADMINISTRATIVE AND PROCEDURAL REQUIREMENTS FOR ALL WORK INCLUDED IN DIVISION 22.
- C. SEE DIVISION 01 FOR ADDITIONAL ADMINISTRATIVE AND PROCEDURAL REQUIREMENTS. WHERE THE REQUIREMENTS OF THIS SECTION CONFLICT WITH THOSE IN DIVISION 01, THE MORE STRINGENT REQUIREMENT SHALL APPLY.
- 1.2 QUALIFICATIONS
- A. AUTHORIZATION: THE CONTRACTOR SHALL BE LICENSED, BONDED, INSURED, AND AUTHORIZED TO PERFORM THE REQUIRED WORK AT THE PROJECT LOCATION.
- B. EXPERIENCE: THE CONTRACTOR SHALL BE EXPERIENCED IN THE TYPE OF WORK REQUIRED BY THE PROJECT.
- 1.3 REGULATIONS, PERMITS, FEES, CHARGES, INSPECTIONS
- A. REGULATIONS: COMPLY WITH ALL APPLICABLE CODES, RULES AND REGULATIONS. ALL MATERIAL AND WORK MUST COMPLY WITH LOCAL CONSTRUCTION, MECHANICAL, PLUMBING, ELECTRICAL AND FIRE CODES.
- B. FEES AND PERMITS: PAY ALL CONNECTION, INSTALLATION, USE, DEVELOPMENT, ETC. FEES AND/OR CHARGES. OBTAIN AND PAY FOR ALL REQUIRED PERMITS AND LICENSES. REFER TO DIVISION 1.
- C. INSPECTIONS: ALL WORK MUST BE INSPECTED AND APPROVED BY LOCAL AUTHORITIES. PRIOR TO FINAL APPROVAL, FURNISH THE ARCHITECT WITH CERTIFICATES OF INSPECTIONS AND APPROVALS BY THE LOCAL AUTHORITIES.
- D. PERFORM WORK IN ACCORDANCE WITH LANDLORD REQUIREMENTS, INCLUDING ANY TENANT CRITERIA MANUALS AND LEASE EXHIBITS, WHERE APPLICABLE.
- 1.4 DRAWINGS AND SPECIFICATIONS
- A. REFER TO PROVISIONS INCLUDED HEREIN FOR INFORMATION ON SUBMITTALS.
- B. IF A CONFLICT EXISTS BETWEEN THE DRAWINGS AND SPECIFICATIONS, PROMPTLY NOTIFY THE ARCHITECT. THE ARCHITECT WILL MAKE THE PROPER INTERPRETATION AND HIS DECISION WILL BE FINAL.
- C. WORK UNDER THESE SECTIONS IS DIAGRAMMATIC UNLESS INDICATED OTHERWISE AND IS INTENDED TO CONVEY THE SCOPE OF WORK AND INDICATE THE GENERAL ARRANGEMENT OF PIPING, EQUIPMENT, AND ACCESSORIES. FOLLOW THESE DRAWINGS IN LAYING OUT THE WORK AND VERIFY SPACES FOR INSTALLATION OF THESE MATERIALS AND EQUIPMENT. WHEREVER A QUESTION EXISTS AS TO THE EXACT INTENDED LOCATION OF PIPE, SPRINKLERS, OR EQUIPMENT, OBTAIN INSTRUCTIONS FROM THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.
- 1.5 WORK AND MATERIALS
- A. UNLESS OTHERWISE SPECIFIED, ALL MATERIALS MUST BE NEW AND OF THE QUALITY AND TYPE SPECIFIED. THE WORKMANSHIP SHALL BE OF A QUALITY THAT IS ACCEPTABLE TO THE CITY INSPECTOR, IS EQUAL TO THE STANDARDS OF THE TRADES, AND IN COMPLIANCE WITH THE CONTRACT DOCUMENTS.
- B. CONTRACTOR MUST STAFF THE PROJECT WITH SUFFICIENT SKILLED WORKMEN, INCLUDING A FULLY QUALIFIED CONSTRUCTION SUPERINTENDENT, TO COMPLETE THE WORK IN THE TIME ALLOTTED. THE SUPERINTENDENT MUST BE QUALIFIED TO SUPERVISE ALL OF THE WORK OF EACH SECTION.
- 1.6 APPROVAL OF MATERIALS AND EQUIPMENT
- A. REFER TO DIVISION 01 AND GENERAL BIDDING REQUIREMENTS FOR DESCRIPTION OF MATERIAL AND EQUIPMENT FOR PRIOR APPROVALS AND SUBSTITUTIONS.
- 1.7 SUBMITTALS
- A. SUBMITTALS ARE FOR INFORMATION AND COORDINATION ONLY. THE ENGINEER WILL DILIGENTLY REVIEW THE SUBMITTALS AND ATTEMPT TO VERIFY COMPLIANCE WITH THE PROJECT REQUIREMENTS. SUCH REVIEW, HOWEVER, DOES NOT CONSTITUTE APPROVAL OR DISAPPROVAL OF OBLIGATION TO COMPLY WITH ALL PROJECT REQUIREMENTS. THE SUBMITTALS ARE NOT TO BE CONSTRUED TO BE CONTRACT DOCUMENTS. ANY FAILURE BY THE ENGINEER TO NOTE A POINT OF NON-COMPLIANCE SHALL NOT BE CONSTRUED TO BE ACCEPTANCE OR APPROVAL OF THE DISCREPANCY. EACH COPY OF THE SUBMITTALS SHALL BEAR A STATEMENT SIGNED BY A RESPONSIBLE REPRESENTATIVE OF THE CONTRACTOR, CERTIFYING THAT THE SUBMITTAL HAS BEEN REVIEWED AND DOES SATISFY THE PROJECT REQUIREMENTS.
- B. PRODUCT INFORMATION SHEETS: PROVIDE MANUFACTURER'S LITERATURE WHICH INCLUDES THE INFORMATION REQUIRED BY THE PRODUCT DATA PARAGRAPH OF THE APPLICABLE SPECIFICATION SECTION. WHERE PRODUCT INFORMATION SHEETS SHOW MULTIPLE MODELS OR OPTIONS, CLEARLY MARK THE MODEL AND OPTIONS TO BE PROVIDED.
- C. FORMAT: PRODUCT DATA SHALL BE SUBMITTED IN A 3-RING OR SPIRAL BINDER WITH PRODUCT INFORMATION SHEETS SEPARATED INTO TABBED SECTIONS. PROVIDE A TABLE OF CONTENTS FOR THE BINDER. PROVIDE, IN THE FRONT OF EACH TABBED SECTION, A SUMMARY SHEET WITH A TABLE OR SCHEDULE SUMMARIZING THE EQUIPMENT OR FIXTURES INCLUDED IN THAT SECTION. PROVIDE A 4" WIDE BY 3" HIGH OR LARGER SPACE FOR THE ENGINEER'S APPROVAL STAMP ON THE SUMMARY SHEET. THE INFORMATION TO BE INCLUDED ON THE SUMMARY SHEET IS AS FOLLOWS: EQUIPMENT OR FIXTURE TAG/MARK, EQUIPMENT OR FIXTURE DESCRIPTION, MANUFACTURER, MODEL NUMBER, FLOW RATE, OVERALL CAPACITY, SIGNIFICANT CHARACTERISTIC, VOLTAGE/PHASE, AMPERAGE, HORSEPOWER, MAJOR COMPONENTS OR ACCESSORIES.
1. EXAMPLES (FOR FORMAT ONLY) OF THE SUMMARY INFORMATION TO BE INCLUDED ARE:
- WC-1: WATER CLOSET, KOHLER K-4302, 1.6 GPF, SLOAN 111, 1.6 GPF, CHURCH 9550C
- E. FAILURE TO PREPARE THE SUBMITTALS IN THE REQUESTED FORMAT, OR FAILURE TO PROVIDE COMPLETE PRODUCT INFORMATION, MAY RESULT IN THE SUBMITTALS BEING RETURNED TO THE CONTRACTOR WITHOUT REVIEW.
- F. IN CASE OF SUBSTITUTION, THE CONTRACTOR SHALL INCLUDE CLEARLY MARKED ENGINEERING DATA ON BOTH THE SPECIFIED ITEMS AND THE SUBSTITUTE ITEMS. IN SOME CASES, AS DEEMED PROPER BY THE ENGINEER, TABLE TOP INSPECTIONS OF BOTH SPECIFIED ITEMS AND THE SUBSTITUTE ITEMS MAY BE REQUIRED. THE PURPOSE IS TO FACILITATE DIRECT COMPARISON BY THE ENGINEER.
- 1.8 MATERIAL SAFETY DATA SHEETS
- A. PROVIDE CURRENT, MATERIAL SAFETY DATA SHEETS (MSDS), FOR ALL HAZARDOUS CHEMICALS THAT ARE PROPOSED FOR USE AT THE PROJECT SITE.
1. PROVIDE ONE COMPLETE SET TO THE OWNER FOR REVIEW AND APPROVAL A MINIMUM OF ONE WEEK PRIOR TO THE DELIVERY OF ANY HAZARDOUS CHEMICALS TO THE SITE.
2. MAINTAIN A SECOND COMPLETE SET AT THE PROJECT LOCATION, READILY ACCESSIBLE BY BOTH THE OWNER'S PERSONNEL AND THE CONTRACTOR'S PERSONNEL.
- 1.9 ELECTRICAL COORDINATION
- A. ELECTRICAL WIRING INCLUDING POWER WIRING AND CONTROL WIRING ALL RACEWAYS, WIRING, OUTLET AND JUNCTION BOXES, AND LABOR FOR INSTALLATION OF THE WIRING AND EQUIPMENT SHALL BE INCLUDED IN DIVISION 26 OF THE SPECIFICATIONS.
- B. ALL STARTERS AND MOTOR CONTROL CENTERS UNLESS SPECIFICALLY INDICATED TO BE FURNISHED WITH THE EQUIPMENT ARE TO BE FURNISHED AND INSTALLED UNDER THE ELECTRICAL DIVISION OF THE SPECIFICATIONS.
- C. BEFORE ORDERING ANY MOTORS AND EQUIPMENT, VERIFY THE AVAILABLE VOLTAGE AND PHASE WITH THE ELECTRICAL CONTRACTOR.
- D. ALL FIELD WIRING AND EQUIPMENT MUST CONFORM TO THE APPLICABLE SECTIONS OF THE DIVISION 26 SPECIFICATIONS.
- 1.10 PROJECT RECORD DOCUMENTS
- A. RECORD DRAWINGS: MAINTAIN AND SUBMIT ONE SET OF BLUE- OR BLACK-LINE WHITE PRINTS OF CONTRACT DRAWINGS. MARK RECORD PRINTS TO SHOW THE ACTUAL INSTALLATION WHERE INSTALLATION VARIES FROM THAT SHOWN ORIGINALLY. REQUIRE INDIVIDUAL OR ENTITY WHO OBTAINED RECORD DATA, WHETHER INDIVIDUAL OR ENTITY IS INSTALLER, SUBCONTRACTOR, OR SIMILAR ENTITY, TO PREPARE THE MARKED-UP RECORD PRINTS.
- B. GIVE PARTICULAR ATTENTION TO INFORMATION ON CONCEALED ELEMENTS THAT CANNOT BE READILY IDENTIFIED AND RECORDED LATER; RECORD ANY REVISIONS TO DUCT AND PIPE SIZES AND LOCATIONS, AND EQUIPMENT LAYOUTS; RECORD DATA AS SOON AS POSSIBLE AFTER OBTAINING IT. RECORD AND CHECK THE MARKUP BEFORE ENCLOSING CONCEALED INSTALLATIONS.
- C. MARK RECORD SETS WITH ERASABLE, RED-COLORED PENCIL. USE OTHER COLORS TO DISTINGUISH BETWEEN CHANGES FOR DIFFERENT CATEGORIES OF THE WORK AT THE SAME LOCATION.

- D. IDENTIFY AND DATE EACH RECORD DRAWING; INCLUDE THE DESIGNATION "PROJECT RECORD DRAWING" IN A PROMINENT LOCATION. ORGANIZE INTO MANAGEABLE SETS; BIND EACH SET WITH DURABLE PAPER COVER SHEETS. INCLUDE IDENTIFICATION ON COVER SHEETS.
- 1.11 OPERATION AND MAINTENANCE MANUALS
- A. ASSEMBLE A COMPLETE SET OF OPERATION AND MAINTENANCE DATA INDICATING THE OPERATION AND MAINTENANCE OF EACH SYSTEM, SUBSYSTEM, AND PIECE OF EQUIPMENT NOT PART OF A SYSTEM, INCLUDE OPERATION AND MAINTENANCE DATA REQUIRED IN INDIVIDUAL SPECIFICATION SECTIONS AND AS FOLLOWS: OPERATION DATA: INCLUDE EMERGENCY INSTRUCTIONS AND PROCEDURES, SYSTEM AND EQUIPMENT DESCRIPTIONS, OPERATING PROCEDURES, AND SEQUENCE OF OPERATIONS; MAINTENANCE DATA: INCLUDE MANUFACTURER'S INFORMATION, LIST OF SPARE PARTS, MAINTENANCE PROCEDURES, MAINTENANCE AND SERVICE SCHEDULES FOR PREVENTIVE AND ROUTINE MAINTENANCE, AND COPIES OF WARRANTIES AND BONDS. SERVICING AGENCY: INCLUDE NAME, ADDRESS AND PHONE NUMBER OF LOCAL OR NEAREST FACTORY-AUTHORIZED SERVICING AGENCY FOR EACH ITEM OF PLUMBING EQUIPMENT, E.G., PUMPS, BOILERS, WATER HEATERS, ETC.
- B. ORGANIZE OPERATION AND MAINTENANCE MANUALS INTO SUITABLE SETS OF MANAGEABLE SIZE. BIND AND INDEX DATA IN HEAVY-DUTY, THREE-RING, VINYL-COVERED, LOOSE-LEAF BINDERS, IN THICKNESS NECESSARY TO ACCOMMODATE CONTENTS, WITH POCKET INSIDE THE COVERS TO RECEIVE FOLDED OVERSIZED SHEETS. IDENTIFY EACH BINDER ON FRONT AND SPINE WITH THE PRINTED TITLE "OPERATION AND MAINTENANCE MANUAL," PROJECT NAME, AND SUBJECT MATTER OF CONTENTS.
- 1.12 WARRANTIES
- A. GUARANTEE ALL MATERIAL, EQUIPMENT, AND WORKSMANSHIP IN WRITING TO BE FREE FROM DEFECTS FOR TWO YEARS FROM DATE OF SUBSTANTIAL COMPLETION AS OUTLINED IN DIVISION 01. REPLACE WITHOUT CHARGE ANY MATERIAL OR EQUIPMENT PROVING DEFECTIVE DURING THIS PERIOD. THE GUARANTEE SHALL INCLUDE PERFORMANCE OF THE EQUIPMENT UNDER ALL CONDITIONS OF LOAD, INSTALLING ANY ADDITIONAL ITEMS OF CONTROL AND/OR PROTECTIVE DEVICES AS REQUIRED AND THE REPLACING OF ANY REFRIGERANT LOST.
- B. GATHER AND SUBMIT WRITTEN WARRANTIES TO ARCHITECT AT PROJECT CLOSE-OUT.
- C. PROVIDE ADDITIONAL COPIES OF EACH WARRANTY TO INCLUDE IN OPERATION AND MAINTENANCE MANUALS.
- 2.1 MATERIALS
- A. CLEANING AGENTS: USE CLEANING MATERIALS AND AGENTS RECOMMENDED BY MANUFACTURER OR FABRICATOR OF THE SURFACE TO BE CLEANED. DO NOT USE CLEANING AGENTS THAT ARE POTENTIALLY HAZARDOUS TO HEALTH OR PROPERTY OR THAT MIGHT DAMAGE FINISHED SURFACES.
- B. ASBESTOS FREE: ALL PRODUCTS USED SHALL BE ASBESTOS FREE. PROVIDE SIGNED STATEMENT AT COMPLETION OF PROJECT ATTESTING THAT ALL PRODUCTS AND MATERIALS USED ARE ASBESTOS FREE.
- 3.1 VERIFICATION OF DIMENSIONS
- A. SCALED AND FIGURED DIMENSIONS ARE APPROXIMATE ONLY. BEFORE PROCEEDING WITH WORK, CAREFULLY CHECK AND VERIFY DIMENSIONS AT SITE. VERIFY ALL DIMENSIONS TO BE PROPERLY FITTING EQUIPMENT AND MATERIALS TOGETHER AND TO THE STRUCTURE IN SPACES PROVIDED.
- B. DRAWINGS ARE ESSENTIALLY DIAGRAMMATIC AND MANY OFFSETS, BENDS, SPECIAL FITTINGS AND EXACT LOCATIONS ARE NOT INDICATED.
- C. CAREFULLY STUDY DRAWINGS AND VISIT PREMISES IN ORDER TO DETERMINE BEST METHODS, EXACT LOCATIONS, ROUTES, BUILDING OBSTRUCTIONS, AND INSTALL APPARATUS AND EQUIPMENT IN AVAILABLE LOCATIONS. INSTALL APPARATUS AND EQUIPMENT IN MANNER AND IN LOCATIONS TO AVOID OBSTRUCTIONS, PRESERVE HEADROOM, AND KEEP OPENINGS AND PASSAGEWAYS CLEAR.
- 3.2 CONSTRUCTION FACILITIES
- A. FURNISH AND MAINTAIN FROM THE BEGINNING TO THE COMPLETION OF ALL WORK ALL LAWFUL AND NECESSARY GUARDS, RAILINGS, FENCES, CANOPIES, LIGHTS, AND WARNING SIGNS. TAKE ALL NECESSARY PRECAUTIONS REQUIRED BY CITY, STATE AND FEDERAL LAWS TO AVOID INJURY OR DAMAGE TO ANY AND ALL PERSONS AND PROPERTY.
- 3.3 EXISTING MATERIALS AND EQUIPMENT
- A. EXISTING SERVICES: THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING SERVICE TO EXISTING BUILDING DURING THE CONSTRUCTION PERIOD. EXISTING BUILDING OPERATIONS ARE NOT TO BE INTERRUPTED DURING CONSTRUCTION WITHOUT THE EXPRESSED CONSENT OF THE OWNER. ALL UTILITIES ARE TO BE MAINTAINED IN OPERATION THROUGHOUT THE CONSTRUCTION PERIOD. SCHEDULING OF SERVICES INTERRUPTIONS ARE TO BE COORDINATED WITH THE ARCHITECT AND OWNER.
- B. PROTECTION OF EXISTING: IN AREAS OF THE EXISTING BUILDING WHICH ARE HAVING ALTERATIONS, THE CONTRACTOR SHALL SCREEN, COVER AND OTHERWISE PROTECT ALL EXISTING BUILDING FINISHES, EQUIPMENT AND MATERIALS.
- C. CONTINUITY OF SERVICES: CONTRACTOR SHALL PERMANENTLY REROUTE EXISTING SERVICES OR PROVIDE TEMPORARY CONNECTION AS REQUIRED TO MAINTAIN SERVICE TO EXISTING BUILDING WHICH ARE TO REMAIN IN SERVICE.
- 3.4 CUTTING AND PATCHING
- A. CUT EXISTING WORK AND PATCH AS NECESSARY TO PROPERLY INSTALL THE NEW WORK. AS THE WORK PROGRESSES, LEAVE NECESSARY OPENINGS, HOLES, CHASES, ETC., IN THEIR CORRECT LOCATION. IF THE REQUIRED OPENINGS, HOLES AND CHASES ARE NOT IN THEIR CORRECT LOCATIONS, MAKE THE NECESSARY CORRECTIONS AT NO COST TO THE OWNER. AVOID EXCESSIVE CUTTING AND DO NOT CUT STRUCTURAL MEMBERS WITHOUT THE CONSENT OF THE ARCHITECT AND OWNER.
- 3.5 CLOSING-IN OF UNFINISHED WORK
- A. COVER NO WORK UNTIL INSPECTED, TESTED AND APPROVED. WHERE WORK IS COVERED BEFORE INSPECTION AND TEST, UNCOVER IT AND WHEN INSPECTED, TESTED AND APPROVED, RESTORE ALL WORK TO ORIGINAL PROPER CONDITION.
- 3.6 EXCAVATION AND BACKFILL
- A. PERFORM ALL NECESSARY EXCAVATION, SHORING AND BACKFILLING REQUIRED FOR THE PROPER LAYING OF ALL PIPES AND CONDUITS AS MAY BE NECESSARY. REMOVE ALL EXCESS EXCAVATED MATERIALS FROM THE SITE OR DISPOSE OF ON SITE AS DIRECTED BY CONTRACTOR.
- B. TRENCHING: EXCAVATE TRENCH BANKS AS NEARLY VERTICAL AS PRACTICABLE, AND SHORE AND BRACE TRENCHES WHERE REQUIRED FOR STABILITY AND SAFETY. EXCAVATE TRENCHES TRUE TO LINE AND MAKE BOTTOM NOT LESS THAN 18 INCHES WIDE BUT NO WIDER THAN NECESSARY TO PROVIDE AMPLE WORK ROOM. GRADE TRENCH BOTTOMS ACCURATELY TO PROVIDE UNIFORM BEARING AND SUPPORT FOR EACH SECTION OF PIPE ON UNDISTURBED SOIL ALONG ITS ENTIRE LENGTH. DIG "BELL" HOLES AFTER TRENCH BOTTOM HAS BEEN GRADED. MACHINE GRADE ONLY TO THE TOP LINE OF THE PIPES, DOING THE BALANCE BY HAND. DO NOT CUT ANY TRENCH NEAR OR UNDER FOOTINGS WITHOUT FIRST CONSULTING THE ENGINEER. COMPLY WITH OSHA REQUIREMENTS.
- C. PROVIDE NOT LESS THAN 4 INCHES OF GRANULAR MATERIAL AS PIPE BEDDING PRIOR TO LAYING PIPE IN TRENCH TO CONTINUOUSLY SUPPORT PIPE AND MAINTAIN REQUIRED SLOPE. GRANULAR MATERIAL SHALL BE PEA GRAVEL OR SAND PER MAG STANDARDS.
- D. PROVIDE BACKFILLING AND COMPACTION IN ACCORDANCE WITH PROVISIONS OF THESE SPECIFICATIONS AND UNDER THE DIRECTION OF THE ARCHITECT TO THE REQUIRED DENSITY.
- E. PROVIDE NOT LESS THAN 4 INCHES OF GRANULAR MATERIAL, SAME AS PIPING BEDDING, ALL AROUND PIPE. MAKE NOT LESS THAN 2 INCH LAYERS. EACH LAYER SHALL BE COMPACTED AS DIRECTED AND FREE FROM ROCKS, LARGE CLOTS OF EARTH, LEAVES, BRANCHES, AND DEBRIS. COMPACT THE REST OF THE BACKFILL AS DIRECTED, USING IN THE BACKFILL NO ROCKS LARGER THAN 4 INCHES IN DIAMETER, AND USING NO ROCK IN THE TOP 12 INCHES.
- 3.7 PAINTING
- A. PAINT ALL EXPOSED UNFINISHED METAL WITH ONE COAT OF RUST INHIBITING PRIMER. (GALVANIZED DUCTWORK AND FACTORY PAINTED EQUIPMENT SHALL BE CONSIDERED AS HAVING A FINISHED SURFACE). FINISHED PAINTING SHALL BE PROVIDED UNDER THIS SECTION AND SHALL BE SUITABLE FOR EXTERIOR APPLICATION AND SHALL MEET ALL OSHA, EPA AND GOVERNMENT REGULATIONS FOR MATERIALS, COMPOSITION AND APPLICATION.
- B. COORDINATE COLOR OF FINISH PAINTING WITH THE ARCHITECT.
- 3.8 DEFECTIVE AND SUBSTANDARD WORK
- A. PROMPTLY REPAIR OR REPLACE ANY ITEMS DEFECTIVE IN MATERIALS OR WORKSMANSHIP.
- B. PROMPTLY CORRECT DEFICIENCIES NOTED BY OWNER, ARCHITECT, OR CITY INSPECTOR.
- 3.9 DEMONSTRATION AND TRAINING
- A. INSTRUCTION: INSTRUCT OWNER'S PERSONNEL ON HOW TO ADJUST, OPERATE, AND MAINTAIN SYSTEMS,

- SUBSYSTEMS, AND EQUIPMENT NOT PART OF A SYSTEM; PROVIDE INSTRUCTORS EXPERIENCED IN OPERATION AND MAINTENANCE PROCEDURES; PROVIDE INSTRUCTION AT MUTUALLY AGREED-ON TIMES. FOR EQUIPMENT THAT REQUIRES SEASONAL OPERATION, PROVIDE SIMILAR INSTRUCTION AT THE START OF EACH SEASON; SCHEDULE TRAINING WITH OWNER, THROUGH ARCHITECT, WITH AT LEAST SEVEN DAYS' ADVANCE NOTICE; COORDINATE INSTRUCTORS, INCLUDING PROVIDING NOTIFICATION OF DATES, TIMES, LENGTH OF INSTRUCTION, AND COURSE CONTENT.
- 3.10 FINAL CLEANING
- A. GENERAL: PROVIDE FINAL CLEANING. CONDUCT CLEANING AND WASTE-REMOVAL OPERATIONS TO COMPLY WITH LOCAL LAWS AND ORDINANCES AND FEDERAL AND LOCAL ENVIRONMENTAL AND ANTIPOLLUTION REGULATIONS.
- B. CLEANING: EMPLOY EXPERIENCED WORKERS OR PROFESSIONAL CLEANERS FOR FINAL CLEANING. CLEAN EACH SURFACE OR UNIT TO CONDITION EXPECTED IN AN AVERAGE COMMERCIAL BUILDING CLEANING AND MAINTENANCE PROGRAM. COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.
- C. SCOPE: COMPLETE THE FOLLOWING CLEANING OPERATIONS BEFORE REQUESTING INSPECTION FOR CERTIFICATION OF SUBSTANTIAL COMPLETION FOR ENTIRE PROJECT OR FOR A PORTION OF PROJECT; REMOVE TOOLS, CONSTRUCTION EQUIPMENT, MACHINERY, AND SURPLUS MATERIAL FROM PROJECT SITE; REMOVE DEBRIS FROM LIMITED ACCESS SPACES, INCLUDING ROOFS, PLENUMS, SHAFTS, TRENCHES, EQUIPMENT VAULTS, MANHOLES, ATTICS, AND SIMILAR SPACES; REMOVE LABELS THAT ARE NOT PERMANENT; TOUCH UP AND OTHERWISE REPAIR AND RESTORE MARRED, EXPOSED FINISHES AND SURFACES. REPLACE FINISHES AND SURFACES THAT CANNOT BE SATISFACTORILY REPAIRED OR RESTORED OR THAT ALREADY SHOW EVIDENCE OF REPAIR OR RESTORATION. DO NOT PAINT OVER 'UL' AND SIMILAR LABELS, INCLUDING MECHANICAL AND ELECTRICAL NAMEPLATES; CLEAN PLUMBING FIXTURES TO A SANITARY CONDITION, FREE OF STAINS, INCLUDING STAINS RESULTING FROM WATER EXPOSURE; LEAVE PROJECT CLEAN AND READY FOR OCCUPANCY.
- D. COMPLY WITH SAFETY STANDARDS FOR CLEANING. DO NOT BURN WASTE MATERIALS. DO NOT BURY DEBRIS OR EXCESS MATERIALS ON OWNER'S PROPERTY. DO NOT DISCHARGE VOLATILE, HARMFUL, OR DANGEROUS MATERIALS INTO DRAINAGE SYSTEMS. REMOVE WASTE MATERIALS FROM PROJECT SITE AND DISPOSE OF LAWFULLY.
- SECTION 220516 - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING
- 1.1 SECTION INCLUDES
- A. FLEXIBLE PIPE CONNECTORS; PIPE LOOPS, OFFSETS AND SWING JOINTS.
- 2.1 FLEXIBLE PIPE CONNECTORS - COPPER PIPING
- A. MANUFACTURER: MERCER RUBBER COMPANY; METRAFLEX COMPANY.
- B. INNER HOSE: BRONZE; EXTERIOR SLEEVE: BRAIDED BRONZE; PRESSURE RATING: 125 PSI AND 450 DEGREE F; JOINT: AS SPECIFIED FOR PIPE JOINTS; SIZE: USE PIPE SIZED UNITS; MAXIMUM OFFSET: 1 INCH ON EACH SIDE OF INSTALLED CENTER LINE; APPLICATION: COPPER PIPING
- 2.0 FLEXIBLE PIPE CONNECTORS - STEEL PIPING
- A. MANUFACTURER: MERCER RUBBER COMPANY; METRAFLEX COMPANY.
- B. PRESSURE RATING: 125 PSI AND 450 DEGREE F; JOINT: AS SPECIFIED FOR PIPE JOINTS; SIZE: USE PIPE SIZED UNITS; MAXIMUM OFFSET: 1 INCH ON EACH SIDE OF INSTALLED CENTER LINE; APPLICATION: STEEL PIPING.
- 3.1 INSTALLATION
- A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- B. INSTALL IN ACCORDANCE WITH EJMA (EXPANSION JOINT MANUFACTURER'S ASSOCIATION) STANDARDS.
- C. INSTALL FLEXIBLE PIPE CONNECTORS ON PIPES CONNECTED TO VIBRATION ISOLATED EQUIPMENT. PROVIDE LINE SIZE FLEXIBLE CONNECTORS.
- D. INSTALL FLEXIBLE CONNECTORS AT RIGHT ANGLES TO DISPLACEMENT. INSTALL ONE END IMMEDIATELY ADJACENT TO ISOLATED EQUIPMENT AND ANCHOR OTHER END. INSTALL IN HORIZONTAL PLANE UNLESS INDICATED OTHERWISE.
- E. ANCHOR PIPE TO BUILDING STRUCTURE WHERE INDICATED AND AS REQUIRED TO CONTROL DETRIMENTAL MOVEMENT OF PIPING. PROVIDE PIPE GUIDES SO MOVEMENT IS DIRECTED ALONG AXIS OF PIPE ONLY. ERECT PIPING SUCH THAT STRAIN AND WEIGHT IS NOT ON CONNECTIONS OR APPARATUS.
- F. PROVIDE SUPPORT AND EQUIPMENT REQUIRED TO CONTROL EXPANSION AND CONTRACTION OF PIPING. PROVIDE LOOPS, PIPE OFFSETS, AND SWING JOINTS, OR APPROVED EXPANSION JOINTS WHERE REQUIRED.
- G. CONTRACTOR MAY SUBSTITUTE GROOVED PIPING FOR VIBRATION ISOLATED EQUIPMENT INSTEAD OF FLEXIBLE CONNECTORS. GROOVED PIPING NEED NOT BE ANCHORED.
- SECTION 220519 - METERS AND GAGES FOR PLUMBING PIPING
- 1.1 SECTION INCLUDES
- A. POSITIVE DISPLACEMENT METERS; PRESSURE GAUGES; THERMOMETERS AND THERMOMETER WELLS.
- 2.1 MANUFACTURERS: DWYER INSTRUMENTS, INC; FMC TECHNOLOGIES; VENTURE MEASUREMENT COMPANY; MCCROMETER; MOELLER INSTRUMENT CO., INC; OMEGA ENGINEERING, INC.
- 2.2 POSITIVE DISPLACEMENT METERS (LIQUIDS)
- A. AWWA C700, POSITIVE DISPLACEMENT DISC TYPE SUITABLE FOR FLUID WITH BRONZE CASE AND CAST IRON FROST-PROOF, BREAKAWAY BOTTOM CAP, HERMETICALLY SEALED REGISTER, REMOTE READING TO AWWA C706.
- B. METER: BRASS BODY TURBINE METER WITH MAGNETIC DRIVE REGISTER; ACCURACY: 1-1/2 PERCENT.
- 2.3 PRESSURE GAUGES
- A. PRESSURE GAUGES: ASME B40.100, UL 393 DRAWN STEEL CASE, PHOSPHOR BRONZE BOURDON TUBE, ROTARY BRASS MOVEMENT, BRASS SOCKET WITH FRONT RECALIBRATION ADJUSTMENT, BLACK SCALE ON WHITE BACKGROUND, CASE: STEEL WITH BRONZE FRONT TUBE, SIZE: 2 INCH DIAMETER; LENS: CLEAR GLASS, MID-SCALE ACCURACY: TWO PERCENT; SCALE: PSI AND KPA.
- 2.4 STEM TYPE THERMOMETERS
- A. THERMOMETERS - ADJUSTABLE ANGLE: RED OR BLUE-APPEARING NON-TOXIC LIQUID IN GLASS; ASTM E1; LENS FRONT TUBE, CAST ALUMINUM CASE WITH ENAMEL FINISH, CAST ALUMINUM ADJUSTABLE JOINT WITH POSITIVE LOCKING DEVICE, ADJUSTABLE 360 DEGREES IN HORIZONTAL PLANE, 180 DEGREES IN VERTICAL PLANE; SIZE: 7-INCH SCALE; WINDOW: CLEAR LEXAN; STEM: 3/4 INCH NPT BRASS; ACCURACY: 2 PERCENT; CALIBRATION: DEGREE F AND DEGREES C.
- 3.1 INSTALLATION
- A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- B. INSTALL THERMOMETERS IN THE FOLLOWING LOCATIONS: INLET AND OUTLET OF EACH WATER HEATER; INLETS AND OUTLETS OF EACH DOMESTIC WATER HEAT EXCHANGER; INLET AND OUTLET OF EACH DOMESTIC HOT-WATER STORAGE TANK.
- C. INSTALL PRESSURE GAGES IN THE FOLLOWING LOCATIONS: BUILDING WATER SERVICE ENTRANCE INTO BUILDING; INLET AND OUTLET OF EACH PRESSURE-REDUCING VALVE, WHERE INDICATED ON PLANS AND DIAGRAMS; SUCTION AND DISCHARGE OF EACH DOMESTIC WATER PUMP.
- D. INSTALL METERS AND GAGES ADJACENT TO MACHINES AND EQUIPMENT TO ALLOW SERVICE AND MAINTENANCE OF METERS, GAGES, MACHINES, AND EQUIPMENT.
- E. ADJUST FACES OF METERS AND GAGES TO PROPER ANGLE FOR BEST VISIBILITY.
- SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
- 1.1 SECTION INCLUDES:
- A. PIPE SUPPORTS; FIXED ANCHOR SUPPORTS; ACCESSORIES.
- 2.1 MANUFACTURERS
- A. ACCEPTABLE MANUFACTURER: MIRO INDUSTRIES INC.
- 2.2 SUPPORTS AND HANGERS
- A. SUPPORTS AND HANGERS - GENERAL: PROVIDE WITH BASES THAT REST ON THE ROOF MEMBRANE AND THAT HAVE GENTLY ROUNDED EDGES TO PREVENT DAMAGE TO ROOF MEMBRANE. 1 INCH HIGH RAISED EDGES; DRAINAGE PORTS TO PREVENT PONING; CARBON BLACK ADDITIVE IN POLYCARBONATE, WHEN USED, FOR UV STABILIZATION; PROVIDE LOOSE FIT ALUMINUM PIPE STRAP ON ALL SUPPORTS, SPECIFICALLY DESIGNED FOR THE SUPPORT MODELS BELOW. STRAPS SHALL BE LOOSE FITTING TO PREVENT PIPE FROM BEING DISPLACED FROM THE SUPPORT STAND BUT WITHOUT RESTRICTING MOVEMENT FOR EXPANSION AND CONTRACTION.
- B. FIXED HEIGHT PIPE STANDS: POLYCARBONATE RESIN BASES; 1-1/2-INCH NOMINAL PIPE: "U"-SHAPED

- CRADLE; 1-1/2 INCH ID MAXIMUM PIPE CAPACITY, 1-9/10 INCH OD MAXIMUM PIPE CAPACITY. 1-1/2 INCH ADDITIONAL HEIGHT PER SPACER; MAXIMUM 3 SPACERS; TOTAL LOAD UP TO 80 LB. 6 BY 6 INCH BASE FOR EQUIPMENT THAT REQUIRES SEASONAL OPERATION. PROVIDE SIMILAR INSTRUCTION AT THE START OF EACH SEASON; SCHEDULE TRAINING WITH OWNER, THROUGH ARCHITECT, WITH AT LEAST SEVEN DAYS' ADVANCE NOTICE; COORDINATE INSTRUCTORS, INCLUDING PROVIDING NOTIFICATION OF DATES, TIMES, LENGTH OF INSTRUCTION, AND COURSE CONTENT.
- C. STRUT-TYPE SUPPORTS: SINGLE BASE WITH TWO THREADED RODS SUPPORTING HOT DIPPED GALVANIZED HORIZONTAL CHANNEL STRUT; SIZE: 1/2 INCH STRUT 1-5/8 BY 13/16 INCH, PIPE CLEARANCE VARIABLE UP TO 7 INCH (MODEL 12 BASE STRUT); SIZE: 1/2 INCH STRUT 1-5/8 BY 13/16 INCH, PIPE CLEARANCE VARIABLE UP TO 7 INCH (MODEL 16 BOSE STRUT); BASE: POLYCARBONATE RESIN; TOTAL LOAD UP TO 125 LB; 7-1/2 BY 10 INCH OR 9 BY 15-1/8 INCH BASE.
- 2.3 ACCESSORIES
- A. SUPPORT PADS: 15-3/4 BY 19-3/4 INCH SQUARE, 1/8 INCH THICK, FLEXIBLE PVC WITH CARBON BLACK ADDITIVE FOR UV STABILIZATION.
- B. DECK PLATES: SQUARE METAL DECK PLATE WITH CURVED UP EDGES, TO SPREAD LOAD AND PROTECT ROOF MEMBRANE; THICKNESS: 18 GAUGE; MATERIAL: HOT DIP GALVANIZED; SIZE: 12 X 12 INCH SQUARE, TOTAL LOAD UP TO 200 LB (MODEL DP-12); SIZE: 18 X 18 INCH SQUARE; TOTAL LOAD UP TO 400 LB (MODEL DP-18); SIZE: 24 X 24 INCH SQUARE; TOTAL LOAD UP TO 800 LB (MODEL DP-24).
- C. ROLLERS: ROLLER 3: 3 INCH STURDY POLYCARBONATE ROLLER, SHAFT 5/8 INCHES, END DIAMETER 1-7/8 INCHES, ROLLER SURFACE HAS A 3 INCH RADIUS ARCH. MAXIMUM LOAD CAPACITY MAY NOT EXCEED 150 LBS; ROLLER 5: 5 INCH STURDY POLYCARBONATE ROLLER, SHAFT 5/8 INCHES, END DIAMETER 2-7/16 INCHES. ROLLER SURFACE HAS A 5 INCH RADIUS ARCH. MAXIMUM LOAD CAPACITY MAY NOT EXCEED 150 LBS.
- 3.1 HANGER AND SUPPORT INSTALLATION
- A. METAL PIPE-HANGER INSTALLATION: COMPLY WITH MSS SP-69 AND MSS SP-89. INSTALL HANGERS, SUPPORTS, CLAMPS, AND ATTACHMENTS AS REQUIRED TO PROPERLY SUPPORT PIPING FROM THE BUILDING STRUCTURE.
- B. PIPE POSITIONING-SYSTEM INSTALLATION: INSTALL SUPPORT DEVICES TO MAKE RIGID SUPPLY AND WASTE PIPING CONNECTIONS TO EACH PLUMBING FIXTURE.
- C. INSTALL HANGERS AND SUPPORTS COMPLETE WITH NECESSARY ATTACHMENTS, INSERTS, BOLTS, RODS, NUTS, WASHERS, AND OTHER ACCESSORIES.
- D. EQUIPMENT SUPPORT INSTALLATION: FABRICATE FROM WELDED-STRUCTURAL-STEEL SHAPES.
- E. INSTALL HANGERS AND SUPPORTS TO ALLOW CONTROLLED THERMAL AND SEISMIC MOVEMENT OF PIPING SYSTEMS, TO PERMIT FREEDOM OF MOVEMENT BETWEEN PIPE ANCHORS, AND TO FACILITATE ACTION OF EXPANSION JOINTS, EXPANSION LOOPS, EXPANSION BENDS, AND SIMILAR UNITS.
- F. INSTALL LATERAL BRACING WITH PIPE HANGERS AND SUPPORTS TO PREVENT SWAYING.
- G. INSTALL BUILDING ATTACHMENTS WITHIN CONCRETE SLABS OR ATTACH TO STRUCTURAL STEEL. INSTALL ADDITIONAL ATTACHMENTS AT CONCENTRATED LOADS, INCLUDING VALVES, FLANGES, AND STRAINERS. NPS 2-1/2 AND LARGER AND AT CHANGES IN DIRECTION OF PIPING. INSTALL CONCRETE INSERTS BEFORE CONCRETE IS PLACED. FASTEN INSERTS TO FORMS AND INSTALL REINFORCING BARS THROUGH OPENINGS AT TOP OF INSERTS.
- H. LOAD DISTRIBUTION: INSTALL HANGERS AND SUPPORTS SO THAT PIPING LIVE AND DEAD LOADS AND STRESSES FROM MOVEMENT WILL NOT BE TRANSMITTED TO CONNECTED EQUIPMENT.
- I. PIPE SLOPES: INSTALL HANGERS AND SUPPORTS TO PROVIDE INDICATED PIPE SLOPES AND TO NOT EXCEED MAXIMUM PIPE DEFLECTIONS ALLOWED BY ASME B31.9 FOR BUILDING SERVICES PIPING.
- 3.2 FIELD QUALITY CONTROL
- A. AFTER SYSTEM STARTUP CORRECT ANY DEFICIENCIES THAT ARISE, INCLUDING BUT NOT LIMITED TO, IMPROPER LOCATION OR POSITION, IMPROPER SEATING OR LEVEL ON THE ROOF, LACK OF ROOF PADS OR DECK PLATES, INADEQUATE OPERATION, AND AS DIRECTED BY ENGINEER.
- SECTION 220548 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT
- 1.1 SECTION INCLUDES:
- A. CONCRETE HOUSEKEEPING PAD; VIBRATION ISOLATORS; SEISMIC RESTRAINTS.
- 2.1 VIBRATION ISOLATORS
- A. RESTRAINED SPRING ISOLATORS: FREESTANDING, STEEL, OPEN-SPRING ISOLATORS WITH SEISMIC OR LIMIT-STOP RESTRAINT. HOUSING: STEEL WITH RESILIENT VERTICAL-LIMIT STOPS TO PREVENT SPRING EXTENSION DUE TO WEIGHT BEING REMOVED; FACTORY-DRILLED BASEPLATE BONDED TO 1/4-INCH-THICK, NEOPRENE ISOLATOR PAD ATTACHED TO BASEPLATE UNDERSIDE; AND ADJUSTABLE EQUIPMENT MOUNTING AND LEVELING BOLT THAT ACTS AS BLOCKING DURING INSTALLATION. RESTRAINT: SEISMIC OR LIMIT-STOP AS REQUIRED FOR EQUIPMENT AND AUTHORITIES HAVING JURISDICTION. OUTSIDE SPRING DIAMETER: NOT LESS THAN 80 PERCENT OF THE COMPRESSED HEIGHT OF THE SPRING AT RATED LOAD. MINIMUM ADDITIONAL TRAVEL: 50 PERCENT OF THE REQUIRED DEFLECTION OF RATED VERTICAL STIFFNESS. LATERAL STIFFNESS: MORE THAN 80 PERCENT OF RATED VERTICAL STIFFNESS. OVERLOAD CAPACITY: SUPPORT 200 PERCENT OF RATED LOAD, FULLY COMPRESSED, WITHOUT DEFORMATION OF FAILURE.
- B. SPRING HANGERS: COMBINATION COIL-SPRING AND ELASTOMERIC-INSERT HANGER WITH SPRING AND INSERT IN COMPRESSION. FRAME: STEEL, FABRICATED FOR CONNECTION TO THREADED HANGER RODS AND TO ALLOW FOR A MAXIMUM OF 30 DEGREES OF ANGULAR HANGER-ROD MISALIGNMENT WITHOUT BINDING OR REDUCING ISOLATION EFFICIENCY. OUTSIDE SPRING DIAMETER: NOT LESS THAN 80 PERCENT OF THE COMPRESSED HEIGHT OF THE SPRING AT RATED LOAD. MINIMUM ADDITIONAL TRAVEL: 50 PERCENT OF THE REQUIRED DEFLECTION AT RATED LOAD. LATERAL STIFFNESS: MORE THAN 80 PERCENT OF RATED VERTICAL STIFFNESS. OVERLOAD CAPACITY: SUPPORT 200 PERCENT OF RATED LOAD, FULLY COMPRESSED, WITHOUT DEFORMATION OF FAILURE. ELASTOMERIC ELEMENT: MOLDED, OIL-RESISTANT RUBBER OR NEOPRENE. STEEL-WASHER-REINFORCED CUP TO SUPPORT SPRING AND BUSHING PROTECTING THROUGH BOTTOM OF FRAME. SELF-CENTERING HANGER ROD CAP TO ENSURE CONCENTRICITY BETWEEN HANGER ROD AND SUPPORT SPRING COIL.
- C. NEOPRENE PAD ISOLATORS: RUBBER OR NEOPRENE WAFFLE PADS; HARNESS: 30 DUROMETER; THICKNESS: MINIMUM 1/2 INCH; MAXIMUM LOADING: 50 PSI; RIB HEIGHT: MAXIMUM 0.7 TIMES WIDTH; CONFIGURATION: SINGLE LAYER.
- D. RUBBER MOUNT OR HANGER: MOLDED RUBBER DESIGNED FOR 0.4 INCH DEFLECTION WITH THREADED INSERT.
- E. GLASS FIBER PADS: NEOPRENE JACKETED PRE-COMPRESSED MOLDED GLASS FIBER.
- 2.2 SEISMIC-RESTRAINT DEVICES
- A. TYPE: NON-DIRECTIONAL AND DOUBLE ACTING UNIT CONSISTING OF INTERLOCKING STEEL MEMBERS RESTRAINED BY NEOPRENE ELEMENTS.
- B. ELEMENTS: REPLACEABLE NEOPRENE, MINIMUM OF 0.75 INCH THICK WITH MINIMUM 1/8 INCH AIR GAP.
- C. CAPACITY: 4 TIMES LOAD ASSIGNED TO MOUNT GROUPINGS AT 0.4 INCH DEFLECTION.
- D. ATTACHMENT POINTS AND FASTENERS: CAPABLE OF WITHSTANDING 3 TIMES RATED LOAD CAPACITY OF SEISMIC SNUBBER.
- 3.1 EXECUTION
- A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- B. PRIOR TO MAKING PIPING CONNECTIONS TO EQUIPMENT WITH OPERATING WEIGHTS SUBSTANTIALLY DIFFERENT FROM INSTALLED WEIGHTS, BLOCKS UP EQUIPMENT WITH TEMPORARY SHIMS TO FINAL HEIGHT. WHEN FULL LOAD IS APPLIED, ADJUST ISOLATORS TO LOAD TO ALLOW SHIM REMOVAL.
- C. SUPPORT PIPING CONNECTIONS TO EQUIPMENT MOUNTED ON ISOLATORS USING ISOLATORS OR RESILIENT HANGERS TO NEAREST FLEXIBLE PIPE CONNECTOR.
- D. PROVIDE FLEXIBLE CONNECTIONS ON ALL PIPING CONNECTIONS TO EQUIPMENT.
- E. SELECTION OF TYPE, THICKNESS AND DEFLECTION OF VIBRATION ISOLATION SHALL BE BY THE VIBRATION CONTROL MANUFACTURER BASED ON THE SPECIFIC EQUIPMENT TYPE AND SIZE, AS SCHEDULED ON THE DRAWINGS AND INDICATED BELOW.
- F. PROVIDE SEISMIC SNUBBERS FOR ALL EQUIPMENT AND PIPING MOUNTED ON ISOLATORS.
- SECTION 220595 - FIRE STOPPING FOR PLUMBING SYSTEMS
- 1.1 SECTION INCLUDES
- A. FIRESTOPPING MATERIALS; FIRESTOPPING OF ALL PENETRATIONS AND INTERRUPTIONS TO FIRE RATED ASSEMBLIES, WHETHER INDICATED ON DRAWINGS OR NOT, AND OTHER OPENINGS INDICATED.



2.1 FIRESTOPPING ASSEMBLIES

- A. FIRESTOPPING: ANY MATERIAL MEETING REQUIREMENTS; FIRE RATINGS: USE ANY SYSTEM LISTED BY UL OR FM OR TESTED IN ACCORDANCE WITH ASTM E 814 OR ASTM E 119 THAT HAS F RATING EQUAL TO FIRE RATING OF PENETRATED ASSEMBLY AND MINIMUM T RATING EQUAL TO F RATING AND THAT MEETS ALL OTHER SPECIFIED REQUIREMENTS.
- 2.2 MATERIALS
- A. MANUFACTURERS: A/D FIRE PROTECTION SYSTEMS INC.; 3M FIRE PROTECTION PRODUCTS; SPECIFIED TECHNOLOGIES.
- B. ELASTOMERIC SILICONE FIRESTOPPING: SINGLE OR MULTIPLE COMPONENT SILICONE ELASTOMERIC COMPOUND AND COMPATIBLE SILICONE SEALANT; CONFORMING TO THE FOLLOWING: DURABILITY AND LONGEVITY: PERMANENT; COLOR: MANUFACTURER'S STANDARD COLOR.
- C. FOAM FIRESTOPPING: SINGLE OR MULTIPLE COMPONENT FOAM COMPOUND; CONFORMING TO THE FOLLOWING: DURABILITY AND LONGEVITY: PERMANENT; COLOR: MANUFACTURER'S STANDARD COLOR.
- D. FIBERED COMPOUND FIRESTOPPING: FORMULATED COMPOUND MIXED WITH INCOMBUSTIBLE NON-ASBESTOS FIBERS; CONFORMING TO THE FOLLOWING: DURABILITY AND LONGEVITY: PERMANENT; COLOR: MANUFACTURER'S STANDARD COLOR.
- E. FIBER PACKING MATERIAL: MINERAL OR CERAMIC FIBER PACKING INSULATION; CONFORMING TO THE FOLLOWING: DURABILITY AND LONGEVITY: PERMANENT.
- F. FIRESTOP DEVICES: MECHANICAL DEVICE WITH INCOMBUSTIBLE OR SILICONE ELASTOMER FILLER AND SHEET STAINLESS STEEL JACKET, COLLAR, AND FLANGED STOPS; CONFORMING TO THE FOLLOWING: DURABILITY AND LONGEVITY: PERMANENT; SUITABLE FOR PEDESTRIAN TRAFFIC OR VEHICULAR TRAFFIC WHERE NECESSARY.
- G. FIRESTOP PILLOWS: FORMED MINERAL FIBER PILLOWS; CONFORMING TO THE FOLLOWING: DURABILITY AND LONGEVITY: PERMANENT.

- H. PRIMERS, SLEEVES, FORMS, AND ACCESSORIES: TYPE REQUIRED FOR TESTED ASSEMBLY DESIGN.

3.1 EXAMINATION

- A. VERIFY OPENINGS ARE READY TO RECEIVE THE WORK OF HIS SECTION.

3.2 PREPARATION

- A. CLEAN SUBSTRATE SURFACES OF DIRT, DUST, GREASE, OIL, LOOSE MATERIAL, OR OTHER MATTER WHICH MAY AFFECT BOND OF FIRESTOPPING MATERIAL.

- B. INSTALL BACKING MATERIALS TO ARREST LIQUID MATERIAL LEAKAGE.

3.3 INSTALLATION

- A. INSTALL MATERIALS IN MANNER DESCRIBED IN FIRE TEST REPORT AND IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, COMPLETELY CLOSING OPENINGS.
- B. DO NOT COVER INSTALLED FIRESTOPPING UNTIL INSPECTED BY AUTHORITY HAVING JURISDICTION.

- C. INSTALL LABELING REQUIRED BY CODE.

3.4 CLEANING AND PROTECTION

- A. CLEAN ADJACENT SURFACES OF FIRESTOPPING MATERIALS.

SECTION 220719 - PLUMBING PIPING INSULATION

- 1.1 SECTION INCLUDES INSULATING THE FOLLOWING PLUMBING PIPING SERVICES: DOMESTIC HOT-WATER PIPING; DOMESTIC RECIRCULATING HOT-WATER PIPING; SANITARY WASTE PIPING EXPOSED TO FREEZING CONDITIONS; SUPPLIES AND DRAINS FOR HANDICAP-ACCESSIBLE LAVATORIES AND SINKS.
- 2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION
- A. SURFACE BURNING CHARACTERISTICS: FLAME SPREAD/SMOKE DEVELOPED INDEX OF 25/50, MAXIMUM, WHEN TESTED IN ACCORDANCE WITH ASTM E 84, NFPA 255 OR UL 723.

- B. THE CONTRACTOR MAY USE ANY OF THE FOLLOWING INSULATING/JACKETING MATERIALS AT HIS OPTION, PROVIDED THE SELECTED MATERIAL MEETS WITH THE APPROVAL OF ALL STATE, LOCAL AUTHORITIES AND UTILITY COMPANY REQUIREMENTS. VERIFICATION OF COMPLIANCE OF THE SELECTED INSULATING/JACKETING MATERIAL IS THE SOLE RESPONSIBILITY OF THE INSTALLING CONTRACTOR.
- 2.2 FLEXIBLE ELASTOMERIC INSULATION
- A. MANUFACTURER'S: ARMACELL INTERNATIONAL
- B. FLEXIBLE ELASTOMERIC INSULATION: CLOSED-CELL, SPONGE- OR EXPANDED-RUBBER MATERIALS; COMPLY WITH ASTM C 534, TYPE I FOR TUBULAR MATERIALS. MINIMUM SERVICE TEMPERATURE: -40 DEGREES F; MAXIMUM SERVICE TEMPERATURE: 220 DEGREES F; CONNECTION: WATERPROOF VAPOR BARRIER ADHESIVE.
- C. ELASTOMERIC FOAM ADHESIVE: AIR DRIED, CONTACT ADHESIVE, COMPATIBLE WITH INSULATION.

2.3 MINERAL-FIBER, PREFORMED PIPE INSULATION:

- A. TYPE I, 850 DEG F (454 DEG C) MATERIALS: MINERAL OR GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 547, TYPE I, GRADE A, WITH FACTORY-APPLIED ASJ OR WITH FACTORY-APPLIED ASJ. SUBJECT TO COMPLIANCE WITH REQUIREMENTS. PROVIDE ONE OF THE FOLLOWING: JOHN'S MANVILLE; ZESTON; P.I.C. PLASTICS, INC.; FG SERIES; PROTO CORPORATION; LOSMOKE; SPEEDLINE CORPORATION; SMOKE SAFE; ADHESIVE: AS RECOMMENDED BY JACKET MATERIAL MANUFACTURER; COLOR: WHITE. FACTORY-FABRICATED FITTING COVERS TO MATCH JACKET IF AVAILABLE; OTHERWISE, FIELD FABRICATE. SHAPES: 45- AND 90-DEGREE, SHORT- AND LONG-RADIUS ELBOWS, TEES, VALVES, FLANGES, UNIONS, REDUCERS, END CAPS, SOIL-PIPE HUBS, TRAPS, MECHANICAL JOINTS, AND P-TRAP AND SUPPLY COVERS FOR LAVATORIES.

- B. ALUMINUM JACKET: COMPLY WITH ASTM B 209 (ASTM B 209M), ALLOY 3003, 3005, 3105, OR 5005, TEMPER H-14. PREPARED TO COMPLIANCE WITH REQUIREMENTS. PROVIDE ONE OF THE FOLLOWING: CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; METAL JACKETING SYSTEMS; RPR PRODUCTS, INC.; INSUL-MATE; PABCO METALS CORP.; SUREFIT. SHEET AND ROLL STOCK READY FOR SHOP OR FIELD SIZING OR FACTORY CUT AND ROLLED TO SIZE. FINISH AND THICKNESS ARE INDICATED IN FIELD-APPLIED JACKET SCHEDULES. AMONG THE THREE MOISTURE BARRIERS IN FIRST SUBPARAGRAPH BELOW, 1-MIL BARRIER PROVIDES THE LEAST PROTECTION AGAINST GALVANIC CORROSION, 3-MIL BARRIER OFFERS BETTER PROTECTION, AND POLYSURLYN BARRIER OFFERS THE BEST PROTECTION. FOR MOST INDOOR APPLICATIONS, 1-MIL BARRIER IS ADEQUATE. FOR OUTDOOR APPLICATIONS, SELECT EITHER 3-MIL OR POLYSURLYN BARRIER. MOISTURE BARRIER FOR INDOOR APPLICATIONS: 1-MIL THICK, HEAT-BONDED POLYETHYLENE AND KRAFT PAPER; 3-MIL-THICK, HEAT-BONDED POLYETHYLENE AND KRAFT PAPER; 2.5-MIL-THICK POLYSURLYN.

2.4 FIELD-APPLIED JACKETS

- A. PVC JACKET: HIGH-IMPACT-RESISTANT, UV-RESISTANT PVC COMPLYING WITH ASTM D 1784, CLASS 16354-C. THICKNESS AS SCHEDULED; ROLL STOCK READY FOR SHOP OR FIELD CUTTING AND FORMING. THICKNESS IS INDICATED IN FIELD-APPLIED JACKET SCHEDULES. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING: JOHN'S MANVILLE; ZESTON; P.I.C. PLASTICS, INC.; FG SERIES; PROTO CORPORATION; LOSMOKE; SPEEDLINE CORPORATION; SMOKE SAFE; ADHESIVE: AS RECOMMENDED BY JACKET MATERIAL MANUFACTURER; COLOR: WHITE. FACTORY-FABRICATED FITTING COVERS TO MATCH JACKET IF AVAILABLE; OTHERWISE, FIELD FABRICATE. SHAPES: 45- AND 90-DEGREE, SHORT- AND LONG-RADIUS ELBOWS, TEES, VALVES, FLANGES, UNIONS, REDUCERS, END CAPS, SOIL-PIPE HUBS, TRAPS, MECHANICAL JOINTS, AND P-TRAP AND SUPPLY COVERS FOR LAVATORIES.

- B. ALUMINUM JACKET: COMPLY WITH ASTM B 209 (ASTM B 209M), ALLOY 3003, 3005, 3105, OR 5005, TEMPER H-14. PREPARED TO COMPLIANCE WITH REQUIREMENTS. PROVIDE ONE OF THE FOLLOWING: CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; METAL JACKETING SYSTEMS; RPR PRODUCTS, INC.; INSUL-MATE; PABCO METALS CORP.; SUREFIT. SHEET AND ROLL STOCK READY FOR SHOP OR FIELD SIZING OR FACTORY CUT AND ROLLED TO SIZE. FINISH AND THICKNESS ARE INDICATED IN FIELD-APPLIED JACKET SCHEDULES. AMONG THE THREE MOISTURE BARRIERS IN FIRST SUBPARAGRAPH BELOW, 1-MIL BARRIER PROVIDES THE LEAST PROTECTION AGAINST GALVANIC CORROSION, 3-MIL BARRIER OFFERS BETTER PROTECTION, AND POLYSURLYN BARRIER OFFERS THE BEST PROTECTION. FOR MOST INDOOR APPLICATIONS, 1-MIL BARRIER IS ADEQUATE. FOR OUTDOOR APPLICATIONS, SELECT EITHER 3-MIL OR POLYSURLYN BARRIER. MOISTURE BARRIER FOR INDOOR APPLICATIONS: 1-MIL THICK, HEAT-BONDED POLYETHYLENE AND KRAFT PAPER; 3-MIL-THICK, HEAT-BONDED POLYETHYLENE AND KRAFT PAPER; 2.5-MIL-THICK POLYSURLYN.

3.1 PREPARATION

- A. SURFACE PREPARATION: CLEAN AND DRY SURFACES TO RECEIVE INSULATION. REMOVE MATERIALS THAT WILL ADVERSELY AFFECT INSULATION APPLICATION.

3.2 GENERAL PIPE INSULATION INSTALLATION

- A. INSTALL INSULATION OVER FITTINGS, VALVES, STRAINERS, FLANGES, UNIONS, AND OTHER SPECIALTIES WITH CONTINUOUS THERMAL AND VAPOR-RETARDER INTEGRITY UNLESS OTHERWISE INDICATED.
- B. INSULATE PIPE ELBOWS, TEES, VALVES, ETC., USING PREFORMED FITTING INSULATION OR MITERED FITTINGS MADE FROM SAME MATERIAL AS ADJOINING PIPE INSULATION. EACH PIECE SHOULD BE BUTTED TIGHTLY AGAINST ADJOINING PIECE AND BONDED WITH ADHESIVE. FILL JOINTS, SEAMS, VOIDS, AND IRREGULAR SURFACES WITH INSULATING CEMENT FINISHED TO A SMOOTH, HARD, AND UNIFORM CONTOUR THAT IS UNIFORM WITH ADJOINING PIPE INSULATION.

- C. COVER SEGMENTED INSULATED SURFACES WITH A LAYER OF FINISHING CEMENT AND COAT WITH A MASTIC. INSTALL VAPOR-BARRIER MASTIC FOR BELOW-AMBIENT SERVICES AND A BREATHER MASTIC FOR ABOVE-AMBIENT SERVICES. REINFORCE THE MASTIC WITH FABRIC-REINFORCING MESH. TROWEL THE MASTIC TO A SMOOTH AND WELL-SHAPED CONTOUR.

- D. INSULATE INSTRUMENT CONNECTIONS FOR THERMOMETERS, PRESSURE GAGES, PRESSURE TEMPERATURE TAPS, TEST CONNECTIONS, FLOW METERS, SENSORS, SWITCHES, AND TRANSMITTERS ON INSULATED PIPES. SHAPE INSULATION AT THESE CONNECTIONS BY TAPERING IT TO AND AROUND THE CONNECTION WITH INSULATING CEMENT AND FINISH WITH FINISHING CEMENT, MASTIC, AND FLASHING SEALANT.

- E. INSTALL REMOVABLE INSULATION COVERS AT LOCATIONS INDICATED. INSTALLATION SHALL CONFORM TO THE FOLLOWING: MAKE REMOVABLE FLANGE AND UNION INSULATION FROM SECTIONAL PIPE INSULATION OF SAME THICKNESS AS THAT ON ADJOINING PIPE. INSTALL SAME INSULATION JACKET AS ADJOINING PIPE INSULATION. CONSTRUCT REMOVABLE VALVE INSULATION COVERS IN SAME MANNER AS FOR FLANGES, EXCEPT DIVIDE THE TWO-PART SECTION ON THE VERTICAL CENTER LINE OF VALVE BODY.

3.3 PIPING INSULATION SCHEDULE

- A. THE CONTRACTOR MAY USE ANY OF THE FOLLOWING INSULATING MATERIALS, AT HIS OPTION, PROVIDED THE SELECTED MATERIAL MEETS WITH THE APPROVAL OF ALL STATE, LOCAL AUTHORITIES AND UTILITY

COMPANY REQUIREMENTS. VERIFICATION OF COMPLIANCE OF THE SELECTED INSULATING MATERIAL AND THICKNESS WITH ALL STATE AND LOCAL CODES AND UTILITY COMPANY REQUIREMENTS IS THE SOLE RESPONSIBILITY OF THE INSTALLING CONTRACTOR.

B. PLUMBING SYSTEMS:

1. DOMESTIC HOT AND RECIRCULATED HOT WATER-FLEXIBLE ELASTOMERIC: 1 INCH THICK; MINERAL-FIBER, PREFORMED PIPE INSULATION, TYPE I: 1 INCH THICK; POLYOLEFIN: 1 INCH (25 MM) THICK.
2. DOMESTIC COLD WATER: FLEXIBLE ELASTOMERIC: 1/2 INCH THICK; MINERAL-FIBER, PREFORMED PIPE INSULATION, TYPE I: 1/2 INCH THICK; POLYOLEFIN: 1/2 INCH (25 MM) THICK.

SECTION 220720 - PIPING SAFETY COVERS

1.1 SECTION INCLUDES

- A. PIPING SAFETY COVERS.

2.1 MANUFACTURERS

- A. ACCEPTABLE MANUFACTURER: TRUEBRO, INC.

2.2 PIPING INSULATION ACCESSORIES

- A. PROVIDE PRODUCTS THAT COMPLY WITH THE FOLLOWING: AMERICANS WITH DISABILITIES ACT (ADA), ARTICLE 4.19.4; ANSI/ICC 417.1, AMERICAN NATIONAL STANDARD FOR ACCESSIBLE BUILDINGS AND FACILITIES; REQUIREMENTS OF APPLICABLE BUILDING CODE.
- B. PIPING SAFETY COVERS, TRUEBRO LAV-GUARD, CHARACTERISTICS: THREE-PIECE MOLDED ASSEMBLY, MINIMUM 1/8 INCH WALL THICKNESS, WITH INTERNAL RIBS TO PROVIDE AIR SPACE BETWEEN PIPING AND PIPING INSULATION JACKET, MOLDED TO RECEIVE MANUFACTURER'S SNAP-CLIP FASTENERS; VINYL MATERIAL: IMPACT-RESISTANT AND STAIN-RESISTANT MOLDED CLOSED-CELL ANTI-MICROBIAL VINYL COMPOUND, UV-STABLE, NON-FADING, NON YELLOWING, HAVING THE LOT LOWING PERFORMANCE CHARACTERISTICS - BURNING CHARACTERISTICS, 0 SECONDS AVERAGE TIME OF BURNING (ATB), 0MM AREA OF BURNING (AEB), WHEN TESTED IN ACCORDANCE WITH ASTM 535; THERMAL CONDUCTIVITY, K-VALUE 1.17, WHEN TESTED IN ACCORDANCE WITH ASTM C 177; INDENTATION HARDNESS, 90, MINIMUM WHEN TESTED IN ACCORDANCE WITH ASTM D 2240, USING TYPE A DUROMETER; TRAP ASSEMBLY COVER: THREE-PIECE ASSEMBLY, WITH REMOVABLE CLEAN-OUT NUT ENCLOSURE, ANGLE STOP COVERS; FORMED WITH HINGED CAP FOR ACCESS TO VALVE WITHOUT REQUIRING COVER REMOVAL; CONFIGURATIONS: IN ACCORDANCE WITH MANUFACTURER'S PRODUCT DATA FOR PROJECT PIPING CONFIGURATIONS INDICATED ON DRAWINGS; COLOR: CHINA WHITE, GLOSS FINISH; PAINTABLE; FASTENERS: MANUFACTURER'S STANDARD RE-USABLE SNAP-CLIP FASTENERS; WIRE-TIE FASTENERS NOT PERMITTED.

3.1 EXAMINATION

- A. VERIFY THAT PIPING CONFIGURATIONS ARE CORRECT TYPE FOR PIPING COVER COMPONENT CONFIGURATIONS SPECIFIED.

3.2 INSTALLATION

- A. INSTALL PRODUCTS OF THIS SECTION IN ACCORDANCE WITH MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS.
- 3.3 PROTECTION OF INSTALLED PRODUCTS
- A. DO NOT ALLOW DAMAGE TO INSTALLED PRODUCTS BY SUBSEQUENT CONSTRUCTION ACTIVITIES; PROTECT PRODUCTS UNTIL SUBSTANTIAL COMPLETION. REPLACE ANY DAMAGED PRODUCTS PRIOR TO OCCUPANCY.

SECTION 221005 - PLUMBING PIPING

1.1 SECTION INCLUDES

- A. PIPE, PIPE FITTINGS, VALVES AND CONNECTIONS FOR PIPING SYSTEMS: SANITARY SEWER, DOMESTIC WATER, NATURAL GAS.
- 2.1 PRODUCTS

A. THE CONTRACTOR MAY USE ANY OF THE FOLLOWING PIPING MATERIALS, AT HIS OPTION, PROVIDED THE SELECTED MATERIAL MEETS WITH THE APPROVAL OF ALL STATE AND LOCAL AUTHORITIES AND UTILITY COMPANY REQUIREMENTS. VERIFICATION OF COMPLIANCE OF THE SELECTED PIPING MATERIAL WITH LOCAL REQUIREMENTS IS THE SOLE RESPONSIBILITY OF THE INSTALLING CONTRACTOR. VERIFY THE USE OF PLASTIC PIPING SYSTEMS WITH LOCAL JURISDICTION. NON-METALLIC PIPING SYSTEMS MAY NOT BE USED IN ANY RETURN AIR PLENUM CEILING SPACES, NO EXCEPTIONS.

2.2 SANITARY SEWER PIPING

- A. PVC PIPE AND FITTINGS: SOLID-WALL PVC PIPE AND FITTINGS: ASTM D 2665, DRAIN, WASTE, AND VENT, FITTINGS MADE TO ASTM D 3311, DRAIN, WASTE, AND VENT PATTERNS AND TO FIT SCHEDULE 40 PIPE. ADHESIVE PRIMER: ASTM F 656. ADHESIVE PRIMER SHALL HAVE A VOC CONTENT OF 550 GIL OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24). ADHESIVE PRIMER SHALL COMPLY WITH THE TESTING AND PRODUCT REQUIREMENTS. "STANDARD PRACTICE FOR THE TESTING OF VOLATILE ORGANIC EMISSIONS FROM VARIOUS SOURCES USING SMALL-SCALE ENVIRONMENTAL CHAMBERS": SOLVENT CEMENT: ASTM D 2564. PVC SOLVENT CEMENT SHALL HAVE A VOC CONTENT OF 510 GIL OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24). SOLVENT CEMENT SHALL COMPLY WITH THE TESTING AND PRODUCT REQUIREMENTS OF THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES' "STANDARD PRACTICE FOR THE TESTING OF VOLATILE ORGANIC EMISSIONS FROM VARIOUS SOURCES USING SMALL-SCALE ENVIRONMENTAL CHAMBERS."

- B. HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS: PIPE AND FITTINGS: ASTM A 74, SERVICE CLASS, C1. LOGO- NSF INTERNATIONAL LISTED, GASKETS: ASTM C 564, RUBBER.

- C. SPECIALTY PIPE FITTINGS: FITTING OR DEVICE FOR JOINING PIPING WITH SMALL DIFFERENCES IN OD'S OR OF DIFFERENT MATERIALS. INCLUDE END CONNECTIONS SAME SIZE AS AND COMPATIBLE WITH PIPES TO BE JOINED, FITTING-TYPE TRANSITION COUPLINGS: MANUFACTURED PIPING COUPLING OR SPECIFIED PIPING SYSTEM FITTING, SHIELDED, NONPRESSURE TRANSITION COUPLINGS: MANUFACTURERS: ANACO, MISSION RUBBER COMPANY; A DIVISION OF MCP INDUSTRIES, INC. STANDARD: ASTM C 1460. ELASTOMERIC OR RUBBER SLEEVE WITH FULL-LENGTH, CORROSION-RESISTANT OUTER SHIELD AND CORROSION-RESISTANT METAL TENSION BAND AND TIGHTENING MECHANISM ON EACH END, SHIELD MARKED TO IDENTIFY TRANSITION MATERIAL.

2.3 DOMESTIC WATER PIPING

- A. PEX PIPE AND FITTINGS PEX-A (ENGLER-METHOD CROSSLINKED POLYETHYLENE) PIPING: ASTM F 876/877 BY UPONOR.

- B. PEX-A FITTINGS: ELBOWS, ADAPTERS, COUPLINGS, PLUGS, TEES AND MULTI-PORT TEES (1/2 INCH THROUGH 2 INCH NOMINAL PIPE SIZE): ASTM F1960 COLD-EXPANSION FITTING MANUFACTURED FROM THE FOLLOWING MATERIAL TYPES: UNS NO. C69300 LEAD-FREE (LF) BRASS, 2.0% CLASS-FILLED POLYSULFONE AS SPECIFIED IN ASTM D 6394, UNREINFORCED POLYSULFONE (GROUP 03, CLASS 1, GRADE 2) AS SPECIFIED IN ASTM D 6394, POLYPHENYLSULFONE (GROUP 03, CLASS 1, GRADE 2) AS SPECIFIED IN ASTM D 6394, BLEND OF POLYPHENYLSULFONE (55-80%) AND UNREINFORCED POLYSULFONE (REM.) AS SPECIFIED IN ASTM D 6394. REINFORCING COLD-EXPANSION RINGS SHALL BE MANUFACTURED FROM THE SAME SOURCE AS PEX-A PIPING MANUFACTURER AND MARKED "F1960".

- C. PRE-SLEEVED PIPING: PEX-A PIPING, WITH A HIGH-DENSITY POLYETHYLENE (HDPE) CORRUGATED SLEEVE.

- D. MULTI-PORT TEES: MULTIPLE-OUTLET FITTING COMPLYING WITH ASTM F 877; WITH ASTM F 1960 INLETS AND OUTLETS.

- E. MANIFOLDS: MULTIPLE-OUTLET ASSEMBLY COMPLYING WITH ASTM F 877; WITH ASTM F 1960 OUTLETS.

- F. TRANSITION FITTINGS: PEX-TO-METAL TRANSITION FITTINGS: MANUFACTURERS: PROVIDE FITTINGS FROM THE SAME MANUFACTURER OF THE PIPING. BRASS SWEAT TO PEX-A TRANSITION: ONE-PIECE BRASS FITTING WITH SWEAT ADAPTER AND ASTM F 1960 COLD-EXPANSION END, WITH PEX-A REINFORCING COLD-EXPANSION RING.
- G. VALVES: PEX-TO-PEX LEAD FREE (LF) BRASS BALL VALVE; MANUFACTURERS: PROVIDE BALL VALVE(S) FROM THE SAME MANUFACTURER AS THE PIPING SYSTEM. FULL-PORT BALL VALVE: TWO-PIECE, ASTM F1960 COLD-EXPANSION ENDS, WITH PEX-A REINFORCING COLD-EXPANSION RING. LF BRASS VALVE WITH A POSITIVE STOP SHOULDER MANUFACTURED FROM C69300 BRASS. IN COMPLIANCE WITH: 250 CWP, ANS/INFS 359, ANS/INFS 14/61, NSF-US-PW-G LEAD FREE 0.25% LEAD MAX., ASTM F1960, ASTM F 877.

- H. INSTALLATION: INSTALL PLUMBING SYSTEM ACCORDING TO APPROVED SHOP DRAWINGS AND COORDINATION DRAWINGS. INSTALL PIPING IN COMPLIANCE WITH MANUFACTURER'S PLUMBING INSTALLATION GUIDE.

- I. HANGERS AND SUPPORTS: HORIZONTAL PEX-A PIPING HANGERS: INSTALL CTS HANGERS SUITABLE FOR PEX-A PIPING IN COMPLIANCE WITH CHAPTER 6 - INSTALLATION METHODS" AND LOCAL CODES, WITH THE FOLLOWING MAXIMUM SPACING: 3 INCH AND BELOW: MAXIMUM SPAN, 32 INCHES. VERTICAL PEX-A PIPING: SUPPORT PEX-A PIPING WITH MINIMUM SPACING OF 5 FEET.

J. PIPING SCHEDULE

- K. UNDERGROUND WATER PIPING SHALL BE COPPER PIPING ASTM B88 TYPE L WITH WROUGHT COPPER ASME B16.22 SOLDER TYPE FITTINGS. USE ASTM B813 WATER-FLUSHABLE, LEAD-FREE FLUX AND ASTM B32 LEAD-FREE ALLOY SOLDER. ISOLATE ALL COPPER PIPE FROM CONTACT WITH DISSIMILAR MATERIAL WITH 20 MIL TAPE.

- L. ABOVEGROUND DOMESTIC WATER PIPING SHALL BE THE FOLLOWING: PEX-A PIPING, WITH ENGINEERED POLYMER (EP) OR LEAD-FREE BRASS F1960 COLD-EXPANSION FITTINGS, OR LEAD-FREE BRASS COMPRESSION FITTINGS COMPLYING WITH ASTM F 877.

- M. PIPE JOINT CONSTRUCTION: PEX-A CONNECTIONS: INSTALL PER MANUFACTURER'S RECOMMENDATIONS. USE MANUFACTURER-RECOMMENDED COLD-EXPANSION TOOL FOR ASTM F 1960 CONNECTIONS.

- N. FIELD QUALITY CONTROL: DO NOT EXPOSE PEX PIPING TO DIRECT SUNLIGHT FOR MORE THAN 30 DAYS. IF CONSTRUCTION DELAYS ARE ENCOUNTERED, PROVIDE COVER TO PORTIONS OF PIPING EXPOSED TO DIRECT SUNLIGHT.

2.4 BACKFLOW PREVENTERS

- A. REDUCED-PRESSURE-PRINCIPLE BACKFLOW PREVENTERS SUITABLE FOR CONTINUOUS PRESSURE APPLICATION, CONSISTING OF TWO POSITIVE-SEATING CHECK VALVES WITH INTERMEDIATE RELIEF VALVE, AND TEST LOCKS: MANUFACTURERS: AMES CO., CONBRACO INDUSTRIES, INC., MUELLER CO., HERSEY METERS DIV., WATTS INDUSTRIES, INC.; WATER PRODUCTS DIV., ZURN PLUMBING PRODUCTS GROUP, WILKINS DIV.

- B. SPECIFICATIONS: STANDARD ASSE 1013, OPERATION: CONTINUOUS-PRESSURE APPLICATIONS, PRESSURE LOSS: 7 PSIG MAXIMUM, THROUGH MIDDLE THIRD OF FLOW RANGE, PRESSURE LOSS AT DESIGN FLOW RATE: 7 PSIG, BODY: BRONZE FOR NPS 2 AND SMALLER, CAST IRON OR STEEL WITH INTERIOR LINING THAT COMPLIES WITH AWWA C550 OR THAT IS FDA APPROVED, STAINLESS STEEL FOR NPS 2-1/2 AND LARGER. END CONNECTIONS: THREADED FOR NPS 2 AND SMALLER, FLANGED FOR NPS 2-1/2 AND LARGER. CONFIGURATION: DESIGNED FOR HORIZONTAL, STRAIGHT-THROUGH OR VERTICAL-INLET, HORIZONTAL-CENTER-SECTION, AND VERTICAL-OUTLET FLOW AS INDICATED.
- C. ACCESSORIES: VALVES NPS 2 AND SMALLER: BALL TYPE WITH THREADED ENDS ON INLET AND OUTLET. AIR-GAP FITTING: ASME A12.1.2, MATCHING BACKFLOW-PREVENTER CONNECTION.

2.5 WATER PRESSURE-REDUCING VALVES

- A. MANUFACTURERS: CONBRACO INDUSTRIES, INC., HONEYWELL INTERNATIONAL INC., WATTS REGULATOR COMPANY, ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP, WILKINS WATER CONTROL PRODUCTS.
- B. SPECIFICATIONS: STANDARD ASSE 1003, PRESSURE RATING: INITIAL WORKING PRESSURE OF 150 PSIG. BODY: BRONZE FOR NPS 2 AND SMALLER, CAST IRON WITH INTERIOR LINING THAT COMPLIES WITH AWWA C550 OR THAT IS FDA APPROVED FOR NPS 2-1/2 AND NPS 3. END CONNECTIONS: THREADED FOR NPS 2 AND SMALLER; FLANGED FOR NPS 2-1/2 AND NPS 3.

2.6 TEMPERATURE-ACTUATED, WATER MIXING VALVES

1. MANUFACTURERS: POWERS, SLOAN
2. SPECIFICATIONS: STANDARD ASSE 1017, PRESSURE RATING: 125 PSIG, TYPE, THERMOSTATICALLY CONTROLLED WATER MIXING VALVE, MATERIAL: BRONZE BODY WITH CORROSION-RESISTANT INTERIOR COMPONENTS, CONNECTIONS: THREADED OR UNION INLETS AND OUTLET, ACCESSORIES: CHECK STOPS ON HOT- AND COLD-WATER SUPPLIES, AND ADJUSTABLE, TEMPERATURE-CONTROL HANDLE, TEMPERED-WATER SETTING: 110 DEG F, VALVE FINISH: CHROME PLATED OR ROUGH BRONZE.

2.7 BALL VALVES

- A. MANUFACTURERS: CONBRACO INDUSTRIES, INC.; APOLLO VALVES, MILWAUKEE VALVE COMPANY, NIBCO INC. WATTS REGULATOR CO.; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.

- B. DESCRIPTION: TWO-PIECE, FULL-PORT, BRONZE BALL VALVES WITH BRONZE TRIM, STANDARD: MSS SP-110, CWP RATING: 400 PSIG, BODY DESIGN: TWO PIECE, BODY MATERIAL: BRONZE, ENDS: THREADED, SEATS: PTFE OR TFE, STEM: BRONZE, BLOWOUT-PROOF, BALL: CHROME-PLATED BRASS, PORT: FULL.

2.8 BRONZE SWING CHECK VALVES

- A. MANUFACTURERS: MILWAUKEE VALVE COMPANY, NIBCO INC, WATTS REGULATOR CO.; A DIVISION OF WATTS WATER TECHNOLOGIES, INC., CONBRACO INDUSTRIES, INC.
- B. DESCRIPTION: CLASS 125, BRONZE SWING CHECK VALVES WITH NONMETALLIC DISC, TYPE 4, CLASS 125, BRONZE, SWING CHECK VALVES: BRONZE BODY WITH NONMETALLIC DISC, BRONZE SEAT, BRONZE HINGE, AND STAINLESS STEEL HINGE PIN.

3.1 EXECUTION AND INSTALLATION

- A. INSTALL VALVES WITH UNIONS OR FLANGES AT EACH PIECE OF EQUIPMENT ARRANGED TO ALLOW SERVICE, MAINTENANCE, AND EQUIPMENT REMOVAL WITHOUT SYSTEM SHUTDOWN.
- B. LOCATE VALVES FOR EASY ACCESS AND PROVIDE SEPARATE SUPPORT WHERE NECESSARY.

- C. INSTALL VALVES IN HORIZONTAL PIPING WITH STEM AT OR ABOVE CENTER OF PIPE.

- D. INSTALL VALVES IN POSITION TO ALLOW FULL STEM MOVEMENT.

- E. SOLDERED JOINTS: USE ASTM B 813, WATER-FLUSHABLE, LEAD-FREE FLUX, ASTM B 32, LEAD-FREE ALLOY SOLDER; AND ASTM B 828 PROCEDURE, UNLESS OTHERWISE INDICATED.

- F. ADJUST OR REPLACE VALVE PACKING AFTER PIPING SYSTEMS HAVE BEEN TESTED AND PUT INTO SERVICE BUT BEFORE FINAL ADJUSTING AND BALANCING. REPLACE VALVES IF PERSISTENT LEAKING OCCURS.

- G. INSTALL BACKFLOW PREVENTERS IN EACH WATER SUPPLY TO MECHANICAL EQUIPMENT AND SYSTEMS AND TO OTHER EQUIPMENT AND WATER SYSTEMS THAT MAY BE SOURCES OF CONTAMINATION. COMPLY WITH AUTHORITIES HAVING JURISDICTION. LOCATE BACKFLOW PREVENTERS IN SAME ROOM AS CONNECTED EQUIPMENT OR SYSTEM. INSTALL DRAIN FOR BACKFLOW PREVENTERS WITH ATMOSPHERIC-VENT DRAIN CONNECTION WITH AIR-GAP FITTING, FIXED AIR-GAP FITTING, OR EQUIVALENT POSITIVE PIPE SEPARATION OF AT LEAST TWO PIPE DIAMETERS IN DRAIN PIPING AND PIPE-TO-FLOOR DRAIN. LOCATE AIR-GAP DEVICE ATTACHED TO OR UNDER BACKFLOW PREVENTER. SIMPLE AIR BREAKS ARE UNACCEPTABLE FOR THIS APPLICATION. DO NOT INSTALL BYPASS PIPING AROUND BACKFLOW PREVENTERS.

- H. INSTALL WATER REGULATORS WITH INLET AND OUTLET SHUTOFF VALVES AND BYPASS WITH MEMORY-STOP BALANCING VALVE. INSTALL PRESSURE GAGES ON INLET AND OUTLET.

- I. INSTALL BALANCING VALVES IN LOCATIONS WHERE THEY CAN EASILY BE ADJUSTED.

- J. INSTALL TEMPERATURE-ACTUATED, WATER MIXING VALVES WITH CHECK STOPS OR SHUTOFF VALVES ON INLETS AND WITH SHUTOFF VALVE ON OUTLET.

- K. INSTALL WATER-HAMMER ARRESTERS IN WATER PIPING ACCORDING TO PDI-WH 201.

- L. INSTALL PIPING AT INDICATED SLOPES AND INSTALL PIPING FREE OF SAGS AND BENDS.

- M. MAKE CHANGES IN DIRECTION FOR SOIL AND WASTE DRAINAGE AND VENT PIPING USING APPROPRIATE BRANCHES, BENDS, AND LONG-SWEEP BENDS. SANITARY TEES AND SHORT-SWEEP 1/4 BENDS MAY BE USED ON VERTICAL STACKS IF CHANGE IN DIRECTION OF FLOW IS FROM HORIZONTAL TO VERTICAL. USE LONG-TURN DOUBLE-Y-BRANCH AND 1/8-BEND FITTINGS IF TWO FIXTURES ARE INSTALLED BACK TO BACK OR SIDE BY SIDE WITH COMMON DRAIN PIPE. STRAIGHT TEES, ELBOWS, AND CROSSES MAY BE USED ON VENT LINES. DO NOT CHANGE DIRECTION OF FLOW MORE THAN 90 DEGREES. USE PROPER SIZE OF STANDARD INCREASERS AND REDUCERS IF PIPES OF DIFFERENT SIZES ARE CONNECTED. REDUCING SIZE OF DRAINAGE PIPING IN DIRECTION OF FLOW IS PROHIBITED.

- N. INSTALL CAST-IRON SOIL PIPING ACCORDING TO CISPI'S "CAST IRON SOIL PIPE AND FITTINGS HANDBOOK," CHAPTER IV, "INSTALLATION OF CAST IRON SOIL PIPE AND FITTINGS."

- O. INSTALL ABOVEGROUND PVC PIPING ACCORDING TO ASTM D 2665 AND UNDERGROUND PVC PIPING ACCORDING TO ASTM D 2321.

- P. INSTALL CLEANOUTS AT GRADE AND EXTEND TO WHERE BUILDING SANITARY DRAINS CONNECT TO BUILDING SANITARY SEWERS IN SANITARY DRAINAGE GRAVITY-FLOW PIPING. COMPLY WITH REQUIREMENTS FOR CLEANOUTS SPECIFIED IN SECTION 221319 "SANITARY WASTE PIPING SPECIALTIES."

- Q. INSTALL DRAINS IN SANITARY DRAINAGE GRAVITY-FLOW PIPING. COMPLY WITH REQUIREMENTS FOR DRAINS SPECIFIED IN SECTION 221319 "SANITARY WASTE PIPING SPECIALTIES."

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

- S. JOIN HUB-AND-SPIGOT, CAST-IRON SOIL PIPING WITH GASKET JOINTS ACCORDING TO CISPI'S "CAST IRON SOIL PIPE AND FITTINGS HANDBOOK" FOR COMPRESSION JOINTS.

- T. PLASTIC, NONPRESSURE-PIPING, SOLVENT-CEMENT JOINTS: CLEAN AND DRY JOINING SURFACES. JOIN PIPE AND FITTINGS ACCORDING TO THE FOLLOWING: COMPLY WITH ASTM F 402 FOR SAFE-HANDLING PRACTICE OF CLEANERS, PRIMERS, AND SOLVENT CEMENTS. PVC PIPING: JOIN ACCORDING TO ASTM D 2855 AND ASTM D 2665 APPENDICES.

- U. DURING INSTALLATION, NOTIFY AUTHORITIES HAVING JURISDICTION AT LEAST 24 HOURS BEFORE INSPECTION MUST BE MADE. PERFORM TESTS SPECIFIED BELOW IN PRESENCE OF AUTHORITIES HAVING JURISDICTION.

- V. REPORTS: PREPARE INSPECTION REPORTS AND HAVE THEM SIGNED BY AUTHORITIES HAVING JURISDICTION.

- W. TEST SANITARY DRAINAGE AND VENT PIPING ACCORDING TO PROCEDURES OF AUTHORITIES HAVING JURISDICTION OR, IN ABSENCE OF PUBLISHED PROCEDURES, AS FOLLOWS:

1. TEST FOR LEAKS AND DEFECTS IN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED. IF TESTING IS PERFORMED IN SEGMENTS, SUBMIT SEPARATE REPORT FOR EACH TEST, COMPLETE WITH DIAGRAM OF PORTION OF PIPING TESTED.
2. LEAVE UNCOVERED AND UNCONCEALED NEW, ALTERED, EXTENDED, OR REPLACED DRAINAGE AND VENT PIPING UNTIL IT HAS BEEN TESTED AND APPROVED. EXPOSE WORK THAT WAS COVERED OR CONCEALED BEFORE IT WAS TESTED.
3. ROUGHING-IN PLUMBING TEST PROCEDURE: TEST DRAINAGE AND VENT PIPING EXCEPT OUTSIDE LEADERS ON COMPLETION OF ROUGHING-IN. CLOSE OPENINGS IN PIPING SYSTEM AND FILL WITH WATER TO POINT OF OVERFLOW, BUT NOT LESS THAN 10-FOOT HEAD OF WATER. FROM 15 MINUTES BEFORE INSPECTION STARTS TO COMPLETION OF INSPECTION, WATER LEVEL MUST NOT DROP. INSPECT JOINTS FOR LEAKS.
4. FINISHED PLUMBING TEST PROCEDURE: AFTER PLUMBING FIXTURES HAVE BEEN SET AND TRAPS FILLED WITH WATER, TEST CONNECTIONS AND PROVE THEY ARE GASTIGHT AND WATERTIGHT. PLUG VENT-STACK OPENINGS ON ROOF AND BUILDING DRAINS WHERE THEY LEAVE BUILDING. INTRODUCE AIR INTO PIPING SYSTEM EQUAL TO PRESSURE OF 1-INCH WG. AIR PRESSURE MUST REMAIN CONSTANT WITHOUT INTRODUCING ADDITIONAL AIR THROUGHOUT PERIOD OF INSPECTION. INSPECT PLUMBING FIXTURE CONNECTIONS FOR GAS AND WATER LEAKS.
5. REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS AND RETEST PIPING, OR PORTION THEREOF, UNTIL SATISFACTORY RESULTS ARE OBTAINED.
6. PREPARE REPORTS FOR TESTS AND REQUIRED CORRECTIVE ACTION.

- X. CLEAN INTERIOR OF PIPING. REMOVE DIRT AND DEBRIS AS WORK PROGRESSES. PROTECT DRAINS DURING REMAINDER OF CONSTRUCTION PERIOD TO AVOID CLOGGING WITH DIRT AND DEBRIS AND TO PREVENT DAMAGE FROM TRAFFIC AND CONSTRUCTION WORK. PLACE PLUGS IN ENDS OF UNCOMPLETED PIPING AT END OF DAY AND WHEN WORK STOPS. EXPOSED PVC PIPING: PROTECT PLUMBING VENTS EXPOSED TO SUNLIGHT WITH TWO COATS OF WATER-BASED LATEX PAINT.

- Y. INSTALL DOMESTIC WATER PIPING LEVEL WITHOUT PITCH AND PLUMB AND INSTALL PIPING FREE OF SAGS AND BENDS.

- Z. REAM ENDS OF PIPES AND TUBES AND REMOVE BURRS. BEVEL PLAIN ENDS OF STEEL PIPE. REMOVE SCALE, SLAG, DIRT, AND DEBRIS FROM INSIDE AND OUTSIDE OF PIPES, TUBES, AND FITTINGS BEFORE ASSEMBLY.

- AA. S

ALTERED, EXTENDED, OR REPAIRED. IF TESTING IS PERFORMED IN SEGMENTS, SUBMIT A SEPARATE REPORT FOR EACH TEST, COMPLETE WITH DIAGRAM OF PORTION OF PIPING TESTED.

- c. LEAVE NEW, ALTERED, EXTENDED, OR REPLACED DOMESTIC WATER PIPING UNCOVERED AND UNCONCEALED UNTIL IT HAS BEEN TESTED AND APPROVED. EXPOSE WORK THAT WAS COVERED OR CONCEALED BEFORE IT WAS TESTED.
- d. CAP AND SUBJECT PIPING TO STATIC WATER PRESSURE OF 50 PSIG (345 KPA) ABOVE OPERATING PRESSURE, WITHOUT EXCEEDING PRESSURE RATING OF PIPING SYSTEM MATERIALS. ISOLATE TEST SOURCE AND ALLOW IT TO STAND FOR FOUR HOURS. LEAKS AND LOSS IN TEST PRESSURE CONSTITUTE DEFECTS THAT MUST BE REPAIRED.
- e. REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS, AND RETEST PIPING OR PORTION THEREOF UNTIL SATISFACTORY RESULTS ARE OBTAINED.
- f. PREPARE REPORTS FOR TESTS AND FOR CORRECTIVE ACTION REQUIRED.

CC. MANUALLY ADJUST BALL-TYPE BALANCING VALVES IN HOT-WATER-CIRCULATION RETURN PIPING TO PROVIDE HOT-WATER FLOW IN EACH BRANCH. ADJUST CALIBRATED BALANCING VALVES TO FLOWS INDICATED. REMOVE PLUGS USED DURING TESTING OF PIPING AND FOR TEMPORARY SEALING OF PIPING DURING INSTALLATION. REMOVE AND CLEAN STRAINER SCREENS. CLOSE DRAIN VALVES AND REPLACE DRAIN PLUGS. CHECK PLUMBING SPECIALTIES AND VERIFY PROPER SETTINGS, ADJUSTMENTS, AND OPERATION.

DD. CLEAN AND DISINFECT POTABLE DOMESTIC WATER PIPING AS FOLLOWS: PURGE NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED BEFORE USING. USE PURGING AND DISINFECTING PROCEDURES PRESCRIBED BY AUTHORITIES HAVING JURISDICTION. IF METHODS ARE NOT PRESCRIBED, USE PROCEDURES DESCRIBED IN EITHER AWWA C651 OR AWWA C652 OR FOLLOW PROCEDURES DESCRIBED BELOW: FLUSH PIPING SYSTEM WITH CLEAN, POTABLE WATER UNTIL DIRTY WATER DOES NOT APPEAR AT OUTLETS. FILL AND ISOLATE SYSTEM ACCORDING TO EITHER OF THE FOLLOWING: FILL SYSTEM OR PART THEREOF WITH WATER/CHLORINE SOLUTION WITH AT LEAST 50 PPM (50 MGL) OF CHLORINE. ISOLATE WITH VALVES AND ALLOW TO STAND FOR 24 HOURS. FILL SYSTEM (OR PART THEREOF) WITH WATER/CHLORINE SOLUTION WITH AT LEAST 200 PPM (200 MGL) OF CHLORINE. ISOLATE AND ALLOW TO STAND FOR THREE HOURS. FLUSH SYSTEM WITH CLEAN, POTABLE WATER UNTIL NO CHLORINE IS IN WATER COMING FROM SYSTEM AFTER THE STANDING TIME. REPEAT PROCEDURES IF BIOLOGICAL EXAMINATION SHOWS CONTAMINATION. SUBMIT WATER SAMPLES IN STERILE BOTTLES TO AUTHORITIES HAVING JURISDICTION. PREPARE AND SUBMIT REPORTS OF PURGING AND DISINFECTING ACTIVITIES. INCLUDE COPIES OF WATER-SAMPLE APPROVALS FROM AUTHORITIES HAVING JURISDICTION. CLEAN INTERIOR OF DOMESTIC WATER PIPING SYSTEM. REMOVE DIRT AND DEBRIS AS WORK PROGRESSES.

### 3.2 PIPE HANGING SCHEDULES

A. COMPLY WITH REQUIREMENTS FOR PIPE HANGER, SUPPORT PRODUCTS, AND INSTALLATION IN SECTION 220529 "HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT."

1. VERTICAL PIPING: MSS TYPE 8 OR 42, CLAMPS.
2. INDIVIDUAL, STRAIGHT, HORIZONTAL PIPING RUNS: 100 FEET AND LESS: MSS TYPE 1, ADJUSTABLE, STEEL CLEVIS HANGERS, LONGER THAN 100 FEET: MSS TYPE 43, ADJUSTABLE ROLLER HANGERS.
3. MULTIPLE, STRAIGHT, HORIZONTAL PIPING RUNS 100 FEET OR LONGER: MSS TYPE 44, PIPE ROLLS. SUPPORT PIPE ROLLS ON TRAPEZE.
4. BASE OF VERTICAL PIPING: MSS TYPE 52, SPRING HANGERS.

B. INSTALL HANGERS FOR COPPER TUBING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:

1. NPS 3/4 AND SMALLER: 60 INCHES WITH 3/8-INCH ROD.
2. NPS 1 AND NPS 1-1/4: 72 INCHES WITH 3/8-INCH ROD.
3. NPS 1-1/2 AND NPS 2: 96 INCHES WITH 3/8-INCH ROD.
4. NPS 2-1/2: 108 INCHES WITH 1/2-INCH ROD.

C. INSTALL VINYL-COATED HANGERS FOR PEX PIPING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:

1. NPS 2 AND SMALLER: 48 INCHES WITH 3/8-INCH ROD.

D. INSTALL SUPPORTS FOR VERTICAL PLASTIC PIPING EVERY 48 INCHES.

E. SUPPORT PIPING AND TUBING NOT LISTED IN THIS ARTICLE ACCORDING TO MSS SP-69 AND MANUFACTURER'S WRITTEN INSTRUCTIONS.

### SECTION 223400-GAS-FIRED, TANKLESS, DOMESTIC-WATER HEATERS

A. MANUFACTURER'S: RINNAI CORPORATION

B. SPECIFICATIONS: STANDARDS: ANSI Z21.10.3/CSA 4.3 FOR GAS-FIRED, INSTANTANEOUS, DOMESTIC-WATER HEATERS FOR INDOOR APPLICATION. CONSTRUCTION: COPPER PIPING OR TUBING COMPLYING WITH NSF 61 BARRIER MATERIALS FOR POTABLE WATER, WITHOUT STORAGE CAPACITY. TAPPINGS: ASME B1.20.1 PIPE THREAD, 150 PSIG, COPPER TUBING HEAT EXCHANGER, INSULATION: COMPLY WITH ASHRAE/IESNA 90.1, METAL JACKET, WITH PAINTED FINISH, OR PLASTIC, BURNER: FOR USE WITH TANKLESS, DOMESTIC-WATER HEATERS AND NATURAL-GAS FUEL, AUTOMATIC, GAS IGNITION, ADJUSTABLE THERMOSTAT. SUPPORT BRACKET FOR WALL MOUNTING.

C. SEISMIC PERFORMANCE: COMMERCIAL DOMESTIC-WATER HEATERS SHALL WITHSTAND THE EFFECTS OF EARTHQUAKE MOTIONS DETERMINED ACCORDING TO ASCE/SEI 7.

D. SUBMITTALS: SEISMIC QUALIFICATION CERTIFICATES: FOR FUEL-FIRED, DOMESTIC-WATER HEATERS, ACCESSORIES, AND COMPONENTS, FROM MANUFACTURER. BASIS FOR CERTIFICATION: INDICATE WHETHER WITHSTAND CERTIFICATION IS BASED ON ACTUAL TEST OF ASSEMBLED COMPONENTS OR ON CALCULATION. DIMENSIONED OUTLINE DRAWINGS OF EQUIPMENT UNIT. IDENTIFY CENTER OF GRAVITY AND LOCATE AND DESCRIBE MOUNTING AND ANCHORAGE PROVISIONS. DETAILED DESCRIPTION OF EQUIPMENT ANCHORAGE DEVICES ON WHICH THE CERTIFICATION IS BASED AND THEIR INSTALLATION REQUIREMENTS. PRODUCT CERTIFICATES: FOR EACH TYPE OF GAS-FIRED, TANKLESS DOMESTIC-WATER HEATER, FROM MANUFACTURER. DOMESTIC-WATER HEATER LABELING: CERTIFIED AND LABELED BY TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION. SOURCE QUALITY-CONTROL REPORTS, FIELD QUALITY-CONTROL REPORTS AND WARRANTY: SAMPLE OF SPECIAL WARRANTY.

E. QUALITY ASSURANCE: SUBMIT THE FOLLOWING: ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION; ASHRAE/IESNA COMPLIANCE: FABRICATE AND LABEL FUEL-FIRED, DOMESTIC-WATER HEATERS TO COMPLY WITH ASHRAE/IESNA 90.1. NSF COMPLIANCE: FABRICATE AND LABEL EQUIPMENT COMPONENTS THAT WILL BE IN CONTACT WITH POTABLE WATER TO COMPLY WITH NSF 61, "DRINKING WATER SYSTEM COMPONENTS - HEALTH EFFECTS."

F. WARRANTY: SPECIAL WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR OR REPLACE COMPONENTS OF FUEL-FIRED, DOMESTIC-WATER HEATERS THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD. FAILURES INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING: STRUCTURAL FAILURES INCLUDING STORAGE TANK AND SUPPORTS, FAULTY OPERATION OF CONTROLS AND DETERIORATION OF METALS, METAL FINISHES, AND OTHER MATERIALS BEYOND NORMAL USE. WARRANTY PERIODS: FROM DATE OF SUBSTANTIAL COMPLETION.

G. DOMESTIC-WATER COMPRESSION TANKS: MANUFACTURER'S: AMTROL INC. DESCRIPTION: STEEL, PRESSURE-RATED TANK CONSTRUCTED WITH WELDED JOINTS AND FACTORY-INSTALLED BUTYL-RUBBER DIAPHRAGM. INCLUDE AIR PRECHARGE TO MINIMUM SYSTEM-OPERATING PRESSURE AT TANK. CONSTRUCTION: TAPPINGS: FACTORY-FABRICATED STEEL, WELDED TO TANK BEFORE TESTING AND LABELING. INCLUDE ASME B1.20.1 PIPE THREAD, INTERIOR FINISH: COMPLY WITH NSF 61 BARRIER MATERIALS FOR POTABLE-WATER TANK LININGS, INCLUDING EXTENDING FINISH INTO AND THROUGH TANK FITTINGS AND OUTLETS. AIR-CHARGING VALVE: FACTORY-INSTALLED.

H. PIPING-TYPE HEAT TRAPS: FIELD-FABRICATED PIPING ARRANGEMENT ACCORDING TO ASHRAE/IESNA 90.1 OR ASHRAE 90.2. HEAT-TRAP FITTINGS: ASHRAE 90.2.

I. GAS ACCESSORIES: GAS SHUTOFF VALVES: ANSI Z21.15/CSA 9.1-M, MANUALLY OPERATED. FURNISH FOR INSTALLATION IN PIPING. GAS PRESSURE REGULATORS: ANSI Z21.18/CSA 6.3, APPLIANCE TYPE. INCLUDE 1/2-PSIG PRESSURE RATING AS REQUIRED TO MATCH GAS SUPPLY. AUTOMATIC GAS VALVES: ANSI Z21.21/CSA 6.5, APPLIANCE, ELECTRICALLY OPERATED, ON-OFF AUTOMATIC VALVE.

J. COMBINATION TEMPERATURE-AND-PRESSURE RELIEF VALVES: INCLUDE RELIEVING CAPACITY AT LEAST AS GREAT AS HEAT INPUT, AND INCLUDE PRESSURE SETTING LESS THAN DOMESTIC-WATER HEATER WORKING-PRESSURE RATING. SELECT RELIEF VALVES WITH SENSING ELEMENT THAT EXTENDS INTO STORAGE TANK. GAS-FIRED, DOMESTIC-WATER HEATERS: ANSI Z21.22/CSA 4.4-M.

K. DOMESTIC-WATER HEATER MOUNTING BRACKETS: MANUFACTURER'S FACTORY-FABRICATED STEEL BRACKET FOR WALL MOUNTING, CAPABLE OF SUPPORTING DOMESTIC-WATER HEATER AND WATER.

L. FACTORY TESTS: TEST AND INSPECT ASSEMBLED DOMESTIC-WATER HEATERS SPECIFIED TO BE ASME-CODE CONSTRUCTION, ACCORDING TO ASME BOILER AND PRESSURE VESSEL CODE. DOMESTIC-WATER HEATERS WILL BE CONSIDERED DEFECTIVE IF THEY DO NOT PASS TESTS AND INSPECTIONS. COMPLY WITH REQUIREMENTS IN SECTION 014000 "QUALITY REQUIREMENTS" FOR RETESTING AND RE-INSPECTING REQUIREMENTS AND SECTION 017300 "EXECUTION" FOR REQUIREMENTS FOR CORRECTING THE WORK. PREPARE TEST AND INSPECTION REPORTS.

M. TANKLESS, DOMESTIC-WATER HEATER MOUNTING: INSTALL TANKLESS, DOMESTIC-WATER HEATERS AT LEAST 18 INCHES ABOVE FLOOR ON WALL BRACKET, MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES, ARRANGE UNITS SO CONTROLS AND DEVICES THAT REQUIRE SERVING ARE ACCESSIBLE. PLACE AND SECURE ANCHORAGE DEVICES. USE SETTING DRAWINGS, TEMPLATES, DIAGRAMS, INSTRUCTIONS, AND DIRECTIONS FURNISHED WITH ITEMS TO BE EMBEDDED. INSTALL ANCHOR BOLTS TO ELEVATIONS REQUIRED FOR PROPER ATTACHMENT TO SUPPORTED EQUIPMENT. ANCHOR DOMESTIC-WATER HEATERS TO SUBSTRATE.

N. INSTALL GAS-FIRED, DOMESTIC-WATER HEATERS ACCORDING TO NFPA 54. INSTALL GAS SHUTOFF VALVES ON GAS SUPPLY PIPING TO GAS-FIRED, DOMESTIC-WATER HEATERS WITHOUT SHUTOFF VALVES. INSTALL GAS PRESSURE REGULATORS ON GAS SUPPLIES TO GAS-FIRED, DOMESTIC-WATER HEATERS WITHOUT GAS PRESSURE REGULATORS IF GAS PRESSURE REGULATORS ARE REQUIRED TO REDUCE GAS PRESSURE AT BURNER. INSTALL AUTOMATIC GAS VALVES ON GAS SUPPLIES TO GAS-FIRED, DOMESTIC-WATER HEATERS IF REQUIRED FOR OPERATION OF SAFETY CONTROL. COMPLY WITH REQUIREMENTS FOR GAS SHUTOFF VALVES, GAS PRESSURE REGULATORS, AND AUTOMATIC GAS VALVES SPECIFIED IN SECTION 231123 "FACILITY NATURAL-GAS PIPING."

O. INSTALL COMMERCIAL DOMESTIC-WATER HEATERS WITH SEISMIC-RESTRAINT DEVICES. COMPLY WITH REQUIREMENTS FOR SEISMIC-RESTRAINT DEVICES SPECIFIED IN SECTION 220548 "VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT."

P. INSTALL COMBINATION TEMPERATURE-AND PRESSURE RELIEF VALVES IN WATER PIPING FOR DOMESTIC-WATER HEATERS WITHOUT STORAGE. EXTEND COMMERCIAL-WATER-HEATER RELIEF-VALVE OUTLET, WITH DRAIN PIPING SAME AS DOMESTIC-WATER PIPING IN CONTINUOUS DOWNWARD PITCH, AND DISCHARGE BY POSITIVE AIR GAP ON CLOSEST FLOOR DRAIN.

Q. INSTALL THERMOMETER ON OUTLET PIPING OF DOMESTIC-WATER HEATERS. COMPLY WITH REQUIREMENTS FOR THERMOMETERS SPECIFIED IN SECTION 220519 "METERS AND GAGES FOR PLUMBING PIPING."

R. ASSEMBLE AND INSTALL INLET AND OUTLET PIPING MANIFOLD KITS FOR MULTIPLE DOMESTIC-WATER HEATERS. FABRICATE, MODIFY, OR ARRANGE MANIFOLDS FOR BALANCED WATER FLOW THROUGH EACH DOMESTIC-WATER HEATER. INCLUDE SHUTOFF VALVE AND THERMOMETER IN EACH DOMESTIC-WATER HEATER INLET AND OUTLET, AND THROTTLING VALVE IN EACH DOMESTIC-WATER HEATER OUTLET. COMPLY WITH REQUIREMENTS FOR VALVES SPECIFIED IN SECTION 220523 "GENERAL-DUTY VALVES FOR PLUMBING PIPING," AND COMPLY WITH REQUIREMENTS FOR THERMOMETERS SPECIFIED IN SECTION 220519 "METERS AND GAGES FOR PLUMBING PIPING."

S. INSTALL PIPING-TYPE HEAT TRAPS ON INLET AND OUTLET PIPING OF DOMESTIC-WATER HEATER STORAGE TANKS WITHOUT INTEGRAL OR FITTING-TYPE HEAT TRAPS. FILL DOMESTIC-WATER HEATERS WITH WATER. CHARGE DOMESTIC-WATER COMPRESSION TANKS WITH AIR.

T. PERFORM TESTS AND INSPECTIONS. LEAK TEST: AFTER INSTALLATION, CHARGE SYSTEM AND TEST FOR LEAKS. REPAIR LEAKS AND RETEST UNTIL NO LEAKS EXIST. OPERATIONAL TEST: AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, START UNITS TO CONFIRM PROPER OPERATION. TEST AND ADJUST CONTROLS AND SAFETIES. REPLACE DAMAGED AND MALFUNCTIONING CONTROLS AND EQUIPMENT. DOMESTIC-WATER HEATERS WILL BE CONSIDERED DEFECTIVE IF THEY DO NOT PASS TESTS AND INSPECTIONS. COMPLY WITH REQUIREMENTS IN SECTION 014000 "QUALITY REQUIREMENTS" FOR RETESTING AND RE-INSPECTING REQUIREMENTS AND SECTION 017300 "EXECUTION" FOR REQUIREMENTS FOR CORRECTING THE WORK. PREPARE TEST AND INSPECTION REPORTS.

### SECTION 224200 - COMMERCIAL PLUMBING FIXTURES

1.1 THIS SECTION INCLUDES ALL PLUMBING FIXTURES AS SCHEDULED ON THE DRAWINGS.

#### 1.2 FIXTURE INSTALLATION

A. ASSEMBLE FIXTURES, TRIM, FITTINGS, AND OTHER COMPONENTS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.

B. INSTALL OFF-FLOOR SUPPORTS AFFIXED TO BUILDING SUBSTRATE, FOR WALL-HANGING FIXTURES. USE CARRIER SUPPORTS WITH WASTE FITTING AND SEAL FOR BACK-OUTLET FIXTURES. USE CARRIER SUPPORTS WITHOUT WASTE FITTING FOR FIXTURES WITH TUBULAR WASTE PIPING. USE CHAIR-TYPE CARRIER SUPPORTS WITH RECTANGULAR STEEL UPRIGHTS FOR ACCESSIBLE FIXTURES.

C. INSTALL BACK-OUTLET, WALL-HANGING FIXTURES ONTO WASTE FITTING SEALS AND ATTACH TO SUPPORTS.

D. INSTALL FLOOR-MOUNTING FIXTURES ON CLOSET FLANGES OR OTHER ATTACHMENTS TO PIPING OR BUILDING SUBSTRATE.

E. INSTALL WALL-HANGING FIXTURES WITH TUBULAR WASTE PIPING ATTACHED TO SUPPORTS.

F. INSTALL FLOOR-MOUNTING, BACK-OUTLET WATER CLOSETS ATTACHED TO BUILDING FLOOR SUBSTRATE AND WALL BRACKET AND ONTO WASTE FITTING SEALS.

G. INSTALL FIXTURES LEVEL AND PLUMB ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS AND ROUGHING-IN DRAWINGS.

H. INSTALL WATER-SUPPLY PIPING WITH STOP ON EACH SUPPLY TO EACH FIXTURE TO BE CONNECTED TO WATER DISTRIBUTION PIPING. ATTACH SUPPLIES IN A RIGID MANNER TO SUPPORTS OR SUBSTRATE WITHIN PIPE SPACES BEHIND FIXTURES. INSTALL STOPS IN LOCATIONS WHERE THEY CAN BE EASILY REACHED FOR OPERATION.

I. INSTALL CHROME PLATED BRASS TRAP AND TUBULAR WASTE PIPING ON DRAIN OUTLET OF EACH FIXTURE TO BE DIRECTLY CONNECTED TO SANITARY DRAINAGE SYSTEM.

J. INSTALL CHROME PLATED TUBULAR WASTE PIPING ON DRAIN OUTLET OF EACH FIXTURE TO BE INDIRECTLY CONNECTED TO DRAINAGE SYSTEM.

K. INSTALL FLUSHMETER VALVES FOR ACCESSIBLE COMPLIANT WATER CLOSETS AND URINALS WITH HANDLE MOUNTED ON WIDE SIDE OF COMPARTMENT. INSTALL OTHER ACTUATORS IN LOCATIONS THAT ARE EASY FOR PEOPLE WITH DISABILITIES TO REACH.

L. INSTALL TANKS FOR ACCESSIBLE, COMPLIANT TANK-TYPE WATER CLOSETS WITH LEVER HANDLE MOUNTED ON WIDE SIDE OF COMPARTMENT.

M. INSTALL TOILET SEATS ON WATER CLOSETS.

N. INSTALL FAUCET-SPOUT FITTINGS WITH SPECIFIED FLOW RATES AND PATTERNS AERATOR IN FAUCET SPOUTS IF FAUCETS ARE NOT FURNISHED WITH REQUIRED RATES AND PATTERNS.

O. INSTALL SHOWER HEAD WITH FLOW-CONTROL WITH SPECIFIED MAXIMUM FLOW RATES.

P. INSTALL TRAPS ON FIXTURE OUTLETS. EXCEPTIONS: OMIT TRAP ON FIXTURES WITH INTEGRAL TRAPS, OMIT TRAP ON INDIRECT WASTE PIPING.

R. INSTALL DISPOSER IN OUTLET OF SINKS INDICATED TO HAVE DISPOSER. INSTALL SWITCH WHERE INDICATED OR IN WALL ADJACENT TO SINK IF LOCATION IS NOT INDICATED.

S. INSTALL ESCUTCHEONS AT PIPING FOR WALL AND CEILING PENETRATIONS IN EXPOSED, FINISHED LOCATIONS AND WITHIN CABINETS AND MILLWORK. USE DEEP-PATTERN ESCUTCHEONS IF REQUIRED TO CONCEAL PROTRUDING FITTINGS. REFER TO DIVISION 22 FOR ESCUTCHEONS.

T. SET BATHTUBS, SHOWER RECEPTORS, AND SERVICE BASINS IN LEVELING BED OF CEMENT GROUT. REFER TO DIVISION 22 FOR GROUT.

U. SEAL JOINTS BETWEEN FIXTURES AND WALLS, FLOORS, AND COUNTERS USING SANITARY-TYPE, ONE-PART, MILDEW-RESISTANT, SILICONE SEALANT. MATCH SEALANT COLOR TO FIXTURE COLOR.

V. PROVIDE PRE-INSULATED DRAINS, OFF-SET DRAINS, P-TRAPS, AND DRAIN PIPE EXPOSED FOR ACCESSIBLE COMPLIANT LAVATORIES AND SINKS.

#### 1.3 CONNECTIONS

A. PIPING INSTALLATION REQUIREMENTS ARE SPECIFIED IN OTHER DIVISION 22 SECTIONS. DRAWINGS INDICATE GENERAL ARRANGEMENT OF PIPING, FITTINGS, AND SPECIALTIES.

B. SUPPLY AND WASTE CONNECTIONS TO PLUMBING FIXTURES: CONNECT FIXTURES WITH WATER SUPPLIES, STOPS, RISERS, TRAPS, AND WASTE PIPING. USE SIZE FITTINGS REQUIRED TO MATCH FIXTURES. CONNECT TO PLUMBING PIPING.

C. SUPPLY AND WASTE CONNECTIONS TO FIXTURES AND EQUIPMENT SPECIFIED IN OTHER SECTIONS: CONNECT FIXTURES AND EQUIPMENT WITH WATER SUPPLIES, STOPS, RISERS, TRAPS, AND WASTE PIPING SPECIFIED. USE SIZE FITTINGS REQUIRED TO MATCH FIXTURES AND EQUIPMENT. CONNECT TO PLUMBING PIPING.

D. GROUND EQUIPMENT ACCORDING TO DIVISION 26.

E. CONNECT WIRING ACCORDING TO DIVISION 26.

#### 1.4 FIELD QUALITY CONTROL

A. VERIFY THAT INSTALLED PLUMBING FIXTURES ARE CATEGORIES AND TYPES SPECIFIED FOR LOCATIONS

WHERE INSTALLED.

B. CHECK THAT PLUMBING FIXTURES ARE COMPLETE WITH TRIM, FAUCETS, FITTINGS, AND OTHER SPECIFIED COMPONENTS.

C. INSPECT INSTALLED PLUMBING FIXTURES FOR DAMAGE. REPLACE DAMAGED FIXTURES AND COMPONENTS.

D. TEST INSTALLED FIXTURES AFTER WATER SYSTEMS ARE PRESSURIZED FOR PROPER OPERATION. REPLACE MALFUNCTIONING FIXTURES AND COMPONENTS, THEN RETEST. REPEAT PROCEDURE UNTIL UNITS OPERATE PROPERLY.

E. INSTALL FRESH BATTERIES IN SENSOR-OPERATED MECHANISMS.

#### 1.5 PROTECTION

A. PROVIDE PROTECTIVE COVERING FOR INSTALLED FIXTURES AND FITTINGS. REPLACE ANY DAMAGED FIXTURE OR FITTINGS.

B. DO NOT ALLOW USE OF FIXTURES FOR TEMPORARY FACILITIES UNLESS APPROVED IN WRITING BY OWNER.

#### ENERGY CONSERVATION NOTES:

1. AS PER 2018 VIRGINIA ENERGY CONSERVATION CODE C403.11.3, PIPING FROM A WATER HEATER TO THE TERMINATION OF HEATED WATER FIXTURE SUPPLY PIPE SHALL BE INSULATED IN ACCORDANCE WITH TABLE OF MINIMUM PIPE INSULATION THICKNESS.

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

2. HOT WATER SYSTEM PIPING IS DESIGNED AS PER MAXIMUM ALLOWED PIPE LENGTH METHOD AS PER VIRGINIA ENERGY CONSERVATION CODE C404.5.1. THE HOT WATER VOLUME FROM THE NEAREST SOURCE OF HEATED WATER TO THE TERMINATION OF THE FIXTURE SUPPLY PIPE SHALL BE AS PER MAXIMUM PIPING LENGTH TABLE.

NOMINAL PIPE SIZE (INCHES)	MAXIMUM PIPING LENGTH (FEET)	
	PUBLIC LAV	OTHER FIXTURES
½"	2'	43'
¾"	0.5'	20'
1"	0.5'	13'
1½"	0.5'	8'
1½"	0.5'	6'
2" OR LARGER	0.5'	4'

3. AS PER 2018 VIRGINIA ENERGY CONSERVATION CODE, AUTOMATIC CONTROLS SHALL BE INSTALLED THAT LIMIT THE OPERATION OF A RECIRCULATING PUMP AND THE SYSTEM RETURN PIPE SHALL BE A DEDICATED RETURN PIPE OR A COLD WATER SUPPLY PIPE.

4. AS PER 2018 VIRGINIA ENERGY CONSERVATION CODE C404.6.1, 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.

5. AS PER 2018 VIRGINIA ENERGY CONSERVATION CODE C404.7, PUMPS SHALL HAVE CONTROLS THAT COMPLY WITH BOTH OF THE FOLLOWING:

A. THE CONTROL SHALL START THE PUMP UPON RECEIVING A SIGNAL FROM THE ACTION OF A USER OF A FIXTURE OR APPLIANCE, SENSING THE PRESENCE OF A USER OF A FIXTURE OR SENSING THE FLOW OF HOT OR TEMPERED WATER TO A FIXTURE FITTING OR APPLIANCE.

B. THE CONTROL SHALL LIMIT THE TEMPERATURE OF THE WATER ENTERING THE COLD-WATER PIPING TO 104°F (40°C).

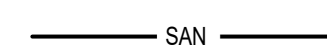
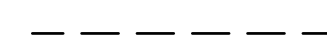

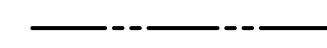
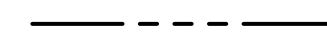




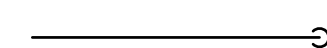
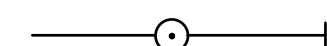
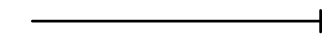


### KEYED NOTES

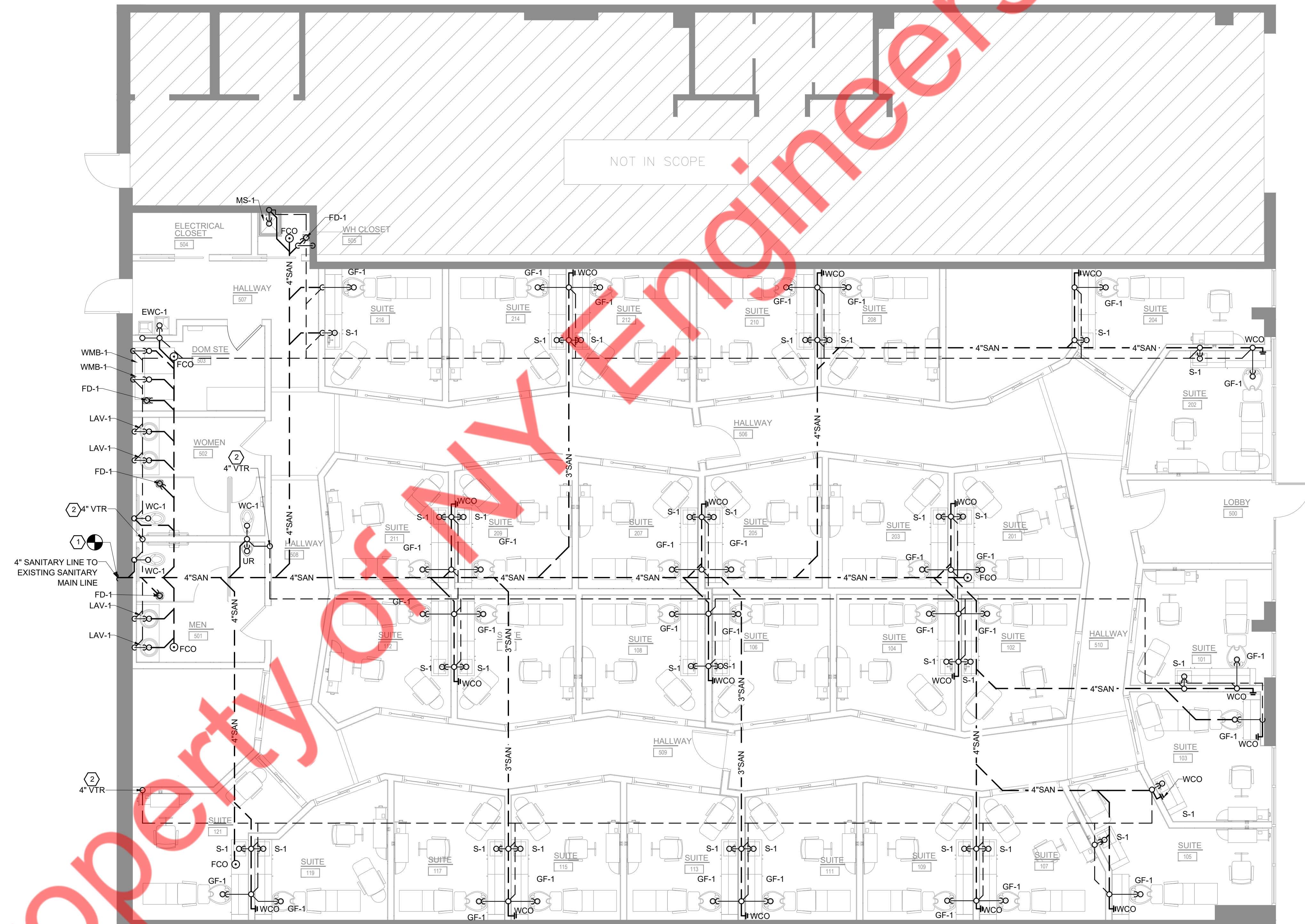
1. CONNECT NEW SANITARY LINE TO EXISTING SANITARY LINE. FIELD VERIFY LOCATION, SIZE, INVERT AND FLOW DIRECTION. NOTIFY ENGINEER OF RECORD IMMEDIATELY IF EXISTING CONDITIONS DIFFER.
2. CONNECT 3" VENT LINE TO 4" VENT THRU ROOF. FIELD VERIFY LOCATION AND MAINTAIN 10FT DISTANCE FROM ANY MECHANICAL UNITS. NOTIFY ENGINEER OF RECORD IMMEDIATELY IF THE CONDITIONS DIFFER.

### GENERAL NOTES

- A. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO START OF WORK. VERIFY ALL DIMENSIONS. DRAWINGS ARE ILLUSTRATIVE AND MAY NOT REFLECT EXACT CONDITIONS OR DIMENSIONS.
- B. DO NOT SCALE THE DRAWINGS. DRAWINGS ARE DIAGRAMMATIC AND SHOW THE GENERAL ARRANGEMENT OF EQUIPMENT AND SYSTEMS. THEY ARE NOT INTENDED TO SHOW EVERY OFFSET, FITTING AND COMPONENT. DO NOT USE THE PLANS FOR EXACT LOCATION OF EQUIPMENT, FIXTURES OR ARCHITECTURAL ITEMS SUCH AS WALLS, WINDOWS, SOFFITS, AND PILASTERS. SPECIFIC LOCATIONS, MOUNTING HEIGHTS AND OVERALL DIMENSIONS OF DEVICES AND FIXTURES ARE TO BE OBTAINED FROM THE ARCHITECTURAL DRAWINGS AND DETAILS WHEN AVAILABLE.
- C. DRAWINGS SPECIFIC TO THIS TRADE DO NOT LIMIT THE RESPONSIBILITY OR WORK REQUIRED BY THE CONTRACT DOCUMENTS REFER TO DRAWINGS AND SPECIFICATIONS OF OTHER TRADES FOR COMPLETE INFORMATION PRIOR TO BID.
- D. WHERE CONFLICTS EXIST AMONG DRAWINGS, SPECIFICATIONS AND EQUIPMENT SCHEDULES, THE MORE STRINGENT SHALL APPLY. NOTIFY THE ENGINEER OF ALL CONFLICTS FOR RESOLUTION OR INTERPRETATION.
- E. NOTIFY THE OWNER IN WRITING AND FIELD VERIFY CONDITIONS BEFORE PERFORMING ANY SAWCUTTING, TRENCHING, CORING OR ANY OTHER STRUCTURAL MODIFICATIONS. INSURE THAT NO ADVERSE EFFECT TO THE BUILDING'S STRUCTURAL INTEGRITY WILL OCCUR.
- F. ANY EXISTING CONDITION DISCOVERED DURING THE DEMOLITION OR CONSTRUCTION PROCESS WHICH, BY GENERALLY ACCEPTED CONSTRUCTION PRACTICES, SHOULD BE REMEDIED, SHOULD BE BROUGHT TO THE ATTENTION OF THE ENGINEER/ARCHITECT IMMEDIATELY, IN WRITING.
- G. OBTAIN WRITTEN APPROVAL FROM THE ENGINEER BEFORE REUSING ANY EXISTING EQUIPMENT, COMPONENTS OR OPENINGS.
- H. INSULATE PLUMBING LINES IN EXTERIOR WALLS TO PREVENT FREEZING.
- I. COORDINATE ROOF WORK WITH ROOFING CONTRACTOR TO ASSURE THAT THE ROOF WARRANTY IS NOT VOIDED.
- J. DRAIN AND WATER LINES FOR THE COLOR AND SHAMPOO STATIONS MUST BE AT THE LOWEST HEIGHT POSSIBLE AND AT THE SAME HEIGHT FOR BOTH CABINETS.
- K. CONTRACTOR TO FIELD VERIFY FEASIBILITY OF SLAB PENETRATION AS PER STRUCTURAL REQUIREMENT.

### PLUMBING LEGEND

	SANITARY SEWER (UNDERFLOOR)
	VENT PIPING
	COLD WATER PIPING
	HOT WATER PIPING
	HOT WATER RETURN PIPING
	EXISTING HOT WATER PIPING
	EXISTING COLD WATER PIPING
	GAS PIPING
	P-TRAP
	PIPE UP
	PIPE DROP
	FLOOR CLEANOUT
	PLUGGED OUTLET/CLEANOUT
	POINT OF CONNECTION



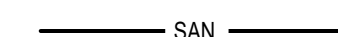




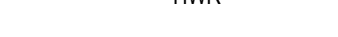








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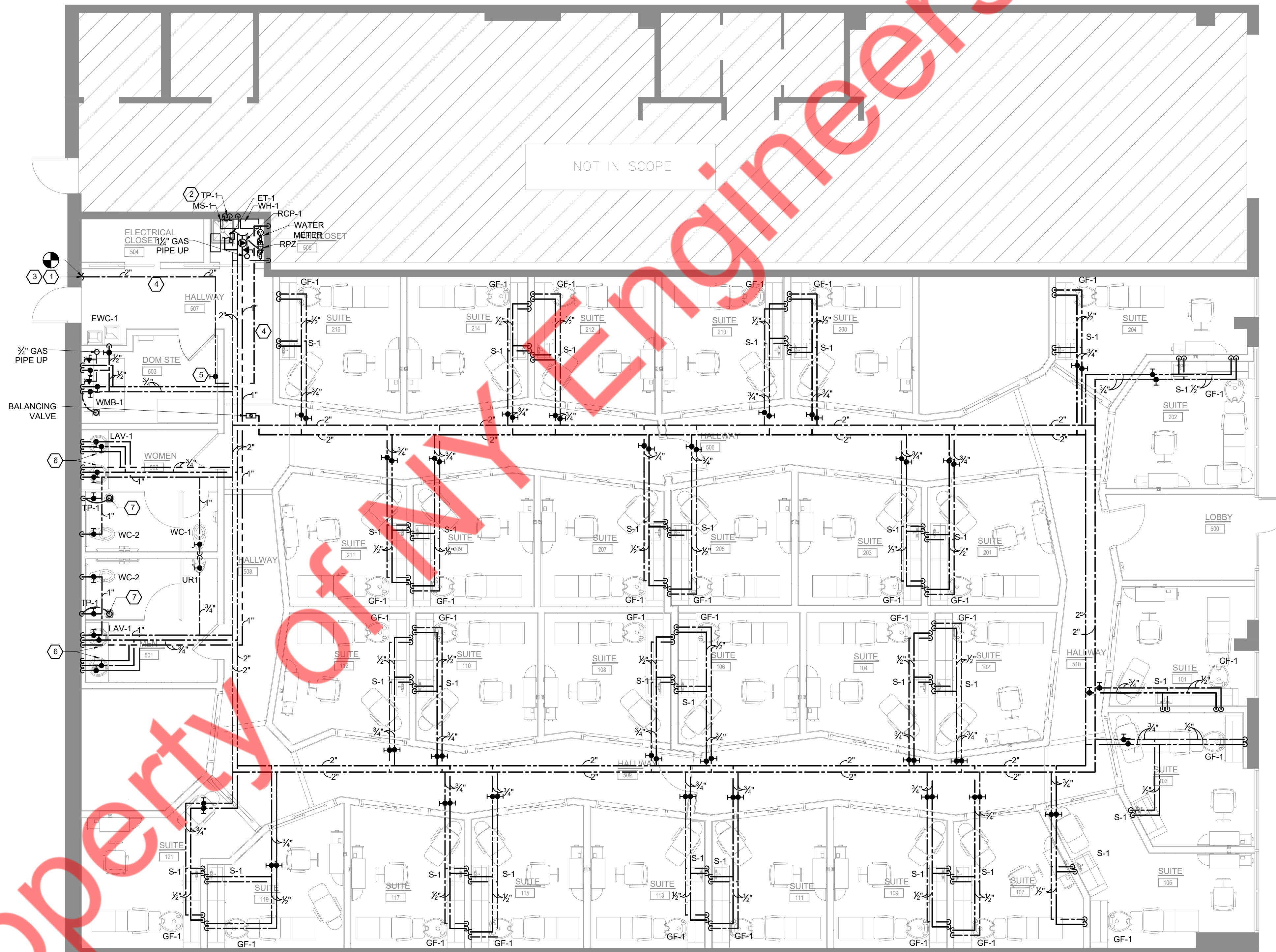
1. CONNECT NEW 2" CW TO EXISTING COLD WATER MAIN IN THIS AREA FOR TENANT. CONTRACTOR FIELD VERIFY EXACT SIZE AND LOCATION OF EXISTING MAIN INCOMING WATER LINE AND WATER METER.
2. INSTALL #3 NEW WATER HEATERS ABOVE UTILITY SINK. ROUTE RELIEF PIPING AND DRAIN PAN PIPING TO UTILITY SINK BELOW. ROUTE CONCENTRIC VENT THROUGH ROOF. REFER TO WATER HEATER DETAIL ON DRAWING P-201 FOR ADDITIONAL INFORMATION.
3. PROVIDE BALL VALVE FOR ISOLATION OF WATER SERVICE TO TENANT.
4. NO TAP OFF TO BE TAKEN BEFORE BFP.
5. THE MAIN SHUT-OFF VALVE IS LOCATED AT A 50" HEIGHT.
6. PROVIDE A TEMPERING VALVE FOR PUBLIC LAVATORIES. IN ACCORDANCE WITH ASSE. 1070 OR EQUAL. SET TEMPERATURE TO A MAXIMUM OF 110° F.
7. TRAP PRIMER (TP) EXTEND AND CONNECT 1/2" COLD WATER PIPING TO FLOOR DRAINS WITH TRAP PRIMER CONNECTIONS.

## GENERAL NOTES

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- C. DRAWINGS SPECIFIC TO THIS TRADE DO NOT LIMIT THE RESPONSIBILITY OR WORK REQUIRED BY THE CONTRACT DOCUMENTS REFER TO DRAWINGS AND SPECIFICATIONS OF OTHER TRADES FOR COMPLETE INFORMATION PRIOR TO BID.
- D. WHERE CONFLICTS EXIST AMONG DRAWINGS, SPECIFICATIONS AND EQUIPMENT SCHEDULES, THE MORE STRINGENT SHALL APPLY. NOTIFY THE ENGINEER OF ALL CONFLICTS FOR RESOLUTION OR INTERPRETATION.
- E. NOTIFY THE OWNER IN WRITING AND FIELD VERIFY CONDITIONS BEFORE PERFORMING ANY SAWCUTTING, TRENCHING, CORING OR ANY OTHER STRUCTURAL MODIFICATIONS. INSURE THAT NO ADVERSE EFFECT TO THE BUILDING'S STRUCTURAL INTEGRITY WILL OCCUR.
- F. ANY EXISTING CONDITION DISCOVERED DURING THE DEMOLITION OR CONSTRUCTION PROCESS WHICH, BY GENERALLY ACCEPTED CONSTRUCTION PRACTICES, SHOULD BE REMEDIED, SHOULD BE BROUGHT TO THE ATTENTION OF THE ENGINEER/ARCHITECT IMMEDIATELY, IN WRITING.
- G. OBTAIN WRITTEN APPROVAL FROM THE ENGINEER BEFORE REUSING ANY EXISTING EQUIPMENT, COMPONENTS OR OPENINGS.
- H. INSULATE PLUMBING LINES IN EXTERIOR WALLS TO PREVENT FREEZING.
- I. COORDINATE ROOF WORK WITH ROOFING CONTRACTOR TO ASSURE THAT THE ROOF WARRANTY IS NOT VOIDED.
- K. MAIN WATER SHUTOFF VALVE TO BE READILY ACCESSIBLE.
- L. ALL WATER LINES THAT ARE ELIMINATED TO BE TAKEN BACK TO THE MAIN AND TO BE CAPPED.
- M. GC TO PROVIDE LABELING ON ALL WATER SUPPLY PIPES.
- N. WATER HEATER DRAIN SPILLS TO THE NEAREST FLOOR DRAIN/MOP SINK.
- O. PROVIDE ELECTRONIC TRAP PRIMER TO ALL FLOOR DRAINS.
- P. PROVIDE ACCESS PANELS FOR WATER HAMMER ARRESTOR, CLEANOUTS & SHUT-OFF VALVES AS REQUIRED PER THE CODE PDI WH-201.
- Q. PROVIDE BRANCH PRV IF PRESSURE EXCEEDS 80 PSI.
- R. CW/HW PIPING TO BE PROVIDED WITH INSULATION AS PER VIRGINIA ENERGY CONSERVATION CODE 2018(IECC2018)
- S. CONTRACTOR TO CO ORDINATE WITH WATER HEATER MANUFACTURERS FOR INSTALLATION REQUIREMENTS.
- U. PROVIDE WATER HAMMER ARRESTOR FOR DOMESTIC WATER PIPING AS REQUIRED PER THE CODE PDI WH-201.

## PLUMBING LEGEND

	SAN	SANITARY SEWER (UNDERFLOOR)
	VENT PIPING	
	CW	COLD WATER PIPING
	HW	HOT WATER PIPING
	HWR	HOT WATER RETURN PIPING
	G	EXISTING HOT WATER PIPING
	G	EXISTING COLD WATER PIPING
	G	GAS PIPING
	P-TRAP	
	PIPE UP	
	PIPE DROP	
	FLOOR CLEANOUT	
	PLUGGED OUTLET/CLEANOUT	
	POINT OF CONNECTION	



1 WATER SUPPLY PLAN  
P-111 SCALE: 3/16"=1'0" N

### KEYED NOTES

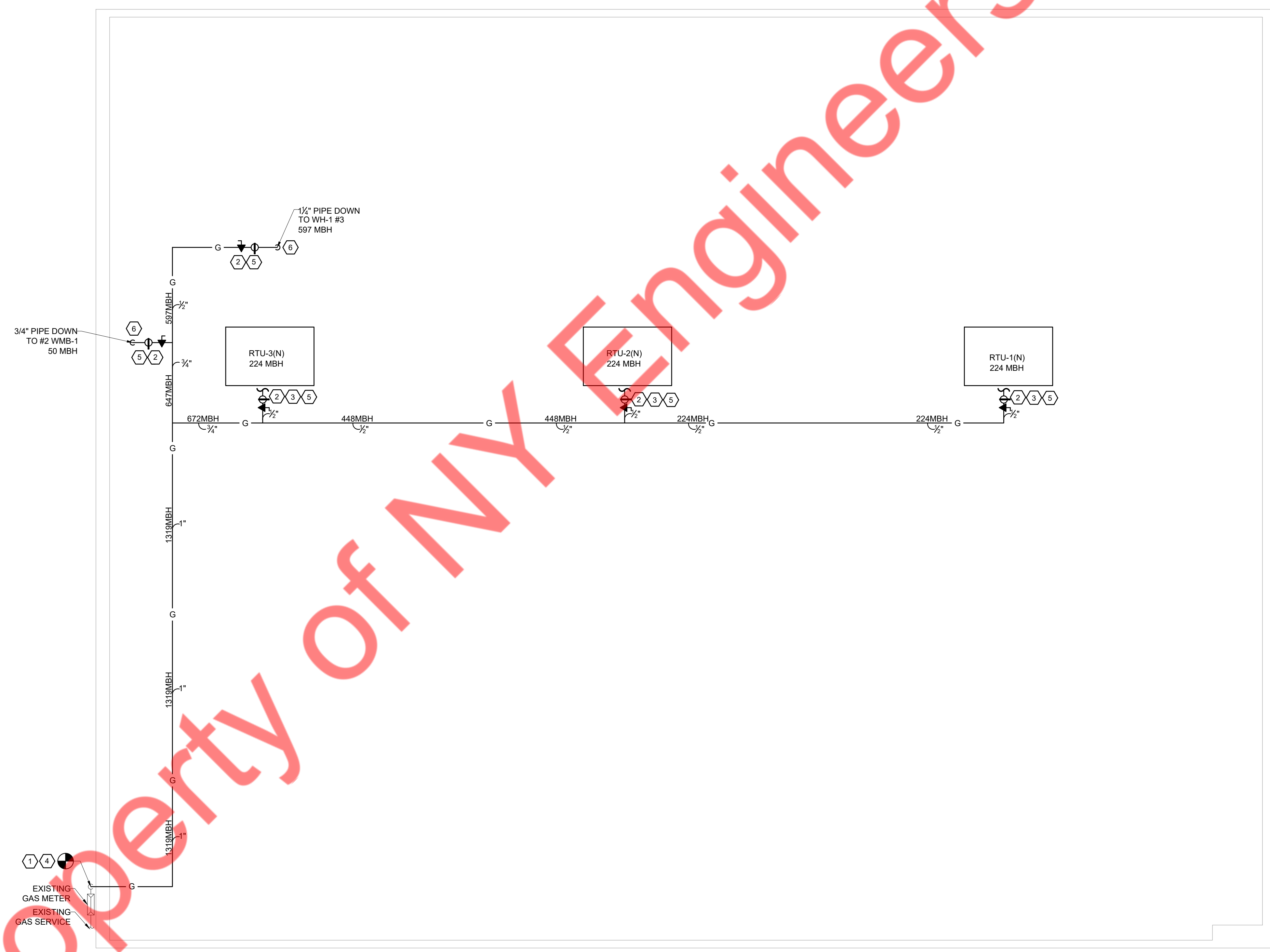
1. CONNECT NEW 1" GAS TO EXISTING GAS LINE IN THIS AREA FOR TENANT. EXTEND NEW PIPING AS INDICATED. CONTRACTOR TO FIELD VERIFY EXACT SIZE AND LOCATION OF EXISTING MAIN.
2. EXTEND GAS LINE TO RTU-1(N), RTU-2(N), RTU-3(N), AND WH-1, PROVIDE SHUTOFF VALVE, PRESSURE REGULATOR, UNION AND DIRTLEG AT AN ACCESSIBLE LOCATION.
3. ROUTE GAS PIPING UP THROUGH ROOF TOP UNIT IN ACCORDANCE WITH DETAIL 6/P-301
4. CONTRACTOR TO FIELD VERIFY EXISTING AVAILABLE GAS PRESSURE AND MAKE SURE TO PROVIDE ADEQUATE INLET PRESSURE REQUIRED FOR DRYER, GAS FIRED WATER HEATER, RTU-1(N), RTU-2(N) AND RTU-3(N)
5. CONTRACTOR TO FIELD VERIFY EXISTING AVAILABLE GAS PRESSURE REQUIRED FOR MECHANICAL EQUIPMENT, DRYER AND GAS FIRED WATER HEATER.
6. LOW PRESSURE GAS PIPE TO GAS FIRED DRYER AND WATER HEATER AND WASHER DRYER

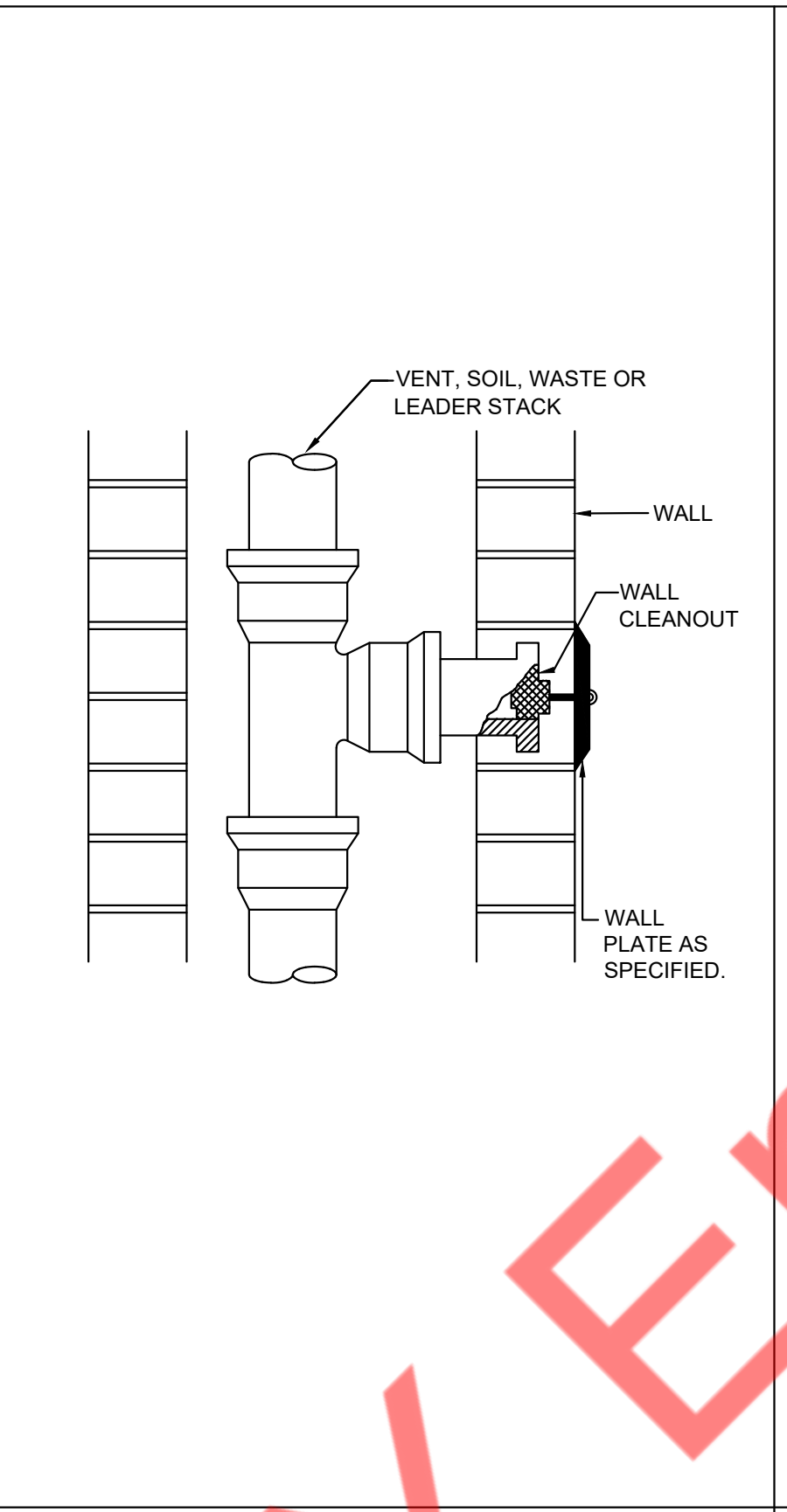
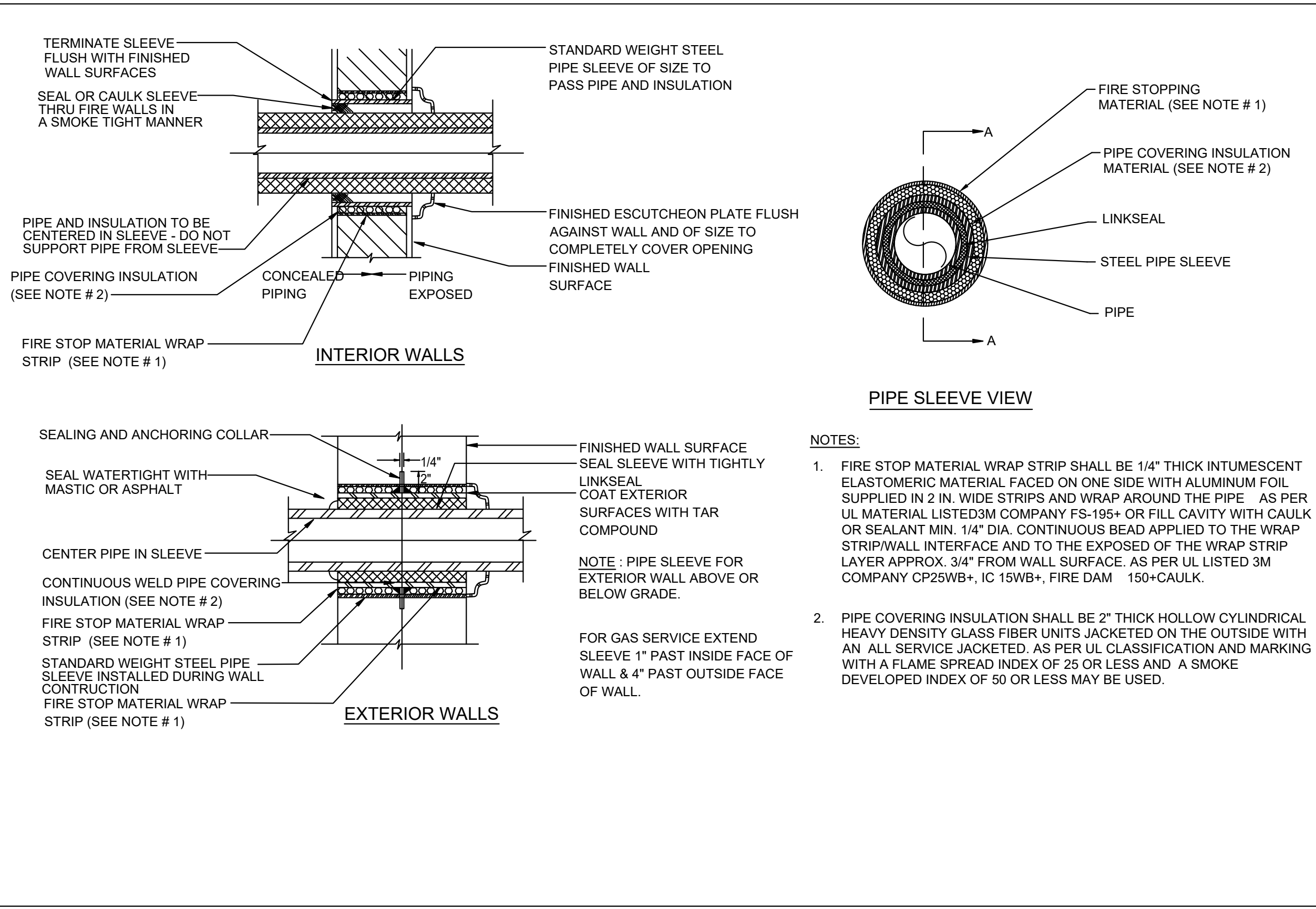
### GENERAL NOTES

- A. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO START OF WORK. VERIFY ALL DIMENSIONS. DRAWINGS ARE ILLUSTRATIVE AND MAY NOT REFLECT EXACT CONDITIONS OR DIMENSIONS.
- B. DO NOT SCALE THE DRAWINGS. DRAWINGS ARE DIAGRAMMATIC AND SHOW THE GENERAL ARRANGEMENT OF EQUIPMENT AND SYSTEMS. THEY ARE NOT INTENDED TO SHOW EVERY OFFSET, FITTING AND COMPONENT. DO NOT USE THE PLANS FOR EXACT LOCATION OF EQUIPMENT, FIXTURES OR ARCHITECTURAL ITEMS SUCH AS WALLS, WINDOWS, SOFFITS, AND PILASTERS. SPECIFIC LOCATIONS, MOUNTING HEIGHTS AND OVERALL DIMENSIONS OF DEVICES AND FIXTURES ARE TO BE OBTAINED FROM THE ARCHITECTURAL DRAWINGS AND DETAILS WHEN AVAILABLE.
- C. DRAWINGS SPECIFIC TO THIS TRADE DO NOT LIMIT THE RESPONSIBILITY OR WORK REQUIRED BY THE CONTRACT DOCUMENTS REFER TO DRAWINGS AND SPECIFICATIONS OF OTHER TRADES FOR COMPLETE INFORMATION PRIOR TO BID.
- D. WHERE CONFLICTS EXIST AMONG DRAWINGS, SPECIFICATIONS AND EQUIPMENT SCHEDULES, THE MORE STRINGENT SHALL APPLY. NOTIFY THE ENGINEER OF ALL CONFLICTS FOR RESOLUTION OR INTERPRETATION.
- E. NOTIFY THE OWNER IN WRITING AND FIELD VERIFY CONDITIONS BEFORE PERFORMING ANY SAWCUTTING, TRENCHING, CORING OR ANY OTHER STRUCTURAL MODIFICATIONS. INSURE THAT NO ADVERSE EFFECT TO THE BUILDING'S STRUCTURAL INTEGRITY WILL OCCUR.
- F. ANY EXISTING CONDITION DISCOVERED DURING THE DEMOLITION OR CONSTRUCTION PROCESS WHICH, BY GENERALLY ACCEPTED CONSTRUCTION PRACTICES, SHOULD BE REMEDIED, SHOULD BE BROUGHT TO THE ATTENTION OF THE ENGINEER/ARCHITECT IMMEDIATELY, IN WRITING.
- G. OBTAIN WRITTEN APPROVAL FROM THE ENGINEER BEFORE REUSING ANY EXISTING EQUIPMENT, COMPONENTS OR OPENINGS.
- H. ALL GAS PIPING OTHER THAN BLACK STEEL SHALL BE PERMANENTLY IDENTIFIED BY A YELLOW LABEL AT INTERVALS OF NOT MORE THAN 5'-0" .
- I. ALL OUTSIDE EXPOSED GAS PIPING SHALL BE COATED WITH A RUST INHIBITOR TO PREVENT ATMOSPHERIC CORROSION.
- L. GAS PIPING SHALL BE INSPECTED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS PER IFGC 406.1, NFPA 54 AND ANSI B 31.2.
- M. MAINTAIN 3 FEET AWAY FROM ELECTRIC LINE.
- N. PROVIDE ANVIL H-BLOCK HBS SUPPORT WITH H-164 STEEL CHANNEL ROOFTOP SUPPORT SYSTEM WHEN PIPING IS INSTALLED ON ROOFTOP.

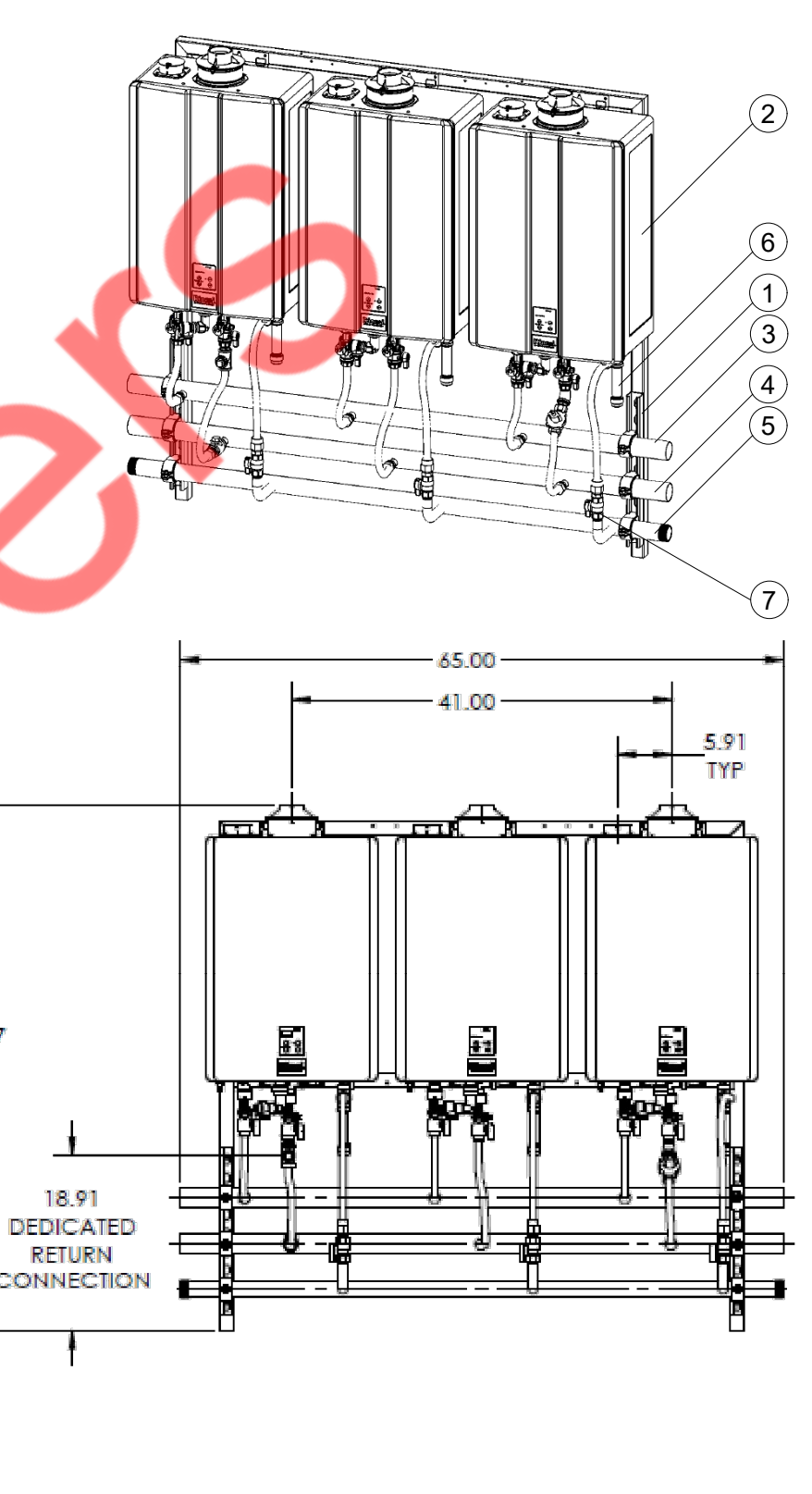
### PLUMBING LEGEND

	EXISTING GAS PIPING
	NEW GAS PIPING
	GAS SHUT OFF VALVE
	GAS REGULATOR





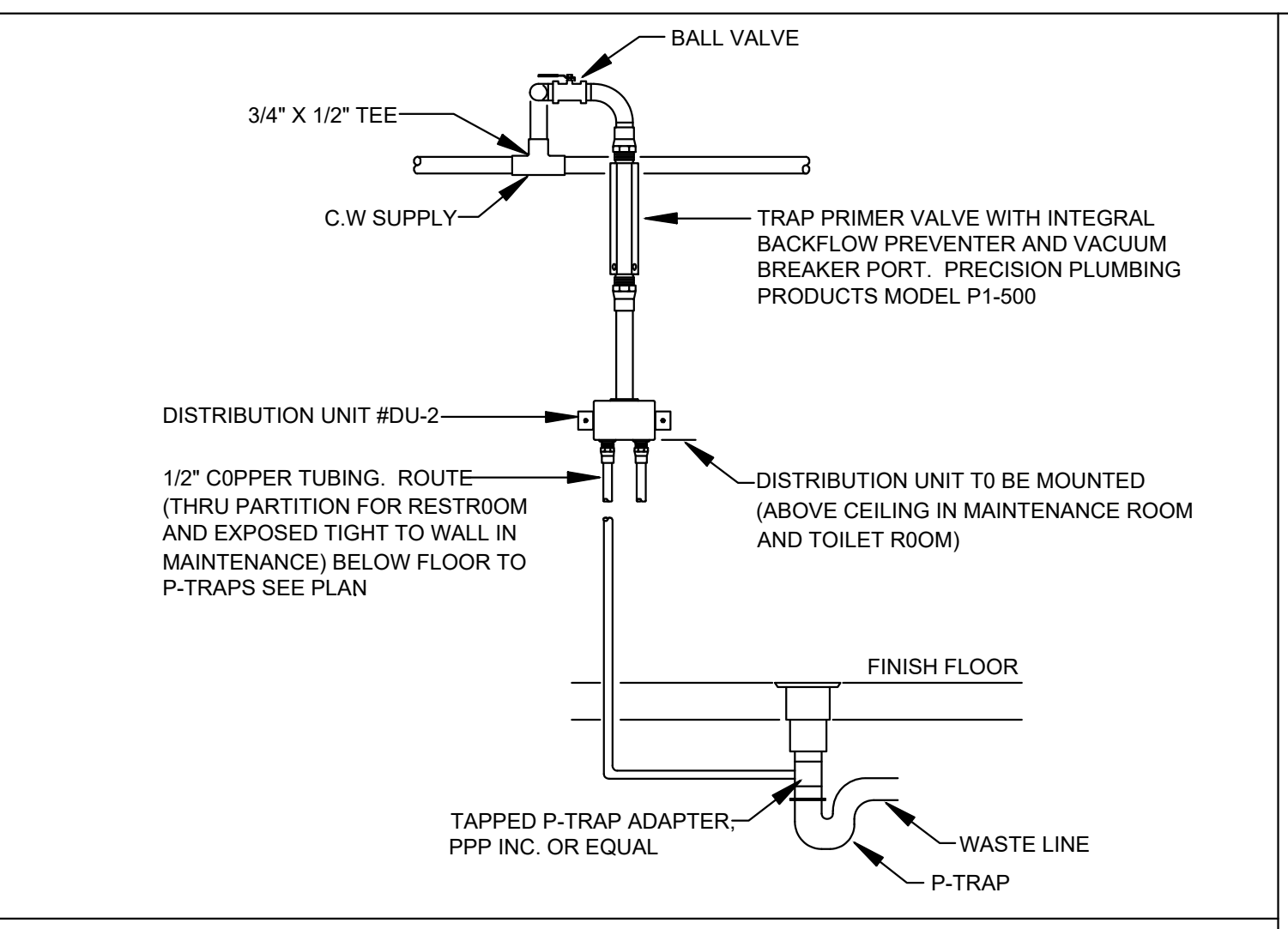
NO	DESCRIPTION	QTY
1	FRAME	1
2	RINNAI TANKLESS INDOOR UNIT	3
3	MANIFOLD, HOT WATER	1
4	MANIFOLD, COLD WATER	1
5	MANIFOLD, GAS	1
6	3/4" DIRT LEG	3
7	3/4" FNPT BRASS BALL VALVE-GAS	3



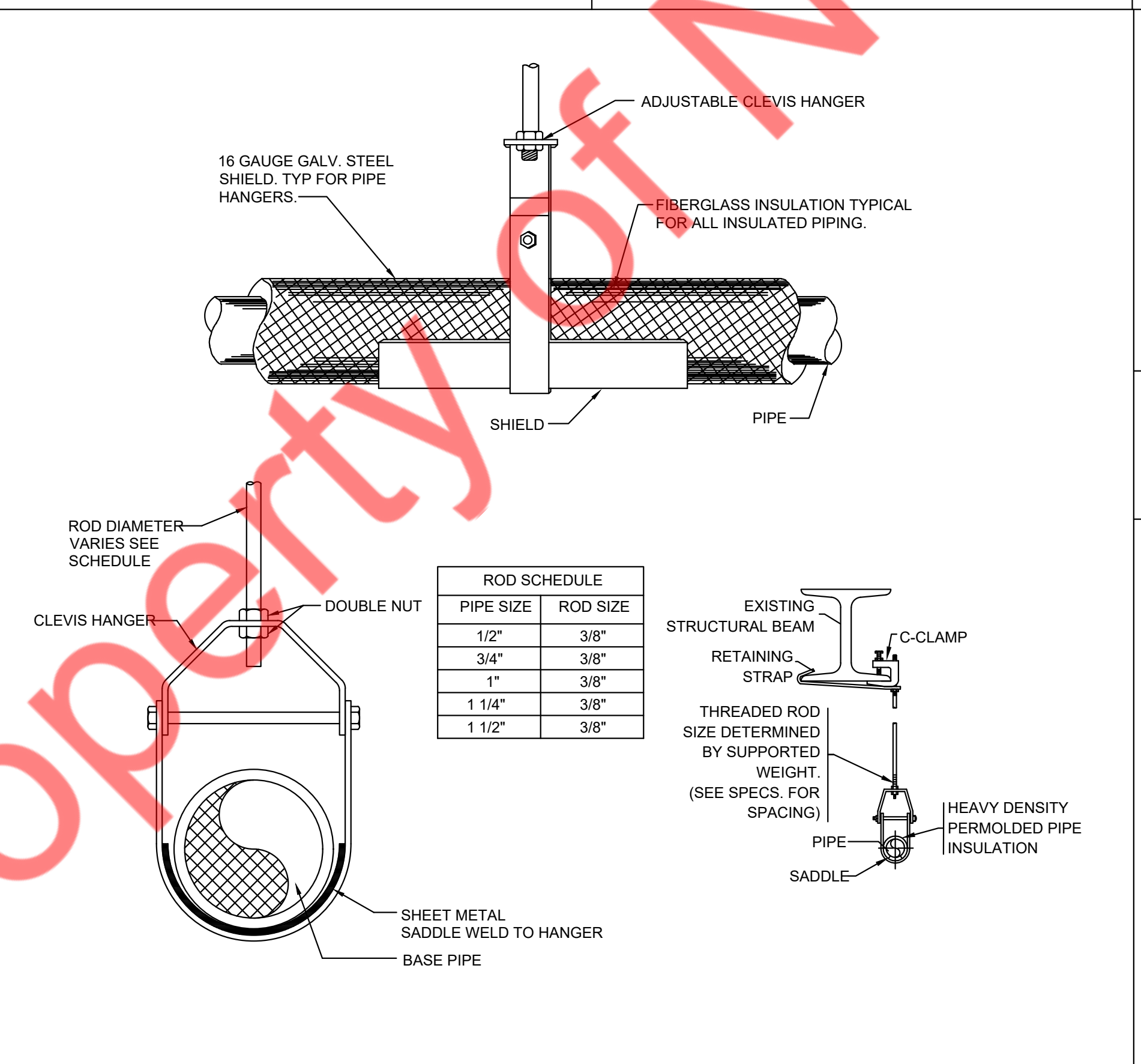
**1 PIPE SLEEVE THRU WALL SECTION**  
P-301 N.T.S.

**2 WALL CLEANOUT DETAILS**  
P-301 N.T.S.

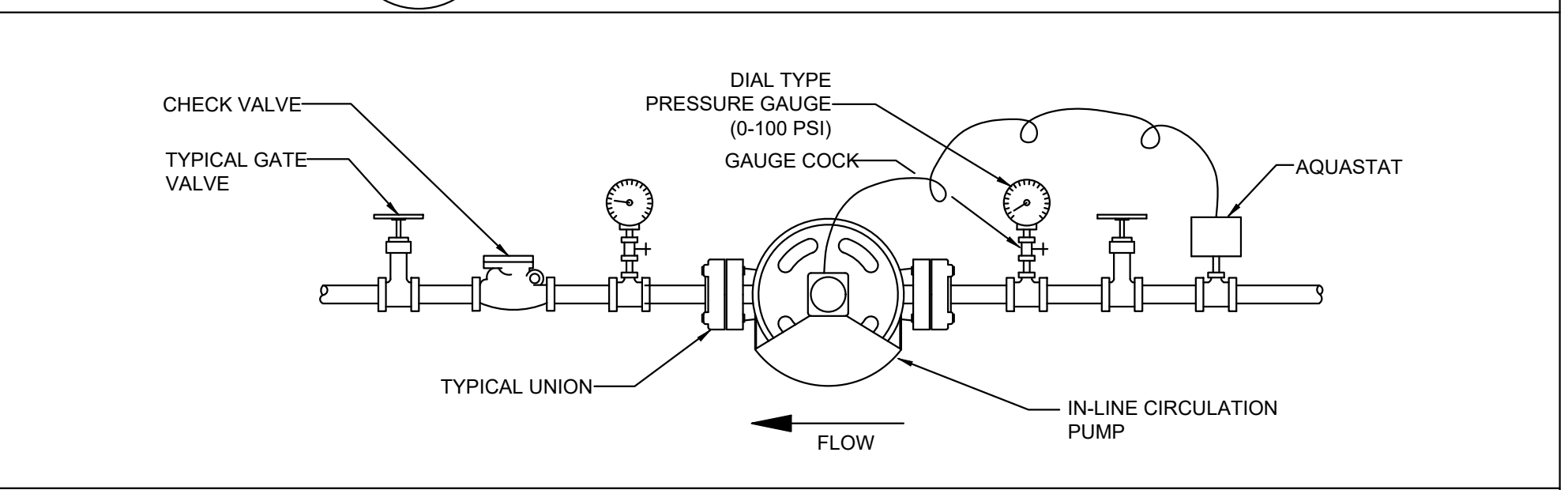
**3 WATER HEATER (WALL MOUNTED) DETAILS**  
P-301 N.T.S.



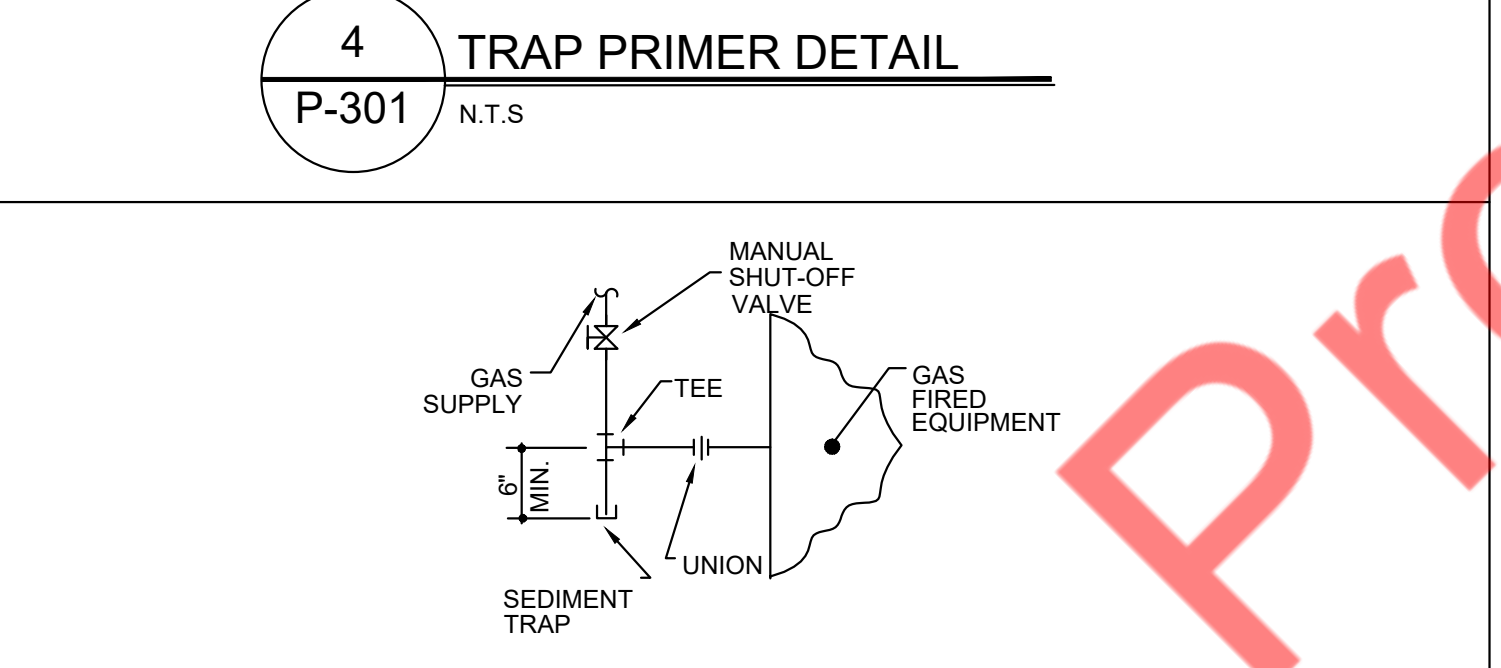
**4 TRAP PRIMER DETAIL**  
P-301 N.T.S.



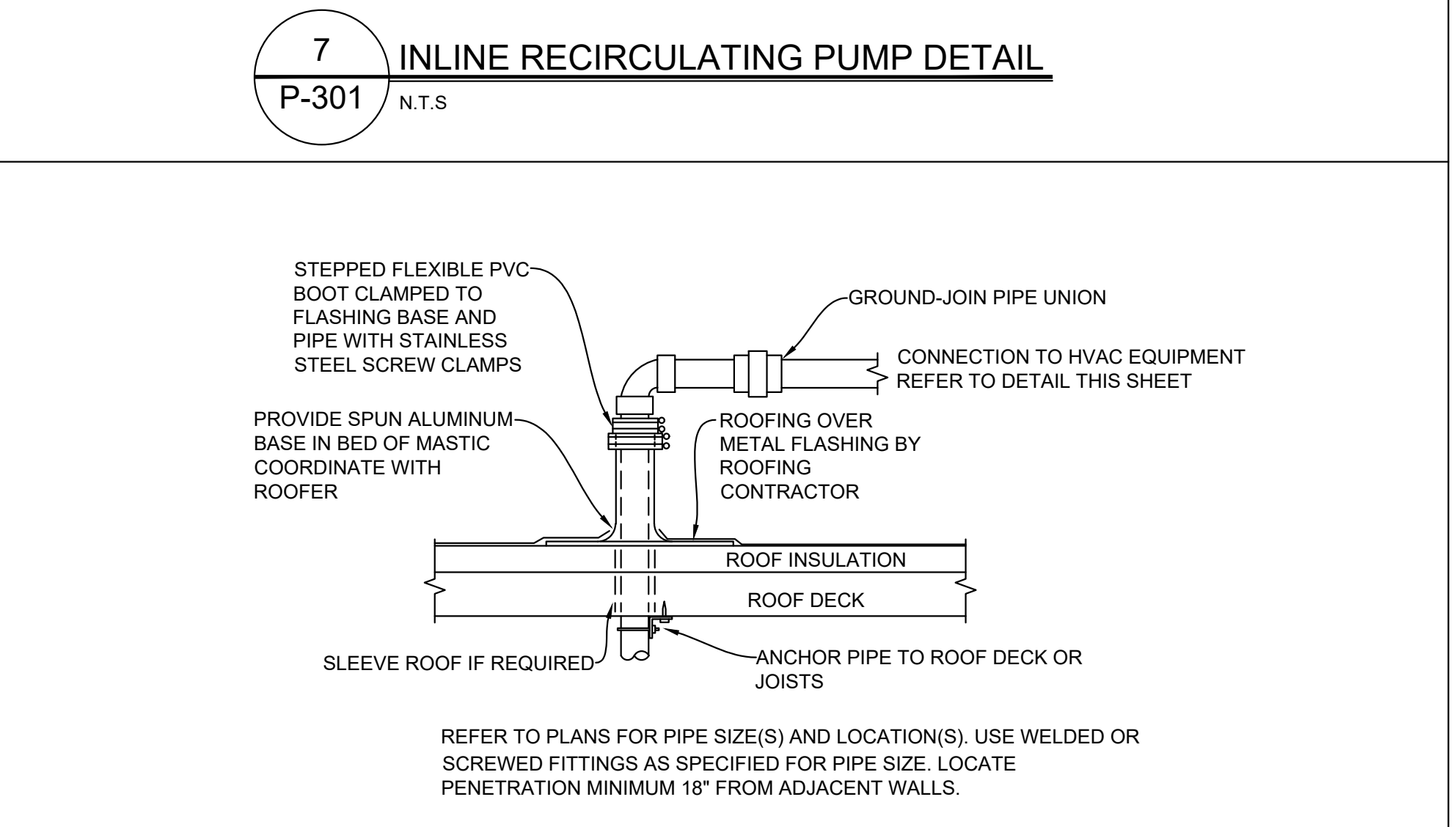
**6 HANGER DETAIL**  
P-301 N.T.S.



**7 INLINE RECIRCULATING PUMP DETAIL**  
P-301 N.T.S.



**5 EQUIPMENT GAS PIPING**  
P-301 N.T.S.



**8 ROOF PENETRATION DETAIL**  
P-301 N.T.S.

**PLUMBING FIXTURE SCHEDULE**

MARK	DESCRIPTION	MANUFACTURER	MODEL	VALVE/FAUCET MFGR	VALVE/FAUCET MODEL	CW SIZE (in)	HW SIZE (in)	SAN SIZE (in)	VENT SIZE (in)	TRAP SIZE (in)	INT TRAP	ACCESSORIES
EWC-1	DOMESTIC ELECTRIC WATER COOLER	ELKAY	EZH20 LZSTL8WSSP			1/2		1-1/2	1-1/2		NO	D-SHAPED, ONE PIECE POLISHED STAINLESS STEEL BASIN, INT. DRAIN GRID, BASE FLOW RATE OF 8.0 GPH, SELF CONTRAINED
GF-1	PLUMBING FIXTURE	KAEMARK	#903	KAEMARK	#904							OWNER PROVIDED. PROVIDE CONNECTIONS FOR SHAMPOO SINK 110 DEG F. COORDINATION LOCATION WITH ARCH PLANS, MANUFACT. RECS AND LOCAL REQMENTS PRIOR TO ROUGH-IN.
LAV-1	LAVATORY	KOHLER	K-2211-0	SLOAN	EBF-650	1/2	1/2	1-1/2	1-1/2	1-1/2	NO	PROVIDE CHROME PLATED ANGLE STOPS WITH LOOSE KEY HANDLE, PROTECTIVE PIPE COVER TRUEBRO 103 E-Z
LAV-2	LAVATORY - AT ADA STALL	KOHLER	K-2084-L-0	SLOAN	EBF-650	1/2	1/2	1-1/2	1-1/2	1-1/2	NO	PROVIDE CHROME PLATED ANGLE STOPS WITH LOOSE KEY HANDLE, PROTECTIVE PIPE COVER TRUEBRO 103 E-Z
MS-1	UTILITY SINK	TABCO	FE-1-1812	TABCO	B-1141	3/4	3/4	3	1-1/2	3	NO	STAINLESS STEEL UTILITY SINK WITH 4" T&S BRASS WORKS BOARD FAUCET CHROME
S-1	SINK	ELKAY	HD320874LFR	ELKAY	HD320874LFR	1/2	1/2	1-1/2	1-1/2	1-1/2	NO	PROVIDE SINGLE BOWL THREE FAUCET HOLES 4" CENTER WITH 2.2" GPM AT 60 PSI PROVIDE CHROME PLATED ANGLE STOPE WITH LOOSE KEY HANDLE, CHROME PLATED FLEXIBLE BASS RISER, INSULATE ALL EXPOSED WATER LINES AND VALVES. PROVIDE ELKAY MODEL LK188 SINK WASTE
UR	URINAL	KOHLER	K-5016-ET-0			3/4		1-1/2	1-1/2		YES	PROVIDE SLOAN MODEL 8111-1.28 FLUSHING SYSTEM.
WC-1	FLUSH VALVE WATER CLOSET	KOHLER	K-96057-0	KOHLER	K-10956-SV-CP	1		4	2		YES	VITREOUS CHINA, FULLY GLAZED TRAPWAY, 1.28 GPF, FLOOR MOUNTED, COLOR: WHITE, WITH A CHURCH 9500SST SEAT. INCLUDE BATTERY
WMB-1	WASHER DRYER	ALLIANCE LAUNDRY	SRGBCASP-113TW01			1/2	1/2	1-1/2	1-1/2	1-1/2	NO	SINGLE LEVER SHUT-OFF VALVES AND INT. WATER HAMMER ARRESTERS.

**PLUMBING WATER HEATER SCHEDULE**

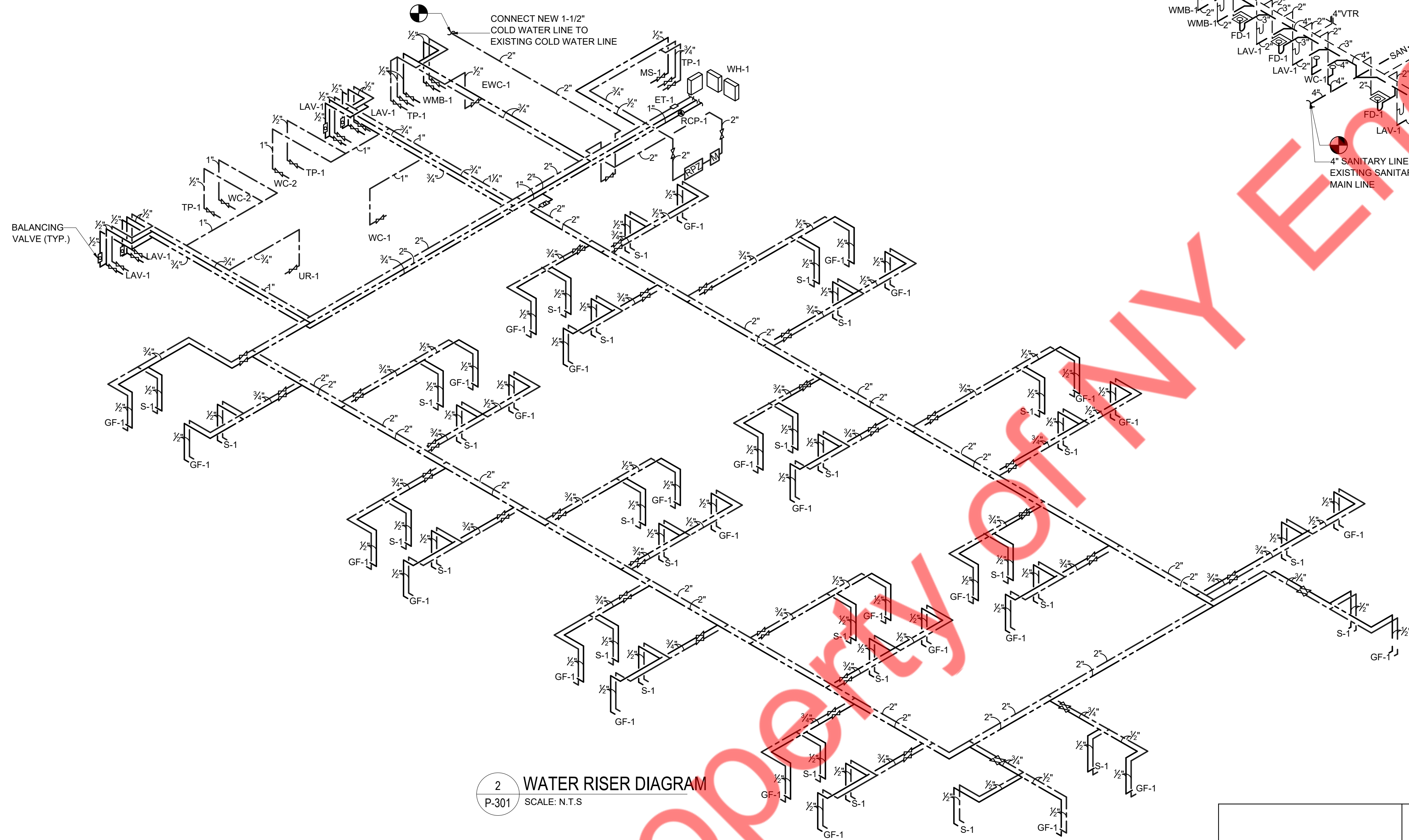
Equipment shall be braced and labeled by the equipment manufacturer to withstand the minimum scheduled available fault current value for listed equipment.

MARK	DESCRIPTION	MANUFACTURER	MODEL	QTY	FLOW RATE	EFFICIENCY	EWT (DEG F)	LWT (DEG F)	GAS HTG IN (MBH)	FUEL	MIN GAS PRESSURE (IN WC)	MAX GAS PRESSURE (IN WC)	VOLTS	PHASE	FLA	CCP	ACCESS
WH-1	GAS-FIRED TANKLESS WATER HEATER	RINNAI	CU190i	3	4.2GPM@90F	95	140	140	199	NATURAL GAS	4	10.5	120	1	8	15	PROVIDE WITH AMTROL ST-12 EXPANSION TANK

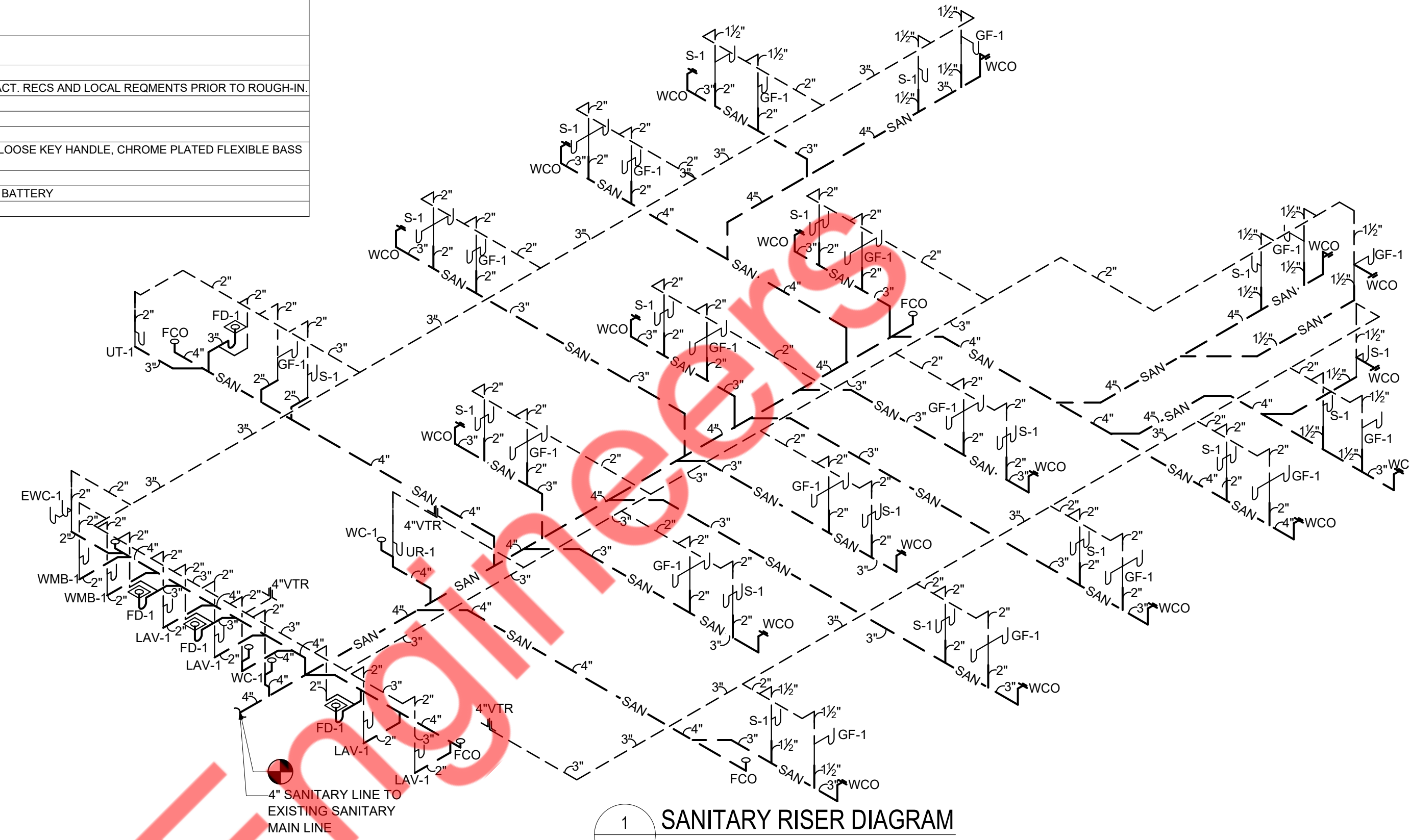
**RECIRCULATION PUMP SCHEDULE**

Equipment shall be braced and labeled by the equipment manufacturer to withstand the minimum scheduled available fault current value for listed equipment.

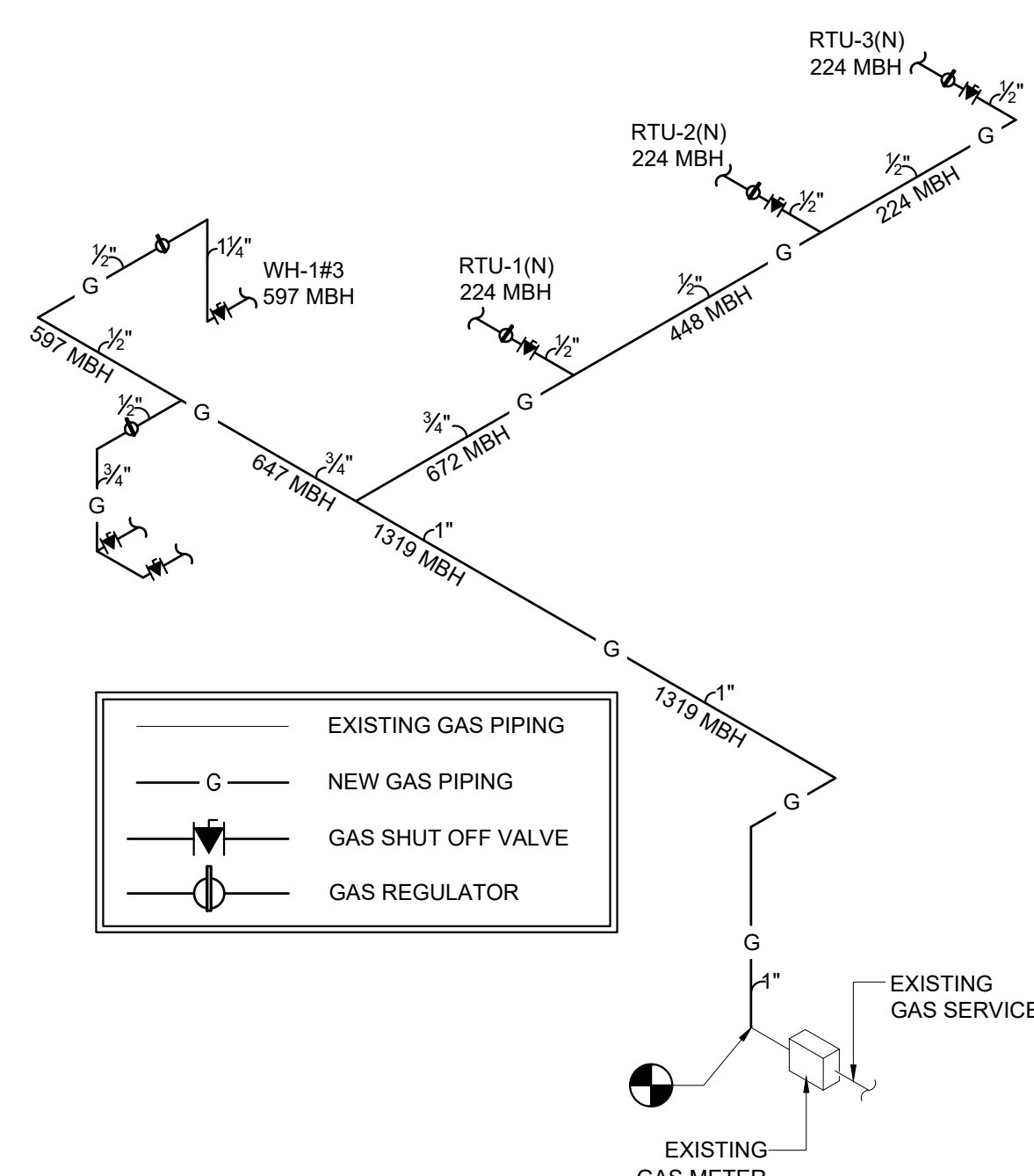
MARK	DESCRIPTION	MANUFACTURER	MODEL	GPM	HAED	HP	VOLTS	PHASE	HZ	REMARKS
RCP-1	RE-CIRCULATION PUMP	GRNDFOS	UPS 26-99	2	10	196 WATTS	115	1	60	HONEYWELL 6006C AQUASTAT



**2 WATER RISER DIAGRAM**  
P-301 SCALE: N.T.S



**1 SANITARY RISER DIAGRAM**  
P-301 SCALE: N.T.S



**3 GAS RISER DIAGRAM**  
P-301 SCALE: N.T.S

**NAT. GAS DESIGN**

HIGH PRESSURE SYSTEM (IFGC 2018 402.4(7))  
 INLET PRESSURE - 5.0 PSI  
 PRESSURE DROP - 3.5 PSI  
 LONGEST LENGTH-APPROX. 200'  
 LOW PRESSURE SYSTEM (IFGC 2018 402.4(2))  
 INLET PRESSURE - < 2 PSI  
 PRESSURE DROP - 0.5 WC  
 LONGEST LENGTH-APPROX. 20'

**GAS LOAD SUMMARY**

EQUIPMENT TAG	CFH LOAD
WH-1(3)	597
RTU-1(N)	224
RTU-2(N)	224
RTU-3(N)	224
WMB-1(2)	50
<b>TOTAL LOAD</b>	<b>1319</b>

GAS PIPE SIZING BASED ON TABLE 402.4(7) AND 402.4(2) 2018 VIRGINIA FUEL GAS CODE.

CONTRACTOR TO VERIFY EXACT TOTAL DEVELOPED LENGTH AND GAS SUPPLY PRESSURE IN FIELD AND NOTIFY ENGINEER IF DIFFERENT THAN SHOWN ON THIS PLAN

- GAS NOTES**
- ALL GAS PIPING OTHER THAN BLACK STEEL SHALL BE PERMANENTLY IDENTIFIED BY A YELLOW LABEL AT INTERVALS OF NOT MORE THAN 5'-0".
  - ALL OUTSIDE EXPOSED GAS PIPING SHALL BE COATED WITH A RUST INHIBITOR TO PREVENT ATMOSPHERIC CORROSION.
  - GAS PIPING SHALL BE INSPECTED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS PER IFGC 406.1, NFPA 54 AND ANSI B 31.2.
  - MAINTAIN 3 FEET AWAY FROM ELECTRIC LINE.
  - PROVIDE ANVIL H-BLOCK HBS SUPPORT WITH H-164 STEEL CHANNEL ROOFTOP SUPPORT SYSTEM WHEN PIPING IS INSTALLED ON ROOFTOP.

**PLUMBING RESPONSIBILITY SCHEDULE**

	EXISTING	FURNISHED BY		INSTALLED BY		REMARKS
		LANDLORD OWNER/FRANCHISE	UTILITY	TENANT CONTRACTOR	LANDLORD OWNER/FRANCHISE	
PLUMBING FIXTURES						
WATER HEATERS						
WASTE AND VENT PIPING						
DOMESTIC WATER PIPING						
WATER METER						EXISTING WATER LINES TO REMAIN
NATURAL GAS PIPING						
NATURAL GAS METER						
AS BUILT DRAWINGS						