LEGEND

Symbol	Description
	CEILING SUPPLY DIFFUSER
	CEILING RETURN AIR GRILLE
	MANUAL VOLUME DAMPER
	FIRE DAMPER, FIRE SMOKE DAMPER
(T)	THERMOSTAT
M	MOTORIZED DAMPER
	NEW WORK
SD	SMOKE DETECTOR
TS	TEMPERATURE SENSOR
GD	BACKDRAFT DAMPER
	POINT OF CONNECTION
	POINT OF DISCONNECTION
U	DOOR UNDERCUT

ABBREVIATIONS

A/C	ABOVE CEILING
AD	ACCESS DOOR
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AUTO	AUTOMATIC
AC	AIR CONDITIONING
AHU	AIR HANDLING UNIT
BAL	BALANCING
BDD	BACKDRAFT DAMPER
B/F	BELOW FLOOR
B/G	BELOW GRADE
B'FLY	BUTTERFLY
BHP	BRAKE HORSEPOWER
BCO	BASE CLEANOUT
CFM	CUBIC FEET PER MINUTE
CBCR	CURVED BLADE CEILING REGISTER
CSD	CEILING SUPPLY DIFFUSER
CU	CONDENSING UNIT
CW	COLD WATER (DOMESTIC)
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN
CON	CONCENTRIC
CO	CLEANOUT
COND	CONDENSATE
CD	CEILING DIFFUSER
db	DRY BULB
DN	DOWN
DR	DRAIN
do	DITTO
dB	DECIBELS
DWG	DRAWING
DU	DEHUMIDIFIER
EA	EACH
EAT	ENTERING AIR TEMPERATURE
ECC	ECCENTRIC
EF	EXHAUST FAN
EOD	EMERGENCY OVERFLOW DRAIN
ER	EXHAUST REGISTER
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
EFF	EFFICIENCY
EG	EXHAUST AIR GRILLE
F	FAHRENHEIT
FCO	FLOOR CLEAN OUT
FCU	FAN COIL UNIT
FSD	FIRE/SMOKE DAMPER
FD	FIRE DAMPER OR FLOOR DRAIN
FL DR	FLOOR DRAIN (only)
FLR	FLOOR
FOB	FLAT ON BOTTOM
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOT	FLAT ON TOP
FPM	FEET PER MINUITE
FPS	FEET PER SECOND
FT	FEET
G	GATE
GA	GAUGE
GPM	GALLONS PER MINUTE
GL	GLOBE
GCO	GRADE CLEANOUT
HD	HUB DRAIN
HP	HORSEPOWER
HTG	HEATING
HW	HOT WATER (DOMESTIC)
HWR	HOT WATER RETURN
HWRR	HOT WATER REVERSE RETURN
HWS	HOT WATER SUPPLY
Hz	HERTZ

ID	INSIDE DIMENSION
IN	INCHES
KW	KILOWATTS
LAT	LEAVING AIR TEMPERATURE
LB	POUNDS
LG	LINEAR GRILLE
LRG	LINEAR RETURN GRILLE
LWR	LOOP WATER RETURN
LWS	LOOP WATER SUPPLY
MIN	MINIMUM
MAX	MAXIMUM
MD	MANUAL DAMPER
MOD	MOTOR OPERATED DAMPER
MFR	MANUFACTURER
NC	NORMALLY CLOSED
NG	NATURAL GAS
NFWH	NON-FREEZE WALL HYDRANT
NO	NORMALLY OPEN
NOM	NOMINAL
OA	OUTSIDE AIR
OD	OUTSIDE DIMENSION
OBD	OPPOSED BLADE DAMPER
PIU	POWERED INDUCTION UNIT
PSI	POUNDS PER SQUARE INCH
R	RELOCATE
RA	RETURN AIR
RAD	RADIUS
RG	RETURN AIR GRILLE
RED	REDUCER
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION / RETURN SLOTS
RTU	ROOFTOP UNIT
RR	RETURN REGISTER
SP	STATIC PRESSURE
SPS	STATIC PRESSURE SENSOR
SA	SUPPLY AIR
SAN	SANITARY
SD	SMOKE DAMPER / SLOT DIFFUSER
SEN	SENSIBLE
SQ	SQUARE
SR	SUPPLY REGISTER
ST	STORM
SS	SPLIT SYSTEM
SG	SUPPLY AIR GRILLE
TEMP	TEMPERATURE
TG	TRANSFER GRILLE
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
V	VENT
VA	VALVE
VTR	VENT THRU ROOF
VAV	VARIABLE AIR VOLUME
wb	WET BULB
WC	WATER COLUMN
WHA	WATER HAMMER ARRESTOR
WT	WEIGHT
W	WASTE
WMS	WIRE MESH SCREEN
WSHP	WATER SOURCE HEAT PUMP

MECHANICAL DRAWING LIST

M-001	MECHANICAL SYMBOLS, ABBREVIATIONS & GENERAL NOTES
M-002	MECHANICAL SPECIFICATIONS
M-100	MECHANICAL FLOOR PLAN
M-101	MECHANICAL ROOF PLAN
M-300	MECHANICAL SCHEDULES
M-400	MECHANICAL DETAILS

GENERAL NOTES

1. ALL APPLICABLE CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS, AND THEIR PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR WHO SHALL INFORM THE OWNER,PRIOR TO SUBMITTING A PROPOSAL, OF ANY WORK OR MATERIALS WHICH VIOLATE ANY OF THE ABOVE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED BY THE CONTRACTOR.

2. BEFORE PROCEEDING WITH ANY WORK IN OCCUPIED OR USED AREAS, THE CONTRACTOR SHALL APPLY TO OWNER FOR PERMISSION TO ENTER SUCH AREAS. THE CONTRACTOR IS OBLIGED TO PERFORM HIS WORK ONLY AT THE TIMES DESIGNATED BY OWNER. THERE WILL BE NO ADDITIONAL COMPENSATION FOR THE WORK PERFORMED AFTER HOURS OR ON OFF-DAYS WITHOUT PRIOR WRITTEN APPROVAL.

3. THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, AND IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.

4. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS.WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK IN OVERTIME AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.

5. CONTRACTOR SHALL ASCERTAIN THE APPROPRIATE METHOD FOR BRINGING THE UNITS INTO AND THROUGH THE BUILDING TO POSITION UNIT IN LOCATION SHOWN ON THE PLANS. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH RESTRICTIVE SPACES. COORDINATE WITH BUILDING OWNER APPROPRIATE TIMES OF DAY SUCH EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.

6. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES IN MAKING UP THE WORK PROPOSAL.

7. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW SYSTEM.

8. CONNECT NEW WORK TO EXISTING WORK IN NEAT AND APPROVED AREAS. RESTORE EXISTING WORK DISTURBED WHILE INSTALLING NEW WORK TO ACCEPTABLE CONDITION AS DETERMINED BY ARCHITECT.

9. PLAN INSTALLATION OF NEW WORK AND CONNECTIONS TO EXISTING WORK TO INSURE MINIMUM INTERFERENCE WITH REGULAR OPERATION OF EXISTING FACILITIES. ALL SYSTEM SHUTDOWNS AFFECTING OTHER AREAS SHALL BE COORDINATED WITH BUILDING OWNER. INSTALL ISOLATION VALVES AT POINT OF CONNECTION TO THE EXISTING PIPING. PROVIDE TEMPORARY DUCT CAPS AND/OR CONNECTIONS TO MINIMIZE SHUTDOWN TIME.

10. SUPPORT ALL DUCTWORK AND PIPING FROM BUILDING STRUCTURE AND/OR FRAMING IN AN APPROVED MANNER. WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING OR SUPPORTS FOR EQUIPMENT, FURNISH ADDITIONAL FRAMING. INSERTS SHALL BE STEEL, SLOTTED TYPE AND FACTORY PAINTED. SINGLE ROD SHALL BE SIMILAR TO GRINNELL FIG. 281. MULTI-ROD SHALL BE SIMILAR TO FEE & MASON SERIES 9000 WITH END CAPS AND CLOSURE STRIPS. MAXIMUM LOADING INCLUDING PIPES, DUCTWORK CONTENTS AND COVERING SHALL NOT EXCEED 75% OF RATED INSERT CAPABILITY. WHEN SUPPORTING FROM BUILDING USE BEAM CLAMPS IN APPROVED MANNER.

11. PROVIDE ALL NECESSARY FLASHING AND COUNTER FLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF PIPES, DUCTS, LOUVERS, CONDUIT, AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AND DUNNAGE STEEL AS REQUIRED.

12. SEAL OPENINGS AROUND DUCTS AND PIPING THROUGH PARTITIONS, WALLS AND FLOORS (NOT IN SHAFTS) WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL (FIBERGLASS INSULATION IS NOT ACCEPTABLE).

13. WHERE PENETRATIONS THROUGH FIRE RATED WALLS ARE NOT FIRE PROOFED THIS CONTRACTOR SHALL BE RESPONSIBLE TO SEAL SAME TO MAINTAIN THE RATED INTEGRITY.

14. INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES WHICH INVOLVE EXTRA COST SHALL NOT BE MADE WITHOUT APPROVAL.

15. ACCESS DOORS ARE REQUIRED FOR ALL FANS, AND ACCESS DOOR SHALL HAVE THE EQUAL RATED CAPACITY (1HR, 2HR, ETC.) AS WALL. COORDINATE ALL LOCATIONS OF ACCESS DOORS WITH THE ARCHITECT.

16. REMOVABLE ACCESS TILE AND/OR ACCESS DOOR ARE REQUIRED IN HUNG CEILINGS, SHAFTS AND WALLS FOR ALL VOLUME AND FIRE DAMPERS, AUTOMATIC DAMPERS AND ALL OTHER MECHANICAL EQUIPMENT AND DEVICES. HVAC CONTRACTOR TO FURNISH ACCESS LOCATION REQUIREMENTS TO GENERAL CONTRACTOR. ACCESS TILE IDENTIFICATION: PROVIDE BUTTONS, TABS, AND MARKERS TO IDENTIFY LOCATION OF CONCEALED VALVES, DAMPERS AND EQUIPMENT.

17. THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING, EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR.

18. UNLESS OTHERWISE SPECIFICALLY SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.

19. MATERIALS AND WORKMANSHIP, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.

20. ALL EQUIPMENT SHALL BE PROVIDED WITH ONE YEAR WARRANTY PARTS AND LABOR AND FIVE YEARS ON COMPRESSORS. WARRANTY PERIOD BEGINS UPON PROJECT ACCEPTANCE.

21. ALL MATERIAL AND EQUIPMENT TO BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.

22. THE CONTRACTOR SHALL BE RESPONSIBLE FOR HIS WORK WITH ITS COMPLETION AND FINAL ACCEPTANCE AND SHALL REPLACE ANY OF THE SAME WHICH MAY BE DAMAGED, LOST, OR STOLEN WITHOUT ADDITIONAL COST TO THE OWNER.

23. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FAILURE OF ANY DUCTWORK SYSTEM OR EQUIPMENT TO FUNCTION PROPERLY UPON COMPLETION OF HIS WORK UPON SAID SYSTEM OR EQUIPMENT.

24. SUBMIT SHOP DRAWING OF ALL WORK WHICH MUST BE APPROVED BY THE ARCHITECT AND ENGINEER BEFORE WORK COMMENCES.

25. ALL MATERIAL AND EQUIPMENT TO BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.

26. SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE EXISTING BUILDING, EQUIPMENT, ETC., WHICH AFFECT THIS WORK, AND THE ACCESS TO SUCH SPACES, HAS BEEN MADE AND THAT THE CONTRACTOR IS FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THE WORK. LATER CLAIMS SHALL NOT BE MADE FOR LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN DURING SUCH AN EXAMINATION. THE ON-SITE INSPECTION SHALL VERIFY EXISTING DUCTWORK, PIPING (SIZES, CLEARANCES, ETC) AND CONDITIONS.

27. INSURANCE: IN ACCORDANCE WITH BUILDING REQUIREMENTS THE CONTRACTOR SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.

28. THE FINAL ACCEPTANCE WILL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, BALANCED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES OF INSPECTION AND APPROVAL.

29. SPECIFICATIONS ARE OF SIMPLIFIED FORM AND INCLUDE INCOMPLETE SENTENCES. WORDS OR PHRASES SUCH AS "THE CONTRACTOR SHALL," "SHALL BE," "FURNISH," "PROVIDE," "A," "THE," AND "ALL" HAVE BEEN OMITTED FOR BREVITY.

30. WHERE A CONFLICT EXISTS BETWEEN THE DRAWINGS, THE SPECIFICATIONS OR ANY OTHER CONSTRUCTION DOCUMENT, THE ONE WITH THE MOST STRINGENT REQUIREMENT(S) SHALL APPLY.

DEFINITIONS:

1) "PROVIDE": TO SUPPLY, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.

2)"INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.

3)"FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.

THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OR ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES, BY OWNER, INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDE THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.

GENERAL HVAC NOTES

1. PERFORM ALL WORK IN ACCORDANCE WITH ALL APPLICABLE CODES AND AUTHORITIES HAVING JURISDICTION. PROVIDE ALL PERMITS, INSPECTIONS, LICENSES AND FEES. FURNISH ALL LABOR, EQUIPMENT, SUPPLIES AND MATERIALS NECESSARY TO PROVIDE COMPLETE AND OPERATIONAL SYSTEMS.

2. THE DRAWINGS AND SPECIFICATIONS INDICATE THE GENERAL DESIGN AND ARRANGEMENT OF PIPES, FIXTURES, EQUIPMENT, SYSTEMS, ETC. INFORMATION SHOWN IS DIAGRAMMATIC IN CHARACTER AND DOES NOT NECESSARILY INDICATE EVERY REQUIRED OFFSET, FITTING, ETC. DO NOT SCALE THE DRAWINGS FOR DIMENSIONS. TAKE ALL DIMENSIONS, MEASUREMENTS, EQUIPMENT LOCATIONS, LEVELS, ETC FROM THE ARCHITECTURAL DRAWINGS AND FROM THE EQUIPMENT TO BE FURNISHED. PIPING MAY BE RELOCATED OR OFFSET FOR PROPER CLEARANCES OR TO AVOID CONFLICTS WITH OTHER TRADES. THE DESIGN INTENT (I.E. PITCHES, VELOCITIES, PRESSURE DROPS, VOLTAGE DROPS, ETC) CANNOT BE GREATLY ALTERED WITHOUT THE APPROVAL OF THE ARCHITECT. THE COST OF THESE DEVIATIONS TO AVOID INTERFERENCE'S SHALL BE PART OF THE ORIGINAL CONTRACT BID.

3. CONFER AND COOPERATE WITH ALL OTHER TRADES TO COORDINATE THEIR WORK. COORDINATION SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO MATERIALS AND EQUIPMENT ROUTED IN CEILING AND WALL CAVITIES, EQUIPMENT ARRANGEMENT IN MECHANICAL SPACES, INCLUDING EQUIPMENT CLEARANCE REQUIREMENTS, ELEVATIONS AND DIMENSIONS OF STRUCTURAL MEMBERS AND OPENINGS, ETC. NOTIFY THE ARCHITECT OF ANY CONFLICTS.

4. BASE FINAL INSTALLATION OF MATERIALS AND EQUIPMENT ON ACTUAL DIMENSIONS AND CONDITIONS AT THE PROJECT SITE. FIELD MEASURE FOR MATERIALS AND EQUIPMENT REQUIRING EXACT FIT. NO EXTRAS WILL BE GIVEN FOR THE CONTRACTOR'S FAILURE TO FIELD COORDINATE.

5. THE OWNER OR ENGINEER ARE NOT RESPONSIBLE FOR THE CONTRACTOR'S SAFETY PRECAUTIONS OR FOR MEANS, METHODS, TECHNIQUES, CONSTRUCTION SEQUENCES, OR PROCEDURES REQUIRED TO PERFORM THE WORK.

6. LOCATE ALL EQUIPMENT THAT MUST BE SERVICED, OPERATED, OR MAINTAINED IN FULLY ACCESSIBLE POSITIONS. EQUIPMENT SHALL INCLUDE (BUT NOT LIMITED TO) VALVES, MOTORS, CONTROLLERS, SWITCHGEAR, AND DRAIN POINTS IF REQUIRED FOR BETTER ACCESSIBILITY. FURNISH ACCESS DOORS FOR THIS PURPOSE. MINOR DEVIATIONS FROM THE DRAWINGS MAY BE ALLOWED TO PROVIDE FOR BETTER ACCESSIBILITY. ANY CHANGES SHALL BE APPROVED BY THE ARCHITECT AND CONSTRUCTION MANAGER/GENERAL CONTRACTOR PRIOR TO MAKING THE CHANGE.

7. PROVIDE ACCESS DOORS, WALL OPENINGS, ROOF OPENINGS OR ANY OTHER CONSTRUCTION REQUIREMENT NEEDED TO ACCOMMODATE THE MECHANICAL EQUIPMENT. LOCATIONS OF THESE OPENINGS SHALL BE SUBMITTED IN SUFFICIENT TIME TO BE INSTALLED IN THE NORMAL COURSE OF WORK.

8. CORDINATE ELECTRICAL REQUIREMENTS OF APPROVED MECHANICAL EQUIPMENT WITH THE ELECTRICAL SUB-CONTRACTOR PRIOR TO THE PURCHASE AND INSTALLATION OF ANY ELECTRICAL EQUIPMENT, DEVICES, WIRING, OR CONDUIT.

9. PROVIDE GENERAL CONTROL WIRING, THERMOSTATS, MOTORIZED DAMPERS AND CONDUIT ASSOCIATED WITH HVAC EQUIPMENT. COORDINATE THE LOCATION OF ALL THERMOSTATS, ROOM SENSORS, ETC WITH THE ARCHITECT AND ALL OTHER TRADES PRIOR TO INSTALLATION. IF A CONFLICT WITH MILLWORK, LIGHT SWITCHES, WINDOWS, ETC EXISTS, NOTIFY THE ARCHITECT OF THE POTENTIAL INTERFERENCE PRIOR TO INSTALLATION. INSTALL THERMOSTATS WITH PROTECTIVE LOCKING COVER, CENTERED AT 4'-0" ABOVE FINISHED FLOOR, UNLESS OTHERWISE INDICATED. COMPLY WITH THE PROVISIONS OF THE AMERICANS WITH DISABILITIES ACT (ADA).

10. ALL DIMENSIONS SHOWN ON THE DRAWINGS FOR DUCTWORK ARE NET INSIDE CLEAR DIMENSIONS. FOR RECTANGULAR DUCT, THE FIRST FIGURE OF THE DUCT SIZE INDICATES THE DIMENSION OF THE FACE SHOWN. VERIFY THAT THE DUCTWORK SPECIFIED WILL FIT IN THE SPACE AVAILABLE USING THE ARCHITECTURAL, STRUCTURAL AND ELECTRICAL DRAWINGS AS REFERENCE PRIOR TO FABRICATION AND INSTALLATION. ROUND DUCT OF EQUAL NET INSIDE CLEAR AREA MAY BE USED IN LIEU OF RECTANGULAR DUCT.

11. PROVIDE TURNING VANES ON ALL RECTANGULAR SUPPLY, OUTDOOR AIR, EXHAUST AND RETURN DUCTWORK INCLUDING THE TOP AND BOTTOM OF VERTICAL DUCTS.

12. PROVIDE A LOCKING QUADRANT VOLUME DAMPER AT THE TAP OF EACH RUN-OUT TO DIFFUSERS FOR BALANCING PURPOSES, UNLESS OTHERWISE INDICATED. THE RUN-OUT DUCT SIZE IS THE SAME SIZE AS THE DIFFUSER OR GRILLE NECK SIZE UNLESS OTHERWISE INDICATED.

13. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION OF ALL FIRE RATED WALLS AND CEILINGS. PROVIDE FIRE DAMPERS AND/OR COMBINATION FIRE/SMOKE DAMPERS IN DUCTWORK AT ALL LOCATIONS WHERE DUCTS PASS THROUGH FIRE RATED ASSEMBLY. MECHANICAL SUB-CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING FIRE AND FIRE/SMOKE DAMPERS. COORDINATE CONSTRUCTION REQUIREMENTS AND PROVISIONS FOR CONNECTIONS TO FIRE ALARM SYSTEM.

14. ALL DUCTWORK SHALL BE SHEET METAL FABRICATED IN ACCORDANCE WITH SMACNA STANDARDS. ALL DUCT WORK ASSOCIATED WITH CONSTANT VOLUME SYSTEMS SHALL BE CONSTRUCTED TO 2" W.G. AND SEALED TO SMACNA CLASS B. SEAL ALL SEAMS WITH MASTIC SEALANT UL 181 LISTED FOR THE APPLICATION USED. SEALANT SHALL BE DESIGNED FOR USE ON METAL DUCT AND FLEXIBLE DUCT.

15. ALL RECTANGULAR AND ROUND SUPPLY AND RETURN DUCTWORK LOCATED IN EXPOSED INTERIOR AREAS SHALL BE INTERNALLY LINED WITH DUCT LINER AND EXTERNALLY PAINTED. REFER TO ARCHITECT FOR COLOR SELECTION.

16. PROVIDE VIBRATION ISOLATORS FOR MOTOR DRIVEN EQUIPMENT UNLESS NOTED OTHERWISE. PROVIDE ISOLATION AS INDICATED OR AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER.

17. SOME DUCTS SHOWN ON EACH FLOOR PLAN MAY BE SHOWN WITH AN OFFSET FOR CLARITY.

18. SEAL ALL DUCT PENETRATIONS THROUGH FIRE RATED BUILDING ELEMENTS WITH AN APPROVED FIRE PROOFING MATERIAL.

19. ALL EQUIPMENT SHALL HAVE IDENTIFICATION TAGS. TAGS SHALL BE PLASTIC LAMINATE, WHITE FACE WITH 1/2" TALL BLACK LETTERS. THE TAG SHALL MATCH THE UNIT DESIGNATIONS SHOWN ON THE SCHEDULES.

20. EXPAND OR REDUCE DUCTS AT EQUIPMENT CONNECTIONS BASED ON THE EQUIPMENT PURCHASED, WITH TRANSITIONS NOT TO EXCEED 30 DEGREES. SIZES SHOWN ON SCHEDULES, ETC. ARE FOR GUIDANCE ONLY. ASPECT RATIO SHALL BE NO GREATER THAN 4:1, PER SMACNA'S GUIDELINES.

21. ALL DUCTS WITH A DIMENSION GREATER THAN 12" PASSING THRU A NON-RATED WALL SHALL HAVE THE OPENING FRAMED IN WITH METAL STUDS.

22. WHERE DAMPERS ARE LOCATED ABOVE HARD CEILINGS PROVIDE CONCEALED YOUNG REGULATORS. REGULATORS SHALL NOT BE LOCATED IN CORRIDORS, PATEINT CARE, OR TREATMENT AREAS. EACH REGULATOR SHALL BE LABLE PER THE SPECIFICATIONS.

23. TEST AND BALANCE SHALL BE PERFORMED BY AN AABC LICENSED FIRM IN THE TESTING, ADJUSTING, AND BALANCING (TAB) BUSINESS FOR A MINIMUM OF 10 YEARS. AABC FIRM SHALL SUBMIT A REPORT TO THE ENGINEER OF RECORD INDICATING EQUIPMENT NAMEPLATE DATA, DESIGN PERFORMANCE, INITIAL TESTED PERFORMANCE, AND FINAL ADJUSTED PERFORMANCE. REPORT SHALL BE SUBMITTED IN A TIMELY FASHION PRIOR TO JOB CLOSE-OUT. TAB SHALL BE PERFORMED ON ALL EXISTING SYSTEMS MODIFIED AS PART OF THIS CONTRACT. TAB FIRM SHALL PERFORM A FUNCTIONAL PERFORMANCE TEST OF THE SYSTEM BASED ON THE CONTRACT DOCUMENTS HEREIN SHALL AND RELAY ALL DISCREPANCIES AND OUTSTANDING CONSTRUCTION ITEMS RELATING TO THE MECHANICAL EQUIPMENT AND PERFORMANCE TO THE ENGINEER OF RECORD.

MERIDIAN, ID BUILDING DEPARTMENT NOTES

ALL WORK SHALL COMPLY WITH APPLICABLE SECTIONS OF THE 2018 INTERNATIONAL BUILDING CODE, AND ALL AMENDMENTS AND RULES AND REGULATIONS OF THE DEPARTMENT OF BUILDINGS TO DATE.

1. ALL HEATING AND COOLING LOADS CALCULATED PER ASHRAE/ACCA 183.

2. VENTILATION FOR ALL AREA SHALL COMPLY WITH 2018 INTERNATIONAL MECHANICAL CODE CHAPTER 4.

3. AS PER 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.

4. AS PER 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.

5. TESTS WILL BE CONDUCTED UNDER DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSON HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS. THE TESTS WILL SHOW COMPLIANCE WITH 2018 INTERNATIONAL BUILDING CODE REQUIREMENTS AS OUTLINES IN SECTION [BC 1704].

6. THE LICENSED PROFESSIONAL ENGINEER, ARCHITECT OR OTHER PERSON HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE SUPERVISING THE INSTALLATION OF SUCH MECHANICAL SYSTEMS AND CONDUCTING SUCH TESTS WILL FILE DOCUMENTATION AND REPORTS OF TESTS THAT THE SYSTEM COMPLIES WITH THE CONSTRUCTION DOCUMENTS AND APPLICABLE LAWS.

7. TESTS OF MECHANICAL SYSTEMS SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING SECTIONS OF THE 2018 INTERNATIONAL MECHANICAL CODE:
A. VENTILATION SYSTEM BALANCING IMC 2018 - 403.1

8. THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIES, ETC. SHALL COMPLY WITH THE REFERENCED CODE OR STANDARD:
A. STANDARDS OF HEATING -IMC 2018 - 309.1
B. DUCT CONSTRUCTION AND INSTALLATION-IMC 2018 - 603
C. AIR INTAKES, EXHAUSTS AND RELIEF - IMC 2018 - 401.5 & 501.3
D. AIR FILTERS - IMC 2018 - 605
E. MINIMUM TEMPERATURE TO BE MAINTAINED IN OCCUPIED SPACES DURING HEATING SEASON: 68 DEG. FAHRENHEIT.

9. A STATEMENT SHALL BE FILED BY THE OWNER OR TENANT IN POSSESSION THAT THE VENTILATION SYSTEM WILL BE KEPT IN CONTINUOUS OPERATION AT ALL TIMES DURING THE NORMAL OCCUPANCY OF THE STRUCTURE AS REQUIRED BY IMC 2018 - 403.3

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

11. THESE PLANS ARE APPROVED ONLY FOR THE WORK INDICATED ON THE APPLICATION SPECIFICATION SHEET. ALL OTHER MATTERS SHOWN ARE NOT TO BE RELIED UPON OR TO BE CONSIDERED AS EITHER BEING APPROVED OR IN ACCORDANCE WITH APPLICABLE CODES.

THERMOSTATIC CONTROLS

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, NOT FEWER THAN 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 THAT BOTH OF THE FOLLOWING CONDITIONS ARE MET:

1. THE PERIMETER SYSTEM INCLUDES NOT FEWER THAN ONE THERMOSTATIC CONTROL ZONE FOR EACH BUILDING EXPOSURE HAVING EXTERIOR WALLS FACING ONLY ONE ORIENTATION (WITHIN ±45 DEGREES) (0.8 RAD) FOR MORE THAN 50 CONTIGUOUS FEET (15 240 MM).
2. 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 CONFIGURED TO PROVIDE A TEMPERATURE RANGE OR DEADBAND OF NOT LESS THAN 5°F (2.8°C) WITHIN WHICH THE SUPPLY OF HEATING AND COOLING ENERGY TO THE ZONE IS SHUT OFF OR REDUCED TO A MINIMUM.
EXCEPTIONS:

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

C403.4.1.3 SETPOINT 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 CONFIGURED TO PREVENT THE HEATING SETPOINT FROM EXCEEDING THE COOLING SETPOINT AND TO MAINTAIN A DEADBAND IN ACCORDANCE WITH SECTION C403.4.1.2.

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:

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

403.4.2.1 THERMOSTATIC SETBACK

THERMOSTATIC SETBACK CONTROLS SHALL BE CONFIGURED 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).

403.4.2.2 AUTOMATIC SETBACK AND SHUTDOWN

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 NOT FEWER THAN 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 CONFIGURED TO OPERATE THE SYSTEM FOR UP TO 2 HOURS; OR AN OCCUPANCY SENSOR.

C403.4.2.3 AUTOMATIC START AND STOP

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.

PROJECT LOCATION:
TECOVAS

M-001

HVAC SYSTEM SPECIFICATIONS

SUPERVISION
THIS HVAC PROJECT REQUIRES A FULL-TIME MECHANICAL SUPERVISOR TO BE ONSITE WHENEVER ANY HVAC CONTRACTOR IS PERFORMING INSTALLATION, COMMISSIONING, OR SERVICE WORK.

ALL HVAC CONTRACTOR PERSONNEL MUST OBTAIN AND WEAR AN OFFICIAL ID BADGE AT ALL TIMES. THE CONTRACTOR, AT THEIR DISCRETION, SHALL APPLY FOR AND SECURE FROM THE SOFTWARE ENGINEERING INSTITUTE A PHOTO ID CREDENTIAL FOR EACH HVAC TECHNICIAN OR FOR DESIGNATED STAFF AUTHORIZED TO LOG OTHER EMPLOYEES IN AND OUT.

PERMITS, CODES & REGULATORY COMPLIANCE
THE HVAC CONTRACTOR SHALL SECURE AND PAY FOR ALL NECESSARY MECHANICAL PERMITS, BUILDING PERMITS, AND INSPECTION CERTIFICATES REQUIRED FOR HVAC INSTALLATION, DUCTWORK FABRICATION, REFRIGERANT PIPING, CONTROLS, AND COMMISSIONING. THE OWNER WILL SECURE ZONING AND OCCUPANCY PERMITS.

ALL HVAC SYSTEM WORK SHALL CONFORM TO STATE AND LOCAL MECHANICAL CODES, ENERGY CODES, AND ALL APPLICABLE ORDINANCES, INCLUDING OSHA SAFETY REQUIREMENTS. IN THE EVENT OF ANY CONFLICT BETWEEN THE HVAC DESIGN AND APPLICABLE CODES (IMC, NFPA, NEC, UL), THE GOVERNING CODES AND STANDARDS SHALL TAKE PRECEDENCE AT NO ADDITIONAL COST TO THE OWNER.

ALL HVAC WORK SHALL FULLY COMPLY WITH THE INTERNATIONAL MECHANICAL CODE (IMC 2009 OR LATEST EDITION), NFPA, NEC, UL, AND OSHA REQUIREMENTS, AS WELL AS ALL MUNICIPAL, COUNTY, STATE, AND FEDERAL REGULATIONS HAVING JURISDICTION OVER HVAC SYSTEMS. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ALL HVAC-RELATED PERMITS ASSOCIATED WITH THIS PROJECT.

A. IT IS THE RESPONSIBILITY OF THE HVAC CONTRACTOR (IN COORDINATION WITH THE GENERAL CONTRACTOR) TO MAINTAIN COOLING AND CONDITIONED AIR SUPPLY AT ALL TIMES FOR THE MECHANICAL/EQUIPMENT FLOOR AREAS. ALL HVAC DEMOLITION, MODIFICATIONS, AND NEW INSTALLATIONS SHALL BE FULLY COORDINATED AND MAY NOT BEGIN UNTIL A WRITTEN METHOD OF PROCEDURE (MOP) IS REVIEWED AND APPROVED BY THE OWNER AND THE ENGINEER.

B. DURING CONSTRUCTION, THE CONTRACTOR SHALL CAP, SEAL, OR CLOSE OFF ALL DUCTWORK, PIPING, AND HVAC SYSTEM COMPONENTS NOT ACTIVELY UNDER INSTALLATION OR SERVICE, USING AN APPROVED METHOD. THIS IS TO PREVENT THE ENTRY OF DUST, DIRT, AND CONSTRUCTION DEBRIS INTO THE HVAC SYSTEM. SHOULD THE CONTRACTOR FAIL TO PROTECT OPEN ENDS OF DUCTS, CHILLED WATER PIPES, OR REFRIGERANT PIPING, THEY MAY BE REQUIRED TO VACUUM-CLEAN AND FLUSH THE ENTIRE HVAC SYSTEM AND REMOVE CONTAMINATED DUCT SECTIONS FOR INSPECTION.

C. ALL AIR OUTLETS, GRILLES, REGISTERS, AND DIFFUSERS SHALL BE COVERED WITH CHEESECLOTH OR MINIMUM 1-INCH FILTER MEDIA WHENEVER NEW AIR HANDLING UNITS (AHUS), FAN COIL UNITS (FCUS), OR OTHER HVAC SYSTEMS ARE BEING OPERATED TO PREVENT DUST MIGRATION INTO THE SYSTEM.

D. THE CONTRACTOR SHALL DISCONNECT, REMOVE, RELOCATE, OR REPLACE EXISTING HVAC PIPING, CONDUIT, DUCTWORK, AND ACCESSORIES (PART OF THE EXISTING SYSTEM) AS REQUIRED FOR HVAC SYSTEM ALTERATIONS, REROUTING, OR INSTALLATION OF NEW EQUIPMENT, IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS AND SPECIFICATIONS.

E. THE CONTRACTOR SHALL COORDINATE ALL HVAC UTILITY SHUTDOWNS (CHILLED WATER, CONDENSER WATER, HOT WATER, REFRIGERANT LINES, AND POWER TO HVAC SYSTEMS) IN ADVANCE WITH THE OWNER TO MINIMIZE OPERATIONAL IMPACT.

F. ALL HVAC ITEMS DESIGNATED FOR REUSE (E.G., DIFFUSERS, GRILLES, DAMPERS, PIPING, VALVES, DUCT SECTIONS, OR MECHANICAL EQUIPMENT) SHALL BE REMOVED CAREFULLY, STORED SECURELY, AND PROTECTED FROM DAMAGE, MOISTURE, OR THEFT. THE CONTRACTOR SHALL THOROUGHLY INSPECT AND TEST ALL REUSABLE HVAC COMPONENTS FOR DEFECTS PRIOR TO DISCONNECTION AND IMMEDIATELY NOTIFY THE OWNER OF DEFICIENCIES. ANY DAMAGE NOT NOTED AT REMOVAL SHALL BE CONSIDERED THE RESPONSIBILITY OF THE HVAC CONTRACTOR.

G. SALVAGED HVAC MATERIALS
THE OWNER SHALL DETERMINE THE DISPOSITION OF ALL SALVAGED HVAC MATERIALS, DUCT SECTIONS, PIPING, VALVES, DIFFUSERS, AND RELATED COMPONENTS. THE CONTRACTOR SHALL BE FULLY FAMILIAR WITH OWNER REQUIREMENTS FOR SALVAGE, RECYCLING, OR DISPOSAL OF HVAC MATERIALS, AND SHALL ADHERE STRICTLY TO THESE GUIDELINES.

H. BUILDING ENVELOPE & HVAC OPENINGS
ALL OPENINGS TO THE OUTDOORS CREATED BY HVAC PENETRATIONS (DUCTWORK, LOUVERS, REFRIGERANT LINES, PIPING SLEEVES, OR OTHER CONSTRUCTION ACTIVITIES) SHALL BE SEALED OFF AT THE END OF EACH WORKDAY TO MAINTAIN BUILDING PRESSURIZATION, INDOOR AIR QUALITY, AND SECURITY.

I. MATERIALS, WORKMANSHIP, AND METHODS

ALL HVAC MATERIALS AND EQUIPMENT SHALL BE NEW, FACTORY-CERTIFIED, AND OF THE HIGHEST QUALITY, FULLY CONFORMING TO THESE SPECIFICATIONS. WORKMANSHIP SHALL MEET THE HIGHEST PROFESSIONAL STANDARDS IN DUCT FABRICATION, REFRIGERANT PIPING, HYDRONIC PIPING, INSULATION, CONTROLS WIRING, AND EQUIPMENT INSTALLATION. ALL ITEMS SHALL BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS, ASHRAE STANDARDS, AND PROJECT SPECIFICATIONS.

THE MEANS, METHODS, TECHNIQUES, SEQUENCES, PROCEDURES, AND JOB SITE HVAC SAFETY (INCLUDING REFRIGERANT HANDLING, CONFINED SPACE WORK, AND LOCK-OUT/TAG-OUT PROCEDURES) SHALL REMAIN THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND THEIR SUBCONTRACTORS.

J. OBSTRUCTIONS

THE CONTRACTOR SHALL NOTE THAT HVAC WORK IS BEING PERFORMED WITHIN EXISTING FACILITIES AND NUMEROUS OBSTRUCTIONS (STRUCTURAL BEAMS, EXISTING DUCTWORK, PIPING, CABLE TRAYS, LIGHTING, AND CEILING SYSTEMS) MAY HINDER INSTALLATION. THESE OBSTRUCTIONS MAY NOT BE SHOWN ON DRAWINGS; THEREFORE, THE HVAC CONTRACTOR SHALL INSTALL EQUIPMENT AND DUCTWORK IN SUCH A MANNER AS TO OVERCOME THESE DIFFICULTIES, COORDINATING WITH OTHER TRADES AS REQUIRED.

IF APPLICABLE TO THE INSTALLATION OF HVAC EQUIPMENT, EXISTING LIGHTING FIXTURES SHALL BE TEMPORARILY REMOVED AND RE-INSTALLED IN THEIR ORIGINAL LOCATIONS. THE CONTRACTOR SHALL LOCATE, IDENTIFY, AND DE-ENERGIZE CEILING LIGHTING CIRCUITS IN THE PROPOSED HVAC WORK AREAS, AND SHALL DISCONNECT AND RECONNECT ELECTRICAL BRANCH WIRING AS NEEDED TO FACILITATE HVAC INSTALLATION.

TEMPORARY HVAC VENTILATION

THE CONTRACTOR SHALL PROVIDE TEMPORARY HVAC VENTILATION SYSTEMS AS REQUIRED TO:

- DISSIPATE HUMIDITY AND MOISTURE,
- PREVENT ACCUMULATION OF DUST, CONSTRUCTION DEBRIS, FUMES, VAPORS, AND GASES,
- MAINTAIN ACCEPTABLE INDOOR AIR QUALITY (IAQ) DURING CONSTRUCTION ACTIVITIES.

ALL TEMPORARY VENTILATION PROCEDURES SHALL BE CONDUCTED IN SUCH A MANNER AS TO AVOID DISTURBANCE TO BUILDING OCCUPANTS AND TO COMPLY WITH ASHRAE STANDARDS AND OSHA REQUIREMENTS. WHERE NECESSARY, CONTRACTORS SHALL PROVIDE HEPA-FILTERED NEGATIVE AIR MACHINES, EXHAUST FANS, OR TEMPORARY DUCTED VENTILATION TO CONTROL AIR CONTAMINANTS.

POWDER–ACTUATED FASTENERS (HVAC INSTALLATION)

THE USE OF POWDER-ACTUATED FASTENERS (PAFS) AND THE TOOLS REQUIRED FOR THEIR INSTALLATION SHALL COMPLY WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS, INCLUDING OSHA SAFETY STANDARDS. ONLY TRAINED AND CERTIFIED PERSONNEL SHALL OPERATE POWDER-ACTUATED FASTENING EQUIPMENT ON HVAC PROJECTS.
USE OF POWDER-ACTUATED FASTENERS SHALL BE LIMITED TO ANCHORING HVAC MATERIALS, SUPPORTS, HANGERS, AND FIXTURES INTO CONCRETE FLOORS, MASONRY WALLS, OR OTHER APPROVED SUBSTRATES WHERE SHEAR TRANSFER IS REQUIRED. TYPICAL HVAC APPLICATIONS INCLUDE:

- ANCHORING DUCTWORK SUPPORTS AND TRAPEZE HANGERS,
- SECURING PIPE HANGERS, BRACKETS, AND EQUIPMENT RAILS,
- MOUNTING CONDUIT AND CABLE TRAYS RELATED TO HVAC SYSTEMS.

POWDER-ACTUATED FASTENERS SHALL NOT BE USED FOR MAKING CONNECTIONS TO STRUCTURAL STEEL MEMBERS OR FOR ANY HVAC EQUIPMENT ANCHORAGE REQUIRING ENGINEERED BOLTS, EXPANSION ANCHORS, OR CHEMICAL ADHESIVE ANCHORS.

CONSTRUCTION SCHEDULE
UPON CONTRACT AWARD, THE HVAC CONTRACTOR SHALL PREPARE AND SUBMIT TO THE ENGINEER A DETAILED HVAC CONSTRUCTION SCHEDULE SHOWING:
- PHASING OF MAJOR HVAC SYSTEM INSTALLATION
- KEY MILESTONE DATES FOR EQUIPMENT DELIVERY AND STARTUP,
- TESTING, ADJUSTING, AND BALANCING (TAB) SCHEDULE, COMMISSIONING DATES.
- THE SCHEDULE SHALL BE UPDATED PERIODICALLY TO REFLECT ACTUAL PROGRESS.

SHEETING, BRACING, AND HVAC EQUIPMENT PROTECTION
THE HVAC CONTRACTOR SHALL INSTALL AND MAINTAIN ALL SHEETING, BRACING, AND PROTECTIVE BARRIERS AS REQUIRED TO SAFEGUARD EXISTING MECHANICAL EQUIPMENT, ELECTRICAL SWITCHGEAR, BATTERIES, ADJACENT TRADES, AND STRUCTURAL SYSTEMS DURING HVAC INSTALLATION. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE ADEQUACY OF ALL BRACING AND PROTECTIVE SYSTEMS, IN COMPLIANCE WITH OSHA, ASHRAE SAFETY PRACTICES, AND AGC STANDARDS.

CONTRACTOR SHALL CONSTRUCT TEMPORARY HARD OR SOFT PARTITIONS AS DIRECTED BY THE OWNER'S REPRESENTATIVE OR AS REQUIRED BY REAL ESTATE LEASE REQUIREMENTS, HVAC PHASING PLANS, OR CONSTRUCTION DRAWINGS TO ISOLATE HVAC CONSTRUCTION AREAS FROM OCCUPIED SPACES.

WORK BY OTHERS AND COORDINATION WITH TRADES

A. THE ELECTRICAL SUBCONTRACTOR SHALL PERFORM ALL POWER WIRING FOR HVAC SYSTEMS. ALL CONTROL WIRING, BAS (BUILDING AUTOMATION SYSTEM) CONNECTIONS, AND DDC (DIRECT DIGITAL CONTROL) INTERFACES SHALL BE PERFORMED BY THE CONTROLS SUBCONTRACTOR (B.C.I. OR OWNER'S DESIGNATED PROVIDER).

B. THE HVAC CONTRACTOR SHALL COORDINATE FULLY WITH THE GENERAL CONTRACTOR AND OTHER TRADES REGARDING SCHEDULING, WORK SEQUENCING, AND THE ALLOCATION OF SPACE FOR DUCTWORK, PIPING, CONDUIT, EQUIPMENT PADS, AND CEILING PLENUM COORDINATION.

SCHEDULE OF WORK
ALL WORK SHALL BE SCHEDULED TO MINIMIZE DISRUPTION OF BUILDING OPERATIONS. ANY REQUIRED SHUTDOWN OF CHILLED WATER, HOT WATER, CONDENSER WATER, STEAM, OR POWER SYSTEMS SHALL BE COORDINATED IN WRITING WITH THE OWNER IN ADVANCE. CONTRACTOR SHALL PROVIDE A METHOD OF PROCEDURE (M.O.P.) FOR EACH SHUTDOWN AT LEAST 7 DAYS IN ADVANCE FOR OWNER AND ENGINEER REVIEW.

CONTRACTOR'S BID SHALL INCLUDE ALL COSTS FOR OVERTIME LABOR, TEMPORARY DUCT OR PIPING CONNECTIONS, BYPASS CONNECTIONS, AND OTHER MEASURES NECESSARY TO MAINTAIN HVAC SYSTEM FUNCTIONALITY DURING CONSTRUCTION.

ACCESS AND STAGING
THE CONTRACTOR SHALL HAVE LIMITED ACCESS TO THE SITE STAGING AREAS, PARKING LOTS, AND LOADING DOCKS. ANY ADDITIONAL SPACE REQUIRED FOR HVAC EQUIPMENT STORAGE, DUCTWORK STAGING, OR CRANE LIFTS SHALL BE COORDINATED WITH THE OWNER.

MEETINGS
THE CONTRACTOR AND REQUIRED SUBCONTRACTORS (CONTROLS, TAB, INSULATION, SHEET METAL, PIPING, ELECTRICAL, ETC.) SHALL ATTEND WEEKLY PROGRESS MEETINGS. CONTRACTOR'S SUPERINTENDENT SHALL SUBMIT A WRITTEN REPORT DETAILING HVAC WORK COMPLETED DURING THE PRIOR WEEK AND WORK SCHEDULED FOR THE FOLLOWING WEEK.

RECORD DRAWINGS
THE CONTRACTOR SHALL MAINTAIN AT THE SITE A COMPLETE SET OF REDLINED HVAC CONTRACT DRAWINGS SHOWING ALL FIELD DEVIATIONS, APPROVED CHANGES, AND ROUTING ADJUSTMENTS FOR DUCTWORK, PIPING, AND EQUIPMENT LOCATIONS. AT PROJECT COMPLETION, THE CONTRACTOR SHALL PROVIDE A FULL SET OF RECORD DRAWINGS (AS-BUILTS) TO THE ENGINEER OF RECORD AND OWNER FOR TURNOVER.

REVIEW OF SHOP DRAWINGS
THE CONTRACTOR SHALL SUBMIT DOCUMENTATION OF ALL EQUIPMENT AND MATERIALS TO BE USED ON THIS PROJECT FOR REVIEW BY THE ENGINEER OF RECORD AND OWNER PRIOR TO INSTALLATION. SIX (6) COPIES OF EACH SUBMITTAL SHALL BE PROVIDED, INCLUDING BUT NOT LIMITED TO:
- END-SUCTION, BASE-MOUNTED CENTRIFUGAL PUMPS
- INERTIA BASES
- VARIABLE FREQUENCY DRIVES
- PIPE INSULATION
- PIPING AND RELATED ACCESSORIES
- TEST & BALANCE CONTRACTOR INFORMATION AND QUALIFICATIONS
- CONTROLS SYSTEM INFORMATION AS FURNISHED BY B.C.I.
- B.A.S. WIRING DIAGRAMS
- CONCRETE PAD LAYOUT EQUIPMENT AND SHOP DRAWINGS AS REQUIRED

SITE VISITATION
THE CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO BIDDING TO VERIFY ALL EXISTING CONDITIONS, INCLUDING.
- EXISTING DUCT AND PIPING ROUTING,
- EQUIPMENT LOCATIONS AND SIZES,
- ABOVE-CEILING CONDITIONS AND ACCESS CLEARANCES.

SUBMISSION OF A BID SHALL SERVE AS CONFIRMATION THAT THE CONTRACTOR HAS VISITED THE SITE, REVIEWED CONDITIONS, AND ACCOUNTED FOR THEM IN THE PROPOSAL. FAILURE TO FAMILIARIZE WITH EXISTING CONDITIONS SHALL NOT BE CONSIDERED GROUNDS FOR ADDITIONAL COST OR TIME.

DRAWINGS AND SPECIFICATIONS
THE CONTRACTOR SHALL CAREFULLY REVIEW ALL DRAWINGS AND SPECIFICATIONS. ANY DISCREPANCIES IDENTIFIED SHALL BE REPORTED IN WRITING TO THE ENGINEER OF RECORD AND OWNER'S REPRESENTATIVE FOR INSTRUCTIONS PRIOR TO PROCEEDING. NO DEVIATIONS FROM THE CONTRACT DOCUMENTS SHALL BE MADE WITHOUT PRIOR WRITTEN APPROVAL.

IN CASE OF QUESTIONS OR DISPUTES REGARDING INTERPRETATION OF THE DRAWINGS OR SPECIFICATIONS, THE OWNER'S REPRESENTATIVE SHALL PROVIDE CLARIFICATION, WHICH SHALL BE FINAL AND BINDING.

THE DRAWINGS AND SPECIFICATIONS ARE NOT INTENDED TO INDICATE EVERY DETAIL OR MATERIAL REQUIRED FOR THE WORK. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL COMPONENTS, CONNECTIONS, AND ACCESSORIES NECESSARY TO PROVIDE A COMPLETE AND FUNCTIONAL SYSTEM AS IMPLIED BY THE CONTRACT DOCUMENTS.

DRAWINGS ARE DIAGRAMMATIC IN NATURE AND DO NOT SHOW EXACT ROUTING OR LOCATIONS OF EQUIPMENT. THE CONTRACTOR SHALL COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS.

DUE TO THE SCALE OF THE DRAWINGS, NOT ALL OFFSETS OR FITTINGS MAY BE SHOWN. THE CONTRACTOR SHALL INSTALL WORK IN A MANNER THAT AVOIDS INTERFERENCE WITH PIPING, CONDUITS, EQUIPMENT, ARCHITECTURAL, AND STRUCTURAL FEATURES. ANY ADJUSTMENTS OR MODIFICATIONS NECESSARY TO ACCOMMODATE SITE CONDITIONS SHALL BE INCLUDED WITHOUT ADDITIONAL COST TO THE OWNER.

BECAUSE OF LIMITED CEILING SPACE AND THE EXTENT OF DUCTWORK, INSTALLATION OF DUCT SYSTEMS SHALL TAKE PRECEDENCE OVER OTHER TRADES. COORDINATION WITH ALL OTHER CONTRACTORS IS REQUIRED TO MAINTAIN PROPER CLEARANCES.

LOCATIONS
THE CONTRACTOR SHALL OBTAIN DETAILED INFORMATION REGARDING THE ACTUAL LOCATION OF EQUIPMENT AS FIELD CONDITIONS MAY VARY FROM THE DRAWINGS. ANY RELOCATION OR REINSTALLATION REQUIRED DUE TO THE CONTRACTOR'S FAILURE TO VERIFY CONDITIONS SHALL BE COMPLETED AT NO ADDITIONAL COST TO THE OWNER.

THE LAYOUT AND SUPPORTS SHALL BE SUBJECT TO REVISIONS AS REQUIRED TO AVOID CONFLICTS WITH STRUCTURE, ARCHITECTURAL ELEMENTS, AND EXISTING UTILITIES.

EXISTING EQUIPMENT
THE CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING EQUIPMENT, PIPING, BRANCH DUCTWORK, DIFFUSERS, REGISTERS, AND RELATED AUXILIARIES AS INDICATED.

CLEAN UP
THE CONTRACTOR SHALL PROTECT ALL EQUIPMENT AND MATERIALS UNTIL FINAL COMPLETION AND ACCEPTANCE OF THE PROJECT. ANY DAMAGED ITEMS SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL COST TO THE OWNER.

DURING CONSTRUCTION, THE CONTRACTOR SHALL CLEAN ALL AREAS AND EQUIPMENT—INCLUDING HOODS, CABINETS, DIFFUSERS, REGISTERS, CONTROL PANELS, THERMOSTATS, FLOORING, AND WINDOWS—TO THE OWNER'S SATISFACTION PRIOR TO PROJECT TURNOVER

INTERRUPTION OF EXISTING SERVICES
NO EXISTING SERVICES SHALL BE INTERRUPTED WITHOUT PRIOR APPROVAL. ANY APPROVED INTERRUPTIONS SHALL BE KEPT TO THE SHORTEST DURATION POSSIBLE.

CONNECTIONS TO EXISTING MATERIALS
WHERE NEW WORK TIES INTO EXISTING SYSTEMS, THE CONTRACTOR SHALL PERFORM ALL CUTTING, ADJUSTMENTS, AND MODIFICATIONS REQUIRED TO ENSURE PROPER AND DURABLE CONNECTIONS, AS SHOWN ON DRAWINGS OR AS REQUIRED BY CONDITIONS.

ALL SUCH WORK SHALL CONFORM TO SPECIFICATIONS. ANY REMOVED PORTION OF A SYSTEM SHALL BE PROPERLY CAPPED, PLUGGED, OR CLOSED OFF. ALL UNUSED DUCTWORK AND PIPING MADE OBSOLETE BY THIS PROJECT SHALL BE REMOVED.

IDENTIFICATION
ALL MATERIALS, EQUIPMENT, AND SYSTEM COMPONENTS PROVIDED SHALL BE IDENTIFIED BY NAMEPLATES INDICATING NAME, SERVICE, FUNCTION, OR CONTROL.NAMEPLATES SHALL BE AT LEAST 1"X3" WITH CHARACTERS NOT LESS THAN 1/4". THEY SHALL BE MADE UP OF TWO LAMINATED BLACK PLASTIC SHEETS BONDED WITH A MIDDLE SHEET OF WHITE PLASTIC AND CHARACTERS ENGRAVED THROUGH ONE BLACK SHEET TO DEPTH OF WHITE PLASTIC.

ACCESS TO EQUIPMENT
IT SHALL BE THIS CONTRACTOR'S RESPONSIBILITY TO INSURE THAT ACCESS IS PROVIDED TO ALL CONCEALED DAMPERS, VALVES, COILS, CONTROL DEVICES, AND OTHER ITEMS REQUIRING PERIODIC MAINTENANCE

WORK BEYOND SCOPE AREAS
IN AREAS OF THE BUILDING NOT DIRECTLY INCLUDED IN THE SCOPE OF WORK, THE CONTRACTOR SHALL PERFORM ALL NECESSARY CUTTING, PATCHING, AND PAINTING REQUIRED TO COMPLETE THE INSTALLATION. ALL DISTURBED AREAS SHALL BE FINISHED TO MATCH THE SURROUNDING CONSTRUCTION AND APPROVED BY THE OWNER'S REPRESENTATIVE.

CUTTING AND PATCHING
ALL OPENINGS IN COMPLETED NEW WORK AND IN EXISTING WALLS AND FLOORS REQUIRED TO INSTALL WORK SHALL BE CUT BY THIS CONTRACTOR. ALL PATCHING MADE NECESSARY BY CONTRACTOR'S CUTTING SHALL BE COMPLETED BY THIS CONTRACTOR. CONTRACTOR'S RESPONSIBILITY AND SHALL BE PERFORMED BY WORKMEN SKILLED IN THIS RESPECTIVE TRADE. SURFACES OF PATCHWORK SHALL MATCH ADJACENT EXISTING CONSTRUCTION SUBJECT TO APPROVAL OF OWNER'S REPRESENTATIVE. HOLES REQUIRED THROUGH EXISTING FLOORS AND WALLS SHALL BE CUT WITH A CORE DRILL AND SHALL BE DRILLED BETWEEN RIBS, BEAMS OR JOISTS. ALL PATCHWORK SHALL BE SUBJECT TO REVIEW AND APPROVAL OF THE OWNER'S REPRESENTATIVE.

WIRING DIAGRAMS (FOR CONTROLS)
CONTRACTOR SHALL PREPARE A FINAL COMPOSITE WIRING DIAGRAM AND SHOW ALL RELATED EQUIPMENT UNDER HIS CONTRACT; HE SHALL SUBMIT 7 COPIES FOR REVIEW. WIRING DIAGRAM SHALL BE COMPATIBLE WITH ALL MISCELLANEOUS SWITCHES, STARTERS, CONTROL PANELS, MOTORS, AND ALL OTHER ELECTRICAL AND CONTROL DEVICES.

PAINTING
PAINTING OF WALLS SHALL BE COMPLETED BY THIS CONTRACTOR. PAINT SHALL BE COMMERCIAL QUALITY AND COLOR AS ACCEPTED BY OWNER, PROVIDE ONE PRIMER COAT AND TWO FINISH COATS. ALL PAINTING IS SUBJECT TO REVIEW AND APPROVAL OF THE OWNER'S REPRESENTATIVE.

LINTELS
CONTRACTOR SHALL PROVIDE ALL STEEL LINTELS FOR OPENINGS IN NEW AND EXISTING MASONRY WALLS REQUIRED FOR ITEMS INSTALLED UNDER THIS CONTRACT. COORDINATE INSTALLATION OF LINTELS WITH OTHER CONTRACTORS.

WARRANTY
WARRANTY PERIOD IS FOR ONE YEAR FROM DATE OF FINAL ACCEPTANCE.
AFTER ACCEPTANCE OF WORK BY OWNER, CONTRACTOR SHALL WARRANT THAT DURING ONE YEAR SPECIFIED PERIOD HE SHALL REPAIR ALL DEFECTIVE WORK AND REPLACE ALL DEFECTIVE MATERIALS FURNISHED OR INSTALLED UNDER CONTRACT, WITHOUT COST TO OWNER.

PERFORMANCE OF EQUIPMENT
ALL MOVING PARTS OF EQUIPMENT AND APPURTENANCES SHALL BE PROPERLY LUBRICATED BY CONTRACTOR AND SHALL BE STARTED UP AND TESTED BY HIM. ALL EQUIPMENT SHALL OPERATE WITHOUT OBJECTIONABLE NOISE OR VIBRATION AS DETERMINED BY OWNER'S REPRESENTATIVE. SHOULD SUCH OBJECTIONABLE NOISE OR VIBRATION BE PRODUCED AND TRANSMITTED TO OCCUPIED PORTIONS OF THE BUILDING BY APPARATUS, PIPING, PUMPS OR OTHER PARTS OF THIS WORK, ANY NECESSARY CHANGES AS APPROVED SHALL BE MADE WITHOUT COST TO OWNER.

SHEET METAL
GENERAL
1. FURNISH AND INSTALL ALL SHEET METAL WORK, GRILLES, DAMPERS, DIFFUSERS, CONTROL EQUIPMENT, ETC., AND ALL OTHER APPURTENANCES REQUIRED TO COMPLETE THE AIR CONDITIONING SYSTEMS AS SHOWN ON THE DRAWINGS OR SPECIFIED HEREIN.
2. THE SIZE AND LOCATION OF ALL DUCTWORK ARE SHOWN ON THE DRAWINGS. IF MEASUREMENTS IN THE FIELD INDICATE THAT CLEARANCES ARE INADEQUATE TO PASS THE DUCTS AS SHOWN, THE DUCTS MAY BE RESIZED OR RELOCATED SUBJECT TO THE REVIEW OF THE ENGINEER, WHERE NECESSARY, TO AVOID CONFLICT WITH THE WORK OF OTHER TRADES, THE LOCATION OF THE DUCTS MAY BE ALTERED SLIGHTLY FROM THAT SHOWN ON THE DRAWINGS, SUBJECT TO THE REVIEW OF THE ENGINEER. WHERE DIMENSIONS ARE NOT SHOWN ON DRAWINGS, DUCTS ARE TO BE SIZED TO FIT GRILLES, DUCT COLLARS, ETC., IN THE CASE OF LINED DUCTS, THE SIZES INDICATED ARE CLEAR INSIDE DIMENSIONS.
3. ALL PLENUMS AND ALL DUCTWORK SHALL BE CONSTRUCTED FROM GALVANIZED SHEET STEEL ALL HANGERS, ANGLES, BRACES, BOLTS, ETC. SHALL BE GALVANIZED. SHEET THICKNESS SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLE, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

WIDTH OF DUCT SIDE-INCHES	USS GAGE NO.
0 TO 24	24
25 TO 40	22
41 TO 60	20
61 & OVER	18

4. ALL RECTANGULAR DUCTS SHALL BE COMPLETE WITH FOUR SIDES AND SHALL BE AIR TIGHT AND STIFFENED WITH BEADING AT 12" CENTERS. BEADING SHALL BE ACROSS THE DUCT ON ALL FOUR SIDES. ALL DUCTS SHALL BE MADE WITH TIGHT JOINTS AND SHALL NOT BE CROSS-BROKEN. POOR WORKMANSHIP IN THE MAKING F SEAMS OR JOINTS SHALL BE SUFFICIENT CAUSE FOR REJECTING DUCTWORK. LL LONGITUDINAL SEAMS IN DUCTS SHALL BE TIGHT DOUBLE LOCK PITTSBURGH TYPE. NO SECTIONS OF DUCT SHALL BE OVER FIVE FEET IN LENGTH.
5. DO NOT HANG DUCTWORK FROM BEAM DROPS OR COLUMNS.
6. ALL TRANSITIONS SHALL BE 5:1 UNLESS NOTED OTHERWISE.
CONTRACTOR SHALL SUBMIT SHOP DRAWINGS ON ALL SHEET METAL WORK TO BE INSTALLED OR MODIFIED. SHOP DRAWINGS SHALL BE DRAWN TO SCALE. INSULATION - DUCTWORK ALL RECTANGULAR OUTDOOR, MIXED AIR PLENUM SHALL BE INSULATED WITH 1" THICK OWENS CORNING 703 FRK (FIBER RIGID DUCT INSULATION) WITH A FIBERGLASS REINFORCED DRAFT (FRK) JACKET OR SIMILAR PRODUCT AS MANUFACTURED BY KNAUF. ALL JOINTS AND EXPOSED EDGES SHALL BE NEATLY SEALED WITH A 4" STRIP OR PRESSURE SENSITIVE TAPE MADE OF THE JACKET MATERIAL. ALL HOLES IN INSULATION SHALL BE SEALED. FIBERGLASS RIGID VAPOR SEAL WITH UL RATED FACING, INSTALL WITH STICK- KLIPS.
7. ALL EQUIPMENT AND ACCESSORIES IN SHEET METAL ENCLOSURES AND IN DUCTS SHALL BE BOLTED IN POSITION ON NOT MORE THAN 6" CENTERS. ALL ITEMS SHALL BE EASILY REMOVABLE, AND CLEARANCES SHALL BE PROVIDED TO PERMIT REMOVAL OF EACH ITEM WITHOUT CUTTING OR REMOVING THE DUCTWORK. CUT OFF EXCESS BOLT LENGTHS.
PRIOR TO REMOVING ANY INSTALLED DUCT, OUTER SURFACES OF DUCT MUST BE VACUUMED WITH A HEPA TYPE VACUUM CLEANER AND DUSTED WITH AN OIL IMPREGNATED CLOTH. EACH SECTION OF DUCT REMOVED MUST BE CAPPED WITH PLASTIC PRIOR TO REMOVAL TO ELIMINATE FALLOUT OF INTERIOR DUCT DURING ANY DRILLING OPERATION, A HEPA TYPE VACUUM MUST BE USED TO ELIMINATE DUST. IN ADDITION, A PLUNGER HEAD OR EQUIVALENT MUST BE USED WITH THE DRILL ND VACUUM WHEN DRILLING OVERHEAD.CONTRACTOR TO COVER ALL EXISTING AND NEW SUPPLY OUTLETS WITH CHEESE CLOTH PRIOR TO ANY WORK BEING PERFORMED ON SYSTEM TO PREVENT DIRT, METAL CHIPS/FLAKES, DUST BEING ENTERED IN THE AIRSTREAM. CHEESE CLOTH TO BE REMOVED PRIOR TO SYSTEM BALANCING.
8. MINIMUM INSULATION REQUIREMENTS AS PER 2018 IECC :

	SUPPLY	RETURN
UNCONDITIONED SPACES WITHIN BUILDING:	R-6	R-6
INDIRECTLY CONDITIONED SPACES:	R-12	R-12
OUTSIDE OF BUILDING:	R-12	R-12

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

SERVICE SIZE (OPERATING TEMP.)	THICKNESS	FINISH
REFRIGERANT PIPING (141-200 DEG.F)<1.5"	1.5"	P-6
CONDENSATE PIPING (105-140 DEG.F) <1.5"	1.0"	P-6

TESTING AND BALANCING
THE GENERAL CONTRACTOR SHALL MAKE TESTS DIRECTED BY THE OWNER. THEY SHALL PROVIDE ALL LABOR, TOOLS, EQUIPMENT, INSTRUMENTS AND MATERIALS TO MAKE SUCH TESTS. ALL SYSTEMS SHALL BE LEFT IN GOOD OPERATING CONDITION. IF DEFECTS OF WORKMANSHIP OR MATERIALS IN PIPING AND WIRING SYSTEM OR EQUIPMENT ARE DISCLOSED AS A RESULT OF THESE TESTS AND OPERATION, REPAIRS SHALL BE MADE BY THE CONTRACTOR. TESTS SHALL BE REPEATED UNTIL SATISFACTORY TEST HAS BEEN MADE TO CONTRACTOR'S SATISFACTION. ALL DEFECTIVE APPARATUS SHALL BE REMOVED FROM THE SITE AND REPLACED BY MATERIALS CONFORMING TO REQUIREMENTS OF THESE SPECIFICATIONS. ENTIRE COST OF REPLACEMENTS AND REPAIRS SHALL BE BORNE BY THE GENERAL CONTRACTOR.

THE FOLLOWING OPERATIONS SHALL BE PERFORMED IN PREPARATION FOR FINAL INSPECTION BY THE ENGINEER. THE CONTRACTOR SHALL DEMONSTRATE TO THE ENGINEER THAT THE SYSTEM IS OPERATING IN COMPLIANCE WITH THE DRAWINGS AND SPECIFICATIONS. ALL TESTS AND INSPECTIONS SHALL BE COMPLETED BEFORE FINAL PAYMENT IS MADE TO THE CONTRACTOR. BEFORE A FINAL WALK THROUGH AND SYSTEM ACCEPTANCE BY THE OWNER, THE CONTRACTOR WILL SUBMIT COMPLETED SYSTEM REPORTS TO THE DESIGN PROFESSIONAL.

WORK
DESCRIPTION OF WORK
AIR BALANCING AND ADJUSTING
THE GENERAL CONTRACTOR SHALL PROVIDE AS PART OF THIS CONTRACT THE SERVICES OF TESTING AND BALANCING FIRM AS LISTED BY THE ASSOCIATED AIR BALANCE COUNCIL (AABC). THE BALANCING FIRM SHALL BE RESPONSIBLE FOR ALL BALANCING

WORK BY THE BALANCING FIRM SHALL BE UNDER THE DIRECT SUPERVISION OF A REGISTERED PROFESSIONAL ENGINEER, WHO IS A FULL TIME EMPLOYEE OF THE FIRM.

TESTING SHALL BE IN STRICT ACCORDANCE WITH PUBLISHED AABC PROCEDURES.ALL INSTRUMENTS SHALL CONFORM TO AABC REQUIREMENTS, WITH AABC FORMS UTILIZED TO RECORD DATA. CERTIFIED TESTING AND BALANCING REPORT SHALL MEET ALL AABC REQUIREMENTS.

THE CONTRACTOR AND PRIOR BALANCING FIRM SHALL REPORT TO THE SITE AND REVIEW THE WORK REQUIRED PRIOR TO BEGINNING OF THEIR WORK. INSPECTIONS OF THE AIR SYSTEMS SHALL BE MADE BY THE BALANCING FIRM AND THEY SHALL REPORT THEIR FINDINGS TO ENGINEER. ALL TESTS REQUIRED SHALL BE PERFORMED DURING OR AFTER CONSTRUCTION AT NO ADDITIONAL COST TO THE OWNER. REPAIR ALL EXISTING LEAKS PRIOR TO BALANCING.

AFTER THE VARIOUS PARTS OF THE SYSTEM HAVE BEEN TESTED A PRELIMINARY SYSTEM TEST SHALL BE RUN.

DURING ALL TESTS, IT SHALL BE DEMONSTRATED THAT THE SYSTEMS ARE FREE FROM LEAKS AND THAT ALL PARTS OF THE SYSTEM WILL OPERATE CORRECTLY. THE BALANCING FIRM SHALL MAKE FINAL ADJUSTMENTS TO ALL EQUIPMENT AND CONTROLS AS MAY BE REQUIRED TO PROPER OPERATION MAINTAINING CORRECT TEMPERATURES IN ALL PARTS OF THE BUILDING. CONTROLS SHALL BE ADJUSTED BY THE CONTROL CONTRACTOR'S MECHANICS ON THE ADVICE OF THE BALANCING FIRM.

THE BALANCING FOR NEW AND EXISTING AIR CONDITIONING UNITS SHALL INCLUDE THE FOLLOWING WORK:

DETERMINE THE PERFORMANCE OF EACH AIR CONDITIONING UNIT PRIOR TO INSTALLATION OF BELTS, PULLEYS AND MOTOR SHEAVES AND AFTER THE FANS HAVE BEEN ADJUSTED, NOTE THE FOLLOWING READINGS.

FANS: SUCTION PRESSURE, DISCHARGE PRESSURE, MOTOR RPM, FAN RPM,
MOTOR VOLTS AND AMPERES, CFM.

MAKE PITOT TUBE TRAVERSE OF MAIN SUPPLY DUCTS AND OBTAIN DESIGN CFM

TEST AND RECORD SYSTEM STATIC PRESSURE, SUCTION AND DISCHARGE.

TEST AND ADJUST SYSTEM FOR DESIGN AIR CFM.

TEST AND RECORD ENTERING AND LEAVING AIR DRY BULB AND WET BULB.
ADJUST ALL ZONES TO PROPER DESIGN CFM, SUPPLY AND RETURN.

TEST AND ADJUST EACH REGISTER TO WITHIN 10 PERCENT OF DESIGN REQUIREMENTS AND IDENTIFY EACH AS TO LOCATION AND AREA. LIST SIZE AND TYPE OF ALL REGISTERS, FANS, BALANCING DAMPERS AND ALL TESTED EQUIPMENT. MAKE ANY CHANGES IN PULLEYS, MOTOR SHEAVES, BELTS, AND DAMPERS OR THE ADDITION OF DAMPERS REQUIRED FOR CORRECT BALANCE.

PROVIDE SINGLE LINE DUCTWORK DRAWING LOCATING OUTLETS AND AIR HANDLING UNIT COMPONENTS INDICATING CFM OF EACH OUTLET, S.P. OF EACH COMPONENT OF FAN UNITS.

PROVIDE SINGLE LINE DRAWING OF AIR HANDLING UNIT INDICATING PRESSURE DROPS OF COIL, FILTERS, BLENDER SECTION, DAMPERS, ETC. SUPPLY REGISTERS SERVING TELEPHONE EQUIPMENT AREAS – DEFLECTION OF VANES TO BE DIRECTED TO SUPPLY AIR BETWEEN EQUIPMENT AISLES.

SUPPLY REGISTERS SERVING TELEPHONE EQUIPMENT AREAS – DEFLECTION OF VANES TO BE DIRECTED TO SUPPLY AIR BETWEEN EQUIPMENT AISLES

CHECK THE OPERATION OF ALL AUTOMATIC TEMPERATURE CONTROL EQUIPMENT,VERIFY ALL THERMOSTAT, HUMIDISTAT,ETC, SET POINTS AND OPERATIONS

DEMONSTRATION OF OPERATION: AFTER COMPLETION OF THE ADJUSTMENT AND BALANCING, THE SYSTEMS SHALL BE OPERATED FOR A PERIOD OF ONE WEEK DURING WHICH TIME THE SYSTEM SHALL DEMONSTRATE TO OWNER AS BEING COMPLETED AND OPERATING IN CONFORMANCE WITH THE SPECIFICATION.

THE SYSTEM SERVING TELEPHONE EQUIPMENT AREA SHALL BE BALANCED WITH A STATIC PRESSURE OF 0.50 IMPOSED AT THE FILTERS.

INCLUDE A SINGLE LINE DIAGRAM OF THE SUPPLY AND RETURN AIR SYSTEM FOR HE AIR HANDLING UNITS, WHICH INCLUDES ALL SUPPLY REGISTERS, DRUM LOUVERS AND RETURN GRILLES.

THE BALANCING CONTRACTOR SHALL DETERMINE THE FAN SPEED (RPM) AND SHEAVE SIZES REQUIRED TO DELIVER THE MAXIMUM DESIGN AIRFLOW TO ALL OUTLETS AT THE MAXIMUM DESIGN STATIC PRESSURE DROP FOR THE INITIAL AIR QUANTITIES. THE CONTRACTOR SHALL PROVIDE AND INSTALL FIXED SHEAVES, BELTS AND PULLEYS, TO MEET THIS CONDITION. USING THE DAMPERS TO CONTROL THE MAXIMUM DESIGN FLOW IS PROHIBITED. THE FINAL FIXED SHEAVES, BELTS AND PULLEYS FURNISHED FOR THE FANS SHALL BE ENGINEERED TO OPERATE THE FAN SUCH THAT THE FAN WILL NOT OVERLOAD OR EXCESSIVE STATIC PRESSURE WILL NOT BE PERMITTED TO BUILD UP IN THE DUCT SYSTEM.

THE BALANCING FIRM SHALL PLUG ALL HOLES DRILLED IN DUCTS WITH TYPE 5M REMOVABLE CAPS AS MANUFACTURED BY ROBROY INDUSTRIES.

FINAL ADJUSTMENT AND BALANCING SHALL PROVIDE OPTIMUM CONDITIONS IN ALL AREAS. THE TOTAL AIR QUANTITY OF ANY FAN SHALL BE BALANCED WITHIN PLUS OR MINUS 5% OF THE RATED FLOW. AIR QUANTITIES AT EACH OUTLET SHALL BE BALANCED WITHIN PLUS OR MINUS 10% OF RATED FLOW. DURING AND FOLLOWING FINAL ADJUSTMENT, THE CONTRACTOR SHALL REPLACE DRIVE SHEAVES, BELTS AND PULLEYS AND INSTALL VOLUME DAMPERS, TO BALANCE THE SYSTEM SATISFACTORILY. DRIVES AND DAMPERS SHALL BE INCLUDED IN THE CONTRACT AMOUNT.

SUBMIT REPORT ON THE SUPPLY AIR SYSTEM. THIS REPORT SHALL CERTIFY TEST METHODS AND INSTRUMENTS USED, ALL READINGS OBTAINED, TEMPERATURE AND PRESSURE DROPS, RPM OF EQUIPMENT, AMPERAGE OF ALL MOTORS, AND QUANTITIES AT EACH SUPPLY REGISTER, DIFFUSER, AND AIR BALANCING PROBLEMS ENCOUNTERED AND SUGGESTIONS. A MINIMUM OF THREE CERTIFIED COPIES OF REPORTS SHALL BE SUBMITTED TO THE ENGINEER AND EACH SHALL INCLUDE DATA ON ALL TEST IN THE FORM NORMALLY USED BY AABC, HOWEVER, VARIED TO SUIT THESE SPECIFICATIONS.

INSTRUCTIONS
A. AFTER ALL TESTS AND ADJUSTMENTS HAVE BEEN MADE, APPROVED FACTORY/AUTHORIZED SYSTEM REPRESENTATIVES AND THE CONTRACTOR SHALL FULLY INSTRUCT THE OWNER IN ALL DETAILS OF OPERATION AND MAINTENANCE OF EQUIPMENT INSTALLED UNDER HIS DESIGNATED CONTRACT. DATES AND TIMES OF SUCH INSTRUCTIONS SHALL BE AS DIRECTED.

OPERATING INSTRUCTIONS
A. THE CONTRACTOR SHALL FURNISH THREE COMPLETE SETS OF OPERATING AND MAINTENANCE INSTRUCTIONS. THIS SHALL INCLUDE FINAL WIRING AND CONTROL DIAGRAMS, CATALOG DATA INCLUDING CONSTRUCTION AND MAINTENANCE INFORMATION ON ALL EQUIPMENT, AND MAINTENANCE INFORMATION ON THE COMPLETE SYSTEM.

WARRANTY
A. CONTRACTOR SHALL SUBMIT UPON COMPLETION OF THE WORK, A SINGLE WARRANTY STATEMENT THAT ALL PORTIONS OF THE WORK UNDER HIS DESIGNATED CONTRACT ARE IN ACCORDANCE WITH CONTRACT REQUIREMENTS, PERFECT AS TO MATERIAL AND WORKMANSHIP, AND WILL SO REMAIN FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE. CONTRACTOR SHALL FURTHER WARRANT THAT DURING THE ONE YEAR SPECIFIED PERIOD HE WILL REPAIR ALL DEFECTIVE WORK AND REPLACE ALL DEFECTIVE MATERIALS FURNISHED OR INSTALLED UNDER THIS DESIGNATED CONTRACT, WITHOUT COST TO THE OWNER.

DIFFUSERS, REGISTERS, AND GRILLES
1.0 GENERAL
1.01 DESCRIPTION
A DRAWINGS COVER THE PROVISIONS OF ALL LABOR, EQUIPMENT, APPLIANCES AND MATERIALS, AND PERFORMING ALL OPERATIONS IN CONNECTION WITH THE CONSTRUCTION AND INSTALLATION OF AIR DISTRIBUTION DEVICES AS SPECIFIED HEREIN AND AS SHOWN. THESE UNITS INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING:
1. CEILING DIFFUSERS (CD)
2. RETURN AIR GRILLES (RG)
3. SUPPLY AIR GRILLES (SG)
4. EXHAUST AIR GRILLE (EG)

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

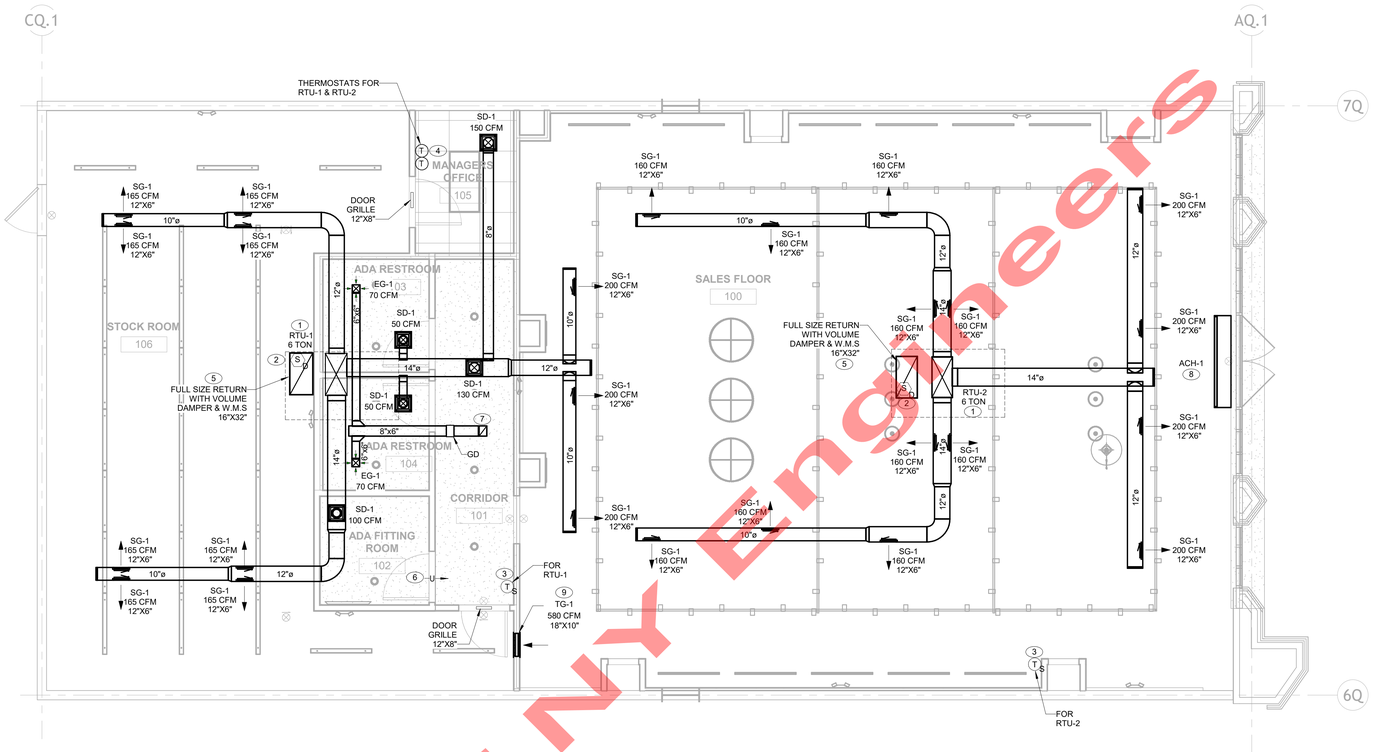
1.03 SELECTION CRITERIA
A. ALL AIR DISTRIBUTION DEVICES SHALL BE SELECTED IN ACCORDANCE WITH THE FOLLOWING MINIMUM CRITERIA UNLESS OTHERWISE NOTED BELOW OR ON THE DRAWINGS:

1. METHOD OF MOUNTING SHALL BE COMPATIBLE WITH THE CEILING, WALL OR DUCT SURFACE WHICH IT MOUNTS ON OR IN; I.E. LAY-IN, SURFACE MOUNTING, PLASTER FRAME, DUCT COLLAR, ETC. THE ARCHITECTURAL DRAWINGS SHALL BE REFERENCED TO DETERMINE THE MOUNTING METHOD FOR EACH DEVICE. ALL FLANGES ON SURFACE MOUNTED DEVICES SHALL BE PROVIDED WITH A GASKET.
2. FINISH OF ALL CEILING MOUNTED DEVICES SHALL BE SELECTED TO MATCH THE COLOR OF THE ADJACENT CEILING. FINISH OF ALL WALL MOUNTED DEVICES SHALL BE PRIMER WHICH IS COMPATIBLE WITH THE FINISH COATING SPECIFIED FOR THE ADJACENT WALL; FINISH COAT WILL BE APPLIED UNDER DIVISION 9.

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

PROJECT LOCATION:
TECOVAS

M-002



MECHANICAL FLOOR PLAN 1/4" = 1'-0" A

1. EXACT LOCATION OF ALL AIR DISTRIBUTION DEVICES SHALL BE COORDINATED WITH THE ARCHITECTURAL RCP & LIGHTING LAYOUT.
2. IF PLENUM IS USED FOR RETURN AIR, MATERIALS EXPOSED WITHIN PLENUMS SHALL BE NONCOMBUSTIBLE OR SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE-DEVELOPED INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E 84 OR OTHER APPROPRIATE STANDARDS.
3. COORDINATE THE EXACT LOCATION OF ALL REMOTE SENSORS WITH FINAL FURNITURE LAYOUT, EQUIPMENT LAYOUT, ARCH AND OWNER'S REPRESENTATIVE. PROVIDE ALL MANUFACTURER AND NEC REQUIRED CLEARANCE FOR ALL EQUIPMENT.
4. COORDINATE THE EXACT LOCATION OF ALL THERMOSTATS WITH FINAL FURNITURE LAYOUT, EQUIPMENT LAYOUT, ARCH AND OWNER'S REPRESENTATIVE. PROVIDE ALL MANUFACTURER AND NEC REQUIRED CLEARANCE FOR ALL EQUIPMENT.
5. ENSURE ALL NEW BUILDING VENTS ARE FITTED WITH ANIMAL SCREENS EXCEPT OTHERWISE NOTED.
6. CONTRACTOR SHALL BALANCE EACH DEVICE WITH THE CFM SHOWN ON PLAN.
7. NEW DUCTWORK SHOWN ON PLAN ARE SCHEMATIC ONLY. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES FOR PIPING AND DUCTWORK ROUTING. OFFSET AND RUN PIPING, DUCTWORK INSIDE THE STRUCTURE IF REQUIRED. PROVIDE ANY EXTRA PIPING, DUCTWORK, FITTINGS, INSULATIONS AND OTHER ACCESSORIES IN ORDER TO COMPLETE THE INSTALLATION.
8. COORDINATE LOCATIONS AND SIZES OF ROOF OPENINGS WITH OWNER AND STRUCTURAL ENGINEERS.
9. EQUIPMENT SIZES, DIMENSIONS AND REQUIRED CONNECTIONS SHALL BE VERIFIED WITH THE ACTUAL EQUIPMENT SELECTED VENDOR DRAWINGS BEFORE FABRICATION OF DUCTWORK, PIPING ETC.
10. DUCT SIZES SHOWN ON PLANS ARE CLEAR INSIDE AIR STREAM DIMENSIONS.
11. CONTRACTOR SHALL COORDINATE ALL ELECTRICAL REQUIREMENTS FOR ALL HVAC BASED ON ACTUAL EQUIPMENT SELECTED PRIOR TO INSTALLATION.
12. CONTRACTOR SHALL COORDINATE EQUIPMENT WEIGHTS AND SUPPORTS BASED ON ACTUAL EQUIPMENT SELECTED.
13. MOUNT DUCTWORK AS HIGH AS POSSIBLE.
14. TEST AND BALANCE AIR SYSTEMS. PROVIDE REPORT TO G.C AND OWNER.
15. NEW DUCTWORK IN CONCEALED AREAS MAY BE RECTANGULAR WITH EQUIVALENT CROSS SECTIONAL FLOW AREA.
16. PROVIDE FIRE OR FIRE+SMOKE DAMPER WHEREVER DUCTS ARE CROSSING FIRE/SMOKE RATED WALLS/BARRIERS/ROOF PENETRATIONS. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR FIRE RATINGS OF THE WALLS.
17. PROVIDE R-12 INSULATION (INTERNAL FOR EXPOSED DUCTS AND EXTERNAL FOR CONCEALED DUCTS) FOR SUPPLY & RETURN AIR DUCTS. PROVIDE ACOUSTIC INSULATION ON MAIN SUPPLY AND RETURN DUCTS UP TO 10 FT. FROM HVAC UNIT.
18. PROVIDE CABLE OPERATED DAMPER IN INACCESSIBLE CEILINGS.

GENERAL NOTES NTS C

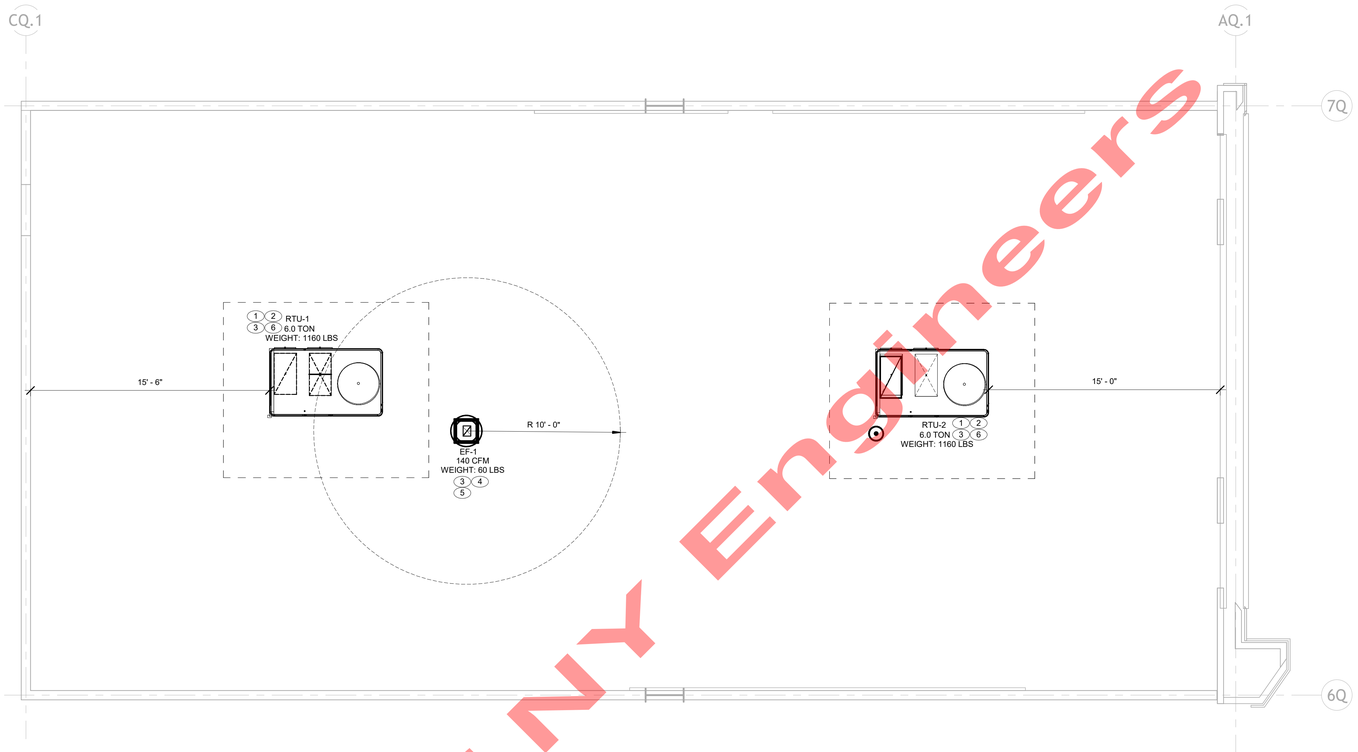
1. EXTEND FULL SIZE SUPPLY & RETURN DUCTWORK FROM HVAC EQUIPMENT AS SHOWN. ACOUSTICALLY LINE THE FIRST 10-0" OF BOTH SUPPLY AND RETURN MAIN DUCTS. CONTRACTOR TO FIELD VERIFY FIRE RATING OF ROOF. PROVIDE FIRE DAMPER AT ROOF PENETRATION AS/IF REQUIRED BY LOCAL CODES.
2. PROVIDE NEW SMOKE DETECTOR (IN SUPPLY AIR DUCT) & IT SHALL BE FURNISHED/INSTALLED BY MECHANICAL CONTRACTOR AND WIRED BY ELECTRICAL CONTRACTOR TO SHUT DOWN CORRESPONDING RTURTU UNDER ALARM CONDITIONS.. ALL WIRING SHALL BE IN CONDUIT PER NEC SMOKE DETECTOR SHALL BE SYSTEM SENSOR MODEL DH100ACDCLP OR EQUAL.
3. PROVIDE NEW REMOTE WALL MOUNTED TEMPERATURE SENSOR/HUMIDITY SENSOR IN THE SALES AREA AS SHOWN ON PLAN AND WIRE BACK TO T-STAT. COORDINATE WITH ARCHITECT/OWNER FOR FINAL LOCATION.
4. PROVIDE NEW 7-DAY PROGRAMMABLE THERMOSTAT . LOCATE THERMOSTAT 4' ABOVE FINISHED FLOOR.COORDINATE EXACT LOCATION WITH ARCHITECT AND OWNER PRIOR TO ROUGH-IN. PROVIDE LOCKABLE COVER.
5. FULL SIZE RETURN AIR DUCT WITH WIRE MESH SCREEN.
6. PROVIDE 1" DOOR UNDERCUT FOR AIR TRANSFER AS SHOWN ON THE PLAN.
7. ROUTE 8"X6" EXHAUST DUCT UP TO THE ROOF & CONNECT TO ROOF MOUNTED EXHAUST FAN EF-1. CONTRACTOR TO FIELD VERIFY FIRE RATING OF ROOF. PROVIDE FIRE DAMPER AT ROOF PENETRATION AS/IF REQUIRED BY LOCAL CODES.
8. CONTRACTOR TO INSTALL NEW AIR CURTAIN AS PER MANUFACTURER SPECIFICATIONS.
9. PROVIDE TWO 18"X10" TRANSFER GRILLES TG-1, ONE ON EACH SIDE OF WALL.

MECHANICAL KEY NOTES - FLOOR PLAN NTS B

PROJECT LOCATION:
TECOVAS

M-100

Property of NY Engineers



Property of NY Engineers

MECHANICAL ROOF PLAN 1/4" = 1'-0" A

GENERAL NOTES NTS C

1. COORDINATE LOCATIONS AND SIZES OF ROOF OPENINGS WITH STRUCTURE ENGINEER..
2. EQUIPMENT SIZES, DIMENSIONS AND REQUIRED CONNECTIONS SHALL BE VERIFIED WITH THE ACTUAL EQUIPMENT SELECTED VENDOR DRAWINGS BEFORE FABRICATION OF DUCTWORK, PIPING ETC.
3. CONTRACTOR SHALL COORDINATE ALL ELECTRICAL REQUIREMENTS FOR ALL HVAC BASED ON ACTUAL EQUIPMENT SELECTED PRIOR TO INSTALLATION.
4. ALL SOURCE OF MECHANICAL INTAKE SHALL MAINTAIN 10 LINEAR FEET SEPARATION BETWEEN ANY SOURCE OF EXHAUST. CONTRACTOR IS RESPONSIBLE TO ADJUST DUCT LENGTH AS NEEDED.

MECHANICAL KEY NOTES - FLOOR PLAN NTS B

(1) EXTEND FULL SIZE SUPPLY AND RETURN DUCTWORK FROM ALL NEW RTU'S TO SPACE. EXTEND AS SHOWN.PROVIDE FLEXIBLE CONNECTORS ON SUPPLY AND RETURN DUCT CONNECTIONS. SET OUTSIDE AIR AS INDICATED ON ROOFTOP UNIT SCHEDULES.

(2) ROUTE CONDENSATE DRAIN FROM RTU ON THE ROOF AND TERMINATE THE DRAIN ON THE NEAREST APPROVED PLACE OF DISPOSAL. PROVIDE HORIZONTAL SLOPE IN THE DIRECTION OF DISCHARGE OF NOT LESS THAN ONE-EIGHTH UNIT VERTICAL IN 12 UNIT HORIZONTAL. CONDENSATE SHALL NOT DISCHARGE INTO STREET, ALLEY OR OTHER AREAS SO AS TO CAUSE A NUISANCE.

(3) COORDINATE FINAL LOCATION OF EQUIPMENT WITH STRUCTURAL DRAWINGS.

(4) PROVIDE NEW EXHAUST FAN EF-1 WITH GRAVITY DAMPER. ENSURE TERMINATION OF THE EXHAUST AIR IS MINIMUM 10' AWAY FROM ANY FRESH AIR INTAKE

(5) ALL EXHAUST AIR TERMINATION SHALL NOT LESS THAN 3 FEET (914 MM) FROM PROPERTY LINES, 3 FEET (914 MM) FROM OPERABLE OPENINGS INTO BUILDINGS FOR ALL OCCUPANCIES OTHER THAN GROUP U, AND 10 FEET (3048 MM) FROM MECHANICAL AIR INTAKES.

(6) PROVIDE CLEARANCE AROUND RTUS AS PER MANUFACTURER'S RECOMMENDATIONS.

PROJECT LOCATION:
TECOVAS

M-101

NEW GAS FIRED PACKAGED ROOF TOP UNIT SCHEDULE

UNIT ID	MANUFACTURER	MODEL	NOMINAL TONS	SUPPLY FAN DATA			HEATING				COOLING DATA				ELECTRICAL DATA					EER	SEER/IEER	OPERATING WEIGHT (LBS)
				TOTAL	OUTSIDE AIR	EXTERNAL STATIC PRESSURE (IN. W.G.)	TYPE	INPUT	OUTPUT	EFFICIENCY	TOTAL	SENSIBLE	AMBIENT TEMP.	ENTERING TEMP.	VOLTS	PHASE	Hz	MCA(A)	MOCP(A)			
				CFM	CFM			MBH	MBH	%	MBH	MBH	DB (°F)	DB / WB(°F)								
RTU-1	TRANE	YSK072A3S0M	6	2400	290	1.2	MEDIUM GAS HEAT	106.49	86.26	81	75.19	63.15	98.7	78/63	460	3	60	20	25	11	-/14.6	1160
RTU-2	TRANE	YSK072A3S0M	6	2400	390	1.2	MEDIUM GAS HEAT	106.49	86.26	81	75.19	63.15	98.7	78/63	460	3	60	20	25	11	-/14.6	1160

NOTES:

1. ALL EQUIPMENT MUST BE HIGH EFFICIENCY, MEETING OR EXCEEDING THE ENERGY CODE MINIMUM REQUIREMENTS.
2. ELECTRICAL CONNECTION TO BE SINGLE POINT AND TO BE THROUGH THE BOTTOM OF THE UNIT.
3. PROVIDE DISCONNECT SWITCH AND AN UNPOWERED GFCI RECEPTACLE.
4. PROVIDE AND INSTALL NEW 14" ROOF CURB. CONTRACTOR SHALL FIELD INSULATE CURB. CURB TO BE SHIPPED AS SOON AS POSSIBLE, AHEAD OF THE UNIT.
5. CONDENSATE DRAIN WITH 2" DEEP VENTED TRAP TO DISCHARGE AT APPROVED PLACE OF DISPOSAL.
6. CABINET WITH 1/2" FIBERGLASS INSULATION.
7. UNIT SHALL BE COMPLETE WITH GAS HEATING SECTION. GAS REGULATOR TO RECEIVE (4.5-14)"W.C. GAS PRESSURE FROM MAIN.
8. ENTHALPY ECONOMIZER WITH BAROMETRIC RELIEF. PROVIDE FDD.
9. PROVIDE 8-WIRE, 24 VAC, AUTOMATIC CHANGEOVER, 2-STAGE HEAT / COOL, REMOTELY PROGRAMMABLE THERMOSTAT.
10. REMOTE SENSORS SHALL BE PROVIDED IN SPACE & WIRED BACK TO PROGRAMMABLE, 24 HOUR, 7 DAY, THERMOSTATS.
11. ANTI SHORT CYCLE TIMER.
12. THROWAWAY 2" FILTERS (MERV 8).
13. PROVIDE ALL COMPRESSORS WITH 5 YEAR WARRANTY.
14. RETURN AIR DUCT SMOKE DETECTOR.
15. VFD SUPPLY FAN.
16. PROVIDE THE RTU WITH R-454B REFRIGERANT.
17. PROVIDE WITH MOTORIZED DAMPER AND OUTSIDE AIR INTAKE HOOD.
18. PROVIDE HOT GAS REHEAT WITH ASSOCIATED CONTROLS AND SENSORS FOR DEHUMIDIFICATION CONTROL.

VENTILATION CALCULATION SCHEDULE

ROOM NAME	AREA	NUMBER OF PEOPLE/1000sq.ft AS PER 2018 IMC	NUMBER OF PEOPLE 2018 IMC	NUMBER OF PEOPLE	FINAL NUMBER OF PEOPLE	CFM AS PER 2018 IMC		CALCULATED OA CFM	REQUIRED OA WITH 0.8 EFFECTIVENESS	PROVIDED OA CFM	TOILET EXHAUST CFM
						CFM/PERSON	CFM/SQ.FT				
SALES AREA	1750	15	27	-	27	7.5	0.12	413	516	520	-
STOCK ROOM	784	0	0	-	0	0	0.12	94	118	120	-
MANAGERS OFFICE	60	5	1	-	2	5	0.06	14	17	20	-
FITTING ROOM	50	5	1	-	1	5	0.06	8	10	10	-
CORRIDOR	115	0	0	-	0	0	0.06	7	9	10	-
RESTROOM-1	50	-	-	-	-	-	-	-	-	-	70
RESTROOM-2	50	-	-	-	-	-	-	-	-	-	70
GRAND TOTAL	**2859**	-	-	-	**30**	-	-	-	-	**680**	**140**

AIR CURTAIN SCHEDULE

UNIT ID	MANUFACTURER	MODEL	LENGTH (IN.)	CFM	AVG VEL.FPM	HEATING MODE	KW	MOTOR (HP)	NO. OF MOTORS	ELECTRICAL		WEIGHT LBS
										V/PH/HZ	AMPS	
ACH-1	BERNER	CLC08-1072E	72	2010	1707	ELECTRIC	11.2	1/5	1	460/3/60	14.4	80

NOTES / ACCESSORIES:

1) PROVIDE MANUFACTURER RECOMMENDED ACCESSORIES.
2) COORDINATE WITH ELECTRICAL CONTRACTOR FOR POWER REQUIREMENT.
3) COORDINATE COLOR CODE WITH CLIENT/ARCHITECT.
4) CONTRACTOR SHALL COORDINATE WITH ARCHITECT/OWNER FOR PROPER INTEGRATION OF AIR CURTAIN WITH DOOR SENSORS OR OTHER CONTROL MECHANISMS. CONTROL SHALL BE PROVIDED TO OPERATE THE AIR CURTAIN IN SYNCHRONIZATION WITH THE OPENING AND CLOSING OF THE DOOR.

AIR TERMINAL DEVICE SCHEDULE

TAG	MANUFACTURER	MODEL	TYPE	CFM RANGE	NECK SIZE(IN.)	FRAME SIZE
SD-1	TITUS	OMNI	SQUARE CEILING SUPPLY DIFFUSER	0-100	6"	12"X12"
				101-200	8"	12"X12"
SG-1		S300FL	SPIRAL DUCT MOUNTED SUPPLY AIR GRILLE	SEE PLAN	SEE PLAN	-
RG-1		350FL	RETURN AIR GRILLE CEILING MOUNTED	SEE PLAN	SEE PLAN	SEE PLAN
EG-1		350FL	EXHAUST AIR GRILLE CEILING MOUNTED	0-100	6"X6"	6"X6"

NOTES:

1) ALL DIFFUSERS : CONTRACTOR SHALL COORDINATE WITH LATEST ARCHITECTURAL REFLECTED CEILING PLANS TO ENSURE PROPER AIR DEVICE BORDER SELECTION.
2) REFER ARCHITECTURAL DRAWINGS FOR CEILING TYPE.
3) COORDINATE COLOR/FINISH WITH ARCHITECT.
4) NOISE CRITERIA: <25 dBA
5) PROVIDE VOLUME CONTROL DAMPER AS ACCESSARY FOR ALL AIR TERMINAL FOR AIR BALANCING. PROVIDE CABLE OPERATED DAMPERS IN INACCESIBLE CEILINGS.

FAN SCHEDULE

TAG	MANUFACTURER	MODEL	FAN PERFORMANCE				MOTOR DATA						WEIGHT LBS	INTERLOCK
			CFM	ESP	FAN RPM	FLA	MCA	MOP	VOLTS	PHASE	HZ			
EF-1	GREENHECK	G-097-VG	140	0.75	1468	3.8	4.8	15	115	1	60		60	TIME CLOCK

NOTES:

1) PROVIDE FACTORY MOUNTED AND INSTALLED DISCONNECT.
2) PROVIDE CURB FOR ROOF MOUNTED FAN.
3) COORDINATE EXACT POWER REQUIREMENT WITH ELECTRICAL CONTRACTOR.
4) PROVIDE FAN WITH A BACKDRAFT DAMPER, AND SPEED CONTROLLER FOR BALANCING PURPOSE.
5) PROVIDE MOTOR STARTERS & DISCONNECTS NEMA 1R FOR EF-1. ALL EQUIPMENT NORMAL POWER WIRING BY ELECTRICAL CONTRACTOR.

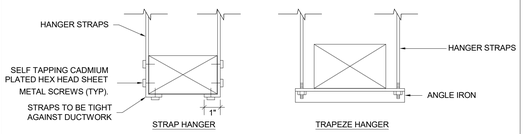
BUILDING AIR BALANCE

UNIT TAG	SUPPLY AIR	OUTSIDE AIR	RETURN AIR	EXHAUST AIR
RTU-1	2400	290	2110	-
RTU-2	2400	390	2010	-
EF-1	-	-	-	140 CFM
TOTAL:	4800 CFM	680 CFM	4120 CFM	140 CFM
BUILDING PRESSURE:		-	540 CFM	POSITIVE

Property of KMK Engineers

PROJECT LOCATION:
TECOVAS

M-300



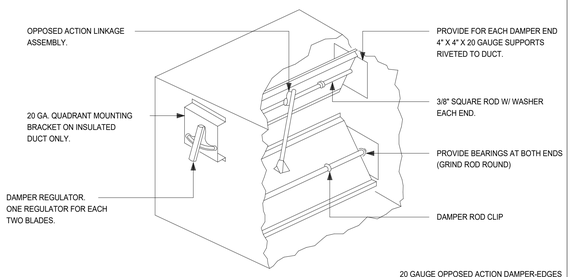
NOTE:
NO POP RIVETS ALLOWED, USE SELF-TAPPING SHEETMETAL SCREWS ONLY.

HANGER SIZES*

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

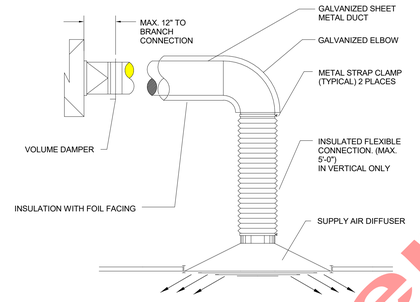
* FOR RECTANGULAR DUCTS

1 M-400 N.T.S — DUCT HANGING DETAILS

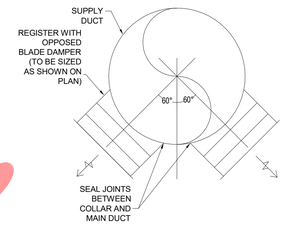


NOTE : 1. FOR DUCTS OVER 29" WIDE AND/OR OVER 12" HIGH.

2 M-400 N.T.S — LOW PRESSURE BALANCING DAMPER



3 M-400 N.T.S — DIFFUSER DETAILS



4 M-400 N.T.S — DUCT MOUNTED DIFFUSER GRILLES

NOTES:
DUCTS TO BE ACOUSTICALLY LINED SHALL BE DESIGNATED BY THE SYMBOL IN FIG. "C" TO THE EXTENT OF LINING. THICKNESS SHALL BE AS SPECIFIED.
DUCTS LINED WITH ACOUSTICAL MATERIAL SHOULD BE FASTENED WITH CLIPS, ADHESIVE, OR PINS

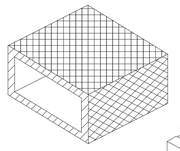
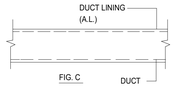


FIG. A



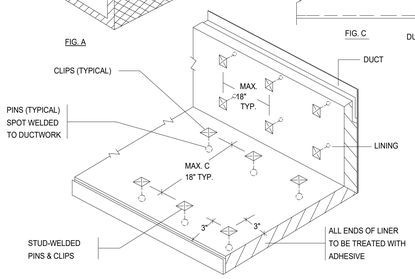
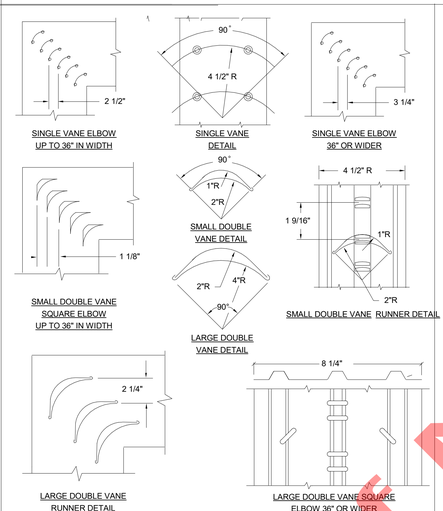
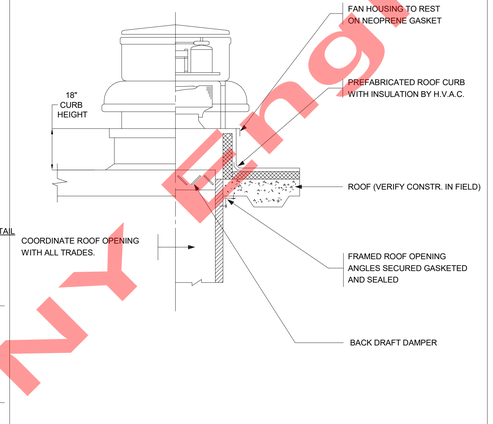


FIG. B

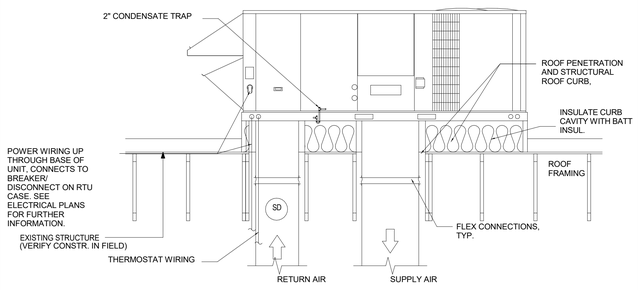
5 M-400 N.T.S — ACOUSTICAL TREATMENT DUCT LINING



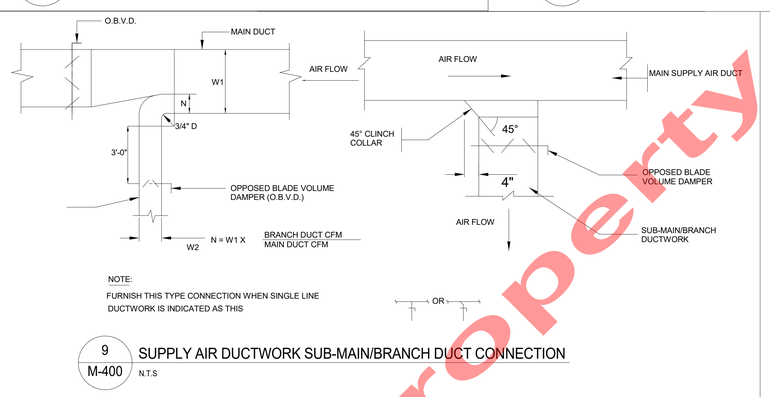
6 M-400 N.T.S — LOW VELOCITY DUCTWORK ELBOWS



7 M-400 N.T.S — ROOF EXHAUST FAN DETAIL



10 M-400 N.T.S — RTU UNIT INSTALLATION DETAIL



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

9 M-400 N.T.S — SUPPLY AIR DUCTWORK SUB-MAIN/BRANCH DUCT CONNECTION

Property of NY Engineers

PROJECT LOCATION:
TECOVAS

M-400

ELECTRICAL SYMBOLS LIST

LIGHTING

	LIGHTING FIXTURE, HALF SHADED FIXTURE OR "NL" INDICATES NIGHT LIGHT FIXTURES, U.O.N.
A 2 a	LUMINAIRE TYPE : INDICATE BY UPPERCASE LETTER SEE LIGHTING FIXTURE SCHEDULE. CIRCUIT NUMBER : INDICATED BY NUMBER SWITCHING INDICATED BY LOWER CASE LETTERS.
EM	DENOTES LUMINAIRE ON EMERGENCY CIRCUIT.
NL	DENOTES FIXTURES DESIGNATED AS NIGHTLIGHT, WIRED TO 24 HOURS UNSWITCHED CIRCUIT.
	CEILING/WALL MOUNTED EXIT SIGN WITH DIRECTIONAL ARROWS AS INDICATED. SHADED AREA DENOTES FACE(S).
	EMERGENCY BATTERY UNIT

SWITCHES AND CONTROLS

$_{3}^{D}$	THREE WAY DIMMER SWITCH
VS	CEILING MOUNTED VACANCY SENSOR
OS	CEILING MOUNTED OCCUPANCY SENSOR
$_{VS}$	WALL MOUNTED VACANCY SENSOR SWITCH, WATTSTOPPER CS-50PIR SERIES
TC	TIME CLOCK
PC	WALL MOUNTED PHOTOCELL IN NEMA 3R ENCLOSURE.
C	LIGHTING CONTACTOR
$_{OSW}$	WALL MOUNTED OCCUPANCY SENSOR
$	MANUAL SWITCH, SMALL LETTER SHOWS LIGHTING FIXTURES CONTROLLED

WIRING SYSTEMS

3 UP-	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF 1#12 ∅, 1#12 N. & 1#12 G. IN 3/4"C, UNLESS OTHERWISE NOTED.
3, 5 UP-	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF 2#12 ∅, 1#12 N. & 1#12 G. IN 3/4"C, UNLESS OTHERWISE NOTED.
3, 5, 7 UP-	POWER OR LIGHTING CIRCUITRY HOMERUN WITH PANELBOARD DESIGNATION, NUMBER WHERE USED INDICATES CIRCUIT NUMBER. IT SHALL CONSISTS OF 3#12 ∅, 1#12 N. & 1#12 G. IN 3/4"C, UNLESS OTHERWISE NOTED.
	CONDUIT TURNING UP, SEE FLOOR PLANS FOR CONDITIONS.
	CONDUIT TURNING DOWN, SEE FLOOR PLANS FOR CONDITION.
	CONDUIT AND WIRE TO BUILDING GROUND.
	EXISTING
	NEW

*NOT ALL LEGENDS USED IN THIS PROJECT

POWER AND TELECOMMUNICATION

JB	JUNCTION BOX WITH BLANK COVER PLATE
	SIMPLEX RECEPTACLE, +18" AFF OR AS NOTED.
	DUPLEX RECEPTACLE
GFCI	DUPLEX GFI RECEPTACLE
	SPECIAL PURPOSE RECEPTACLE
	DUPLEX CEILING MOUNTED RECEPTACLE
	DUPLEX FLOOR MOUNTED RECEPTACLE,
	QUAD RECEPTACLE
	TELEPHONE/DATA OUTLET
	DATA OUTLET
	CONTROLLED RECEPTACLE
	DEDICATED RECEPTACLE
J	CEILING MOUNTED JUNCTION BOX
S	SPEAKER
	SECURITY CAMERA (FIXED)
W	WIRELESS ACCESS POINT
E	EQUIPMENT RACK

MOTORS AND CONTROLS

M Su	AC INDOOR UNIT MOTOR AS NOTED WITH LIQUID TIGHT FLEXIBLE CONNECTION WITH JUNCTION BOX AND MOTOR RATED TOGGLE SWITCH
Su	MOTOR RATED TOGGLE SWITCH
	NON FUSED DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH

ANNOTATION

+24"	INDICATES MOUNTING HEIGHT, CENTER LINE TO FINISHED FLOOR.
0	KEYED NOTE REFERENCE
1 E200	DETAIL REFERENCE: DETAIL NUMBER INDICATED ON TOP; DRAWING NUMBER INDICATED ON BOTTOM

POWER DISTRIBUTION

	BRANCH PANELBOARD, SURFACE MOUNTED U.N.O. SIZE AS NOTED.
	TRANSFORMER

ELECTRICAL ABBREVIATIONS

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

ELECTRICAL GENERAL NOTES:

1. EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS AND SITE VISITS AND MAY NOT REFLECT ACTUAL "AS-BUILT" CONDITIONS. VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BID. COORDINATE NEW AND DEMOLITION WORK WITH ALL OTHER TRADES AND EXISTING CONDITIONS.
2. NOTIFY ARCHITECT, ENGINEER AND OWNER, AS APPLICABLE, IF ANY DANGEROUS CONDITIONS EXIST ON JOB SITE BEFORE ANY DEMOLITION OR REMODEL WORK BEGINS.
3. COORDINATE DISCONNECTION OF POWER TO EQUIPMENT BEING DEMOLISHED/REMOVED/RELOCATED WITH TENANT AND OTHER TRADES PRIOR TO START OF WORK. COORDINATE ANY NECESSARY BUILDING/TENANT SPACE POWER OUTAGES WITH THE LANDLORD AND TENANT AND MAKE EVERY ATTEMPT TO SCHEDULE DURING NON-BUSINESS OR OFF-PEAK BUSINESS HOURS TO MINIMIZE DISRUPTION TO BUSINESS OPERATIONS. REQUESTS FOR ELECTRICAL SHUTDOWNS OF THE LANDLORD'S EQUIPMENT SHALL BE BROUGHT IN WRITING TO THE ATTENTION OF THE LANDLORD AT LEAST 7 DAYS IN ADVANCE. SHUTDOWNS SHALL NOT BE PERFORMED WITHOUT WRITTEN APPROVAL FROM THE LANDLORD.
4. ALL ROOF PENETRATIONS, FLOOR CHASING OR CORE DRILLING SHALL REQUIRE THE SPECIFIC APPROVAL OF THE LANDLORD AND OWNER. ALL WORK IN COMMON AREAS, SHAFTS OR OTHER OWNER SPACES MUST BE SPECIFICALLY REVIEWED AND APPROVED BY THE LANDLORD PRIOR TO ANY WORK BEING PERFORMED. MINIMIZE DISTURBANCE TO OTHER BUILDING TENANTS.
5. FOR AREAS AND EQUIPMENT WITHIN THE SCOPE OF THIS REMODEL: EXISTING ELECTRICAL EQUIPMENT AND CIRCUITRY MAY BE REUSED IF IN GOOD CONDITION AND NEW DESIGN REQUIREMENTS CAN BE MET; OTHERWISE REPLACE.
6. FOR AREAS AND EQUIPMENT WITHIN THE SCOPE OF THIS REMODEL: REPAIR OR REPLACE ANY EXISTING DAMAGED OR RECALLED ELECTRICAL EQUIPMENT, LIGHT FIXTURES, WIRING DEVICES AND RELATED CIRCUITRY AND RESTORE ALL ELECTRICAL SYSTEMS TO PROPER WORKING ORDER. THE FINAL ELECTRICAL INSTALLATION SHALL BE FREE FROM ELECTRICAL DEFECTS TO THE SATISFACTION OF THE AHJ, OWNER, ARCHITECT AND ENGINEER.
7. FOR AREAS AND EQUIPMENT WITHIN THE SCOPE OF THIS REMODEL: ELECTRICAL EQUIPMENT SHALL BE LOCATED SO THAT THE CODE REQUIRED MINIMUM WORKING CLEARANCE AND DEDICATED ELECTRICAL SPACE ARE MAINTAINED. EXISTING EQUIPMENT NOT MEETING CURRENT CODE CLEARANCE REQUIREMENTS MAY REMAIN IF ALLOWED TO REMAIN BY THE AHJ, ENGINEER AND OWNER.

ELECTRICAL SUPPLEMENTAL SPECIFICATIONS:

1. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS. AS APPLICABLE, REVIEW THE LANDLORD CRITERIA, GENERAL NOTES, OTHER TRADE DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT AND ENGINEER OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO SUBMITTING BID.
2. ALL WORK SHALL CONFORM TO ALL LOCAL CODES AND ORDINANCES AS WELL AS APPLICABLE INDUSTRY STANDARDS. ALL EQUIPMENT SHALL BEAR LABELS FOR THE USE INTENDED BY AN AHJ ACCEPTED NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL), SUCH AS UL OR ETL. THE FINAL ELECTRICAL INSTALLATION OF THE FACILITY OCCUPIED BY OWNER SHALL BE FREE FROM ELECTRICAL DEFECTS TO THE SATISFACTION OF THE AHJ, OWNER, ARCHITECT AND ENGINEER.
3. COORDINATE FINAL LOCATION AND INSTALLATION REQUIREMENTS OF ALL LIGHT FIXTURES, ELECTRICAL EQUIPMENT AND ELECTRICAL DEVICES WITH ARCHITECTURAL DRAWINGS, EXISTING CONDITIONS AND OTHER TRADES PRIOR TO ROUGH-IN. PROVIDE ALL NECESSARY DEVICES, CORDS, PLUGS, DISCONNECTS AND FINAL CONNECTIONS TO ELECTRICAL EQUIPMENT FOR PROPER OPERATION IN ACCORDANCE WITH CODE, OWNER AND MANUFACTURER REQUIREMENTS.
4. ELECTRICAL DRAWINGS ARE DIAGRAMMATIC/SCHEMATIC IN NATURE AND REPRESENT THE GENERAL SCOPE OF WORK. IT IS NOT WITHIN THE SCOPE OF THE ELECTRICAL DRAWINGS TO SHOW ALL NECESSARY RACEWAY ROUTING, BENDS, OFFSETS, PULL BOXES AND OBSTRUCTIONS. CONTRACTOR SHALL COORDINATE THE FINAL LOCATION OF EQUIPMENT AND WIRING DEVICES WITH OTHER TRADES PRIOR TO INSTALLATION AND INSTALL ALL WORK TO CONFORM TO THE OWNER REQUIREMENTS.
5. ALL CONDUCTOR AND CONDUIT LENGTHS SHOWN IN THESE DESIGN DOCUMENTS ARE INTENDED SOLELY FOR USE IN THE DESIGN CALCULATIONS BY THE DESIGN PROFESSIONAL, UNLESS NOTED OTHERWISE. LENGTHS SHOWN SHALL NOT BE USED TO ASSIST IN THE BIDDING TAKEOFF PROCESS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE MATERIAL QUANTITIES REQUIRED TO BID AND CONSTRUCT THE COMPLETE PROJECT.
6. COORDINATE LOCATION AND ELECTRICAL REQUIREMENTS FOR ALL DISCONNECT SWITCHES, RECEPTACLES AND CONNECTIONS TO FIRE PROTECTION / HVAC / PLUMBING / REFRIGERATION AND OTHER EQUIPMENT WITH OTHER TRADES PRIOR TO ROUGH-IN. WHERE EQUIPMENT OR WALL MOUNTING IS NOT POSSIBLE, PROVIDE CHANNEL-STRUT (UNISTRUT) SECURED TO STRUCTURE ADJACENT TO EQUIPMENT AS NEEDED. ENSURE ALL CODE REQUIRED CLEARANCES AND ACCESS FOR EQUIPMENT AND DISCONNECTS ARE MAINTAINED. CONFIRM FINAL OVER-CURRENT PROTECTION DEVICE RATINGS WITH OTHER TRADES AND EQUIPMENT NAMEPLATE AND ADJUST ELECTRICAL PROVISIONS AS NEEDED.
7. PROVIDE PROPER FIRE PROOFING AND SEALANT FOR PENETRATIONS THROUGH FIRE RATED ASSEMBLIES. THE FIRE STOPPING METHOD, MATERIAL AND ITS APPLICATION SHALL BE NRTL LISTED, CODE COMPLIANT AND APPROVED BY AHJ.
8. ALL APPLICABLE SWITCHES, RECEPTACLES, OUTLETS, AND CONTROLS SHALL BE PLACED AT HEIGHTS THAT ARE IN ACCORDANCE WITH ADA ACCESSIBILITY GUIDELINES.
9. WIRING DEVICES ADJACENT TO EACH OTHER SHALL BE INSTALLED UNDER A SINGLE COVER PLATE, UNO.
10. ALL WP OUTLET BOX HOODS SHALL BE "EXTRA-DUTY" AND "WHILE-IN-USE COVER" TYPE. OUTLET BOX HOODS SHALL BE LOW PROFILE WHEREVER PRACTICABLE, UNLESS NOTED OTHERWISE. THE USE OF LARGE BUBBLE COVERS SHALL BE AVOIDED ON THE EXTERIOR OF THE BUILDING OR BEHIND EQUIPMENT IN ORDER TO PREVENT DAMAGE TO THE COVER AND TO ALLOW THE EQUIPMENT TO BE LOCATED CLOSE TO THE WALL.
11. ALL RECEPTACLES AND APPLIANCES SHALL BE GFCI PROTECTED IN LOCATIONS REQUIRED BY CODE; THIS INCLUDES BATHROOMS, KITCHENS/FOOD PREP AREAS, EXTERIOR LOCATIONS AND RECEPTACLES WITHIN 6 FEET OF A SINK. GFCI DEVICES SHALL BE READILY ACCESSIBLE AND SHALL NOT BE LOCATED BEHIND OBSTACLES. LABEL WIRING DEVICES PROTECTED BY AN UPSTREAM GFCI DEVICE.
12. PROVIDE TAMPER-RESISTANT (TR) TYPE RECEPTACLES AT ALL CODE REQUIRED LOCATIONS AND AT LOCATIONS WHERE RECEPTACLES ARE MOUNTED LESS THAN 5'-6" AFF AND ARE EASILY ACCESSIBLE BY CHILDREN, UNLESS NOTED OTHERWISE.
13. FLEXIBLE CONDUIT IS ONLY PERMITTED WHERE SPECIFICALLY ALLOWED IN THE CONSTRUCTION DOCUMENTS, WHERE CONCEALED FROM VIEW OR EXPOSED FINAL CONNECTIONS TO LIGHT FIXTURES AND EQUIPMENT IN LENGTHS OF 6'-0" OR LESS.
14. ALL EMPTY CONDUIT/RACEWAY SHALL BE INSTALLED WITH PULL STRINGS. TERMINATE CONDUITS WITH A NYLON BUSHING.
15. EXPOSED CONDUIT/RACEWAY SHALL BE PAINTED TO MATCH ADJACENT SURFACE, UNLESS NOTED OTHERWISE. COORDINATE REQUIREMENTS WITH ARCHITECT AND OWNER PRIOR TO INSTALLATION.
16. CONDUITS/RACEWAYS AND CABLES SHALL BE CONCEALED FROM VIEW WHEREVER PRACTICABLE, UNLESS NOTED OTHERWISE. DO NOT ROUTE CONDUITS ACROSS SKYLIGHTS, ACCESS PANELS, HATCHED TILES, HVAC DIFFUSERS, OR EQUIPMENT WORKING CLEARANCE SPACE. ROUTE ALL EXPOSED NONFLEXIBLE CONDUITS TIGHT TO STRUCTURE, PARALLEL TO BUILDING LINES AND IN STRUT OR CABLE/PIPE TRAY WHERE PRACTICABLE. INSTALL CONDUITS PLUMB/ LEVEL WHERE EXPOSED TO VIEW. COORDINATE RACEWAY ROUTING AND INSTALLATION WITH OTHER TRADES PRIOR TO ROUGH-IN.
17. WHERE PRACTICABLE, ALL UNDER-FLOOR/UNDER-GROUND CONDUITS/RACEWAY SHALL BE INSTALLED A MINIMUM OF 24" BELOW BOTTOM OF SLAB/PAVING/GRADE, UNLESS NOTED OTHERWISE. NOTE: THE DESIGN INTENT FOR INSTALLING ELECTRICAL CIRCUITRY AT THIS DEPTH IS TO PROTECT THE ELECTRICAL CIRCUITRY FROM DAMAGE DUE TO FUTURE WORK.
18. PROVIDE LABEL AT EACH RECEPTACLE COVER PLATE WITH THE RESPECTIVE "PNLBD-CKT#" DESIGNATION. COORDINATE LABEL REQUIREMENTS WITH THE OWNER PRIOR TO INSTALLATION. REFER TO THE SPECIFICATIONS FOR MORE INFORMATION.
19. MULTIWIRE BRANCH CIRCUITS ARE NOT ALLOWED, UNLESS NOTED OTHERWISE.
20. PROVIDE INSULATED EQUIPMENT GROUNDING CONDUCTOR FOR ALL CIRCUITS, UNLESS NOTED OTHERWISE.

COMMISSIONING / FUNCTIONAL TESTING:

CONTRACTOR'S BID SHALL INCLUDE PROVISIONS TO PROVIDE ALL SERVICES RELATED TO THE CODE REQUIRED BUILDING SYSTEMS COMMISSIONING INCLUDING A COMMISSIONING PLAN, FUNCTIONAL TESTING, AND RELATED DOCUMENTATION, REPORTS AND OWNER TRAINING. THIS INCLUDES RETAINING THE SERVICES OF A 3RD PARTY REGISTERED DESIGN PROFESSIONAL OR APPROVED AGENCY. REFER TO THE LATEST ADOPTED EDITION OF THE APPLICABLE ENERGY CODE FOR MORE INFORMATION. CONTRACTOR SHALL COMPLETE ALL RELATED COMMISSIONING REQUIREMENTS PRIOR TO FINAL INSPECTIONS IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS, CODE AND MANUFACTURER 'S INSTRUCTIONS.

LL GENERAL NOTES:

- TENANT IS REQUIRED TO MAKE A FIELD SURVEY OF THE EXISTING ELECTRICAL SERVICE TO ENSURE THAT THE TOTAL CONNECTED LOAD DOES NOT EXCEED THE ELECTRICAL SERVICE. ANY/ ALL MODIFICATIONS OR UPGRADES NEEDED ARE SUBJECT TO LANDLORD'S PRIOR APPROVAL, AND WILL BE COMPLETED BY TENANT/ TENANT'S CC, AT TENANT'S SOLE EXPENSE.
- EMT (ELECTRIC METALLIC TUBING) SHALL BE USED IN ALL DEMISING WALLS, HOME RUNS, AND BETWEEN J-BOXES AND PULL BOXES. MC CABLE MAY BE USED IN OTHER APPLICATION AS ALLOWED BY THE AUTHORITY HAVING JURISDICTION (AHJ), ALL EXPOSED CONDUIT, RIGID OR MC CABLE, SHALL BE INSTALLED IN TIGHT STRAIGHT LINES, PARALLEL OR IN RIGHT ANGLES TO THE BUILDING STRUCTURE. DO NOT LOOP EXCESS MC CABLE IN CEILING SPACE OR WALL CAVITY.
- ALL FEEDERS SHALL BE COPPER. TYPE AC AND NM (ROMEX) CABLES ARE NOT ACCEPTABLE.
- ALL PANELS SHALL BE UL LABELED WITH BOLT ON TYPE CIRCUIT BREAKERS. PANELS SHALL NOT BE RECESSED IN DEMISING AND SHALL BE MOUNTED ON PLYWOOD BACKER PANELS UNLESS RECESSED INTO A FURRED OUT OR INTERIOR WALL.
- PANEL PHASE LOADS TO BE BALANCED WITHIN 10%,
- ONLY 30 KVA AND SMALLER TRANSFORMERS MAY BE SUSPENDED FROM BUILDING STRUCTURE. ALL OTHER TRANSFORMERS MUST BE FLOOR SUPPORTED. STRUCTURAL SUPPORT DOCUMENTATION SHALL BE REQUIRED TO MEET AUTHORITIES HAVING JURISDICTION (AHJ).
- NOTHING IS PERMITTED TO BE ATTACHED TO, SUSPENDED FROM, OR PENETRATE LANDLORD'S STRUCTURE, FLOOR DECK, OR ROOF DECK. YOU MAY ATTACH, NON-DESTRUCTIVELY, TO OR SUSPEND FROM THE TOP CHORD OF THE JOIST OR THE STRUCTURAL STEEL WHICH EXISTS ABOVE THE TENANT SPACE. WHEN ATTACHING TO LANDLORD'S STRUCTURE, DO NOT DRILL, WELD, SCREW, OR SHOOT INTO STRUCTURE, ALTERNATIVE METHODS OF ATTACHMENT ONLY. NOTHING TO DAMAGE LANDLORD'S BASE BUILDING STRUCTURE. TENANT SHALL PROVIDE SIGNED AND SEALED STRUCTURAL DRAWINGS, BY A STRUCTURAL ENGINEER WITH LEGALLY ACTIVE REGISTRATION AS INDICATED BY ALL JURISDICTIONAL REQUIREMENTS. FOR ALL STRUCTURAL MODIFICATIONS FOR LANDLORD RECORDS.
- 7 DAY, 24 HOUR TIME CLOCK IS REQUIRED TO CONTROL STOREFRONT ENTRY LIGHTS, SHOW WINDOW LIGHTS. SHOW WINDOW RECEPTACLES AND STOREFRONT SIGNAGE. ILLUMINATED STOREFRONT SIGNS MUST REMAIN LIT DURING ALL MALL BUSINESS HOURS.
- ALL EQUIPMENT, DEVICES AND FIXTURES SHALL BE GROUNDED IN COMPLIANCE WITH NEC AND LIL REQUIREMENTS.
- THE RE-USE OF ANY EXISTING CONSTRUCTION, FINISHES, EQUIPMENT, OR ELECTRICAL, PLUMBING OR HVAC SYSTEMS CURRENTLY IN THE SPACE IS CONDITIONAL UPON IT BEING APPROPRIATE FOR RE-USE. ANY EXISTING CONDITION OR EQUIPMENT TO BE RE-USED MUST BE RESTORED TO LIKE NEW CONDITIONS. THE LANDLORD MAKES NO WARRANTY ON THE RE-USE OF ANY EXISTING CONDITION IN THE SPACE.
- SLAB REQUIREMENTS: SLAB ON GRADE: TENANT'S GENERAL CONTRACTOR SHALL ADVISE THE OPERATION TEAM PRIOR TO ANY SLAB MODIFICATIONS OR REMOVAL. TENANT GC SHALL VERIFY THAT WORK SHALL NOT CONFLICT WITH ANY EXISTING STRUCTURAL, UTILITY, OR OTHER UNDER-SLAB CONDITION. (NONDESTRUCTIVE VERIFICATION MAYBE REQUIRED.) ANY DAMAGE OR DOWNTIME CAUSED BY TENANT'S WORK SHALL BE REPAIRED AND REIMBURSED AT TENANT'S EXPENSE. ELEVATED SLABS: TENANT'S GENERAL CONTRACTOR SHALL ADVISE THE OPERATIONS TEAM PRIOR TO ANY SLAB MODIFICATION OR REMOVAL. IF ANY ELEVATED SLAB IS TO BE MODIFIED IN ANYWAY (DRILLED, CORED, OR PENETRATED), TENANT SHALL PROVIDE STAMPED AND CERTIFIED DRAWINGS BY A LICENSED STRUCTURAL ENGINEERED CERTIFIED IN THE LOCAL JURISDICTION. ALL PENETRATIONS SHALL BE CORE BORED ONLY. SAW CUTTING, JACK HAMMERING, AND TRENCHING IS STRICTLY PROHIBITED. ALL PENETRATIONS SHALL BE SLEEVED, SEALED, FIRE STOPPED, AND WATERPROOFED. THE PENETRATION SLEEVE SHALL EXTEND A MINIMUM OF 4" ON EITHER SIDE OF THE SLAB AND BE LABELED WITH THE REQUIRED NFPA RATING. TENANT CC SHALL VERIFY THAT WORK SHALL NOT CONFLICT WITH ANY EXISTING STRUCTURAL, UTILITY, OR OTHER UNDER-SLAB CONDITION. (NONDESTRUCTIVE VERIFICATION MAYBE REQUIRED.) ANY DAMAGE OR DOWNTIME CAUSED BY TENANT'S WORK SHALL BE REPAIRED AND REIMBURSED AT TENANT'S EXPENSE.
- LANDLORD STRONGLY PREFERS USE OF ENERGY STAR PRODUCTS AND/OR EQUIPMENT WHENEVER POSSIBLE DURING TENANT BUILD OUT, WHICH CAN REDUCE ENERGY CONSUMPTION.

PROJECT LOCATION:
TECOVAS

E-001

Property of TNY Engineers

DIVISION 26: GENERAL ELECTRICAL REQUIREMENTS

1. GENERAL INSTRUCTIONS

A. GENERAL REQUIREMENTS

ALL REQUIREMENTS UNDER DIVISION 01 AND THE GENERAL AND SUPPLEMENTARY CONDITIONS OF THESE SPECIFICATIONS APPLY TO THIS SECTION AND DIVISION. WHERE THE REQUIREMENTS OF THIS SECTION AND DIVISION EXCEED THOSE OF DIVISION 01, THIS SECTION AND DIVISION TAKE PRECEDENCE. BECOME THOROUGHLY FAMILIAR WITH ALL ITS CONTENTS AS TO REQUIREMENTS THAT AFFECT THIS DIVISION, SECTION, OR BOTH. WORK REQUIRED UNDER THIS DIVISION INCLUDES ALL MATERIAL, EQUIPMENT, APPLIANCES, TRANSPORTATION, SERVICES, AND LABOR REQUIRED TO COMPLETE THE ENTIRE SYSTEM AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS, OR REASONABLY INFERRED TO BE NECESSARY TO FACILITATE THE FUNCTION OF EACH SYSTEM AS IMPLIED BY THE DESIGN AND THE EQUIPMENT SPECIFIED.

THE SPECIFICATIONS AND DRAWINGS FOR THE PROJECT ARE COMPLEMENTARY, AND ANY PORTION OF WORK DESCRIBED IN ONE SHALL BE PROVIDED AS IF DESCRIBED IN BOTH. IN THE EVENT OF DISCREPANCIES, NOTIFY THE ENGINEER AND REQUEST CLARIFICATION PRIOR TO PROCEEDING WITH THE WORK INVOLVED.

DRAWINGS ARE GRAPHIC REPRESENTATIONS OF THE WORK UPON WHICH THE CONTRACT IS BASED. THEY SHOW THE MATERIALS AND THEIR RELATIONSHIP TO ONE ANOTHER, INCLUDING SIZES, SHAPES, LOCATIONS, AND CONNECTIONS. THEY CONVEY THE SCOPE OF WORK, INDICATING THE INTENDED GENERAL ARRANGEMENT OF THE SYSTEMS WITHOUT SHOWING ALL OF THE EXACT DETAILS AS TO ELEVATIONS, OFFSETS, CONTROL LINES, AND OTHER INSTALLATION REQUIREMENTS. USE THE DRAWINGS AS A GUIDE WHEN LAYING OUT THE WORK AND TO VERIFY THAT MATERIALS AND EQUIPMENT WILL FIT INTO THE DESIGNATED SPACES, AND WHICH WHEN INSTALLED PER MANUFACTURERS' REQUIREMENTS, WILL ENSURE A COMPLETE, COORDINATED, SATISFACTORY, AND PROPERLY OPERATING SYSTEM.

B. DEFINITIONS

DIVISION: REFERENCES CONTAINED IN THIS SPECIFICATION FOLLOW THE NUMBERING SYSTEM DEFINED IN THE CONSTRUCTION SPECIFICATIONS INSTITUTE (CSI) MASTERFORMAT 2004 EDITION. SPECIFICATION DIVISIONS 01 THROUGH 13 PROVIDED WITH THIS PROJECT MAY REFERENCE THE CSI MASTERFORMAT 1995 EDITION. THE CORRESPONDING DIVISION REFERENCES BETWEEN THE 2004 EDITION AND 1995 EDITION ARE AS FOLLOWS:

2004 EDITION	1995 EDITION
DIVISION 21 – FIRE SUPPRESSION	DIVISION 15
DIVISION 22 – PLUMBING	DIVISION 15
DIVISION 23 – HVAC	DIVISION 15
DIVISION 26 – ELECTRICAL	DIVISION 16
DIVISION 27 – COMMUNICATIONS	DIVISION 16
DIVISION 28 – ELECTRONIC SAFETY AND SECURITY	DIVISION 16

FURNISH: "TO SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLING, INSTALLING, AND SIMILAR OPERATIONS."

INSTALL: "TO PERFORM ALL OPERATIONS AT THE PROJECT SITE INCLUDING, BUT NOT LIMITED TO, THE ACTUAL UNLOADING, UNPACKING, ASSEMBLING, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, TESTING, COMMISSIONING, STARTING UP AND SIMILAR OPERATIONS, COMPLETE, AND READY FOR THE INTENDED USE."

PROVIDE: "TO FURNISH AND INSTALL."

FURNISHED BY OWNER (OR OWNER-FURNISHED) OR FURNISHED BY OTHERS: "AN ITEM FURNISHED BY THE OWNER OR UNDER OTHER DIVISIONS OR CONTRACTS, AND INSTALLED UNDER THE REQUIREMENTS OF THIS DIVISION, COMPLETE, AND READY FOR THE INTENDED USE, INCLUDING ALL ITEMS AND SERVICES INCIDENTAL TO THE WORK NECESSARY FOR PROPER INSTALLATION AND OPERATION. INCLUDE THE INSTALLATION UNDER THE WARRANTY REQUIRED BY THIS DIVISION.

ENGINEER: WHERE REFERENCED IN THIS DIVISION, "ENGINEER" IS THE ENGINEER OF RECORD AND THE DESIGN PROFESSIONAL FOR THE WORK UNDER THIS DIVISION, AND IS A CONSULTANT TO, AND AN AUTHORIZED REPRESENTATIVE OF THE ARCHITECT, AS DEFINED IN THE GENERAL AND/OR SUPPLEMENTARY CONDITIONS. WHEN USED IN THIS DIVISION, ENGINEER MEANS INCREASED INVOLVEMENT BY AND OBLIGATIONS TO THE ENGINEER, IN ADDITION TO INVOLVEMENT BY AND OBLIGATIONS TO THE ARCHITECT.

AHJ : THE LOCAL CODE AND/OR INSPECTION AGENCY (AUTHORITY) HAVING JURISDICTION OVER THE WORK.

NRTL : NATIONALLY RECOGNIZED TESTING LABORATORY, AS DEFINED AND LISTED BY OSHA IN 29 CFR 1910.7 (E.G., UL, ETL, CSA), AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT. NATIONALLY RECOGNIZED TESTING LABORATORIES AND STANDARDS LISTED ARE USED ONLY TO REPRESENT THE CHARACTERISTICS REQUIRED AND ARE NOT INTENDED TO RESTRICT THE USE OF OTHER NRTLS THAT ARE ACCEPTABLE TO THE AHJ AND STANDARDS THAT MEET THE SPECIFIED CRITERIA.

HOMERUN: THAT PORTION OF AN ELECTRICAL CIRCUIT ORIGINATING AT A JUNCTION BOX, TERMINATION BOX, RECEPTACLE, OR SWITCH WITH TERMINATION AT AN ELECTRICAL PANELBOARD. NOTE: WHERE MC CABLE IS UTILIZED FOR RECEPTACLE AND/OR LIGHTING BRANCH CIRCUITING LOADS, THE ORIGINATING POINT OF THE HOMERUN SHALL BE AT THE FIRST LOAD IN THE CIRCUIT OR AT A JUNCTION BOX LOCATED IN AN ACCESSIBLE CEILING SPACE AS CLOSE AS POSSIBLE TO THE FIRST LOAD.

SUBSTITUTION: CHANGES IN PRODUCTS, MATERIALS, EQUIPMENT, AND METHODS OF CONSTRUCTION FROM THOSE REQUIRED BY THE CONTRACT DOCUMENTS AND PROPOSED BY CONTRACTOR. SUBSTITUTIONS INCLUDE VALUE ENGINEERING PROPOSALS.

1. SUBSTITUTIONS FOR CAUSE: CHANGES PROPOSED BY CONTRACTOR THAT ARE REQUIRED DUE TO CHANGED PROJECT CONDITIONS, SUCH AS UNAVAILABILITY OF PRODUCT, REGULATORY CHANGES, OR UNAVAILABILITY OF REQUIRED WARRANTY TERMS.
2. SUBSTITUTIONS FOR CONVENIENCE: CHANGES PROPOSED BY CONTRACTOR OR OWNER THAT ARE NOT REQUIRED IN ORDER TO MEET OTHER PROJECT REQUIREMENTS BUT MAY OFFER ADVANTAGE TO CONTRACTOR OR OWNER.

WHEN 'FURNISH', 'INSTALL', 'PERFORM', OR 'PROVIDE' IS NOT USED IN CONNECTION WITH SERVICES, MATERIALS, OR EQUIPMENT IN A CONTEXT CLEARLY REQUIRING AN OBLIGATION OF CONTRACTOR, "PROVIDE" IS IMPLIED.

THE TERMS "APPROVED EQUAL", "EQUIVALENT", OR "EQUAL" ARE USED SYNONYMOUSLY AND SHALL MEAN "ACCEPTED BY OR ACCEPTABLE TO THE ENGINEER AS EQUIVALENT TO THE ITEM OR MANUFACTURER SPECIFIED". THE TERM "APPROVED" SHALL MEAN LABELED, LISTED, CERTIFIED, OR ALL THREE, BY AN NRTL, AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.

C. PRE-BID SITE VISIT

PRIOR TO SUBMITTING BID, VISIT THE SITE OF THE PROPOSED WORK AND BECOME FULLY INFORMED AS TO THE CONDITIONS UNDER WHICH THE WORK IS TO BE DONE. FAILURE TO COMPLY WITH THIS REQUIREMENT SHALL NOT BE CONSIDERED SUFFICIENT JUSTIFICATION TO REQUEST OR OBTAIN EXTRA COMPENSATION OVER AND ABOVE THE CONTRACT PRICE.

[EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS AND/OR SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BID. COORDINATE NEW AND DEMOLITION WORK WITH ALL OTHER TRADES AND EXISTING CONDITIONS.]

D. MATERIAL AND WORKMANSHIP

PROVIDE NEW MATERIAL, EQUIPMENT, AND APPARATUS UNDER THIS CONTRACT UNLESS OTHERWISE STATED HEREIN, OF BEST QUALITY NORMALLY USED FOR THE PURPOSE IN GOOD COMMERCIAL PRACTICE, AND FREE FROM DEFECTS. MODEL NUMBERS LISTED IN THE SPECIFICATIONS OR SHOWN ON THE DRAWINGS ARE NOT NECESSARILY INTENDED TO DESIGNATE THE REQUIRED TRIM, WRITTEN DESCRIPTIONS OF THE TRIM GOVERN MODEL NUMBERS.

PROVIDE MARKINGS OR A NAMEPLATE FOR ALL MATERIAL AND EQUIPMENT IDENTIFYING THE MANUFACTURER AND PROVIDING SUFFICIENT REFERENCE TO ESTABLISH QUALITY, SIZE, AND CAPACITY. ALL WORKMANSHIP SHALL BE OF THE FINEST POSSIBLE BY EXPERIENCED MECHANICS OF THE PROPER TRADE. IN GENERAL, PROVIDE THE FOLLOWING QUALITY GRADE(S) FOR ALL MATERIALS AND EQUIPMENT.

COMMERCIAL SPECIFICATION GRADE
PROVIDE ALL HOISTS, SCAFFOLDS, STAGING, RUNWAYS, TOOLS, MACHINERY, AND EQUIPMENT REQUIRED FOR THE PERFORMANCE OF THE ELECTRICAL WORK. STORE AND MAINTAIN MATERIAL AND EQUIPMENT IN CLEAN CONDITION, AND PROTECTED FROM WEATHER, MOISTURE, AND PHYSICAL DAMAGE.

FURNISH ONLY MATERIAL AND EQUIPMENT THAT ARE LISTED, LABELED, CERTIFIED, OR ALL THREE, BY AN NRTL WHENEVER ANY LISTING OR LABELING EXISTS FOR THE TYPES OF MATERIAL AND EQUIPMENT SPECIFIED.

AT A MINIMUM, GENERAL WORK PRACTICES FOR ELECTRICAL CONSTRUCTION SHALL BE IN ACCORDANCE WITH NECA 1 (LATEST EDITION), "STANDARD PRACTICES FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION".

E. MANUFACTURERS

IN OTHER ARTICLES WHERE LISTS OF MANUFACTURERS ARE INTRODUCED, SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE MANUFACTURERS SPECIFIED.

WHERE A LIST IS PROVIDED, MANUFACTURERS ARE LISTED ALPHABETICALLY AND NOT IN ACCORDANCE WITH ANY RANKING OR PREFERENCE.

WHERE MANUFACTURERS ARE NOT LISTED, PROVIDE PRODUCTS SUBJECT TO COMPLIANCE WITH REQUIREMENTS FROM MANUFACTURERS THAT HAVE BEEN ACTIVELY INVOLVED IN MANUFACTURING THE SPECIFIED PRODUCT FOR NO LESS THAN 5 YEARS.

F. COORDINATION

COORDINATE ALL WORK WITH OTHER DIVISIONS AND TRADES SO THAT VARIOUS COMPONENTS OF THE SYSTEMS ARE INSTALLED AT THE PROPER TIME, FIT THE AVAILABLE SPACE, AND ALLOW PROPER SERVICE ACCESS TO THOSE ITEMS REQUIRING MAINTENANCE. COMPONENTS WHICH ARE INSTALLED WITHOUT REGARD TO THE ABOVE SHALL BE RELOCATED AT NO ADDITIONAL COST TO THE OWNER.

ALL ROOF PENETRATIONS, FLOOR CHASING AND/OR CORE DRILLING SHALL REQUIRE THE SPECIFIC APPROVAL OF THE LANDLORD AND OWNER. ALL WORK IN COMMON AREAS, SHAFTS OR OTHER LANDLORD OWNED SPACES MUST BE REVIEWED AND APPROVED BY THE LANDLORD AND OWNER PRIOR TO COMMENCEMENT OF THE WORK. CONTRACTOR SHALL MINIMIZE ANY DISRUPTION AND DISTURBANCES TO OTHER TENANTS. ALL WORK WITHIN OTHER TENANT SPACES MUST BE COORDINATED WITH AND APPROVED BY THE LANDLORD AND OWNER.

UNLESS OTHERWISE INDICATED, THE GENERAL CONTRACTOR SHALL PROVIDE CHASES AND OPENINGS IN BUILDING CONSTRUCTION REQUIRED FOR INSTALLATION OF THE SYSTEMS SPECIFIED HEREIN. CONTRACTOR SHALL FURNISH THE GENERAL CONTRACTOR WITH INFORMATION WHERE CHASES AND OPENINGS ARE REQUIRED. CONTRACTOR SHALL KEEP INFORMED AS TO THE WORK OF OTHER TRADES ENGAGED IN THE CONSTRUCTION OF THE PROJECT AND SHALL EXECUTE WORK IN A MANNER AS TO NOT INTERFERE WITH OR DELAY THE WORK OF OTHER TRADES.

FIGURED DIMENSIONS SHALL BE TAKEN IN PREFERENCE TO SCALE DIMENSIONS. CONTRACTOR SHALL TAKE HIS OWN MEASUREMENTS AT THE BUILDING, AS VARIATIONS MAY OCCUR. CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ERRORS THAT COULD HAVE BEEN AVOIDED BY PROPER CHECKING AND INSPECTION.

PROVIDE MATERIALS WITH TRIM THAT WILL PROPERLY FIT THE TYPES OF CEILING, WALL, OR FLOOR FINISHES ACTUALLY INSTALLED. MODEL NUMBERS LISTED IN THE SPECIFICATIONS OR SHOWN ON THE DRAWINGS ARE NOT INTENDED TO DESIGNATE THE REQUIRED TRIM.

MAKE ALL OFFSETS REQUIRED TO CLEAR EQUIPMENT, BEAMS, AND OTHER STRUCTURAL MEMBERS, AND TO FACILITATE CONCEALING RACEWAYS IN THE MANNER ANTICIPATED IN THE DESIGN. PROVIDE MATERIALS WITH TRIM THAT WILL FIT PROPERLY THE TYPES OF CEILING, WALL, OR FLOOR FINISHES ACTUALLY INSTALLED.

COORDINATE ALL WORK WITH ARCHITECTURAL PHASING DRAWINGS TO PROPERLY STAGE TRANSITIONS OF WORK TO PROVIDE POWER TO EXISTING, NEW AND TEMPORARY LOADS. MONITOR LOADS ON DISTRIBUTION SYSTEM TO ENSURE SHIFTING OF LOADS DOES NOT OVERLOAD ELECTRICAL EQUIPMENT.

G. ORDINANCES AND CODES

WORK PERFORMED UNDER THIS CONTRACT SHALL, AT A MINIMUM, BE IN CONFORMANCE WITH APPLICABLE NATIONAL, STATE AND LOCAL CODES HAVING JURISDICTION. EQUIPMENT FURNISHED AND ASSOCIATED INSTALLATION WORK PERFORMED UNDER THIS CONTRACT SHALL BE IN STRICT COMPLIANCE WITH CURRENT APPLICABLE CODES ADOPTED BY THE LOCAL AHJ, INCLUDING ANY AMENDMENTS AND STANDARDS AS SET FORTH BY THE FOLLOWING:

1. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
2. UNDERWRITERS LABORATORIES (UL)
3. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)
4. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
5. AMERICAN SOCIETY OF TESTING MATERIALS (ANSM)
6. RULES AND REGULATION OF PUBLIC UTILITIES AND MUNICIPAL DEPARTMENTS AFFECTED BY CONNECTION OF SERVICES.
7. OTHER NATIONAL STANDARDS AND CODES WHERE APPLICABLE.

WHERE THE CONTRACT DOCUMENTS EXCEED THE REQUIREMENTS OF THE REFERENCED CODES, STANDARDS, ETC., THE CONTRACT DOCUMENTS SHALL TAKE PRECEDENCE. WHERE CONFLICTS BETWEEN VARIOUS CODES, ORDINANCES, RULES, AND REGULATIONS EXIST, COMPLY WITH THE MOST STRINGENT.

PROMPTLY BRING ALL CONFLICTS OBSERVED BETWEEN CODES, ORDINANCES, RULES, REGULATIONS, REFERENCED STANDARDS, AND THESE DOCUMENTS TO THE ATTENTION OF THE ARCHITECT AND ENGINEER FOR FINAL RESOLUTION. CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY VIOLATION OF THE LAW.

PROCURE AND PAY FOR PERMITS AND LICENSES REQUIRED FOR THE ACCOMPLISHMENT OF THE WORK HEREIN DESCRIBED. WHERE REQUIRED, OBTAIN, PAY FOR, AND FURNISH CERTIFICATES OF INSPECTION TO OWNER. PROVIDE ALL SAFETY LIGHTS, GUARDS, AND WARNING SIGNS REQUIRED FOR THE PERFORMANCE OF THE WORK AND FOR THE SAFETY OF THE PUBLIC.

ELECTRICAL EQUIPMENT SHALL BE LOCATED SO THAT THE CODE REQUIRED MINIMUM WORKING CLEARANCE AND DEDICATED ELECTRICAL SPACE ARE MAINTAINED. EXISTING EQUIPMENT NOT MEETING CURRENT CODE REQUIRED CLEARANCE REQUIREMENTS MAY REMAIN IF ALLOWED BY THE AHJ, ENGINEER AND OWNER.

H. PROTECTION OF EQUIPMENT AND MATERIALS

STORE AND PROTECT FROM DAMAGE EQUIPMENT AND MATERIALS DELIVERED TO JOB SITE. FOR MATERIALS AND EQUIPMENT SUSCEPTIBLE TO CHANGING WEATHER CONDITIONS, DAMPNESS, OR TEMPERATURE VARIATIONS, STORE INSIDE IN CONDITIONED SPACES. FOR MATERIALS AND EQUIPMENT NOT SUSCEPTIBLE TO THESE CONDITIONS, COVER WITH WATERPROOF, TEAR-RESISTANT, HEAVY TARP OR POLYETHYLENE PLASTIC AS REQUIRED TO PROTECT FROM PLASTER, DIRT, PAINT, WATER, OR PHYSICAL DAMAGE. EQUIPMENT AND MATERIAL DAMAGED BY CONSTRUCTION ACTIVITIES SHALL BE REJECTED, AND CONTRACTOR SHALL FURNISH NEW EQUIPMENT AND MATERIAL OF A LIKE KIND AT HIS OWN EXPENSE.

KEEP PREMISES BROOM CLEAN OF FOREIGN MATERIAL CREATED DURING WORK PERFORMED UNDER THIS CONTRACT. CONDUIT, EQUIPMENT, ETC. SHALL HAVE A NEAT AND CLEAN APPEARANCE AT THE TERMINATION OF THE WORK.

PROTECT ADJACENT MATERIALS INDICATED TO REMAIN. FOR WORK SPECIFIC TO THIS DIVISION, INSTALL AND MAINTAIN DUST AND NOISE BARRIERS TO KEEP DIRT, DUST, AND NOISE FROM BEING TRANSMITTED TO ADJACENT AREAS. REMOVE PROTECTION AND BARRIERS AFTER DEMOLITION OPERATIONS ARE COMPLETE.

PLUG OR CAP OPEN ENDS OF CONDUITS WHILE STORED AND INSTALLED DURING CONSTRUCTION WHEN NOT IN USE TO PREVENT THE ENTRANCE OF DEBRIS INTO THE SYSTEMS.

I. SUBSTITUTIONS

MATERIALS, PRODUCTS, EQUIPMENT, AND SYSTEMS DESCRIBED IN THE BIDDING DOCUMENTS ESTABLISH A STANDARD OF REQUIRED FUNCTION, DIMENSION, APPEARANCE AND QUALITY TO BE MET BY THE PROPOSED SUBSTITUTION. THE BASE BID SHALL INCLUDE ONLY THE PRODUCTS FROM MANUFACTURERS SPECIFICALLY NAMED IN THE DRAWINGS AND SPECIFICATIONS. TO REQUEST A SUBSTITUTION, REQUEST THE SUBSTITUTION REQUEST FORM FROM THE ARCHITECT OR ENGINEER. COMPLETE AND SEND THE SUBSTITUTION REQUEST FROM FOR EACH MATERIAL, PRODUCT, EQUIPMENT, OR SYSTEM THAT IS PROPOSED TO BE SUBSTITUTED. THE BURDEN OF PROOF OF THE MERIT OF THE PROPOSED SUBSTITUTION IS UPON THE PROPOSER.

UNLESS STATED OTHERWISE IN WRITING TO THE ENGINEER BY THE CONTRACTOR, CONTRACTOR WARRANTS TO THE ENGINEER, ARCHITECT, AND OWNER THE FOLLOWING:

1. PROPOSED SUBSTITUTION HAS BEEN FULLY INVESTIGATED AND DETERMINED TO MEET OR EXCEED THE SPECIFIED WORK IN ALL RESPECTS UNLESS STATED OTHERWISE IN THE SUBSTITUTION REQUEST.
2. PROPOSED SUBSTITUTION IS CONSISTENT WITH THE CONTRACT DOCUMENTS AND WILL PRODUCE INDICATED RESULTS, INCLUDING FUNCTIONAL CLEARANCES, MAINTENANCE SERVICE, AND SOURCING OF REPLACEMENT PARTS.

PROPOSED SUBSTITUTIONS HAS RECEIVED NECESSARY APPROVALS OF AUTHORITIES HAVING JURISDICTIONS.

SAME WARRANTY WILL BE FURNISHED FOR PROPOSED SUBSTITUTIONS AS FOR SPECIFIED WORK.

IF ACCEPTED SUBSTITUTIONS FAILS TO PERFORM AS REQUIRED, CONTRACTOR SHALL REPLACE SUBSTITUTE MATERIAL OR SYSTEM WITH THAT ORIGINALLY SPECIFIED AND BEAR COSTS INCURRED THEREBY.

COORDINATION, INSTALLATIONS AND CHANGES IN WORK AS NECESSARY FOR ACCEPTED SUBSTITUTIONS WILL BE COMPLETE IN ALL RESPECTS.

NO SUBSTITUTIONS WILL BE CONSIDERED UNLESS THE SUBSTITUTION REQUEST FORM IS COMPLETED AND ATTACHED WITH THE APPROPRIATE SUBSTITUTION DOCUMENTATION. NO SUBSTITUTION WILL BE CONSIDERED PRIOR TO RECEIPT OF BIDS UNLESS WRITTEN REQUEST FOR APPROVAL TO BID HAS BEEN RECEIVED BY THE ENGINEER AT LEAST TEN (10) CALENDAR DAYS PRIOR TO THE DATE FOR RECEIPT OF BIDS.

IF THE PROPOSED SUBSTITUTION IS APPROVED PRIOR TO RECEIPT OF BIDS, SUCH APPROVAL WILL BE STATED IN AN ADDENDUM. BIDDERS SHALL NOT RELY UPON APPROVALS MADE IN ANY OTHER WAY. VERBAL APPROVAL WILL NOT BE GIVEN. NO SUBSTITUTIONS WILL BE CONSIDERED AFTER THE CONTRACT IS AWARDED UNLESS SPECIFICALLY PROVIDED IN THE CONTRACT DOCUMENTS.

PROVIDE FACTORY GENERATED POINT-BY-POINT CALCULATIONS FOR ALL EXTERIOR LIGHT FIXTURES (PHOTOMETRIC FILES SUPPLIED SO THE ENGINEER CAN GENERATE A POINT-BY-POINT DO NOT SUFFICE FOR THE POINT-BY-POINT CALCULATIONS). PROVIDE INTERIOR POINT-BY-POINT CALCULATIONS AT THE DISCRETION OF THE ENGINEER.

J. SUBMITTALS

ASSEMBLE AND SUBMIT FOR REVIEW SHOP DRAWINGS, MATERIAL LISTS, MANUFACTURER PRODUCT LITERATURE FOR EQUIPMENT TO BE FURNISHED, AND ITEMS REQUIRING COORDINATION BETWEEN CONTRACTORS UNDER THIS CONTRACT. PROVIDE SUBMITTALS IN SUFFICIENT DETAIL SO AS TO DEMONSTRATE COMPLIANCE WITH THESE CONTRACT DOCUMENTS AND THE DESIGN CONCEPT. PRIOR TO TRANSMITTING SUBMITTALS, VERIFY THAT THE EQUIPMENT SUBMITTED IS MUTUALLY COMPATIBLE WITH AND SUITABLE FOR THE INTENDED USE, WILL FIT THE AVAILABLE SPACE, AND MAINTAIN MANUFACTURER RECOMMENDED SERVICE CLEARANCES. IF THE SIZE OF EQUIPMENT FURNISHED MAKES NECESSARY ANY CHANGE IN LOCATION OR CONFIGURATION, SUBMIT A SHOP DRAWING SHOWING THE PROPOSED LAYOUT.

TRANSMIT SUBMITTALS AS EARLY AS REQUIRED TO SUPPORT THE PROJECT SCHEDULE. ALLOW TWO WEEKS FOR ENGINEER REVIEW TIME, PLUS TO/FROM MAILING TIME VIA THE ARCHITECT, PLUS A DUPLICATION OF THIS TIME FOR RESUBMITTALS, IF REQUIRED. ONLY RESUBMIT THOSE SECTIONS REQUESTED FOR RESUBMITTAL.

SUBMITTALS SHALL CONTAIN THE PROJECT NAME, APPLICABLE SPECIFICATION SECTION, SUBMITTAL DATA, EQUIPMENT IDENTIFICATIONS ACRONYM AS USED ON THE DRAWINGS, AND THE CONTRACTOR'S STAMP. THE STAMP SHALL CERTIFY THAT THE SUBMITTAL HAS BEEN CHECKED BY THE CONTRACTOR, COMPLIES WITH THE DRAWINGS AND SPECIFICATIONS, AND IS COORDINATED WITH OTHER TRADES. MANUFACTURER PRODUCT LITERATURE SHALL INCLUDE SHOP DRAWINGS, PRODUCT DATA, PERFORMANCE SHEETS, SAMPLES, AND OTHER SUBMITTALS REQUIRED BY THIS DIVISION. HIGHLIGHT, MARK, LIST, OR INDICATE THE MATERIALS, PERFORMANCE CRITERIA, AND ACCESSORIES THAT ARE BEING PROPOSED. GENERAL PRODUCT CATALOG DATA NOT SPECIFICALLY NOTED TO BE PART OF THE SPECIFIED PRODUCT WILL BE REJECTED AND RETURNED WITHOUT REVIEW.

SUBMITTALS AND SHOP DRAWINGS SHALL NOT CONTAIN FIRM NAME, LOGO, THE SEAL, OR SIGNATURE OF THE ENGINEER. THEY SHALL NOT BE COPIES OF THE WORK PRODUCT OF THE ENGINEER. IF THE CONTRACTOR DESIRES TO USE ELEMENTS OF SUCH PRODUCT, REFER TO PARAGRAPH "ELECTRONIC DRAWING FILES" FOR PROCEDURES TO BE USED.

SEPARATE SUBMITTALS ACCORDING TO INDIVIDUAL SPECIFICATION SECTIONS. ILLEGIBLE SUBMITTALS WILL BE REJECTED AND RETURNED WITHOUT REVIEW. CATALOG DATA SHALL BE PROPERLY IDENTIFIED, INDEXED AND TABBED. A HARD COPY FORMAT OR A SINGLE PDF FILE FOR EACH SPECIFICATION SECTION IS ACCEPTABLE. EACH ITEM OR MODEL NUMBER SHALL BE CLEARLY MARKED AND ACCESSORIES INDICATED. LABEL THE CATALOG DATA WITH THE EQUIPMENT IDENTIFICATION ACRONYM OR NUMBER AS USED ON THE DRAWINGS AND INCLUDE PERFORMANCE CURVES, CAPACITIES, SIZES, WEIGHTS, MATERIALS, FINISHES, WIRING DIAGRAMS, ELECTRICAL REQUIREMENTS AND DEVIATIONS FROM SPECIFIED EQUIPMENT OR MATERIALS. MARK OUT INAPPLICABLE ITEMS. SHOP DRAWINGS WILL BE RETURNED WITHOUT REVIEW IF THE ABOVE MENTIONED REQUIREMENTS ARE NOT MET.

PROVIDE THE QUANTITY OF SUBMITTALS REQUIRED BY DIVISION 01. IF NOT INDICATED AND HARD-COPY SETS ARE PROVIDED, SUBMIT A MINIMUM OF SIX (6) COPIES. REFER TO DIVISION 01 FOR ACCEPTANCE OF ELECTRONIC SUBMITTALS FOR THIS PROJECT. FOR ELECTRONIC SUBMITTALS, CONTRACTOR SHALL SUBMIT THE DOCUMENTS IN ACCORDANCE WITH THE PROCEDURES SPECIFIED IN DIVISION 01. CONTRACTOR SHALL NOTIFY THE ARCHITECT AND ENGINEER THAT THE SUBMITTALS HAVE BEEN POSTED. IF ELECTRONIC SUBMITTAL PROCEDURES ARE NOT DEFINED IN DIVISION 01, CONTRACTOR SHALL INCLUDE THE WEBSITE, USER NAME, AND PASSWORD INFORMATION NEEDED TO ACCESS THE SUBMITTALS. FOR SUBMITTALS SENT BY E-MAIL, CONTRACTOR SHALL COPY THE DESIGNATED REPRESENTATIVES OF THE ARCHITECT AND ENGINEER. CONTRACTOR SHALL ALLOW FOR THE ENGINEER REVIEW TIME AS SPECIFIED ABOVE IN THE CONSTRUCTION SCHEDULE. CONTRACTOR SHALL SUBMIT ONLY THE DOCUMENTS REQUIRED TO PURCHASE THE MATERIALS AND/OR EQUIPMENT IN THE SUBMITTAL.

THE CHECKING AND SUBSEQUENT ACCEPTANCE OF SUBMITTALS BY THE ENGINEER AND/OR ARCHITECT SHALL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR DEVIATIONS FROM THE DRAWINGS AND SPECIFICATIONS, ERRORS IN DIMENSIONS, DETAILS, SIZES OF EQUIPMENT, OR QUANTITIES, OMISSIONS OF COMPONENTS OR FITTINGS, COORDINATION OF ELECTRICAL REQUIREMENTS, AND NOT COORDINATING ITEMS WITH ACTUAL BUILDING CONDITIONS AND ADJACENT WORK. CONTRACTOR SHALL REQUEST AND SECURE WRITTEN ACCEPTANCE FROM THE ENGINEER AND ARCHITECT PRIOR TO IMPLEMENTING ANY DEVIATION.

K. ELECTRONIC DRAWING FILES

IN PREPARATION OF SHOP DRAWINGS OR RECORD DRAWINGS, CONTRACTOR MAY, AT HIS OPTION, OBTAIN ELECTRONIC DRAWING FILES IN AUTOCAD OR DXF FORMAT ON CD-ROM DISK, DVD DISK, FLASH DRIVE, OR DIRECT DOWNLOAD, AS DESIRED, FROM THE ENGINEER FOR A SHIPPING AND HANDLING FEE OF $200 FOR A DRAWING SET UP TO 12 SHEETS AND $15 PER SHEET FOR EACH ADDITIONAL SHEET. CONTACT THE ARCHITECT FOR WRITTEN AUTHORIZATION AND ENGINEER FOR THE NECESSARY AGREEMENT FORM AND TO SPECIFY SHIPPING METHOD AND DRAWING FORMAT. IN ADDITION TO PAYMENT, THE WRITTEN AUTHORIZATION FROM THE ARCHITECT AND RELEASE AGREEMENT FORM FROM THE ENGINEER MUST BE RECEIVED BEFORE ELECTRONIC DRAWING FILES WILL BE SENT.

L. RECORD DRAWING (AS-BUILT DRAWINGS)

DURING PROGRESS OF THE WORK IN THIS DIVISION, CONTRACTOR SHALL MAINTAIN AN ACCURATE RECORD OF ALL CHANGES MADE DURING THE INSTALLATION OF THE SYSTEM. UPON COMPLETION OF THE WORK, ACCURATELY TRANSFER ALL RECORD INFORMATION TO THREE IDENTICAL SETS OF THE APPROVED SHOP DRAWINGS. INSERT ONE SET INTO EACH COPY OF THE MANUAL DESCRIBED BELOW.

SEE DIVISION 01 AND GENERAL CONDITIONS FOR ADDITIONAL INFORMATION.

M. OPERATION AND MAINTENANCE INSTRUCTIONS

DURING THE COURSE OF CONSTRUCTION, COLLECT AND COMPILE A COMPLETE BROCHURE OF EQUIPMENT FURNISHED AND INSTALLED ON THIS PROJECT. INCLUDE OPERATIONAL AND MAINTENANCE INSTRUCTIONS, MANUFACTURER'S CATALOG SHEETS, WIRING DIAGRAMS, PARTS LISTS, APPROVED SUBMITTALS AND SHOP DRAWINGS, WARRANTIES, AND DESCRIPTIVE LITERATURE AS FURNISHED BY THE EQUIPMENT MANUFACTURER. INCLUDE AN INSIDE COVER SHEET THAT LISTS THE PROJECT NAME, DATE, OWNER, ARCHITECT, ENGINEER, GENERAL CONTRACTOR, SUB-CONTRACTOR, AND AN INDEX OF CONTENTS.

SUBMIT THREE COPIES OF LITERATURE BOUND IN APPROVED BINDERS WITH INDEX AND TABS SEPARATING EQUIPMENT TYPES TO THE ARCHITECT, FOR ENGINEER'S REVIEW, AT THE TERMINATION OF THE WORK. PAPER CLIPS, STAPLES, RUBBER BANDS, LOOSE-LEAF BINDING, AND MAILING ENVELOPES ARE NOT CONSIDERED APPROVED BINDERS. FINAL APPROVAL OF SYSTEMS INSTALLED UNDER THIS CONTRACT SHALL BE WITHHELD UNTIL THIS EQUIPMENT BROCHURE IS RECEIVED AND DEEMED COMPLETE BY THE ARCHITECT AND ENGINEER. INSTRUCT WORKMEN TO SAVE REQUIRED LITERATURE SHIPPED WITH THE EQUIPMENT ITSELF FOR INCLUSION IN THIS BROCHURE.

INCLUDE RECORD DRAWINGS AS DESCRIBED ABOVE.

REFER TO DIVISION 01 FOR ACCEPTANCE OF ELECTRONIC MANUALS FOR THIS PROJECT FOR ELECTRONIC MANUALS , REFER TO PARAGRAPH "SUBMITTALS" FOR REQUIREMENTS.

N. TRAINING

AT A TIME MUTUALLY AGREED UPON BETWEEN THE OWNER AND CONTRACTOR, PROVIDE THE SERVICES OF A FACTORY TRAINED AND AUTHORIZED REPRESENTATIVE TO TRAIN OWNER'S DESIGNATED PERSONNEL ON THE OPERATION AND MAINTENANCE OF THE EQUIPMENT PROVIDED FOR THIS PROJECT.

PROVIDE TRAINING TO INCLUDE, BUT NOT BE LIMITED TO, AN OVERVIEW OF THE SYSTEM AND/OR EQUIPMENT AS IT RELATES TO THE FACILITY AS A WHOLE; OPERATION AND MAINTENANCE PROCEDURES AND SCHEDULES RELATED TO STARTUP AND SHUTDOWN, TROUBLESHOOTING, SERVICING, PREVENTIVE MAINTENANCE AND APPROPRIATE OPERATOR INTERVENTION; AND REVIEW OF DATA INCLUDED IN THE OPERATION AND MAINTENANCE MANUALS.

SUBMIT A CERTIFICATION LETTER TO THE ARCHITECT STATING THAT THE OWNER'S DESIGNATED REPRESENTATIVE HAS BEEN TRAINED AS SPECIFIED HEREIN. LETTER SHALL INCLUDE DATE, TIME, ATTENDEES AND SUBJECT OF TRAINING. THE CONTRACTOR AND THE OWNER'S REPRESENTATIVE SHALL SIGN THE CERTIFICATION LETTER INDICATING AGREEMENT THAT THE TRAINING HAS BEEN PROVIDED.

SCHEDULE TRAINING WITH OWNER WITH AT LEAST 7 DAYS ADVANCE NOTICE.

O. WARRANTIES

WARRANT EACH SYSTEM AND EACH ELEMENT THEREOF AGAINST ALL DEFECTS DUE TO FAULTY WORKMANSHIP, DESIGN, OR MATERIAL FOR A PERIOD OF 12 MONTHS FROM DATE OF SUBSTANTIAL COMPLETION, UNLESS SPECIFIC ITEMS ARE NOTED TO CARRY A LONGER WARRANTY IN THESE CONSTRUCTION DOCUMENTS OR MANUFACTURER'S STANDARD WARRANTY EXCEEDS 12 MONTHS. REMEDY ALL DEFECTS OCCURRING WITHIN THE WARRANTY PERIOD(S) AS STATED IN THE GENERAL CONDITIONS AND DIVISION 01.

WARRANTIES SHALL INCLUDE LABOR AND MATERIAL, INCLUDING TRAVEL EXPENSES. MAKE REPAIRS OR REPLACEMENTS WITHOUT ANY ADDITIONAL COSTS TO THE OWNER, AND TO THE SATISFACTION OF THE OWNER, ARCHITECT, AND ENGINEER.

PERFORM THE REMEDIAL WORK PROMPTLY, UPON WRITTEN NOTICE FROM THE ENGINEER OR OWNER.

ALSO WARRANT THE FOLLOWING ADDITIONAL ITEMS:

1. ALL RACEWAYS ARE FREE FROM OBSTRUCTIONS, HOLES, CRUSHING, OR BREAKS OF ANY NATURE.
2. ALL RACEWAY SEALS ARE EFFECTIVE.
3. THE ENTIRE ELECTRICAL SYSTEM IS FREE FROM ALL SHORT CIRCUITS AND UNWANTED OPEN CIRCUITS AND GROUNDS.

AT THE TIME OF SUBSTANTIAL COMPLETION, DELIVER TO THE OWNER ALL WARRANTIES, IN WRITING AND PROPERLY EXECUTED, INCLUDING TERM LIMITS FOR WARRANTIES EXTENDING BEYOND THE ONE YEAR PERIOD AND ANY ACTIONS THE OWNER MUST TAKE IN ORDER TO MAINTAIN WARRANTY STATUS. EACH WARRANTY INSTRUMENT SHALL BE ADDRESSED TO THE OWNER AND STATE THE COMMENCEMENT DATE AND TERM.

2. GENERAL MATERIALS AND INSTALLATIONS

A. BUILDING OPERATION

COMPLY WITH THE SCHEDULE OF OPERATIONS AS OUTLINED IN THE ARCHITECTURAL PORTIONS OF THIS SPECIFICATION. BUILDING SHALL BE IN OPERATION DURING NORMAL WORKDAY HOURS. ACCOMPLISH WORK REQUIRING INTERRUPTION OF BUILDING OPERATION AT A TIME WHEN THE BUILDING IS NOT IN OPERATION AND ONLY WITH WRITTEN APPROVAL OF BUILDING OWNER AND/OR TENANT. COORDINATE INTERRUPTION OF BUILDING OPERATION WITH THE OWNER AND/OR TENANT A MINIMUM OF SEVEN (7) DAYS IN ADVANCE OF WORK.

B. EXISTING EQUIPMENT REUSE AND REMOVAL

PROVIDE ALL DEMOLITION OF EXISTING ELECTRICAL SYSTEMS AND NEW ELECTRICAL SYSTEM MODIFICATIONS REQUIRED BECAUSE OF BUILDING REMODELING, AS NOTED ON THE DRAWINGS, OR NECESSARY FOR PROPER OPERATION AND NEW CONSTRUCTION. REMOVE ALL ABANDONED CABLES AND WIRING AND CONDUIT ABOVE ACCESSIBLE CEILINGS AND VENTILATION SHAFTS.

NOTIFY ARCHITECT, ENGINEER AND OWNER IMMEDIATELY OF ANY DANGEROUS CONDITIONS THAT EXIST ON THE JOB SITE, AS THEY ARE DISCOVERED, BEFORE DEMOLITION, DURING SELECTIVE DEMOLITION OR BEFORE REMODEL WORK BEGINS.

REMOVE ALL EXISTING WIRING, LIGHT FIXTURES, EXPOSED CONDUITS, AND OTHER ELECTRICAL INSTALLATIONS NOT REUSED PRIOR TO SUBSTANTIAL COMPLETION OF THE WORK.

EXISTING RACEWAYS MAY BE REUSED IF THEIR POINTS OF TERMINATIONS ARE SUITABLE; IF THEY ARE CLEAN INSIDE WITH NO EVIDENCE OF RUST OR BURRS; IF FREE FROM CRACKS, FLATTENED SECTIONS, OR SHARP BENDS; AND, IF SUITABLY LOCATED TO AVOID CONFLICTS WITH OTHER TRADES OR INSTALLATIONS. CAREFULLY "FISH" ALL EXISTING CONDUITS REUSED UNDER THIS CONTRACT TO REMOVE ALL DEBRIS AND OBSTRUCTIONS, AND SWAB UNTIL ALL MOISTURE IS REMOVED.

CUT, PATCH, AND REPAIR WHERE REQUIRED FOR NEW ELECTRICAL INSTALLATIONS, AND PATCH AND REPAIR ALL SURFACE DAMAGE RESULTING FROM THIS WORK. CUT FLUSH WITH THE FLOOR AND PLUG AT BOTH ENDS RACEWAYS STUBBED ABOVE THE FLOOR AND NOT USED AT SUBSTANTIAL COMPLETION OF THE WORK.

RELOCATE ALL EXISTING ELECTRICAL SYSTEMS REQUIRED TO BE IN OPERATION AT SUBSTANTIAL COMPLETION OF THE CONTRACT, IF REQUIRED, AS A RESULT OF WORK INCLUDED UNDER THIS CONTRACT, EVEN IF NOT SPECIFICALLY INDICATED IN THE DRAWINGS OR SPECIFICATIONS.

EXISTING SERVICE ENTRANCE CONDUCTORS AND FEEDER CONDUCTORS MAY BE REUSED IF ALL OF THE FOLLOWING CONDITIONS ARE MET:

1. CONDUCTOR SIZES MEET OR EXCEED THE SIZES SPECIFIED ON THE DRAWINGS.
2. CONDUCTOR INSULATION IS IN GOOD OR BETTER CONDITION.
3. CONDUCTOR INSULATION IS THE CORRECT TYPE FOR THE CONDITIONS.

C. COINCIDENTAL DAMAGE

AVOID DAMAGING STREETS, SIDEWALKS, DRIVES, PAVING, WALLS, FINISHES, AND OTHER FACILITIES, INCLUDING EQUIPMENT, LIGHT FIXTURES, AND DEVICES THAT ARE EXISTING TO REMAIN, NEW OR REUSED. REPAIR ALL DAMAGE CAUSED IN THE COURSE OF THIS WORK AT NO EXTRA COST TO THE OWNER. REPAIR OR REPLACE ANY EXISTING DAMAGED OR RECALLED ELECTRICAL EQUIPMENT, LIGHT FIXTURES, WIRING DEVICES AND RELATED CIRCUITRY AND RESTORE ALL ELECTRICAL SYSTEMS TO PROPER WORKING ORDER. REPAIR MATERIALS SHALL MATCH EXISTING CONSTRUCTION. REPAIR WORK SHALL MEET ALL REQUIREMENTS OF THE OWNER, LOCAL AUTHORITIES HAVING JURISDICTION, AND MEET THE SATISFACTION OF THE ARCHITECT. REPAIR WORK SHALL BE THOROUGHLY FIRST CLASS AND BE FREE FROM ANY DEFECTS.

D. CUTTING AND PATCHING

CONFORM TO THE REQUIREMENTS IN DIVISION 01. CUT WALLS, FLOORS, CEILINGS, AND OTHER PORTIONS OF THE FACILITY AS REQUIRED TO INSTALL WORK UNDER THIS DIVISION. OBTAIN PERMISSION OF THE ARCHITECT PRIOR TO CUTTING. DO NOT CUT OR DISTURB STRUCTURAL MEMBERS WITHOUT PRIOR APPROVAL FROM THE ARCHITECT. CUT HOLES AS SMALL AS POSSIBLE. PATCH WALLS, FLOORS, AND OTHER PORTIONS OF THE FACILITY AS REQUIRED BY WORK UNDER THIS DIVISION. PATCHING SHALL MATCH THE ORIGINAL MATERIAL AND CONSTRUCTION INCLUDING FIRE RATINGS, IF APPLICABLE. REPAIR AND REFINISH AREAS DISTURBED BY WORK TO THE CONDITION OF ADJOINING SURFACES IN A MANNER SATISFACTORY TO THE ARCHITECT.

E. ROUGH-IN

COORDINATE WITHOUT DELAY ALL ROUGHING-IN WITH OTHER DIVISIONS. CONCEAL ALL CONDUIT AND RACEWAYS EXCEPT IN UNFINISHED AREAS AND WHERE OTHERWISE INDICATED ON THE DRAWINGS.

F. SUPPORT SYSTEMS

STEEL SLOTTED SUPPORT SYSTEMS (SLOTTED CHANNEL): COMPLY WITH MFMA-3, FACTORY-FABRICATED COMPONENTS FOR FIELD ASSEMBLY; 12-GAUGE, 1-5/8-INCH BY 1-5/8-INCH.

FINISHES:

1. METALLIC COATINGS: HOT-DIP GALVANIZED AFTER FABRICATION AND APPLIED ACCORDING TO MFMA-3.

   ALUMINUM SLOTTED SUPPORT SYSTEMS (SLOTTED CHANNEL): COMPLY WITH MFMA-3, TYPE 6063-T6, PER ASTM B221; FACTORY-FABRICATED COMPONENTS FOR FIELD ASSEMBLY; 12-GAUGE, 1-5/8-INCH BY 1-5/8-INCH.

   MANUFACTURERS: COOPER B-LINE, ERICO INTERNATIONAL, HILTI, POWER-STRUT, THOMAS AND BETTS, OR UNISTRUT.

FIELD FABRICATION:

WHERE FIELD CUTTING OF STANDARD LENGTHS OF CHANNEL ARE REQUIRED, MAKE CUTS STRAIGHT AND PERPENDICULAR TO MANUFACTURED SURFACES.

FOR FIELD-CUT OR DAMAGED SURFACES OF COATED CHANNELS, DRESS CUT ENDS, DAMAGED SURFACES, OR BOTH, WITH AN ABRASIVE MATERIAL (E.G., FILE, GRINDING STONE, OR SIMILAR) AND CLEANSER TO REMOVE OILS, RUST, SHARP EDGES, AND SHARDS.

FOR CHANNEL WITH A FACTORY-APPLIED COATING, RE-FINISH CUT EDGES WITH A COATING COMPATIBLE WITH THE FACTORY FINISH AND AS RECOMMENDED BY THE MANUFACTURER (E.G., MANUFACTURER'S TOUCH-UP PAINT OR ZINC-RICH COLD-GALVANIZING COMPOUND, AS APPLICABLE).

G. ACCESS DOORS

PROVIDE ACCESS DOORS FOR ALL CONCEALED EQUIPMENT WHERE INDICATED OR AS REQUIRED, EXCEPT WHERE ABOVE LAY-IN CEILINGS. ACCESS DOORS SHALL BE ADEQUATELY SIZED FOR THE DEVICES SERVED WITH A MINIMUM SIZE OF 18 INCHES X 18 INCHES. ACCESS DOORS MUST BE OF THE PROPER CONSTRUCTION FOR THE TYPE OF CONSTRUCTION IN WHICH IT IS INSTALLED. OBTAIN ARCHITECT'S APPROVAL OF TYPE, SIZE, LOCATION AND COLOR BEFORE ORDERING. PROVIDE FACTORY-FABRICATED AND ASSEMBLED UNITS, COMPLETE WITH ATTACHMENT DEVICES AND FASTENERS READY FOR INSTALLATION, CONCEALED HINGES, FLUSH SCREWDRIVER-OPERATED CAM LOCK, AND ANCHOR STRAPS. PROVIDE ACCESS DOORS MANUFACTURED BY: BAR-CO, J.L. INDUSTRIES, KARP ASSOCIATES, MILCOR, NYSTROM BUILDING PRODUCTS, OADE, OR ZUM.

A. PENETRATIONS

COORDINATE SLEEVE SELECTION AND APPLICATION WITH SELECTION AND APPLICATION OF FIRE-STOPPING SPECIFIED IN DIVISION 07 SECTION "THROUGH-PENETRATION FIRESTOP SYSTEMS."

ROOFS:

1. COORDINATE ALL ROOF PENETRATIONS WITH ENGINEER, OWNER, AND AS APPLICABLE, THE ROOFING CONTRACTOR PROVIDING A ROOF WARRANTY.
2. KEEP ALL RACEWAY PENETRATIONS WITHIN MECHANICAL EQUIPMENT CURBS WHEREVER POSSIBLE. COORDINATE WITH DIVISION 01.
3. FLASH AND COUNTERFLASH ALL OPENINGS THROUGH ROOF, AND/OR PROVIDE PRE-FABRICATED MOLDED SEALS COMPATIBLE WITH THE ROOF CONSTRUCTION INSTALLED, OR AS REQUIRED BY THE ENGINEER, OWNER, OR ROOFING CONTRACTOR. ALL ROOF PENETRATIONS SHALL BE LEAKTIGHT AT THE TERMINATION OF THE WORK AND SHALL NOT VOID ANY NEW OR EXISTING ROOF WARRANTIES.

WALLS AND FLOORS:

1. STEEL PIPE SLEEVES FOR RACEWAYS AND CABLES: ASTM A53/A53M, TYPE E, GRADE B, SCHEDULE 40, GALVANIZED STEEL, PLAIN ENDS, AND DRIP RINGS.
2. CAST-IRON PIPE SLEEVES FOR RACEWAYS AND CABLES: CAST OR FABRICATED "WALL PIPE," EQUIVALENT TO DUCTILE-IRON PRESSURE PIPE, WITH PLAIN ENDS AND INTEGRAL WATERSTOP, UNLESS OTHERWISE INDICATED.
3. SLEEVES FOR RECTANGULAR OPENINGS: GALVANIZED SHEET STEEL WITH MINIMUM 0.052 INCH THICKNESS AND OF LENGTH TO SUIT APPLICATION.

B. FIRESTOPPING

SEALANTS AND ACCESSORIES SHALL HAVE FIRE-RESISTANCE RATINGS INDICATED, AS ESTABLISHED BY TESTING IDENTICAL ASSEMBLIES IN ACCORDANCE WITH UL 2079 OR ASTM E 814, OR OTHER NRTL ACCEPTABLE TO AHJ.

MANUFACTURERS: HILTI, RECTORSEAL, SPECIFIED TECHNOLOGIES INC., UNITED STATES GYPSUM COMPANY, OR 3M CORP.

THROUGH AND MEMBRANE PENETRATION FIRESTOPPING SYSTEMS PRODUCT SCHEDULE: PROVIDE UL LISTING, LOCATION, WALL OR FLOOR RATING, AND INSTALLATION DRAWING FOR EACH PENETRATION FIRE STOP SYSTEM.

WHERE PROJECT CONDITIONS REQUIRE MODIFICATION TO QUALIFIED TESTING AND INSPECTING AGENCY'S ILLUSTRATIONS FOR A PARTICULAR FIRESTOPPING CONDITION, SUBMIT ILLUSTRATION, WITH MODIFICATIONS MARKED, APPROVED BY PENETRATION FIRESTOPPING MANUFACTURER'S FIRE-PROTECTION ENGINEER AS AN ENGINEERING JUDGMENT OR EQUIVALENT FIRE-RESISTANCE-RATED ASSEMBLY. INCLUDE QUALIFICATIONS DATA FOR TESTING AGENCY.

C. EQUIPMENT FURNISHED BY OTHERS

PROVIDE NECESSARY EQUIPMENT AND ACCESSORIES THAT ARE NOT PROVIDED BY THE EQUIPMENT SUPPLIER OR OWNER TO COMPLETE INSTALLATION OF EQUIPMENT FURNISHED BY OTHERS IN LOCATIONS AS INDICATED ON THE DRAWINGS, SPECIFIED HEREIN, OR BOTH. EQUIPMENT AND ACCESSORIES NOT PROVIDED BY THE EQUIPMENT SUPPLIER MAY INCLUDE, BUT NOT BE LIMITED TO, FLEXIBLE CORDS AND PLUGS AS REQUIRED FOR PROPER OPERATION OF THE COMPLETE SYSTEM, IN ACCORDANCE WITH THE MANUFACTURERS' INSTRUCTIONS.

CONTRACTOR SHALL BE RESPONSIBLE FOR CORRECT ROUGH-IN DIMENSIONS, AND VERIFY THEM WITH ARCHITECT AND/OR EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN AND SERVICE INSTALLATIONS.

D. SYSTEM TESTING AND ADJUSTING

ADJUST, ALIGN, AND TEST ALL ELECTRICAL EQUIPMENT ON THIS PROJECT PROVIDED UNDER THIS DIVISION AND ALL ELECTRICAL EQUIPMENT FURNISHED BY OTHERS FOR INSTALLATION OR WIRING UNDER THIS DIVISION FOR PROPER OPERATION.

TEST ALL SYSTEMS AND EQUIPMENT ACCORDING TO THE REQUIREMENTS IN NETA ATS (LATEST EDITION) AND ALL ADDITIONAL REQUIREMENTS SPECIFIED IN FOLLOWING SECTIONS.

MAINTAIN THE FOLLOWING ON THE PROJECT PREMISES AT ALL TIMES: A TRUE RMS READING VOLTMETER, A TRUE RMS READING AMMETER, AND A MEGOHMMETER INSULATION RESISTANCE TESTER. PROVIDE TEST DATA READINGS AS REQUESTED OR AS REQUIRED BY THE ENGINEER.

E. EQUIPMENT IDENTIFICATION

PROVIDE EQUIPMENT IDENTIFICATION NAMEPLATES ON ALL SWITCHBOARDS, PANELBOARDS, ELECTRICAL EQUIPMENT ENCLOSURES, ACCESS DOORS, TRANSFORMERS, DISCONNECT SWITCHES, ENCLOSED CIRCUIT BREAKERS, MOTOR STARTERS, FEEDER DEVICES IN SWITCHBOARDS, DISTRIBUTION PANELBOARDS, AND MOTOR CONTROL CENTERS AND WHERE INDICATED ON THE DRAWINGS.

NAMEPLATES:

1. ENGRAVED, CONTRASTING COLOR, THREE-LAYER, LAMINATED PLASTIC, INDICATING THE NAME OF THE EQUIPMENT, LOAD, OR CIRCUIT AS DESIGNATED ON THE DRAWINGS AND IN THE SPECIFICATIONS:
2. FIELD-APPLIED PERMANENT EPOXY ADHESIVE, COMPATIBLE WITH THE EQUIPMENT FINISH.

ATTACHMENT METHOD SHALL BE ACCEPTABLE TO THE MANUFACTURERS OF THE EQUIPMENT TO WHICH THE NAMEPLATES ARE BEING APPLIED.

NAMEPLATE COLOR:

1. BLACK BACKGROUND WITH WHITE LETTERS FOR NORMAL POWER;
2. RED BACKGROUND WITH WHITE LETTERS FOR EMERGENCY POWER.
3. LETTER HEIGHT: 1/8-INCH MINIMUM.

F. SYSTEM START UP

PERFORM THE FOLLOWING PRIOR TO STARTING UP THE ELECTRICAL SYSTEMS;

1. CHECK ALL COMPONENTS AND DEVICES AND LUBRICATE ITEMS ACCORDINGLY.
2. TIGHTEN SCREWS AND BOLTS FOR CONNECTORS AND TERMINALS ACCORDING TO MANUFACTURER'S PUBLISHED TORQUE-TIGHTENING VALUES. IF MANUFACTURER'S TORQUE VALUES ARE NOT INDICATED, USE THOSE SPECIFIED IN UL 486A AND UL 486B.
3. ADJUST TAPS ON EACH TRANSFORMER FOR RATED SECONDARY VOLTAGE WHEN THE TRANSFORMER IS AT MINIMUM LOAD.
4. CHECK AND RECORD BUILDING'S SERVICE ENTRANCE VOLTAGE, GROUNDING CONDITIONS, GROUNDING RESISTANCE, AND PROPER PHASING.
5. REPLACE ALL BURNED-OUT LAMPS AND LAMPS USED FOR TEMPORARY CONSTRUCTION LIGHTING IN PERMANENT LIGHT FIXTURES.
6. AFTER ALL SYSTEMS HAVE BEEN INSPECTED AND ADJUSTED, CONFIRM ALL OPERATING FEATURES REQUIRED BY THE DRAWINGS AND SPECIFICATIONS AND MAKE FINAL ADJUSTMENTS AS NECESSARY.

END OF SECTION 26
DIVISION 26: BASIC ELECTRICAL MATERIAL AND METHODS

1 RACEWAYS

A. METALLIC CONDUIT AND TUBING

ELECTRICAL METALLIC TUBING, COUPLINGS, AND FITTINGS (EMT): ANSI C80.3, UL 797. ONLY STEEL PRODUCTS ALLOWED.

FLEXIBLE METAL CONDUIT (FMC): ZINC-COATED STEEL OR ALUMINUM, UL 1. REDUCED-WALL FMC IS NOT ALLOWED.

INTERMEDIATE METAL CONDUIT (IMC): HOT-DIP GALVANIZED RIGID STEEL CONDUIT, ANSI C80.6, UL 1242.

LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC): FLEXIBLE STEEL CONDUIT WITH PVC JACKET, UL 360; FITTINGS: NEMA FB 1.

RIGID METAL CONDUIT (RMC):

1. HOT-DIP GALVANIZED RIGID STEEL CONDUIT (GRS): ANSI C80.1, UL 6.

PLASTIC-COATED IMC, RMC, AND FITTINGS: NEMA RN 1, NRTL LISTED. COATING THICKNESS OF 0.04 INCHES MINIMUM.

IMC AND RMC FITTINGS: NEMA FB 1; COMPATIBLE WITH CONDUIT TYPE AND MATERIAL, NRTL LISTED.

MANUFACTURERS: AFC CABLE, ALFLEX, ANAMET ELECTRICAL, ELECTRI-FLEX, INDALEX, MANHATTAN/CDT/COLE-FLEX, O-Z/GEDNEY, REPUBLIC RACEWAY, TYCO INTERNATIONAL, WESTERN TUBE AND CONDUIT, OR WHEATLAND TUBE.

B. NON-METALLIC CONDUIT AND TUBING

RIGID NONMETALLIC CONDUIT (RNC): SCHEDULE 40 PVC, 90 DEG C RATED, NEMA TC-2, UL 651

FITTINGS: NEMA TC 3, TC 6; UL 651, COMPATIBLE WITH CONDUIT/TUBING TYPE AND MATERIAL, NRTL LISTED.

MANUFACTURERS: ABB, AMERICAN CONDUIT, AMERICAN PIPE AND PLASTICS, ANAMET ELECTRICAL, AKCORE, CANTEX, CARLON, ELECTRI-FLEX, HUBBELL, IPEX USA, NUCOR TUBULAR PRODUCTS, O-Z/GEDNEY, PRIME CONDUIT, SOUTHWIRE, SUPERFLEX LTD, WESTERN TUBE AND CONDUIT, OR WHEATLAND TUBE.

2. RACEWAY INSTALLATIONS

A. GENERAL RACEWAY INSTALLATIONS REQUIREMENTS

INSTALL RACEWAYS PARALLEL AND PERPENDICULAR TO BUILDING LINES.

INSTALL RACEWAYS TO REQUIREMENTS OF STRUCTURE, TO REQUIREMENTS OF ALL OTHER WORK ON THE PROJECT, AND TO CLEAR ALL OPENINGS, DEPRESSIONS, PIPES, DUCTS, REINFORCING STEEL, AND OTHER IMMOVABLE OBSTACLES.

INSTALL RACEWAYS SET IN FORMS FOR CONCRETE STRUCTURE IN SUCH A MANNER THAT INSTALLATION WILL NOT AFFECT THE STRENGTH OF THE STRUCTURE.

EXCEPT WHERE APPROVED IN WRITING BY THE ENGINEER, INSTALL NO RACEWAY IN A SLAB-ON-GRADE. LOCATE RACEWAY BELOW GRANULAR FILL BELOW SLABS-ON-GRADE.

INSTALL RACEWAYS A MINIMUM OF 24"] BELOW BOTTOM OF SLAB/PAVING/GRADE WHERE PRACTICABLE.

INSTALL RACEWAYS CONTINUOUS BETWEEN CONNECTIONS TO OUTLETS, BOXES, AND CABINETS WITH A MINIMUM POSSIBLE NUMBER OF BENDS AND NOT MORE THAN THE EQUIVALENT OF FOUR 90-DEGREE BENDS BETWEEN CONNECTIONS. USE MANUFACTURED ELBOWS FOR ALL 45- AND 90-DEGREE BENDS, UNLESS APPROVED BY THE ENGINEER IN ADVANCE. MAKE OTHER BENDS SMOOTH, EVEN AND WITHOUT FLATTENING RACEWAY OR FLAKING GALVANIZING OR ENAMEL. RADII OF BENDS SHALL BE AS LONG AS POSSIBLE AND NEVER SHORTER THAN THE CORRESPONDING TRADE ELBOW.

CONCEAL RACEWAYS FROM VIEW UNLESS NOTED OR APPROVED OTHERWISE.

ROUTE RACEWAYS SERVING ROOFTOP EQUIPMENT INSIDE EQUIPMENT CURB AND MINIMIZE ROOF PENETRATIONS AND EXTERIOR RACEWAY RUNS. SUPPORT RACEWAY FROM STRUCTURE, DO NOT SUPPORT FROM THE ROOF DECKING. MAINTAIN 2" SPACING BETWEEN THE RACEWAY AND ROOF DECK TO PREVENT ROOFING SCREWS FROM PENETRATING RACEWAY. DO NOT ROUTE RACEWAYS ACROSS SKYLIGHTS OR OTHER ROOF PENETRATIONS.

ROUTE ALL EXPOSED NON-FLEXIBLE RACEWAYS TIGHT TO STRUCTURE, PARALLEL TO BUILDING LINES IN STRUT OR CABLE TRAY WHERE PRACTICABLE. INSTALL RACEWAYS PLUMB/LEVEL WHERE EXPOSED TO VIEW.

USE LONG RADIUS ELBOWS FOR ALL UNDERGROUND INSTALLATIONS, WHERE NECESSARY, OR WHERE OTHERWISE INDICATED.

SECURELY FASTEN RACEWAYS IN PLACE WITH APPROVED STRAPS, HANGERS, AND STEEL SUPPORTS AS REQUIRED. ATTACH RACEWAY SUPPORTS TO THE BUILDING STRUCTURE. HANG SINGLE RACEWAYS FOR FEEDERS WITH MALLEABLE SPLIT RING HANGERS WITH ROD AND TURNBUCKLE SUSPENSION FROM INSERTS SPACED NOT OVER 10 FEET APART IN CONSTRUCTION ABOVE. CLAMP GROUPS OF HORIZONTAL FEEDER RACEWAYS TO STEEL CHANNELS THAT ARE SUSPENDED FROM INSERTS SPACED NOT OVER 10 FEET APART IN CONSTRUCTION ABOVE. SECURELY CLAMP VERTICAL FEEDER RACEWAYS TO STRUCTURAL STEEL MEMBERS ATTACHED TO STRUCTURE. INSTALL CABLE CLAMPS FOR SUPPORT OF VERTICAL FEEDERS WHERE REQUIRED. ADD RACEWAY SUPPORTS WITHIN 12 INCHES OF ALL BENDS, ON BOTH SIDES OF THE BENDS. DO NOT SUPPORT RACEWAYS FROM SUSPENDED CEILING COMPONENTS.

REAM RACEWAY ENDS, THOROUGHLY CLEAN RACEWAYS BEFORE INSTALLATION, AND KEEP CLEAN AFTER INSTALLATION. PLUG OR COVER OPENINGS AND BOXES AS REQUIRED TO KEEP RACEWAYS CLEAN DURING CONSTRUCTION AND FISH ALL RACEWAYS CLEAR OF OBSTRUCTIONS BEFORE PULLING CONDUCTOR WIRES. PROVIDE RACEWAYS OF AMPLE SIZE FOR PULLING OF WIRE, NOT SMALLER THAN CODE REQUIREMENTS AND NOT LESS THAN 1/2-INCH IN SIZE, UNLESS INDICATED OTHERWISE ON DRAWINGS. HOMERUNS CONTAINING MORE THAN ONE BRANCH CIRCUIT SHALL NOT BE LESS THAN 3/4-INCH IN SIZE.

PROTECT ALL RACEWAY INSTALLATIONS AGAINST DAMAGE DURING CONSTRUCTION. REPAIR ALL RACEWAYS DAMAGED OR MOVED OUT OF LINE AFTER ROUGHING-IN TO MEET ENGINEER'S APPROVAL WITHOUT ADDITIONAL COST TO THE OWNER.

ALIGN AND INSTALL TRUE AND PLUMB ALL RACEWAY TERMINATIONS AT PANELBOARDS, SWITCHBOARDS, MOTOR CONTROL EQUIPMENT, AND JUNCTION BOXES.

INSTALL APPROVED EXPANSION/DEFLECTION FITTINGS WHERE RACEWAYS PASS THROUGH (IF EMBEDDED) OR ACROSS (IF EXPOSED) EXPANSION JOINTS, AND WHEN USING RNC OR RAC IN EXPOSED ENVIRONMENTS IN ACCORDANCE WITH NFPA 70 AND EXPANSION/CONTRACTION PROPERTIES OF RNC OR RAC.

INSTALL A PULL WIRE IN EACH EMPTY RACEWAY THAT IS LEFT FOR INSTALLATION OF CONDUCTORS OR CABLES UNDER OTHER DIVISIONS OR CONTRACTS. USE POLYPROPYLENE OR MONOFILAMENT PLASTIC LINE WITH NOT LESS THAN 200-LB TENSILE STRENGTH. LEAVE AT LEAST 24 INCHES OF SLACK AT EACH END OF PULL WIRE.

TERMINATE ALL CONDUIT STUB-UPS WITH NYLON BUSHINGS.

MAKE ALL JOINTS AND CONNECTIONS IN A MANNER THAT WILL ENSURE MECHANICAL STRENGTH AND ELECTRICAL CONTINUITY.

COORDINATE RACEWAY ROUTING AND INSTALLATION WITH OTHER TRADES PRIOR TO ROUGH-IN AND INSTALLATION.

PROJECT LOCATION:
TECOVAS

B. ABOVE GROUND RACEWAY USE

INSTALL ALL CIRCULAR RACEWAYS CONCEALED ABOVE SUSPENDED CEILINGS OR CONCEALED IN WALLS OR FLOORS WHEREVER POSSIBLE EXCEPT WHERE OTHERWISE INDICATED. PROVIDE GRS FOR ALL CONDUITS EXPOSED TO WEATHER OR OTHER HAZARDOUS CONDITIONS.

UNLESS NOTED OTHERWISE, ALL OTHER RACEWAY MAY BE EMT WHERE APPROVED BY LOCAL CODE. USE COMPRESSION TYPE FITTINGS FOR EMT, WITH ALL FITTINGS NRTL LISTED FOR THE ENVIRONMENT IN WHICH THEY ARE USED. UNLESS NOTED OTHERWISE, SET-SCREW TYPE FITTINGS ARE NOT ALLOWED.

C. UNDERGROUND RACEWAY USE:

PROVIDE GRS INSTALLED BELOW GRADE WITH A CORROSION-RESISTANT BONDED-PLASTIC OR APPROVED MASTIC COATING. THIS SHALL INCLUDE THE 90-DEGREE ELBOW BELOW GRADE AND THE ENTIRE VERTICAL TRANSITION TO ABOVE GRADE.

RNC CONDUIT MAY BE USED UNDERGROUND WHERE PERMITTED BY LOCAL CODE AND WHERE NOT SPECIFICALLY RESTRICTED BY THESE DOCUMENTS. WHEN USED, PROVIDE PLASTIC-COATED GRS, AS SPECIFIED ABOVE, FOR ALL BENDS GREATER THAN 30 DEGREES, INCLUDING THE 90-DEGREE ELBOWS BELOW GRADE AND THE ENTIRE VERTICAL RISERS FOR TRANSITIONS FROM BELOW TO ABOVE GRADE OR ABOVE SLAB.

ALL SITE ELECTRICAL CONDUITS SHALL BE 1" MINIMUM, UNLESS NOTED OTHERWISE.

D. EQUIPMENT CONNECTIONS

USE FMC FOR FINAL CONNECTION TO EACH MOTOR, TRANSFORMER, AND ANY DEVICE THAT WOULD OTHERWISE TRANSMIT MOTION, VIBRATION, OR NOISE. USE LFMC WHERE EXPOSED TO LIQUIDS, VAPORS, OR SUNLIGHTPROVIDE ALL FMC AND LFMC WITH AN INSULATED BONDING CONDUCTOR.

USE ONLY METAL RACEWAYS FOR ALL POWER WIRING FROM THE OUTPUT OF VARIABLE FREQUENCY DRIVES TO THEIR RESPECTIVE MOTORS.

E. BUSHINGS AND LOCKNUTS

RIGIDLY TERMINATE CONDUITS ENTERING SHEET METAL ENCLOSURES TO THE ENCLOSURE WITH A BUSHING AND LOCKNUT ON THE INSIDE AND A LOCKNUT OR AN APPROVED HUB ON THE OUTSIDE. CONDUIT SHALL ENTER THE ENCLOSURE SQUARELY.

PROVIDE BUSHINGS AND LOCKNUTS MADE OF GALVANIZED MALLEABLE IRON WITH SHARP, CLEAN-CUT THREADS.

WHERE EMT ENTERS A BOX, PROVIDE APPROVED EMT COMPRESSION CONNECTORS.

USE INSULATED, GROUNDING, OR COMBINATION BUSHINGS WHEREVER CONNECTION IS SUBJECT TO VIBRATION AND/OR MOISTURE, OR WHEN REQUIRED BY NFPA 70.

PROVIDE NYLON BUSHINGS FOR ALL COMMUNICATIONS AND LOW VOLTAGE WIRING CONDUITS AND SLEEVES, UNLESS NOTED OTHERWISE.

3 CONDUCTORS AND CABLES

A. GENERAL CONDUCTORS AND CABLE REQUIREMENTS

ANNEALED (SOFT) COPPER COMPLYING WITH ICEA S-95-658/NEMA WC70 AND UL STANDARDS 44 OR 83 AS APPLICABLE.

CONDUCTOR INSULATION TYPES: 90-DEGREE C-RATED, TYPE THHN/THWN-2 OR XHHW-2 COMPLYING WITH ICEA S-95-658/NEMA WC70.

SIZES OF CONDUCTORS AND CABLES INDICATED OR SPECIFIED ARE IN AMERICAN WIRE GAGE (AWG - BROWN AND SHARPE).

ALL FEEDER AND BRANCH CIRCUIT CONDUCTORS NO. 8 AWG AND LARGER: STRANDED.

ALL CONDUCTORS, NO. 10 AWG AND SMALLER: SOLID COPPER.

ALL BRANCH CIRCUIT WIRING: NOT SMALLER THAN NO. 12 AWG. IF NO CONDUCTOR SIZE IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE CONDUCTORS AND CONDUIT SIZED PER NFPA 70 AND BASED ON THE INDICATED BRANCH CIRCUIT OVERCURRENT PROTECTIVE DEVICE (OCPD) RATING AND NUMBER OF POLES. WHERE NO CIRCUIT SIZE (I.E., CONDUCTORS AND OCPD) IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE THREE NO.12 AWG CONDUCTORS, IN 3/4-INCH RACEWAY, AND A 20A CIRCUIT BREAKER.

CONTROL WIRING: STRANDED COPPER CONDUCTORS, 600V INSULATION, OF THE PROPER TYPE, SIZE, AND NUMBER AS REQUIRED TO ACCOMPLISH SPECIFIED FUNCTION. MINIMUM SIZE: NO. 14 AWG, UNLESS NOTED OTHERWISE.

FLEXIBLE CORDS AND CABLES: STRANDED COPPER CONDUCTORS FOR ALL, UNLESS NOTED OTHERWISE.

SPECIAL PURPOSE CONDUCTORS AND CABLES, SUCH AS LOW VOLTAGE CONTROL AND SHIELDED INSTRUMENT WIRING: AS RECOMMENDED BY THE SYSTEM EQUIPMENT MANUFACTURER UNLESS INDICATED OTHERWISE.

COPPER CONDUCTOR MANUFACTURERS: ALAN WIRE, CERROWIRE, COLONIAL WIRE & CABLE, ENCORE WIRE, GENERAL CABLE, NORTHERN CABLES, OKONITE, OR SOUTHWIRE.

COPPER CONDUCTOR MANUFACTURERS: ALAN WIRE, CERROWIRE, COLONIAL WIRE & CABLE, ENCORE WIRE, GENERAL CABLE, NORTHERN CABLES, OKONITE, OR SOUTHWIRE.

CONNECTIONS: APPLY A ZINC BASED ANTI OXIDIZING COMPOUND TO CONNECTIONS. DO NOT USE TERMINALS ON WIRING DEVICES TO FEED THROUGH TO THE NEXT DEVICE.

B. CONDUCTORS AND CABLE INSTALLATION

INSTALL ALL WIRING IN APPROVED RACEWAY AND ENCLOSURES, EXCEPT WHERE SPECIFIED OR INDICATED FOR LOW-VOLTAGE WIRING, WHERE SPECIFIED OR INDICATED FOR DIRECT-BURIED CABLES, OR WHERE TYPE MC CABLE IS INDICATED OR SPECIFIED AS ACCEPTABLE.

INSTALL ALL CONDUCTORS AND CABLES IN RACEWAYS CONTINUOUS WITHOUT TAPS OR SPLICES. SPLICE OR TAP ONLY IN APPROVED BOXES AND ENCLOSURES WITH APPROVED SOLDERLESS CONNECTORS, OR CRIMP CONNECTORS AND TERMINAL BLOCKS FOR CONTROL WIRING, AND KEEP TO THE MINIMUM REQUIRED. INSULATE ALL SPLICES, TAPS, AND JOINTS AS REQUIRED BY CODES.

ALL MATERIALS USED TO TERMINATE, SPLICE, OR TAP CONDUCTORS: DESIGNED FOR, PROPERLY SIZED FOR, AND NRTL LISTED FOR THE SPECIFIC APPLICATION AND CONDUCTORS INVOLVED, AND INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, USING THE MANUFACTURER'S RECOMMENDED TOOLS.

WHERE WIRING IS INDICATED AS INSTALLED, BUT THE CONNECTION IS INDICATED "FUTURE" OR "BY OTHER DIVISION, TRADES, OR CONTRACTS", LEAVE A MINIMUM 3-FOOT "PIGTAIL" AT THE BOX, TAPE THE ENDS OF THE CONDUCTORS, AND COVER THE BOX.

IN GENERAL, THE DIRECTION OF BRANCH CIRCUIT "HOME RUN" ROUTING IS INDICATED ON THE DRAWINGS, COMPLETE WITH CIRCUIT NUMBERS AND PANELBOARD DESIGNATION. CONTINUE ALL SUCH "HOME RUN" WIRING TO THE DESIGNATED PANELBOARD, AS THOUGH "CIRCUIT RUNS" WERE INDICATED IN THEIR ENTIRETY. COMMON OR SHARED NEUTRALS ARE NOT ALLOWED UNLESS SHOWN ON THE DRAWINGS TO BE USED OR SPECIFICALLY NOTED TO BE ALLOWED.

WHERE MULTI-WIRE BRANCH CIRCUITS (I.E., SHARED NEUTRAL) ARE ALLOWED, THEY SHALL BE PROVIDED WITH A MEANS THAT WILL SIMULTANEOUSLY DISCONNECT ALL UNGROUNDED CONDUCTORS AT THE POINT THE BRANCH CIRCUIT ORIGINATES. MULTI-POLE BREAKERS OR 3 SINGLE-POLE BREAKERS WITH A HANDLE TIE ARE TWO EXAMPLES.

WHEN MULTIPLE HOME RUNS ARE COMBINED INTO A SINGLE RACEWAY SUCH THAT THE NUMBER OF CONDUCTORS EXCEEDS FOUR (CONDUCTOR COUNT IS MADE UP OF ANY COMBINATION OF PHASE AND NEUTRAL CONDUCTORS), THE FOLLOWING RESTRICTIONS APPLY, WHICH ARE IN ADDITION TO THOSE IN NFPA 70:

NORMAL OR NON-ESSENTIAL CIRCUITS:

1. MAXIMUM OF 16 CONDUCTORS IN A SINGLE RACEWAY. FOR UP TO EIGHT CONDUCTORS IN A RACEWAY, MINIMUM RACEWAY SIZE: 3/4-INCH. FOR GREATER THAN EIGHT CONDUCTORS, MINIMUM RACEWAY SIZE: 1-INCH. DO NOT INSTALL ANY OTHER TYPE OF CIRCUIT IN THIS RACEWAY.
2. MINIMUM WIRE SIZE FOR ALL CONDUCTORS IN THIS RACEWAY: NO. 10 AWG.
3. ONLY 15A AND 20A BRANCH CIRCUIT HOMERUNS MAY BE COMBINED INTO ONE RACEWAY.

GFCI CIRCUITS:

1. DO NOT USE MULTI-CONDUCTOR CIRCUITS, WITH A SHARED NEUTRAL, FOR ANY GFCI CIRCUIT BREAKER OR RECEPTACLE CIRCUIT.

FOR BRANCH CIRCUITS FED FROM GFCI CIRCUIT BREAKERS, LIMIT THE ONE-WAY CONDUCTOR LENGTH TO 100 FEET BETWEEN THE PANELBOARD AND THE MOST REMOTE RECEPTACLE OR LOAD ON THE GFCI CIRCUIT.

PROPERLY IDENTIFY ALL TERMINAL BLOCKS AND WIRE TERMINALS FOR CONTROL WIRING WITH VINYL STICK-ON MARKERS OR EQUIVALENT. PROVIDE ENGINEER WITH A LIST OF PROPOSED IDENTIFYING NUMBERS FOR REVIEW PRIOR TO INSTALLING MARKERS.

PROVIDE AN EQUIPMENT-GROUNDING CONDUCTOR OR BONDING JUMPER, AS APPLICABLE, IN ALL FEEDERS AND BRANCH CIRCUITS, SIZED IN ACCORDANCE WITH NFPA 70 TABLES 250.66 OR 250.122, AS APPLICABLE, UNLESS INDICATED AS LARGER ON THE DRAWINGS.

VOLTAGE DROP IN BRANCH CIRCUITS SHALL NOT EXCEED 3 PERCENT.

WIRING SHALL HAVE INSULATION OF THE PROPER COLOR TO MATCH COLOR CODE SYSTEM IN THE TABLE BELOW UNLESS THERE IS A COLOR SYSTEM CURRENTLY IN USE BY THE FACILITY, UTILITY, OR ENFORCED BY LOCAL AMENDMENTS, IN WHICH CASE THE COLORS ARE TO MATCH THE REQUIREMENTS SET FORTH BY THE AHJ, UTILITY OR FACILITY MANAGEMENT. IN LARGER SIZES WHERE PROPERLY COLORED INSULATION IS NOT AVAILABLE, USE VINYL PLASTIC ELECTRICAL TAPE OF THE APPROPRIATE COLOR AROUND EACH CONDUCTOR AT ALL TERMINATION POINTS, JUNCTIONS, AND PULL BOXES.

SYSTEM VOLTAGE:

240V AND UNDER, INCLUDING 208Y/120, 120/208 , AND 240D/120 SYSTEMS:

1. PHASE A: BLACK.
2. PHASE B: RED.
3. PHASE C: BLUE.
4. NEUTRAL: WHITE.
5. EQUIPMENT GROUND: GREEN.
6. ISOLATED GROUND: GREEN WITH YELLOW STRIPE.

C. MC CABLE

METAL-CLAD CABLE (MC CABLE): 600V, UNJACKETED; UL STANDARD 83, 1569, AND 1685; NFPA 70 ARTICLE 330; ALUMINUM OR GALVANIZED STEEL INTERLOCKED ARMOR; THHN- OR XHHW-INSULATED CONDUCTORS; COLOR CODE: ICEA METHOD 1, WITH GREEN INSULATED GROUNDING CONDUCTOR; LISTED FOR USE IN UL 1, 2, AND 3 HOUR THROUGH-PENETRATION FIRESTOP SYSTEMS. MC CABLE MANUFACTURERS: ATKORE/AFC CABLE SYSTEMS, CERROWIRE, ENCORE WIRE CORPORATION, KAF-TECH, NORTHERN CABLES, OR SOUTHWIRE.

D. APPLICATION OF MC CABLE

IN LIEU OF FLEXIBLE CONDUIT AND WIRING FROM LIGHT FIXTURES LOCATED IN ACCESSIBLE CEILINGS TO JUNCTION BOXES ATTACHED TO BUILDING STRUCTURE DIRECTLY ABOVE THE CEILING. PROVIDE CABLE WHIPS OF SUFFICIENT LENGTHS TO ALLOW FOR RELOCATING EACH LIGHT FIXTURE WITHIN A 5 FOOT RADIUS OF ITS INSTALLED LOCATION, BUT NOT EXCEEDING 6 FEET IN UNSUPPORTED LENGTHS.

E. PROHIBITED USE OF MC CABLE UNLESS NOTED ABOVE

EXAMPLES OF THOSE USES INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING:
1. HOMERUNS TO PANELBOARDS (REFER TO SECTION 26: DEFINITIONS).
2. WHERE EXPOSED TO VIEW.
3. WHERE EXPOSED TO DAMAGE.
4. HAZARDOUS LOCATIONS.
5. WET LOCATIONS.
6. WHEN RESTRICTED OTHERWISE.
7. WHEN SPECIFICALLY DISALLOWED BY THE LOCAL AHJ.
8. WHEN SPECIFICALLY DISALLOWED BY THE LANDLORD.
9. CIRCUITS SUPPLIED BY AN EMERGENCY OR STANDBY POWER SOURCE.

F. MC CABLE INSTALLATION

SECURE AND SUPPORT CABLE PER NFPA 70 ARTICLE 330. SECURE CABLE WITHIN 12 INCHES OF EVERY BOX OR FITTING. SECURING AND SUPPORTING INTERVALS SHALL NOT EXCEED SIX FEET. MAINTAIN CONSISTENT SPACING TO AVOID DERATING DUE TO BUNDLING PER NFPA 70 SECTION 310.15. UTILIZE STEEL CABLE HANGERS, ARLINGTON SMC SERIES OR EQUIVALENT, TO SUPPORT WHEREVER POSSIBLE SO CABLES CAN BE ROUTED IN A NEAT AND WORKMANSHIP LIKE MANNER.

4 JUNCTION BOXES, PULL BOXES, CABINETS, AND WIREWAYS

PROVIDE JUNCTION BOXES, PULL BOXES, CABINETS, AND WIREWAYS WHEREVER NECESSARY FOR PROPER INSTALLATION OF VARIOUS ELECTRICAL SYSTEMS ACCORDING TO NFPA 70 AND WHERE INDICATED ON THE DRAWINGS. SIZE AS REQUIRED FOR THE SPECIFIC FUNCTION OR AS REQUIRED BY NFPA 70, WHICHEVER IS LARGER. CONSTRUCTION SHALL BE OF A NEMA DESIGN SUITABLE FOR THE ENVIRONMENT INSTALLED.

JUNCTION BOXES INSTALLED BEHIND WALL CASES AND IN OR ON OTHER STORE FIXTURES, EXCEPT WHERE OTHERWISE SPECIFIED, SHALL BE 4 INCHES SQUARE OR LARGER WITH GALVANIZED COVERS.

HORIZONTALLY MOUNT JUNCTION BOXES UNDER CENTER FIXTURES (AND CASES), HANDY BOXES OR 4-INCH SQUARE BOXES WITH TOPS OF BOXES NOT MORE THAN 3-1/2 INCHES ABOVE THE FLOOR. SIZE JUNCTION BOXES TO ADEQUATELY CONTAIN ALL REQUIRED CONDUCTORS AND SPLICES.

5 OUTLET BOXES

ALL OUTLETS INCLUDING LIGHT FIXTURE, SWITCH, RECEPTACLE, AND SIMILAR OUTLETS: GALVANIZED STEEL KNOCKOUT BOXES, SUITABLE IN DESIGN TO THE PURPOSE THEY SERVE AND THE SPACE THEY OCCUPY. SIZE AS REQUIRED FOR THE SPECIFIC FUNCTION OR AS REQUIRED BY NFPA 70, WHICHEVER IS LARGER. SET ALL OUTLET BOXES IN WALLS, COLUMNS, FLOORS, OR CEILINGS SO THEY ARE FLUSH WITH THE FINISHED SURFACE, ACCURATELY SET, AND RIGIDLY SECURED IN POSITION. PROVIDE PLASTER RINGS, EXTENSION RINGS AND/OR MASONRY RINGS AS REQUIRED FOR FLUSH MOUNTING. PROVIDE APPROVED CAST OUTLET BOXES WITH HUBS AND WEATHERPROOF COVERS IN ALL AREAS SUBJECT TO DAMP, WET, OR HARSH CONDITIONS.

MANUFACTURERS: APPLETON, COOPER, ERIKSON ELECTRICAL, HOFFMAN, KILLARK ELECTRIC, O-Z/GEDNEY, RACO, ROBROY INDUSTRIES, SCOTT FETZER, SPRING CITY ELECTRICAL, THOMAS AND BETTS, WALKER SYSTEMS, OR WOODHEAD.

6 OUTLET LOCATIONS

COORDINATE LOCATIONS OF OUTLET BOXES. OUTLETS ARE ONLY APPROXIMATELY LOCATED ON THE SMALL SCALE DRAWINGS. USE GREAT CARE IN THE ACTUAL LOCATION BY CONSULTING THE VARIOUS LARGE SCALE DETAILED DRAWINGS USED BY OTHER DIVISION TRADES, AND BY SECURING DEFINITE LOCATIONS FROM THE ARCHITECT.

7 MOUNTING HEIGHTS

UNLESS NOTED OTHERWISE, INSTALL WIRING DEVICES VERTICALLY ALIGNED AT HEIGHT INDICATED ON CONSTRUCTION DRAWINGS.

8 RECEPTACLES

UNLESS INDICATED OTHERWISE, INSTALL VERTICALLY WITH THE GROUND SLOT MOUNTED AT THE TOP.

WHERE INSTALLED HORIZONTALLY, INSTALL WITH THE NEUTRAL SLOT MOUNTED AT THE TOP.

ABOVE COUNTER: MOUNT VERTICALLY ALIGNED.

MECHANICAL AND ELECTRICAL EQUIPMENT ROOMS AND JANITORS CLOSETS: MOUNT VERTICALLY ALIGNED.

GARAGES: MOUNT VERTICALLY ALIGNED.

WEATHERPROOF EXTERIOR RECEPTACLES: HORIZONTALLY ALIGNED.

GFCI RECEPTACLES: SAME AS GENERAL RECEPTACLES.

ISOLATED GROUND RECEPTACLES: SAME AS GENERAL RECEPTACLES.

SPD RECEPTACLES: SAME AS GENERAL RECEPTACLES.

CLOCK RECEPTACLES: 84 INCHES ABOVE FINISHED FLOOR.

CONCRETE BLOCK WALLS: AS LONG AS ADA REQUIREMENTS ARE MAINTAINED, DIMENSIONS ABOVE MAY BE ADJUSTED SLIGHTLY AS REQUIRED TO COMPENSATE FOR VARIABLE JOINT DIMENSIONS SUCH THAT BOTTOM OR TOP OF BOXES, AS APPLICABLE, ARE AT BLOCK JOINTS.

9 SWITCHES

GENERAL: ALL SWITCHES SHALL BE MOUNTED AT THE SAME HEIGHT THROUGHOUT THE PROJECT UNLESS NOTED OTHERWISE.

ABOVE COUNTERS: SAME AS FOR RECEPTACLES.

CONCRETE BLOCK WALLS: AS LONG AS ADA REQUIREMENTS ARE MAINTAINED, DIMENSIONS ABOVE MAY BE ADJUSTED SLIGHTLY AS REQUIRED TO COMPENSATE FOR VARIABLE JOINT DIMENSIONS, SUCH THAT BOTTOM OR TOP OF BOXES, AS APPLICABLE, ARE AT BLOCK JOINTS.

WALLS WITH WAINSCOTING: 6 INCHES MINIMUM ABOVE WAINSCOTING, BUT NOT EXCEEDING 48 INCHES ABOVE FINISHED FLOOR.

10 MULTI-OUTLET ASSEMBLIES

AS INDICATED ON THE DRAWINGS

11 TELEPHONE/DATA OUTLET BOXES

GENERAL: MATCH MOUNTING HEIGHT OF ADJACENT WIRING DEVICE LISTED ABOVE.

WALL-MOUNTED TELEPHONE (PUBLIC): ONE AT 48 INCHES ABOVE FINISHED FLOOR AND ONE AT 36 INCHES ABOVE FINISHED FLOOR.

FOR OTHER THAN WIRING DEVICES, REFER TO PARAGRAPHS, ARTICLES, SECTIONS, DIVISIONS, OR DRAWINGS TO OBTAIN MOUNTING HEIGHTS FOR SPECIFIC EQUIPMENT OR SYSTEMS.

12 WIRING DEVICES

THE CATALOG NUMBERS LISTED FOR WIRING DEVICES ARE GENERALLY FOR 20A RATED DEVICES. WHERE 15A RATED DEVICES ARE INDICATED ON THE DRAWINGS OR REQUIRED FOR CIRCUIT RATING LIMITATIONS, PROVIDE WIRING DEVICES EQUIVALENT TO THOSE SPECIFIED FOR 20A, BUT RATED FOR 15A.

ALL RECEPTACLES LOCATED OUTDOORS OR IN DAMP OR WET LOCATIONS: LISTED AS 'WEATHER RESISTANT', DESIGNATED BY A 'WR' ON THE FACEPLATE.

MINOR CHANGES RELATIVE TO THE LOCATION OF ELECTRICAL EQUIPMENT MAY BE MADE TO COMPLY WITH STRUCTURAL AND BUILDING REQUIREMENTS AS DETERMINED IN THE COURSE OF CONSTRUCTION. PROVIDE ALL WIRING DEVICES OF THE SAME MANUFACTURER AND NOT MIXED ON THE PROJECT, TO THE MAXIMUM EXTENT POSSIBLE. PROVIDE COLOR OF TOGGLES AND RECEPTACLES AS REQUESTED BY THE ARCHITECT.

[WIRING DEVICES: UNLESS NOTED OTHERWISE, DEVICES SHALL BE COMMERCIAL GRADE AND RATED FOR 20A. WIRING DEVICE MANUFACTURERS: COOPER, HUBBELL, LEGRAND, OR LEVITON.]

AUTOMATICALLY CONTROLLED RECEPTACLES: WHERE INDICATED ON DRAWINGS, PROVIDE DEVICE TYPE FROM OTHER APPLICABLE CATEGORY, ALONG WITH MARKING FOR CONTROLLED RECEPTACLES AS REQUIRED BY THE CURRENT VERSION OF THE NEC. IN THE CASE WHERE THE NEC IS NOT APPLICABLE TO THE PROJECT, THE DEVICE SHALL STILL BE PROVIDED WITH THIS MARKING. IN THAT CASE, THE NEC IS PROVIDING THE STANDARD FOR THE MARKING AND THIS SPECIFICATION IS REQUIRING IT TO BE MARKED ABOVE AND BEYOND THE APPLICATION OF THE CODE.

COORDINATE FINAL DEVICES AND COVERPLATES WITHIN FLOOR BOXES AND POKE-THRUS WITH ARCHITECT AND OWNER PRIOR TO ORDERING.

PROVIDE TAMPER RESISTANT (TR) DEVICES WHERE INDICATED ON THE PLANS. TR DEVICES SHALL ALSO BE PROVIDED IN LOCATIONS REQUIRED BY LOCAL CODES OR AS REQUIRED BY THE AHJ.

13 SWITCH AND OUTLET COVER PLATES

SWITCH AND OUTLET PLATES: AS DIRECTED BY ARCHITECT; BY THE SAME MANUFACTURER AS THE WIRING DEVICES, WHEREVER POSSIBLE. VERIFY DESIRED MATERIALS AND COLORS WITH ARCHITECT BEFORE INSTALLATION. SWITCH PLATES IN UNFINISHED ROOMS AND SPACES: STAMPED STEEL, CADMIUM PLATED. INSTALL GROUPS OF SWITCHES UNDER ONE GANGED-PLATE, USUALLY HORIZONTALLY; OR, WHERE REQUIRED BY DETAILS, VERTICALLY. SET ALL COVER PLATES PLUMB, PARALLEL, AND FINISHED FLUSH WITH THE WALL.

PROVIDE TYPE-WRITTEN, ADHESIVE BACKED LABEL AT EACH RECEPTACLE COVER PLATE WITH THE RESPECTIVE "PNLBD-CKT#" DESIGNATION. COORDINATE FINAL LABELLING REQUIREMENTS WITH THE OWNER PRIOR TO INSTALLATION. WHERE VISIBLE TO THE PUBLIC, LABELS SHALL BE ADHERED TO THE BACKSIDE OF THE COVERPLATE.

14 WEATHERPROOF COVER PLATES

PROVIDE GFCI RECEPTACLES FOR DESIGNATED WEATHERPROOF RECEPTACLES, UNLESS INDICATED OTHERWISE ON THE DRAWINGS.

UNATTENDED EXTERIOR, WET LOCATIONS OR OTHER LOCATIONS AS INDICATED: IN-USE, NEMA 3R, RECESSED OR FLUSH MOUNT, NRTL LABELED PLATES MOLDED FROM A CLEAR HIGH IMPACT ULTRAVIOLET STABILIZED POLYCARBONATE MATERIAL FOR EASY VERIFICATION THAT CORDS ARE PLUGGED IN AND THAT THE GFCI IS FUNCTIONING. BACK BOX MUST BE SUITABLE FOR CONDUIT CONNECTING. COORDINATE BACK BOX WITH WALL DEPTH. INTERMATIC WP1000C/HC SERIES OR EQUAL.

ATTENDED WET OR DAMP LOCATIONS: WEATHERPROOF COVER PLATES NRTL LISTED FOR WET LOCATIONS WITH COVER(S) CLOSED; DIE-CAST ALUMINUM OR TYPE 302 STAINLESS STEEL; SINGLE-COVER FOR SWITCHES AND VERTICALLY MOUNTED RECEPTACLES; DOUBLE-COVER FOR HORIZONTALLY MOUNTED RECEPTACLES; SELF-CLOSING COVERS.

COVER PLATES: BY THE SAME MANUFACTURER AS THE WIRING DEVICES; COMPLYING WITH NFPA 70 ARTICLES 406.9 (A) OR (B) REQUIREMENTS FOR ATTENDED OR UNATTENDED USE AS APPLICABLE.

15 ELECTRICAL SERVICE AND GROUNDING

A. GROUNDING

PERMANENTLY AND EFFECTIVELY GROUND AND BOND THE ELECTRICAL INSTALLATION IN A THOROUGH AND EFFICIENT MANNER, AND IN CONFORMANCE, AT A MINIMUM, WITH NFPA 70, OR THESE DOCUMENTS, WHERE THEY EXCEED CODE REQUIREMENTS. USE BARE OR INSULATED CONDUCTORS AS SPECIFIED HEREIN, AND OTHER MATERIALS INDICATED ON THE DRAWINGS.

16 DISTRIBUTION AND CONTROL EQUIPMENT

A. WORK ON EXISTING DISTRIBUTION EQUIPMENT

PROVIDE NEW, TYPEWRITTEN CARD DIRECTORY FOR DISTRIBUTION EQUIPMENT (INCLUDING BUT NOT LIMITED TO LOAD CENTERS, PANELBOARDS, SWITCHBOARDS AND SWITCHGEAR) WHERE CHANGES OCCUR UNDER THIS SCOPE OF WORK. INDICATE EXACT LOADS SERVED BY EACH EXISTING CIRCUIT BREAKER OR SWITCH.

B. CIRCUIT BREAKERS IN EXISTING PANELBOARDS/SWITCHBOARDS

PROVIDE NEW CIRCUIT BREAKERS FOR INSTALLATION IN EXISTING PANELBOARDS/SWITCHBOARDS, OF THE SAME MANUFACTURER AND TYPE AS THE EXISTING PANELBOARD/SWITCHBOARD CIRCUIT BREAKERS. SHORT CIRCUIT CURRENT INTERRUPTING RATING OF ANY NEW BREAKER SHALL BE THE LARGER OF THE EXISTING PANEL RATING OR THE AVAILABLE FAULT CURRENT INDICATED ON THE DRAWINGS.

C. DISCONNECT (SAFETY) SWITCHES

DISCONNECT (SAFETY) SWITCHES: HEAVY-DUTY, FUSED OR NON-FUSED (AS INDICATED ON DRAWINGS OR REQUIRED) NEMA KS1, EXTERNALLY OPERATED, VISIBLE-BLADE SAFETY SWITCHES; NEMA ENCLOSURE TYPE INDICATED ON THE DRAWINGS OR SUITABLE FOR THE ENVIRONMENT IN WHICH INSTALLED. BASED ON FUSIBLE SWITCH AND FUSE SIZES INDICATED, INCLUDE CLASS R, J, OR L FUSE PROVISIONS AS APPLICABLE.

WHERE INDICATED, PROVIDE FUSIBLE SWITCHES PERMANENTLY LABELED AS SUITABLE FOR USE AS SERVICE ENTRANCE EQUIPMENT, WITH INTEGRAL AND SEPARATE NEUTRAL AND GROUND ASSEMBLIES, SUITABLE FOR THE SIZES OF CONDUCTORS INDICATED. DO NOT DOUBLE-LUG ANY TERMINATIONS NOT SPECIFICALLY LISTED AS SUITABLE FOR MORE THAN ONE CONDUCTOR.

PROVIDE SWITCHES WHERE NOT FURNISHED WITH THE STARTING EQUIPMENT, AT ALL OTHER POINTS REQUIRED BY NFPA 70, AND WHERE INDICATED ON THE DRAWINGS. MANUFACTURERS: EATON, ABB, SIEMENS, OR SQUARE D.

D. SURGE PROTECTIVE DEVICES (SPD)

PROVIDE SPD LABELED IN ACCORDANCE WITH THE LATEST EDITIONS OF UL 1283 AND 1449, INCLUDING THE HIGHEST FAULT CURRENT OF SECTION 37.3 (NRTL RECOGNIZED FOR SPD INTEGRAL TO PANELBOARD) THAT MEETS OR EXCEEDS THE FOLLOWING CRITERIA:
MAXIMUM SURGE CURRENT CAPABILITY (SINGLE PULSE RATED) PER PHASE:

1. SERVICE ENTRANCE SWITCHBOARDS, SWITCHGEAR: 240KA.
2. DISTRIBUTION PANELBOARDS, PANELBOARDS USED FOR SERVICE ENTRANCE & MCC: 120KA.
3. BRANCH PANELBOARDS: 80KA (NON-MODULAR IS ACCEPTABLE).

SPD SHALL HAVE A MINIMUM EMI/RFI FILTERING OF -50DB AT 100KHZ.

INDICATORS: THE SPD SHALL USE LED INDICATORS THAT PROVIDE INDICATION OF SUPPRESSION COMPONENT FAILURE IN ALL PROTECTION MODES INCLUDING N-G, AS WELL AS OPTICALLY ISOLATED N/C DRY CONTACTS FOR REMOTE MONITORING.

SWITCHBOARD, SWITCHGEAR, PANELBOARD, AND MCC INTERNALLY MOUNTED SPD: FACTORY INSTALLED AND NRTL LABELED BY AND AT THE FACILITY OF THE ELECTRICAL DISTRIBUTION EQUIPMENT MANUFACTURER.

EXTERNALLY MOUNTED SPD (ONLY ALLOWED WHERE NOTED ON THE CONSTRUCTION DOCUMENTS): INSTALL WITH CONDUCTORS AS SHORT AND STRAIGHT AS POSSIBLE. TWIST THE SPD INPUT CONDUCTORS TOGETHER TO REDUCE INPUT CONDUCTOR INDUCTANCE. FOLLOW THE SPD MANUFACTURER'S RECOMMENDED INSTALLATION PRACTICES AND COMPLY WITH ALL APPLICABLE CODES.

WARRANTY: THE MANUFACTURER SHALL PROVIDE A MINIMUM FULL FIVE YEAR PARTS, LABOR, AND TRAVEL WARRANTY FROM DATE OF SUBSTANTIAL COMPLETION AGAINST ANY PART FAILURE, EXCLUDING BREAKERS, WHEN INSTALLED IN COMPLIANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS, NRTL LISTING REQUIREMENTS, AND ALL APPLICABLE NATIONAL OR LOCAL ELECTRICAL CODES. MANUFACTURER SHALL MAKE AVAILABLE LOCAL, NATIONAL FIELD ENGINEERING SERVICE SUPPORT. WHERE DIRECT FACTORY EMPLOYED SERVICE ENGINEERS ARE NOT LOCALLY AVAILABLE, TRAVEL TIME FROM THE FACTORY OR NEAREST DISPATCH CENTER SHALL BE STATED.

THOROUGHLY FACTORY TEST THE SPECIFIED SYSTEM BEFORE SHIPMENT. TESTING OF EACH SYSTEM SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO, QUALITY CONTROL CHECKS, DIELECTRIC VOLTAGE WITHSTAND TESTS AT TWICE RATED VOLTAGE PLUS 1000V PER NRTL REQUIREMENTS, AND OPERATIONAL AND CALIBRATION TESTS.

MANUFACTURERS: ABB USA, AC DATA SOLUTIONS, APT, ATLANTIC SCIENTIFIC, CURRENT TECHNOLOGY, DANAHER POWER SOLUTIONS, EATON, G.E., INTERMATIC, LEA INTERNATIONAL, LEVITON, LIEBERT, NORTHERN TECHNOLOGIES, SIEMENS, SQUARE D, OR SURGE SUPPRESSION INCORPORATED.

E. FUSES

PROVIDE EACH CIRCUIT AND SET OF FUSE CLIPS THROUGHOUT THE WORK WITH SIZES AND TYPES AS REQUIRED OR INDICATED. ALL FUSES LARGER THAN 600A: UL CLASS L, SIMILAR TO TYPE KRP-C BUSSMANN LOW PEAK OR EQUAL. FUSES USED TO PROTECT MOTORS: UL CLASS RK5, BUSSMANN FUSETRON OR EQUAL. FUSES USED TO PROTECT ALL OTHER ELECTRICAL EQUIPMENT: UL CLASS RK1, DUAL ELEMENT, BUSSMANN LPS/LPN OR EQUAL. ALL FUSED DEVICES SHALL BE LABELED AS TO TYPE AND SIZE OF FUSE REQUIRED.

FURNISH THREE SPARE FUSES OF EACH SIZE AND TYPE USED ON THE PROJECT (EXCEPT FOR MAIN SWITCH FUSES, FURNISH ONE SPARE), NEATLY CONTAINED IN A PROPERLY LABELED CABINET.

WHERE ARC ENERGY REDUCTION IS REQUIRED, FUSE MANUFACTURER SHALL PROVIDE DOCUMENTATION INDICATING CLEARING TIME FOR FUSES TO MEET THE REQUIREMENTS OF THE CODE.

MANUFACTURERS: EATON, MERSEN, OR LITTLEFUSE.

F. FRACTIONAL HORSEPOWER MANUAL CONTROLLER

MANUAL MOTOR STARTERS FOR FRACTIONAL HORSEPOWER SINGLE-PHASE MOTORS SHALL CONSIST OF A MANUALLY OPERATED TOGGLE SWITCH EQUIPPED WITH MELTING ALLOY TYPE OVERLOAD RELAY. THERMAL UNIT SHALL BE OF ONE PIECE CONSTRUCTION AND INTERCHANGEABLE. STARTER SHALL BE INOPERATIVE IF THERMAL UNIT IS REMOVED. PROVIDE FLUSH MOUNTED UNITS IN FINISHED AREAS AND SURFACE MOUNTED UNITS IN UNFINISHED AREAS. STARTERS SHALL HAVE NEMA I GENERAL PURPOSE ENCLOSURE, UNLESS OTHERWISE INDICATED, AND BE RATED FOR THE MOTOR HORSEPOWER REQUIRED. PROVIDE WITH HANDLE GUARD WITH LOCKING PROVISIONS AND AN INTEGRAL PILOT LIGHT.

MANUFACTURERS: SQUARE D CLASS 2510 TYPE F, OR APPROVED EQUAL BY ABB, EATON OR SIEMENS.

G. INTEGRAL HORSEPOWER MANUAL CONTROLLER

MANUAL MOTOR STARTERS SHALL CONSIST OF A MANUALLY OPERATED SWITCH EQUIPPED WITH MELTING ALLOY TYPE THERMAL OVERLOAD RELAYS. THERMAL UNIT SHALL BE OF ONE PIECE CONSTRUCTION AND INTERCHANGEABLE. STARTER SHALL BE INOPERATIVE IF THERMAL UNIT IS REMOVED. PROVIDE FLUSH MOUNTED UNITS IN FINISHED AREAS AND SURFACE MOUNTED UNITS IN UNFINISHED AREAS. STARTERS SHALL HAVE NEMA I GENERAL PURPOSE ENCLOSURE, UNLESS OTHERWISE INDICATED, AND BE RATED FOR THE MOTOR HORSEPOWER REQUIRED. PROVIDE WITH HANDLE GUARD WITH LOCKING PROVISIONS AND AN INTEGRAL PILOT LIGHT.

MANUFACTURERS: SQUARE D CLASS 2510 TYPE M, OR APPROVED EQUAL BY ABB, EATON OR SIEMENS.

H. MANUAL MOTOR STARTER DISCONNECT

MOTOR STARTING SWITCHES SHALL CONSIST OF A TOGGLE OPERATED TWO- OR THREE-POLE SWITCH. CONTACTS SHALL BE DOUBLE BREAK SILVER ALLOY, VISIBLE FROM BOTH SIDES OF THE SWITCH, AND SHALL HAVE A DIRECT LINKAGE TO THE OPERATOR FOR POSITIVE BREAK. PROVIDE FLUSH MOUNTED UNITS IN FINISHED AREAS AND SURFACE MOUNTED UNITS IN UNFINISHED AREAS. STARTERS SHALL HAVE NEMA I GENERAL PURPOSE ENCLOSURE UNLESS OTHERWISE INDICATED, AND BE RATED FOR THE MOTOR HORSEPOWER REQUIRED. PROVIDE HANDLE GUARD WITH LOCKING PROVISIONS.

MANUFACTURERS: SQUARE D CLASS 2510 TYPE K, OR APPROVED EQUAL BY ABB, EATON, OR SIEMENS..

I. LABELLING OF SERVICE EQUIPMENT, PANELBOARDS, SWITCHBOARDS & TRANSFORMERS

PROVIDE A PERMANENT LABEL TO FRONT OF EQUIPMENT ENCLOSURE. LABEL SHALL READ AS FOLLOWS (INCLUDE RESPECTIVE NAMES IN BLANKS):

SERVICE EQUIPMENT LABEL:

LINE 1: NOMINAL VOLTAGE AND FREQUENCY IN HERTZ
LINE 2: SERVICE EQUIPMENT BUS RATING IN AMPS
LINE 3: SCCR OF SERVICE EQUIPMENT IN AMPS
LINE 4: MAXIMUM AVAILABLE FAULT CURRENT IN AMPS
LINE 5: DATE CALCULATED

EXAMPLE:

208Y/120V, 60HZ
800A
SCCR = 65,000A
MAX AVAILABLE FAULT CURRENT = 58,815A
CALCULATED: 01/01/2018

PANELBOARD/SWITCHBOARD LABEL:

LINE 1: PANELBOARD DESIGNATION
LINE 2: VOLTAGE, PHASE, WIRES, AMPS
LINE 3: FED FROM " "

EXAMPLES:

H1A
480Y/277V, 3PH, 4W, 200A
FED FROM MDB

L1A
208Y/120V, 3PH, 4W, 225A
FED FROM H1A VIA XFMR T1

TRANSFORMER LABEL:

LINE 1: TRANSFORMER DESIGNATION
LINE 2: FED FROM " "
LINE 3: SUPPLIES " "

EXAMPLE:

T1
FED FROM H1A
SUPPLIES L1A

DISCONNECT SWITCH LABEL:

LINE 1: DESIGNATION OF EQUIPMENT SERVED BY DISCONNECT
LINE 2: VOLTAGE, PHASE, WIRES, AMPS
LINE 3: FED FROM " "

EXAMPLES:
WATER HEATER WH1
480V, 3PH, 3W, 100A
FED FROM MDB

2 LIGHT FIXTURES, LAMPS AND BALLASTS

A. LIGHT FIXTURE LOCATIONS

LIGHT FIXTURES SHOWN ON THE DRAWINGS REPRESENT GENERAL ARRANGEMENTS ONLY. REFER TO ARCHITECTURAL DRAWINGS FOR MORE EXACT LOCATIONS. COORDINATE LOCATION WITH ALL OTHER TRADES BEFORE INSTALLATION TO AVOID CONFLICTS. COORDINATE LIGHT FIXTURE LOCATIONS IN MECHANICAL ROOMS WITH FINAL INSTALLED PIPING AND DUCTWORK LAYOUTS.

B. LIGHT FIXTURES

PROVIDE LIGHT FIXTURES AS SCHEDULED ON DRAWINGS, INCLUDING ALL LAMPS, ALL NECESSARY ACCESSORIES, MATERIAL AND LABOR TO SECURELY HANG, CLEAN, AND MAKE LIGHT FIXTURES COMPLETELY READY FOR USE. LIGHT FIXTURE MODEL NUMBERS SCHEDULED ON THE DRAWINGS SHOW ONLY THE MANUFACTURER, GRADE, AND STYLE OF LIGHT FIXTURES REQUIRED. PROVIDE ALL HANGERS, SUPPORTS, AND MISCELLANEOUS HARDWARE REQUIRED TO INSTALL LIGHT FIXTURES, PROPER TRIM TO FIT EACH CEILING CONDITION ACTUALLY ENCOUNTERED, AND ADDITIONAL TIE WIRES CONNECTED TO STRUCTURE TO CONFORM TO SEISMIC REQUIREMENTS WHERE REQUIRED BY THE APPLICABLE BUILDING CODE.

PACKAGING OF LIGHT FIXTURES WILL NOT BE ALLOWED. ONLY THOSE LUMINAIRES LISTED IN THE LIGHT FIXTURE SCHEDULE OR APPROVED IN ACCORDANCE WITH SUBSTITUTIONS OF THESE SPECIFICATIONS WILL BE ACCEPTED. WHERE THE LIGHT FIXTURE SCHEDULE INDICATES AN ALLOWANCE FOR A SPECIFIC LIGHT FIXTURE, THE PRICE IS A CONTRACTOR PRICE. INCLUDE ALL ADDITIONAL COSTS FOR FREIGHT, LAMPS, AND INSTALLATION OF LIGHT FIXTURE AND LAMPS.

INSTALL LINEAR LIGHT FIXTURES HUNG IN CONTINUOUS ROWS ON CHANNEL STRUTS SPECIFICALLY DESIGNED FOR THIS PURPOSE.

INSTALL ALL LIGHT FIXTURES LOCATED IN AREAS WITHOUT CEILINGS IMMEDIATELY BELOW THE ROOF-FRAMING MEMBERS, OR SUSPENDED FROM CHAIN HANGERS SUITABLE IN LENGTH TO PROVIDE THE INDICATED MOUNTING HEIGHT.

THROUGH-WIRING OF RECESSED LIGHT FIXTURES IN SUSPENDED CEILINGS IS NOT PERMITTED. CONNECT EACH LIGHT FIXTURE BY A WHIP TO A JUNCTION BOX. PROVIDE CABLE WHIPS OF SUFFICIENT LENGTHS TO ALLOW FOR RELOCATING EACH LIGHT FIXTURE WITHIN A 5-FOOT RADIUS OF ITS INSTALLED LOCATION, BUT NOT EXCEEDING 6 FEET IN UNSUPPORTED LENGTHS.

LIGHT FIXTURES NEAR OR IN CONTACT WITH INSULATION SHALL COMPLY WITH CODE FOR SUCH. MAINTAIN MINIMUM 3" WORKING CLEARANCE BETWEEN NON-IC RATED LIGHT FIXTURE HOUSINGS AND INSULATION ON ALL ADJACENT DUCTWORK, PIPING, WALLS AND CEILINGS.

C. EMERGENCY LIGHTING UNITS AND EXIT SIGNS

DESCRIPTION: SELF-CONTAINED UNITS COMPLYING WITH UL 924.

GENERAL: ALL EMERGENCY LIGHTS AND EXIT SIGNS WITH INTEGRAL BATTERY BACK-UP SHALL BE CONNECTED TO A SEPARATE UNSWITCHED CONDUCTOR BYPASSING ALL OTHER CONTROLS AND CONTACTORS, UNLESS NOTED OTHERWISE. EXIT SIGNS SHALL NOT BE SWITCHED. REFER TO MANUFACTURER'S WRITTEN INSTRUCTIONS FOR PROPER INSTALLATION AND TESTING. ALLOW BATTERY TO CHARGE FOR A MINIMUM OF 48 HOURS BEFORE LIGHT LEVEL TESTING. IN ORDER TO PREVENT BATTERY DAMAGE, DO NOT TURN OFF POWER FOR EXTENDED PERIODS OF TIME AFTER EMERGENCY LIGHT HAS BEEN POWERED.

BATTERY: SEALED, MAINTENANCE-FREE, LEAD-ACID TYPE. THE BATTERIES SHALL BE OF SUITABLE RATING AND CAPACITY TO SUPPLY AND MAINTAIN AT NOT LESS THAN 87-1/2 PERCENT OF THE NOMINAL BATTERY VOLTAGE FOR THE TOTAL LAMP LOAD ASSOCIATED WITH THE UNIT FOR A PERIOD OF AT LEAST 1-1/2 HOURS, OR THE UNIT EQUIPMENT SHALL SUPPLY AND MAINTAIN NOT LESS THAN 60 PERCENT OF THE INITIAL EMERGENCY ILLUMINATION FOR A PERIOD OF AT LEAST 1-1/2 HOURS.

CHARGER: FULLY AUTOMATIC, SOLID-STATE TYPE WITH SEALED TRANSFER RELAY.

OPERATION: RELAY AUTOMATICALLY TURNS LAMP ON WHEN POWER SUPPLY CIRCUIT VOLTAGE DROPS TO 80 PERCENT OF NOMINAL VOLTAGE OR BELOW. LAMP AUTOMATICALLY DISCONNECTS FROM BATTERY WHEN VOLTAGE APPROACHES DEEP-DISCHARGE LEVEL. WHEN NORMAL VOLTAGE IS RESTORED, RELAY DISCONNECTS LAMPS FROM BATTERY, AND BATTERY IS AUTOMATICALLY RECHARGED AND FLOATED ON CHARGER.

TEST PUSH BUTTON: PUSH-TO-TEST TYPE, IN UNIT HOUSING, SIMULATES LOSS OF NORMAL POWER, AND DEMONSTRATES UNIT OPERABILITY.

LED INDICATOR LIGHT: INDICATES NORMAL POWER ON. NORMAL GLOW INDICATES TRICKLE CHARGE, AND BRIGHT GLOW INDICATES CHARGING AT END OF DISCHARGE CYCLE.

WIRE GUARD: HEAVY-CHROME-PLATED WIRE GUARD PROTECTS LAMP HEADS OR FIXTURES.

REMOTE TEST: SWITCH IN HAND-HELD REMOTE DEVICE AIMED IN DIRECTION OF TESTED UNIT INITIATES CODED INFRARED SIGNAL. SIGNAL RECEPTION BY FACTORY-INSTALLED INFRARED RECEIVER IN TESTED UNIT TRIGGERS SIMULATION OF LOSS OF ITS NORMAL POWER SUPPLY, PROVIDING VISUAL CONFIRMATION OF EITHER PROPER OR FAILED EMERGENCY RESPONSE.

D. LAMPS

PROVIDE LAMPS AND COLOR TEMPERATURES AS INDICATED ON THE DRAWINGS FOR ALL LIGHT FIXTURES; OR, IF NOT INDICATED, PER THE ARCHITECT AND/OR LIGHTING DESIGNER. LAMPS SHALL BE BY THE SAME MANUFACTURER FOR COLOR CONSISTENCY. LAMPS SHALL BE COMPATIBLE WITH THE SPECIFIED LIGHT FIXTURE. FLUORESCENT, METAL HALIDE, AND INCANDESCENT LAMP MANUFACTURERS: EIKO, G.E., OSRAM/SYLVANIA, PHILIPS, SORAA, OR VENTURE.

FLUORESCENT LAMPS: LOW-MERCURY TYPE IN COMPLIANCE WITH NEMA LL 1; MINIMUM COLOR-RENDERING INDEX (CRI) OF 82 UNLESS NOTED OTHERWISE; MINIMUM AVERAGE RATED LIFE OF 24,000 HOURS.

METAL HALIDE LAMPS: PULSE-START (CERAMIC WHEN AVAILABLE); COATED; MINIMUM CRI OF 80 UNLESS NOTED OTHERWISE; MINIMUM AVERAGE RATED LIFE OF 18,000 HOURS IN THE VERTICAL POSITION AND 12,000 HOURS IN THE HORIZONTAL POSITION; LOW-WATTAGE LAMPS SHALL HAVE A PROTECTIVE SHROUD OR OTHER SUITABLE CONTAINMENT MATERIAL FOR USE IN OPEN FIXTURES.

INCANDESCENT LAMPS: TYPE AND WATTAGE AS SHOWN ON THE DRAWINGS; RATED 130V UNLESS OTHERWISE SCHEDULED OR SPECIFIED.

LED LAMPS AND LUMINAIRES: COMPLY WITH ANSI C78.377 FOR WHITE LIGHT LED COLOR RANGE; MINIMUM CRI OF 80 UNLESS NOTED OTHERWISE; LED BINNING SPECIFICATION TOLERANCE TO BE WITHIN 3 MACADAM ELLIPSES OF RATED VALUES; ALL LEDS USED FOR SAME FIXTURE TYPE THROUGHOUT THE PROJECT MUST ORIGINATE FROM THE SAME PRODUCTION BIN; MINIMUM AVERAGE RATED LIFE OF 20,000 HOURS FOR LED LAMPS AND 50,000 HOURS FOR LED LUMINAIRES; ROHS COMPLIANT. LED LAMP MANUFACTURERS: BRIDGELUX, CREE, NICHIA, OSRAM, OR XICATO.

E. BALLASTS

LED DRIVERS: COMPLY WITH NRTL REQUIREMENTS AND ANSI C82.77; DESIGNED FOR TYPE AND QUANTITY OF LAMPS SERVED; SOUND LEVELS NOT EXCEEDING CLASS A AMBIENT NOISE LEVELS; LAMP CURRENT CREST FACTOR OF 1.5 OR LESS; 90-PERCENT POWER FACTOR OR GREATER; LINE TRANSIENT WITHSTAND RATINGS AS DEFINED IN ANSI/IEEE C62.41, CATEGORY A.; TOTAL HARMONIC DISTORTION LESS THAN 20 PERCENT; SHALL TOLERATE SUSTAINED OPEN CIRCUIT AND SHORT CIRCUIT OUTPUT CONDITIONS WITHOUT DAMAGE; SHALL NOT OVER-DRIVE LEDS AT A CURRENT OR VOLTAGE ABOVE LED RATED VALUES; ROHS COMPLIANT; MEETS EN610000 REQUIREMENTS FOR INPUT HARMONICS.

F. DIMMABLE LIGHT FIXTURES

FOR DIMMABLE LIGHT FIXTURES PROVIDE BOTH CONTROL AND POWER WIRING BETWEEN LIGHT FIXTURE AND CONTROL DEVICE AND BETWEEN LIGHT FIXTURES. QUANTITY OF LOW VOLTAGE AND LINE VOLTAGE WIRING AND WIRE TYPE SHALL BE PER MANUFACTURER'S RECOMMENDATIONS. COORDINATE LIGHT FIXTURE AND CONTROL DEVICE DIMMING TYPES FOR COMPATIBILITY.

3 MISCELLANEOUS ELECTRICAL

A. WIRING OF MECHANICAL EQUIPMENT

PROVIDE ALL RACEWAYS AND POWER WIRING FOR ALL DIVISION 23 EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS, INCLUDING BUT NOT LIMITED TO PUMPS, WATER HEATERS, AND HVAC EQUIPMENT, AND ALL LINE-VOLTAGE CONTROL AND INTERLOCK WIRING NOT PROVIDED UNDER DIVISION 23. CONNECT PER MANUFACTURERS' WIRING DIAGRAMS. COORDINATE WITH DIVISION 23 FOR DISCONNECTS AND VARIABLE FREQUENCY DRIVES (VFD) FURNISHED WITH EQUIPMENT, AND PROVIDE ALL DISCONNECT SWITCHES AND FINAL CONNECTIONS AS REQUIRED. IF VFD IS SEPARATE OR DOES NOT HAVE AN INTEGRAL DISCONNECT FEATURE, PROVIDE DISCONNECT SWITCH WITH AUXILIARY CONTACT SUCH THAT MOTOR WILL BE TURNED OFF IF SWITCH IS OFF. PROVIDE VFD CABLE, BELDEN OR APPROVED EQUIVALENT, FOR CONNECTION OF VFD TO MOTOR WHEN REQUIRED. AFTER INSTALLING WIRING, VERIFY THAT EACH MOTOR LOAD HAS THE CORRECT PHASE ROTATION.

VERIFY THE ACTUAL "MAXIMUM OVERCURRENT PROTECTION" (MOCP) DEVICE RATINGS AND "MINIMUM CIRCUIT AMPACITY" (MCA) CONDUCTOR SIZING FOR MECHANICAL EQUIPMENT FROM THE EQUIPMENT NAMEPLATE. BASE ELECTRICAL INSTALLATIONS ON ACTUAL REQUIRED AMPERAGES, WHICH MAY VARY SOMEWHAT FROM THE CONDUCTOR AND EQUIPMENT SIZES SHOWN ON THE DRAWINGS; HOWEVER, IN NO CASE, REDUCE THE SIZE OF CONDUCTORS INDICATED ON THE DRAWINGS WITHOUT AUTHORIZATION FROM THE ENGINEER. PROVIDE PROPERLY SIZED ELECTRICAL WIRING AND EQUIPMENT WITHOUT EXTRA COST TO THE OWNER. NOTIFY THE ENGINEER OF ALL CHANGES REQUIRED IN THE ELECTRICAL INSTALLATION DUE TO EQUIPMENT VARIANCES SO THAT THE EFFECTS ON FEEDERS, BRANCH CIRCUITS, PANELBOARDS, FUSES AND CIRCUIT BREAKERS CAN BE CHECKED PRIOR TO PURCHASING AND INSTALLATION. BE RESPONSIBLE FOR COORDINATING WITH DIVISION 23 TO VERIFY THE ACTUAL AMPACITIES AND CORRECT SIZES OF ALL CONDUCTORS AND OVERCURRENT PROTECTIVE DEVICES FOR ALL EQUIPMENT, AND CORRECT OVERLOAD HEATERS FOR ALL MOTORS, WHEN STARTERS ARE PROVIDED UNDER DIVISION 26.

B. WIRING OF THERMOSTATS, TIME AND TEMPERATURE CONTROLS

PROVIDE ALL RACEWAYS, POWER WIRING, AND LINE-VOLTAGE CONTROL AND INTERLOCK WIRING NOT PROVIDED UNDER DIVISION 23, FOR ALL THERMOSTATS, TEMPERATURE CONTROL DEVICES, HUMIDISTATS, AC SOLENOIDS, AND CONTROLS, INCLUDING, BUT NOT LIMITED TO, NIGHT-STATS, WATER HEATER INTERLOCKS, TIME SWITCHES AND OVERRIDE TIMERS. SEE MECHANICAL DRAWINGS FOR LOCATIONS AND TEMPERATURE CONTROL DIAGRAMS. LOW-VOLTAGE CONDUCTORS FOR THERMOSTATS AND TEMPERATURE CONTROL SYSTEM MAY BE RUN EXPOSED ABOVE FINISHED ACCESSIBLE CEILINGS, IF APPROVED AND LISTED FOR THIS PURPOSE, BUT SHALL BE INSTALLED IN CONDUIT WITHIN WALLS AND WHERE EXPOSED IN THE WORK AREAS.

PROVIDE BACK BOX AND 3/4" CONDUIT FROM EACH THERMOSTAT LOCATION TO MECHANICAL EQUIPMENT. BOX SHALL BE FLUSH MOUNT WHEREVER PRACTICABLE.

C. TELEPHONE SYSTEM PROVISIONS

PROVIDE INCOMING TELEPHONE SERVICE RACEWAYS AS INDICATED ON DRAWINGS OR AS REQUIRED BY THE SERVING TELEPHONE COMPANY. PROVIDE 3/4-INCH THICK PLYWOOD BOARD, FIRE-RETARDANT-TREATED AND STAMPED FRT, SECURELY ANCHORED TO THE WALL, AT THE LOCATION AND OF THE SIZE AS INDICATED ON THE DRAWINGS. PROVIDE FLUSH MOUNTED TELEPHONE OUTLET BOXES WITH 1 INCH CONDUIT STUB-UP WITH PULL-STRING CONCEALED TO ACCESSIBLE CEILING SPACE AT LOCATIONS AS INDICATED ON THE DRAWINGS.

D. DATA SYSTEM PROVISIONS

PROVIDE FLUSH MOUNTED DATA OUTLET BOXES WITH 1 INCH CONDUIT STUB-UP WITH PULL-STRING CONCEALED TO ACCESSIBLE CEILING SPACE AT LOCATIONS AS INDICATED ON THE DRAWINGS.

E. MISCELLANEOUS EQUIPMENT AND CONNECTIONS

ALL WIRING AND CONNECTIONS TO ILLUMINATED CASES.

ALL RACEWAYS, WIRING, AND CONNECTIONS OF DEVICES TO ENERGY MANAGEMENT SYSTEM THAT ARE NOT THE RESPONSIBILITY OF DIVISION 23.

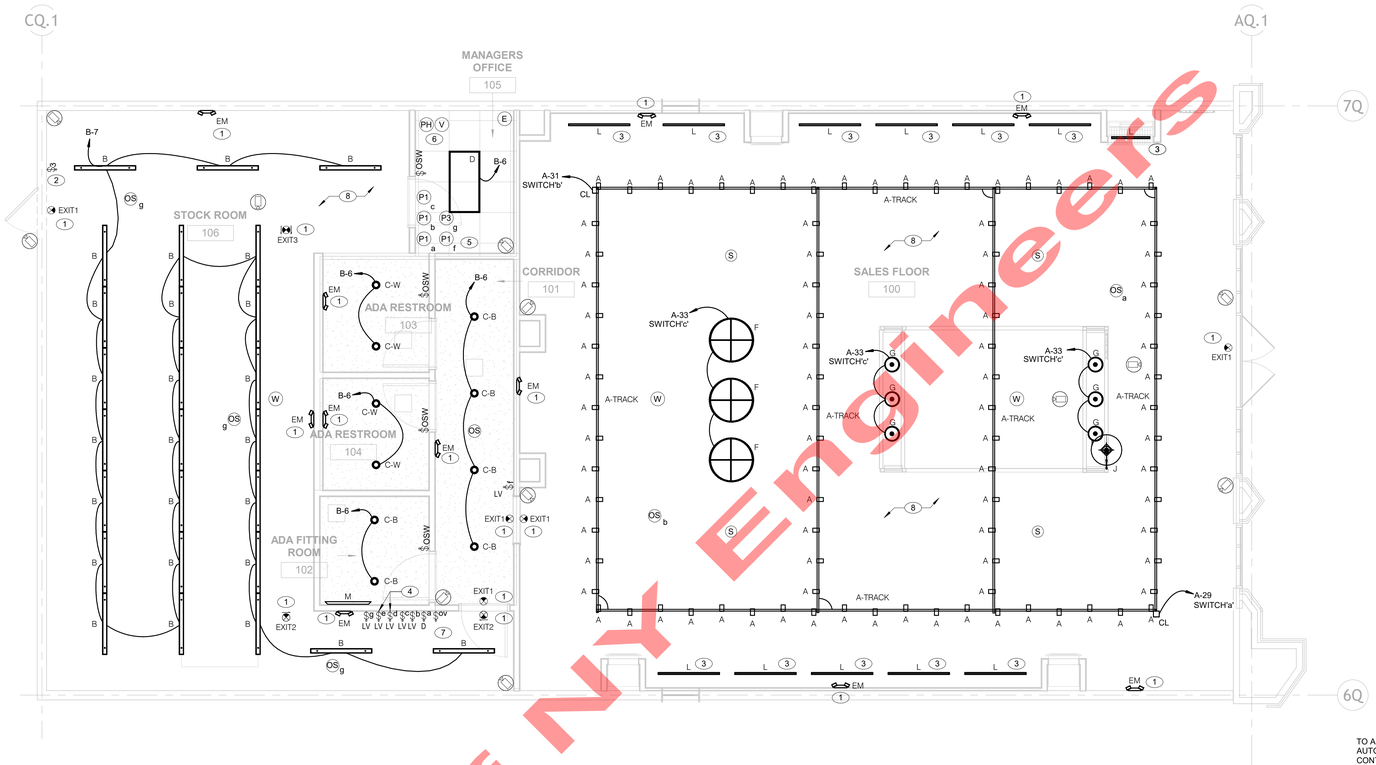
ALL WIRING AND CONNECTIONS OF EXIT DOOR ALARMS.

END OF SECTION 26

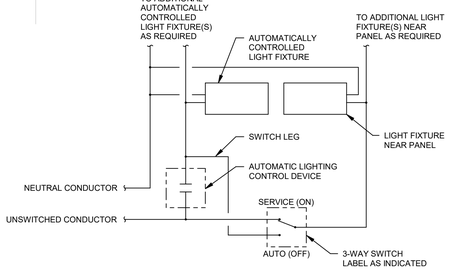
PROJECT LOCATION:
TECOVAS

E-003

Property of NX Engineers



Property of NY Engineers



PANEL MAINTENANCE OVERRIDE SWITCH DETAILS

LIGHTING PLAN 1/4" = 1'-0" A

LIGHTING FIXTURE SCHEDULE 1

TYPE	DESCRIPTION	MANUFACTURER	MODEL	VOLTAGE	WATT
A	ECLIPSE CURVE LED TRACK LUMINAIRES	CONTECH LIGHTING	CTL9051F27CD-B	120 V	9 VA
A-TRACK	SINGLE CIRCUIT LINE VOLTAGE TRACK	CONTECH LIGHTING	LT		0 VA
B	SUSPENDED LINEAR LIGHT	IDEOLI	1105-0027	120 V	20 VA
C-B	4" LED DOWNLIGHT	INTENSE LIGHTING	LD4-NC-L0-D101-BLANK LD4DR-279-W-SF	120 V	20 VA
C-W	4" LED DOWNLIGHT	INTENSE LIGHTING	LD4-NC-L0-D101-BLANK LD4DR-279-W-SF	120 V	20 VA
D	2' x 4' EDGE LIT FLAT PANEL	ILP, INC.	VPAN22-33L-U-35	120V	30 VA
EM	EMERGENCY LIGHT - WHITE	LTHONIA	ELML4L	120 V	5 VA
EXIT1	EDGELIT ALUMINUM EXIT SIGN	ELXTEU	ELXTEU-FACE-GREEN-C-B-EM	120 V	5 VA
EXIT2	EDGELIT ALUMINUM EXIT SIGN - SINGLE ARROW	ELXTEU	ELXTEU-FACE-GREEN-C-W-EM	120 V	5 VA
EXIT3	EDGELIT ALUMINUM EXIT SIGN - DOUBLE ARROW	ELXTEU	ELXTEU-FACE-GREEN-C-W-EM	120 V	5 VA
F	BOOT LOUNGE PENDANT: SHAW PENDANT	WEST ELM	SKU: 7794755	120 V	5 VA
G	SERVICE COUNTER: CARSON 12" CORD PENDANT	REJUVENATION	SKU: 9336930	120 V	9 VA
J	ORIGINAL 1227 BRASS WALL MOUNTED TASK LAMP	LIGHTOLOGY	SPEC #: AGP567936	120 V	4 VA
L	LINEAR BOOT WALL	-	-	120 V	30 VA
M	FITTING ROOM MIRROR: BEVELED MIRROR , LIT	STYLEMARK	620096-03_123-BUFFET SATIN BLACK	120 V	39 VA

LIGHT FIXTURE SCHEDULE GENERAL NOTES:

1. ALL LIGHT FIXTURES AND RELATED COMPONENTS SHALL BE FURNISHED BY THE OWNER AND INSTALLED BY THE CONTRACTOR, UNLESS NOTED OTHERWISE.
2. FOR OWNER FURNISHED LIGHT FIXTURES: CONTRACTOR SHALL DESIGNATE A PRIMARY POINT OF CONTACT WITH THE OWNER'S LIGHT FIXTURE SUPPLIER TO COORDINATE AND FACILITATE. THE RECEIPT, HANDLING AND REPLACEMENT OF LIGHT FIXTURES AND RELATED PARTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RECEIVING, INSPECTING, STORING AND INSTALLING ALL LIGHT FIXTURES AND RELATED PARTS. THE CONTRACTOR SHALL NOTIFY THE OWNER AND THE LIGHT FIXTURE SUPPLIER OF ANY INCORRECT, DAMAGED OR MISSING LIGHT FIXTURES AND RELATED PARTS WITHIN 48 HOURS OF ON-SITE RECEIPT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFIRMING THAT THE PROPER LIGHT FIXTURES ARE FURNISHED IN ACCORDANCE WITH THE LIGHT FIXTURE SCHEDULE AND THE APPROVED LIGHTING SUBMITTALS PRIOR TO INSTALLATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADDITIONAL COSTS INCURRED DUE TO REPLACEMENT/REPAIR OF LIGHT FIXTURES AND RELATED PARTS AFTER ON-SITE RECEIPT. CONTRACTOR SHALL NOTIFY THE OWNER'S LIGHT FIXTURE SUPPLIER OF ANY MISSING LIGHT FIXTURES AND RELATED PARTS REQUIRED FOR PROJECT COMPLETION.
3. THE PARTY SUPPLYING THE LIGHT FIXTURES IS RESPONSIBLE FOR SUPPLYING THE PROPER QUANTITY OF LIGHT FIXTURES.
4. COORDINATE LIGHT FIXTURE MOUNTING HARDWARE AND TRIMS NEEDED TO SUIT CEILING CONDITIONS. LIGHT FIXTURES NEAR OR IN CONTACT WITH INSULATION SHALL COMPLY WITH CODE. MAINTAIN 3" MINIMUM WORKING CLEARANCE BETWEEN NON-IC RATED LIGHT FIXTURE HOUSINGS AND INSULATION ON ALL ADJACENT DUCTWORK, PIPING, WALLS, AND CEILINGS.

LIGHTING SUPPLEMENT SPECIFICATIONS D

1. REFER TO THE ARCHITECTURAL DRAWINGS FOR LIGHT FIXTURE LOCATIONS, MOUNTING HEIGHTS, TRACK LENGTHS AND ADDITIONAL MOUNTING INFORMATION. CONTRACTOR SHALL BE RESPONSIBLE FOR INSURING THAT COORDINATION AND CONFLICT ISSUES ARE RESOLVED PRIOR TO INSTALLATION OF LIGHT FIXTURES. CONTACT ARCHITECT/ENGINEER IMMEDIATELY IF THERE ARE DISCREPANCIES.
2. THROUGH WIRING OF RECESSED LIGHT FIXTURES, IN SUSPENDED CEILINGS, IS NOT PERMITTED. CONNECT EACH LIGHT FIXTURE BY A WHIP TO A JUNCTION BOX. PROVIDE CABLE WHIPS OF SUFFICIENT LENGTHS TO ALLOW FOR RELOCATING EACH LIGHT FIXTURE WITHIN A 5'-0" RADIUS OF ITS INDICATED LOCATION. CABLE WHIPS SHALL NOT EXCEED 6'-0" OF UNSUPPORTED LENGTHS.
3. ALL EMERGENCY LIGHTS AND EXIT SIGNS WITH INTEGRAL BATTERY BACK-UP SHALL BE CONNECTED TO A SEPARATE UNSWITCHED CONDUCTOR BYPASSING ALL OTHER CONTROLS AND CONTACTORS, UNLESS NOTED OTHERWISE. EXIT SIGNS SHALL NOT BE SWITCHED. REFER TO MANUFACTURER'S WRITTEN INSTRUCTIONS FOR PROPER INSTALLATION AND TESTING. ALLOW BATTERY TO CHARGE FOR A MINIMUM OF 48 HOURS BEFORE LIGHT LEVEL TESTING. IN ORDER TO PREVENT BATTERY DAMAGE, DO NOT TURN OFF POWER FOR EXTENDED PERIODS OF TIME AFTER EMERGENCY LIGHT HAS BEEN POWERED.
4. PROVIDE A NEUTRAL CONDUCTOR TO ALL WALL MOUNTED LINE VOLTAGE LIGHT SWITCHES, UNLESS NOTED OTHERWISE. IF NEUTRAL TERMINATION IS NOT REQUIRED FOR THE DEVICE THEN CAP CONDUCTOR AND TAG AS "NEUTRAL FOR FUTURE USE".
5. COORDINATE ALL OCCUPANCY/VACANCY SENSOR SETTINGS WITH OWNER AND ADJUST AS NECESSARY FOR PROPER OPERATION. SETTINGS MUST COMPLY WITH AHJ AND LOCAL ENERGY CODE REQUIREMENTS.
6. DO NOT INSTALL OCCUPANCY/VACANCY SENSORS WITHIN 48" OF AIR DIFFUSER OR SIMILAR OBSTRUCTION THAT MAY ADVERSLY AFFECT THE SENSOR PERFORMANCE. COORDINATE FINAL SENSOR LOCATIONS WITH OTHER TRADES AND INSTALL IN ACCORDANCE WITH MANUFACTURER 'S RECOMMENDATIONS.
7. COORDINATE FINAL FIXTURE MAKE, WATTAGE, AND MODEL WITH ARCHITECT.
8. ALL ILLUMINATED EXIT SIGNS TO HAVE A MAX WATTAGE OF 5 PER SIDE.
9. AUTOMATIC LIGHTING CONTROLS: OCCUPANCY SENSOR SHALL BE CAPABLE OF TURNING OFF LIGHTS WITHIN 20 MINUTES OF ALL OCCUPANTS LEAVING THE SPACE.
10. ALL LIGHTING CONTROLS SHALL BE AS PER IECC 2018.
11. FOR LIGHTING/ROOM CONTROL SCHEDULE REFER TO SHEET E-301.

GENERAL NOTES NTS C

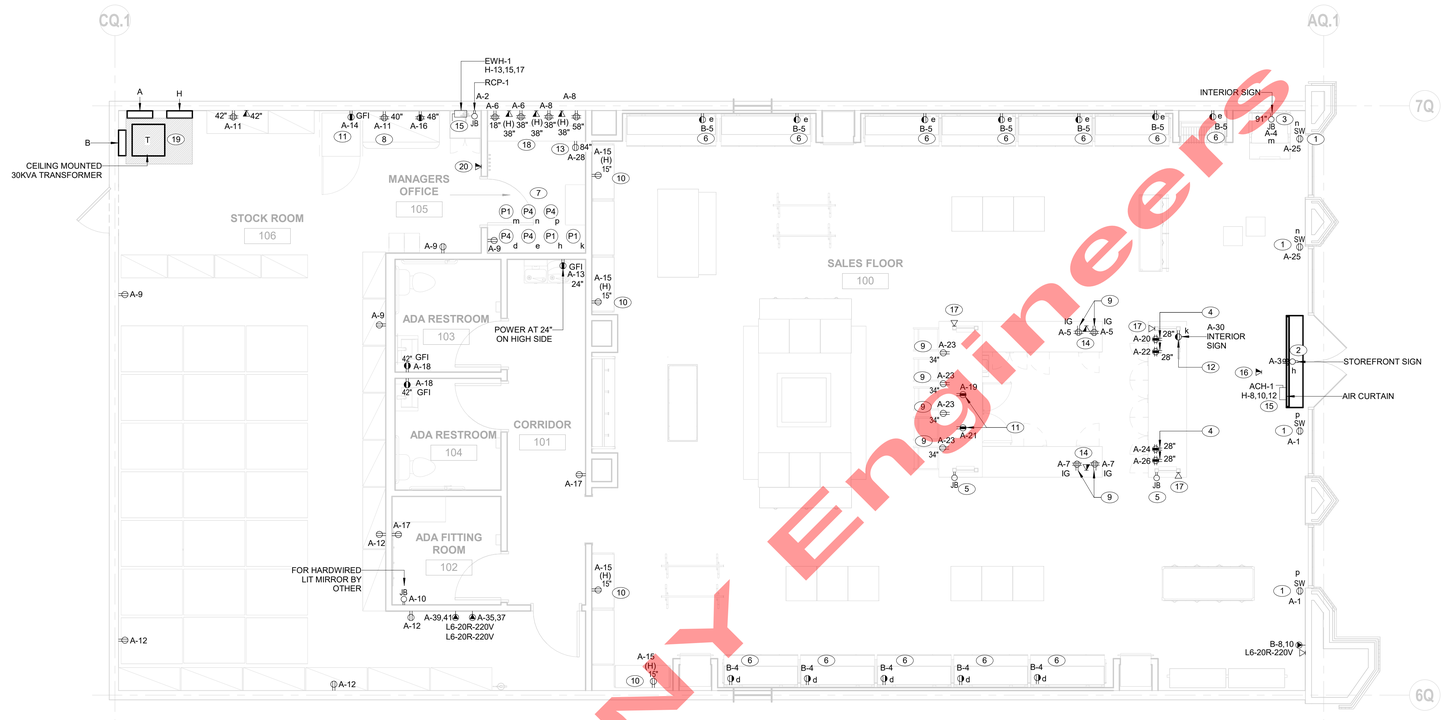
1. LIGHTING SHALL BE CIRCUITED EXACTLY AS SHOWN ON PLANS.
2. COORDINATE EXACT LOCATION AND MOUNTING HEIGHTS WITH ARCHITECTURAL PLANS. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS, DETAILS, AND LIGHTING NOTES FOR FURTHER INFORMATION OF DEVICE PLACEMENT AND OTHER RELEVANT INFORMATION.
3. EMERGENCY AND EXIT LIGHTS SHALL BE INSTALLED AND CIRCUITED PER THE LATEST NATIONAL ELECTRIC CODE AND ALL LOCAL CODES UNSWITCHED AHEAD OF ALL LIGHTING CONTROLS. ALL EMERGENCY AND EXIT FIXTURES SHALL BE DUAL VOLTAGE (120/277 VOLT INPUT) WITH 90 MINUTE BATTERY BACK UP.
4. VERIFY PROPER FUNCTIONALITY OF ALL EXISTING AND RELOCATED LIGHT FIXTURES, THEIR CONTROL DEVICES, AND EXIT SIGNS. PROVIDE REPLACEMENTS AS REQUIRED IF ANY ARE NOT OPERATING AS INTENDED OR HAVE ABOVE NORMAL WEAR OR DEFECTS.
5. LOWER CASE LETTERS IN LIGHTING FIXTURES AND ADJACENT TO SWITCHES IN EACH INDIVIDUAL ROOM/AREA INDICATE WHICH LIGHT FIXTURE IS TO BE CONTROLLED FROM EACH CORRESPONDING SWITCH IN THAT ROOM/AREA..
6. PROVIDE LABEL AT EACH MANUAL LIGHT SWITCH INDICATING THE LIGHT FIXTURE(S) THAT THE SWITCH CONTROLS AND THE RESPECTIVE "PNLBD-CKT#" DESIGNATION. A SINGLE LIGHT SWITCH FOR A SMALL ROOM DOES NOT NEED TO INDICATE THE SPACE CONTROLLED SINCE IT IS INTUITIVELY OBVIOUS. COORDINATE LABEL REQUIREMENTS WITH THE OWNER PRIOR TO INSTALLATION. REFER TO THE SPECIFICATIONS FOR MORE INFORMATION.
7. ALL REMOTELY LOCATED LIGHT FIXTURE POWER SUPPLIES AND CONTROLLERS SHALL BE LOCATED IN AN ACCESSIBLE LOCATION WITH PROPER VENTILATION IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. CONCEAL DEVICES AND RELATED WIRING FROM CUSTOMER/PUBLIC VIEW. PROVIDE ENCLOSURE IF REQUIRED. COORDINATE LOCATION AND ENCLOSURE TYPE WITH ARCHITECT AND OWNER PRIOR TO INSTALLATION. CONNECT POWER SUPPLIES TO LIGHT FIXTURES PER MANUFACTURER'S RECOMMENDATIONS. PROVIDE APPROPRIATE WIRE SIZE FOR LOW-VOLTAGE WIRING TO REDUCE VOLTAGE DROP TO MANUFACTURER 'S TOLERANCES FOR PROPER OPERATION.
8. PROVIDE ALL NECESSARY LOW VOLTAGE CONTROL WIRING, BOXES, AND CONDUIT FROM CONTROL DEVICES TO LIGHT FIXTURES AS REQUIRED FOR PROPER OPERATION. (LOW VOLTAGE WIRING MAY NOT BE SHOWN ON PLAN FOR CLARITY). COORDINATE REQUIREMENTS WITH LIGHT FIXTURE AND CONTROL MANUFACTURER PRIOR TO INSTALLATION.

KEY NOTES - LIGHTING PLAN NTS B

1. FIXTURE SHALL BE PROVIDED WITH INTEGRAL BATTERY BACKUP. ALL EXIT SIGNS & EMERGENCY LIGHTS TO BE CONNECTED TO LOCAL LIGHTING CIRCUIT AHEAD OF SWITCHING.
2. PROVIDE 3-WAY SWITCH FOR OVERRIDE OF AUTOMATIC LIGHTING CONTROLS NEAR PANELBOARD PER NEC 110.26 (D). PROVIDE ENGRAVED LABEL ON COVERPLATE STATING "PANELBOARD MAINTENANCE". REFER TO DETAIL ON THIS SHEET FOR MORE INFORMATION.
3. LIGHT FIXTURE IS INTEGRAL TO MILLWORK AND POWERED THROUGH CONTROLLED RECEPTACLE. REFERENCE SHEET E-200 FOR CIRCUITING INFORMATION.
4. CONNECT SWITCH TO BOOT WALL CONTROLLED RECEPTACLES ON SALES FLOOR FOR FIXTURE TYPE L. REFERENCE DETAIL- A, SHEET E-200, FOR LOCATIONS AND CIRCUITING.
5. LOCATE POWER PACKS IN ACCESSIBLE LOCATION WITH GOOD VENTILATION HIDDEN FROM CUSTOMER VIEW AND ACCORDING TO MANUFACTURER'S SPECIFICATION. COORDINATE EXACT LOCATION WITH ARCHITECT AND OWNER PRIOR TO ROUGH-IN.
6. LOCATE VIVE HUB IN ACCESSIBLE LOCATION WITH GOOD VENTILATION HIDDEN FROM CUSTOMER VIEW AND ACCORDING TO MANUFACTURER'S SPECIFICATION. COORDINATE EXACT LOCATION WITH ARCHITECT AND OWNER PRIOR TO ROUGH-IN.
7. SWITCH BANK LOCATION. CONTRACTOR SHALL FIELD VERIFY THE EXACT LOCATION AND SWITCH QUANTITY WITH ARCHITECT OWNER PRIOR TO ROUGH-INS. CONFIRM SWITCH BANK WILL FIT WITHIN THIS DESIGNATED AREA AND STACK MULTIPLE SWITCH BANK AT THIS LOCATION IF A SINGLE SWITCH BANK WILL NOT FIT WITHIN THIS DESIGNATED AREA. BASE BID ACCORDINGLY.
8. CONTRACTOR TO COORDINATE EXACT LOCATIONS AND REQUIREMENTS FOR ALL LV DEVICES (CAMERA, SPEAKER, WIRELESS ACCESS, NETWORK JACK, ETC...) WITH LOW VOLTAGE VENDOR AND OTHER TRADES PRIOR TO ROUGH-INS. BASE BID ACCORDINGLY.

PROJECT LOCATION:
TECOVAS

E-100



Property of NY Engineers

ELECTRICAL POWER PLAN - GROUND FLOOR 1/4" = 1'-0" A

GENERAL NOTES NTS C

1. ELECTRICAL CONTRACTOR SHALL VERIFY ALL CONNECTION REQUIREMENTS FOR ALL EQUIPMENT SUPPLIED BY OTHERS PRIOR TO ROUGH-IN. COORDINATE NEMA PLUG CONFIGURATION FOR EQUIPMENT AND PROVIDE MATCHING RECEPTACLE WHERE APPLICABLE.
2. COORDINATE MECHANICAL AND PLUMBING EQUIPMENT REQUIREMENTS WITH OTHER TRADES.
3. ALL EXTERIOR DISCONNECTS SHALL BE WEATHERPROOF.
4. PROVIDE GROUNDING IN ACCORDANCE WITH NEC 250. PROVIDE A #6 CU GROUND TO ANY NEW METAL GAS PIPING SYSTEMS. FINAL CONNECTION TO ALL HARD-WIRED EQUIPMENT SHALL BE MADE WITH LIQUID-TITE FLEXIBLE CONDUIT.
5. ALL CIRCUITS SHALL HAVE AN INSULATED GROUND WIRE SIZED PER NEC 250 BUT NOT SMALLER THAN #12 AWG.
6. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL DISCONNECT SWITCHES, CONDUIT, AND WIRE FOR EQUIPMENT. INSTALL UNDER SUPERVISION OF EQUIPMENT SUPPLIER.
7. CONFIRM LOCATION OF ALL EQUIPMENT WITH ARCHITECT AND OWNER..
8. ALL GFCI RECEPTACLES SHALL BE INSTALLED IN A READILY ACCESSIBLE LOCATION OR A DEAD FRONT GFI DEVICE INSTALLED IN A READILY ACCESSIBLE LOCATION. OR A GFCI CIRCUIT BREAKER SHALL USED TO FEED THE CIRCUIT NOTED.
9. FINAL CONDUIT/CABLE ROUTING SHALL BE DETERMINED IN-FIELD, AND PRIOR TO THE COMMENCEMENT OF WORK, COORDINATED WITH OTHER TRADE CONTRACTORS AND THE TENANT.
10. FOR LIGHTING CONTROL DEVICE SCHEDULE AND ROOM CONTROL SCHEDULE REFER TO SHEET E-301.

KEY NOTES - ELECTRICAL POWER PLAN NTS B

(1) PROVIDE SHOW WINDOW RECEPTACLE WITHIN 18" OF TOP OF WINDOW. NO POINT ALONG THE TOP OF WINDOW SHALL BE FARTHER THAN 6'-0" FROM RECEPTACLE IN ACCORDANCE WITH NEC 210.62. MOUNT RECEPTACLE ON WALL OR CEILING AS APPLICABLE. COORDINATE LOCATION WITH OTHER TRADES PRIOR TO ROUGH-IN.

(2) ENTRANCE SIGNAGE (OWNER FURNISHED & OWNER INSTALLED). PROVIDE LOCKABLE TOGGLE DISCONNECT SWITCH AND POWER CONNECTION TO SIGNAGE AS REQUIRED. COORDINATE LOCATION AND REQUIREMENTS WITH SIGN INSTALLER AND ARCHITECT. BASE BID ACCORDINGLY.

(3) INTERIOR SIGNAGE (OWNER FURNISHED & OWNER INSTALLED). PROVIDE LOCKABLE TOGGLE DISCONNECT SWITCH AND POWER CONNECTION TO SIGNAGE AS REQUIRED. COORDINATE LOCATION AND REQUIREMENTS WITH SIGN INSTALLER AND ARCHITECT. BASE BID ACCORDINGLY.

(4) COORDINATE WITH FIXTURE VENDOR FOR ALL POWER LOCATIONS TO BE INSTALLED WITHIN MILLWORK. POWER TO BE RUN FROM ABOVE, TIGHT TO DECK, AND DOWN MILLWORK INSIDE UPRIGHTS AT ALL LOCATIONS; NO TRENCHING. GC TO USE MC CABLING. BASE BID ACCORDINGLY.

(5) JUNCTION BOX AT TOP OF STEEL TUBE FOR POWER. POWER TO ROUTE THROUGH STEEL UPRIGHT TUBE TO MILLWORK BELOW. COORDINATE WITH TECOVAS MILLWORK CONTRACTOR PRIOR TO ROUGH INS.

(6) CONTROLLED RECEPTACLE FOR BOOT WALL INTEGRAL LIGHTING. REFERENCE SHEET E-100 FOR OVERRIDE SWITCH LOCATION. OUTLETS TO BE LUTRON SMART RECEPTACLE. COORDINATE LOCATION WITH FIXTURE VENDOR AND ARCHITECTURAL PLANS BEFORE ROUGH-IN.

(7) LOCATE POWER PACKS IN ACCESSIBLE LOCATION WITH VENTILATION HIDDEN FROM CUSTOMER VIEW AND ACCORDING TO MANUFACTURER'S SPECIFICATION. COORDINATE EXACT LOCATION WITH ARCHITECT AND OWNER PRIOR TO ROUGH-IN.

(8) QUAD RECEPTACLE WITH (1) USB PORT AND (1) USB C PORT.

(9) POWER RECEPTACLE WITH (1) USB PORT AND (1) USB C PORT. COORDINATE WITH FIXTURE VENDOR FOR ALL POWER LOCATIONS TO BE INSTALLED WITHIN MILLWORK. POWER TO BE RUN FROM ABOVE AT ALL LOCATIONS; NO TRENCHING.

(10) RECEPTACLE TO BE CENTERED IN APPAREL FIXTURE BAY. EC TO COORDINATE EXACT LOCATION WITH TECOVAS FIXTURE CONTRACTOR PRIOR TO ROUGH IN.

(11) ELECTRICAL CONTRACTOR SHALL VERIFY EXACT POWER REQUIREMENTS AND LOCATION WITH THE OWNER/ARCHITECT/MANUFACTURER PRIOR TO ROUGH-IN. PROVIDE THE OUTLET AS PER EQUIPMENT CUTSHEET. BASE BID ACCORDINGLY.

(12) RECEPTACLE FOR OFOI (OWNER FURNISHED & OWNER INSTALLED) LIGHTING/SIGNAGE MOUNTED TO MILLWORK. DUPLEX RECEPTACLE TO BE LOCATED IN CEILING ABOVE. POWER CORD TO BE ROUTED THROUGH METAL POST TO PLUG ABOVE.

(13) (1) DEDICATED QUAD WALL OUTLETS FOR IT RACK AT 7'-0" AFF. MINIMUM 48" FROM TOP OF PANELS TO BOTTOM OF RECEPTACLES/PORTS; RECEPTACLES/PORTS MUST HAVE 24" CLEAR WALL SPACE ON ALL SIDES. CONTRACTOR TO CONFIRM EXACT HEIGHT AND LOCATIONS WITH TECOVAS PRIOR TO ROUGH IN.

(14) DATA RECEPTACLE WITH (4) PORTS. GC TO COORDINATE WITH FIXTURE VENDOR FOR ALL RECEPTACLE LOCATIONS TO BE INSTALLED WITHIN MILLWORK.

(15) ALL MECHANICAL AND PLUMBING EQUIPMENT SHALL BE PROVIDED WITH THE REQUIRED ROUGH-INS, MOCP, AND WIRE SIZE REQUIREMENTS. THE ELECTRICAL CONTRACTOR MUST COORDINATE WITH THE MANUFACTURER FOR THE EXACT TYPE OF ROUGH-INS, WIRE SIZE AND LOCATION THE COMMENCEMENT OF WORK.

(16) NETWORK JACK TO BE LOCATED IN CEILING, 3'-0" AWAY FROM FRONT DOOR FOR SHOPPERTRAK EQUIPMENT. HEIGHT OF EQUIPMENT TO BE DETERMINED IN FIELD FOR FULL VISIBILITY OF FRONT DOOR.

(17) PROVIDE DATA PATH AT TOP OF STEEL TUBE. DATA TO ROUTE THROUGH STEEL UPRIGHT TUBE TO MILLWORK BELOW. E.C. TO COORDINATE WITH TECOVAS MILLWORK CONTRACTOR PRIOR TO ROUGH INS.

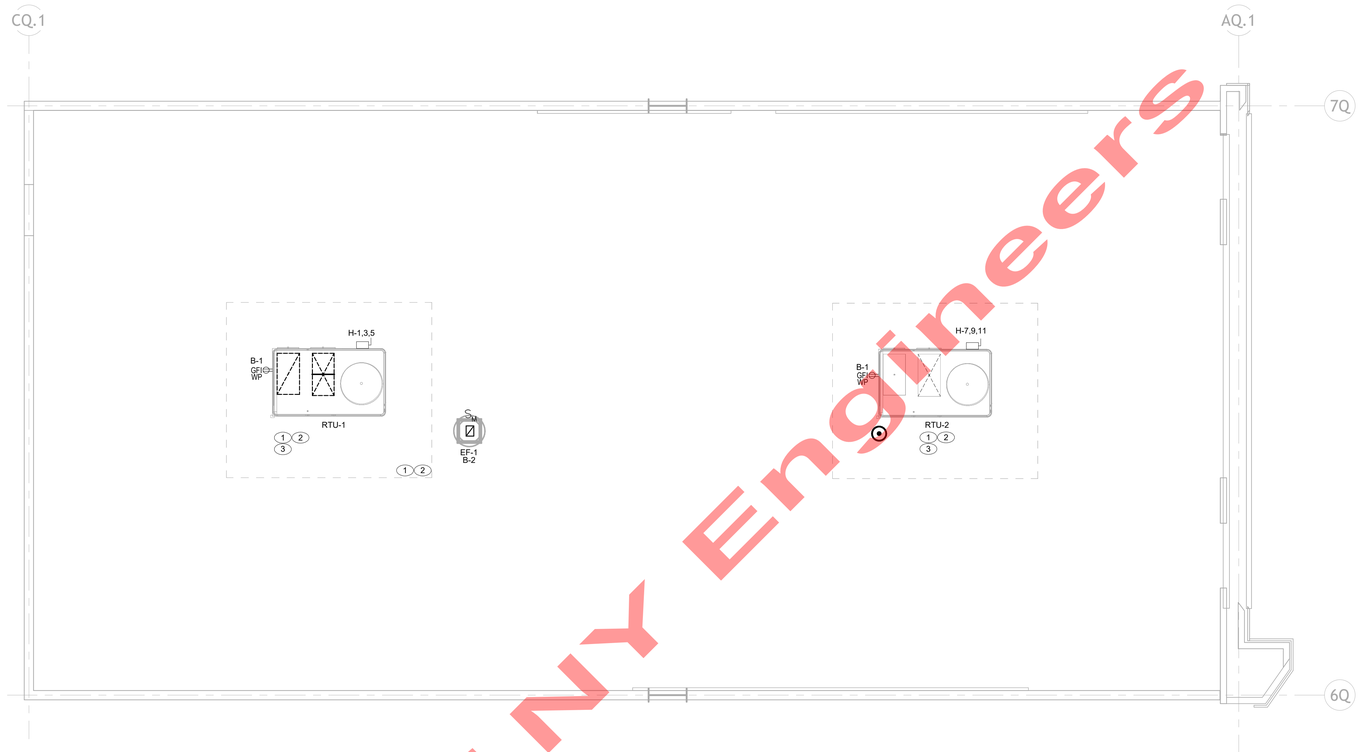
(18) INSTALL DATA RECEPTACLES HORIZONTALLY AT MANAGER DESK..

(19) ELECTRICAL CONTRACTOR SHALL VERIFY THE LOCATION OF ELECTRICAL PANELS IN COMPLIANCE WITH NEC ARTICLE 110.26(A) AND (B). ELECTRICAL CONTRACTOR SHALL FIELD VERIFY THAT THE PANELS ARE UNOBSTRUCTED, AND THE AREA WHERE THE PANELS ARE PLACED SHALL NOT BE USED AS A STORAGE SPACE. REFER TO THE ELECTRICAL RISER A DIAGRAM (SHEET E-300) AND PANEL SCHEDULE (SHEET E-301) FOR MORE INFORMATION.

(20) NETWORK JACK FOR ALARM TABLET.

PROJECT LOCATION:
TECOVAS

E-200



Property of NY Engineers

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

GENERAL NOTES NTS C

1. ELECTRICAL CONTRACTOR SHALL VERIFY ALL CONNECTION REQUIREMENTS FOR ALL EQUIPMENT SUPPLIED BY OTHERS PRIOR TO ROUGH-IN. COORDINATE NEMA PLUG CONFIGURATION FOR EQUIPMENT AND PROVIDE MATCHING RECEPTACLE WHERE APPLICABLE.
2. COORDINATE MECHANICAL AND PLUMBING EQUIPMENT REQUIREMENTS WITH OTHER TRADES.
3. ALL EXTERIOR DISCONNECTS SHALL BE WEATHERPROOF.
4. PROVIDE GROUNDING IN ACCORDANCE WITH NEC 250. PROVIDE A #6 CU GROUND TO ANY NEW METAL GAS PIPING SYSTEMS. FINAL CONNECTON TO ALL HARD-WIRED EQUIPMENT SHALL BE MADE WITH LIQUID-TITE FLEXIBLE CONDUIT.
5. ALL CIRCUITS SHALL HAVE AN INSULATED GROUND WIRE SIZED PER NEC 250 BUT NOT SMALLER THAN #12 AWG.
6. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL DISCONNECT SWITCHES, CONDUIT, AND WIRE FOR EQUIPMENT. INSTALL UNDER SUPERVISION OF EQUIPMENT SUPPLIER.
7. CONFIRM LOCATION OF ALL EQUIPMENT WITH ARCHITECT AND OWNER..
8. ALL GFCI RECEPTACLES SHALL BE INSTALLED IN A READILY ACCESSIBLE LOCATION OR A DEAD FRONT GFI DEVICE INSTALLED IN A READILY ACCESSIBLE LOCATION. OR A GFCI CIRCUIT BREAKER SHALL USED TO FEED THE CIRCUIT NOTED.
9. FINAL CONDUIT/CABLE ROUTING SHALL BE DETERMINED IN-FIELD, AND PRIOR TO THE COMMENCEMENT OF WORK, COORDINATED WITH OTHER TRADE CONTRACTORS AND THE TENANT.
10. FOR LIGHTING CONTROL DEVICE SCHEDULE AND ROOM CONTROL SCHEDULE REFER TO SHEET E-301.

KEY NOTES - ELECTRICAL POWER PLAN NTS B

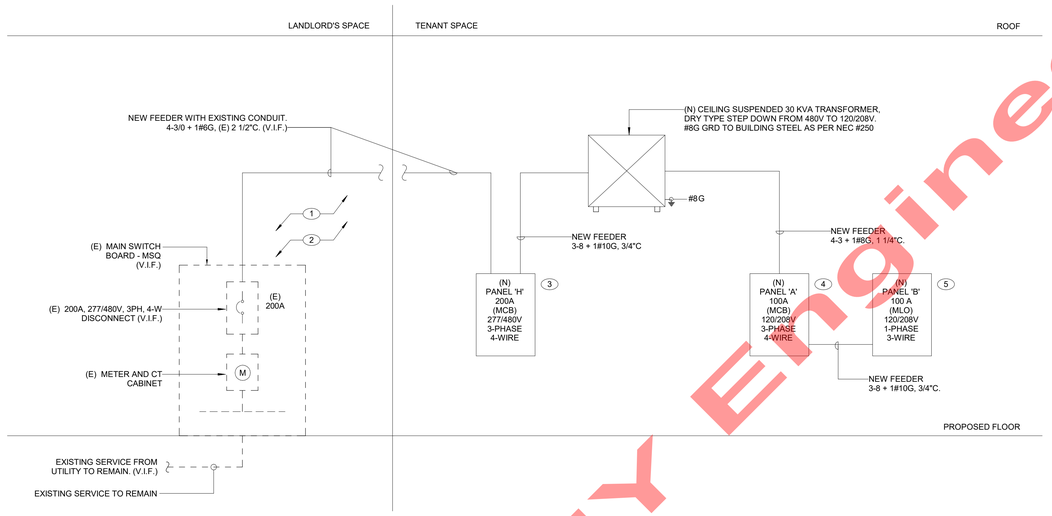
(1) ALL OUTDOOR ELECTRICAL EQUIPMENT SHALL BE NEMA 3R RATED. COORDINATE EXACT ELECTRICAL REQUIREMENT WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN. CIRCUIT FACTORY INSTALLED RECEPTACLE AS REQUIRED. OTHERWISE PROVIDE NEW AS SHOWN.

(2) CONTRACTOR TO VERIFY IN FIELD ANY RECEPTACLE IS PRESENT WITHIN 25FT OF HVAC UNITS. IF YES, EXISTING RECEPTACLES TO REMAIN. WIRE TO NEW AVAILABLE CIRCUIT AS SHOWN IF NEEDED. VERIFY EXACT LOCATION. ELSE PROVIDE NEW WEATHER PROOF, GFI, 120V, 20A RECEPTACLE WITHIN 25FT OF THE HVAC UNITS AS SHOWN. BASE BID ACCORDINGLY.

(3) ALL MECHANICAL AND PLUMBING EQUIPMENT SHALL BE PROVIDED WITH THE REQUIRED ROUGH-INS, MOCP, AND WIRE SIZE REQUIREMENTS. THE ELECTRICAL CONTRACTOR MUST COORDINATE WITH THE MANUFACTURER FOR THE EXACT TYPE OF ROUGH-INS, WIRE SIZE AND LOCATION THE COMMENCEMENT OF WORK.

PROJECT LOCATION:
TECOVAS

E-201



ELECTRICAL RISER DIAGRAM N.T.S. A

Property of NY Engineers

PROJECT LOCATION:
TECOVAS

GENERAL NOTES NTS C

VERIFY THE FOLLOWING PRIOR TO BID/ PRICING:

- EXISTING CONDUIT AND FEEDERS SIZE BETWEEN TENANT SPACE AND LANDLORD SWITCHBOARD.
- EXISTING MAIN SERVICE DISCONNECT RATING.
- EXISTING METER.

IF THE EXISTING SERVICE DISCONNECT AND FEEDERS ARE RATED FOR LESS THAN THE RATING SHOWN ON THIS RISER, NOTIFY THE PROJECT MANAGER AND ENGINEER IMMEDIATELY PRIOR TO SUBMITTING BID/ PRICING PACKAGE SO DRAWINGS CAN BE REVISED AND UPDATED ACCORDINGLY

1. E.C. SHALL VERIFY INCOMING SERVICE AMPERAGE, WIRE SIZING AND DISTRIBUTION.
2. ELECTRICAL CONTRACTOR TO COORDINATE FAULT CURRENT (Isc) RATING WITH UTILITY COMPANY AND AHJ PRIOR TO COMMENCING ANY WORK.
3. ABOVE RISER DIAGRAM IS FOR REFERENCE PURPOSE ONLY. E.C. SHALL VERIFY THE EXACT DISRIBUTION AND RATINGS OF ALL EQUIPMENTS/PANELS IN FIELD. INFORM ENGINEER FOR ANY DISCREPANCY FOUND. BASE BID ACCORDINGLY.

KEY NOTES - ELECTRICAL RISER DIAGRAM NTS B

(1) ELECTRICAL CONTRACTOR SHALL COORDINATE WITH BASE BUILDING/LANDLORD/OWNER FOR EXACT POWER DISTRIBUTION PRIOR TO COMMENCING ANY WORK. INFORM ENGINEER ON RECORD FOR ANY DISCREPANCIES. BASE BID ACCORDINGLY.

(2) ELECTRICAL CONTRACTOR SHALL COORDINATE WITH BASE BUILDING/LANDLORD/OWNER/UTILITY COMPANY FOR EXACT LOCATION OF ELECTRICAL METER & DISCONNECT SWITCH OF THIS SPACE PRIOR TO COMMENCING ANY WORK. BASE BID ACCORDINGLY.

(3) NEW 200A (MCB), 277/480V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "H" FOR THE PROJECT SPACE. ELECTRICAL CONTRACTOR TO COORDINATE WITH ARCHITECT/OWNER FOR EXACT LOCATION. BASE BID ACCORDINGLY.

(4) NEW 100A (MCB), 120/208V, 3-PHASE, 4-WIRE ELECTRICAL PANEL "A" FOR THE PROJECT SPACE. ELECTRICAL CONTRACTOR TO COORDINATE WITH ARCHITECT/OWNER FOR EXACT LOCATION. BASE BID ACCORDINGLY.

(5) NEW 100A (MLO), 120/208V, 1-PHASE, 3-WIRE ELECTRICAL PANEL "B" FOR THE PROJECT SPACE. ELECTRICAL CONTRACTOR TO COORDINATE WITH ARCHITECT/OWNER FOR EXACT LOCATION. BASE BID ACCORDINGLY.

E-300

Branch Panel: H

Location: STOCK ROOM
Supply From: MAIN SWITCH BOARD MSQ
Mounting: SURFACE
Enclosure: TYPE 1

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating: V.I.F.
Mains Type: MCB
Mains Rating: 225 A
MCB Rating: 200 A

Notes:

CKT	Load Name	Wire Size	Trip	Poles	A		B		C		Poles	Trip	Wire Size	Load Name	CKT
1	RTU-1	10	25 A	3	5311	8125					3	50 A	8	30 KVA TRANSFORMER	2
3	--	--	--	--			5311	6970			--	--	--	--	4
5	--	--	--	--					5311	7575	--	--	--	--	6
7	RTU-2	10	25 A	3	5311	3990					3	20 A	12	AIR CURTAIN (ACH-1)	8
9	--	--	--	--			5311	3990			--	--	--	--	10
11	--	--	--	--					5311	3990	--	--	--	--	12
13	HOT WATER HEATER (EWH-1)	12	20 A	3	1333	0					1	20 A		SPARE	14
15	--	--	--	--			1333	0			1	20 A		SPARE	16
17	--	--	--	--					1333	0	1	20 A		SPARE	18
19	SPARE		20 A	1	0	--					1	--		SPACE	20
21	SPARE		20 A	1			0	--			1	--		SPACE	22
23	SPARE		20 A	1					0	--	1	--		SPACE	24
25	SPACE		--	1	--	--					1	--		SPACE	26
27	SPACE		--	1			--	--			1	--		SPACE	28
29	SPACE		--	1					--	--	1	--		SPACE	30
			Total Load:		24072 VA		22917 VA		23522 VA						
			Total Amps:		87 A		83 A		85 A						

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	44416 VA	100.00%	44416 VA		
Motor	20 VA	100.00%	20 VA	**Total Conn. Load:**	70510 VA
Other	30 VA	100.00%	30 VA	**Total Est. Demand:**	70091 VA
Receptacle	14540 VA	84.39%	12270 VA	**Total Conn.:**	85 A
Spare	100 VA	100.00%	100 VA	**Total Est. Demand:**	84 A
Lighting	2306 VA	125.00%	2882 VA		
Signage	1500 VA	125.00%	1875 VA		
Show Window	3600 VA	125.00%	4500 VA		
Water Heater	4000 VA	100.00%	4000 VA		

Notes:

Branch Panel: A

Location: STOCK ROOM
Supply From: TRANSFORMER
Mounting: SURFACE
Enclosure: TYPE 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: V.I.F.
Mains Type: MCB
Mains Rating: 100 A
MCB Rating: 100 A

Notes:

CKT	Load Name	Wire Size	Trip	Poles	A		B		C		Poles	Trip	Wire Size	Load Name	CKT
1	SHOW WINDOW RECPT	12	20 A	1	1800	100					1	20 A	12	RCP-1	2
3	STOREFRONT SIGN	12	20 A	1			500	500			1	20 A	12	INTERIOR SIGN	4
5	RCPT - CASHWRAP POS 1	12	20 A	1					720	720	1	20 A	12	RECPT - MANAGER OFFICE 1	6
7	RCPT - CASHWRAP POS 2	12	20 A	1	720	720					1	20 A	12	RECPT - MANAGER OFFICE 2	8
9	RECPT - BOH/OFFICE CONV - 1	12	20 A	1			720	80			1	20 A	12	MIRROR LIGHTING_FITTING ROOM	10
11	RECPT - BOH CONV - 3	12	20 A	1					720	720	1	20 A	12	RECPT - BOH CONV - 2	12
13	DRINKING FOUNTAIN	12	20 A	1	500	500					1	20 A	12	BOH - REFRIGERATOR	14
15	RECPT - SALES APPAREL FIXTURES	12	20 A	1			720	360			1	20 A	12	RECPT - BOH SHELF (DED)	16
17	RECPT - FITTINGS / CORRIDOR	12	20 A	1					360	360	1	20 A	12	RECPT - GFI RESTROOM	18
19	CASHWRAP - UC FREEZER	12	20 A	1	720	180					1	20 A	12	RECPT - CASHWRAP DED. 1	20
21	CASHWRAP - UC REFRIGERATOR	12	20 A	1			720	180			1	20 A	12	RECPT - CASHWRAP DED. 2	22
23	RECPT - CASHWRAP CONV	12	20 A	1					720	180	1	20 A	12	RECPT - CASHWRAP DED. 3	24
25	SHOW WINDOW RECPT	12	20 A	1	1800	180					1	20 A	12	RECPT - CASHWRAP DED. 4	26
27								360			1	20 A	12	RECPT - IT RACK	28
29	LTG - SALES TRACK	12	20 A	1					405	500	1	20 A	12	INTERIOR SIGN	30
31	LTG - SALES TRACK	12	20 A	1	405	0					1	20 A	12	SPARE	32
33	LTG - SALES	12	20 A	1			364	0			1	20 A	12	SPARE	34
35	FUTURE USE	12	20 A	2					500	0	1	20 A	12	SPARE	36
37	--	--	--	--	500	0					1	20 A	12	SPARE	38
39	FUTURE USE	12	20 A	2			500	1967			2	50 A	8	PANEL - B	40
41	--	--	--	--					500	1170	--	--	--	--	42
			Total Load:		8125 VA		6970 VA		7575 VA						
			Total Amps:		68 A		58 A		64 A						

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	576 VA	100.00%	576 VA		
Motor	20 VA	100.00%	20 VA	**Total Conn. Load:**	22670 VA
Other	30 VA	100.00%	30 VA	**Total Est. Demand:**	22251 VA
Receptacle	14540 VA	84.39%	12270 VA	**Total Conn.:**	63 A
Spare	100 VA	100.00%	100 VA	**Total Est. Demand:**	62 A
Lighting	2306 VA	125.00%	2882 VA		
Signage	1500 VA	125.00%	1875 VA		
Show Window	3600 VA	125.00%	4500 VA		

Notes:

Branch Panel: B

Location: STOCK ROOM
Supply From: PANEL - A
Mounting: SURFACE
Enclosure: TYPE 1

Volts: 120/208 Single
Phases: 1
Wires: 3

A.I.C. Rating: V.I.F.
Mains Type: MLO
Mains Rating: 100 A
MCB Rating: NA

Notes:

CKT	Load Name	Wire Size	Trip	Poles	B		C		Poles	Trip	Wire Size	Load Name	CKT
1	ROOF GFI RECEPTACLE	12	20 A	1	360	576			1	20 A	12	EF-1	2
3	SPARE		20 A	1			0	150	1	20 A	12	LTG - BOOTWALL FIXTURE - 2	4
5	LTG - BOOTWALL FIXTURE - 1	12	20 A	1	210	229			1	20 A	12	LTG - CORRIDOR, FITTING RM, RESTROOM,...	6
7	LTG - STOCK ROOM	12	20 A	1			520	500	2	20 A	12	FUTURE USE - MUSIC SPEAKER	8
9	VIVE CONTROL	12	20 A	1	100	500			--	--	--	--	10
11	SPARE		20 A	1			0	0	1	20 A		SPARE	12
13	SPARE		20 A	1	0	0			1	20 A		SPARE	14
15	SPARE		20 A	1			0	0	1	20 A		SPARE	16
17	SPARE		20 A	1	0	0			1	20 A		SPARE	18
			Total Load:		1967 VA		1170 VA						
			Total Amps:		18 A		11 A						

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	576 VA	100.00%	576 VA		
Motor	20 VA	100.00%	20 VA	**Total Conn. Load:**	3137 VA
Other	30 VA	100.00%	30 VA	**Total Est. Demand:**	3400 VA
Receptacle	1360 VA	100.00%	1360 VA	**Total Conn.:**	15 A
Spare	100 VA	100.00%	100 VA	**Total Est. Demand:**	16 A
Lighting	1053 VA	125.00%	1316 VA		

Notes:

LIGHTING CONTROL DEVICE SCHEDULE

NETWORK LIGHTING CONTROL SYSTEMS

NETWORK OCCUPANCY SENSORS

SYMBOL TAG	MANUFACTURER MODEL/SERIES	DEVICE DESCRIPTION	COVERAGE (W X D)	VOLTAGE	NOTES
OS	LUTRON LRF2-OCR2B-P-WH	CEILING MOUNT WIRELESS OCCUPANCY SENSOR 360DEGREE COVERAGE. INTERNAL BATTERY POWERED. MAX RECOMENDED MOUNTING HEIGHT OF 12'-0"	MAJOR 26'Ø MINOR 18' Ø	BATTERY	
OSW	LUTRON MS-OPS6MS-DV-WH180	WALL MOUNT PASSIVE INFRARED OCCUPANCY SENSOR. 180 DEGREE COVERAGE. DIGITAL. (2) RJ45	MAJOR 30'X30' MINOR 20'X20'	120/277V	

NETWORK DAYLIGHT SENSORS

NETWORK ROOM CONTROLLERS (POWER PACK)

SYMBOL TAG	MANUFACTURER MODEL/SERIES	DEVICE DESCRIPTION	VOLTAGE	NOTES
P1	LUTRON RMJS-16R-DV-B (ON/OFF)	WIRELESS ROOM CONTROLLER FOR ON/OFF CONTROL OF LIGHTING LOADS. (1) 16A LOAD INPUT, UP TO 10 PICO/OCCUPANCY SENSORS AND 1 POWER SAVER DAYLIGHT SENSOR OUTPUTS. MANUAL-, AND AUTO-ON MODES.	120/277	
P2	LUTRON RMJS-PNE-DV (PHASE)	WIRELESS ROOM CONTROLLER FOR ON/OFF/PHASE DIMMING CONTROL OF LIGHTING LOADS. (1) 450W LOAD INPUT WITH ELV FIXTURES, UP TO 10 PICO/OCCUPANCY SENSORS AND 1 POWER SAVER DAYLIGHT SENSOR RELAY OUTPUTS. MANUAL-, PARTIAL-, AND AUTO-ON MODES.	120/277	
P3	LUTRON RMJS-8T-DV-B (0-10V)	WIRELESS ROOM CONTROLLER FOR ON/OFF/0-10V DIMMING CONTROL OF LIGHTING LOADS. (1) 8A LOAD INPUT, UP TO 10 PICO/OCCUPANCY SENSORS AND 1 POWER SAVER DAYLIGHT SENSOR. MANUAL-, PARTIAL-, AND AUTO-ON MODES.	120/277	
P4	LUTRON RMJS-20R-DV-B (PLUG)	DIGITAL ROOM CONTROLLER FOR PLUG CONTROL. (1) 20A LOAD INPUT, UP TO 10 PICO/OCCUPANCY SENSORS. MANUAL-, AND AUTO-ON MODES.	120	

NETWORK LIGHTING SWITCHES

SYMBOL TAG	MANUFACTURER MODEL/SERIES	DEVICE DESCRIPTION	VOLTAGE	NOTES
LV	LUTRON PJ2-2B-GWH-L01	DIGITAL 2 BUTTON SWITCH FOR MANUAL ON/OFF AND SCENE CONTROL. EACH BUTTON HAS INTEGRAL LED THAT ILLUMINATES WHEN LOAD IS ON. WIRELESS SWITCH WITH INTERNAL BATTERY.	BATTERY	NOTES
D	LUTRON PJ2-3BRL-GWH-L01	DIGITAL 3 BUTTON SWITCH FOR MANUAL ON/OFF AND SCENE CONTROL WITH RAISE/LOWER. EACH BUTTON HAS INTEGRAL LED THAT ILLUMINATES WHEN LOAD IS ON. WIRELESS SWITCH WITH INTERNAL BATTERY.	BATTERY	

NETWORK AUXILIARY LIGHTING EQUIPMENT

SYMBOL TAG	MANUFACTURER MODEL/SERIES	DEVICE DESCRIPTION	VOLTAGE	NOTES
PH	LUTRON PHPM-PA-120-WH	SURFACE OR RECESSED PHASE ADAPTIVE POWER MODULE. 16A CAPACITY FOR A 1 ZONE. MAY BE USED TO DIM INCANDESCENT, HALOGEN, ELV, MLV, AND NEON	120/277V	
V	LUTRON HJS-0-FM	VIVE WIRELESS HUB WITH 365 DAY AND HOLIDAY TIME CLOCK SCHEDULE. SURFACE OR RECESS MOUNT OPTIONS. FULL WIRELESS SYSTEM WITH CONNECTIVITY TO IOS AND ANDROID DEVICES. ALL ASSOCIATED WIRELESS DEVICES MUST BE WITHIN 71 FT OF VIVE HUB.	SUPPLY 120/277V HUB 24V	

GENERAL NOTES:

A. OCCUPANCY SENSOR LAYOUT DESIGNED FROM BASIS-OF-DESIGN COVERAGE PATTERNS. IF SUBMITTING ALTERNATE PER 'EQUIVALENT MANUFACTURER' COLUMN, ADJUST SENSOR QUANTITIES AND LOCATIONS PER MANUFACTURER-SPECIFIC SPACING CRITERIA.
B. PROVIDE SHOP DRAWINGS FOR ENGINEER AND ARCHITECT REVIEW THAT INCLUDE PRODUCT CUT SHEETS AND PROJECT-SPECIFIC LAYOUTS. LAYOUTS MUST INCLUDE SENSOR LOCATIONS, HEIGHTS, ORIENTATION, AND COVERAGE AREAS. SHOW COORDINATION WITH ALL OTHER CEILING DEVICES INCLUDING BUT NOT LIMITED TO HVAC SUPPLY AND RETURN GRILLES, SPRINKLERS, LIGHT FIXTURES, AND OTHER OWNER-PROVIDED CEILING MOUNTED DEVICES SUCH AS SPEAKERS, SECURITY CAMERAS, PROJECTORS, ETC. (SENSORS MAY BE ADVERSELY AFFECTED IF LOCATED TOO CLOSE TO OTHER CEILING MOUNTED DEVICES). ALSO PROVIDE SCHEMATICS AND SCHEDULES WHEN APPLICABLE.
C. LIGHTING CONTROLS PRICING SHALL BE COMPLETELY SEPARATE OF ANY LIGHT FIXTURE PRICING.
D. VERIFY COLOR(S) FOR ALL WALL AND CEILING MOUNTED DEVICES WITH THE ARCHITECT.
E. ALL WALL SWITCH AND CEILING SENSORS SHALL HAVE AN ADJUSTABLE TIME DELAY RANGE OF 0-30 MIN, UNO. CONFIRM SENSOR SETTINGS WITH SEQUENCE OF OPERATIONS AND OWNER PRIOR TO SYSTEM COMMISSIONING.
F. PROVIDE COPIES OF OPERATION AND MAINTENANCE INSTRUCTIONS FOR ALL DEVICES TO OWNER.
G. PROVIDE A NEUTRAL CONDUCTOR TO ALL WALL SWITCH LOCATIONS PER NEC REQUIREMENTS.
H. DO NOT SHARE NEUTRAL CONDUCTOR ON LOAD SIDE OF DIMMERS.

ROOM CONTROLLER SCHEDULE

**REFER TO LIGHTING CONTROL DEVICE SCHEDULE FOR DEVICE SPECIFICATION.

ID	DESCRIPTION / LABEL	CONTROL TYPE	LOAD (WATTS)	ZONE
a	LTG - SALES GENERAL TRACK	ON/OFF	405	1
b	LTG - SALES GENERAL TRACK	ON/OFF	405	1
c	LTG - SALES	ON/OFF	604	1
d	LTG - BOOT WALL FIXTURES	PLUG	150	1
e	LTG - BOOT WALL FIXTURES	PLUG	210	1
f	LTG - CORRIDOR	ON/OFF	80	4
g	LTG - STOCKROOM	ON/OFF	500	2
h	STOREFRONT SIGNAGE	ON/OFF	500	1
k	LTG - BAR MILLWORK	ON/OFF	500	1
m	INTERIOR SIGN	ON/OFF	500	1
n	RCPT - SHOW WINDOW	PLUG	1800	1
p	RCPT - SHOW WINDOW	PLUG	1800	1

CONTROL TYPE LEGEND:
ELV = ELECTRONIC LOW VOLTAGE DIMMING
MLV = MAGNETIC LOW VOLTAGE DIMMING
NON-DIM = SWITCHING ONLY LOAD (NO DIMMING)
PLUG = PLUG LOADS (NO DIMMING)
0-10V = 0-10V DIMMING
2-WIRE = 2-WIRE DIMMING
3-WIRE = 3-WIRE DIMMING
DMX = COLOR CHANGING DIMMING

LIGHTING CONTROL SEQUENCE OF OPERATIONS:

A. HOURS/MODES OF OPERATION
GENERAL NOTE: CONFIRM ALL TIMECLOCK SCHEDULES AND SENSOR TIME DELAYS WITH OWNER PRIOR TO FINAL PROGRAMMING.

OCCUPIED HOURS: COORDINATE WITH OWNER
BUSINESS HOURS: COORDINATE WITH OWNER

B. GENERAL REQUIREMENTS
1. EMERGENCY LIGHTING: EMERGENCY EGRESS LIGHTING IS POWERED FROM EMERGENCY BATTERY BALLASTS AND DRIVERS INTEGRAL TO FIXTURES DESIGNATED AS EMERGENCY. UPON LOSS OF POWER, ALL LIGHTS DESIGNATED AS EMERGENCY SHALL TURN ON AT FULL EMERGENCY BATTERY BACK-UP OUTPUT.

C. ZONE #1 SALES AND CUSTOMER-ACCESSIBLE AREAS
1. TIMECLOCK: SPACE IS NETWORKED TO A CENTRAL TIMECLOCK.
2. MANUAL CONTROL: OCCUPANT CAN MANUALLY CONTROL LIGHTS VIA REMOTELY-LOCATED SWITCH(ES).
3. OCCUPANCY: LIGHTS SHALL OPERATE AS INDICATED BELOW:
   a. GENERAL LIGHTING SHALL AUTOMATICALLY TURN ON TO 50% DURING OCCUPIED HOURS, AND THE OCCUPANT MAY MANUALLY ADJUST THE DIMMING LEVEL VIA SWITCH.
   b. ALL DISPLAY, MILLWORK/CASE, AND DECORATIVE LIGHTING ZONES SHALL OPERATE AUTOMATICALLY DURING BUSINESS HOURS.
   c. INTERIOR SIGNAGE ZONE(S) SHALL OPERATE AUTOMATICALLY ON AN INDEPENDENT TIME SCHEDULE. CONFIRM TIMES WITH OWNER AND LANDLORD.
   d. EXTERIOR SIGNAGE ZONE(S) SHALL OPERATE ASTRONOMICALLY (DUSK TO DAWN).
4. VACANCY: LIGHTS SHALL TURN OFF AUTOMATICALLY BASED ON TIMECLOCK SCHEDULE. REFER TO OCCUPANCY SECTION ABOVE FOR OPERATION SCHEDULE. DURING NON-OCCUPIED HOURS GENERAL LIGHTING SHALL TURN OFF AFTER 15 MINUTES VIA CEILING MOUNTED OCCUPANCY SENSORS.

D. ZONE #2 STOCKROOM/STORAGE/OFFICE
1. TIMECLOCK: SPACE IS NETWORKED TO A CENTRAL TIMECLOCK BUT IS CONTROLLED LOCALLY.
2. MANUAL CONTROL: OCCUPANT CAN MANUALLY TURN LIGHTS ON/OFF VIA LOCAL SWITCH(ES).
3. OCCUPANCY: ALL CONTROLLED LOADS SHALL AUTOMATICALLY TURN ON TO 50% DURING OCCUPIED HOURS, AND THE OCCUPANT CAN MANUALLY ADJUST THE DIMMING LEVEL VIA SWITCH.
4. VACANCY: AFTER 15 MINUTES, ALL CONTROLLED LOADS SHALL TURN OFF.

E. ZONE #3 RESTROOM/FITTING
1. TIMECLOCK: SPACE IS STAND-ALONE (NOT NETWORKED).
2. MANUAL CONTROL: OCCUPANT CAN MANUALLY CONTROL LIGHTS VIA LOCAL SWITCH.
3. OCCUPANCY: ALL CONTROLLED LOADS SHALL AUTOMATICALLY TURN ON.
4. VACANCY: AFTER 15 MINUTES, ALL CONTROLLED LOADS SHALL TURN OFF.

F. ZONE #4 CORRIDOR
1. TIMECLOCK: SPACE IS NETWORKED TO A CENTRAL TIMECLOCK BUT IS CONTROLLED LOCALLY.
2. MANUAL CONTROL: OCCUPANT CAN MANUALLY CONTROL LIGHTS VIA LOCAL SWITCH.
3. OCCUPANCY: ALL CONTROLLED LOADS SHALL AUTOMATICALLY TURN ON TO 50% DURING OCCUPIED HOURS, AND THE OCCUPANT CAN MANUALLY ADJUST THE DIMMING LEVEL VIA SWITCH.
4. VACANCY: AFTER 15 MINUTES, ALL CONTROLLED LOADS SHALL TURN OFF.

1. ALL CIRCUITING SHOWN IS FOR REFERENCE PURPOSE ONLY. E.C. SHALL VERIFY CIRCUITING OF THE EXISTING DEVICES IN FIELD AND INFORM ENGINEER FOR DISCREPANCIES.
2. ELECTRICAL CONTRACTOR TO VERIFY THE EXACT PANEL SIZES AND INCOMING FEEDER SIZE.
3. ELECTRICAL CONTRACTOR TO COORDINATE WITH THE MANUFACTURER OF EQUIPMENT FOR THE WIRE SIZE & RATING OF MOCP BEFORE THE COMMENCEMENT OF WORK.
4. ELECTRICAL CONTRACTOR TO COORDINATE EXACT LOCATION AND ELECTRICAL REQUIREMENT OF PLUMBING/MECHANICAL EQUIPMENTS WITH RESPECTIVE SYSTEM CONTRACTOR/OWNER/ARCHITECT.
5. E.C. SHALL VERIFY THE EXACT CIRCUIT, CIRCUIT NUMBER IN FIELD & ADJUST / MODIFY CIRCUITING AS REQUIRED.

GENERAL NOTES NTS | **B**

NOT USED NTS | **A**

PROJECT LOCATION:
TECOVAS

E-301

Property of NY Engineers

PLUMBING LEGEND & SYMBOLS

PLUMBING		PLUMBING	
VENT PIPING (V)	—V—	BALL VALVE	
SANITARY PIPING (S)	—SAN—	REDUCED PRESSURE BACK FLOW PREVENTER	
EXISTING COLD WATER LINE	—EX.CW—	MANUAL AIR VENT	MAV
COLD WATER LINE	—CW—	PRESSURE REDUCING VALVE	
HOT WATER LINE	—HW—	UNION	
HOT WATER RETURN LINE	—HWR—	STRAINER	
FLOOR DRAIN	FD	THERMOSTATIC MIXING VALVE	
FLOOR CLEANOUT	FCO	BALANCING VALVE	
WALL CLEAN OUT	WCO	NON-FREEZE WALL HYDRANT	
CLEAN OUT	CO	HOSE BIB	
PUMP			
FLOW METER	M		
PIPE RISE			
PIPE DROP			
PIPE TOP TAKE-OFF			
PIPE BOTTOM TAKE-OFF			
PIPE CAP			
PIPE CONTINUATION			
ISOLATION VALVE			
CHECK VALVE			

ABBREVIATIONS DESCRIPTION		ABBREVIATIONS DESCRIPTION	
ASV	AUTOMATIC SHUT OFF VALVE	BFP	BACK FLOW PREVENTOR
CL	CENTER LINE	BV	BALANCING VALVE
CDP	CONDENSATE DRAIN PIPE	CO	CLEAN OUT
DN	DOWN	CW	COLD WATER
EWC-1	ELECTRIC WATER COOLER	MS	MOP SINK
ET	EXPANSION TANK	MNPT	MALE NATIONAL PIPE THREAD TAPER
FD	FLOOR DRAIN	NC	NORMALLY CLOSED
FCO	FLOOR CLEAN OUT	PRV	PRESSURE REDUCING VALVE
FDC	FIRE DEPARTMENT CONNECTION	QSR	QUICK SERVICE RESTAURANT
FLS	FILTRATION SYSTEM	SOV	SOLENOID VALVE
HW	HOT WATER 120 °F	SAN	SANITARY SEWER
HSK	HAND SINK	TMV	THERMOSTATIC MIXING VALVE
HWR	HOT WATER RETURN	V	VENT
HD	HUB DRAIN	VTR	VENT THROUGH ROOF
HB	HOSE BIB	WH	WATER HEATER
E/EX	EXISTING	WCO	WALL CLEAN OUT
ETR	EXISTING TO REMAIN	RCP	RE-CIRCULATION PUMP
D	DEMO		

GENERAL NOTES :

1. IT IS THE INTENT OF THESE SPECIFICATIONS TO PROVIDE A COMPLETE INSTALLATION FOR FINISHED WORK, TESTED AND READY FOR OPERATION. THE WORK THROUGHOUT SHALL BE EXECUTED IN THE BEST AND MOST THOROUGH MANNER UNDER THE DIRECTION OF AND TO THE SATISFACTION OF THE OWNER.
2. ALL MATERIALS REQUIRED FOR THIS WORK SHALL BE NEW, UNUSED, BEST OF ITS RESPECTIVE KINDS, AND FREE FROM DEFECTS AND OF FIRST CLASS QUALITY. BASIS OF QUALITY SHALL BE LATEST STANDARDS OF ASTM, ANSI FEDERAL SPECIFICATIONS OR OTHER ACCEPTABLE STANDARDS.
3. THE PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR THEIR WORK UNTIL ITS COMPLETION AND FINAL ACCEPTANCE AND SHALL REPLACE ANY OF THE SAME WHICH MAY BE DAMAGED, LOST OR STOLEN WITHOUT ADDITIONAL COST TO THE OWNER.
4. THE PLUMBING CONTRACTOR SHALL GUARANTEE ALL WORK PERFORMED AND MATERIALS INSTALLED TO BE FREE FROM INHERENT DEFECTS AND SHALL KEEP IN REPAIR AND REPLACE ANY DEFECTIVE MATERIALS OF WORKMANSHIP, FREE OF COST TO THE TENANT (OWNER) FOR A PERIOD OF ONE (1) YEAR AFTER THE OPENING FOR BUSINESS.
5. ALL WORK SHALL BE DONE ACCORDING TO THE REQUIREMENTS OF ALL APPLICABLE CODES AND LEASE CRITERIA (IF APPLICABLE) AND SHALL RECEIVE THE APPROVAL OF ALL AUTHORITIES HAVING JURISDICTION. PREPARE ALL REQUIRED DOCUMENTS, DRAWINGS AND PERFORM ALL REQUIRED TESTS AND PAY ALL REQUIRED CHARGES TO OBTAIN THESE APPROVALS.
6. CONTRACTOR SHALL BE HELD TO HAVE EXAMINED THE SITE FOR THE WORK BEFORE HAVING SUBMITTED A PROPOSAL. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR CONDITIONS FOUND DURING THE COURSE OF THE CONTRACT.
7. THIS CONTRACTOR MUST PROVIDE LANDLORD'S CONSTRUCTION REPRESENTATIVE WITH COPIES OF REQUIRED INSURANCE AND COPIES TO BE FURNISHED TO THE OWNER BEFORE COMMENCING WORK.
8. SUBMIT THREE (3) SETS OF SHOP DRAWINGS IDENTIFIED WITH PROJECT NAME OF THE FOLLOWING (1) ELECTRIC HOT WATER HEATER OR INSINKERATOR (2) PLUMBING FIXTURES AND TRIM. CONTRACTOR SHALL SUBMIT SHOP DRAWING OF PIPING LAYOUT TO THE OWNER FOR THEIR FILE.
9. THE PLUMBING SUBCONTRACTOR IS A SUBCONTRACTOR OF THE TENANT'S GENERAL CONTRACTOR.
10. NOTCHING AND BORING OF STRUCTURAL STEEL MEMBERS IS NOT PERMITTED. WHEN HANGING FROM STRUCTURAL STEEL ONLY HANG FROM TOP FLANGE OF BEAMS AND TOP CHORDS ONLY AT PANEL POINTS OF JOISTS / TRUSSES.

A. WORK RESPONSIBILITY

1. FURNISH ALL LABOR, MATERIALS, EQUIPMENT AND CONTRACTORS FOR A COMPLETE, SAFE INSTALLATION OF PLUMBING WORK IN FULL CONFORMITY WITH REQUIREMENTS OF ALL AUTHORITIES HAVING JURISDICTION AS INDICATED ON DRAWINGS AND/OR HEREIN SPECIFIED, INCLUDING IN GENERAL THE FOLLOWING:
2. SANITARY DRAINAGE CONNECTIONS TO PLUMBING FIXTURES AND EQUIPMENT REQUIRING SAME WITH FINAL CONNECTIONS TO EXISTING PREINSTALLED OUTLETS PROVIDED BY PRIOR TENANT(S) OR LANDLORD. PLUMBER SHALL VERIFY EXACT LOCATION OF WASTE PIPE OUTLET BEFORE SUBMITTING BID AND NOTIFY THE ARCHITECT OF ANY LOCATION DISCREPANCIES. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR ANY CONCRETE SAWCUTTING REQUIRED TO MAKE THE FINAL CONNECTION TO THE EXISTING WASTE PIPING OR CAPPED OUTLET(S). SAWCUTTING, EXCAVATING, BACKFILLING AND NEW CONCRETE MUST MEET WITH THE LANDLORD'S APPROVAL.
   A. SNAKE SANITARY FOR A DISTANCE OF 100 FEET AND REPORT ANY BLOCKAGE.
   B. TEST WATER PRESSURE TO INSURE MINIMUM OF 50 PSI.
3. COMPLETE VENT SYSTEM, ALL FIXTURES INDIVIDUALLY VENTED WITH FINAL CONNECTION THROUGH ROOF OR TO EXISTING LANDLORD SUPPLIED COMMON VENT. ROOF PENETRATION AND FLASHING TO BE PERFORMED BY LANDLORD'S ROOFER (IF APPLICABLE). COST OF ROOF PENETRATION AND FLASHING TO BE PART OF THIS CONTRACT, UNLESS NOTED OTHERWISE IN BID PROPOSAL (IF APPLICABLE).
4. DOMESTIC WATER SUPPLY SYSTEM INCLUDING CONNECTION TO EXISTING CAPPED OUTLET AND FINAL CONNECTIONS TO PLUMBING FIXTURES AND EQUIPMENT REQUIRING SAME. VERIFY EXACT LOCATION AND SIZE BEFORE SUBMITTING BID.
5. INSULATION OF ALL HOT AND COLD WATER PIPING, INCLUDING UNDER LAVATORY A.D.A. PIPE WRAPPINGS.
6. FURNISH AND INSTALL WATER METER (IF APPLICABLE) ACCESSIBLE TO UTILITY COMPANY OR LANDLORD'S REPRESENTATIVE FOR MONITORING WATER, BUT METER SHOULD IN NO WAY BE IN THE PATH OF THE A.D.A./CABO-ANSI, 5'-0" CIRCULAR PATTERN.
7. COSTS FOR WORKING BELOW TENANT'S SLAB IN ANOTHER TENANT'S SPACE.
8. INSTALLATION OF FLOOR DRAIN, BACKFLOW PREVENTER (IF REQ. BY CODE) PER LANDLORD REQUIREMENT AND CLEANOUT PER LOCAL CODE. COORDINATE ALL LOCATIONS WITH OPERATIONS MANAGER.

B. GENERAL ITEMS

1. SLEEVES: PROVIDE #22 GAGE GALVANIZED IRON PIPE SLEEVES FOR PIPING THROUGH WALLS AND FLOOR, PACK WITH NON-ASBESTOS ROPE AND FILL WITH EXPANDED NON-SHRINKING CEMENT.
2. ESCUTCHEONS: PROVIDE EXPOSED PIPING, BOTH BARE AND COVERED, WITH CP CAST BRASS ESCUTCHEONS WHERE PASSING THROUGH FLOORS, CEILINGS, WALLS OR PARTITIONS.
3. HANGERS AND SUPPORTS: SUPPORT HORIZONTAL DRAINAGE PIPING AT LEAST EVERY 5 FEET OR AT EVERY HUB, COPPER TUBING EVERY 7 FEET AND STEEL PIPE EVERY 10 FEET WITH "CLEVIS" HANGERS AND INSULATION PROTECTION SHIELDS. PIPING SHALL NOT BE SUPPORTED FROM BRIDGING OR OTHER PIPING. ONLY SUPPORT FROM TOP FLANGES OF BEAMS AND TOP CHORDS AT PANELS OF JOIST AND TRUSSES. PROVIDE SWAY AND SEISMIC BRACING WHERE REQUIRED BY CODES.
4. TEST: TEST PIPING AND PROVE TIGHT FOR AT LEAST TWO HOURS IN ACCORDANCE WITH REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION AND/OR AS SPECIFIED. TEST SHALL BE PERFORMED IN THE PRESENCE OF OWNER'S REPRESENTATIVE AND LOCAL INSPECTOR. TEST SHALL BE REPEATED IF NECESSARY UNTIL FINAL APPROVAL OF SYSTEM IS OBTAINED.
   A. TEST DRAINAGE AND VENT PIPING BY FILLING WITH WATER TO OVERFLOWING AT ROOF. WATER LEVEL TO REMAIN.
   B. TEST WATER PIPING WITH WATER 1 1/2 TIMESTHE WORKING PRESSURE.
5. STERILIZATION OF DOMESTIC WATER SYSTEM: BEFORE BEING PLACED IN SERVICE, ALL WATER LINES SHALL BE CHLORINATED TO THE SATISFACTION OF THE ARCHITECT OR LANDLORD'S REPRESENTATIVE, IN ACCORDANCE WITH A.W.W.A. SPECIFICATION C651-05.
6. SLOPE WASTE LINES 2 INCHES AND SMALLER NOT LESS THAN 1/4 INCH PER FOOT. SLOPE LARGER MAINS NOT LESS THAN 1/8 INCH PER FOOT.
7. INSTALL A CLEANOUT AT BASE OF EACH SOIL STACK, AT EACH CHANGE IN DIRECTION, AT INTERVALS NOT OVER 50 FEET AND ELSEWHERE AS SHOWN ON DRAWINGS OR REQUIRED BY LOCAL CODE. CLEANOUTS SHALL NOT BE INSTALLED IN PUBLIC AREAS WITHOUT SPECIFIC PERMISSION BY TENANT'S CONSTRUCTION MANAGER.

C. MATERIALS

1. DRAINAGE AND VENT PIPING: EXTRA HEAVY HUB AND SPIGOT CAST IRON SOIL WITH RUBBER GASKETS CONFORMING TO ASTM C564. NO-HUB CAST IRON TO HAVE HEAVY DUTY, TYPE 304 STAINLESS STEEL COUPLINGS CONFORMING TO ASTM A 666, TYPE 304 STAINLESS STEEL SHIELD, TYPE 304 STAINLESS STEEL BANDS AND SLEEVE. NPS 1 1/2" TO NPS 4": 3" WIDE SHIELD WITH 4 BANDS; NPS 5" TO NPS 10": 4" WIDE BAND WITH 6 BANDS. BELOW GRADE SANITARY TO BE SCHEDULE 40 PVC CONFORMING TO ASTM D2665 WITH PVC SOCKET FITTINGS.
2. WATER PIPING BELOW SLAB: TYPE K HARD COPPER TUBING, WITH CAST BRONZE OR WROUGHT COPPER SOLDER JOINT FITTINGS USING 95-5 SOLDER. WATER PIPING ABOVE SLAB: TYPE L HARD COPPER TUBING USING SILVER SOLDER. ALL WATER SUPPLY PIPING TO CONFORM TO NSF/ANSI 61 AND ASTM B 75, ASTM B 88, ASTM B 251, OR ASTM B 447. ALL PIPE FITTINGS SHALL CONFORM TO ASSE 1061, ASME B 16.15, ASME B 16.18, ASME B 16.22, ASME B 16.23, ASME B 16.26, AND ASME B 16.29.
3. VALVES: GATE VALVE WATTS SERIES B-3000, CHECK VALVE WATTS SERIES B-5000, BALL VALVE WATTS SERIES B6080 OR B6081 FULL PORT. ALL VALVES 1/2" TO 2" BRONZE BODY. VALVES SHALL CONFORM TO NSF/ANSI 61.
4. PRESSURE AND TEMPERATURE RELIEF VALVE: WATTS REGULATING CO. MODEL 10L. T&P RELIEF VALVE SHALL CONFORM TO ANSI Z21.22.
5. AIR VENT: HOFFMAN #79 WATER MAIN VENT VALVE.
6. MIXING VALVE: WATTS SERIES MMV MIXING VALVE, 1/2" LINE SIZE. MIXING VALVE SHALL CONFORM TO ASSE 1017.

D. INSULATION

1. ALL HOT AND COLD WATER PIPING AND FITTINGS SHALL BE INSULATED WITH 1" THICK RIGID FIBERGLASS WITH VAPOR BARRIER UNIVERSAL JACKET PASTED WITH VAPOR BARRIER CEMENT. VAPOR BARRIER NOT REQUIRED ON HOT WATER PIPING.
2. ALL ADA CONFORMING, WHEELCHAIR ACCESSIBLE LAVATORY P-TRAP AND ANGLE VALVE ASSEMBLIES TO BE COVERED WITH THE MOLDED, ANTIMICROBIAL TRUBRO, INC "LAV-GUARD" UNDERSINK PROTECTIVE PIPE COVER MODEL #103.

E. SPECIFIC PLUMBING SPECIFICATIONS

1. INSTALL NEW ONLY IF EXISTING DOES NOT MEET CURRENT ADA/CABO-ANSI (AS APPLICABLE) STANDARDS, OR IS DAMAGED, NOT IN WORKING ORDER OR NOT EXISTING AS APPLICABLE.
2. IT IS THIS CONTRACTOR'S RESPONSIBILITY TO SUPPLY HANDICAPPED TOILET FIXTURES, IF REQUIRED BY CODE OR NOTED ON THE DRAWINGS, UTILIZING THE SPECIFICATION ABOVE AS A STANDARD AND MEETING CODE REQUIREMENTS. SPACING OF FIXTURES TO BE COORDINATED WITH THE GENERAL CONTRACTOR AS WELL AS THE PLUMBING INSPECTOR'S REQUIREMENTS.

F. LANDLORD'S CRITERIA

1. THE PLUMBING CONTRACTOR IS TO BECOME FAMILIARIZED WITH LANDLORD'S CRITERIA FOR THIS LOCATION AND INCLUDE ANY WORK REQUIRED OF THIS CRITERIA, WHICH IS NOT SPECIFICALLY NOTED IN THESE DRAWINGS AND SPECIFICATIONS.

PLUMBING FIXTURE SCHEDULE

DESCRIPTION	MANUFACTURER/ CATALOG NO.
EWC	ELECTRIC WATER – BOTTLE FILLER COOLER (ADA ACCESSIBLE): ELKAY EZSTL8WS(VR)K BARRIER FREE, LEAD FREE, MODULAR HI-LOW WITH BOTTLE FILLING STATION. FRONT AND SIDE PUSH ACTUATOR BARS, STAINLESS STEEL BOWL, FLEXIBLE POLYESTER ELSTOMER SAFETY BUBBLER AND GALVANIZED STEEL FRONT AND SIDES. CHILLER WITH CAPACITY OF 8.0 GALLONS PER HOUR, AT 50F INLET 80F OUTLET AND 90F AMBIENT TEMPERATURES. BOTTLE FILLING STATION: ELECTRONIC SENSOR FOR TOUCHLESS ACTIVATION WITH AUTO 20-SECOND SHUT-OFF TIMER, UNIT PROVIDES 1.1-1.5 GPM WITH LAMINAR FLOW TO MINIMALS SPLASHING. FILTER: ELKAY WATERSENTRY PLUS FILTER WITH 3,000 GALLON USE CAPACITY WITH VISUAL MONITOR TO INDICATE WHEN FILTER REQUIRES REPLACEMENT TRIM: McGUIRE # LF2165CC LEAD FREE BRASS COMPRESSION ANGLE STOP VALVE WITH RISER AND ESCUTCHEON, McGUIRE # B8872CF 1-1/4" 17 GAUGE CAST CHROME PLATED BRASS ADJUSTABLE P-TRAP AND WASTE ARM WITH CLEANOUT PLUG AND ESCUTCHEON, AND SUITABLE CARRIER WITH STANCHIONS TO FLOOR. ELECTRICAL REQUIREMENTS: 120-VOLT, 5 FULL LOAD AMPS
MS	MOP SINK: EAGLE MOP SINK STORAGE CABINET # F1916-VSCS, 16" x 20" x 8" MOP SINK FEATURING LARGE RADIUS CORNER AND 3-1/2" NPS STAINLESS STEEL DRAIN WITH 2" NPS CONNECTION. FAUCET: CHICAGO FAUCET # 897-CP FAUCET WITH WALL BRACE, INTEGRAL VACUUM BREAKER, PAIL HOOK, AND 3/4" MALE HOSE THREADED OUTLET. SECURE FAUCET IN WALL WITH BACKBOARD. TRIM: # BP TYPE 304, 20 GAUGE, STAINLESS STEEL WALL SURROUNDS, # T-35 THREE FOOT LONG REINFORCED HOSE WITH 3/4" CHROME COUPLING AND WALL HOOK, # V-70 EXTRUDED VINYL BUMPER GUARD, AND TWO-POLE MOP HOLDER.
LAV	WALL-MOUNTED LAVATORY: AMERICAN STANDARD # 0355.012 "LUCERNE" 20-1/2" X 18-1/4" RECTANGULAR WALL MOUNTED WHITE VITREOUS CHINA FIXTURE WITH FAUCET LEDGE AND FRONT OVERFLOW. FAUCET: CHICAGO FAUCET # 802-VE2805ABCP 4" CENTERSET, VANDAL RESISTANT, LEAD FREE FAUCET WITH # 390 LEVER HANDLES, CERAMIC QUARTER TURN CARTRIDGES AND # E2805.0.5 GPM AERATOR. TRIM: McGUIRE # 155A GRID DRAIN WITH TAILPIECE, McGUIRE #LF2165CCLK LEAD FREE BRASS LOOSE KEY COMPRESSION ANGLE STOP VALVES WITH RISERS AND ESCUTCHEONS, McGUIRE # B8872CF 1-1/4" 17 GAUGE CAST CHROME PLATED BRASS ADJUSTABLE P-TRAP AND WASTE ARM WITH CLEANOUT PLUG AND ESCUTCHEON, CONCEALED ARM CARRIER WITH STANCHIONS TO FLOOR.
TMV	THERMOSTATIC MIXING VALVE: POWERS # LFG480, SOLID LEAD FREE BRASS OR BRONZE BODY, THERMOSTATIC WAX ELEMENT, CORROSION RESISTANT INTERNAL PARTS, AND INTEGRAL CHECKS, ASSE 1070 COMPLIANT, CAPABLE OF 2.2 GPM WITH A 20 PSI DIFFERENTIAL AND A MINIMUM FLOW RATE OF 0.5 GPM. SET TEMPERATURE TO 110F FOR DUAL TEMPERATURE LAVATORIES AND HAND SINKS, 100F FOR SINGLE TEMPERATURE LAVATORIES AND HAND SINKS AND 120F FOR SINKS. MOUNT BELOW THE PLUMBING FIXTURE WHERE INDICATED ON PLAN(S).
TS	TIME SWITCH: INTERMATIC #ET2705CSPST, 7 DAY, ONE CIRCUIT-SINGLE POLE SINGLE THROW, ELECTRONIC TIME SWITCH OR EQUAL BY TORK. TIME SWITCH SHALL BE MOTOR RATED (1 H.P. @ 120 VOLT, SINGLE PHASE), MINIMUM OF 99 SET POINTS (48 ON/OFF CYCLES) AND BATTERY BACK UP. COORDINATE WITH ELECTRICAL FOR INSTALLATION AND INTERLOCK OF TIME SWITCH IN SERIES WITH THE AQUASTAT AND RECIRCULATION PUMP
WC	FLOOR-MOUNTED WATER CLOSET: AMERICAN STANDARD # 2898.012 "CADET" TANK-TYPE WHITE VITREOUS CHINA FIXTURE WITH ELONGATED BOWL, 1.6 GALLON PER FLUSH, AND SIPHON FLUSH ACTION AND CLOSE-COUPLED TANK WITH LEFT HAND TRIP LEVER. TRIM: CHURCH # 9500SSC WHITE OPEN-FRONT CONTOURED, SOLID PLASTIC, HEAVY DUTY, SEAT LESS COVER WITH SELF-SUSTAINING CHECK HINGES AND STAINLESS STEEL BOLTS, McGUIRE # 2166CC ANGLE STOP VALVE WITH RISER AND CHROME-PLATED ESCUTCHEON.
WCO	WALL CLEANOUT: JAY R. SMITH # 4530S, CAST IRON CLEANOUT TEE, COUNTER SUNK PLUG, STAINLESS STEEL ROUND COVER AND SCREW, AND IRON PLUG WITH GASKET SEAL. REFER TO SPECIFICATIONS FOR INSTALLATION.
TP	TRAP PRIMER: PRECISION PLUMBING PRODUCTS # PR-500 "PRIME RITE", CORROSION RESISTANT BRASS BODY, "O" RING SEALS, 1/2" INLET AND OUTLET, AND INTEGRAL VACUUM BREAKER. INSTALL THE VALVE AT A MINIMUM OF 12" ABOVE FINISHED FLOOR.
WHA	WATER HAMMER ARRESTER: PRECISION PLUMBING PRODUCTS, HARD DRAWN COPPER BODY WITH WROUGHT COPPER FITTINGS, PISTON TYPE WITH LUBRICATED EPDM "O" RING SEALS, MEETING ASSE 1010 OR PDI WH-201. PROVIDE PDI SIZES "A" THROUGH "F" AS SHOWN ON PLANS. PROVIDE SIZE "A" UNLESS SHOWN OTHERWISE ON THE PLANS.
FD	FLOOR DRAIN: JAY R .SMITH # 2005L (-A), CAST IRON BODY AND CLAMPING COLLAR, ADJUSTABLE 6" ROUND NICKEL BRONZE STRAINE. USE PUSH-ON JOINT OF OUTLET SIZE AS SHOWN ON PLANS.
HS-1	17"x19", ONE HOLE, 22 GAUGE STAINLESS STEEL, DROP IN TYPE. PROVIDE WITH PROFLO - PFX3085 FAUCET. 0.5 GPM 2 HANDLE 8 CENTER 8 IN SPOUT POLISHED CHROME . VERIFY FAUCET WITH ARCHITECT PRIOR TO BID.PROVIDE WITH GARBAGE DISPOSAL - BADGER IBADGER1WC.
FFD	ZURN #415 TYPE 'E' ROUND FUNNEL STRAINER, 8"Ø NICKEL BRONZE TOP, CAST IRON BODY, CONVERTIBLE MEMBRANE CLAMP, AND ADJUSTABLE COLLAR.

NOTES:

A. VERIFY THE MODEL AND FAUCET WITH ARCHITECT PRIOR TO BID.
B. COORDINATE WITH ARCHITECT AN MANUFACTURER FOR PROPER INSTALLATION.

RECIRCULATION PUMP SCHEDULE

MARK	MANUFACTURER	MODEL NO.	LOCATION	GPM	HEAD (FT)	CONNECTION SIZE	ELECTRICAL DATA			NOTES
							VOLTS	PH	WATT	
RCP-1	GRUNDFOS	UP 15-10 BS	ABOVE MOP SINK	1 GPM	5 FT.	1/2"	115	1Ø	25 W	A-D

NOTES:

A. ALL LEAD FREE CAST BRONZE BOOSTER.
B. PROVIDE WITH STRAINER UPSTREAM OF PUMP.
C. PROVIDE ADJUSTABLE, SURFACE MOUNTED AQUASTAT - HONEYWELL L6006C.
D. SET AQUASTAT TO SHUT OFF RECIRCULATION PUMP AT WATER HEATER SET POINT AND ON AT 10°F BELOW SET POINT.

ELECTRIC STORAGE WATER HEATER SCHEDULE

MARK	MANUFACTURER	MODEL NO.	LOCATION	TANK SIZE (GALLONS)	ELECTRICAL DATA			RECOVERY (GPH)	WEIGHT (LB)	NOTES
					VOLTS	PH	WATT			
EWH-1	A.O. SMITH	#DEL-10	ABOVE MOP SINK	10 GAL.	480	1Ø	4 KW	18 GAL.	54	A,B,C

NOTES:

A. 90°F TEMPERATURE RISE WITH 140°F OPERATING TEMPERATURE.
B. SINGLE ELEMENT.
C. "LOW BOY" DESIGN.

PLUMBING EXPANSION TANK SCHEDULE

MARK	MANUFACTURER	MODEL NO.	TANK SIZE (GALLONS)	MIN. ACCEPTANCE VOLUME (GALLONS)	WEIGHT (LB)	NOTES
ET-1	AMTROL	ST-5	2 GAL.	0.9	22	A

NOTES:

A. CHARGE TANK WITH AIR RO IDENTICAL PRESSURE AS STATIC DOMESTIC WATER PRESSURE.

BACKFLOW PREVENTER DEVICE SCHEDULE

MARK	MANUFACTURER	MODEL NO.	SIZE	TYPE	USAGE	APPROVAL
BFP-1	WATTS	009-QT	1"	REDUCED PRESSURE BACKFLOW PREVENTER	DOMESTIC WATER CONNECTION	ASSE 1015, AWWA 1013

WATER SUBMETER SCHEDULE

MANUFACTURER	MODEL NO.	SIZE	TYPE	USAGE
ASSURED AUTOMATION	WM-NLC-100	1"	WATER SUB-METER	DOMESTIC WATER CONNECTION

Property of NTX Engineering

PROJECT LOCATION:
TECOVAS

P-001

PLUMBING SPECIFICATIONS

SECTION 22 05 00

COMMON WORK RESULTS FOR PLUMBING

1.0 GENERAL
1.01 DESCRIPTION

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

1. 02 EXISTING CONDITIONS

A. PRIOR TO THE SUBMISSION OF BIDS, EACH BIDDER SHALL VISIT THE PROJECTS SITE, THOROUGHLY INVESTIGATE AND BE FAMILIAR WITH ALL THE SITE CONDITIONS WHICH WILL AFFECT THEIR WORK.

B. CONNECT NEW WORK IN A NEAT AND WORKMANLIKE MANNER.

1.03 INTENT OF DRAWINGS AND SPECIFICATIONS

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

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

1.04 SPACE PRIORITY

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

1. GRAVITY FLOW PIPING SYSTEMS
2. VENT PIPING SYSTEMS.
3. RECESSED LIGHTING FIXTURES
4. CONCEALED HVAC TERMINALS AND EQUIPMENT
5. AIR DUCT SYSTEMS
6. SPRINKLER PIPING SYSTEMS
7. PRESSURIZED PIPING SYSTEMS
8. ELECTRICAL CONDUIT, WIRING, CONTROL AIR TUBING

B. ORDER OF SPACE PRIORITY DOES NOT DICTATE INSTALLATION SEQUENCE. INSTALLATION SEQUENCE SHALL BE AS REQUIRED TO INSTALL ALL AFFECTED THREADS.
C. THE WORK OF THIS DIVISION 22 SHALL NOT OBSTRUCT ACCESS FOR INSTALLATION, OPERATION AND MAINTENANCE OF THE WORK OF ANY OTHER DIVISION.
D. ALL MAJOR ITEMS OF EQUIPMENT SHALL BE ARRANGED S0 A3 TO PROVIDE A MINIMUM OF 28" CLEAR AISLE SPACE. ADDITIONAL APACE SHALL BE PROVIDED BETWEEN AND AROUND EQUIPMENT FOR MAINTENANCE AND PROPER OPERATION OS SHOW IN THE EQUIPMENT MANUFACTURER'S LITERATURE.

1. 05 COORDINATION

A. COORDINATE ALL WORK UNDER THIS DIVISION 22 WITH WORK UNDER AL OTHER DIVISIONS, PROVIDING ADJUSTMENT AS NECESSARY.
B. COORDINATION OF SPACE REQUIREMENTS WITH RESPECT TO DIVISION 26 SHALL BE PERFORMED SUCH THAT.
1. NO EQUIPMENT, PIPING OR DUCTWORK, OTHER THAN ELECTRICAL, SHALL BE INSTALLED WITHIN 42" OF SWITCHBOARDS OR PANEL BOARDS.
2. NO PIPING OR DUCTWORK WHICH EVER OPERATES AT A TEMPERATURE IN EXCESS OF 120F SHALL BE INSTALLED WITHIN 3" OF ANY ELECTRICAL CONDUCTOR.
C. ALL ITEMS MOUNTED IN OR BELOW THE CEDING, AND AIL ITEMS PENETRATING THE CEILING, STALL BE COORDINATED WITH THE ARCHITECTURAL REFLECTED CEDING PLANS. IF ANY ITEMS ARE NOT SHOWN ON THESE PLANS, OR ANY ITEMS NEED TO BE RELOCATED FOR COORDINATION PURPOSES, PREPARE A REFLECTED CEDING PLAN AND SUBMIT IT TO THE ARCHITECT FOR APPROVAL.

1.06 CODE COMPLIANCE

A. ALL WORKMANSHIP AND MATERIALS PROVIDED UNDER THIS DIVISION 22 SHALL COMPLY WITH ALL LAWS, ORDINANCES, CODES AND REGULATIONS OF ALL FEDERAL, STATE AND LOCAL AUTHORITIES HAVING JURISDICTION.
B. ALL FIRE SUPPRESSION, PLUMBING, HEATING, VENTING, AND A CONDITIONING MATERIALS AND WORKMANSHIP SHALL COMPLY WITH ALL LOCAL, STATE, AND FEDERAL CODES AND THE FOLLOWING STANDARDS AS MINIMUM REQUIREMENTS:
1. 2018 INTERNATIONAL BUILDING CODE (IBC), WITH AMENDMENTS
2. 2018 INTERNATIONAL MECHANICAL CODE (IMC), WITH AMENDMENTS
3. 2017 IDAHO (UNIFORM) PLUMBING CODE (UPC)
4. 2017 NATIONAL ELECTRICAL CODE (NEC)
5. 2018 IDAHO FIRE CODE (IFC), (IBC), WITH AMENDMENTS
6. 2018 INTERNATIONAL ENERGY CONSERVATION CODE (IECC), (IBC), WITH AMENDMENTS

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

1.07 ELECTRICAL REQUIREMENTS AND INTERFACE

A. ALL ELECTRICAL EQUIPMENT AND WIRING PROVIDED UNDER THIS DIVISION 22 SHALL COMPLY WITH THE ELECTRICAL SYSTEM CHARACTERISTICS INDICATED ON THE ELECTRICAL DRAWINGS AND SPECIFIED IN DIVISION 26.
B. ELECTRIC CONTROLS, CONTRACTORS, STARTERS, PILOT LIGHTS, PUSH BUTTONS, ETC., SHALL BE PROVIDED COMPLETE AS PORT OF THE MOTOR, HEATER OR OTHER EQUIPMENT WHICH IT OPERATES. AM ELECTRICAL COMPONENTS SHALL BE IN CONFORMANCE WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE AND DIVISION 26. STARTERS SHALL BE WYE-DELTA, CLOSED TRANSITION TYPE. REFERENCE DIVISION 26 AND THE ELECTRICAL ENGINEERING DRAWINGS FOR THOSE MOTOR STARTERS PROVIDED UNDER DIVISION 26. ALL STARTERS NOT SHOWN SHALL BE PROVIDED UNDER THIS DIVISION 22, UNLESS SPECIFIED OTHERWISE UNDER OTHER INDIVIDUAL EQUIPMENT SECTIONS, MOTOR STARTERS SHALL CONFORM TO THE FOLLOWING MINIMUM REQUIREMENTS:
1. STARTERS FOR MOTORS 1/3 HORSEPOWER OR SMALLER SHALL BE MANUAL UNLESS REMOTE OR AUTOMATIC STARTING IS REQUIRED, IN WHICH CASE THE STARTERS SHALL BE MAGNETIC, FULL VOLTAGE, NON--REVERSING, SINGLE--SPEED, UNLESS OTHERWISE INDICATED. ALL OTHER STARTERS SHALL BE MAGNETIC.
2. EACH STARTER FOR A THREE-PHASE MOTOR SHALL BE FURNISHED WITH THREE (3) OVERLOAD RELAYS SIZED FOR THE FULL-LOAD RUNNING CURRENT OF THE MOTOR PROVIDED. PROVIDE AN EXTERNAL "HAND- OFF-- AUTO" SELECTOR SWITCH WITH RED "RUNNING" LIGHT. PROVIDE A GREEN PILOT LIGHT TO INDICATE MOTOR "STOPPED. EACH PILOT LIGHT SHALL HAVE A LEGEND PLATE INDICATING REASON FOR SIGNAL.
3. EACH OVERLOAD RELAY SHALL HAVE A NORMALLY OPEN ALARM CONTACT, WHICH WILL CLOSE ONLY WHEN ACTUATED BY ON OVERLOAD (NOT TO BE CONFUSED WITH N.O. OR N.C. AUXILIARY CONTACTS). THESE CONTACTS SHALL BE PROPERLY WIRED TO THEIR RESPECTIVE BLUE PILOT LIGHT PROVIDED ON THE STARTER FRONT COVER AND HAVE A "TRIPPED" LEGEND PLATE.
4. INDIVIDUALLY MOUNTED MOTOR STARTERS SHALL BE IN A NEMA TYPE 1 GENERAL PURPOSE ENCLOSURE IN UNFINISHED AREAS AND SHALL BE FLUSH MOUNTED IN ALL FINISHED AREAS. ALL STARTERS MOUNTED IN EXTERIOR AREAS SHALL HAVE A NEMA 3R ENCLOSURE. EACH STARTER SHALL HAVE A LAMINATED NAMEPLATE TO 'INDICATE EQUIPMENT UNIT NUMBER, FUNCTION, AND CIRCUIT NUMBER.
5. ALL MOTOR STARTERS, PUSH BUTTONS AND PILOT LIGHTS SHALL BE OF THE SAME MANUFACTURER AS THE SWITCHBOARD AND SHALL BE GENERAL ELECTRIC, SQUARED, SIEMENS, OR WESTINGHOUSE.

C. MOTOR STARTERS FOR THE FOLLOWING EQUIPMENT SHALL BE PROVIDED UNDER DIVISION 22 BY THE MANUFACTURER OF THE EQUIPMENT:
1. PUMPS WITHOUT VFDS.
2. OTHER EQUIPMENT HEREIN AFTER SPECIFIED IN OTHER SECTIONS TO BE PROVIDED WITH INTEGRAL STARTERS.

D. UNLESS OTHERWISE NOTED OR SPECIFIED IN INDIVIDUAL SECTIONS, ALL 3-PHASE MOTORS SHALL BE STANDARD NEMA CONTINUOUS DUTY "B" TYPE, WITH CLASS 8 INSULATION, OPEN DRIP--PROOF FRAME FOR INDOOR SERVICE, TEFC FOR OUTDOOR SERVICE, AND A SERVICE FACTOR OF 1.15. ALL MOTORS 5 HP AND LARGER SHALL BE U.S. MOTORS HI-EFFICIENCY MODEL OR RELIANCE XE HI-EFFICIENCY MODEL.
E. ALL POWER WIRING AND FINAL CONNECTIONS TO EQUIPMENT SHALL BE PROVIDED UNDER DIVISION 26.
F. CONTROL COMPONENTS, ALL INTERLOCKS (CONTROL! VALVES, LEAK SENSORS, ETC.) AND CONTROL WIRING (120 VOLTS, SINGLE PHASE OR LESS) SHALL BE PROVIDED UNDER DIVISION 22 AS REQUIRED TO ACHIEVE THE SPECIFIED CONTROL SEQUENCES.
G. ALL CONTROL WIRING OVER 30 VOLTS SHALL BE INSTALLED BY A LICENSED ELECTRICIAN WORKING UNDER THIS DIVISION 22.

1.08 SLEEVES, SEALS, AND ESCUTCHEONS

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

1.09 FIRE STOPS

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

1.10 CORE DRILLING

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

1.11 IDENTIFICATION OF PIPING

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

2.0 PRODUCTS

2.01 BASIS AND SUBSTITUTION PROCEDURES

A. MANUFACTURER NAMES, SERIES, AND MODEL NUMBERS, AS NOTED OR SPECIFIED, ARE FOR THE PURPOSE OF DESCRIBING TYPE, CAPACITY, AND QUALITY OF EQUIPMENT, MATERIALS, AND PRODUCTS TO BE USED. UNLESS "OR EQUAL" IS SPECIFICALLY STATED, BIDS SHALL BE BASED ONLY ON THE SPECIFIED "BASIS OF DESIGN" MANUFACTURER. THE LISTING OF A PARTICULAR MANUFACTURER AS AN "EQUAL" OR "ACCEPTABLE SUBSTITUTE" MANUFACTURER SHALL NOT BE MISCONSTRUED AS APPROVING, NOR ALLOWING THE SUBSTITUTION OF, THAT MANUFACTURER'S STANDARD PRODUCT IN PLACE OF THE BASIS OF DESIGN. NO CONSIDERATION WILL BE GIVEN TO A PRODUCT THAT WOULD REQUIRE DIMENSIONAL, SPATIAL, OR AESTHETIC CHANGES TO THE PROJECT. "ACCEPTABLE SUBSTITUTE" AND "EQUAL" MANUFACTURERS SHALL ONLY BID THOSE PRODUCTS THAT EXACTLY MATCH THE SIZE AND OTHER CHARACTERISTICS OF THE SPECIFIED BASIS OF DESIGN. ANY CHANGES TO OTHER DISCIPLINES AND TRADES OF WORK REQUIRED BY AN "OR EQUAL" OR "SUBSTITUTE" PRODUCT SHALL BE DULY CONSIDERED AND PRICED ACCORDINGLY BEFORE BIDDING OR PRICING. THE DECISION AS TO WHETHER OR NOT A PROPOSED SUBSTITUTE OR "EQUAL" PRODUCT IS EQUAL TO THAT SPECIFIED SHALL REST SOLELY WITH THE ARCHITECT.
B. REQUESTS TO PROVIDE "EQUAL" PRODUCTS IN LIEU OF THOSE SPECIFIED SHALL BE SUBMITTED TO THE ARCHITECT IN WRITING AT LEAST TEN (10) DAYS PRIOR TO FINAL PRICING AND EXECUTION OF THE CONTRACT. NO CONSIDERATION WILL BE GIVEN TO SUBSTITUTE PRODUCTS AFTER FINAL PRICING AND EXECUTION OF THE CONTRACT.
C. ANY "OR EQUAL" PRODUCT OR PROPOSED PRODUCT SUBSTITUTION WHICH WILL CAUSE A CHANGE IN THE APPEARANCE, DIMENSIONS, OR DESIGN OF ANY PART OF THE BUILDING, STRUCTURE, ELECTRICAL SYSTEM, OR ANY OTHER ENGINEERED SYSTEM SHALL BE ACCOMPANIED BY A SCALED DRAWING AND WRITTEN DESCRIPTION OF THE REQUIRED CHANGE(S) FOR APPROVAL BY THE ARCHITECT. IF DEEMED NECESSARY BY THE ARCHITECT, DESIGN CHANGES SHALL BE SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER, CURRENTLY LICENSED IN THIS STATE. THIS SHALL BE PERFORMED UNDER THE CONTRACTOR SELECTING THE SUBSTITUTION'S SCOPE.
D. ANY AND ALL CHANGES DUE TO THE SUBSTITUTION OF BASIS OF DESIGN EQUIPMENT INCLUDING BUT NOT LIMITED TO ELECTRICAL CONNECTION, PHYSICAL SIZE, ACCESS, PIPING CONNECTIONS, CONTROLS, ETC. SHALL BE SOLELY THE RESPONSIBILITY OF THE CONTRACTOR SELECTING THE SUBSTITUTION.

2.02 MINIMUM STANDARDS

A. EVERY PIECE OF ENERGY-CONSUMING EQUIPMENT, ALL FIRE SUPPRESSION PRODUCTS, AND LIFE SAFETY EQUIPMENT SHALL COMPLY WITH THE FOLLOWING STANDARDS AS APPLICABLE; ESPECIALLY REGARDING PREVAILING CODES:
1. FACTORY MUTUAL LABORATORIES (FM)
2. INDUSTRIAL RISK INSURERS (IRI)
3. UNDERWRITERS LABORATORIES, INC. (UL)
4. ADC: AIR DIFFUSION COUNCIL
5. AGA: AMERICAN GAS ASSOCIATION
6. AMCA: AIR MOVING AND CONDITIONING ASSOCIATION, INC.
7. ANSI: AMERICAN NATIONAL STANDARDS INSTITUTE
8. API: AMERICAN PETROLEUM INSTITUTE
9. AHRI: AIR CONDITIONING, HEATING, OND REFRIGERATION INSTITUTE
10. ASHRAE: AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS
11. ASME: AMERICAN SOCIETY OF MECHANICAL ENGINEERS
12. ASTM: AMERICAN SOCIETY OF TESTING AND MATERIALS
13. AWWA: AMERICAN WATER WORKS ASSOCIATION
14. IBR: INSTITUTE OF BOILER AND RADIATOR MANUFACTURERS
15. MSS: MANUFACTURERS STANDARDIZATION SOCIETY
16. NBBPVI; NATIONAL BOARD OF BOARD AND PRESSURE VESSEL INSPECTORS
17. NEMA: NOTIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
18. OSHA: OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION
19. PDI: PLUMBING DRAINAGE INSTITUTE
20. PPT PLASTIC PIPE INSTITUTE
21. CISPI: CAST IRON SOIL PIPING INSTITUTE

2.03 PIPE HANGERS AND SUPPORTS

A. PIPE HANGERS, HANGER RODS, TRAPEZE TYPE HANGERS, UPPER ATTACHMENTS AND OTHER SUPPORTS SHALL BE SELECTED BASED ON PIPE SIZE (PLUS INSULATION OF PIPES SPECIFIED TO BE INSULATED) AND THE WEIGHT OF THE MEDIUM BEING TRANSPORTED OR THE MEDIUM USED FOR TESTING, WHICHEVER IS GREATER, PROVIDE ALL HANGERS AND RODS, TURNBUCKLES, ANGLES, CHANNELS, AND OTHER STRUCTURAL SUPPORTS TO SUPPORT THE PIPING SYSTEMS. RODS FOR PIPE HANGERS SHALL BE FULL SIZE OF THE HANGER MANUFACTURER'S CATALOG LISTED ROD SIZE FOR EACH TYPE HANGER SPECIFIED. HANGERS 'AND SUPPORTS SHALL BE MICHIGAN, ITT GRINNELL OR B-LINE.

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

C. PIPE HANGERS SELECTED FOR SUPPORTING HORIZONTAL INSULATED PIPING SHALL BE SIZED TO FIT AROUND THE OUTSIDE OF THE PIPE INSULATION. INSULATED PIPING SHALL BE SUPPORTED ON GALVANIZED SHIELDS.
SHIELDS SHALL BE AS FOLLOWS:
1. PIPES 2" AND SMALLER: 18 GOUGE X 12" LONG
2. PIPES 2 1/2" AND LARGER: 16 GAUGE X 18" LONG
3. SHIELDS SHALL BE 180 DEGREES AROUND THE LOWER HALF OF THE PIPE AT ALL PIPE HANGERS, EXCEPT THAT ON TRAPEZE HANGERS, PIPE RACKS AND FLOOR SUPPORTED HORIZONTAL PIPES, SHIELDS SHALL BE 360 DEGREES AROUND THE ENTIRE PIPE.

A. PIPE HANGERS TOUCHING COPPER PIPING SHALL BE COPPER PLATED OR THE PIPING SHALL BE DIELECTRICALLY ISOLATED FROM ANY STEEL HANGERS OR CLAMPS THAT ARE USED. NOTE THE REQUIREMENT FOR DOMESTIC WATER PIPING REQUIRES THE HANGERS TO BE INSTALLED OVER THE INSULATION.

B. STEEL RODS, FRAMING, AND CLAMPS SHALL BE PLATED OR PRIMED TO PREVENT RUST FORMATION.

3.0 EXECUTION
3.01 GENERAL

A. ALL PIPING, VALVES, AND FITTINGS SHALL BE PRODUCTS OF A DOMESTIC MANUFACTURER AND MADE IN THE USA.
B. FLEXIBLE PIPING CONNECTIONS SHALL BE PROVIDED AND INSTALLED AT ALL SUCTION AND DISCHARGE CONNECTIONS OF PACKAGED BOOSTER PUMPS AND AT ANY PUMP 2.0 HP AND ABOVE. FLEXIBLE PIPING CONNECTIONS SHALL BE SUITABLE FOR 150 PSI WORKING PRESSURE OR THE SYSTEM PRESSURE AT THE INSTALLATION LOCATION, WHICHEVER IS GREATER, AND BE SUITABLE FOR THE TEMPERATURE OF THE SYSTEM. FLEXIBLE CONNECTIONS SHALL BE STAINLESS STEEL BRAIDED HOSE TYPE, WITH A LENGTH NOT LESS THAN THEIR PIPE DIAMETER. PROVIDE AND INSTALL RESTRAINING RODS IF RECOMMENDED BY THE MANUFACTURER FOR THE INSTALLATION LOCATION AND APPLICATION.
C. PROVIDE AND INSTALL SHUT-OFF VALVES AT ANY AND ALL EQUIPMENT INCLUDING WATER HEATERS, DOMESTIC BOOSTER PUMPS, RE-CIRCULATION PUMPS, STORAGE AND PRESSURE TANKS, ETC, AND AT ANY LOCATIONS REQUIRED BY CODE, SUCH AS BRANCH LINES FROM RISERS SERVING MORE THAN ONE FIXTURE. SHUT-OFFS SHALL BE IN ADDITION TO THE SPECIFICALLY SHOWN OR NOTED IN THE CONTRACT DOCUMENTS.

3.02 SUBMITTALS

A. BEFORE PREPARING SUBMITTALS, STUDY ALL CONTRACT DRAWINGS AND SPECIFICATIONS IN DETAIL, OBTAIN MANUFACTURER'S RECOMMENDED INSTRUCTIONS, AND HAVE SUBMITTALS PREPARED BASED ON SPECIFIC EQUIPMENT AND MATERIAL PROPOSED FOR INSTALLATION. AN OFFICER OF THE CONTRACTING FIRM SHALL SIGN ALL SHOP DRAWINGS (CERTIFYING CONFORMANCE WITH PLANS AND SPECIFICATIONS) BEFORE SUBMITTING TO THE ARCHITECT OR RELEASING TO THE FIELD.
B. THE SUBMITTAL PROCESS SHALL NOT BE UTILIZED AS AN AVENUE TO SUBSTITUTE PRODUCTS AFTER THE EXECUTION OF THE CONTRACT. SHOULD ON UNSPECIFIED OR UNEQUAL PRODUCT BE SUBMITTED, IT WILL BE REJECTED. IF O SECOND ATTEMPT AT SUBSTITUTION IS MADE DURING THE RE-SUBMITTAL OF THE SAME PRODUCT, THEN NO MORE REVIEWS OF THAT PRODUCT WILL BE PERFORMED WITHOUT DIRECT COMPENSATION TO THE ENGINEER BEING PAID FOR THE ADDITIONAL SERVICES REQUIRED FOR THE THIRD REVIEW AND ANY FURTHER REVIEWS.
C. ALL SUBMITTALS SHALL BE SUBMITTED AND RETURNED ELECTRONICALLY.
D. SUBMITTALS WILL NOT BE ACCEPTED FOR REVIEW UNLESS THEY:
1. COMPLY WITH THE REQUIREMENTS OF DIVISION 1.
2. INCLUDE COMPLETE INFORMATION PERTAINING TO ALL APPURTENANCES AND ACCESSORIES.
3. ARE SUBMITTED CS COMPLETE PACKAGES WHICH PERTAIN TO ALL RELATED ITEMS IN DIVISION 22. SEPARATE PACKAGES SHALL BE SUBMITTED AS FOLLOWS:
a. ALL PLUMBING EQUIPMENT, PIPING, SPECIALTIES, AND COMPONENTS.
b. ALL PLUMBING FIXTURES
4. ARE PROPERLY MARKED WITH EQUIPMENT, SERVICE OR FUNCTION IDENTIFICATION AS RELATED TO THE PROJECT AND ARE MARKED WITH PERTINENT SPECIFICATION PARAGRAPH NUMBER.

E. SUBMIT CATALOG INFORMATION, FACTORY ASSEMBLY DRAWINGS, FIELD INSTALLATION DRAWINGS, AND CERTIFICATIONS OS REQUIRED FOR A COMPLETE EXPLANATION AND DESCRIPTION OF ALL ITEMS OF EQUIPMENT. THE SUBMITTAL DATA SHALL PROVIDE AMPLE, UNQUESTIONABLE COMPLIANCE WITH THE CONTRACT DOCUMENTS.
F. REVIEW OF SUBMITTALS SHALL NOT BE CONSTRUED AS AUTHORIZING ANY DEVIATIONS FROM THE PLANS AND SPECIFICATIONS UNLESS SUCH DEVIATIONS ORE CLEARLY IDENTIFIED AND SEPARATELY SUBMITTED IN THE FORM OF A LETTER THAT IS ENCLOSED WITH THE SUBMITTALS.
G. SUBMITTALS ARE REQUIRED ON ALL MANUFACTURED EQUIPMENT, ESPECIALLY ENERGY CONSUMING EQUIPMENT. SUBMITTALS SHALL INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING ITEMS OF EQUIPMENT:

1. PIPING AND PIPING SPECIALITIES
2. INSULATION
3. WATER HEATERS
4. PUMPS
5. PLUMBING FIXTURES
6. PIPING SHOP DRAWINGS
7. FIRE-STOPPING PRODUCTS AND APPLICABLE UL FIRE-STOP DETAILS

3.03 EXCAVATION, TRENCHING, AND BACKFILLING

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

3.04 INSTALLATION REQUIREMENTS

A. ALL EQUIPMENT SHALL BE INSTALLED IN STRICT CONFORMANCE WITH THE RECOMMENDATIONS OF THE EQUIPMENT MANUFACTURER, AS INDICATED ON THE DRAWINGS, AND AS SPECIFIED.
B. PROVIDE INSTALLATION MANUALS FOR EACH PIECE OF EQUIPMENT. SUBMIT IN SEPARATELY BOUND VOLUMES AFTER REVIEW OF SUBMITTALS.
C. PROVIDE SUPPLEMENTARY STEEL FRAMING AND WELDED STEEL EQUIPMENT SUPPORT STANDS AS REQUIRED FOR PROPER HANGING AND SUPPORT OF THE PLUMBING SYSTEMS. STEEL ANGLES, CHANNELS AND TUBING UTILIZED FOR SUCH FRAMING SHALL BE SELECTED TOR A MAXIMUM DEFLECTION OF 1/360TH OF THE SPAN.
D. ALL ROOF CURBS SHALL BE A MINIMUM OF 12" HIGH AND SELECTED FOR THE VARIOUS ROOF PITCHES. CURBS INSTALLED ON ROOFS HAVING PITCHES OF NOT MORE THAN 1/4" PER FOOT MAY BE STANDARD CURBS SHIMMED LEVEL WITH STEEL CHANNELS OR ZS TO PROVIDE SUITABLE SUPPORT AND FLASHING SURFACES.

3.05 CLEANING, LUBRICATION AND ADJUSTMENT

A. THE EXTERIOR SURFACES OF OF PLUMBING EQUIPMENT, PIPING, CONDUIT, ETC., SHALL BE CLEANED AND FREE OF ALL DIRT, GREASE, OIL, PAINT SPLATTER, AND OTHER CONSTRUCTION DEBRIS.
B. BEARINGS THAT REQUIRE LUBRICATION SHALL BE LUBRICATED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
C. ALL CONTROL EQUIPMENT, VALVES, EQUIPMENT SETTINGS, PRESSURE TANKS, ETC. SHALL BE ADJUSTED TO THE SETTINGS REQUIRED FOR THE PERFORMANCE SPECIFIED.
D. DO ALL MATERIALS, EQUIPMENT, ETC. SUBJECT TO WEATHER, CORROSION, DUST, DEBRIS, WATER ETC. TO BE INSTALLED OR UTILIZED FOR THE PROJECT SHALL BE FULLY PROTECTED. THIS IS INCLUSIVE OF PIPING AND DUCT OPENINGS AND INTERNAL NON VENTILATION INTAKES AND DISCHARGES. THIS DIVISION'S SCOPE INCLUDES PROTECTION AND REMEDIATION OF ANY AND ALL DIVISION MATERIALS, ETC. INCLUDING CLEANING, VACUUMING, DUSTING, ETC. REQUIRED FOR A CLEAN SYSTEM AND OPERATION. INSULATION AND EQUIPMENT WITH ELECTRICAL CONNECTIONS SUBJECT TO WATER SHALL BE REPLACED IN THEIR ENTIRETY. COORDINATE WITH ALL OTHER TRADES AND SCHEDULES.

3.06 PAINTING

A. ALL UNCOATED AND UN-INSULATED STEEL SURFACES EXPOSED TO SIGHT INSIDE THE BUILDING, SUCH AS PIPING, EQUIPMENT HANGERS AND SUPPORTS, WHICH ARE NOT PROVIDED WITH FACTORY PRIME COAT OR GALVANIZING, SHALL BE CLEANED AND POINTED WITH ONE COAT OF RUST INHIBITING PRIMER. IN ADDITION, ALL SURFACES IN FINISHED SPACES SHALL ALSO BE PAINTED WITH TWO COOTS OF FINISH PAINT IN A COLOR SELECTED BY THE ARCHITECT.
B. STEEL ITEMS EXPOSED OUTSIDE THE BUILDING, SUCH AS EQUIPMENT SUPPORTS, UN-INSULATED PIPING AND HANGERS WHICH ARE NOT FACTORY POINTED OR GALVANIZED SHALL BE CLEANED AND PAINTED WITH ONE COAT OF RUST INHIBITING PRIMER AND TWO COATS OF ASPHALTIC BASE ALUMINUM PAINT. INSULATED STEEL PIPES OUTSIDE THE BUILDING SHALL BE CLEANED AND PAINTED WITH ONE COAT OF RUST INHIBITING PRIMER BEFORE INSTALLING INSULATION.
C. FACTORY PAINTED EQUIPMENT THAT HAS BEEN SCRATCHED OR MARRED SHALL BE REPAINTED TO MATCH THE ORIGINAL FACTORY COLOR.

3.07 PIPING LEAK TESTING

A. SANITARY, WASTE, STORM, AND VENT PIPING SHALL BE TESTED WITH WATER BEFORE INSTALLING FIXTURES. WATER TEST SHALL BE APPLIED TO THE SYSTEM EITHER IN ITS ENTIRETY OR TO THE INDIVIDUAL SECTIONS. EACH OPENING EXCEPT THE HIGHEST OPENING OF THE SECTION UNDER TEST SHALL BE PLUGGED, AND THE SECTION SHALL BE FILLED WITH WATER AND TESTED WITH A HEED OF WATER OF AT LEAST TEN (10) FEET ABOVE THE HIGHEST POINT IN THE SYSTEM. THE WATER SHALL BE KEPT IN THE PORTION UNDER TEST, FOR AT LEAST THIRTY (30) MINUTES; NO DROP IN THE WATER LEVEL WILL BE ACCEPTABLE.
B. THE WATER PIPING SYSTEMS SHALL BE TESTED AT A MINIMUM PRESSURE OF 125 PSI, OR 1.5 TIMES THE SYSTEM OPERATING CONDITIONS, WHICHEVER IS GREATER, AND PROVED TIGHT AT THIS PRESSURE FOR NOT LESS THAN THIRTY (30) MINUTES OR LONGER IF REQUIRED THE PERMIT INSPECTION OF ALL JOINTS. NO LOSS IN PRESSURE WILL BE PERMITTED.
C. ALL COMPRESSED AIR PIPING SHALL BE TESTED PNEUMATICALLY AND PROVED TIGHT AT A PRESSURE OF NOT LESS THAN 100 PSI FOR A PERIOD OF NOT LESS THAN TWO (2) HOURS. NO LOGS IN PRESSURE WILL BE PERMITTED.
D. ALL LEAKS SHALL BE REPAIRED BY TIGHTENING, REMAKING JOINTS, OR REPLACING PIPE AND FITTINGS. CAULKING OF JOINTS SHALL NOT BE PERMITTED.
E. SEE SPECIFICATION SECTION 23 11 23 FOR TESTING REQUIREMENTS OF NATURAL GAS AND LIQUID PROPANE GAS PIPING. SYSTEM SHALL BE PORT OF DIVISION 22 SCOPE UNLESS OTHERWISE ARRANGED WITHIN THE CONTRACT. COORDINATE WITH DIVISION 23.

3.08 RECORD (AS-BUILT) DRAWINGS

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

3.09 OPERATING AND MAINTENANCE MANUALS AND INSTRUCTIONS

A. COMPLETE OPERATING AND MAINTENANCE MANUALS SHALL BE PROVIDED TO THE OWNER. FOUR COPIES SHALL BE PROVIDED. EACH COPY SHALL BE BOUND IN A SEPARATE 3-RING, LOOSE LEAF NOTEBOOK. OPERATING INSTRUCTIONS SHALL BE PROVIDED FOR EACH PLUMBING SYSTEM, AND SHALL EACH INCLUDE A BRIEF SYSTEM DESCRIPTION, A SIMPLE SCHEMATIC AND A SEQUENCE OF OPERATION. OPERATING AND MAINTENANCE INSTRUCTIONS SHALL BE PROVIDED FOR EACH PIECE OF EQUIPMENT. A CONTROL SYSTEM WIRING DIAGRAM SHALL BE INCLUDED IN EACH OPERATING AND MAINTENANCE MANUAL.
B. PRIOR TO FINAL ACCEPTANCE OR BENEFICIAL OCCUPANCY, PROVIDE THE SERVICES OF A COMPETENT TECHNICIAN FOR NOT LESS THAN ONE {1} DAY TO INSTRUCT THE OWNER IN THE OPERATION OF THE PLUMBING SYSTEMS.

3.10 MINIMUM HANGER SPACING

A. PIPE HANGERS OR SUPPORTS SHALL BE PROVIDED WITHIN 18" OF EACH HORIZONTAL FITTING, EQUIPMENT CONNECTION, VALVE, ETC. AND WITHIN 18° OF THE CENTERLINE OF HORIZONTAL OF VERTICAL CHANGES IN DIRECTION SUMMING TO 90° OR MORE. SPECIFIC ATTENTION IS CALLED TO TURNS INTO VERTICAL RISERS,
B. PIPING SUPPORTS SHALL BE PROVIDED, AT A MINIMUM, IN ACCORDANCE WITH THE GREATER OF THE BELOW OR CODE MINIMUM. WHERE THE BELOW OR CODE DOES NOT ADDRESS SUPPORT FOR SPECIFIC PIPING, SUPPORTS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.

PIPING MATERIAL	MAX. HORZ. SPACING	MAX. VERT. SPACING
CAST IRON PIPE	5'	15'
COPPER PIPE	12'	10'
COPPER TUBING ≤ 1-1/4" DIA	6'	10'
COPPER TUBING ≥ 1-1/2" DIA	10'	10'
CPVC PIPE ≤ 1" DIA	3'	10'
CPVC PIPE ≥ 1-1/4" DIA	4'	10'
PVC PIPE	4'	10'
PEX PIPE	32'	10'

MIDSTORY GUIDE REQUIRED FOR PIPING 2" DIAMETER AND SMALLER

C. RISER CLAMPS SHALL BE PROVIDED AT EACH FLOOR PENETRATION. FOR PRESSURIZED PIPING SYSTEMS, PROVIDE VIBRATION ISOLATION AT ALL RISER CLAMPS WITH TWO (2) PAD--TYPE MOUNTINGS CONSISTING OF A MINIMUM 3/8" THICK RIBBED OR WAFFLED ELASTOMERIC PADS BONDED BETWEEN MINIMUM 16-GOUGE GALVANIZED STEEL SEPARATOR PLATES. PODS SHALL BE SIZED FOR A DEFLECTION OF 0.12" TO 0.16". PADS SHALL BE MINIMUM 3"X3" SQUARE.

3.11 WARRANTY

A. ALL WORK PROVIDED UNDER THIS DIVISION 22 SHALL BE SUBJECT TO A MINIMUM ONE YEAR WARRANTY, THE WARRANTY SHALL INCLUDE PROMPT REPAIR OR REPLACEMENT OF EQUIPMENT OR SYSTEM FAILURES AND SHALL INCLUDE ALL PARTS AND LABOR. IN ADDITION, AIL COMPRESSORS SHALL CARRY AN ADDITIONAL FOUR YEAR PARTS--ONLY WARRANTY. EXTENDED WARRANTIES SHALL BE PROVIDED ON ALL OTHER EQUIPMENT SO SPECIFIED IN OTHER SECTIONS.

3.12 SHOP DRAWINGS.

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

3.13 OWNER TRAINING

A. OWNER TRAINING SHALL BE PROVIDED FOR ALL SYSTEMS AND EQUIPMENT AND SHALL INCLUDE THE FOLLOWING:
1. 8-HOURS OF TRAINING FOR EACH TYPE OF EQUIPMENT
2. 16-HOURS FOR OVERALL SYSTEM OPERATIONAL TRAINING
B. A TRAINING SUMMARY AND SCHEDULE SHALL BE SUBMITTED TO THE ARCHITECT FOR APPROVAL WITHIN NINETY (90) DAYS OF THE DATE OF SUBSTANTIAL COMPLETION.
C. TRAINING TIMING WILL VARY AND SHALL BE ASSUMED TO INCLUDE MULTIPLE SESSIONS OS REQUIRED BY THE OWNER.

3.14 BID REQUIREMENTS

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

END OF SECTION

SECTION 22 07 00
PLUMBING INSULATION

1.0 GENERAL
1.01 DESCRIPTION

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

1.02 INTENT

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

1.03 ACCEPTABLE MANUFACTURERS

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

2.0 PRODUCTS

2.01 PLUMBING INSULATION

A. ALL PIPE INSULATION PRODUCTS SHALL HAVE A PERMANENT COMPOSITE INSULATION, JOCKEY AND ADHESIVE FIRE AND SMOKE HAZARD RATING AS TESTED BY PROCEDURE ASTM-84, NFPA 255 AND UL 723 NOT EXCEEDING FLAME SPREAD 25 OR SMOKE DEVELOPED 50.
B. BLANKET---TYPE INSULATION ON STORM DRAINS SHALL HOVE ON OVERAGE THERMAL CONDUCTIVITY {K---VALUE) NOT TO EXCEED 0.27 BTU PER INCH/H.SQFT AT A MEAN TEMPERATURE OF 75 DEG F. INSULATION SHALL HAVE A MINIMUM DENSITY OF 1 LB/CU.FT, AND SHALL BE 2" THICK.
C. PREFORMED INSULATION FOR ALL DOMESTIC HOT WATER PIPING SHALL BE A MINIMUM 1-1/2" THICK FOR PIPING LESS THAN OR EQUAL TO 1-1/2" DIAMETER, 2" THICK FOR PIPING ABOVE 1-1/2" IN DIAMETER, PREFORMED FIBERGLASS PIPE INSULATION WITH WHITE ALL-SERVICE JACKET. ALL LONGITUDINAL JOINTS SHALL BE LAPPED, SELF-STICKING TYPE WITH ALL BUTT JOINTS, TEARS, ETC. SEATED WITH A MATCHING WHITE VAPOR BARRIER TAPE. ELBOWS SHALL BE MITERED OR MAY BE ZESTON COVERS FILLED WITH EQUIVALENT FIBERGLASS INSULATION. THE MAXIMUM CONDUCTIVITY (K-VALUE)} OF THE INSULATION SHALL BE 0.23 BTU PER INCH/SQ.F AT 75 DEG F.
D. PREFORMED INSULATION FOR ALL DOMESTIC COLD WATER PIPING, EXCEPT TRAP PRIMER PIPING UNDERGROUND, SHALL BE MINIMUM 1" THICK. PREFORMED FIBERGLASS PIPE INSULATION WITH WHITE ALL-SERVICE JACKET. ALL LONGITUDINAL JOINTS SHALL BE LOPPED, SELF--STICKING TYPE WITH OF BUTT JOINTS, TEARS, ETC. SEALED WITH A MATCHING WHITE VAPOR BARRIER TAPE. ELBOWS SHALL BE MITERED OR MAY BE ZESTON COVERS FILED WITH EQUIVALENT FIBERGLASS INSULATION. THE MAXIMUM CONDUCTIVITY (K-VALUE} OF THE INSULATION SHALL BE 0.23 BTU PER INCH/H.SQ.FT AT 75F.
E. INSULATION SHALL BE CONTINUOUS OVER ALL VALVE BODIES, FITTINGS, AND WALL AND FLOOR PENETRATIONS. DO NOT INSULATE UNIONS ON HOT WATER PIPING, NOR INSTRUMENTS, GOUGES, VALVE HAND WHEELS, ETC. ON ANY PIPER.

F. ALL PIPING INSULATION COVERING WATER*CARRYING PIPING THAT IS EXPOSED TO THE WEATHER AND SUBJECT TO BURSTING FROM FREEZING TEMPERATURES SHALL HAVE OVERSIZED INSULATION TO ACCOMMODATE HEATING CABLE. SEE SPECIFICATION 23 05 33.
G. PIPING INSTALLED OUTSIDE THE BUILDING AND EXPOSED TO WEATHER SHALL HAVE POLYISOCYANURATE INSULATION IN ACCORDANCE WITH SPECIFICATION 23 07 19. PROVIDE A CONTINUOUS WATERTIGHT ALUMINUM JACKET AND FITTING COVERS FOR ALL POLYISOCYANURATE INSULATION PIPING EXPOSED TO THE WEATHER.
H. CLOSED-CELL INSULATION SHALL BE PROVIDED OVER ALL PING CALLED TO HAVE INSULATION THAT IS INSTALLED BELOW GROUND. CLOSED-CELL PIPING INSULATION SHALL MATCH THE THICKNESS FOR ABOVE-GROUND PING, 25/50 ARMAFLEX OR RUBATEX. ALL GLUES AND COATINGS SHALL BE PRODUCTS OF THE SOME MANUFACTURER AS THE INSULATION. THE INSULATION SHALL BE INSTALLED BY THE SLIP--ON METHOD; SLITTING OF THE INSULATION IS PROHIBITED AND SHALL BE CAUSE FOR REJECTION.

3.0 EXECUTION
3.01 ARRANGEMENT

A. FOLLOW THE GENERAL PIPING LAYOUT, ARRANGEMENT, SCHEMATICS AND DETAILS. PROVIDE ALL OFFSETS, VENTS, DRAINS, AND CONNECTIONS NECESSARY TO ACCOMPLISH THE INSTALLATION. FABRICATE PIPING ACCURATELY TO MEASUREMENTS ESTABLISHED AT THE PROJECT SITE TO AVOID INTERFERENCE WITH DUCTWORK, OTHER PIPING, EQUIPMENT, OPENINGS, ELECTRICAL CONDUITS AND LIGHT FIXTURES. MAKE SUITABLE PROVISION FOR EXPANSION AND CONTRACTION WITH EXPANSION LOOPS AND OFFSETS.
3.02 INSULATION INSTALLATION
A. PROVIDE BLANKET INSULATION OVER ALL HORIZONTAL ROOF DRAIN PIPING WHICH IS WITHIN THE BUILDING INCLUDING THE VERTICAL RISERS TO THE ROOF DRAINS AND THE UNDERBODY OF THE ROOF DRAINS.
1. BLANKET INSULATION SHALL BE WRAPPED AROUND THE PIPING AND UNDERBODIES OF ROOF DRAINS, ENDS OF INSULATION SHALL OVERLAP AT LEAST 2" AND THE BOTTOM OF INSULATION SHALL OVERLAP PIPE INSULATION AT PIPE CONNECTION TO ROOF DRAIN AT LEAST 3", ADHERE INSULATION TO ROOF DRAIN UNDERBODIES WITH 100% COVERAGE OF FIRE RETARDANT ADHESIVE AND TAPE ALL JOINTS WITH 3" WIDE FOIL REINFORCED KRAFT TAPE.
B. PROVIDE INSULATION OVER ALL ABOVE GROUND HOT AND COLD WATER PIPING, EXCEPT THAT NO INSULATION IS REQUIRED ON COLD WATER LINES INSTALLED INSIDE INTERIOR PLUMBING CHASES (THOSE CHASES WITH NO EXTERIOR WALL). IN ADDITION, NO INSULATION IS REQUIRED FOR COLD WATER PIPING OUTSIDE THE BUILDING VAPOR BARRIER AND DESIGNED TO BE DRAINED DOWN FOR FREEZE-PROTECTION, SUCH OS PARKING DECK HOSE BIBS FOR WASH DOWN. ALL JOINTS AND TEARS SHALL BE SEALED WITH MATCHING WHITE VAPOR BARRIER TAPE
C. SEE SPECIFICATION 23 07 19 FOR HVAC PIPING INSULATION REQUIREMENTS.

END OF SECTION

SECTION 22 10 00
PLUMBING PIPING

1.0 GENERAL
1.01 DESCRIPTION

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

1.02 INTENT

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

PROJECT LOCATION:
TECOVAS

P-002

PLUMBING SPECIFICATIONS

1.03 GENERAL REQUIREMENTS

A. PROVIDE ALL REDUCING FITTINGS, FLANGES, COUPLINGS, AND UNIONS OF THE SIZE AND TYPE OF MATERIAL TO MATCH THE PIPING CONNECTIONS AT EACH FIXTURE, PIECE OF EQUIPMENT, VALVE, AND ACCESSORY.
B. UNION JOINTS, COUPLINGS, OR FLANGES SHALL BE PROVIDED IN EACH PIPE LINES CONNECTED TO EACH PIECE OF EQUIPMENT, FIXTURE, AND ELSEWHERE AS INDICATED AND SPECIFIED. UNIONS SHALL MATCH THE PIPING SYSTEM IN WHICH THEY ARE INSTALLED.
C. UNIONS OR FLANGES SHALL BE PROVIDED BETWEEN ALL COPPER-TO-STEEL CONNECTIONS. THESE UNIONS SHALL BE DIELECTRIC, INSULATING TYPE.
D. ALL CHANGES IN DIRECTION AND BRANCHES SHALL BE MADE WITH MANUFACTURED FITTINGS.
E. THE USE OF OFFSET-TYPE REDUCERS IS STRICTLY PROHIBITED IN ANY PIPING SYSTEM.
F. IN ALL WATER PIPING SYSTEMS, CHANGES IN HORIZONTAL PIPE LINE SIZES SHALL BE MADE WITH ECCENTRIC REDUCERS INSTALLED FLAT ON TOP FOR PROPER AIR VENTING. REDUCING TEES, REDUCING ELBOWS AND CONCENTRIC REDUCERS SHALL ONLY BE ALLOWED IN WATER PIPING SYSTEMS FOR CHANGING PIPE SIZES IN VERTICAL RISERS AND TOR MAKING CONNECTIONS TO EQUIPMENT AND ACCESSORIES FROM VERTICAL RISERS.
G. ALL PIPE JOINTS SHALL BE CUT SQUARE AND ALL BURRS SHALL BE REMOVED.
H. OPEN ENDS OF PIPELINES NOT CURRENTLY BEING HANDLED SHALL BE PLUGGED DURING INSTALLATION TO KEEP DIRT, WATER, AND FOREIGN MATERIAL OUT OF THE SYSTEM.
I. SANITARY WASTE AND STORM DRAINAGE PIPING SHALL SLOPE DOWN IN THE DIRECTION OF FLOW A3 SHOWN ON THE DRAWINGS OR AS PRESCRIBED BY CODE, OUT NOT LESS THAN 1 PERCENT.
J. ALL VENTS THROUGH THE ROOF (VTR) SHALL BE OFFSET JUST BELOW THE ROOF SUCH THAT THEIR TERMINATION POINTS ARE AT LEAST 15 FT FROM ANY OUTSIDE AIR INTAKE OF ANY HVAC UNIT: SPECIAL ATTENTION IS CALLED TO PACKAGED ROOF TOP AND DEDICATED MAKE=-P AIR UNITS.
K. TRAP PRIMERS SHALL BE PROVIDED AT ALL FLOOR DRAINS, FLOOR SINKS, TRENCH DRAINS, AND HUB DRAINS EXCEPT TRAP PRIMERS MAY BE OMITTED WHERE DRAIN ROUTES TO THE STORM SYSTEM. ROUTE WATER PIPING FROM THE NEAREST COLD WATER LINE AS ALLOWED BY CODE.
L. ALL PIPING, VALVES, AND FITTINGS SHALL BE PROVIDED BY A DOMESTIC MANUFACTURER AND MANUFACTURED IN THE USA.

2.0 PRODUCTS
2.01 SANITARY WASTE AND VENT SYSTEMS

A. ALL UNDERGROUND SANITARY WASTE AND VENT PIPING SHALL BE PVC, DWV SOLID WALL SCHEDULE 40 WITH SOCKET-TYPE, SOLVENT WELDED JOINTS IN SIZES UP TO 12"; 14" AND LARGER PIPING SHALL BE PVC, DWV SOLID WALL SCHEDULE 80 WITH SOCKET-TYPE, SOLVENT WELDED JOINTS. ALL PVC PIPING SHALL BE INSTALLED IN ACCORDANCE TO ASTM.
B. ALL ABOVE GROUND SANITARY, WASTE, AND VENT PIPING SHALL BE HUBLESS CAST IRON SOIL PIPE UON. ALL CAST IRON SOIL PIPE AND FITTINGS SHALL BEAR THE COLLECTIVE TRADEMARK OF THE CAST IRON SOIL PIPE INSTITUTE AND SHALL BE LISTED BY NSF INTERNATIONAL OR RECEIVE PRIOR APPROVAL BY THE **ARCHITECT/ENGINEER. ALL HUBLESS CAST IRON PIPE SHALL CONFORM TO ASTM A 888 AND CISPI STANDARD 301.
1. SANITARY, WASTE, AND VENT PIPING LESS THAN OR EQUAL TO 2.5" MAY BE COPPER DWV WITH BRAZED JOINTS. PIPING SHALL MEET ASTM B 75, B 88, B 251, AND B 306.
2. DRAIN PIPING FROM EQUIPMENT WITH HIGH-TEMPERATURE DISCHARGE, SUCH AS KITCHEN WARE WASHERS, POT SINKS, ETC. SHALL BE TYPE L HARD-DRAWN COPPER TUBING WITH WROUGHT COPPER FITTINGS AND SOLDERED JOINTS.
3. SANITARY AND WASTE PIPING IN PRESSURIZED PIPING SYSTEMS, SUCH AS FOR ELEVATOR SUMP PUMPS OR SANITARY SUMP PUMPS, SHALL BE COPPER DWV WITH WROUGHT COPPER FITTINGS. ALL JOINTS SHALL BE BRAZED.
C. JOINTS ON HUBLESS COST IRON SOIL PIPE SHALL BE MADE WITH NEOPRENE COUPLINGS AND STAINLESS STEEL CLAMPS. GASKETS SHALL CONFORM TO ASTM C 564. COUPLINGS AND GASKETS SHALL BE PRODUCED BY THE SAME MANUFACTURER AND SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, INCLUDING BAND TIGHTENING SEQUENCE AND TORQUE. ALL COUPLINGS SHALL BE MANUFACTURED TO THE CISP1 310 STANDARD, ASTM C 1277, ASTM C 150, FM STANDARD 1680 CLASS | AND CERTIFIED BY NSF INTERNATIONAL. COUPLING SHALL BE AS FOLLOWS:
1. 1" TO 3" - TWO (2) STAINLESS STEEL BANDS
2. 4" TO 8" -- FOUR (4) STAINLESS STEEL BANDS
3. 10" TO 15" - HEAVY DUTY COUPLING WITH SIX (6) STAINLESS STEEL BANDS. HEAVY-DUTY COUPLINGS SHALL CONFORM TO ASTM C 1540.
D. ALL OFFSETS ON 8" PIPE AND LARGER SHALL HAVE METAL RESTRAINING STROPS BY HOLDRITE OR APPROVED EQUAL.
E. CLEANOUTS SHALL BE PROVIDED AT THE LOCATIONS INDICATED AND, A3 A MINIMUM, WHERE REQUIRED BY CODE. FLOOR CLEANOUTS SHALL BE A MINIMUM OF 4" AND SHALL BE COMPLETE WITH A FLUSH PLUG AND REMOVABLE, SCORIATED BRONZE FLOOR PLATE. PROVIDE CARPET BUTTONS IN CARPETED AREAS. WALL CLEANOUTS SHALL BE THREADED CLEANOUT TEES AND PLUGS WITH POLISHED STAINLESS STEEL COVER PLATE WITH CENTER SET SCREW.
F. FLOOR DRAINS IN TOILETS AND FINISHED AREAS SHALL BE JR SMITH 2000 SERIES WITH 6" TYPE B SQUARE ADJUSTABLE STRAINERS FINISHED IN SATIN NICKEL BRONZE; OR EQUAL PRODUCTS BY JOSAM OR ZURN. PROVIDE VANDOLPROOF SECURED TOPS.
G. FLOOR DRAINS IN MECHANICAL ROOMS AND UNFINISHED CONCRETE FLOORS SHALL BE JR SMITH 2131 SERIES WITH ROUND 11 3/4" CAST IRON GRATE, SEDIMENT BUCKET AND DEEP-SEAL P-TROP; OR EQUAL PRODUCTS BY JOSAM OR ZURN. PROVIDE VANDAL-PROOF SECURED TOPS.
H. HUB DRAINS (HD) SHALL BE MADE WITH O REDUCER FITTING WITH OPENING AT LEAST ONE NOMINAL SIZE LARGER THAN THE CONNECTED PIPING OS SCHEDULED. HD SHALL BE SIZED TO RECEIVE ALL DISCHARGES WITHOUT SPLASHING.

2.02 DOMESTIC WATER PIPING

A. UNDERGROUND DOMESTIC WATER SERVICE ENTRANCE PIPING 3" AND SMALLER IN SIZE SHALL BE TYPE K HARD-DRAWN COPPER TUBING WITH WROUGHT COPPER FITTINGS. ALL JOINTS SHALL BE BRAZED.
B. UNDERGROUND DOMESTIC WATER SERVICE ENTRANCE PIPING ABOVE 3" IN SIZE SHALL BE CLASS 150 DUCTILE IRON PIPE WITH MECHANICAL JOINTS.
C. ALL UNDERGROUND COPPER BRANCH LINES (1/2" AND 3/4" ONLY) SHALL BE CONTINUOUS LENGTHS OF SOFT TYPE K COPPER TUBING WITH NO JOINTS ALLOWED UNDERGROUND.
D. ABOVEGROUND DOMESTIC WATER SYSTEM PIPING 3" IN SIZE AND SMALLER SHALL BE TYPE L HARD-DRAWN COPPER TUBING WITH WROUGHT COPPER FITTINGS AND SOLDERED POINTS.
E. ABOVEGROUND DOMESTIC WATER PIPING 4" AND LARGER SHALL BE TYPE L HARD-DRAWN COPPER TUBING WITH ROLLED GROOVED JOINTS AND FITTINGS. INSTALLATION-READY COPPER FITTINGS SHALL MEET THE SAME GASKET MATERIAL SPECIFICATIONS AS COUPLINGS. FITTINGS SHALL BE AS FOLLOWS, OR EQUAL, AND SHALL BE PROVIDED BY THE MANUFACTURER WITH THE GASKET INCLUDED IN THE COUPLER ASSEMBLY:
1. COUPLING: RIGID, VICTAULIC STYLE 607 (8" AND SMALLER)
2. GASKETS: GRADE EHP EPDM (8" AND SMALLER)
F. ALL VALVES IN POTABLE WATER SYSTEMS SHALL BE "LEAD-FREE" TYPE.
G. ALL VALVES 3/4" AND SMALLER SHALL BE "FULL-PORT" TYPE, AND GREATER THAN 3/4" MAYBE "REDUCED-PORT" TYPE.
H. GATE VALVES (WATER ENTRANCES ONLY) SHALL BE CONSTRUCTED WITH O GRAY IRON, NON-RISING STEM, OUTSIDE SCREW AND YOKE (OS&Y), FULL PORT. STEM TO BE ADJUSTABLE GRAPHITE PACKING, ANSI 372 LEAD FREE, BRONZE MOUNTED SEAT RINGS, SOLID WEDGE, BOCK SEAT PROTECTION, WITH MALLEABLE IRON HAND WHEELS. VALVE SHALL MEET MSS-SP70, APOLLO VALVES 611F OF APPROVED EQUALS BY HAMMOND/MILWAUKEE, NIBCO, OR STOCKHAM.
I. BALL VALVES:
1. VALVES 2 INCH AND SMALLER SHALL BE TWO-PIECE BRONZE BODY, FULL PORT WITH SOLID, SMOOTH BORE CHROME PLATED BRASS BALL, MEETING MSS-SP1I0 AND RATED FOR NO LESS THAN 300 PSI. SEATS SHALL BE REINFORCED TFE WITH TEFLON PACKING RING AND THREADED ADJUSTABLE PACKING NUT. VALVES ON INSULATED LINES WILL BE PROVIDED WITH STEM EXTENSIONS TO PROVIDE CLEARANCE FOR TWO INCHES OF PIPE INSULATION. VALVES TO BE APOLLO VALVES 77C, HAMMOND/MILWAUKEE UP8301, OR WATTS B-6080.
2. VALVES LARGER THAN 2 INCH AND UP TO 4 INCHES SHALL BE TWO-PIECE BRONZE BODY, STANDARD PORT WITH SOLID, SMOOTH BORE CHROME PLATED BRASS BOLL, MEETING MSS-SP110, AND RATED FOR NO LESS THAN 300 PSI. SEATS SHALL BE REINFORCED TFE (OR TFM FOR 4") WITH TEFLON PACKING RING AND THREADED ADJUSTABLE PACKING NUT. VALVES ON INSULATED LINES WILL BE PROVIDED WITH STEM EXTENSIONS TO PROVIDE CLEARANCE FOR TWO INCHES OF PIPE INSULATION. VALVES TO BE APOLLO VALVES 70-100, HAMMOND/MILWAUKEE UP&S01, OR WATTS B-6000.
J. BALANCING VALVES:
1. VALVES SHALL BE NSF/ANS! 61/372 CERTIFIED AND SUITABLE FOR POTABLE WATER APPLICATIONS, VALVE SHALL BE SUITABLE FOR THE GREATER OF 125 PSIG PRESSURE AND 40F TO 250F TEMPERATURE OR THE SYSTEM'S OPERATING CONDITIONS. VALVE SHALL PROVIDE POSITIVE SHUT-OFF AND BE RATED FOR 300 PSIG. EACH BALANCING VALVE SHALL BE EQUIPPED WITH TWO GOUGE TAPS WITH CHECK VALVES AND DRIP CAPS. PROVIDE PREFORMED INSULATION AT ENCASE VALVE ASSEMBLY IN INSULATED PIPING.
2. VALVES UP TO 3" SHALL HAVE LEAD-FREE BRASS BODY, FULL-PORT BALL CONSTRUCTED OF 304 STAINLESS STEEL, AND SHALL HAVE CALIBRATED NAMEPLATE WITH MEMORY STOP. BALANCING VALVES SHALL BE BELL AND GOSSETT CIRCUIT-SETTER PLUS OR EQUAL BY NEXUS, FLOW DESIGN, OR WATTS. AFTER THE TEST AND BALANCE IS COMPLETE, PROVIDE TO THE OWNER WITH A DIFFERENTIAL PRESSURE GAUGE TO MATCH THE BALANCING VALVES. AUTO FLOW VALVES ARE ACCEPTABLE AS A SUBSTITUTION PROVIDED THE FLOW CARTRIDGE IS REPLACEABLE AND THE FLOW RATE IS DEARLY AND PERMANENTLY LABELED.
K. CHECK VALVES:
1. VALVES IN WATER SYSTEMS SHALL BE NSF/ANSI 61/372 CERTIFIED AND SUITABLE FOR PATEBLE WATER APPLICATIONS. VALVE SHALL BE SWING-TYPE, BRASS BODY, BRONZE SEAT, APOLLO VALVES 161S-LF UP TO 200 PSI CWP, OR EQUAL BY MILWAUKEE UP968 OR HAMMOND.
2. IN GROOVED PIPING SYSTEMS, CHECK VALVES MAY BE STAINLESS STEEL BODY, DISC SHAFT AND SPRING, GRADE P FLUOROELASTOMER SEAT, 300 PSI CWP; VICTAULIC 816 OR EQUAL.
3. VALVES IN WASTE SYSTEMS BELOW GROUND SHALL MATCH THE MATERIAL OF THE PIPING. VALVES SHALL BE CAST IRON WITH GASKETED BOLTED COVER OR PVC ANSI 14 WITH INNER RISER ASSEMBLY. VALVES SHALL HAVE HINGED FLAPPERS.
4. VALVES IN WASTE SYSTEMS ABOVE GROUND, SUCH AS ELEVATOR SUMP PUMP DISCHARGES, SHALL BE NON-SLAM TYPE WITH IRON BODY, GLOBE-TYPE SILENT CHECKS WITH BRONZE TRIM, STAINLESS STEEL SPRING AND FLANGED END CONNECTIONS. FLOW AREA THROUGH THE VALVE SHALL EXCEED THE CROSS-SECTIONAL AREA OF THE PIPE IN WHICH THE VALVE IS INSTALLED BY NOT LESS THAN 10% VALVES SHALL BE APOLLO VALVES 910F UP TO 200 PSI OR 2" AND UNDER, 169T UP TO 600 PSI OR EQUAL BY MUELLER CO., APCO, METRAFLEX GLOBE STYLE SILENT CHECK VALVE, HAMMOND IR 9354, OR MILWAUKEE 1800. IN GROOVED PIPING SYSTEMS, VALVES SHALL BE VICTAULIC 716, 779, OR W715 AS APPROPRIATE.
5. ALL CHECK VALVES ON PUMP DISCHARGES SHALL BE NON-SLAM TYPE.
6. ALL CHECK VALVES SHALL BE INSTALLED IN AN ORIENTATION ALLOWED BY THE MANUFACTURER'S RECOMMENDATIONS.
7. ALL CHECK VALVES INSTALLED IN INSULATED PIPING SYSTEMS SHALL HAVE THE CHECK VALVE LOCATION EXPLICITLY LABELED ON THE OUTSIDE OF THE INSULATION.

L. WATER CONNECTIONS TO APPLIANCES SHALL BE MADE WITH FLEXIBLE COPPER TUBING OR COMMERCIAL GRADE DOUBLE-REINFORCED STAINLESS STEEL BRAIDED HOSE, NO LESS THAN 3/8" IN SIZE, OR THE CONNECTIONS SIZE OF THE APPLIANCE, WHICHEVER IS GREATER.

M. POINT OF USE MIXING VALVES SHALL BE LEONARD 170-LF OR AN APPROVED EQUAL WITH LEAD-FREE CONSTRUCTION, VANDAL RESISTANT ADJUSTMENT COP, AND INTEGRAL INLET CHECK VALVES. MIXING VALVE SHALL BE ASSE 1070 RATED. THE MIXING VALVE SHALL BE SIZED BY THE MANUFACTURER FOR THE FIXTURE(S) SERVED. MIXING VALVE SHALL HAVE FOR MORE THAN 0.25 GPM MINIMUM FLOW RATE REQUIRED.

N. ALL WATER HAMMER ARRESTERS (WHA) SHALL BE PDI CERTIFIED, SIZE A, B, C, D, E OR F, AS INDICATED FOR THE FIXTURE UNITS SERVED; JOSAM, JR SMITH, WATTS, OR ZURN. WHA's THAT ARE NOT PDI-CERTIFIED ARE DISALLOWED. WHA's IN POTABLE WATER APPLICATIONS SHALL BE LEAD-FREE.
O. THE HOSE BIBBS (HB) SHALL BE COMPLETE WITH VACUUM BREAKER AND **VANDAL RESISTANT HANDLE; WATTS, APOLLO VALVES, JR SMITH, OR ZURN.
P. SOLDERED JOINTS SHALL BE MODE WITH TIN--ANTIMONY/SILVER SOLDER. SOLDER CONTAINING LEAD SHALL NOT BE PERMITTED.
Q. SADDLE VALVES, AND "T" FITTINGS THAT RELY ON PUNCTURING THE PIPING MAIN ARE DISALLOWED.
R. THERMOMETERS AND PRESSURE GOUGES SHALL BE PRODUCTS OF TRERICE, WESKLER, OR WEISS. SELECT ALL DEVICES TO OPERATE WITHIN 20% OF THE MIDPOINT OF THEIR SCALES UNDER NORMAL OPERATING CONDITIONS. GOUGES PROVIDED ON PUMPS SHALL BE COMPOUND TYPE.
S. PRESSURE AND TEMPERATURE (P&T) TEST PLUGS SHALL BE CONSTRUCTED OF BRASS WITH TWO (2) SELF-CLOSING NORDEL CORES AND BE COMPLETE WITH COP AND GASKET. PLUGS SHALL BE MANUFACTURED BY PETERSON OR LANCASTER. PROVIDE A COMPLETE TEST KIT TO THE OWNER AT THE TIME OF FINAL INSPECTION. TEST KIT SHALL BE COMPLETE WITH A PRESSURE GAUGE, THERMOMETER, PROBES, AND CARRYING CASE.

3.0 EXECUTION,
3.01 ARRANGEMENT

A. FOLLOW THE GENERAL PIPING LAYOUT, ARRANGEMENT, SCHEMATICS AND DETAILS. PROVIDE ALL OFFSETS, VENTS, DRAINS AND CONNECTIONS NECESSARY TO ACCOMPLISH THE INSTALLATION. FABRICATE PIPING ACCURATELY TO MEASUREMENTS ESTABLISHED AT THE PROJECT SITE TO AVOID INTERFERENCE WITH DUCTWORK, OTHER PIPING, EQUIPMENT, OPENINGS, ELECTRICAL CONDUITS AND LIGHT FIXTURES. MAKE SUITABLE PROVISIONS FOR EXPANSION AND CONTRACTION WITH EXPANSION LOOPS AND OFFSETS.
B. WATER HAMMER ARRESTERS SHALL BE INSTALLED AT THE TOP OF EACH RISER AND ON EACH FIXTURE BRANCH IN ACCORDANCE WITH PLUMBING AND DRAINAGE INSTITUTE STANDARD WH201. WHA's SHALL ALSO BE INSTALLED AT ALL WATER SERVICE TO APPLIANCES WITH QUICK-CLOSING VALVES, SUCH AS CLOTHES WASHERS, KITCHEN WARE WASHERS, ICE MAKERS, ETC.
C. CLEANOUTS SHALL BE PROVIDED AT THE BASE OF ALL SANITARY AND STORM RISERS AND AS REQUIRED BY CODE.
D. FITTINGS, UNIONS, JOINTS, COUPLINGS (INCLUDING NO-HUB COUPLINGS), ETC. SHALL NOT BE WITHIN SLABS,
E. ALL POTABLE DOMESTIC WATER CONNECTIONS TO EQUIPMENT SHALL BE PROVIDED WITH BACKFLOW PREVENTION AS REQUIRED BY THE SPECIFICATION SECTION AND CODE.
F. PRESSURE GAUGES AND THERMOMETERS CALLED TO BE PERMANENTLY INSTALLED SHALL BE EASILY VISIBLE FROM A STANDING POSITION ON THE GROUND.

3.02 UNDERGROUND WATER PIPING

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

3.03 PIPING INSTALLATION ABOVE CEILINGS

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

3.04 DISINFECTION
A. ALL DOMESTIC WATER PIPING INSTALLED UNDER THIS DIVISION SHALL BE DISINFECTED WITH CHLORINE BEFORE IT IS PLACED INTO OPERATION. THE CHLORINATING MATERIAL SHALL BE LIQUID CHLORINE CONFORMING TO FEDERAL SPECIFICATION B8-C-120 AND SHALL BE INTRODUCED TO THE SYSTEM BY EXPERIENCED OPERATORS ONLY. THE CHLORINE SOLUTION APPLIED TO THE PIPING SECTIONS OR SYSTEM SHALL CONTAIN AT LEAST FIFTY PARTS PER MILLION OF AVAILABLE CHLORINE AND SHALL REMAIN IN THE SECTIONS OR SYSTEM FOR A PERIOD OF NOT LESS THAN SIXTEEN (16) HOURS. DURING THE DISINFECTION PERIOD, ALL VALVES SHALL BE OPENED AND CLOSED AT LEAST FOUR TIMES. AFTER THE DISINFECTION PERIOD, THE CHLORINATED WATER SHALL BE FLUSHED FROM THE SYSTEM WITH CLEAR WATER UNTIL THE RESIDUAL CHLORINE CONTENT IS NOT GREATER THAN TWO-TENTHS PORTS PER MILLION (0.2 PPM). SUBMIT CERTIFICATION TO THE ARCHITECT THAT THE SYSTEM WAS DISINFECTED.

END OF SECTION

SECTION 22 30 00
PLUMBING EQUIPMENT

1.0 GENERAL
1.01 DESCRIPTION

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

1.02 GENERAL REQUIREMENTS

A. ALL PLUMBING EQUIPMENT INSTALLED IN LOCATIONS WITH A WATER HARDNESS OF 25 GRAINS PER GALLON OR MORE, SHALL BE RESISTANT TO CORROSION. WHERE COPPER MATERIALS ARE IN THE WATER STREAM, IT SHALL BE CUPRO-NICKEL OF NOT MORE THAN 90% COPPER.
B. ALL WATER HEATERS SHALL BE NSF/ANSI 61 CERTIFIED TEOD FREE" FOR POTABLE WATER SERVICE.
C. ALL WATER HEATERS SHALL HAVE ASME-RATED TEMPERATURE AND PRESSURE RELIEF VALVE(S). VALVE(S) SHALL BE PROVIDED BY THE MANUFACTURER AND SIZED FOR THE DISCHARGE LOCATION NOTED IN THE PLANS.
D. ALL WATER HEATERS AND TANKS SHALL BE GLASS--LINED, 1600F FIRED, WITH A WORKING PRESSURE OF 150 PSI, A TEST PRESSURE OF 300 PSI, OR THE SYSTEM PRESSURE AT THE INSTALLATION LOCATION, WHICHEVER IS GREATER, AND SHALL HAVE MAGNESIUM ANODES FOR ELECTROLYTIC PROTECTION. SEPARATE STORAGE TANKS MAY ALSO BE CEMENT---LINED. TANKS SHALL BE ASTM STAMPED.
ALL WATER HEATERS SHALL MEET OR EXCEED THE ENERGY EFFICIENCY REQUIREMENTS OF THE LATEST VERSION OF 2018 INTERNATIONAL ENERGY CONSERVATION CODE (IECC) AMENDMENTS.
E. ALL WATER HEATERS AND PUMPS SHALL BE UL APPROVED AND LABELED, AND BE AGA-CERTIFIED WHERE APPLICABLE.
F. ALL WATER HEATERS AND PUMPS SHALL BE NEMA-RATED APPROPRIATE FOR THE INSTALLATION LOCATION IN WHICH THEY ARE INSTALLED.
G. WATER HEATER CONTROLS SHALL INCLUDE AN OPERATING THERMOSTAT AND MANUAL RESET HIGH LIMIT CONTROL FOR EACH HEATING ELEMENT OR BURNER. THE SAFETY HIGH LIMIT CONTROL SHALL PREVENT OVERHEATING IN THE EVENT OF A THERMOSTAT FAILURE.
H. ALL CONTROLS SHALL BE FACTORY--WIRED AND REQUIRE NO EXTERNAL POWER SOURCE.
I. WATER HEATERS AND TANKS SHALL HAVE DRAINS WITH EXTERNAL ACCESS AND HOSE END CONNECTION.
J. ALL WATER HEATER CONDENSATE LINES SHALL BE PROTECTED FROM FREEZING OR SHALL BE HEAT TRACED IN ACCORDANCE WITH SPECIFICATION 23 05 93.
K. THE WATER HEATER SHALL BE CERTIFIED BY AN INDEPENDENT LABORATORY FOR OXIDES OF NITROGEN (NOX) OF LESS THAN 10 PPM CORRECTED TO 3% 02 OR BETTER OS REQUIRED BY THE AHJ.
L. WHERE CLASSIFIED AS A BOILER BY THE DEPARTMENT OF LABOR, AH, OR APPLICABLE CODES, THE SYSTEM SHALL ADDITIONALLY MEET ALL REQUIREMENTS. AN EMERGENCY POWER OFF {EPO} SWITCH SHALL BE PROVIDED OT LOCATIONS REQUIRED BY THE AHJ. THE EPO(S) SHALL BE ACCESSIBLE, CLEARLY LABELED, AND SHALL SHUT OFF ALL POWER TO THE BOILERS AND CAUSE THE EQUIPMENT TO BE DISENGAGED. EPO(S) SHALL BE COORDINATED WITH CONTROLS AND DIVISION 26 AND SHALL BE INSTALLED AND WIRED UNDER THIS SCOPE.

2.0 PRODUCTS:

2.01 WATER HEATER **COMMERCIAL ELECTRIC**

A. TANKS SHALL 10 GALLON STORAGE CAPACITY AND SHALL HAVE 150 PSI WORKING PRESSURE AND BE EQUIPPED WITH GLASS LINING PERMANENTLY BONDED TO TANK INTERIOR SURFACE.
B. THE WATER HEATER SHALL BE AS SCHEDULED. ACCEPTABLE SUBSTITUTE MANUFACTURERS ARE AO SMITH, LOCHINVAR, STATE, RHEEM, AND BRODFORD WHITE, SUBJECT TO SUBSTITUTION REQUIREMENTS. WATER HEATERS SHALL BE COMMERCIAL-GRADE.
C. BURNER SHALL BE ALUMINIZED STEEL OR CAST IRON, ADJUSTABLE, OR SELF-ADJUSTING AIR-GAS MIXTURE CONTROL.
D. INSTALL THE WORK OF THIS SECTION IN ACCORDANCE WITH NFPA 54, NFPA 211, AND THE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS, UNLESS OTHERWISE SPECIFIED.
E. THE OUTER JACKET SHALL BE STEEL WITH BAKED ENAMEL/ACRYLIC FINISH AND SHALL BE PROVIDED WITH ACCESS DOOR FOR SERVICING CONTROLS AND BURNER.
F. THE DRAIN VALVE SHALL BE LOCATED IN THE FRONT FOR EASE OF SERVICING.

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

3.0 EXECUTION
3.1 INSTALLATION

A. THE WATER HEATERS AND ACCESSORIES SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND THE CONTRACT DOCUMENTS.
B. ALL TEMPERATURE AND PRESSURE RELIEF VALVES SHALL BE PIPED FULL SIZE TO ON INDIRECT WASTE SUCH AS THE NEAREST FLOOR DRAIN, SERVICE SINK, SINK TAILPIECE, ETC. PIPING SHALL BE IN ACCORDANCE WITH SPECIFICATION 22 10 00 FOR DWV SERVICES. SIZE SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.
C. ALL WATER HEATERS SHALL HAVE INTERNAL HEAT TRAPS OR SHALL HAVE HEAT TRAPS INSTALLED IN THE COLD WATER AND HOT WATER PIPING. INSTANTANEOUS WATER HEATERS SHALL BE PROVIDED WITH HEAT TRAPS UNLESS MANUFACTURER DOCUMENTATION SPECIFICALLY ALLOWS EXCLUSION.
WATER HEATERS SHALL BE COMPLETELY ENCASED IN HIGH-DENSITY INSULATION OF SUFFICIENT VALUE TO MEET THE ENERGY EFFICIENCY STANDARDS OF THE LATEST VERSION OF 2018 INTERNATIONAL ENERGY CONSERVATION CODE (IECC) AMENDMENTS, OR SHALL BE FACTORY INSULATED WITH NON-CFC POLYURETHANE CLOSED--CELL FOAM INSULATION. PROVIDE REMOVABLE INSULATION PANELS TO MAINTAIN ACCESS TO ALL REQUIRED COMPONENTS.
D. ALL WATER HEATERS OR BOILERS SUBJECT TO CONDENSING UNDER NORMAL STEADY-STATE OPERATING CONDITIONS SHALL BE PROVIDED AND INSTALLED WITH ACCESSORY CONDENSATE NEUTRALIZATION KITS.

3.02 WARRANTY

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

END OF SECTION

SECTION 22 40 00
PLUMBING FIXTURES

1.0 GENERAL
1.01 DESCRIPTION

A. ALL WORK SPECIFIED IN THIS SECTION IS GOVERNED BY THE COMMON WORK RESULTS FOR PLUMBING SECTION 22 05 00.
B. THIS SECTION 22 40 00 AND THE ACCOMPANYING DRAWINGS COVER THE PROVISIONS OF ALL LABOR, FIXTURES, EQUIPMENT, APPLIANCES AND MATERIALS, AND PERFORMING ALL OPERATIONS IN CONNECTION WITH THE CONSTRUCTION AND INSTALLATION OF THE PLUMBING FIXTURES AND TRIM AS SPECIFIED HEREIN AND AS SHOWN.
C. ALL FINISHES SHALL BE AS SELECTED BY THE ARCHITECT. WHERE THE ARCHITECT DOES NOT HAVE A PREFERENCE, FINISHES SHALL BE IN ACCORDANCE WITH THIS SPECIFICATION.
D. ALL EXPOSED PIPING, VALVES, STOPS, P--TRAPS, ETC. SHALL BE CHROME-PLATED. ALSO, ALL EXPOSED PIPING PENETRATIONS THROUGH WALLS, FLOORS OR CEILINGS SHALL BE PROVIDED WITH CHROME-PLATED CAST BRASS ESCUTCHEONS.
E. ALL P-TRAPS SHALL BE MINIMUM 17--GOUGE BRASS.
F. ALL EXPOSED P-TRAPS SUBJECT TO CONTACT, SUCH AS THOSE BELOW WALL-MOUNTED LAVATORIES, SHALL BE PROVIDED WITH INSULATED COVERS AS REQUIRED.
G. FLUSH VALVES SHALL HAVE A NON-HOLD OPEN FEATURE, VACUUM BREAKERS, AND COVER CAP ON ANGLE-TYPE STOP.
H. PROVIDES ALL FINAL CONNECTIONS TO ALL EQUIPMENT AND FIXTURES FURNISHED BY OWNER.
I. UNLESS OTHERWISE SPECIFIED IN ON INDIVIDUAL FIXTURE DESCRIPTION, ALL ENAMELED CAST-IRON AND PORCELAIN FIXTURES SHALL BE WHITE.
J. ALL LAVATORIES AND OTHER HAND-WASHING FIXTURES SHALL BE PROVIDED AND INSTALLED WITH ASSE 1070 POINT--OF--USE MIXING VALVE ON THE HOT WATER CONNECTION. MIXING VALVE SHALL BE SET TO PROVIDE NO MORE THAN 110° F HOT WATER.

1.02 INTENT

A. IT IS THE INTENT OF THIS SECTION OF THE SPECIFICATIONS TO PROVIDE COMPLETE, OPERABLE, ADJUSTED, CLEAN PLUMBING FIXTURES AS SHOWN AND SPECIFIED, WHICH ARE FREE OF LEAKS, NOISE, AIR, VIBRATION, AND WATERFLOW FLUCTUATIONS.

1.03 BASE OF DESIGN

A. THE BASIS OF DESIGN IS AS OUTLINED FOR EACH FIXTURE IN THE 2.0 PRODUCTS SUB SECTION, ANY PROPOSED SUBSTITUTIONS SHALL BE PROVEN EQUAL IN ALL RESPECTS TO THE EQUIPMENT SPECIFIED AS THE BASIS OF DESIGN.

1.04 ACCEPTABLE MANUFACTURERS

A. ACCEPTABLE FIXTURE MANUFACTURERS FOR EACH TYPE OF FIXTURE ARE AS FOLLOWS:
1. WATER CLOSETS -- AMERICAN STANDARD, KOHLER, SLOAN, AND ZURN
2. MANUAL FLUSH VALVES -- AMERICAN STANDARD, KOHLER, SLOAN, AND ZURN
3. AUTOMATIC FLUSH VALVES -- AMERICAN STANDARD, KOHLER, SLOAN, TOTO, AND ZURN
6. LAVATORY FAUCETS -- AMERICAN STANDARD, BRADLEY, CHICAGO, DELANY, GROHE, KOHLER, SLOAN, TOTO, AND ZURN
7. BREAK ROOM (KITCHEN /PANTRY/ETC. SINKS -- AMERICAN STANDARD, ELKAY, GROHE, DUST, AND KOHLER
8. BREAK ROOM /KITCHEN/PANTRY/ETC. FAUCETS - AMERICAN STANDARD, CHICAGO, DELTA, ELKAY, JUST, KOHLER, AND ZURN
9. SERVICE AND LAUNDRY SINKS - FIAT, KOHLER, MUSTEE, PROFLO, AND STERN-WILLIAMS
10. SERVICE AND LAUNDRY FAUCETS - AMERICAN STANDARD, DELTA,ELKAY, FIAT, KOHLER, T&S BRASS, SPEAKMAN, AND STERN-WILLIAM
11. EMERGENCY SHOWER AND EYEWASH - ACORN, BRADLEY, AND GUARDIAN

2.0 EXECUTION.
2.01 INSTALLATION

A. UNITS SHALL BE INSTALLED AS INDICATED AND IN CONFORMANCE WITH THE MANUFACTURER IS RECOMMENDATIONS. COORDINATE THE ACTUAL UNITS TO BE PROVIDED WITH ALL TRADES.
B. ALL PLUMBING FIXTURES SHALL BE FREE OF LEAKS, PROVIDED COMPLETELY FINISHED, TRIMMED, ADJUSTED, CLEANED, AND READY FOR USE. THEY SHALL BE PROPERLY SECURED TO THE STRUCTURE BY THE USE OF THRU--BOLTING, BACK PLATES, CARRIERS, EXPANSION SHIELDS (FOR FLOOR MOUNTING ONLY) OR TOGGLE BOLTS.
C. WALL HUNG FIXTURES SUPPORTED ON CHOIR CARRIERS SHALL BE BOLTED TO THE FLOOR STAB. CAREFULLY COORDINATE SPACE REQUIREMENTS AND FIXTURE MOUNTING HEIGHT REQUIREMENTS WITH SUPPORTS BEING FURNISHED.
D. FIXTURES SUPPORTED WITH WALL HANGERS ON MASONRY CHASE WALLS SHALL BE FASTENED TO THE WALL WITH NOT LESS THAN 3/8" BOLTS WHICH SHALL PASS THROUGH THE WALL AND THROUGH A 1/4" X 4" WIDE STEEL BACKPLATE ON THE UNFINISHED CHASE WALL SIDE.
E. WHERE FIXTURES ARE HUNG ON SINGLE MASONRY WALLS WITHOUT 9 PIPE CHASE BEHIND, THEY SHALL BE MOUNTED WITH 3/8" TOGGLE BOLTS.
F. FIXTURES ON STEEL STUD WALLS SHALL HAVE A 1/4" X 4" WIDE STEEL BACKPLATE WIRED WITH 1/16" STEEL WIRE TO THE STUDS. BOLTS NOT LESS THAN 3/8" SHALL SECURE THE FIXTURES THROUGH THE FIXTURE HANGER AND THE BACKPLATE.
G. ALL MOUNTING HOLES PROVIDED IN FIXTURES SHALL BE USED FOR SUPPORT. IN ADDITION TO THE MAIN HANGERS, 1/4" TOGGLE BOLTS SHALL SECURE THE BOTTOM OF ALL WALL-HUNG FIXTURES AT EACH DRILLING PROVIDED FOR THIS PURPOSE.
H. MOUNT WALL-HUNG FIXTURES AT THE HEIGHTS INDICATED ON THE ARCHITECTURAL DRAWINGS OR AS PRESCRIBED BY LOCAL CODE. SPECIAL ATTENTION IS CALLED TO THE INSTALLATION REQUIREMENTS OF THE ANSI HANDICAP CODE.

2.02 CLEANING AND ADJUSTMENT

A. THE UNITS SHALL BE CLEANED, TESTED AND FIELD-ADJUSTED TO PROVIDE OPTIMUM FLOW AND DRAINAGE. SPECIFIC ATTENTION IS CALLED TO THE ADJUSTMENT OF AUTOMATIC FLUSH VALVES AND FAUCETS FOR EMPIRICAL CONDITIONS.

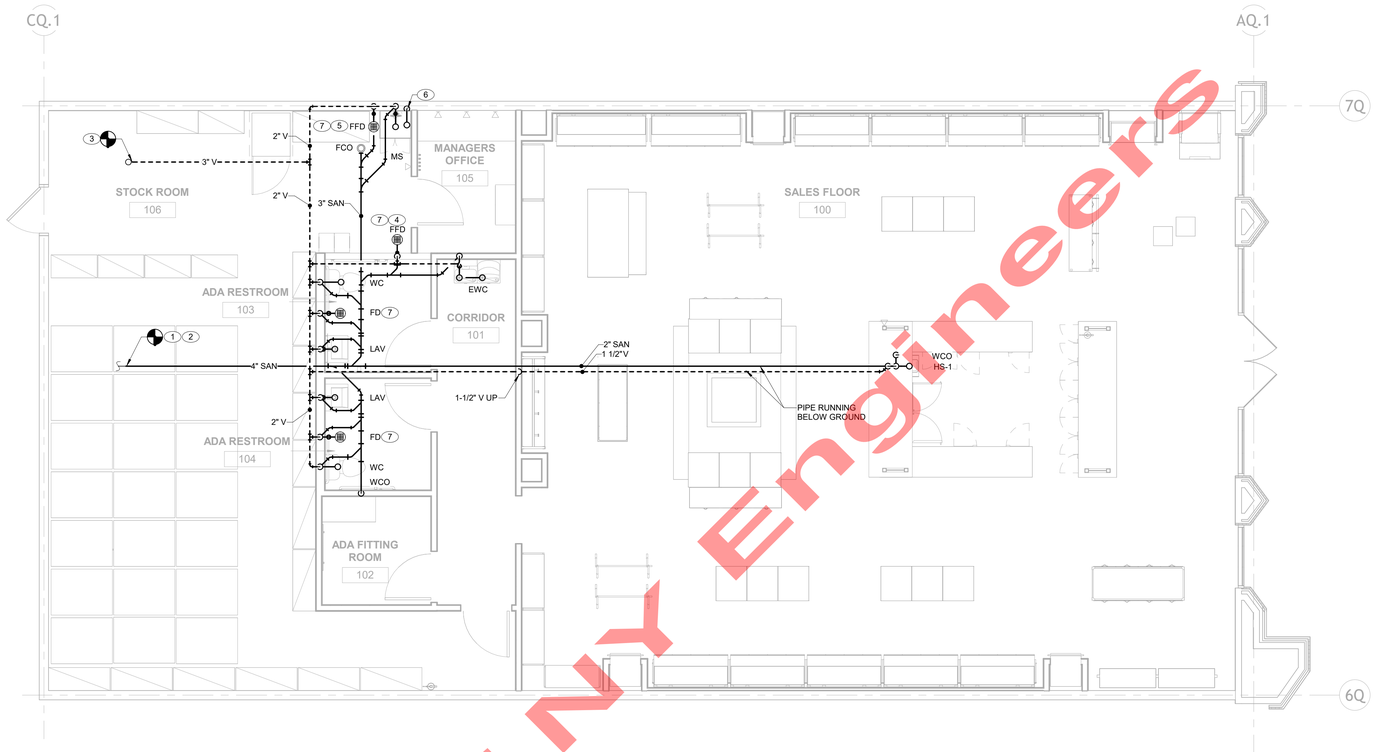
B. ALL FLUSH VALVES, DIAPHRAGMS, STRAINERS, AERATORS, ETC. SHALL BE FULLY CLEANED AFTER AIL PIPING AND FIXTURE FLUSHING.

END OF SECTION

Property of NY Engineers

PROJECT LOCATION:
TECOVAS

P-003



Property of NY Engineers

PLUMBING WASTE & VENT PLAN 1/4" = 1'-0" A

GENERAL NOTES NTS C

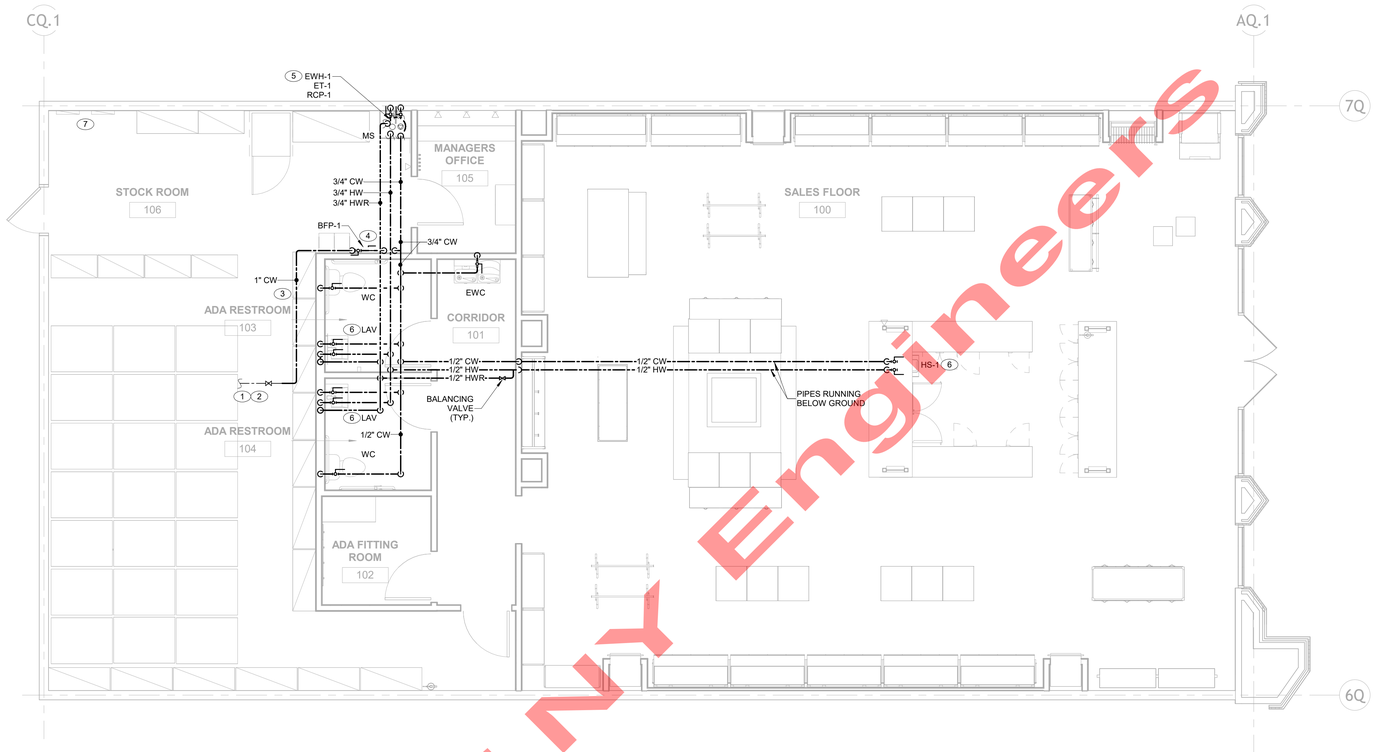
1. ANY CHANGES AND/ OR UPGRADES TO TENANT'S EXISTING PLUMBING SYSTEMS SHALL COMPLY WITH ALL CODES AND BASE BUILDING CRITERIA.
2. ALL MAIN WATER LINES SHALL BE COPPER – PVC IS NOT PERMITTED. THERE SHALL BE NO PIPING JOINTS OR FITTINGS INSTALLED IN WATER PIPING BELOW THE FLOOR SLAB. PEX IS AN ALTERNATIVE, IF ALLOWABLE AND COMPLIANT WITH LOCAL CODE.
3. ALL DRAIN, WASTE AND VENT PIPING AND FITTINGS ABOVE GRADE MUST BE CAST IRON PIPE. (PVC IS ACCEPTABLE IN OUR NEW CONSTRUCTION AS LONG AS IT IS NOT INSTALLED IN A RETURN AIR PLENUM.
4. PLUMBING IS NOT PERMITTED IN ANY DEMISING PARTITIONS. FUR OUT THE WALL AS NECESSARY.
5. EXHAUST AND PLUMBING VENTS SHALL BE LOCATED A MINIMUM OF 10'-0" AWAY FROM ANY OUTSIDE AIR INTAKE, AND 5'-0" FROM ANY DEMISING WALL VERTICAL PLANE. ALL VENTS SHALL BE LOCATED OUTSIDE OF ANY SNOW DRIFT ZONES AS SPECIFIED ON THE CENTER'S DOCUMENTATION.
6. ALL PENETRATIONS TO ROOF MUST BE APPROVED BY LANDLORD. ALL RELATED ROOF WORK MUST BE DONE BY MALL'S DESIGNATED ROOFING CONTRACTOR, AT TENANT'S EXPENSE. COORDINATE ALL WORK WITH PROPERTY MANAGEMENT ON SITE.
7. ANY UNUSED PLUMBING EQUIPMENT, PIPING, ETC., WITHIN OR SERVING THE PREMISES MUST BE COMPLETELY REMOVED TO POINT OF ORIGIN. DO NOT ABANDON IN PLACE. ALL PENETRATIONS THROUGH THE ROOF SHALL BE PATCHED AND REPAIRED BY THE APPROVED ROOFING CONTRACTOR APPROVED BY PROPERTY MANAGEMENT.
8. IF NOT ALREADY EXISTING, INSTALL A SHUT OFF VALVE ON DOMESTIC WATER LINE INSIDE SPACE. EXISTING SHUT OFF VALVE TO THE SPACE SHALL SERVE AS THE POINT OF SERVICE TO THE TENANT SPACE.
9. ALL NEW PLUMBING (DOMESTIC WATER AND DRAIN WASTE VENT "DWV" PIPING) SHALL BE INSULATED WHERE EXPOSED OR IN PLENUM SPACES.
10. TENANT IS REQUIRED TO INSTALL A WATERPROOF MEMBRANE IN ALL WET AREAS OF THE SPACE. TENANT SHALL USE A 30 MIL POLYETHYLENE CLEAVAGE MEMBRANE (EQUAL TO NOBLESEAL TS) INSTALLED PER MANUFACTURERS RECOMMENDATIONS AND ANSI A108. MEMBRANE MUST BE EXTENDED UP THE WALL A MINIMUM OF 6" OR EQUAL TO THE HEIGHT OF THE FLOOR BASE.
11. TENANT'S GENERAL CONTRACTOR SHALL ADVISE THE PROPERTY MANAGEMENT TEAM PRIOR TO ANY SLAB MODIFICATIONS OR REMOVAL. TENANT GC SHALL VERIFY THAT WORK SHALL NOT CONFLICT WITH ANY EXISTING STRUCTURAL, UTILITY, OR OTHER UNDER-SLAB CONDITION. (NONDESTRUCTIVE VERIFICATION MAYBE REQUIRED.) ANY DAMAGE OR DOWNTIME CAUSED BY TENANT'S WORK SHALL BE REPAIRED AND REIMBURSED AT TENANT'S EXPENSE.
12. ALL FLOOR DRAINS ARE REQUIRED TO HAVE TRAP PRIMERS.
13. ALL FLOOR PENETRATIONS MUST BE CORE BORED, SLEEVED, GROUTED, SEALED AND MADE WATERPROOF.
14. REFER TO RISER DIAGRAM FOR ALL WASTE AND VENT SIZES.
15. VERIFY WITH THE LOCAL BUILDING AUTHORITY THAT CONDENSATE DRAINAGE CAN BE ROUTED TO THE NEAREST CODE APPROVED DRAIN.
16. COORDINATE OVERALL PIPING DIAMETER (INCLUDING INSULATION) WITH WALL DEPTH.
17. NOTIFY ARCHITECT IF OVER ALL PIPE DIAMETER EXCEEDS WALL DEPTH.

KEY NOTES - PLUMBING WASTE & VENT PLAN NTS B

1. EXTEND & CONNECT NEW 4" SANITARY LINE TO EXISTING SANITARY LINE IN SPACE. MODIFY AND EXTEND EXISTING SANITARY LINES AS REQUIRED. PROVIDE REQUIRED PITCH TO EXISTING SANITARY LINE AS REQUIRED. CONTRACTOR TO VERIFY EXACT LOCATION, ROUTING, SIZE,INVERT, DIRECTION OF FLOW AND CONNECTION POINT OF SANITARY LINE PRIOR TO BID. NOTIFY ARCHITECT/ENGINEER WITH ANY DISCREPANCIES PRIOR TO BID.
2. EXISTING SANITARY LINE SHOWN IN THE PLAN IS APPROX. CONTRACTOR TO FIELD VERIFY THE LOCATION , SIZE, ROUTING, DIRECTION OF FLOW AND INVERT LEVEL OF THE EXISTING SANITARY LINE AND PROVIDE NEW IF EXISTING IS NOT IN GOOD CONDITION.
3. CONTRACTOR SHALL CONNECT NEW 3" VENT LINE TO EXISTING VENT LINE IN SPACE. MODIFY AND EXTEND EXISTING VENT LINES AS REQUIRED. VERIFY SIZE, ROUTING, LOCATION, & CONNECTION POINT PRIOR TO BID. NOTIFY ARCHITECT/ENGINEER WITH ANY DISCREPANCIES PRIOR TO BID.
4. ROUTE INDIRECT WASTE FROM BFP TO FUNNEL FLOOR DRAIN (FFD) WITH APPROVED WITH APPROVED AIR GAP AS PER LOCAL CODE.
5. CONTRACTOR SHALL DRAIN WATER HEATER (EWH-1), RELIEF VALVE, AND DRAIN PAN INDIRECTLY TO FUNNEL FLOOR DRAIN (FFD) WITH APPROVED AIR GAP AS PER LOCAL CODE.
6. ROUTE CONDENSATE DRAIN DOWN IN WALL AND DISCHARGE TO MOP SINK WITH APPROVED AIR GAP.
7. PROVIDE TRAP PRIMER FOR FLOOR DRAIN PRIME-RITE (PR-500) OR EQUAL.

PROJECT LOCATION:
TECOVAS

P-100



Property of NY Engineers

PLUMBING WATER SUPPLY PLAN 1/4" = 1'-0" A

GENERAL NOTES NTS C

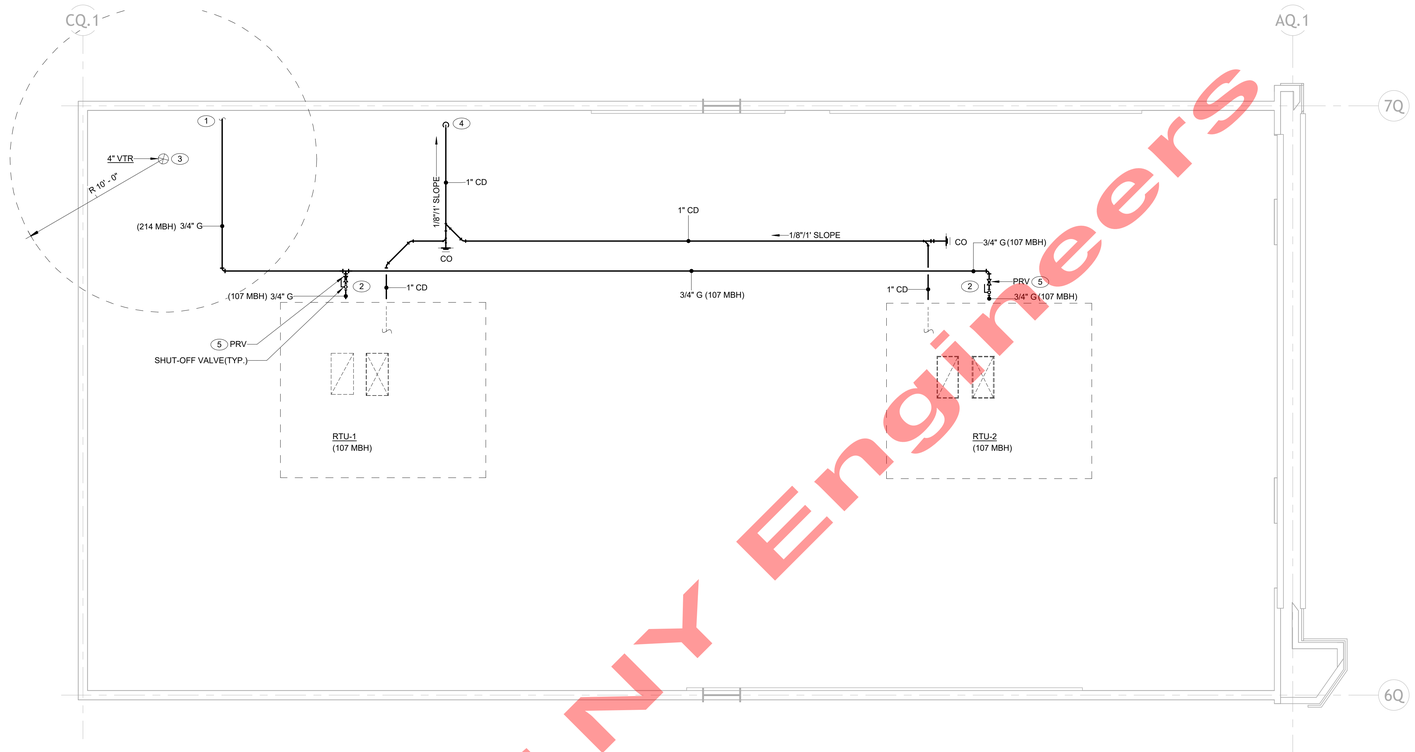
1. ANY CHANGES AND/ OR UPGRADES TO TENANT'S EXISTING PLUMBING SYSTEMS SHALL COMPLY WITH ALL CODES AND BASE BUILDING CRITERIA.
2. ALL MAIN WATER LINES SHALL BE COPPER – PVC IS NOT PERMITTED. THERE SHALL BE NO PIPING JOINTS OR FITTINGS INSTALLED IN WATER PIPING BELOW THE FLOOR SLAB. PEX IS AN ALTERNATIVE, IF ALLOWABLE AND COMPLIANT WITH LOCAL CODE.
3. ALL DRAIN, WASTE AND VENT PIPING AND FITTINGS ABOVE GRADE MUST BE CAST IRON PIPE. (PVC IS ACCEPTABLE IN OUR NEW CONSTRUCTION AS LONG AS IT IS NOT INSTALLED IN A RETURN AIR PLENUM.
4. PLUMBING IS NOT PERMITTED IN ANY DEMISING PARTITIONS. FUR OUT THE WALL AS NECESSARY.
5. EXHAUST AND PLUMBING VENTS SHALL BE LOCATED A MINIMUM OF 10'-0" AWAY FROM ANY OUTSIDE AIR INTAKE, AND 5'-0" FROM ANY DEMISING WALL VERTICAL PLANE. ALL VENTS SHALL BE LOCATED OUTSIDE OF ANY SNOW DRIFT ZONES AS SPECIFIED ON THE CENTER'S DOCUMENTATION.
6. ALL PENETRATIONS TO ROOF MUST BE APPROVED BY LANDLORD. ALL RELATED ROOF WORK MUST BE DONE BY MALL'S DESIGNATED ROOFING CONTRACTOR, AT TENANT'S EXPENSE. COORDINATE ALL WORK WITH PROPERTY MANAGEMENT ON SITE.
7. ANY UNUSED PLUMBING EQUIPMENT, PIPING, ETC., WITHIN OR SERVING THE PREMISES MUST BE COMPLETELY REMOVED TO POINT OF ORIGIN. DO NOT ABANDON IN PLACE. ALL PENETRATIONS THROUGH THE ROOF SHALL BE PATCHED AND REPAIRED BY THE APPROVED ROOFING CONTRACTOR APPROVED BY PROPERTY MANAGEMENT.
8. IF NOT ALREADY EXISTING, INSTALL A SHUT OFF VALVE ON DOMESTIC WATER LINE INSIDE SPACE. EXISTING SHUT OFF VALVE TO THE SPACE SHALL SERVE AS THE POINT OF SERVICE TO THE TENANT SPACE.
9. ALL NEW PLUMBING (DOMESTIC WATER AND DRAIN WASTE VENT "DWV" PIPING) SHALL BE INSULATED WHERE EXPOSED OR IN PLENUM SPACES.
10. TENANT IS REQUIRED TO INSTALL A WATERPROOF MEMBRANE IN ALL WET AREAS OF THE SPACE. TENANT SHALL USE A 30 MIL POLYETHYLENE CLEAVAGE MEMBRANE (EQUAL TO NOBLESEAL TS) INSTALLED PER MANUFACTURERS RECOMMENDATIONS AND ANSI A108. MEMBRANE MUST BE EXTENDED UP THE WALL A MINIMUM OF 6" OR EQUAL TO THE HEIGHT OF THE FLOOR BASE.
11. TENANT'S GENERAL CONTRACTOR SHALL ADVISE THE PROPERTY MANAGEMENT TEAM PRIOR TO ANY SLAB MODIFICATIONS OR REMOVAL. TENANT GC SHALL VERIFY THAT WORK SHALL NOT CONFLICT WITH ANY EXISTING STRUCTURAL, UTILITY, OR OTHER UNDER-SLAB CONDITION. (NONDESTRUCTIVE VERIFICATION MAYBE REQUIRED.) ANY DAMAGE OR DOWNTIME CAUSED BY TENANT'S WORK SHALL BE REPAIRED AND REIMBURSED AT TENANT'S EXPENSE.
12. ALL FLOOR DRAINS ARE REQUIRED TO HAVE TRAP PRIMERS.
13. ALL FLOOR PENETRATIONS MUST BE CORE BORED, SLEEVED, GROUTED, SEALED AND MADE WATERPROOF.
14. REFER TO RISER DIAGRAM FOR ALL WASTE AND VENT SIZES.
15. VERIFY WITH THE LOCAL BUILDING AUTHORITY THAT CONDENSATE DRAINAGE CAN BE ROUTED TO THE NEAREST CODE APPROVED DRAIN.
16. COORDINATE OVERALL PIPING DIAMETER (INCLUDING INSULATION) WITH WALL DEPTH.
17. NOTIFY ARCHITECT IF OVER ALL PIPE DIAMETER EXCEEDS WALL DEPTH.

KEY NOTES - PLUMBING WATER SUPPLY PLAN NTS B

1. CONTRACTOR SHALL CONNECT NEW 1" CW LINE TO THE EXISTING CW LINE FOR THE SPACE. MODIFY AND EXTEND EXISTING CW LINES AS REQUIRED. CONTRACTOR TO VERIFY SIZE, LOCATION, ROUTING & CONNECTION POINT PRIOR TO BID. NOTIFY ARCHITECT/ENGINEER OF ANY DISCREPANCIES PRIOR TO BID.
2. EXISTING COLD WATER LINE SHOWN IN PLAN IS APPROX. CONTRACTOR TO FIELD VERIFY THE LOCATION , SIZE AND ROUTING OF THE EXISTING COLD WATER LINE AND PROVIDE NEW IF EXISTING IS NOT IN GOOD CONDITION.
3. NO TAP OFF TO BE TAKEN BEFORE BFP.
4. PROVIDE A NEW 1" WATER SUB-METER, BACKFLOW PREVENTER (BFP-1), AND SHUTOFF VALVE. CONTRACTOR TO COORDINATE FINAL LOCATION WITH THE OWNER PRIOR TO BID.
5. NEW ELECTRIC HOT WATER HEATER (EWH-1), INSTALLED ABOVE MOP SINK (MS), REFER PLUMBING FIXTURE SCHEDULE FOR MORE DETAILS.
6. PROVIDE THERMOSTATIC MIXING VALVE SET AT 110°F FOR LAVATORY AND SINK.
7. DO NOT INSTALL PLUMBING PIPING OVER ELECTRICAL PANELS OR EQUIPMENT.

PROJECT LOCATION:
TECOVAS

SHEET NO.
P-200



1 Plumbing Roof Plan
1/4" = 1'-0"

Property of NY Engineers

PLUMBING ROOF PLAN 1/4" = 1'-0" A

GENERAL NOTES NTS C

1. GAS PIPING OPERATING AT PRESSURE HIGHER THAN 1LB. WHERE INSTALLED IN BUILDING SHALL HAVE WELDED JOINTS. PIPING BELOW 1LB. PRESSURE SHALL HAVE THREADED CONNECTION.
2. GAS PIPING SHALL BE STANDARD WEIGHT SCHEDULE 40 BLACK STEEL PIPE. PIPE SHALL BE THREADED OR WELDED AS DIRECTED BY LOCAL GAS COMPANY AND STATE AND LOCAL PLUMBING CODES.
3. PROVIDE GAS PIPING COMPLETE WITH ALL REQUIRED FITTINGS, STRAPS, HANGERS, SUPPORTS, ETC. OBTAIN ALL REQUIRED INSPECTIONS AND APPROVALS. GAS PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF NFPA 54 AND ANY APPLICABLE STATE AND LOCAL CODES OR REGULATIONS.
4. GAS PIPING ROUTED ON ROOF SHALL BE SUPPORTED BY ROOF PIPE SUPPORT AS PER CODE.
5. PAINT GAS PIPING EXPOSED TO WEATHER WITH (2) COATS OF "RUSTOLEUM" OR EQUAL PAINT. COLOR TO BE SELECTED BY OWNER OR GENERAL CONTRACTOR AND PER REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
6. MAKE FINAL CONNECTIONS TO GAS FIRED EQUIPMENT. PROVIDE GAS SHUT-OFF VALVE AND 6" DIRT LEG AT EACH CONNECTION.

KEY NOTES - PLUMBING ROOF PLAN NTS B

(1) REFER TO OVERALL BUILDING PLAN FOR CONTINUATION. COORDINATE WITH GAS COMPANY TOTAL LENGTH: +280'-0", SYSTEM PRESSURE: 2 PSI, AND TOTAL LOAD: 214 MBH PRIOR TO BID AND CONSTRUCTION.

(2) GAS CONNECTION TO HVAC EQUIPMENT ON ROOF. PROVIDE WITH GAS COCK, DIRT LEG, AND SHUTOFF VALVE. COORDINATE EXACT ROUTING OF GAS PIPING WITH OTHER TRADES PRIOR TO BID.

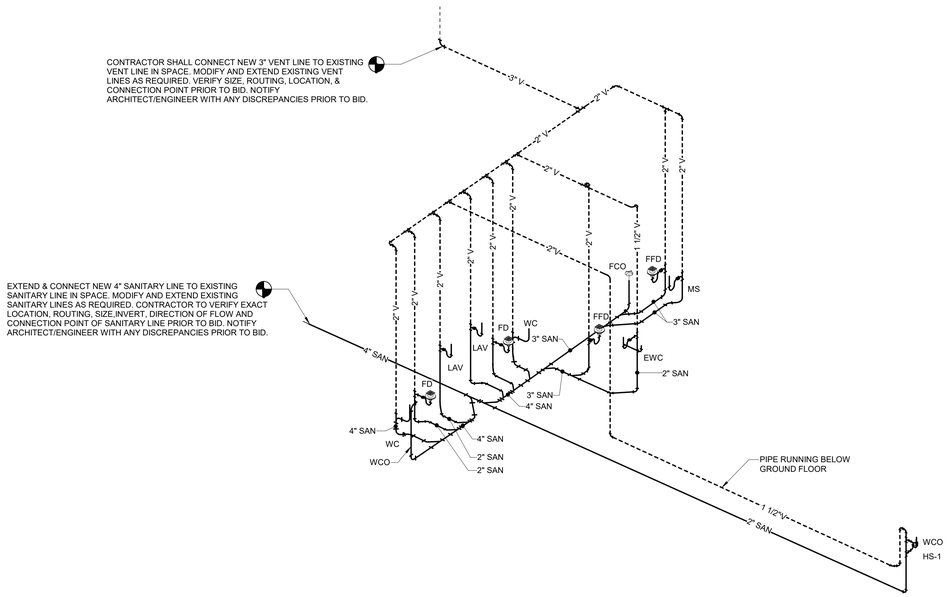
(3) 4" VENT THRU ROOF. MAINTAIN 10'-0" SEPARATION BETWEEN OUTSIDE AIR INTAKES AND VENT LOCATIONS.

(4) 1" CONDENSATE DRAIN DOWN TO MOP SINK WITH APPROVED AIR GAP AS PER LOCAL CODE.

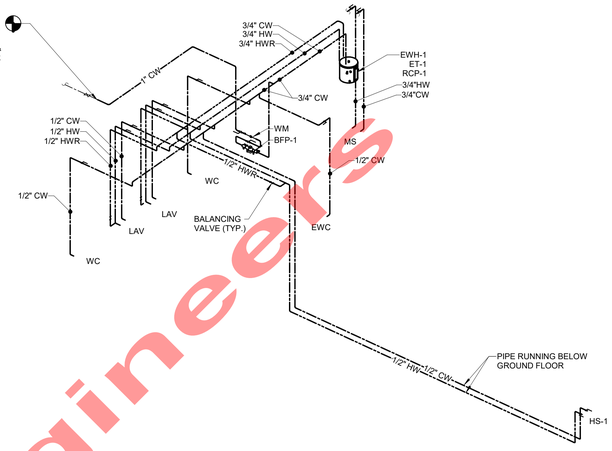
(5) INSTALL A MAXITROL 325-5L-3/4 LINE-PRESSURE REGULATING VALVE (PRV) IMMEDIATELY UPSTREAM OF THE GAS INLET ON EACH INDIVIDUAL ROOFTOP UNIT (RTU). ENSURE COMPLIANCE WITH ALL LOCAL CODES AND PROPER ORIENTATION.

PROJECT LOCATION:
TECOVAS

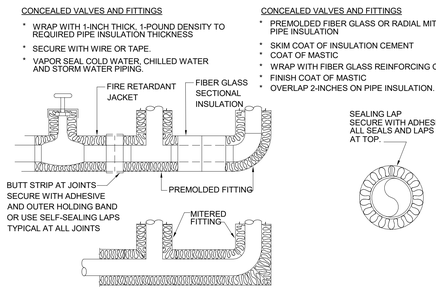
P-300



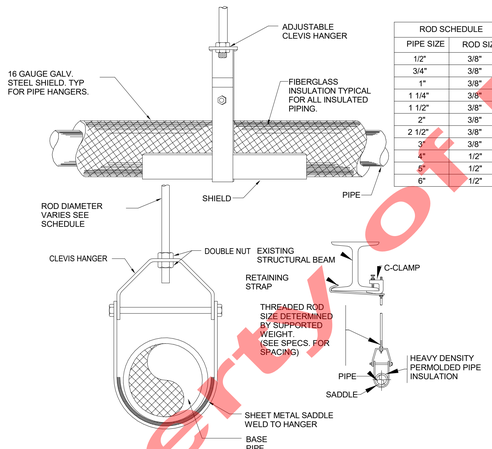
1 WASTE & VENT ISOMETRIC
N.T.S.



2 WATER SUPPLY ISOMETRIC
N.T.S.

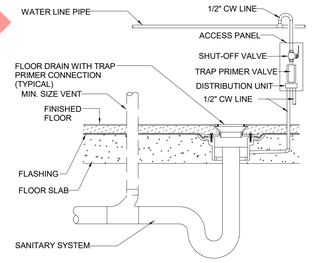


1 PIPE INSULATION DETAILS
P-300 N.T.S

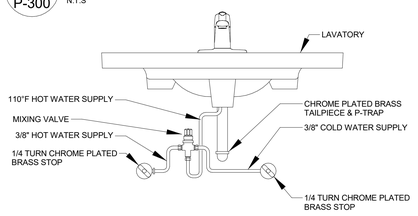


ROD SCHEDULE	
PIPE SIZE	ROD SIZE
1/2"	3/8"
3/4"	3/8"
1"	3/8"
1 1/4"	3/8"
1 1/2"	3/8"
2"	3/8"
2 1/2"	3/8"
3"	3/8"
4"	1/2"
5"	1/2"
6"	1/2"

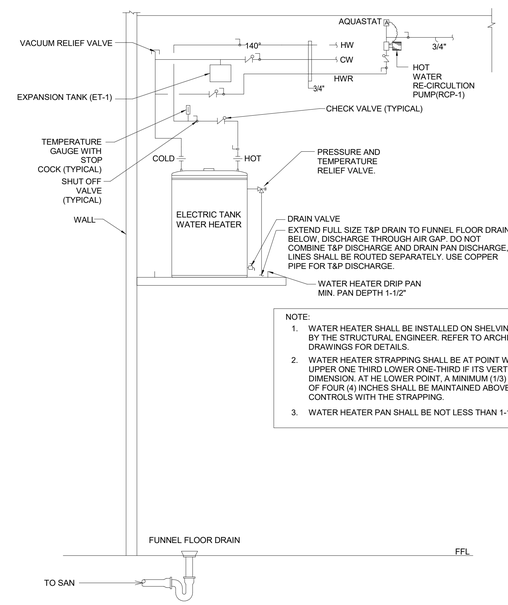
2 PIPE HANGER DETAILS
P-300 N.T.S



3 FLOOR DRAIN WITH TRAP PRIMER DETAIL
P-300 N.T.S

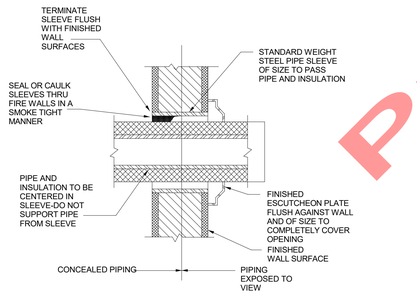


4 HAND SINK/LAVATORY TEMPERING VALVE DETAIL
P-300 N.T.S

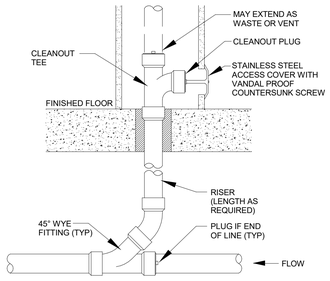


NOTE:
1. WATER HEATER SHALL BE INSTALLED ON SHELVING DESIGNED BY THE STRUCTURAL ENGINEER. REFER TO ARCHITECTURAL DRAWINGS FOR DETAILS.
2. WATER HEATER STRAPPING SHALL BE AT POINT WITHIN THE UPPER ONE THIRD LOWER ONE-THIRD IF ITS VERTICAL DIMENSION. AT HE LOWER POINT, A MINIMUM (1/3) AND DISTANCE OF FOUR (4) INCHES SHALL BE MAINTAINED ABOVE THE CONTROLS WITH THE STRAPPING.
3. WATER HEATER PAN SHALL BE NOT LESS THAN 1-1/2" IN DEPTH.

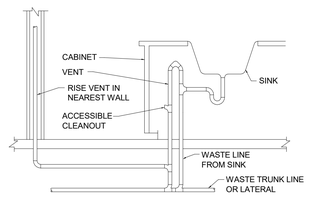
8 WATER HEATER DETAIL
P-300 N.T.S



5 PIPE SLEEVE THROUGH WALL DETAIL
P-300 N.T.S



6 WALL CLEANOUT DETAIL
P-300 N.T.S



7 ISLAND SINK TYPICAL PLUMBING CONNECTION DETAIL
P-300 N.T.S

PROJECT LOCATION:
TECOVAS

P-400

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