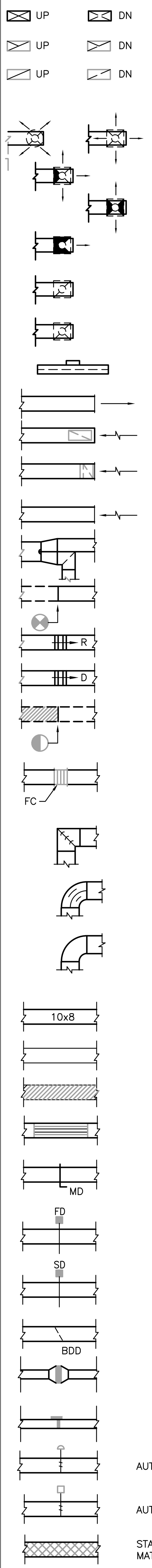
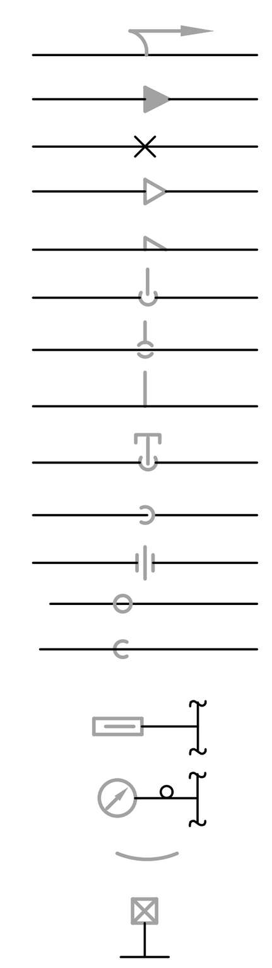
GENERAL DUCTWORK SYMBOLS
(NOT ALL MAY APPLY)



- SUPPLY DUCT (UP & DOWN)
- EXHAUST DUCT (UP & DOWN)
- RETURN DUCT (UP & DOWN)
- ROUND AND SQUARE 4-WAY CEILING DIFFUSERS
- SQUARE 3-WAY CEILING DIFFUSERS
- SQUARE 2-WAY CEILING DIFFUSERS
- SQUARE 1-WAY CEILING DIFFUSERS
- SQUARE CEILING RETURN GRILLES
- SQUARE CEILING EXHAUST GRILLES
- LINEAR SLOT DIFFUSER
- SUPPLY TOP REGISTER OR GRILLE (WALL TYPE)
- EXHAUST OR RETURN CEILING REGISTER OR GRILLE
- EXHAUST OR RETURN BOTTOM REGISTER OR GRILLE (WALL TYPE)
- EXHAUST OR RETURN REGISTER OR TOP GRILLE (WALL TYPE)
- VANED ELBOW & AIR SPLIT TYPE DUCT TAKE-OFF
- CONNECT NEW DUCT TO EXISTING DUCT
- INCLINED RISE, IN DIRECTION OF AIR FLOW
- INCLINED DROP, IN DIRECTION OF AIR FLOW
- LIMIT OF DEMOLITION
- FLEXIBLE CONNECTION, EQUIPMENT, VIBRATION, OR SEISMIC
- VANED ELBOW (PROVIDE ALL SQUARE OR RECTANGULAR ELBOWS WITH VANES EVEN IF SYMBOL IS MISSING)
- VANED ELBOW (SHORT RADIUS)
- STANDARD RADIUS ELBOW (LONG RADIUS)
- NEW DUCT (INSIDE DIMENSIONS: WIDTH x DEPTH)
- EXISTING DUCT TO REMAIN
- EXISTING DUCT TO BE REMOVED
- LOUVER (LOUVER SPECIFIED IN ARCHITECTURAL SECTION.)
- MANUAL VOLUME DAMPER
- FIRE DAMPER
- SMOKE DAMPER
- BACK DRAFT DAMPER
- DUCT MOUNTED COIL (HOT WATER,GAS OR STEAM COIL)
- DUCT MOUNTED COIL (ELECTRIC)
- AUTOMATIC CONTROL DAMPER MODULATING
- AUTOMATIC CONTROL DAMPER TWO POSITION
- STAINLESS STEEL DUCT (OR OTHER CORROSION-RESISTANT MATERIAL, AS NOTED IN DRAWINGS / SPECIFICATIONS)

GENERAL PIPING SYMBOLS
(NOT ALL MAY APPLY)



- DIRECTION OF PIPE PITCH (DOWN)
- DIRECTION OF FLOW
- ANCHOR
- REDUCER OR INCREASER
- ECCENTRIC REDUCER
- TOP CONNECTION, 45° OR 90°
- BOTTOM CONNECTION, 45° OR 90°
- SIDE CONNECTION
- CAPPED OUTLET
- RISE OR DROP IN PIPE
- UNION
- PIPE UP
- PIPE DOWN
- THERMOMETER
- PRESSURE GAGE
- TEST PLUG (PRESSURE/TEMPERATURE)

CONTROLS SYMBOLS
(NOT ALL MAY APPLY)

T	ROOM THERMOSTAT/TRANSMITTER – WALL MOUNT
M	ROOM HUMIDISTAT (MOISTURE)/TRANSMITTER – WALL MOUNT
TT	TEMPERATURE TRANSMITTER
TT	TEMPERATURE TRANSMITTER, AVERAGING ELEMENT
MT	MOISTURE (HUMIDITY) TRANSMITTER
PT	PRESSURE TRANSMITTER
SPS	STATIC PRESSURE SENSOR
FT	FLOW TRANSMITTER
IT	CURRENT TRANSMITTER
SD	SMOKE DETECTOR
PDT	PRESSURE DIFFERENTIAL TRANSMITTER
PDS	PRESSURE DIFFERENTIAL SWITCH
HS	HAND SWITCH (HAND-OFF-AUTO SWITCH)
ZC	VALVE OR DAMPER POSITION CONTROLLER
TSL	TEMPERATURE SWITCH, LOW (FREEZESTAT)
TSH	TEMPERATURE SWITCH, HIGH (FREEZESTAT)
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
AT CO2	CARBON DIOXIDE TRANSMITTER
AT CO	CARBON MONOXIDE TRANSMITTER
AT OC	OCCUPANCY SENSOR
HVAC	HVAC CONTROL PANEL
VSMC	VARIABLE SPEED MOTOR CONTROLLER
ECC	INTEGRATE CONTROL POINT ON REMOTE GRAPHICS WORKSTATION AT ENERGY CONTROL CENTER
FSH	FLOW SWITCH HIGH
FSL	FLOW SWITCH LOW
M	ELECTRIC OPERATED CONTROL DAMPER/OR VALVE

MECHANICAL GENERAL NOTES

GENERAL PROJECT REQUIREMENTS

A. ALL MATERIALS FURNISHED AND ALL WORK PERFORMED SHALL BE IN ACCORDANCE WITH THE LATEST ADOPTED CODES, RULES AND REGULATIONS, INCLUDING BUT NOT LIMITED TO: MECHANICAL, ELECTRICAL, PLUMBING, ENERGY CONSERVATION, BUILDING, NFPA, ASHRAE 62.1 & 90.1, OSHA, UTILITY PROVIDERS, AS WELL AS ALL LOCAL AND STATE CODES. IN ALL CASES, THE MOST STRINGENT SHALL APPLY.

B. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FEES, PERMITS AND LICENSES FOR THE COMPLETE INSTALLATION OF HIS WORK. DRAWINGS ARE DIAGRAMMATIC REPRESENTATION OF THE WORK AND INDICATES GENERAL ARRANGEMENT. SEE ARCHITECTURAL AND/OR FOOD SERVICE DRAWINGS FOR EXACT DIMENSIONS.

C. COORDINATE EXACT PHASING OF ALL WORK WITH GENERAL CONTRACTOR. PREPARE SHOP DRAWINGS TO VERIFY COORDINATION OF WORK BETWEEN TRADES, PRIOR TO INSTALLATION OR PURCHASE OF MATERIAL.

D. INSTALL EQUIPMENT, MATERIALS, ETC., IN STRICT ACCORD WITH MANUFACTURERS' RECOMMENDATIONS AND DIRECTIONS. ALL INSTALLED COMPONENTS/EQUIPMENT SHALL BE LABELED BY UNDERWRITER'S LABORATORIES OR OTHER APPROVED LISTING AGENCY. APPROVED AND LABELING OF INDIVIDUAL COMPONENTS ON AN ASSEMBLY IS NOT ACCEPTABLE AS MEETING THIS REQUIREMENT, UNLESS WAIVED BY THE ENGINEER IN WRITING.

E. ALL ROOF VENTS, DRAINS, CURBS, PIPE PORTALS, ETC. SHALL BE COMPATIBLE WITH THE ROOFING SYSTEM (EITHER EXISTING OR NEW). SEE ARCHITECTURAL PLANS/SPECIFICATIONS FOR MORE INFORMATION. COORDINATE ALL ROOF ACCESSORIES WITH G.C.

F. ALL SUPPORTS FOR EQUIPMENT, DEVICES OR FIXTURES SHALL BE UNIQUE, FROM THE BUILDING STRUCTURE. DO NOT SUPPORT WORK FROM OTHER TRADES, EQUIPMENT OR SUPPORTS WITHOUT WRITTEN PERMISSION FROM THE ENGINEER AND CONSENT OF THE OTHER TRADE, IN WRITING. SUPPORTING FROM CROSS BRACING OR ROOF DECK WILL NOT BE ALLOWED.

G. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR HIS WORK. ALL CUTTING AND PATCHING SHALL BE IN ACCORDANCE WITH THE ARCHITECT'S STANDARDS FOR SUCH WORK. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. IF IN DOUBT, CONTACT THE OWNER/ARCHITECT AND ENGINEERS FOR CLARIFICATIONS PRIOR TO INSTALLING ANY SUCH WORK.

H. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. ANY EXPOSED WORK THAT COULD PRESENT AN ENVIRONMENTAL HAZARD (E.G. CONTACT WITH STEAM PIPING, EXPOSED DUCT JOINTS IN A LOW CEILING) SHALL BE PROVIDED WITH ALL REQUIRED PROTECTIVE MEASURES.

I. DO NOT SCALE FROM DRAWINGS, AS PRINTING DISTORTS SCALE. WORK SHALL BE LAID OUT FROM DIMENSIONED DRAWINGS, OR DIMENSIONS SUPPLIED TO THE CONTRACTOR.

J. THE PURPOSE AND INTENT OF ALL OF THE DOCUMENTS PERTAINING TO THIS PROJECT IS TO PROVIDE A COMPLETE, FUNCTIONAL, SAFE, LIKE NEW FACILITY. ANYTHING LESS SHALL BE UNACCEPTABLE. FURNISH ALL REQUIRED ITEMS EVEN IF NOT SPECIFICALLY SHOWN ON THE DRAWINGS (E.G. OFFSETS, ISOLATION AND BALANCING DEVICES, MAINTENANCE CLEARANCES, ETC.) ALL SYSTEMS, EQUIPMENT AND MATERIALS ARE TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. WORK NOT MEETING THIS CRITERION SHALL BE REMOVED AND REINSTALLED SATISFACTORILY. FINAL DETERMINATION OF THE ACCEPTABILITY OF THE QUALITY OF WORK RESIDES WITH THE ENGINEER.

K. MAINTAIN ALL MANUFACTURER AND CODE-REQUIRED SERVICE CLEARANCES, INTAKE/EXHAUST CLEARANCES, ROOF EDGE CLEARANCES FOR ALL NEW AND EXISTING EQUIPMENT, DUCTWORK AND PLUMBING VENTS.

EXISTING CONDITIONS AND UTILITIES

A. CONTRACTOR SHALL VISIT AND EXAMINE THE SITE PRIOR TO SUBMITTING BID TO BECOME FAMILIAR WITH EXISTING CONDITIONS. NO ALLOWANCE SHALL BE MADE FOR EXISTING CONDITIONS NOT KNOWN TO THE CONTRACTOR. EXISTING EQUIPMENT, DUCT/PIPING (SIZES AND LOCATIONS), ETC. ARE SHOWN FOR REFERENCE ONLY. ADJUST EXACT INSTALLATION AND CONNECTION OF NEW ITEMS ACCORDING TO FIELD CONDITIONS.

B. CONTRACTOR SHALL EXERCISE EXTREME CARE IN THE COURSE OF THEIR WORK SO AS TO ENSURE THAT THEY DO NOT INTERRUPT ANY EXISTING BUILDING SERVICES. FOR SAFETY PURPOSES, PARTICULAR ATTENTION SHALL BE PAID TO THIS PRECAUTION RELATIVE TO STEAM, WASTE, HYDRONIC PIPING, NATURAL GAS AND ELECTRICAL LINES. VERIFY THE LOCATION, SIZE, TYPE, ETC., OF EACH UNDERGROUND OR OVERHEAD UTILITY.

C. CARE SHALL BE TAKEN BY ALL CONTRACTORS TO AVOID DAMAGING OR DISTURBING EXISTING CONSTRUCTION WHICH IS TO REMAIN. CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING ANY REPAIRS NECESSARY TO RECTIFY DAMAGE AND RESTORE EXISTING CONSTRUCTION TO AN UNDAMAGED STATE UPON COMPLETION OF WORK - THIS SHALL BE PERFORMED AT NO ADDITIONAL COST TO OWNER. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING/PATCHING ANY ABANDONED PENETRATIONS, UNLESS DIRECTED OTHERWISE BY OWNER. CONTRACTOR SHALL BE RESPONSIBLE FOR STORAGE OF RELOCATED/RETAINED EQUIPMENT AND MATERIALS DURING CONSTRUCTION. ITEMS DAMAGED DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

D. INTERRUPTION OF ANY EXISTING SERVICES SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR, UTILITY PROVIDER, OWNER'S DESIGNATED REPRESENTATIVE, AND THE ARCHITECT, AT LEAST TWO WEEKS IN ADVANCE OF THE ANTICIPATED INTERRUPTION. A SCHEDULE FOR THESE OUTAGES SHALL BE DEVELOPED AND AGREED UPON BETWEEN THE PARTIES MENTIONED, TO AVOID UNNECESSARY INCONVENIENCE TO THE OWNER OR ANY AFFECTED PARTY. NOTIFY THE UTILITY COMPANY OF ANY ANTICIPATED SERVICES REQUIRED TWO WEEKS IN ADVANCE, IN WRITING. IF UTILITY COMPANY REQUIRES A LONGER NOTIFICATION PERIOD, SO PROVIDE. WHERE INTERRUPTING AN EXISTING UTILITY OR SERVICE DELIBERATELY OR ACCIDENTALLY, THE RESPONSIBLE CONTRACTOR SHALL WORK CONTINUOUSLY AS NEEDED TO RESTORE SAME, PROVIDING PREMIUM TIME AS NEEDED.

E. CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING OWNER/ARCHITECT AND ENGINEER OF ANY AND ALL HAZARDOUS MATERIAL ABATEMENT (LEAD, ASBESTOS, ETC.) REQUIRED FOR DEMOLITION AND/OR NEW WORK. IF ANY HAZARDOUS MATERIALS ARE FOUND, THESE CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF OWNER/G.C. IMMEDIATELY AFTER DISCOVERY. ABATEMENT WORK WILL BE COVERED UNDER A SEPARATE CONTRACT.

COORDINATION WITH FIRE ALARM AND FIRE/SMOKE-RATED ASSEMBLIES

A. PROVIDE FIRE STOP PER BUILDING CODE TO ALL CONDUITS PENETRATING THROUGH FIRE RATED WALLS/PARTITION, FLOORS AND CEILINGS. COORDINATION WITH THE GENERAL CONTRACTOR SHALL BE MAINTAINED TO INSURE THAT FIRE STOPPING IS ACCOMPLISHED. USE APPROVED U.L. OR EQUIVALENT SEALANT. CONTRACTOR SHALL BE RESPONSIBLE FOR SEALING/PATCHING ANY PENETRATIONS IN FLOOR/SLAB/WALL AFTER DEMOLITION. REFER TO ARCHITECTURAL PLANS FOR WALL RATINGS.

B. MECHANICAL CONTRACTOR SHALL PROVIDE FIRE, SMOKE, OR COMBINATION DAMPERS, AS REQUIRED, TO MEET DESIGNATED RATINGS FOR ALL RATED BUILDING ASSEMBLIES, AND/OR AS SHOWN ON PLANS.

C. PROVIDE CEILING AND WALL-MOUNTED AIR DEVICES WITH RADIATION DAMPERS, AS REQUIRED TO MEET ASSEMBLY FIRE/SMOKE RATINGS, AND/OR AS SHOWN ON PLANS.

COORDINATION WITH OTHER TRADES

A. MECHANICAL CONTRACTOR SHALL VERIFY EXACT MOUNTING LOCATION AND CONNECTION REQUIREMENTS OF ALL PLUMBING/MECHANICAL/FOOD SERVICE EQUIPMENT WITH ALL OTHER INVOLVED TRADES PRIOR TO ROUGH-IN.

B. CONTRACTOR SHALL COORDINATE LOCATION OF GRILLES/REGISTERS/DIFFUSERS, DUCTWORK, PIPING, ETC. WITH ALL OTHER TRADES TO AVOID CONFLICT WITH CONDUIT, LIGHTING, DUCTWORK, CABLE TRAYS, PIPING AND SPRINKLER PIPING, ETC.

C. ALL EXTERIOR ELECTRICAL DEVICES AND EQUIPMENT SHALL BE WEATHERPROOF TYPE NEMA 3R. COORDINATE INSTALLATION WITH ELECTRICAL CONTRACTOR.

D. REFER TO ARCHITECTURAL WALL ELEVATIONS (WHERE GIVEN) FOR HEIGHTS AND MOUNTING RELATIONSHIP OF AIR DEVICES, ACCESS PANELS, THERMOSTATS AND OTHER SENSORS, ETC. WHERE MOUNTING HEIGHTS ARE NOT INDICATED OR ARE IN CONFLICT WITH ANY OTHER BUILDING SYSTEMS, CONTACT THE ARCHITECT AND ENGINEER PRIOR TO INSTALLATION. IF APPLICABLE, REFER TO ARCHITECTURAL WALL ELEVATIONS, CEILING HEIGHTS, REFLECTED CEILING PLAN, AND OTHER DETAILS IN THESE DOCUMENTS (AS APPLICABLE).

E. WHERE PENETRATING NEW OR EXISTING ROOFING MEMBRANE OR OTHER MATERIALS USED FOR WEATHERPROOFING THE BUILDING, MAKE SUCH PENETRATION IN A WAY THAT WILL NOT VOID OR DIMINISH THE ROOFING WARRANTY OR INTEGRITY IN ANYWAY. ROOFING CONTRACTOR SHALL MAKE ALL ROOF PENETRATIONS.

F. CONTRACTOR SHALL COORDINATE WITH ELECTRICAL/FIRE ALARM CONTRACTOR FOR PROVISION OF POWER WIRING, DISCONNECTS, SMOKE DETECTORS, INTERRUPTERS, CONTACTS, ETC.

MECHANICAL WORK

A. ALL VALVES, DAMPERS, SENSORS, OPERATORS, DEVICES, CLEAN OUTS, ETC.SHALL BE ACCESSIBLE. PROVIDE ACCESS PANEL(S) AS REQUIRED WITH PRIOR APPROVAL OF ARCHITECT.

B. CONTROLS AND OTHER LOW VOLTAGE WIRING SHALL BE PLENUM RATED IF CONDUCTORS PASS THROUGH AN AIR PLENUM.

C. ALL STRUCTURAL SUPPORTS FOR MECHANICAL EQUIPMENT SHALL BE PROVIDED AND INSTALLED BY MECHANICAL CONTRACTOR. MECHANICAL CONTRACTOR SHALL INCLUDE DESIGN FOR ALL STRUCTURAL SUPPORT.

D. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY BALANCING ALL DUCT, PIPING, EQUIPMENT, TERMINAL DEVICES, AND ANY OTHER APPURTENANCES OF THE BUILDING'S MECHANICAL/PLUMBING SYSTEMS ACCORDING TO AABC/NEBB PROCEDURES AND PROVIDE TEST AND BALANCE REPORT TO ENGINEER. TEST AND BALANCE SERVICES AND REPORT BY CONTRACTOR-HIRED THIRD PARTY BALANCING CONTRACTOR.

E. MECHANICAL CONTRACTOR SHALL PROVIDE PIPING/DUCT SLEEVES FOR UTILITY ROUTING, AS NECESSARY, IN WALLS, FLOORS AND CEILINGS.

F. MECHANICAL CONTRACTOR SHALL PROVIDE FIRE, SMOKE, OR COMBINATION DAMPERS, AS REQUIRED, IN ALL RATED BUILDING ASSEMBLIES.

G. ALL PIPING/DUCT SYSTEMS SHALL BE INSTALLED WITH A MINIMUM OF FITTINGS, BENDS, POINTS OF CONSTRICTION, ETC. ALL PIPING SHALL BE INSTALLED AT RIGHT ANGLES, WITH LONG-SWEEP ELBOWS. PROVIDE PIPING WITH EXPANSION LOOPS AND APPROPRIATE HANGERS/SUPPORTS.

H. PROVIDE GAS-FIRED EQUIPMENT WITH DUST/DRIP LEG, SHUT-OFF VALVE(S), REGULATOR, EMERGENCY SHUT-OFF SWITCH, EARTH-QUAKE SWITCH AND ANY OTHER ACCESSORIES AS DICTATED BY THE CONSTRUCTION DOCUMENTS AND ANY APPLICABLE CODES OR SAFETY STANDARDS.

I. CEILING-MOUNTED AIR DISTRIBUTION DEVICES SHALL BE CENTERED IN 2' X 2' CEILING TILE AND INSTALLED CENTERED ON 2' DIMENSION OF 2' X 4' TILE AND ON CENTERLINE OR A QUARTER POINT ON 4' DIMENSION, AS INDICATED.

J. INSTALL NO PIPING, CONDUIT, DUCTWORK, ETC., IN A LOCATION OR IN A MANNER WHICH WILL ALLOW FREEZING AND THE COLLECTION OF CONDENSATION THEREON.

K. UNLESS OTHERWISE DIRECTED BY THE OWNER, ALL NEW EQUIPMENT, SENSORS, CONTROLLERS, ETC. SHALL BE FULLY INTEGRATED AND INTEROPERABLE WITH EXISTING CONTROLS SYSTEM.

L. UNLESS OTHERWISE NOTED, ALL AIR DEVICES NOT SHOWN AS A FULL CEILING GRID (I.E. 24" X 24") SHALL BE A MINIMUM OF 12" X 12".

M. UNLESS OTHERWISE NOTED, ALL AIR DEVICES SHALL HAVE FACTORY-STANDARD WHITE ENAMEL FINISH. OWNER/ARCHITECT TO CONFIRM COLOR.

N. ALL ELBOWS IN DUCTWORK SHALL BE LONG RADIUS. RECTANGULAR ELBOWS SHALL BE PROVIDED WITH TURNING VANES.

O. MANUAL BALANCING DAMPERS SHALL BE PROVIDED FOR ALL SUPPLY, EXHAUST AND RETURN AIR BRANCH DUCTWORK. DAMPERS SHALL BE LOCATED AS FAR AWAY FROM AIR TERMINAL DEVICE AS IS PRACTICAL, BUT MUST BE LOCATED WITHIN THE SAME ROOM (UNLESS DIRECTED OTHERWISE).

P. ALL DUCT AND PIPING RUNS ARE REPRESENTATIVE ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY CONDITIONS IN THE FIELD (EXISTING, OR PREDICATED BY NEW CONSTRUCTION) THAT MAKE NECESSARY ALTERNATE ROUTING OF DUCT/PIPING.

Q. ALL PIPING EXPOSED TO THE OUTDOORS SHALL BE PROVIDED WITH HEAT TAPE - MINIMUM OF EIGHT (8) WATTS PER LINEAR FOOT. COORDINATE POWER WITH ELECTRICAL CONTRACTOR.

MECHANICAL BASIS OF DESIGN

A. THE HVAC DESIGN AND SUBSEQUENT CONSTRUCTION, INCLUDING BUT NOT LIMITED TO: OUTSIDE AIR REQUIREMENTS, EQUIPMENT EFFICIENCIES, DUCT INSULATION/SEALING, PIPE INSULATION, ETC. IS BASED UPON COMPLIANCE WITH THE LATEST EDITIONS OF MECHANICAL CODE, NFPA, ASHRAE 90.1, ASHRAE 62.1, AND THE IECC.

B. HEATING, COOLING AND VENTILATION CALCULATIONS ARE BASED UPON THE FOLLOWING:

B.1. CLIMATE ZONE 4; COOLING DESIGN TEMPERATURE = 95/78 DEG. F ; HEATING DESIGN TEMPERATURE = 5 DEG. F

B.2. BUILDING ENVELOPE INFORMATION PER PRE-FABRICATED BUILDING MANUFACTURER.

C. CONTRACTOR SHALL PROVIDE AND INSTALL A FULLY WORKING HVAC SYSTEM INCLUDING: BUILDING AUTOMATION SYSTEM (BAS) & CONTROLS, PACKAGED HVAC EQUIPMENT, EXHAUST FANS, ROOF CURB(S), DUCTWORK, HANGERS, SUPPORTS, CONCRETE PADS, INSULATION, AND ALL REQUIRED ACCESSORIES/APPURTENANCES. HVAC EQUIPMENT INCLUDES, BUT IS NOT LIMITED TO:

C.1. STORAGE AREA:

C.1.1. NEW GAS-FIRED UNIT HEATERS SHALL BE PROVIDED FOR THE STORAGE AREA - NO AIR CONDITIONING WILL BE PROVIDED.

C.2. ADMIN/BREAK ROOM:

C.2.1. NEW SPLIT-SYSTEM AIR HANDLING UNITS WITH GAS HEAT SHALL BE PROVIDED, INCLUDING: PIPING, DUCTWORK, CONTROLS, AIR DEVICES, ETC. CERTAIN AIR HANDLING UNITS SHALL BE PROVIDED WITH ECONOMIZER SECTION/DAMPER(S) - SEE NEW WORK SHEETS FOR MORE INFORMATION. NEW OUTSIDE AIR AND RELIEF HOODS, ZONE DAMPERS, CONTROLS/SENSORS, ETC. SHALL BE PROVIDED.

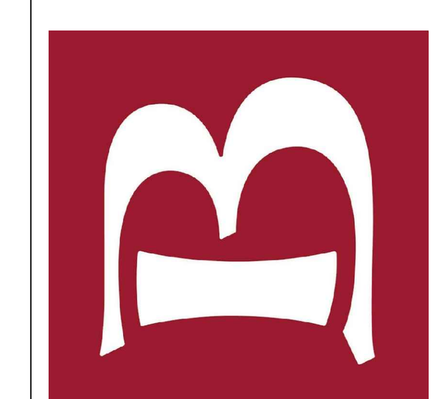
C.2.2. SWITCH-OPERATED EXHAUST FANS SHALL BE PROVIDED FOR RESTROOMS.

D. ALL DUCT AND PIPING PENETRATIONS THROUGH RATED WALL/CEILING ASSEMBLIES SHALL BE FIRE-STOPPED AND PROTECTED PER CODE, CONSTRUCTION DETAILS, AND SPECIFICATIONS. THIS INCLUDES BUT IS NOT LIMITED TO: FIRE-STOPPING, SEALING OF SMOKE WALLS, RADIATION DAMPERS, FIRE/SMOKE/FIRE-SMOKE DAMPERS, ETC. FLOOR PLANS ARE SUBJECT TO CHANGE, AND CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL REQUIRED DAMPERS, WHETHER OR NOT THEY HAVE BEEN SHOWN ON THE DRAWINGS. SEE LATEST ARCHITECTURAL/LIFE SAFETY PLANS FOR MORE INFORMATION. COORDINATE ALL DAMPERS WITH ELECTRICAL/FIRE ALARM CONTRACTOR.

E. PROVIDE DUCT-MOUNTED SMOKE DETECTORS AS REQUIRED BY CODE AND/OR AHJ. TYPICAL MINIMUM THRESHOLDS FOR SMOKE DETECTORS ARE: 2,000 CFM RETURN AIR; 12,000 CFM SUPPLY AIR.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004
CABLE BUILDING



STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED
PROFESSIONAL ENGINEER

JOB NO.	2021-32
DB:	
CB:	
DATE:	02/03/2022

SHEET NO: **M001**

MECHANICAL GENERAL INFORMATION

FOR CONSTRUCTION

DUCT INSULATION SCHEDULE

SERVICE	LOCATION	MATERIAL	MINIMUM R-VALUE	MINIMUM THICKNESS	MINIMUM DENSITY
SUPPLY	INDOOR	FLEXIBLE MINERAL FIBER	R-6	1-1/2"	2 PCF
SUPPLY	OUTDOOR	MINERAL FIBER BOARD	R-6	1-1/2"	3 PCF
RETURN	OUTDOOR	FLEXIBLE MINERAL FIBER	R-6	1-1/2"	2 PCF
RETURN	OUTDOOR	MINERAL FIBER BOARD	R-6	1-1/2"	3 PCF

NOTES:
1. STATE CODES AND/OR ADOPTION DATES, LOCAL ORDINANCES AND/OR CODE AUTHORITIES MAY REQUIRE INCREASED INSULATION VALUES OR CERTAIN JACKETING. ALL SYSTEMS SHALL BE PROVIDED WITH INSULATION MEETING THE STRICTEST APPLICABLE CODE OR DIRECTIVE FROM AHJ.
2. PROVIDE MINERAL FIBER INSULATION WITH FSK JACKETING. OUTDOOR INSULATION SHALL BE PROVIDED WITH METAL JACKETING AND VAPOR BARRIER.
3. ALL JOINTS/SEAMS SHALL BE SEALED WITH APPROVED MATERIALS AND METHODS.
4. DUCTS IN MECHANICAL ROOMS SHALL BE PROVIDED WITH 1-1/2" RIGID FIBERGLASS INSULATION AND ASJ.
5. ALL FLEXIBLE DUCTS SHALL COMPLY WITH UL 181. MINIMUM 1-1/2" THICK INSULATION.
6. ALL INSULATION SHALL HAVE A MAXIMUM FLAME SPREAD/SMOKE DEVELOPED RATING OF 25/50.
7. DUCT SUPPORT HANGERS SHALL PASS AROUND THE OUTSIDE OF THE INSULATION USING SHIELDS OR SADDLES, SUCH THAT THAT INSULATION IS NOT COMPRESSED OR THE JACKETING DAMAGED.

ROOF HOOD SCHEDULE

MARK	DUTY	TYPE	DIMENSIONS		MINIMUM THROAT AREA	AIRFLOW, CFM	MAXIMUM APD, INCH W.G.	BASIS OF DESIGN MANUFACTURER	MODEL	REMARKS
			HOOD	THROAT						
OAH-1	INTAKE	LOUVERED	18x30		3.75 SF	1,800	0.039"	GREENHECK	FGI	ALL
RH-1	RELIEF	LOUVERED	18x30		3.75 SF	1,800	0.04"	GREENHECK	FGR	ALL

REMARKS:
1. ALUMINUM CONSTRUCTION WITH FACTORY ANODIZED OR HIGH-DURABILITY EPOXY/POWDER-COAT FINISH. ARCHITECT TO SELECT COLOR AND FINISH TYPE.
2. PROVIDE WITH FACTORY ALUMINUM BIRD/INSECT SCREEN.
3. PROVIDE WITH 14" HIGH FACTORY ROOF CURB. MATCH SLOPE OF ROOF FOR LEVEL INSTALLATION OF HOODS. PROVIDE TALLER CURB AS REQUIRED TO MEET ANY INTAKE/EXHAUST HOOD DISTANCE REQUIREMENTS PER CODE AND/OR AHJ.
4. PROVIDE WITH FACTORY BACKDRAFT DAMPER. DUCT-MOUNTED DAMPERS MAY BE PROVIDED IN LIEU.
5. SMALLER/ALTERNATE LOUVER SIZES WILL BE CONSIDERED FOR REVIEW IF THEY MEET THE SCHEDULED PERFORMANCE.

FAN SCHEDULE

MARK	TYPE	AIRFLOW, CFM	ESP, IN W.G.	MOTOR HP	MOTOR RPM	DRIVE TYPE	SONES	BASIS OF DESIGN MANUFACTURER	MODEL NO.	ELECTRICAL	REMARKS
EF-1	CEILING MOUNTED	50-80	0.1-0.25"	7.5 W	1,725	DIRECT	0.3	DELTABREEZ	GBR80LED	120 / 1 PH	1-3,5-6

REMARKS:
1. ALL FANS SHALL HAVE AMCA-CERTIFIED RATINGS. FANS SHALL BE ENERGY STAR-RATED AND UL-LISTED.
2. THERMAL OVERLOAD PROTECTION; UNIT-MOUNTED SERVICE/DISCONNECT SWITCH; LOW-VOLTAGE TRANSFORMERS AS REQUIRED. FANS WITH OPEN DISCHARGE DUCT AND/OR GRILLE SHALL BE PROVIDED WITH FACTORY OUTLET GUARDS - THIS INCLUDES FANS FOR WHICH DUCTWORK WAS ORIGINALLY SPECIFIED, BUT WHICH IS LATER OMITTED.
3. BAROMETRIC DAMPER.
4. FACTORY-PROVIDED ROOF CURB. UTILITY SET FANS SHALL ALSO BE PROVIDED WITH STEEL BASE RAILS - CURB MAY BE OMITTED WITH OWNER/ARCHITECT APPROVAL.
5. PROVIDE WITH FACTORY RADIATION DAMPER.
6. UNIT SHALL BE PROVIDED WITH INTEGRATED LIGHT, WALL-SWITCH WITH INTEGRAL TIMER.
7. FACTORY-INSTALLED VARIABLE SPEED MOTOR CONTROLLER.
8. FAN SHALL RUN CONTINUOUSLY.

GAS-FIRED UNIT HEATER SCHEDULE

MARK	TYPE	INPUT, BTUH	OUTPUT, BTUH	TEMPERATURE RISE, DEG. F	AIRFLOW, CFM	GAS PRESSURE, IN W.G.	BASIS OF DESIGN MANUFACTURER	MODEL NO.	ELECTRICAL	REMARKS
UH-1	FAN-POWERED CEILING SUSPENDED	100,000	83,000	47	1,181	MIN: 5" W.C. MAX: 14" W.C.	TRANE	GVNE	120 / 1 PH	ALL
UH-2	FAN-POWERED CEILING SUSPENDED	100,000	83,000	47	1,181	MIN: 5" W.C. MAX: 14" W.C.	TRANE	GVNE	120 / 1 PH	ALL
UH-3	FAN-POWERED CEILING SUSPENDED	100,000	83,000	47	1,181	MIN: 5" W.C. MAX: 14" W.C.	TRANE	GVNE	120 / 1 PH	ALL
UH-4	FAN-POWERED CEILING SUSPENDED	100,000	83,000	47	1,181	MIN: 5" W.C. MAX: 14" W.C.	TRANE	GVNE	120 / 1 PH	ALL

REMARKS:
1. IF NOT FACTORY-PROVIDED, CONTRACTOR SHALL PROVIDE CONTROL TRANSFORMER(S) AS REQUIRED; CIRCUIT FUSING PER U.L. AND NEC.
2. UNIT-MOUNTED DISCONNECT SWITCH.
3. PROVIDE GAS-PRESSURE REGULATORS AS REQUIRED TO MEET MANUFACTURER'S REQUIREMENTS.
4. FACTORY EXHAUST AND INTAKE CONNECTIONS. UNITS SHALL BE CAPABLE OF EITHER HORIZONTAL OR VERTICAL VENTING.
5. PILOT-LESS, DIRECT-SPARK IGNITION. UNIT SHALL BE CAPABLE OF STANDARD PERFORMANCE UP TO A MINIMUM ALTITUDE OF 2,000 FT ASL. PROVIDE HIGH-ALTITUDE ADAPTER KIT AS REQUIRED.
6. FACTORY-PROVIDED COMPRESSION COUPLING CONNECTORS, THERMOSTAT TERMINAL BOARD, WIRE HANGERS. CONTRACTOR SHALL PROVIDE ADDITIONAL HANGERS/SUPPORTS/ETC. AS REQUIRED TO SUIT BUILDING CONDITIONS AND MOUNTING ARRANGEMENT.
7. HIGH-TEMPERATURE EPOXY OR POWDER-COAT CABINET.
8. UNIT SHALL BE PROVIDED WITH ELECTRONIC, MODULATING GAS VALVE (MINIMUM TURN-DOWN = 40%).
9. UNIT SHALL BE PROVIDED WITH SUMMER-WINTER SWITCH.
10. UNIT SHALL BE PROVIDED WITH 90-DEGREE "Y" SPLITTER.

SPLIT A/C W/ GAS FURNACE SCHEDULE (INDOOR UNIT)

MARK	TYPE	SUPPLY AIRFLOW, CFM	OUTSIDE AIRFLOW, CFM	ESP, IN W.G.	MOTOR HP	SENS. COOLING, BTUH	TOTAL COOLING, BTUH	HEATING INPUT, BTUH	HEATING OUTPUT, BTUH	MINIMUM EFFICIENCY	AIR TEMPERATURE RISE, DEG. F	BASIS OF DESIGN MANUFACTURER	MODEL NO.	MCA	MOCP	ELECTRICAL	REMARKS
AHU-1	VERTICAL	600	50	0.7"	1/2	-	24,000	1ST: 39,000 2ND: 60,000	1ST: 31,200 2ND: 48,000	80%	30-60	TRANE	TUD2B060	10.5	15	120 / 1 PH	ALL
AHU-2	VERTICAL	1,800	250	0.7"	1.0	-	60,000	1ST: 65,000 2ND: 100,000	1ST: 52,000 2ND: 80,000	80%	30-60	TRANE	TUD2C100	16.4	20	120 / 1 PH	ALL

REMARKS:
1. ALL UNIT COMPONENTS, INCLUDING MOTORS SHALL MEET LATEST APPLICABLE ENERGY EFFICIENCY REQUIREMENTS. ALL EQUIPMENT SHALL BE UL-LISTED.
2. PROVIDE MANUFACTURER'S REQUIRED LINE SIZES BASED UPON DISTANCE BETWEEN OUTDOOR UNIT AND INDOOR UNIT. SEE MFGR'S PUBLISHED LITERATURE FOR MORE INFORMATION AND INSTALLATION/SIZING REQUIREMENTS.
3. THERMAL OVERLOAD PROTECTION; UNIT-MOUNTED SERVICE/DISCONNECT SWITCH; ANTI SHORT-CYCLE PROTECTION; LOW-VOLTAGE TRANSFORMERS AS REQUIRED.
4. EACH UNIT SHALL BE PROVIDED WITH A WALL-MOUNTED THERMOSTAT. SEE PLANS FOR MORE INFORMATION - COORDINATE FINAL LOCATION WITH OWNER/ARCHITECT.
5. UNLESS OTHER APPROVED, UNITS SHALL HAVE ALL SERVICE ACCESS ON ONE SIDE. CONTRACTOR SHALL COORDINATE LOCATION OF UNITS WITH RESPECT TO OTHER UTILITIES AND BUILDING ELEMENTS TO ENSURE ADEQUATE SERVICE CLEARANCES ARE PROVIDED.
6. LOW-AMBIENT OPERATION. IN EXTREME ENVIRONMENTS (E.G. THOSE WITH ALTITUDES AND/OR DESIGN TEMPERATURES OUTSIDE OF MANUFACTURER'S STANDARD CONSTRUCTION), FACTORY ACCESSORIES SHALL BE PROVIDED TO ENSURE UNIT MEETS SCHEDULED PERFORMANCE
7. UNITS SHALL BE FACTORY-EQUIPPED TO BE READILY INTEGRATED WITH A BUILDING AUTOMATION SYSTEM AND SHALL COMMUNICATE USING INDUSTRY-STANDARD CONTROLS LANGUAGE.
8. ELECTRIC HEATING COILS SHALL BE U.L. LISTED FOR ZERO-CLEARANCE - OPEN COIL TYPE. HEATING ELEMENT SHALL BE HIGH GRADE NICKEL-CHROME.
9. PROVIDE WITH TWO (2) SETS OF FILTERS.
10. UNIT SHALL BE PROVIDE WITH MULTI-SPEED PSC (MIN. 5) OR ECM MOTOR.
11. INSULATED CABINET - NO INSULATION SHALL BE EXPOSED TO AIRSTREAM.
12. UNITS WITH GREATER THAN 2,000 CFM OF RETURN AIR SHALL BE PROVIDED WITH DUCT-MOUNTED SMOKE DETECTORS. COORDINATE INSTALLATION WITH ELECTRICAL/FIRE ALARM CONTRACTOR.
13. CORROSION RESISTANT DRAIN PAN WITH WATER-SENSING OVER-FLOW ALARM - SENSOR SHALL BE HIGHER THAN THE PRIMARY DRAIN LINE AND BELOW THE OVERFLOW RIM; UNIT TO SHUT-DOWN WITH MANUAL RESTART UPON ALARM SIGNAL. ROUTE CONDENSATE TO NEAREST FLOOR DRAIN - PROVIDE CONDENSATE PUMP AS REQUIRED; COORDINATE WITH ELECTRICAL AND PLUMBING CONTRACTORS FOR CONNECTIONS.
14. COOLING COILS SHALL BE COPPER TUBE WITH ALUMINUM FINS. PROVIDE FACTORY FURNISHED PIPING AND VALVE KIT - ALL VALVES AND ACCESSORIES FOR REFRIGERANT PIPING CONNECTIONS SHALL BE INCLUDED.
15. BURNERS/TUBES WITH MINIMUM 10-YEAR WARRANTY.
16. 100% GAS SHUT-OFF SAFETY CONTROLS.
17. PROVIDE WITH VIBRATION ISOLATION BASE/HANGERS.

AIR-COOLED CONDENSING UNIT (DX)

MARK	TYPE	TOTAL CAPACITY, BTUH	BASIS OF DESIGN MANUFACTURER	MODEL NO.	SEER	MCA	MOCP	ELECTRICAL	REMARKS
CU-1	COOLING ONLY	24,000	TRANE	4TTR30	16.0	17	25	208-230/1 PH	1-10
CU-2	COOLING ONLY	60,000	TRANE	4TTR60	16.0	27	45	208-230/1 PH	1-10

REMARKS:
1. ALL UNIT COMPONENTS, INCLUDING MOTORS SHALL MEET LATEST APPLICABLE ENERGY EFFICIENCY REQUIREMENTS. ALL EQUIPMENT SHALL BE UL-LISTED.
2. THERMAL OVERLOAD PROTECTION; UNIT-MOUNTED SERVICE/DISCONNECT SWITCH; LOW-VOLTAGE TRANSFORMERS AS REQUIRED.
3. UNLESS OTHER APPROVED, UNITS SHALL HAVE ALL SERVICE ACCESS ON ONE SIDE. CONTRACTOR SHALL COORDINATE LOCATION OF UNITS WITH RESPECT TO OTHER UTILITIES AND BUILDING ELEMENTS TO ENSURE ADEQUATE SERVICE CLEARANCES ARE PROVIDED.
4. LOW-AMBIENT OPERATION. IN EXTREME ENVIRONMENTS (E.G. THOSE WITH ALTITUDES AND/OR DESIGN TEMPERATURES OUTSIDE OF MANUFACTURER'S STANDARD CONSTRUCTION), FACTORY ACCESSORIES SHALL BE PROVIDED TO ENSURE UNIT MEETS SCHEDULED PERFORMANCE - INCLUDING WIND BAFFLES AND BASIN HEATER. BASIN HEATER MAY BE OMITTED WITH APPROVAL OF OWNER/ENGINEER.
5. UNITS SHALL BE FACTORY-EQUIPPED TO BE READILY INTEGRATED WITH A BUILDING AUTOMATION SYSTEM AND SHALL COMMUNICATE USING INDUSTRY-STANDARD CONTROLS LANGUAGE.
6. PROVIDE WITH THE FOLLOWING FACTORY FEATURES: ANTI SHORT-CYCLE PROTECTION / TIME DELAY CONTROLS; START KIT; CRANK-CASE HEATER; HIGH AND LOW PRESSURE SWITCH; BI-DIRECTIONAL FILTER DRYER; RUBBER CONDENSER ISOLATORS; HARD START KIT.
7. UNITS 3-TONS AND LARGER SHALL BE PROVIDED WITH EVAPORATOR DEFROST CONTROL.
8. PROVIDE UNIT WITH FACTORY SOUND PACKAGE INCLUDING COMPRESSOR BLANKET AND FAN/BLOWER ISOLATORS.
9. PROVIDE UNIT WITH COIL HAIL GUARD.
10. UNIT SHALL BE PROVIDED WITH 2-STAGE OR MODULATING COMPRESSORS.
11. IN AREAS WITH HIGH WIND LOADING UNIT SHALL BE PROVIDED WITH EXTREME CONDITION MOUNTING KIT.

HVAC AIR DEVICE SCHEDULE

SYMBOL	TYPE	FACE SIZE, IN. X IN.	DEVICE TAG	NECK SIZE, IN.	AIRFLOW RANGE, CFM	MAXIMUM APD, IN. W.G.	MAX. SOUND LEVEL, NC	BASIS OF DESIGN MANUFACTURER	BASIS OF DESIGN MODEL	REMARKS
	3/4", 45 DEG. DOUBLE DEFLECTION SUPPLY GRILLE	10"x6"	SG1	-	100-175	<0.067"	<15	PRICE	500/600/700	ALL
	3/4", 0 DEG. DEFLECTION RETURN GRILLE	20"x18"	R6	-	600-900	<0.022"	<15	PRICE	500/600/700	ALL
	SQUARE CONE FACE 4-WAY SUPPLY DIFFUSER	24" X 24"	S1	8" ø	0 - 240	<0.050"	<17	PRICE	SCD	ALL
			S2	10" ø	241 - 380	<0.06"	<17	PRICE	SCD	ALL
			S3	12" ø	381 - 550	<0.070"	<19	PRICE	SCD	ALL
			S4	14" ø	551 - 745	<0.079"	<21	PRICE	SCD	ALL
			S5	15" ø	746 - 850	<0.064"	<17	PRICE	SCD	ALL
	SQUARE CONE FACE 4-WAY SUPPLY DIFFUSER	12" X 12"	S6	4" ø	50	<0.038"	<15	PRICE	SCD	ALL
			S7	5" ø	80	<0.061""	<15	PRICE	SCD	ALL
			S8	6" ø	90	<0.059"	<15	PRICE	SCD	ALL
			S9	8" ø	140	<0.068"	<15	PRICE	SCD	ALL
	ARCHITECTURAL PERFORATED FACE RETURN AIR GRILLE ARCHITECTURAL PERFORATED FACE EXHAUST AIR GRILLE	24" X 24"	R1	22"X10"	0-600	<0.033"	<15	PRICE	PDR	ALL
			R2	22"X22"	601-1680	<0.051"	<17	PRICE	PDR	ALL
			E1	22"X10"	0-600	<0.033"	<15	PRICE	PDR	ALL
			E2	22"X22"	601-1680	<0.051"	<15	PRICE	PDR	ALL
	ARCHITECTURAL PERFORATED FACE RETURN/EXHAUST AIR GRILLE	36" X 24"	R3	34"X22"	1401-2600	<0.051"	<18	PRICE	PDR	ALL
			E3	34"X22"	1401-2600	<0.051"	<18	PRICE	PDR	ALL
	ARCHITECTURAL PERFORATED FACE RETURN/EXHAUST AIR GRILLE	48" X 24"	R4	46"X22"	2601-4000	<0.051"	<19	PRICE	PDR	ALL
			E4	46"X22"	2601-4000	<0.051"	<19	PRICE	PDR	ALL
	ARCHITECTURAL PERFORATED FACE RETURN/EXHAUST AIR GRILLE	12" X 12"	R5	10"X10"	0-340	<0.051"	<15	PRICE	PDR	ALL
			E5	10"X10"	0-340	<0.051"	<15	PRICE	PDR	ALL

REMARKS:
1. UNLESS OTHERWISE NOTED, ALL AIR DEVICES SHALL HAVE FACTORY-STANDARD WHITE FINISH. AIR DEVICES IN WET, CORROSIVE, OR OTHERWISE HARMFUL ENVIRONMENTS SHALL HAVE APPROPRIATE FACTORY-OPTION FINISH. OPTIONAL COLORS TO BE SELECTED AND APPROVED BY ARCHITECT.
2. AIR DEVICES FOR WET/HUMID ENVIRONMENTS SHALL BE FABRICATED FROM ALUMINUM OR ANOTHER CORROSION RESISTANT MATERIAL AS APPROVED BY ENGINEER.
3. AIR DEVICES SHALL BE SELECTED TO MEET REQUIRED TO MEET ASHRAE ROOM NOISE CRITERION (NC) LEVELS. IN GENERAL, AIR DEVICE SELECTIONS SHALL BE BASED UPON A MAXIMUM UNIT DISCHARGE OF NC 21.
4. ALL AIR DEVICES SHALL HAVE INSULATED BACK PAN.
5. CEILING DIFFUSERS ARE TO BE 4-WAY UNLESS OTHERWISE NOTED ON PLANS.
6. PROVIDE BLOW CLIPS TO DIRECT AIR FLOW AWAY FROM WALLS AND GLASS WHEN AIR DEVICES ARE INSTALLED WITHIN 4'-0" OF AN ADJACENT WALL/WINDOW.
7. ALL VISIBLE SURFACES OF THE RETURN/EXHAUST PLENUM AND DUCT CONNECTION SHALL BE PAINTED FLAT BLACK.
8. AIR DEVICE FRAME AND STYLE SHALL BE COORDINATED WITH CEILING AND/OR WALL TYPE. COORDINATE WITH ARCHITECTURAL FINISH AND REFLECTED CEILING PLANS.
9. PROVIDE SQUARE-TO-ROUND ADAPTERS AS REQUIRED TO MAKE FINAL DUCT CONNECTIONS.
10. CONTRACTOR SHALL PROVIDE AIR DEVICES WITH NECK SIZES APPROPRIATE FOR THE GIVEN AIRFLOWS ON THE FLOOR PLANS. IN CASE OF DISCREPANCY BETWEEN THE DEVICE TAG ON THE FLOOR PLAN AND THE REQUIRED AIRFLOW, NECK SIZE SHALL BE BASED UPON THE AIRFLOWS LISTED IN THE ABOVE SCHEDULE.
11. ROUND-DUCT SUPPLY AND RETURN DEVICES SHALL BE PROVIDED WITH NECK AND END GASKETS. AIR SCOOP, AND CURVED FRAME TO MATCH DUCT RADIUS.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

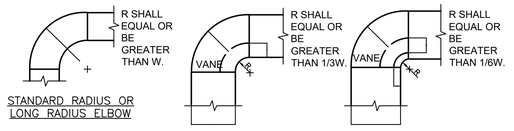
STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: **M002**

MECHANICAL SCHEDULES

FOR CONSTRUCTION

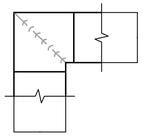


NOTE:

1. THE INTERIOR SURFACE OF ALL RADIUS ELBOWS SHALL BE MADE ROUND.
2. ALL STANDARD RADIUS ELBOWS CAN BE SUBSTITUTED WITH SHORT RADIUS ELBOWS. ALL SHORT RADIUS ELBOWS SHALL HAVE VANES. VANES SHALL BE CONSTRUCTED, SUPPORTED AND FASTENED AS RECOMMENDED BY SMACNA.

1 DUCTWORK RADIUS ELBOWS

NTS

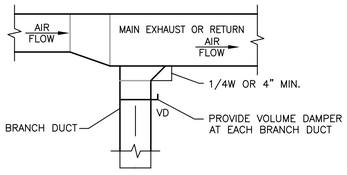


NOTE:

1. ALL VANE ELBOWS SHALL BE CONSTRUCTED AND INSTALLED AS DETAILED BY SMACNA.
2. WHEN W1 DOES NOT EQUAL W2, VANE SHALL BE SINGLE THICKNESS VANE TYPE REGARDLESS OF W DIMENSION.
3. ALL SINGLE THICKNESS VANES SHALL HAVE A 2" RADIUS, 1 1/2" MAXIMUM SPACE BETWEEN VANES AND A 3/4" TRAILING EDGE.
4. WHEN W EQUALS W2 AND W1 IS GREATER THAN 20" VANES SHALL BE DOUBLE VANE TYPE.

2 DUCTWORK SQUARE VANE ELBOWS

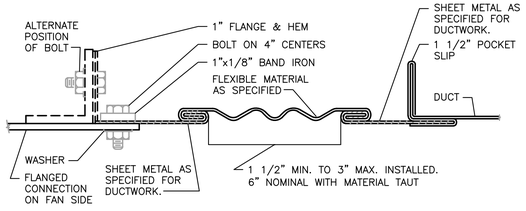
NTS



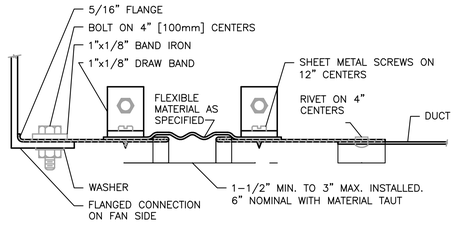
PLAN VIEW

3 EXHAUST OR RETURN BRANCH DUCTWORK

NTS



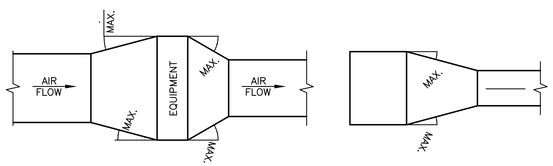
RECTANGULAR FLEXIBLE CONNECTION



ROUND FLEXIBLE CONNECTION

4 FLEXIBLE DUCT CONNECTIONS

NTS



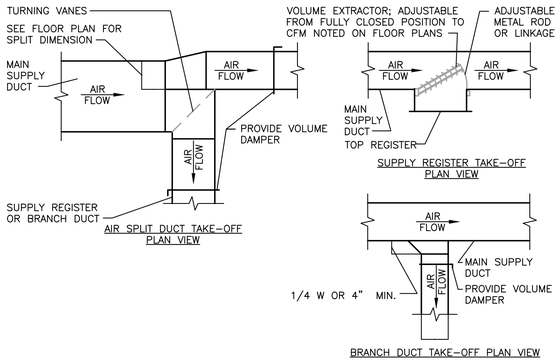
TYPICAL DUCTWORK TRANSITION WITH EQUIPMENT MOUNTED IN DUCT PLAN OR SIDE VIEW

TYPICAL DUCTWORK TRANSITION PLAN OR SIDE VIEW

NOTE:
UNLESS OTHERWISE INDICATED ON PLANS, MAXIMUM ANGLES SHOWN SHALL APPLY.

5 DUCTWORK TRANSITIONS (WITH EQUIPMENT MOUNTED IN DUCT)

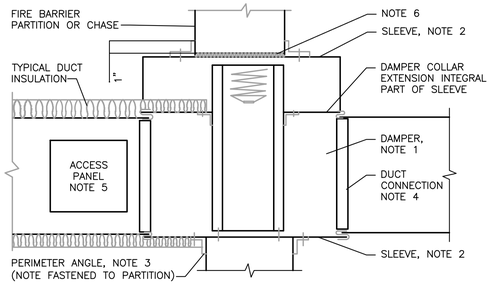
NTS



6 SUPPLY DUCTWORK TAKE-OFFS

NTS

NOTES:
1. THE SUPPLY REGISTER TAKE-OFF MAY BE USED FOR UP UP TO 25% OF THE MAIN DUCT CFM. THE BRANCH DUCT TAKE-OFF MAY BE USED FOR UP TO 15% OF THE MAIN DUCT CFM ANYTIME AND UP TO 40% WHEN THE MAIN DUCT VELOCITY IS 1000 FPM [5.1 M/S] OR LESS. THE AIR SPLIT DUCT TAKE-OFF SHALL BE USED IN ALL OTHER CASES AND MAY BE USED AT ANYTIME.

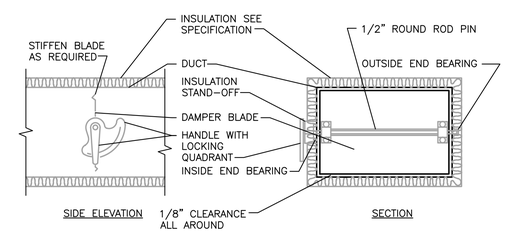


NOTE:

1. A VERTICAL DAMPER IS SHOWN. HORIZONTAL DAMPER INSTALLATION, IS SIMILAR. FOLLOW DAMPER MANUFACTURER'S INSTRUCTIONS, INCLUDING FASTENER OPTIONS AND GAGES FOR SLEEVE AND PERIMETER ANGLES. FIRE DAMPERS MUST BE INSTALLED IN THE PARTITION OR FLOOR AND NOT OUTSIDE THE PENETRATION.
2. GALVANIZED SLEEVE: GAGE NOT LESS THAN CONNECTING DUCT. FASTEN SLEEVE TO DAMPER FRAME AND TO PERIMETER ANGLES.
3. PERIMETER ANGELS: GALVANIZED STEEL, NOT LESS THAN 1 1/2"x1 1/2", 14 GAGE, TO PROVIDE 1" MINIMUM OVERLAP OF OPENING ON ALL 4 SIDES.
4. BREAKAWAY DUCT CONNECTION: CONTRACTOR'S OPTION OF TYPES SHOWN IN SMACNA. ACCESS PANELS: SIZE AND LOCATION TO PERMIT SERVICING THE FUSIBLE LINK OR LINKS.
5. PROVIDE 1/4" TO 1/2" CLEARANCE ON HEIGHT AND WIDTH. FILL OPEN SPACE WITH ROCK WOOL FIRESTOP FIBER.
6. ALL DUCT WORK RISERS WHICH ARE RUN EXPOSED, SUCH AS THRU ATTIC FLOORS AND MECHANICAL ROOM FLOORS, SHALL BE PROVIDED WITH 3" HIGH CONCRETE CURB AROUND OPENING FOR DUCT.

7 SECTION THRU FIRE DAMPER INSTALLATION

NTS

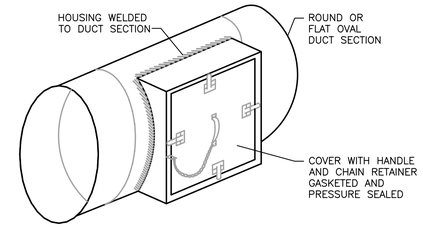


NOTE:

1. DELETE INSULATION STAND-OFF ON DUCTWORK WITHOUT EXTERIOR INSULATION.
2. DETAIL SHOWS SINGLE BLADE DAMPER. DAMPER INSTALLATION SHALL BE SIMILAR FOR MULTI-BLADE DAMPERS & ROUND DAMPERS.

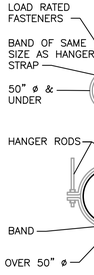
8 VOLUME DAMPER DETAIL

NTS



9 ACCESS SECTION FOR ROUND/OVAL DUCT

NTS

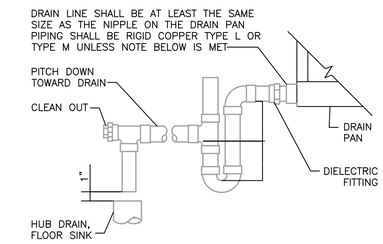


HANGER STRAPS OR RODS			
MAX. DUCT ø IN.	QUANTITY/SIZE, IN.	MAX. LOAD LBS.	MAX. SPACING IN.
26	ONE 1 x 22 GA STRAP	260	144
36	ONE 1 x 18 GA STRAP	420	144
50	ONE 1 x 16 GA STRAP	700	144
60	TWO 3/8 ø. RODS	1320	144
84	TWO 1/2 ø RODS	2500	144

NOTE:
TABULATED DATA FROM SMACNA ALLOWS FOR DUCT REINFORCING AND INSULATION, BUT NO EXTERNAL LOAD.

10 ROUND DUCT HANGERS

NTS



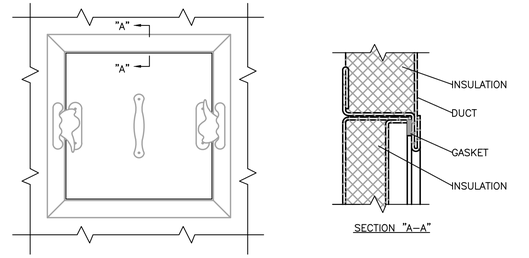
NOTE: 1. CPVC PIPE MAY NOT BE USED.
2. DIELECTRIC FITTING TO BE USED WHEN TWO DISSIMILAR METALS ARE TO BE CONNECTED.

UNIT TYPE	A	B
DRAW THRU	2" PLUS X	X
BLOW THRU	1" MINIMUM	2X

WHERE X = STATIC PRESSURE IN PAN

11 AIR HANDLING UNIT DRAIN TRAP DETAIL

NTS

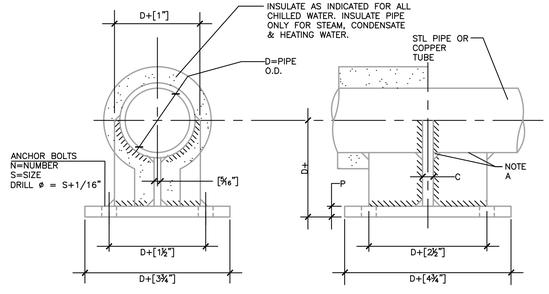


NOTES:
1. LATCHES SHALL BE OF THE WEDGE TYPE TO CLOSE DOORS TIGHTLY.
2. HINGES ON THE ACCESS DOORS SHALL HAVE NON-CORROSIVE PINS.
3. SEE SMACNA 2005, FIGURE 9-15

12 ACCESS PANEL AND DOOR DETAIL

NTS

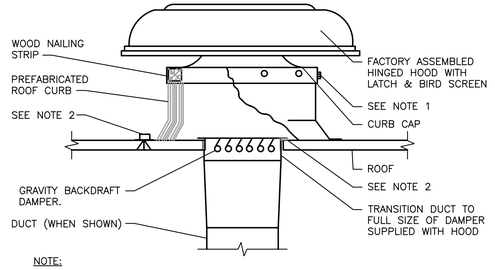
PIPE ANCHOR SCHEDULE											
D		P		C		N		S		BOLT PATTERN
mm	in	mm	in	mm	in	mm	in	mm	in	
102	4	16	5/8	19	3/4	102	4	19	3/4	
76	3	13	1/2	13	1/2	102	4	16	5/8	
64	2 1/2	10	3/8	10	3/8	102	4	16	5/8	
51	2	10	3/8	10	3/8	102	4	16	5/8	
38	1 1/2	10	3/8	6	1/4	102	4	13	1/2"	



NOTE:
WHERE USED FOR COPPER TUBE OR PIPE, BRAZE TO FABRICATED STEEL ANCHOR

13 SMALL PIPE ANCHOR 1½"-4"

NTS



NOTE:

1. SECURE HOOD TO WOOD NAILING STRIP WITH 3/8" [10mm] CADMIUM PLATED LAG BOLTS NOT OVER 12" [300mm] ON CENTER.
2. SECURE ROOF CURB, DUCTWORK AND DAMPER TO ROOF WITH EXPANSION BOLTS (CONCRETE ROOF) OR RUST RESISTANT BOLTS (MENTAL DECK & BAR JOIST ROOF).

14 LOW-SILHOUETTE EXHAUST OR INTAKE HOOD

NTS

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

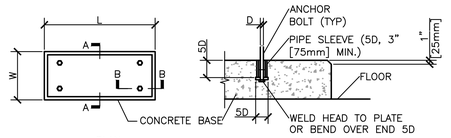
STATE OF KENTUCKY
JEFFREY E MCBRIDE
28473
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: **M003**

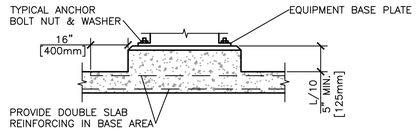
MECHANICAL DETAILS

FOR CONSTRUCTION

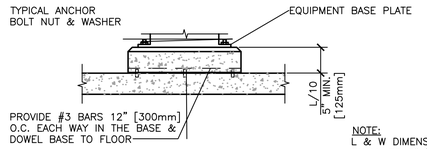


PLAN

SECTION B–B



SECTION A–A (BASE POURED WITH FLOOR SLAB)

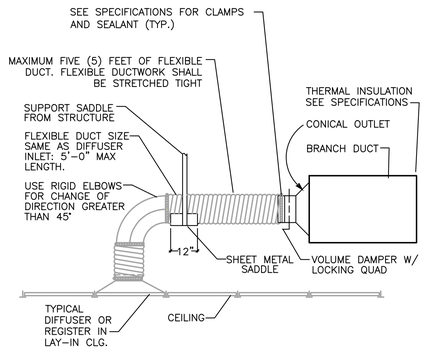


SECTION A–A (BASE NOT POURED WITH SLAB)

NOTE:
L & W DIMENSIONS
SHALL BE 6" [150mm]
GREATER THAN THE
EQUIPMENT BASE PLATE.

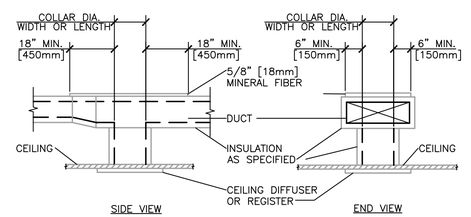
1 CONCRETE EQUIPMENT BASES

NTS

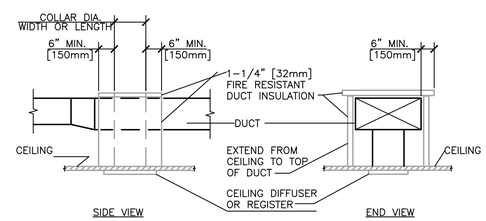


2 FLEXIBLE AIR DUCT CONNECTOR

NTS



INSULATED DUCT TYPE



NON–INSULATED DUCT TYPE

3 FIRE PROTECTION FOR CEILING OUTLETS

NTS

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

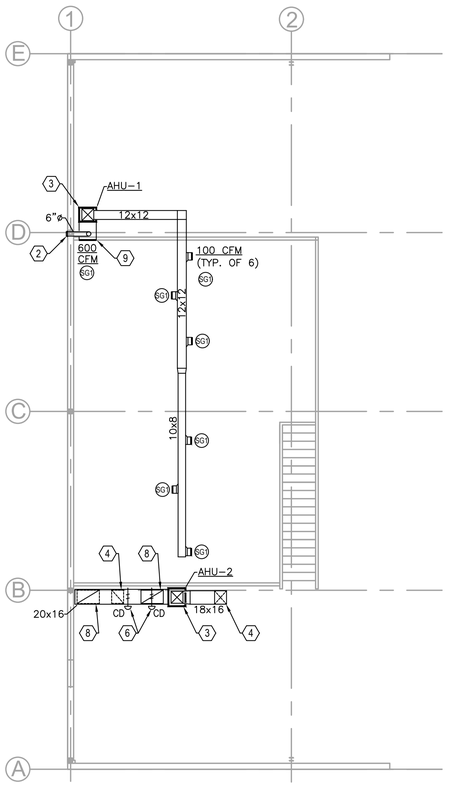
STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

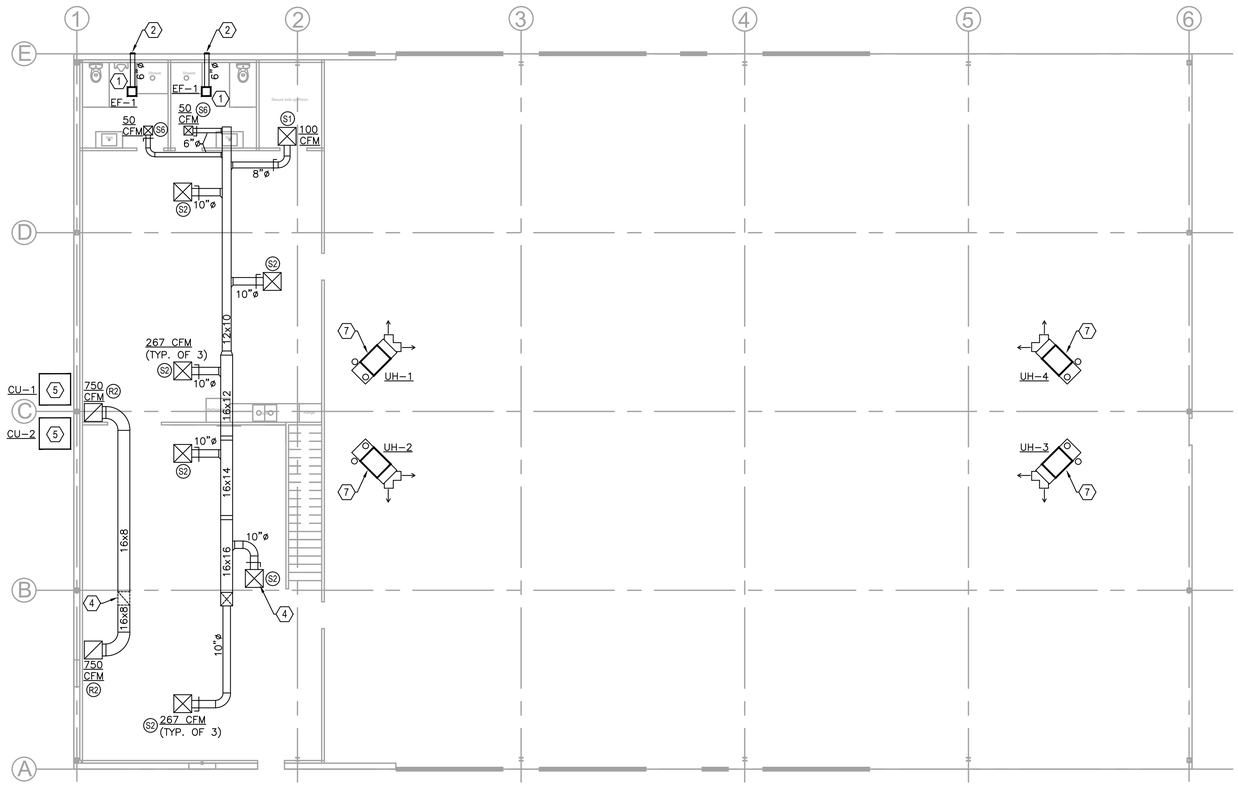
JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: **M004**

MECHANICAL DETAILS

FOR CONSTRUCTION





N
W E
S

2 MEZZANINE NEW WORK PLAN

M100 SCALE: 1/8" = 1'-0"

N
W E
S

1 FIRST FLOOR NEW WORK PLAN

M100 SCALE: 1/8" = 1'-0"

GENERAL MECHANICAL NOTES

1. PROJECT IS BEING DESIGNED AND CONSTRUCTED ON A DESIGN/BUILD BASIS, AND CONTRACTOR SHALL BE RESPONSIBLE FOR:
   - 1.1. COORDINATING WITH OWNER, ARCHITECT, AND ONGOING PROJECTS WITHIN THE BUILDING, INCLUDING INTERIOR RENOVATIONS. COORDINATE WITH ARCHITECT FOR PROVISION OF NEW PENETRATIONS, AS WELL AS SEALING OF EXISTING/NEW PENETRATIONS THROUGH WALLS, FLOORS, ETC.
   - 1.2. COORDINATE ROUTING OF DUCT AND REFRIGERANT PIPING WITH ALL OTHER UTILITIES, STRUCTURE, ETC. AND AS DIRECTED BY OWNER.
   - 1.3. COORDINATING UNIT LOCATIONS, WEIGHTS, ETC. WITH OWNER, ARCHITECT AND STRUCTURAL ENGINEER. PROVIDE STRUCTURAL MODIFICATIONS AS REQUIRED, OR COORDINATE WITH OWNER FOR SAME (IF OWNER PROVIDED).
   - 1.4. COORDINATING PROVISION OF NATURAL GAS FOR ALL EQUIPMENT, ACCESSORIES, CONTROLS, ETC. WITH PLUMBING CONTRACTOR AND/OR THE ON-GOING UPGRADES WITHIN THE BUILDING.
   - 1.5. COORDINATING PROVISION OF POWER FOR ALL EQUIPMENT, ACCESSORIES, CONTROLS, ETC. WITH ELECTRICAL CONTRACTOR AND/OR THE ON-GOING UPGRADES WITHIN THE BUILDING.
   - 1.6. PROVISION OF CONDENSATE DRAINS, RISERS, ETC. INCLUDING PUMPS OR NEW PENETRATIONS THROUGH EXTERIOR WALLS FOR DRAINS THAT ARE DAY-LIT. COORDINATE SEALING OF EXTERIOR PENETRATIONS WITH ARCHITECT AND OWNER. PROVIDE HUB DRAINS AS REQUIRED FOR UNITS THAT ARE DRAINED WITHIN THE BUILDING.
2. <u>DUCT INSTALLED IN CONTINUOUS FIRE-RATED ASSEMBLY:</u>
   DUCT THAT CROSSES THE FIRE-RATED ASSEMBLIES SHALL BE PROVIDED WITH DAMPERS AS REQUIRED TO MAINTAIN FIRE/SMOKE RATINGS. DUCT INSTALLATION/MATERIALS SHALL MEET ALL RELEVANT CODES, AS PRESCRIBED BY AHJ. DUCT, FITTINGS, GRILLES, ETC. SHALL BE INSTALLED PER IMC TO ENSURE COMPLIANCE WITH FIRE DAMPER EXEMPTIONS, INCLUDING, BUT NOT LIMITED TO: SHEET METAL THICKNESS, REQUIRED SLEEVES, CONTINUOUS METAL DUCT, CEILING RADIATION DAMPERS, ETC.
3. THOUGH NOT TYPICALLY SHOWN ON FLOOR PLANS, ALL AIR DEVICES,DUCT AND FANS THAT PENETRATE RATED CEILING ASSEMBLIES SHALL BE PROVIDED WITH RADIATION DAMPERS.
4. THOUGH NOT ALWAYS SHOWN ON FLOOR PLANS, ALL DUCT THAT PENETRATES FIRE/SMOKE RATED ASSEMBLIES SHALL BE PROVIDED WITH CODE-REQUIRED PROTECTION, INCLUDING FIRE, SMOKE AND COMBINATION FIRE/SMOKE DAMPERS. COORDINATE PROVISION OF POWER WITH ELECTRICAL CONTRACTOR, AND COORDINATE ANY REQUIRED ACCESS PANELS WITH OWNER, ARCHITECT AND G.C.
5. EXHAUST GRILLES/FANS THAT PENETRATE RATED CEILING ASSEMBLIES IN SHALL BE PROVIDED WITH RADIATION DAMPERS.
6. ROOF-MOUNTED EQUIPMENT NOT LOCATED ADJACENT TO CONSTRUCTION THAT PROVIDES CODE REQUIRED FALL-PROTECTION SHALL BE LOCATED A MINIMUM OF 10'-0" FROM THE ROOF EDGE, OR AS REQUIRED BY AHJ. IN INSTANCES WHERE THIS IS NOT POSSIBLE, EITHER DUE TO EXISTING OR NEW CONSTRUCTION, ANCHOR POINTS SHALL BE PROVIDED - COORDINATE WITH G.C.
7. CONTRACTOR SHALL PROVIDE AND INSTALL UV-PROTECTIVE COATING AND/OR CLADDING TO ELASTOMERIC PIPE INSULATION THAT IS EXPOSED TO SUNLIGHT (E.G. REFRIGERANT PIPING).
8. THOUGH NOT TYPICALLY SHOWN ON FLOOR PLANS, ALL AIR DEVICES SHALL BE PROVIDED WITH DUCT-MOUNTED MANUAL BALANCING DAMPERS OR OPPOSED-FACE BALANCING DAMPERS AT THE AIR DEVICE.
9. UNDER-CUT DOORS AS REQUIRED FOR NEGATIVE PRESSURIZATION/AIRFLOW. COORDINATE WITH G.C. AND ARCHITECT.
10. COORDINATE DUCT ROUTING AND GRILLE PLACEMENT WITH STRUCTURE AND ALL OTHER UTILITIES AND CEILING-MOUNTED ITEMS. PROVIDE DETAILED SHOP/COORDINATION DRAWINGS FOR ARCHITECT/ENGINEER REVIEW PRIOR TO INSTALLATION.

MECHANICAL KEY NOTES

1. PROVIDE ALL LABOR AND MATERIAL REQUIRED TO INSTALL NEW EXHAUST FAN, INCLUDING: FAN, HANGERS, DUCT AND CONNECTIONS, ETC. COORDINATE PLACEMENT OF FAN AND DUCT WITH STRUCTURE AND ALL OTHER UTILITIES. SEAL ALL PENETRATIONS WEATHER-TIGHT. COORDINATE PROVISION OF POWER WITH ELECTRICAL CONTRACTOR.
2. PROVIDE ALL LABOR AND MATERIAL REQUIRED TO INSTALL NEW ROOF/WALL-MOUNTED INTAKE OR EXHAUST VENT. PROVIDE WITH BIRD/INSECT SCREEN AND BAROMETRIC DAMPER. CONNECT TO DUCTWORK AND SEAL ALL PENETRATIONS WEATHER-TIGHT. COORDINATE WITH ARCHITECT FOR EXACT LOCATION. (TYPICAL)
3. PROVIDE ALL LABOR AND MATERIAL REQUIRED TO INSTALL NEW SPLIT-SYSTEM FURNACE/AIR HANDLER WITH NATURAL-GAS HEAT. ROUTE FLUE TO BUILDING EXTERIOR AND TURN UP TO ACHIEVE CODE-REQUIRED CLEARANCES FROM GRADE, WALKWAYS, OPERABLE WINDOWS, ETC. PROVIDE CONDENSATE PUMPS (W/ BASIN) AS REQUIRED FOR UNITS LOCATED IN ROOMS WITHOUT EXISTING DRAINS, OR WHERE GRAVITY DRAINAGE IS NOT POSSIBLE.

   CONNECT TO REFRIGERANT PIPING AND ROUTE CONDENSATE TO OPEN RECEPTACLE. UNIT SHALL BE PROVIDED WITH SECONDARY CONDENSATE/DRAIN PAN OVERFLOW ALARM. COORDINATE LOCATION OF UNIT WITH ALL OTHER ABOVE CEILING OR CEILING-MOUNTED ITEMS, ENSURING THAT REQUIRED SERVICE CLEARANCES ARE MAINTAINED. COORDINATE PROVISION OF POWER WITH ELECTRICAL CONTRACTOR. COORDINATE SEALING OF EXTERIOR PENETRATIONS WITH OWNER AND ARCHITECT. (TYPICAL)
4. DUCT UP/DOWN. COORDINATE ROUTING WITH ARCHITECT, WALLS, STRUCTURE AND ALL OTHER UTILITIES.
5. PROVIDE ALL LABOR AND MATERIAL REQUIRED TO INSTALL NEW CONDENSING UNIT, ENSURING THAT ALL SERVICE/AIRFLOW CLEARANCES ARE MAINTAINED. ROUTE REFRIGERANT LINES TO INDOOR UNITS. GROUP REFRIGERANT LINE SETS AND PROVIDE WITH HORIZONTAL ROOF PIPE PORTAL - COORDINATE WITH STRUCTURE, OWNER AND ROOFING CONTRACTOR. ROOF-MOUNTED CONDENSERS SHALL BE PROVIDED WITH COMPOSITE BASE RAILS; GROUND-MOUNTED CONDENSERS SHALL BE PROVIDED WITH COMPOSITE PAD OR CONCRETE HOUSE-KEEPING PAD. SEAL ALL PENETRATIONS WEATHER TIGHT. COORDINATE PROVISION OF POWER WITH ELECTRICAL CONTRACTOR. (TYPICAL)
6. PROVIDE ALL LABOR AND MATERIAL REQUIRED TO INSTALL NEW ZONE DAMPER FOR ECONOMIZER SYSTEM, INCLUDING ALL REQUIRED CONTROLS, ELECTRICAL CONNECTIONS, DUCT TRANSITIONS, ETC. COORDINATE PROVISION OF POWER WITH ELECTRICAL CONTRACTOR.

   PROVIDE AND INSTALL NEW RELIEF DUCT AND ROOF HOOD. SEAL ALL PENETRATIONS WEATHER-TIGHT. COORDINATE FINAL MOUNTING HEIGHT AND LOCATION WITH OWNER, ARCHITECT AND ALL OTHER UTILITIES AND/OR STRUCTURE. (TYPICAL)
7. PROVIDE ALL LABOR AND MATERIAL REQUIRED TO INSTALL NEW GAS-FIRED UNIT HEATER. SUSPEND FROM STRUCTURE ABOVE AT 14'-0" ABOVE FINISHED FLOOR - CONFIRM EXACT MOUNTING HEIGHT AND LOCATION WITH OWNER/ARCHITECT AND STEEL BUILDING MANUFACTURER.

   ROUTE HEATER FLUE AND INTAKE OUT EXTERIOR WALL/ROOF AND PROVIDE WITH WALL CAP (BAROMETRIC DAMPER AND BIRD/INSECT SCREEN). SIZE FLUE BASED UPON PURCHASED EQUIPMENT. COORDINATE WITH ALL OTHER DUCT, STRUCTURE, CONDUIT, PIPING, EXTERIOR MOUNTED ITEMS, LIGHTS, ETC. ENSURE ALL REQUIRED INTAKE/EXHAUST CLEARANCES ARE MAINTAINED - CONFIRM LOCATION WITH OWNER/ARCHITECT. SEAL ALL PENETRATIONS WEATHER TIGHT.
8. ROUTE DUCT UP TO ROOF HOOD AND PROVIDE WITH BAROMETRIC DAMPER, AND BIRD/INSECT SCREEN. COORDINATE WITH ROOFING CONTRACTOR AND SEAL ALL PENETRATIONS WEATHER-TIGHT.
9. PROVIDE ALL LABOR AND MATERIAL REQUIRED TO INSTALL NEW WALL-MOUNTED RETURN AIR GRILLE. COORDINATE FINAL MOUNTING HEIGHT/LOCATION WITH OWNER, FRAMING, WALL-MOUNTED ITEMS, AND ALL OTHER UTILITIES.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004
CABLE BUILDING

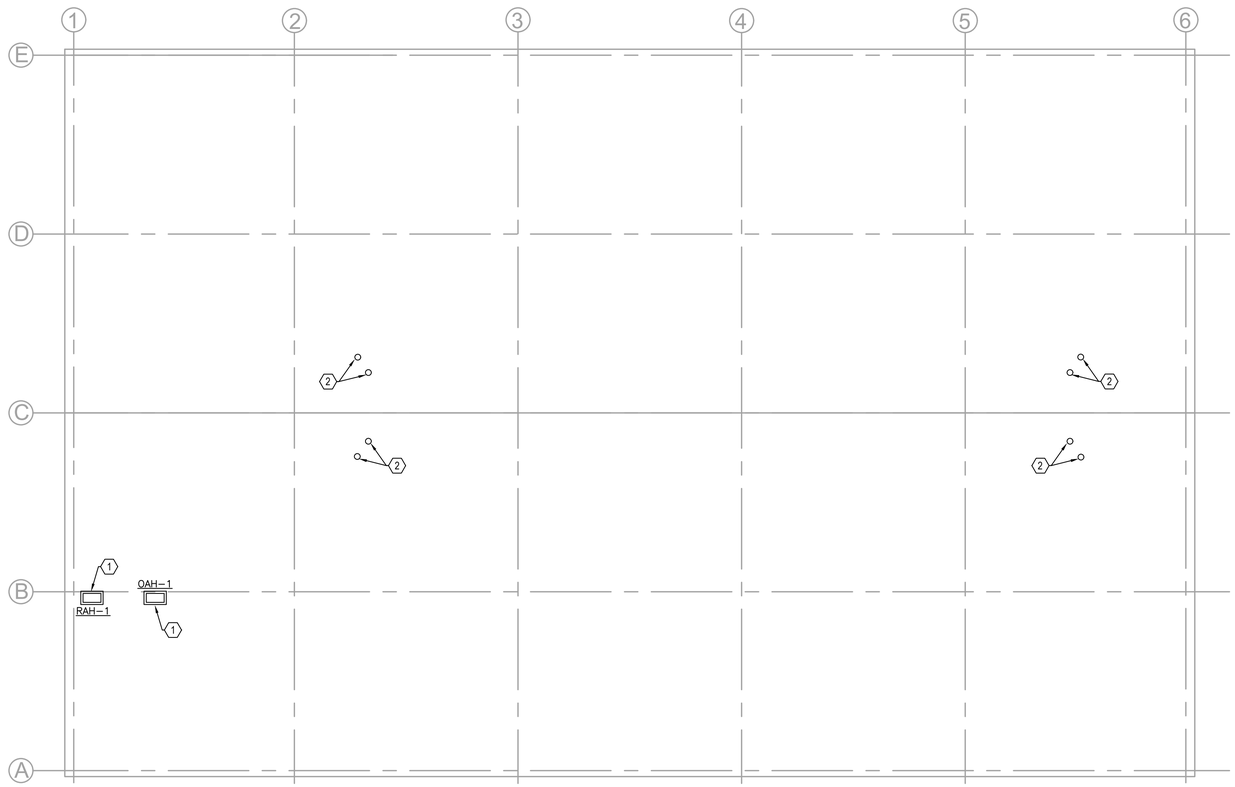
STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: **M100**

FIRST FLOOR AND MEZZANINE NEW MECHANICAL PLAN

FOR CONSTRUCTION



1 M101 ROOF NEW WORK PLAN

SCALE: 1/8" = 1'-0"

GENERAL MECHANICAL NOTES

1. PROJECT IS BEING DESIGNED AND CONSTRUCTED ON A DESIGN/BUILD BASIS, AND CONTRACTOR SHALL BE RESPONSIBLE FOR:
   - 1.1. COORDINATING WITH OWNER, ARCHITECT, AND ONGOING PROJECTS WITHIN THE BUILDING, INCLUDING INTERIOR RENOVATIONS. COORDINATE WITH ARCHITECT FOR PROVISION OF NEW PENETRATIONS, AS WELL AS SEALING OF EXISTING/NEW PENETRATIONS THROUGH WALLS, FLOORS, ETC.
   - 1.2. COORDINATE ROUTING OF DUCT AND REFRIGERANT PIPING WITH ALL OTHER UTILITIES, STRUCTURE, ETC. AND AS DIRECTED BY OWNER.
   - 1.3. COORDINATING UNIT LOCATIONS, WEIGHTS, ETC. WITH OWNER, ARCHITECT AND STRUCTURAL ENGINEER. PROVIDE STRUCTURAL MODIFICATIONS AS REQUIRED, OR COORDINATE WITH OWNER FOR SAME (IF OWNER PROVIDED).
   - 1.4. COORDINATING PROVISION OF NATURAL GAS FOR ALL EQUIPMENT, ACCESSORIES, CONTROLS, ETC. WITH PLUMBING CONTRACTOR AND/OR THE ON-GOING UPGRADES WITHIN THE BUILDING.
   - 1.5. COORDINATING PROVISION OF POWER FOR ALL EQUIPMENT, ACCESSORIES, CONTROLS, ETC. WITH ELECTRICAL CONTRACTOR AND/OR THE ON-GOING UPGRADES WITHIN THE BUILDING.
   - 1.6. PROVISION OF CONDENSATE DRAINS, RISERS, ETC. INCLUDING PUMPS OR NEW PENETRATIONS THROUGH EXTERIOR WALLS FOR DRAINS THAT ARE DAY-LIT. COORDINATE SEALING OF EXTERIOR PENETRATIONS WITH ARCHITECT AND OWNER. PROVIDE HUB DRAINS AS REQUIRED FOR UNITS THAT ARE DRAINED WITHIN THE BUILDING.
2. DUCT INSTALLED IN CONTINUOUS FIRE-RATED ASSEMBLY:
   DUCT THAT CROSSES THE FIRE-RATED ASSEMBLIES SHALL BE PROVIDED WITH DAMPERS AS REQUIRED TO MAINTAIN FIRE/SMOKE RATINGS. DUCT INSTALLATION/MATERIALS SHALL MEET ALL RELEVANT CODES, AS PRESCRIBED BY AHJ. DUCT, FITTINGS, GRILLES, ETC. SHALL BE INSTALLED PER IMC TO ENSURE COMPLIANCE WITH FIRE DAMPER EXEMPTIONS, INCLUDING, BUT NOT LIMITED TO: SHEET METAL THICKNESS, REQUIRED SLEEVES, CONTINUOUS METAL DUCT, CEILING RADIATION DAMPERS, ETC.
3. THOUGH NOT TYPICALLY SHOWN ON FLOOR PLANS, ALL AIR DEVICES,DUCT AND FANS THAT PENETRATE RATED CEILING ASSEMBLIES SHALL BE PROVIDED WITH RADIATION DAMPERS.
4. THOUGH NOT ALWAYS SHOWN ON FLOOR PLANS, ALL DUCT THAT PENETRATES FIRE/SMOKE RATED ASSEMBLIES SHALL BE PROVIDED WITH CODE-REQUIRED PROTECTION, INCLUDING FIRE, SMOKE AND COMBINATION FIRE/SMOKE DAMPERS. COORDINATE PROVISION OF POWER WITH ELECTRICAL CONTRACTOR, AND COORDINATE ANY REQUIRED ACCESS PANELS WITH OWNER, ARCHITECT AND G.C.
5. EXHAUST GRILLES/FANS THAT PENETRATE RATED CEILING ASSEMBLIES IN SHALL BE PROVIDED WITH RADIATION DAMPERS.
6. ROOF-MOUNTED EQUIPMENT NOT LOCATED ADJACENT TO CONSTRUCTION THAT PROVIDES CODE REQUIRED FALL-PROTECTION SHALL BE LOCATED A MINIMUM OF 10'-0" FROM THE ROOF EDGE, OR AS REQUIRED BY AHJ. IN INSTANCES WHERE THIS IS NOT POSSIBLE, EITHER DUE TO EXISTING OR NEW CONSTRUCTION, ANCHOR POINTS SHALL BE PROVIDED - COORDINATE WITH G.C.
7. CONTRACTOR SHALL PROVIDE AND INSTALL UV-PROTECTIVE COATING AND/OR CLADDING TO ELASTOMERIC PIPE INSULATION THAT IS EXPOSED TO SUNLIGHT (E.G. REFRIGERANT PIPING).
8. THOUGH NOT TYPICALLY SHOWN ON FLOOR PLANS, ALL AIR DEVICES SHALL BE PROVIDED WITH DUCT-MOUNTED MANUAL BALANCING DAMPERS OR OPPOSED-FACE BALANCING DAMPERS AT THE AIR DEVICE.
9. UNDER-CUT DOORS AS REQUIRED FOR NEGATIVE PRESSURIZATION/AIRFLOW. COORDINATE WITH G.C. AND ARCHITECT.
10. COORDINATE DUCT ROUTING AND GRILLE PLACEMENT WITH STRUCTURE AND ALL OTHER UTILITIES AND CEILING-MOUNTED ITEMS. PROVIDE DETAILED SHOP/COORDINATION DRAWINGS FOR ARCHITECT/ENGINEER REVIEW PRIOR TO INSTALLATION.

MECHANICAL KEY NOTES

1. PROVIDE ALL LABOR AND MATERIAL REQUIRED TO INSTALL NEW RELIEF/OUTDOOR AIR INTAKE HOOD. COORDINATE FINAL LOCATION/HEIGHT WITH OWNER/ARCHITECT AND ENSURE CODE-REQUIRED DISTANCES FROM ANY SOURCES OF EXHAUST. EXTEND ABOVE ROOF TO AS REQUIRED BY CODE/LOCAL AHJ. ROUTE DUCT TO INDOOR UNITS AND PROVIDE WITH BAROMETRIC AND MANUAL BALANCING DAMPERS.
2. PROVIDE ALL LABOR AND MATERIAL REQUIRED TO INSTALL NEW ROOF/WALL-MOUNTED INTAKE OR EXHAUST VENT. CONNECT TO UNIT HEATER/WATER HEATER FLUE/VENT AND SEAL ALL PENETRATIONS WEATHER-TIGHT. COORDINATE WITH ROOFING CONTRACTOR AND G.C. EXTEND ABOVE ROOF TO AS REQUIRED BY CODE/LOCAL AHJ. (TYPICAL)

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: **M101**

NEW ROOF MECHANICAL PLAN

FOR CONSTRUCTION

MECHANICAL GENERAL REQUIREMENTS

1. GENERAL

1.1. THE FRONT END REQUIREMENTS, BID REQUIREMENTS AND BID FORM DOCUMENTS AND ALL OTHER CONTRACT DOCUMENTS APPLY TO THESE BRANCHES OF THE WORK, AS DO ALL OTHER SECTIONS OF THE SPECIFICATIONS.

1.2. EACH SUB-CONTRACTOR SHALL BE GOVERNED BY ANY ALTERNATES AND UNIT PRICES CALL FOR IN THE "FORM OF PROPOSAL" INSOFAR AS THEY AFFECT HIS PART OF THE WORK.

1.3. THIS SECTION APPLIES EQUALLY TO HEATING, VENTILATION, AIR CONDITIONING, PLUMBING AND ELECTRICAL.

1.4. THE OWNER WILL RETAIN OCCUPANCY AND USE OF ADJACENT SPACES IN THE COURSE OF THE WORK. CONTRACTORS WILL WORK TO MINIMIZE ANY IMPACT ON THE OWNER'S ONGOING ACTIVITIES. INTERRUPTIONS TO UTILITIES WILL NEED TO BE COORDINATED IN ADVANCE WITH ARCHITECT AND OWNER

2. SCOPE

2.1. THE WORK COVERED BY THIS DIVISION OF THE SPECIFICATIONS CONSISTS OF FURNISHING ALL MATERIALS, LABOR, EQUIPMENT, INCIDENTALS, AND PERFORMING ALL OPERATIONS REQUIRED FOR A COMPLETE INSTALLATION OF ALL MECHANICAL SYSTEMS IN ACCORDANCE WITH THE APPLICABLE DRAWINGS AND SPECIFICATIONS.

3. INTENT

3.1. THIS CONTRACTOR SHALL FURNISH ALL EQUIPMENT, MATERIAL AND LABOR MENTIONED IN THIS SPECIFICATION OR ON THE DRAWINGS, UNLESS IT IS SPECIFICALLY STATED OTHERWISE.

3.2. THIS CONTRACTOR SHALL FURNISH AND INSTALL ALL MISCELLANEOUS EQUIPMENT, MATERIAL AND LABOR WHICH (THOUGH NOT SPECIFICALLY CALLED FOR IN THE CONTRACT DOCUMENTS) IS NECESSARY FOR A COMPLETE AND SATISFACTORILY OPERATING INSTALLATION. THIS CONTRACTOR SHALL LEAVE HIS WORK IN OPERATING CONDITION.

4. DRAWINGS AND SPECIFICATIONS

4.1. FOR PURPOSES OF CLARIFY AND LEGIBILITY, THE DRAWINGS ARE NECESSARILY DIAGRAMMATIC. ALTHOUGH SIZE AND LOCATION OF THE EQUIPMENT IS DRAWN TO SCALE WHEREVER POSSIBLE, CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING ALL SERVICE CLEARANCES, FILTER ACCESSES, DISTANCE FROM EFFLUENT SOURCES, ETC. IS MAINTAINED.

4.2. THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO COVER ALL WORK ENUMERATED UNDER THE RESPECTIVE HEADINGS. THE SUB-CONTRACTORS SHALL NOT TAKE ADVANTAGE OF CONFLICT OR ERROR BETWEEN THE DRAWINGS AND SPECIFICATIONS, BUT SHALL REQUEST A CLARIFICATION OF SUCH BEFORE MAKING HIS PROPOSAL SHOULD THIS CONDITION EXIST. FAILURE TO ISSUE THIS REQUEST FOR CLARIFICATION SHALL BE GROUNDS FOR DISMISSAL FOR ANY AND ALL CLAIMS ON THE PART OF THE CONTRACTOR RELATED TO THE ITEMS IN QUESTION.

4.3. IT IS ESPECIALLY REQUIRED THAT THE MECHANICAL, PLUMBING AND ELECTRICAL SUB-CONTRACTORS SHALL OBTAIN A SET OF THE ARCHITECTURAL, STRUCTURAL, AND ANY OTHER TRADES' DRAWINGS AND SPECIFICATIONS, AND CONSULT WITH THE ARCHITECT AND GENERAL CONTRACTOR AS TO THE GENERAL CONSTRUCTION OF THE BUILDING. THIS INCLUDES, BUT IS NOT LIMITED TO: LOCATION OF PLUMBING FIXTURE; SIZE/LOCATION/HEAD ROOM OF PIPE CHASES; LOCATION OF WALLS, PARTITIONS, BEAMS, ETC. ; SWING OF DOORS; LOCATION AND MOUNTING HEIGHT OF SWITCHES AND RECEPTACLES; AND THE ORDER AND TIME OF PLACEMENT OF ALL MECHANICAL WORK.

4.4. THE DRAWINGS ACCOMPANYING THESE SPECIFICATIONS DETERMINE THE GENERAL DESIGN OF THE EQUIPMENT. EXACT DISPOSITION OF THE EQUIPMENT IS SUBJECT TO THE REQUIREMENTS AND CONSTRUCTION OF THE MANUFACTURER'S STANDARD, BUT THE SPACE OCCUPIED AND GENERAL DESIGN SHALL CORRESPOND TO THAT SHOWN ON THE PLANS.

4.5. NO CONTRACTOR SHALL, UNDER ANY CIRCUMSTANCES, SCALE DRAWINGS FOR THE LOCATION OF EQUIPMENT AND WORK.

4.6. THE DRAWINGS INDICATE SIZE AND POINTS OF TERMINATION OF PIPES AND DUCTWORK, AND SUGGEST PROPER ROUTING TO CONFORM TO STRUCTURE, AVOID OBSTRUCTIONS AND PRESERVE CLEARANCES, BUT IT IS NOT THE INTENTION OF THE DRAWINGS TO INDICATE ALL NECESSARY OFFSETS. INSTALL WORK IN A MANNER THAT CONFORMS TO STRUCTURE, AVOIDS OBSTRUCTIONS, PRESERVES CLEAR SPACE ABOVE CEILINGS, AND KEEPS OPENINGS AND PASSAGEWAYS CLEAR WITHOUT FURTHER INSTRUCTIONS OR COST TO THE OWNER.

4.7. IT IS INTENDED THAT MATERIALS SHALL BE LOCATED SYMMETRICALLY WITH ALL ARCHITECTURAL ELEMENTS, ALTHOUGH THE LOCATIONS INDICATED ON THE DRAWINGS MAY BE DISTORTED FOR CLEARNESS OR LEGIBILITY.

5. GENERAL FOR ALL MECHANICAL INSTALLATIONS

5.1. THE DRAWINGS PERTAINING TO THE INSTALLATION S AND SERVICES GENERALLY INDICATE THE LOCATION OF ACCESSORIES, PIPING, UNDERGROUND WORK, PLUMBING FIXTURES, DITCHES, ETC. AND OTHER DETAILS NECESSARY TO COMPLETE THE INSTALLATION OF EACH TRADE'S WORK. BIDDERS ARE URGED TO ACQUAINT THEMSELVES WORKING CONDITIONS, LIMITATIONS AND REQUIREMENTS AT THE BUILDING SITE AS ANY AND ALL CONTRACTS FOR THIS WORK WILL BE BASED UPON FURNISHING ALL LABOR AND MATERIALS REQUIRED TO ENTIRELY COMPLETE EACH INSTALLATION READY FOR USE.

5.2. EACH CONTRACTOR IS URGED, BEFORE SUBMITTING A PROPOSAL, TO VERIFY THE SIZE AND LOCATION OF ALL SERVICES AND THE LIMITATIONS OF SAME.

6. SITE VISIT

6.1. EACH CONTRACTOR SHALL (BEFORE SUBMITTING A PROPOSAL) VISIT AND EXAMINE THE SITE TO SATISFY HIMSELF AS TO THE MATERIALS AND SCOPE OF CONSTRUCTION, ALTERATIONS AND REMODELING, ANY DIFFICULTY ATTENDING TO THE PERFORMANCE OF THE WORK, STORAGE OF MATERIAL, ACCESS TO ANY AND ALL AREAS, ETC.

6.2. THE SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE. CLAIMS MADE SUBSEQUENT TO THE TIME OF SUBMISSION OF THE PROPOSAL FOR LABOR, EQUIPMENT AND MATERIAL REQUIRED FOR DIFFICULTIES ENCOUNTERED (WHICH COULD HAVE BEEN FORESEEN HAD A THOROUGH SITE EXAMINATION BEEN MADE) WILL NOT BE RECOGNIZED AS VALID. ANY AND ALL WORK ASSOCIATED WITH THOSE CLAIMS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.

7. MATERIALS, EQUIPMENT AND WORKMANSHIP

7.1. MATERIALS AND EQUIPMENT USED THROUGHOUT SHALL BE NEW AND THE BEST OF THE RESPECTIVE KINDS. NO SUBSTITUTIONS (OTHER THAN EXPLICITLY SPECIFIED) SHALL BE USED UNLESS APPROVED BY THE ARCHITECT/ENGINEER. ALL WORK SHALL BE EXECUTED IN A TIMELY MANNER, AND SHALL BE CONSISTENT WITH SAFETY REQUIREMENTS AND GOOD WORKMANSHIP.

7.2. COMPETENT WORKMEN SHALL BE EMPLOYED ON ALL PHASES OF THE WORK. POOR WORKMANSHIP WILL BE REJECTED AND WILL CONSTITUTE CAUSE FOR REMOVAL OF THE INDIVIDUAL PERFORMING THE WORK.

7.3. SHOULD ANY DISPUTE ARISE AS TO THE QUALITY OR FITNESS OF MATERIALS, EQUIPMENT OR WORKMANSHIP, THE DECISION RESTS STRICTLY WITH THE ARCHITECT, OWNER AND ENGINEER(S) OF RECORD.

8. SHOP DRAWINGS AND LIST OF MATERIALS

8.1. EACH SUB-CONTRACTOR SHALL SUBMIT TO THE GENERAL CONTRACTOR FOR APPROVAL WITHIN THIRTY (30) DAYS AFTER THE DATE OF THIS CONTRACT, SIX (6) SETS OF COMPLETE CATALOG DATA AND/OR SHOP DRAWINGS FOR EACH ITEM OF MATERIAL OR PIECE OF EQUIPMENT. CATALOG DATA SHALL INCLUDE NAME OF THE MANUFACTURER, CATALOG NUMBERS, TRADE NAMES, PERFORMANCE DATA, DESCRIPTIVE MATERIAL (SUFFICIENT TO IDENTIFY EACH ITEM), AND SPECIFY PERFORMANCE OF THE PRODUCTS SUBMITTED. SHOP DRAWINGS SHALL INCLUDE SPECIFIED CATALOG DATA AND SHALL SHOW EQUIPMENT IN DETAIL, ARRANGEMENT AND DISPOSITION FOR THIS PARTICULAR PROJECT DESIGN.

8.2. THE ARCHITECTS AND/OR ENGINEERS REVIEW AND APPROVAL OF THE (SUB)CONTRACTORS' DRAWINGS OR EQUIPMENT DETAILS DOES NOT RELIEVE THE (SUB)CONTRACTORS FROM RESPONSIBILITY FOR ERRORS, OMISSIONS OR EQUIPMENT FURNISHED IN ACCORDANCE WITH SUCH CHECKED OR APPROVED DRAWINGS. WHERE SUCH ERRORS OR OMISSIONS ARE LATER DISCOVERED, THEY SHALL BE MADE GOOD BY THE RESPECTIVE SUB-CONTRACTOR, IRRESPECTIVE OR ANY APPROVAL BY THE ARCHITECT. THIS WORK SHALL BE PERFORMED AT NO ADDITIONAL COST TO THE OWNER.

9. WORKING SPACE

9.1. IN THE INSTALLATION FOR IN THESE CONTRACTS, SPECIAL ATTENTION SHALL BE GIVEN TO THE ACCESSIBILITY OF THE PARTS AND EQUIPMENT. ADEQUATE SPACE MUST BE PROVIDED FOR OPERATION AND REMOVAL OF ANY PARTS THAT MAY HAVE TO BE EXAMINED, SERVICED, REPLACED IN THE FUTURE.

10. CONCEALED WORK

10.1. NO WORK OF ANY KIND SHALL BE COVERED UP OR CONCEALED BEFORE IT HAS BEEN TESTED, EXAMINED AND APPROVED.

10.2. ALL PLUMBING INSTALLATIONS SHALL BE INSPECTED BY THE PROPER ADMINISTRATIVE AUTHORITY TO ENSURE COMPLIANCE WITH THE REQUIREMENTS OF THE STATE PLUMBING CODE AND ANY/ALL LOCAL ORDINANCES.

11. EQUIPMENT

11.1. IT SHALL BE THE RESPONSIBILITY OF THE RESPECTIVE SUB-CONTRACTORS TO DETERMINE THAT THE EQUIPMENT AND APPLIANCES (WHICH THEY PROPOSE TO FURNISH) CAN BE INSTALLED IN THE AVAILABLE SPACE AND CAN BE BROUGHT IN TO THE BUILDING. EQUIPMENT MUST BE INSTALLED SO THAT ALL PARTS ARE READILY ACCESSIBLE FOR INSPECTION AND MAINTENANCE. NO EXTRA COMPENSATION WILL BE ALLOWED FOR DISMANTLING OF EQUIPMENT TO INSTALL IN THE AVAILABLE SPACE OR TO OBTAIN ENTRANCE INTO THE BUILDING. THIS PROVISION SHALL ALSO APPLY TO DEMOLITION/REPAIR OF ARCHITECTURAL/STRUCTURAL ELEMENTS IN ORDER TO PERMIT INSTALLATION OR ENTRANCE IN TO THE BUILDING.

11.2. THE CONTRACTOR SHALL USE EXTREME CARE IN SELECTION OF EQUIPMENT AND ITS INSTALLATION TO ENSURE THAT NOISES AND VIBRATION WILL BE HELD TO A MINIMUM. IT IS THE INTENTION THAT THE ENTIRE SYSTEM SHALL OPERATE WITHOUT OBJECTIONABLE NOISE OR VIBRATION, AND IF OBJECTIONABLE NOISE OR VIBRATION DOES DEVELOP, IT SHALL BE CORRECTED BY THE CONTRACTOR WITHOUT ADDITIONAL COMPENSATION.

12. PROTECTION

12.1. NO PLUMBING OR HEATING PIPING SHALL BE INSTALLED IN ANY PART OF THE BUILDING WHERE DANGER OF FREEZING MAY EXIST WITHOUT ADEQUATE PROTECTION BEING GIVEN BY THE CONTRACTOR INSTALLING THE PIPE. ALL DAMAGES RESULTING FROM LEAKING PIPES SHALL BE BORNE BY THE CONTRACTOR WHOSE WORK IS AT FAULT.

12.2. ALL WORK SHALL BE PROTECTED AT ALL TIMES. ALL PIPE OPENINGS SHALL BE CLOSED WITH CAPS OR PLUGS DURING CONSTRUCTION. ALL EQUIPMENT ACCESSORIES SHALL BE TIGHTLY COVERED AND PROTECTED AGAINST DIRT, WATER OR OTHER INJURY DURING THE PERIOD OF THE RESPECTIVE CONTRACT.

13. TEMPORARY USE OF EQUIPMENT

13.1. IF IT SHOULD BE NECESSARY TO OPERATE THE EQUIPMENT BEFORE FINAL ACCEPTANCE, OWNER OR CONTRACTOR SHALL BE ALLOWED TO DO SO, BUT ONLY AFTER PROPER ADJUSTMENT AND TRIAL OPERATION AS HEREINAFTER SPECIFIED.

13.2. OWNER OR CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER CARE AND SUPERVISION OF OPERATION OF EQUIPMENT THAT IS USED BEFORE ACCEPTANCE AND SAFEGUARD THE EQUIPMENT IN EVERY WAY.

14. JOB CONDITIONS

14.1. EXISTING UTILITIES - LOCATE AND PROTECT EXISTING UTILITIES AND OTHER WORK IN A MANNER WHICH WILL ENSURE THAT NO DAMAGE OR INTERRUPTION OF SERVICE WILL RESULT.

14.2. PROTECT PROPERTY FROM DAMAGE WHICH MIGHT RESULT FROM DEMOLITION.

14.3. PROTECT PERSONS FROM INJURY AT EXCAVATIONS BY BARRICADES, WARNINGS AND ILLUMINATION.

15. COOPERATION AMONGST CONTRACTORS

15.1. OWING TO THE NATURE OF THE CONSTRUCTION INVOLVED, AND TO PREVENT CONFUSION AND DISCREPANCIES, ONLY APPROXIMATE OR GENERAL DIMENSIONS ARE GIVEN IN SEVERAL CASES. IT BEING INTENDED THAT IN SOME INSTANCES A REASONABLE LIMIT OF VARIATION BE PERMITTED IN ORDER THAT THE MAKING AND THE ERECTION OF THE WORK OF THE SUB-CONTRACTORS MAY BE THEREBY EXPEDITED AND THE BEST INTERESTS OF THE WORK AS A WHOLE BE SERVED. THOSE SEVERAL SUB-CONTRACTORS WILL BE REQUIRED TO ESTABLISH THEIR OWN DIMENSIONS (EACH BY PROMPT CONSULTATION AS TO THE METHODS AND SIZE OF CONSTRUCTION, TIME OF COMMENCING AND SEQUENCE OF OPERATIONS AND EXCHANGE OF DRAWINGS AND DETAILS) WITH ONE ANOTHER AS THE GREATEST MEASURE OF COOPERATION AMONGST THE INTERESTS INVOLVED WILL BE DEMAND AND EXPECTED BY THE OWNER AT ALL TIMES.

15.2. ALL MECHANICAL , PLUMBING AND ELECTRICAL SUB-CONTRACTORS SHALL CONSULT FULLY WITH THE GENERAL CONTRACTOR'S SUPERINTENDENT REGARDING ALL MATTERS AFFECTING THEIR WORK.

15.3. COOPERATE WITH OTHER TRADES TO OBTAIN THE MOST PRACTICAL ARRANGEMENT OF WORK.

15.4. MAKE KNOWN TO OTHER TRADES THE INTENDED POSITIONING OF MATERIALS AND INTENDED ORDER OF WORK. COORDINATE WORK WITH OTHER TRADES AND PROCEED WITH INSTALLATION TO ENSURE NO DELAYS TO OTHER TRADES. DETERMINE INTENDED POSITIONS OF WORK OF OTHER TRADES AND INTENDED ORDER OF INSTALLATION.

15.5. AGREE TO THE MOST PRACTICAL ARRANGEMENT OF WORK WITHIN REQUIREMENTS OF CONTRACT AND CONSULT WITH ARCHITECT/ENGINEER WHEN THERE ARE REASONS FOR DEVIATIONS FROM DRAWINGS OR SPECIFICATIONS, DIFFERENCES OF OPINION BETWEEN CONTRACTORS, OR QUESTIONS CONCERNING THE INTENT OF DRAWINGS OR SPECIFICATIONS.

15.6. FAILURE OF CONTRACTOR TO MAKE KNOWN HIS NEEDS OR DETERMINE REQUIREMENTS OF OTHERS WILL NOT BE CAUSE FOR ADDITIONAL TIME/COMPENSATION TO CORRECT INTERFERENCES.

16. SUB-CONTRACTOR'S RESPONSIBILITY FOR PROMPTNESS OF EXECUTION

16.1. IT IS NOT INCUMBENT UPON THE ARCHITECT TO NOTIFY THE SUB-CONTRACTOR WHEN TO BEGIN, TO CEASE OR RESUME WORK, NOR TO GIVE EARLY NOTIFICATION OF THE REJECTION OF FAULTY WORK, NOR IN ANY WAY TO SUPERINTEND THE WORK, IN ORDER TO RELIEVE THE SUB-CONTRACTOR OF RESPONSIBILITY OR OF ANY CONSEQUENCE OF CARELESSNESS BY HIM OR HIS SUBORDINATES.

16.2. ALL MATERIALS AND LABOR SHALL BE FURNISHED AT SUCH TIMES (TO THE BEST INTEREST OF ALL CONTRACTORS AND SUB-CONTRACTORS CONCERNED) TO THE END THAT THE COMBINED WORK MAY BE PROPERLY AND FULLY COMPLETED ON CONTRACT TIME.

17. PERMITS, CODES AND APPROVALS

17.1. PERMITS: ALL PERMITS NECESSARY FOR THE COMPLETE HEATING, VENTILATION, AIR CONDITIONING, PLUMBING, FIRE PROTECTION AND ELECTRICAL SYSTEMS SHALL BE OBTAINED BY THE RESPECTIVE CONTRACTORS FROM THE AUTHORITIES GOVERNING THE WORK. THE COST OF ALL PERMITS SHALL BE BORNE BY THE CONTRACTOR.

17.2. CODES:

17.2.1. HEATING, VENTILATION, AND AIR CONDITIONING WORK SHALL BE DONE IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), THE LATEST STANDARDS RECOGNIZED BY THE AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (AHSRAE), PER THE LATEST EDITION ENFORCED FOR STATE AND LOCAL MECHANICAL WORK.

17.2.2. ALL PLUMBING WORK SHALL BE INSTALLED ACCORDING TO THE REQUIREMENTS OF THE STATE, CITY, AND COUNTY PLUMBING LAWS, CODES, RULES AND REGULATIONS, AND ANY LOCAL ORDINANCES.

17.2.3. THE MINIMUM STANDARD FOR ALL ELECTRICAL WORK SHALL BE THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC). ALL ELECTRICAL WORK SHALL CONFORM TO THE LOCAL GOVERNING UTILITY COMPANY. HOWEVER, THEIR REQUEST SHALL NOT AUTHORIZE ANY CHANGES IN THE PLANS WITHOUT CONSULTING WITH THE ARCHITECT AND ENGINEERS OF RECORD.

17.2.4. ALL WORK SHALL MEET THE REQUIREMENTS OF THE LIFE SAFETY CODE, STATE AND CITY FIRE MARSHALS, DEPARTMENT OF HOUSING, BUILDINGS AND CONSTRUCTION.

18. INSPECTIONS

18.1. THE RESPECTIVE CONTRACTOR SHALL NOTIFY THE ELECTRICAL AND PLUMBING INSPECTORS, IN WRITING, IMMEDIATELY UPON THE START OF HIS WORK AND A COPY OF THE NOTICE SHALL BE SENT TO THE ARCHITECT/ENGINEER.

18.2. ALL COSTS INCIDENTAL TO THE INSPECTIONS SHALL BE BORNE BY THE RESPECTIVE CONTRACTOR.

18.3. THE INSPECTION SHALL BE SCHEDULED FOR ROUGH AS WELL AS FINISHED WORK. THE ROUGH INSPECTION SHALL BE DIVIDED INTO AS MANY INSPECTIONS AS MAY BECOME NECESSARY TO COVER ALL ROUGH-INS.

18.4. ALL INSPECTIONS TO BE BY THE INSPECTOR HAVING JURISDICTION.

19. REMOVAL OF RUBBISH

19.1. EACH CONTRACTOR SHALL REMOVE HIS OWN RUBBISH, BUT IN CASE OF DISPUTE, THE ARCHITECT/ENGINEER SHALL HAVE THE RIGHT TO ORDER THE GENERAL CONTRACTOR TO REMOVE SAID RUBBISH AND THE COST OF REMOVING SAME SHALL BE CHARGED TO THE GUILTY PARTY, AS MAY BE DECIDED BY THE ARCHITECT/ENGINEER. THE RUBBISH SHALL BE REMOVED IMMEDIATELY WHEN ORDERED BY THE ARCHITECT/ENGINEER OR OWNER'S REPRESENTATIVE. THE BUILDING SHALL BE KEPT AS CLEAN AS POSSIBLE DURING THE PROGRESS OF THE WORK.

20. ADJUSTMENTS AND OPERATION OF SYSTEM

20.1. WHEN ANY WORK INCLUDED IN THE CONTRACT DOCUMENTS IS COMPLETED, AND AT SUCH TIME(S) AS DIRECTED BY THE ARCHITECT/ENGINEER, THE RESPECTIVE EQUIPMENT MANUFACTURER OF CONTRACTOR SHALL CAREFULLY ADJUST ALL PARTS OF HIS EQUIPMENT AND THE SYSTEM, ADVISING THE ARCHITECT/ENGINEER WHEN SAME IS COMPLETE AND READY FOR FINAL TESTING.

20.2. THE RESPECTIVE CONTRACTORS SHALL, AFTER THE WORK IS COMPLETED, FULLY AND CAREFULLY INSTRUCT THE OWNER'S OPERATOR HAVING RESPONSIBILITY FOR THE SYSTEM AS TO ADJUSTMENT AND EFFICIENT/PROPER METHODS OF OPERATING THE SYSTEM AND ITS VARIOUS APPARATUSES.

21. BUILDING CONSTRUCTION MATERIALS

21.1. BIDDERS SHALL CAREFULLY EXAMINE THE GENERAL CONSTRUCTION DOCUMENTS AND ASSURE THEMSELVES OF THE TYPE OF MATERIALS USED THROUGHOUT THE BUILDING THAT MAY IN ANY WAY AFFECT THE WORK TO BE INSTALLED UNDER THEIR CONTRACT, AND THE PROPER PREPARATION OF THEIR PROPOSALS, AS NO CONTRACT ALLOWANCE WILL BE MADE FOR BIDDERS' FAILURE TO ACQUAINT THEMSELVES WITH THE TYPES OF CONSTRUCTION.

22. FINAL CONNECTIONS TO EQUIPMENT FURNISHED BY OTHERS

22.1. THE OWNER AND OTHER CONTRACTORS MAY/SHALL FURNISH AND SET IN PLACE VARIOUS PIECES OF EQUIPMENT.

22.2. THE MECHANICAL, PLUMBING AND ELECTRICAL SUB-CONTRACTORS SHALL INCLUDE IN THEIR BIDS ALL REQUIRED ROUGHING, FINISHED MATERIALS AND LABOR FOR FINAL CONNECTIONS TO ALL EQUIPMENT FURNISHED AND SPECIFIED UNDER OTHER SECTIONS OF THE CONTRACT DOCUMENTS AND/OR FURNISHED BY THE OWNER OR THEIR REPRESENTATIVES.

22.3. THE EQUIPMENT FURNISHED BY OTHER CONTRACTORS SHALL BE PROVIDED WITH TAILPIECES, FAUCETS, AND SPECIAL VALVES, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

22.4. THE MECHANICAL, PLUMBING AND ELECTRICAL CONTRACTORS SHALL FURNISH AND INSTALL ALL TRAPS, SHUT-OFF VALVES, ELECTRICAL BOXES, ELECTRICAL SWITCHES, CONDUIT, WIRING, PIPING, ADAPTERS, AND ANY OTHER MATERIAL REQUIRED FOR MAKING FINAL CONNECTIONS TO EQUIPMENT FURNISHED BY OTHER CONTRACTORS.

22.5. RESPECTIVE CONTRACTORS SHALL OBTAIN ROUGH-IN DATA FROM EQUIPMENT SUPPLIERS PRIOR TO INSTALLING ANY ROUGH-IN WORK. ALL LOCATIONS OF EQUIPMENT AND CONNECTIONS SHALL BE VERIFIED.

23. MAINTENANCE OF UTILITIES

23.1. THE LOCATIONS OF ALL PIPING, CONDUITS, CABLES, UTILITIES AND MAN-HOLES, EXISTING TEMPORARILY OR OTHERWISE THAT COME WITHIN THE CONTRACT CONSTRUCTION SITE, SHALL BE SUBJECT TO CONTINUOUS UNINTERRUPTED MAINTENANCE WITH NO OTHER EXCEPTION THAN THE OWNER'S PERMISSION TO CUT SAME IF THE NEED ARISES.

23.2. CONTRACTOR'S ATTENTION IS DIRECTED TO THE FACT THAT ALL OF THESE UTILITIES AND LINES ARE NOT INDICATED ON THE DRAWINGS; HOWEVER, IT IS REQUIRED THAT PRIOR TO ANY EXCAVATION BEING PERFORMED, THAT THE CONTRACTOR CONSULT THE OWNER'S PERSONNEL AND/OR LOCAL UTILITY LOCATION SERVICES TO ASCERTAIN WHETHER ANY UTILITIES OR LINES ARE ENDANGERED BY THE EXCAVATION.

23.3. IF THE ABOVE-MENTIONED UTILITIES OR LINES OCCUR IN THE EARTH WITHIN THE CONSTRUCTION SITE, IT IS SUGGESTED THAT THE CONTRACTOR FIRST PROBE AND MAKE EVERY EFFORT TO LOCATE THE LINES PRIOR TO EXCAVATING IN THE RESPECTIVE AREA.

24. WARRANTY

24.1. THE CONTRACTOR SHALL WARRANT THE SYSTEMS, EQUIPMENT, AND APPARATUSES TO BE BALANCED, FREE FROM ANY DEFECTS IN MATERIAL/WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR FROM DATE OF ACCEPTANCE. THIS WARRANTY SHALL COVER THE COST OF BOTH LABOR AND MATERIALS TO RECTIFY ANY ISSUES.

25. "OR EQUAL" CLAUSE

25.1. WHEREVER THE WORDS "OR APPROVED EQUAL" APPEAR IN THE CONTRACT DOCUMENTS, THEY SHALL BE INTERPRETED TO MEAN AN ITEM OF MATERIAL OR EQUIPMENT OF EQUAL QUALITY TO THE NAMED, WHICH IS SUITED TO THE SAME USE AND CAPABLE OF PERFORMING THE SAME FUNCTION AS THAT NAMED. THE BURDEN OF PROOF OF EQUAL QUALITY, SERVICE OR PERFORMANCE SHALL BE ON THE SUB-CONTRACTOR. PROOF OF INEQUALITY IS NOT IMPLIED BY THE CONTRACT DOCUMENTS AND IS NOT A BURDEN OF THE ENGINEER. HIS DUTY SHALL BE TO PROPERLY WEIGH THE PROVEN FACTS OF EQUALITY IN FAIRNESS TO ALL PARTIES INVOLVED. INCLUSION OF A CERTAIN MAKE OF TYPE OF MATERIALS OR EQUIPMENT IN THE SUB-CONTRACTOR'S BID OR ESTIMATE SHALL NOT OBLIGATE THE OWNER TO ACCEPT MATERIAL OR EQUIPMENT IF IT DOES NOT, IN THE OPINION OF THE ENGINEER, MEET THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS.

26. STARTERS, ETC.

26.1. ANY NECESSARY STARTERS OR OVERLOAD PROTECTION FOR MECHANICAL EQUIPMENT SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR FOR EQUIPMENT FURNISHED BY HIM OR THE OWNER, UNLESS OTHERWISE SPECIFIED.

27. ELECTRICAL CONNECTIONS

27.1. THE MECHANICAL CONTRACTOR SHALL (REGARDLESS OF VOLTAGE) FURNISH AND INSTALL ALL TEMPERATURE CONTROL WIRING, AND ALL INTERLOCK WIRING, AND EQUIPMENT CONTROL WIRING FOR THE EQUIPMENT THAT THE MECHANICAL CONTRACTOR FURNISHES. UNLESS OTHERWISE SPECIFIED, THE MECHANICAL CONTRACTOR SHALL FURNISH STARTERS FOR ALL EQUIPMENT FURNISHED BY HIM TO THE ELECTRICAL CONTRACTOR FOR INSTALLATION OF SAME. THE MECHANICAL CONTRACTOR SHALL PROVIDE AND BE RESPONSIBLE FOR THE HEATER IN ALL STARTERS THAT THE MECHANICAL CONTRACTOR FURNISHES.

28. PREMISES

28.1. THE SUB-CONTRACTOR SHALL TAKE THE PREMISES AS THEY ARE NOW AND WILL BE REQUIRED TO DO ALL THE WORK SHOWN OR IMPLIED IN THE CONTRACT DOCUMENTS, SO THAT WHEN THE BUILDING/PROJECT IS COMPLETED, IT SHALL BE COMPLETE IN EVERY RESPECT, EXCEPT SUCH PARTS AS ARE DISTINCTLY MENTIONED AS NOT BEING COVERED UNDER THESE SPECIFICATIONS.

29. QUALIFICATIONS

29.1. CONTRACTORS MUST HAVE FIVE (5) YEARS MINIMUM EXPERIENCE, HAVE A SATISFACTORY WORK RESUME WITH COMPARABLE PROJECTS LISTED, HAVE A SOUND FINANCIAL BASIS AND BE TECHNICALLY COMPETENT.

29.2. EQUIPMENT MANUFACTURERS MUST HAVE EIGHT (8) YEARS OF SUCCESSFUL EXPERIENCE, BE TECHNICALLY COMPETENT AND BE FINANCIALLY STABLE.

29.3. OWNER RESERVES THE RIGHT TO REVIEW AND DETERMINE IF THE CONTRACTORS AND MANUFACTURERS MEET THE ABOVE CATEGORIES TO HIS SATISFACTION. THE OWNER HAS THE AUTHORITY TO REJECT ANY EQUIPMENT AND BIDS IF THE ABOVE STANDARDS ARE NOT MET.

30. QUALITY ASSURANCE

30.1. FIRE-STOPPING SYSTEMS (MATERIALS AND DESIGN):

30.1.1. SHALL CONFORM TO BOTH FLAME AND TEMPERATURE RATINGS AS REQUIRED BY LOCAL BUILDING CODES AND AS TESTED BY NATIONALLY ACCEPTED TESTING AGENCIES PER ASTM E814 OR UL 1479 FIRE TESTS, IN A CONFIGURATION THAT IS REPRESENTATIVE OF FIELD CONDITIONS.

30.1.2. THE FLAME RATING MUST BE A MINIMUM OF ONE (1) HOUR BUT NOT LESS THAN THE FIRE RESISTANCE RATING OF THE ASSEMBLY BEING PENETRATED. THE TEMPERATURE RATING, WHEN REQUIRED BY CODE AUTHORITY, SHALL BE EQUAL TO THE REQUIRED FIRE RATING.

30.1.3. FOR JOINTS WITH MOVEMENT CAPABILITIES, THE ASSEMBLIES MUST BE TESTED TO UL 2079.

30.2. FIRE-STOPPING MATERIALS AND SYSTEMS MUST BE CAPABLE OF CLOSING OR FILLING THROUGH-OPENINGS CREATED BY:

30.2.1. THE BURNING OR MELTING OF COMBUSTIBLE PIPES, CABLE JACKETING, OR PIPE INSULATION MATERIALS, OR:

30.2.2. DEFLECTION OF SHEET METAL DUE TO THERMAL EXPANSION.

30.2.3. FIRE-STOPPING MATERIAL SHALL BE ASBESTOS AND LEAD-FREE AND SHALL NOT INCORPORATE NOR REQUIRE THE USE OF HAZARDOUS SOLVENTS.

30.2.4. FIRE-STOPPING SEALANTS MUST BE FLEXIBLE, ALLOWING FOR NORMAL MOVEMENT OF THE UTILITIES WHICH THEY PROTECT.

30.2.5. FIRE-STOPPING SEALANTS SHALL NOT SHRINK UPON DRYING, AS EVIDENCED BY CRACKING OR PULLING BACK FROM CONTACT SURFACES.

30.2.6. FIRE-STOPPING MATERIALS SHALL BE MOISTURE RESISTANT, AND MAY NOT DISSOLVE IN WATER AFTER CURING.

30.2.7. TO THE EXTENT THAT IS POSSIBLE, ALL FIRE-STOPPING MATERIALS SHALL BE MANUFACTURED BY ONE MANUFACTURER.

30.2.8. INSTALLATION OF FIRE-STOPPING SYSTEMS SHALL BE PERFORMED BY A CONTRACTOR TRAINED OR CERTIFIED BY THE FIRE-STOPPING MANUFACTURER, BUT IS ULTIMATELY THE RESPONSIBILITY OF EACH TRADE. MATERIAL USED SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS.

31. PROJECT CONDITIONS

31.1. CONFORM TO MANUFACTURER'S PRINTED INSTRUCTIONS FOR INSTALLATION AND WHEN APPLICABLE, CURING IN ACCORDANCE WITH TEMPERATURE AND HUMIDITY. CONFORM TO VENTILATION AND SAFETY REQUIREMENTS.

31.2. VERIFY THE CONDITION OF THE SUBSTRATES BEFORE STARTING WORK.

31.3. WEATHER CONDITIONS: DO NOT PROCEED WITH INSTALLATION OF FIRE-STOP MATERIALS WHEN TEMPERATURES FALL OUTSIDE OF THE MANUFACTURER'S SUGGESTED LIMITS.

31.4. CARE SHOULD BE TAKEN TO ENSURE THAT FIRE-STOPPING MATERIALS ARE INSTALLED SO AS NOT TO CONTAMINATE ADJACENT SURFACES.

32. CONDITIONS REQUIRING FIRE-STOPPING

32.1. GENERAL: PROVIDE FIRE-STOPPING FOR CONDITIONS SPECIFIED WHETHER OR NOT FIRE-STOPPING IS INDICATED, AND IF INDICATED, WHETHER SUCH MATERIAL IS DESIGNED AS INSULATION, SAFING OR OTHERWISE.

32.2. THROUGH-PENETRATIONS: FIRE-STOPPING SHALL BE INSTALLED IN ALL OPEN PENETRATIONS AND IN THE ANNULAR SPACE IN ALL PENETRATIONS IN ANY BEARING OR NON-BEARING FIRE-RATED BARRIER.

32.3. MEMBRANE PENETRATIONS: ALL MEMBRANE PENETRATIONS IN RATED WALLS SHALL BE PROTECTED WITH FIRE-STOPPING PRODUCTS THAT MEET THE REQUIREMENTS OF THIRD PARTY TIME/TEMPERATURE TESTING.

32.4. SMOKE-STOPPING: AS REQUIRED BY THE OTHER SECTIONS, SMOKE-STOPS SHALL BE PROVIDED FOR THROUGH-PENETRATIONS AND MEMBRANE PENETRATIONS, WITH A MATERIAL APPROVED AND TESTED FOR SUCH APPLICATIONS.

33. INSTALLATION

33.1. GENERAL: INSTALLATION OF FIRE-STOPS SHALL BE PERFORMED BY AN APPLICATOR/INSTALLER QUALIFIED AND TRAINED BY THE MANUFACTURER. INSTALLATION SHALL BE PERFORMED IN STRICT ACCORDANCE WITH MANUFACTURER'S DETAILED INSTALLATION PROCEDURES.

34. FIELD QUALITY CONTROL

34.1. PREPARE AND INSTALL FIRE-STOPPING SYSTEMS IN ACCORDANCE WITH MANUFACTURER'S PRINTED INSTRUCTIONS AND RECOMMENDATIONS.

34.2. FOLLOW SAFETY PROCEDURES RECOMMENDED IN THE MATERIAL SAFETY DATA SHEETS.

34.3. FINISH SURFACES OF FIRE-STOPPING WHICH ARE TO REMAIN EXPOSED IN THE COMPLETED WORK TO A UNIFORM AND LEVEL CONDITION.

34.4. ALL AREAS OF WORK MUST BE ACCESSIBLE UNTIL INSPECTION BY THE APPLICABLE CODE AUTHORITIES.

34.5. CORRECT UNACCEPTABLE FIRE-STOPS AND PROVIDE ADDITIONAL INSPECTION TO VERIFY COMPLIANCE WITH THIS SPECIFICATION.

35. CLEANING

35.1. REMOVE SPILLED AND EXCESS MATERIALS ADJACENT TO FIRE-STOPPING WITHOUT DAMAGING ADJACENT SURFACES.

35.2. LEAVE FINISHED WORK IN NEAT, CLEAN CONDITION WITH NO EVIDENCE OF SPILL OVERS OR DAMAGE TO ADJACENT SURFACES.

36. PROJECT CLOSEOUT, START UP OF SYSTEMS AND TRADE COMPLETION

36.1. EACH TRADE CONTRACTOR SHALL COMPLETE ALL WORK AS HEREIN SPECIFIED AND INDICATED ON DOCUMENTS.

36.2. UPON COMPLETION, CONTRACTOR SHALL NOTIFY, IN WRITING, THAT THE WORK HAS BEEN COMPLETED AND REVIEWED FOR COMPLIANCE BY THEIR SUPERVISORY STAFF AND IS READY FOR FINAL REVIEW (PUNCH LIST).

36.3. AN INTEGRAL PART OF THE CONTRACTOR'S COMPLETION PROCESS IS A START-UP LOG PER MANUFACTURER'S INSTALLATION RECOMMENDATIONS FOR EACH PIECE OF EQUIPMENT.

36.4. UPON RECEIPT OF THE ABOVE, THE ENGINEER WILL VISIT THE SITE AND PREPARE THE FINAL REVIEW COMMENTS (PUNCH LIST).

36.5. THIS LIST WILL BE RETURNED TO THE CONTRACTOR AND OWNER. AFTER EACH ITEM HAS BEEN CORRECTED, THE CONTRACTOR SHALL INITIAL/SIGN OFF THAT THE WORK HAS BEEN COMPLETED PRIOR TO FINAL PAYMENT.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004
CABLE BUILDING

STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO.	2021-32
DB:	
CB:	
DATE:	02/03/2022
SHEET NO:	**M200**

MECHANICAL SPECIFICATIONS

FOR CONSTRUCTION

HVAC DUCTWORK

1. QUALITY ASSURANCE

1.1. FIRE SAFETY CODE: COMPLY WITH NFPA 90A.

1.2. DUCT SYSTEM CONSTRUCTION AND INSTALLATION: REFERENCED SMACNA STANDARDS ARE THE MINIMUM ACCEPTABLE QUALITY.

1.3. DUCT SEALING, AIR LEAKAGE CRITERIA, AND AIR LEAKAGE TESTS: DUCTS SHALL BE SEALED AS PER DUCT SEALING REQUIREMENTS OF SMACNA HVAC AIR DUCT LEAKAGE TEST MANUAL FOR DUCT PRESSURE CLASSES SHOWN ON THE DRAWINGS.

1.4. DUCT ACCESSORIES EXPOSED TO THE AIR STREAM, SUCH AS DAMPERS OF ALL TYPES (EXCEPT SMOKE DAMPERS) AND ACCESS OPENINGS, SHALL BE OF THE SAME MATERIAL AS THE DUCT OR PROVIDE AT LEAST THE SAME LEVEL OF CORROSION RESISTANCE.

2. DUCT MATERIALS AND SEALANTS

2.1. GENERAL: EXCEPT FOR SYSTEMS SPECIFIED OTHERWISE, CONSTRUCT DUCTS, CASINGS, AND ACCESSORIES OF GALVANIZED SHEET STEEL, ASTM A653, COATING G90; OR, ALUMINUM SHEET, ASTM B209, ALLOY 1100, 3003 OR 5052.

2.2. SPECIFIED CORROSION RESISTANT SYSTEMS: STAINLESS STEEL SHEET, ASTM A167, CLASS 302 OR 304, CONDITION A (ANNEALED) FINISH NO. 4 FOR EXPOSED DUCTS AND FINISH NO. 2B FOR CONCEALED DUCT OR DUCTS LOCATED IN MECHANICAL ROOMS.

2.3. GREASE DUCT: DOUBLE WALL FACTORY_BUILT GREASE DUCT, UL LABELED AND COMPLYING WITH NFPA 96 MAY BE FURNISHED IN LIEU OF SPECIFIED MATERIALS FOR KITCHEN AND GRILL HOOD EXHAUST DUCT. INSTALLATION AND ACCESSORIES SHALL COMPLY WITH THE MANUFACTURERS CATALOG DATA. OUTER JACKET OF EXPOSED DUCTWORK SHALL BE STAINLESS STEEL. SQUARE AND RECTANGULAR DUCT SHOWN ON THE DRAWINGS WILL HAVE TO BE CONVERTED TO EQUIVALENT ROUND SIZE.

2.4. JOINT SEALING: REFER TO SMACNA HVAC DUCT CONSTRUCTION STANDARDS, PARAGRAPH S1.9.

2.4.1. SEALANT: ELASTOMERIC COMPOUND, GUN OR BRUSH GRADE, MAXIMUM 25 FLAME SPREAD AND 50 SMOKE DEVELOPED (DRY STATE) COMPOUNDED SPECIFICALLY FOR SEALING DUCTWORK AS RECOMMENDED BY THE MANUFACTURER. GENERALLY PROVIDE LIQUID SEALANT, WITH OR WITHOUT COMPATIBLE TAPE, FOR LOW CLEARANCE SLIP JOINTS AND HEAVY, PERMANENTLY ELASTIC, MASTIC TYPE WHERE CLEARANCES ARE LARGER. OIL BASE CAULKING AND GLAZING COMPOUNDS ARE NOT ACCEPTABLE BECAUSE THEY DO NOT RETAIN ELASTICITY AND BOND.

2.4.2. TAPE: USE ONLY TAPE SPECIFICALLY DESIGNATED BY THE SEALANT MANUFACTURER AND APPLY ONLY OVER WET SEALANT. PRESSURE SENSITIVE TAPE SHALL NOT BE USED ON BARE METAL OR ON DRY SEALANT.

2.4.3. GASKETS IN FLANGED JOINTS: SOFT NEOPRENE.

2.4.4. APPROVED FACTORY MADE JOINTS MAY BE USED.

3. DUCT CONSTRUCTION AND INSTALLATION

3.1. WET AIR EXHAUST DUCTS AND ACCESSORIES: DUCTS FOR DISHWASHERS, SCULLERY HOOD, CART WASHERS, MANUAL CART WASHERS, CAGE WASHERS, STEAM STERILIZER HOODS AND ORTHOTICS HOODS SHALL BE 1.3 MM (18 GAGE) STAINLESS STEEL MADE LIQUID TIGHT WITH CONTINUOUS EXTERNAL WELD FOR ALL SEAMS AND JOINTS. PROVIDE NEOPRENE GASKETS AT FLANGED CONNECTIONS. WHERE DUCTS ARE NOT SELF DRAINING BACK TO THE EQUIPMENT, PROVIDE LOW POINT DRAIN POCKET WITH COPPER DRAIN PIPE TO SANITARY SEWER. PROVIDE ACCESS DOOR IN SIDE OF DUCT AT DRAIN POCKETS.

3.2. KITCHEN AND GRILL HOOD (VENTILATOR) EXHAUST DUCTS: COMPLY WITH NFPA 96.

3.2.1. MATERIAL: 1.6 MM (16 GAGE) STEEL SHEET (BLACK IRON), ASTM A1011, OR 1.3 MM (18 GAGE) STAINLESS STEEL. USE STAINLESS STEEL FOR EXPOSED DUCT IN OCCUPIED AREAS. SEE OPTIONAL DUCT MATERIALS.

3.2.2. CONSTRUCTION: LIQUID TIGHT WITH CONTINUOUS EXTERNAL WELD FOR ALL SEAMS AND JOINTS. WHERE DUCTS ARE NOT SELF DRAINING BACK TO THE EQUIPMENT, PROVIDE LOW POINT DRAIN POCKET WITH COPPER DRAIN PIPE TO SANITARY SEWER. PROVIDE ACCESS DOORS OR PANELS FOR DUCT CLEANING INSIDE OF HORIZONTAL DUCT AT DRAIN POCKETS, AT 6 M (20 FEET) INTERVALS, AND AT EACH CHANGE OF DIRECTION.

3.2.3. ACCESS DOORS OR PANELS SHALL BE OF THE SAME MATERIAL AND THICKNESS OF THE DUCT WITH GASKETS AND SEALANTS THAT ARE RATED 815 DEGREES C (1500 DEGREES F) AND SHALL BE GREASE-TIGHT.

3.2.4. GREASE DUCT: DOUBLE-WALL FACTORY-BUILT GREASE DUCT, UL LABELED AND COMPLYING WITH NFPA 96 MAY BE FURNISHED IN LIEU OF SPECIFIED MATERIALS FOR KITCHEN AND GRILL HOOD EXHAUST. INSTALLATION AND ACCESSORIES SHALL COMPLY WITH THE MANUFACTURERS CATALOG DATA. OUTER JACKET OF EXPOSED DUCTWORK SHALL BE STAINLESS STEEL. SQUARE AND RECTANGULAR DUCT SHOWN IN THE DRAWINGS WILL HAVE TO BE CONVERTED TO EQUIVALENT ROUND SIZE.

3.3. DUCT FOR NEGATIVE PRESSURE UP TO 750 PA (3 INCH W.G.):

3.3.1. ROUND DUCT: GALVANIZED STEEL, SPIRAL LOCK SEAM CONSTRUCTION WITH STANDARD SLIP JOINTS.

3.3.2. RECTANGULAR DUCT: GALVANIZED STEEL, MINIMUM 1.0 MM (20 GAGE), PITTSBURGH LOCK SEAM, COMPANION ANGLE JOINTS 32 MM BY 3.2 MM (1_1/4 BY 1/8 INCH) MINIMUM AT NOT MORE THAN 2.4 M (8 FEET) SPACING. APPROVED PRE-MANUFACTURED JOINTS ARE ACCEPTABLE IN LIEU OF COMPANION ANGLES.

3.4. ROUND AND FLAT OVAL DUCTS: FURNISH DUCT AND FITTINGS MADE BY THE SAME MANUFACTURER TO ENSURE GOOD FIT OF SLIP JOINTS. WHEN SUBMITTED AND APPROVED IN ADVANCE, ROUND AND FLAT OVAL DUCT, WITH SIZE CONVERTED ON THE BASIS OF EQUAL PRESSURE DROP, MAY BE FURNISHED IN LIEU OF RECTANGULAR DUCT DESIGN SHOWN ON THE DRAWINGS.

3.5. ELBOWS: DIAMETERS 80 THROUGH 200 MM (3 THROUGH 8 INCHES) SHALL BE TWO SECTIONS DIE STAMPED, ALL OTHERS SHALL BE GORED CONSTRUCTION, MAXIMUM 18 DEGREE ANGLE, WITH ALL SEAMS CONTINUOUSLY WELDED OR STANDING SEAM. COAT GALVANIZED AREAS OF FITTINGS DAMAGED BY WELDING WITH CORROSION RESISTANT ALUMINUM PAINT OR GALVANIZED REPAIR COMPOUND.

3.6. PROVIDE BELL MOUTH, CONICAL TEES OR TAPS, LATERALS, REDUCERS, AND OTHER LOW LOSS FITTINGS AS SHOWN IN SMACNA HVAC DUCT CONSTRUCTION STANDARDS.

3.7. RIBBED DUCT OPTION: LIGHTER GAGE ROUND/OVAL DUCT AND FITTINGS MAY BE FURNISHED PROVIDED CERTIFIED TESTS INDICATING THAT THE RIGIDITY AND PERFORMANCE IS EQUIVALENT TO SMACNA STANDARD GAGE DUCTS ARE SUBMITTED.

3.7.1. DUCTS: MANUFACTURER'S PUBLISHED STANDARD GAGE, G90 COATING, SPIRAL LOCK SEAM CONSTRUCTION WITH AN INTERMEDIATE STANDING RIB.

3.7.2. FITTINGS: MAY BE MANUFACTURER'S STANDARD AS SHOWN IN PUBLISHED CATALOGS, FABRICATED BY SPOT WELDING AND BONDING WITH NEOPRENE BASE CEMENT OR MACHINE FORMED SEAM IN LIEU OF CONTINUOUS WELDED SEAMS.

3.8. PROVIDE FLAT SIDE REINFORCEMENT OF OVAL DUCTS AS RECOMMENDED BY THE MANUFACTURER AND SMACNA HVAC DUCT CONSTRUCTION STANDARD S3.13. BECAUSE OF HIGH PRESSURE LOSS, DO NOT USE INTERNAL TIE_ROD REINFORCEMENT UNLESS APPROVED BY THE OWNER.

3.9. CASINGS AND PLENUMS: CONSTRUCT IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS SECTION 6, INCLUDING CURBS, ACCESS DOORS, PIPE PENETRATIONS, ELIMINATORS AND DRAIN PANS. ACCESS DOORS SHALL BE HOLLOW METAL, INSULATED, WITH LATCHES AND DOOR PULLS, 500 MM (20 INCHES) WIDE BY 1200 - 1350 MM (48 _ 54 INCHES) HIGH. PROVIDE VIEW PORT IN THE DOORS WHERE SHOWN. PROVIDE DRAIN FOR OUTSIDE AIR LOUVER PLENUM. OUTSIDE AIR PLENUM SHALL HAVE EXTERIOR INSULATION. DRAIN PIPING SHALL BE ROUTED TO THE NEAREST FLOOR DRAIN.

3.10. VOLUME DAMPERS: SINGLE BLADE OR OPPOSED BLADE, MULTI_LOUVER TYPE AS DETAILED IN SMACNA STANDARDS. REFER TO SMACNA DETAIL FIGURE 2-12 FOR SNGLE BLADE AND FIGURE 2.13 FOR MULTI-BLADE VOLUME DAMPERS.

3.11. DUCT HANGERS AND SUPPORTS: REFER TO SMACNA STANDARDS SECTION IV. AVOID USE OF TRAPEZE HANGERS FOR ROUND DUCT.

4. DUCT ACCESS DOORS, PANELS AND SECTION

4.1. PROVIDE ACCESS DOORS, SIZED AND LOCATED FOR MAINTENANCE WORK, UPSTREAM, IN THE FOLLOWING LOCATIONS:

4.1.1. EACH DUCT MOUNTED COIL AND HUMIDIFIER.
4.1.2. EACH FIRE DAMPER (FOR LINK SERVICE), SMOKE DAMPER AND AUTOMATIC CONTROL DAMPER.

4.1.3. EACH DUCT MOUNTED SMOKE DETECTOR.

4.1.4. FOR CLEANING KITCHEN HOOD EXHAUST DUCT, LOCATE ACCESS DOORS AT 6 M (20 FEET) INTERVALS AND AT EACH CHANGE IN DUCT DIRECTION.

4.2. OPENINGS SHALL BE AS LARGE AS FEASIBLE IN SMALL DUCTS, 300 MM BY 300 MM (12 INCH BY 12 INCH) MINIMUM WHERE POSSIBLE. ACCESS SECTIONS IN INSULATED DUCTS SHALL BE DOUBLE_WALL, INSULATED. TRANSPARENT SHATTERPROOF COVERS ARE PREFERRED FOR UNINSULATED DUCTS.

4.2.1. FOR RECTANGULAR DUCTS: REFER TO SMACNA HVAC DUCT CONSTRUCTION STANDARDS (FIGURE 2_12).

4.2.2. FOR ROUND AND FLAT OVAL DUCT: REFER TO SMACNA HVAC DUCT CONSTRUCTION STANDARDS (FIGURE 2-11).

5. FIRE DOORS

5.1. GALVANIZED STEEL, INTERLOCKING BLADE TYPE, UL LISTING AND LABEL, 71 DEGREES C (160 DEGREES F) FUSIBLE LINK, 3 HOUR RATING AND APPROVED FOR OPENINGS IN CLASS A FIRE WALLS WITH RATING UP TO 4 HOURS, 100 PERCENT FREE OPENING WITH NO PART OF THE BLADE STACK OR DAMPER FRAME IN THE AIR STREAM.

6. FLEXIBLE DUCT CONNECTIONS

6.1. WHERE DUCT CONNECTIONS ARE MADE TO FANS, AIR TERMINAL UNITS, AND AIR HANDLING UNITS, INSTALL A NON_COMBUSTIBLE FLEXIBLE CONNECTION OF 822 G (29 OUNCE) NEOPRENE COATED FIBERGLASS FABRIC APPROXIMATELY 150 MM (6 INCHES) WIDE. FOR CONNECTIONS EXPOSED TO SUN AND WEATHER PROVIDE HYPALON COATING IN LIEU OF NEOPRENE. BURNING CHARACTERISTICS SHALL CONFORM TO NFPA 90A. SECURELY FASTEN FLEXIBLE CONNECTIONS TO ROUND DUCTS WITH STAINLESS STEEL OR ZINC_COATED IRON DRAW BANDS WITH WORM GEAR FASTENER. FOR RECTANGULAR CONNECTIONS, CRIMP FABRIC TO SHEET METAL AND FASTEN SHEET METAL TO DUCTS BY SCREWS 50 MM (2 INCHES) ON CENTER. FABRIC SHALL NOT BE STRESSED OTHER THAN BY AIR PRESSURE. ALLOW AT LEAST 25 MM (ONE INCH) SLACK TO INSURE THAT NO VIBRATION IS TRANSMITTED.

7. PREFABRICATED ROOF CURBS

7.1. GALVANIZED STEEL OR EXTRUDED ALUMINUM 300 MM (12 INCHES) ABOVE FINISH ROOF SERVICE, CONTINUOUS WELDED CORNER SEAMS, TREATED WOOD NAILER, 40 MM (1_1/2 INCH) THICK, 48 KG/CUBIC METER (3 POUND/CUBIC FEET) DENSITY RIGID MINERAL FIBERBOARD INSULATION WITH METAL LINER, BUILT_IN CANT STRIP (EXCEPT FOR GYPSUM OR TECTUM DECKS). FOR SURFACE INSULATED ROOF DECK, PROVIDE RAISED CANT STRIP (RECESSED MOUNTING FLANGE) TO START AT THE UPPER SURFACE OF THE INSULATION. CURBS SHALL BE CONSTRUCTED FOR PITCHED ROOF OR RIDGE MOUNTING AS REQUIRED TO KEEP TOP OF CURB LEVEL.

7.2. COORDINATE ALL NEW ROOF CURBS WITH EXISTING STRUCTURE AND ROOFING. ALL TIE-INS TO EXISTING STRUCTURE SHALL BE MADE WITH MEANS, METHODS AND MATERIALS AS DIRECTED AND APPROVED BY A LICENSED STRUCTURAL ENGINEER.

8. INSTALLATION

8.1. FABRICATE AND INSTALL DUCTWORK AND ACCESSORIES IN ACCORDANCE WITH REFERENCED SMACNA STANDARDS:

8.2. DRAWINGS SHOW THE GENERAL LAYOUT OF DUCTWORK AND ACCESSORIES BUT DO NOT SHOW ALL REQUIRED FITTINGS AND OFFSETS THAT MAY BE NECESSARY TO CONNECT DUCTS TO EQUIPMENT, BOXES, DIFFUSERS, GRILLES, ETC., AND TO COORDINATE WITH OTHER TRADES. FABRICATE DUCTWORK BASED ON FIELD MEASUREMENTS. PROVIDE ALL NECESSARY FITTINGS AND OFFSETS AT NO ADDITIONAL COST TO THE GOVERNMENT. COORDINATE WITH OTHER TRADES FOR SPACE AVAILABLE AND RELATIVE LOCATION OF HVAC EQUIPMENT AND ACCESSORIES ON CEILING GRID. DUCT SIZES ON THE DRAWINGS ARE INSIDE DIMENSIONS WHICH SHALL BE ALTERED BY CONTRACTOR TO OTHER DIMENSIONS WITH THE SAME AIR HANDLING CHARACTERISTICS WHERE NECESSARY TO AVOID INTERFERENCES AND CLEARANCE DIFFICULTIES.

8.3. PROVIDE DUCT TRANSITIONS, OFFSETS AND CONNECTIONS TO DAMPERS, COILS, AND OTHER EQUIPMENT IN ACCORDANCE WITH SMACNA STANDARDS, SECTION II. PROVIDE STREAMLINER, WHEN AN OBSTRUCTION CANNOT BE AVOIDED AND MUST BE TAKEN IN BY A DUCT. REPAIR GALVANIZED AREAS WITH GALVANIZING REPAIR COMPOUND.

8.4. PROVIDE BOLTED CONSTRUCTION AND TIE_ROD REINFORCEMENT IN ACCORDANCE WITH SMACNA STANDARDS.

8.5. CONSTRUCT CASINGS, ELIMINATORS, AND PIPE PENETRATIONS IN ACCORDANCE WITH SMACNA STANDARDS, CHAPTER 6. DESIGN CASING ACCESS DOORS TO SWING AGAINST AIR PRESSURE SO THAT PRESSURE HELPS TO MAINTAIN A TIGHT SEAL.

8.6. INSTALL DUCT HANGERS AND SUPPORTS IN ACCORDANCE WITH SMACNA STANDARDS, CHAPTER 4.

8.7. INSTALL FIRE DAMPERS, SMOKE DAMPERS AND COMBINATION FIRE/SMOKE DAMPERS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO CONFORM TO THE INSTALLATION USED FOR THE RATING TEST. INSTALL FIRE DAMPERS, SMOKE DAMPERS AND COMBINATION FIRE/SMOKE DAMPERS AT LOCATIONS INDICATED AND WHERE DUCTS PENETRATE FIRE RATED AND/OR SMOKE RATED WALLS, SHAFTS AND WHERE REQUIRED BY THE RESIDENT ENGINEER. INSTALL WITH REQUIRED PERIMETER MOUNTING ANGLES, SLEEVES, BREAKAWAY DUCT CONNECTIONS, CORROSION RESISTANT SPRINGS, BEARINGS, BUSHINGS AND HINGES PER UL AND NFPA. DEMONSTRATE RE_SETTING OF FIRE DAMPERS AND OPERATION OF SMOKE DAMPERS TO THE RESIDENT ENGINEER.

8.8. SEAL OPENINGS AROUND DUCT PENETRATIONS OF FLOORS AND FIRE RATED PARTITIONS WITH FIRE STOP MATERIAL AS REQUIRED BY NFPA 90A.

8.9. WHERE DIFFUSERS, REGISTERS AND GRILLES CANNOT BE INSTALLED TO AVOID SEEING INSIDE THE DUCT, PAINT THE INSIDE OF THE DUCT WITH FLAT BLACK PAINT TO REDUCE VISIBILITY.

8.10. CONTROL DAMPER INSTALLATION:

8.10.1. PROVIDE NECESSARY BLANK_OFF PLATES REQUIRED TO INSTALL DAMPERS THAT ARE SMALLER THAN DUCT SIZE. PROVIDE NECESSARY TRANSITIONS REQUIRED TO INSTALL DAMPERS LARGER THAN DUCT SIZE.

8.10.2. ASSEMBLE MULTIPLE SECTIONS DAMPERS WITH REQUIRED INTERCONNECTING LINKAGE AND EXTEND REQUIRED NUMBER OF SHAFTS THROUGH DUCT FOR EXTERNAL MOUNTING OF DAMPER MOTORS.

8.10.3. PROVIDE NECESSARY SHEET METAL BAFFLE PLATES TO ELIMINATE STRATIFICATION AND PROVIDE AIR VOLUMES SPECIFIED. LOCATE BAFFLES BY EXPERIMENTATION, AND AFFIX AND SEAL PERMANENTLY IN PLACE, ONLY AFTER STRATIFICATION PROBLEM HAS BEEN ELIMINATED.

8.10.4. INSTALL ALL DAMPER CONTROL/ADJUSTMENT DEVICES ON STAND-OFFS TO ALLOW COMPLETE COVERAGE OF INSULATION.

8.10.5. PROTECTION AND CLEANING: ADEQUATELY PROTECT EQUIPMENT AND MATERIALS AGAINST PHYSICAL DAMAGE. PLACE EQUIPMENT IN FIRST CLASS OPERATING CONDITION, OR RETURN TO SOURCE OF SUPPLY FOR REPAIR OR REPLACEMENT, AS DETERMINED BY RESIDENT ENGINEER. PROTECT EQUIPMENT AND DUCTS DURING CONSTRUCTION AGAINST ENTRY OF FOREIGN MATTER TO THE INSIDE AND CLEAN BOTH INSIDE AND OUTSIDE BEFORE OPERATION AND PAINTING. WHEN NEW DUCTS ARE CONNECTED TO EXISTING DUCTWORK, CLEAN BOTH NEW AND EXISTING DUCTWORK BY MOPPING AND VACUUM CLEANING INSIDE AND OUTSIDE BEFORE OPERATION.

9. DUCT LEAKAGE TEST AND REPAIR

9.1. DUCTWORK LEAKAGE TESTING SHALL BE PERFORMED BY THE TESTING AND BALANCING CONTRACTOR DIRECTLY CONTRACTED BY THE GENERAL CONTRACTOR AND INDEPENDENT OF THE SHEET METAL CONTRACTOR.

9.2. DUCTWORK LEAKAGE TESTING SHALL BE PERFORMED FOR THE ENTIRE AIR DISTRIBUTION SYSTEM (INCLUDING ALL SUPPLY, RETURN, EXHAUST AND RELIEF DUCTWORK), SECTION BY SECTION, INCLUDING FANS, COILS AND FILTER SECTIONS. BASED UPON SATISFACTORY INITIAL DUCT LEAKAGE TEST RESULTS, THE SCOPE OF THE TESTING MAY BE REDUCED BY THE ENGINEER ON DUCTWORK CONSTRUCTED TO THE 500 PA (2" WG) DUCT PRESSURE CLASSIFICATION. IN NO CASE SHALL THE LEAKAGE TESTING OF DUCTWORK CONSTRUCTED ABOVE THE 500 PA (2" WG) DUCT PRESSURE CLASSIFICATION OR DUCTWORK LOCATED IN SHAFTS OR OTHER INACCESSIBLE AREAS BE ELIMINATED.

9.3. TEST PROCEDURE, APPARATUS AND REPORT SHALL CONFORM TO SMACNA LEAKAGE TEST MANUAL. THE MAXIMUM LEAKAGE RATE ALLOWED IS 4 PERCENT OF THE DESIGN AIR FLOW RATE.

9.4. ALL DUCTWORK SHALL BE LEAK TESTED FIRST BEFORE ENCLOSED IN A SHAFT OR COVERED IN OTHER INACCESSIBLE AREAS.

9.5. ALL TESTS SHALL BE PERFORMED IN THE PRESENCE OF THE RESIDENT ENGINEER AND THE TEST AND BALANCE AGENCY. THE TEST AND BALANCE AGENCY SHALL MEASURE AND RECORD DUCT LEAKAGE AND REPORT TO THE OWNER/ENGINEER AND IDENTIFY LEAKAGE SOURCE WITH EXCESSIVE LEAKAGE.

9.6. IF ANY PORTION OF THE DUCT SYSTEM TESTED FAILS TO MEET THE PERMISSIBLE LEAKAGE LEVEL, THE CONTRACTOR SHALL RECTIFY SEALING OF DUCTWORK TO BRING IT INTO COMPLIANCE AND SHALL RETEST IT UNTIL ACCEPTABLE LEAKAGE IS DEMONSTRATED TO THE OWNER/ENGINEER.

9.7. ALL TESTS AND NECESSARY REPAIRS SHALL BE COMPLETED PRIOR TO INSULATION OR CONCEALMENT OF DUCTWORK.

9.9. MAKE SURE ALL OPENINGS USED FOR TESTING FLOW AND TEMPERATURES BY TAB CONTRACTOR ARE SEALED PROPERLY.

10. DUCTWORK EXPOSED TO WIND VELOCITY

10.1. PROVIDE ADDITIONAL SUPPORT AND BRACING TO ALL EXPOSED DUCTWORK INSTALLED ON THE ROOF OR OUTSIDE THE BUILDING TO WITHSTAND WIND VELOCITY OF 90 MPH.

TESTING, ADJUSTING AND BALANCING

1. GENERAL DESCRIPTION

1.1. TESTING, ADJUSTING, AND BALANCING (TAB) OF HEATING, VENTILATING AND AIR CONDITIONING (HVAC) SYSTEMS. TAB INCLUDES THE FOLLOWING:
1.1.1. PLANNING SYSTEMATIC TAB PROCEDURES.
1.1.2. DESIGN REVIEW REPORT.
1.1.3. SYSTEMS INSPECTION REPORT.
1.1.4. DUCT AIR LEAKAGE TEST REPORT.
1.1.5. SYSTEMS READINESS REPORT.

1.2. BALANCING AIR AND WATER DISTRIBUTION SYSTEMS; ADJUSTMENT OF TOTAL SYSTEM TO PROVIDE DESIGN PERFORMANCE; AND TESTING PERFORMANCE OF EQUIPMENT AND AUTOMATIC CONTROLS.

1.3. VIBRATION AND SOUND MEASUREMENTS.

1.4. RECORDING AND REPORTING RESULTS.

2. DEFINITIONS

2.1. HYDRONIC SYSTEMS: INCLUDES CHILLED WATER, CONDENSER WATER, HEATING HOT WATER AND GLYCOL_WATER SYSTEMS.
2.2. AIR SYSTEMS: INCLUDES ALL OUTSIDE AIR, SUPPLY AIR, RETURN AIR, EXHAUST AIR AND RELIEF AIR SYSTEMS.
2.3. FLOW RATE TOLERANCE: THE ALLOWABLE PERCENTAGE VARIATION, MINUS TO PLUS, OF ACTUAL FLOW RATE FROM VALUES (DESIGN) IN THE CONTRACT DOCUMENTS.

3. QUALIFICATIONS

3.1. TAB AGENCY: THE TAB AGENCY SHALL BE A SUBCONTRACTOR OF THE GENERAL CONTRACTOR AND SHALL REPORT TO AND BE PAID BY THE GENERAL CONTRACTOR.

3.2. THE TAB AGENCY SHALL BE EITHER A CERTIFIED MEMBER OF AABC OR CERTIFIED BY THE NEBB TO PERFORM TAB SERVICE FOR HVAC, WATER BALANCING AND VIBRATIONS AND SOUND TESTING OF EQUIPMENT. THE CERTIFICATION SHALL BE MAINTAINED FOR THE ENTIRE DURATION OF DUTIES SPECIFIED HEREIN. IF, FOR ANY REASON, THE AGENCY LOSES SUBJECT CERTIFICATION DURING THIS PERIOD, THE GENERAL CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER AND SUBMIT ANOTHER TAB FIRM FOR APPROVAL. ANY AGENCY THAT HAS BEEN THE SUBJECT OF DISCIPLINARY ACTION BY EITHER THE AABC OR THE NEBB WITHIN THE FIVE YEARS PRECEDING CONTRACT AWARD SHALL NOT BE ELIGIBLE TO PERFORM ANY WORK RELATED TO THE TAB. ALL WORK PERFORMED IN THIS SECTION AND IN OTHER RELATED SECTIONS BY THE TAB AGENCY SHALL BE CONSIDERED INVALID IF THE TAB AGENCY LOSES ITS CERTIFICATION PRIOR TO CONTRACT COMPLETION, AND THE SUCCESSOR AGENCY'S REVIEW SHOWS UNSATISFACTORY WORK PERFORMED BY THE PREDECESSOR AGENCY.

3.3. TAB SPECIALIST: THE TAB SPECIALIST SHALL BE EITHER A MEMBER OF AABC OR AN EXPERIENCED TECHNICIAN OF THE AGENCY CERTIFIED BY NEBB. THE CERTIFICATION SHALL BE MAINTAINED FOR THE ENTIRE DURATION OF DUTIES SPECIFIED HEREIN. IF, FOR ANY REASON, THE SPECIALIST LOSES SUBJECT CERTIFICATION DURING THIS PERIOD, THE GENERAL CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER AND SUBMIT ANOTHER TAB SPECIALIST FOR APPROVAL. ANY INDIVIDUAL THAT HAS BEEN THE SUBJECT OF DISCIPLINARY ACTION BY EITHER THE AABC OR THE NEBB WITHIN THE FIVE YEARS PRECEDING CONTRACT AWARD SHALL NOT BE ELIGIBLE TO PERFORM ANY DUTIES RELATED TO THE HVAC SYSTEMS, INCLUDING TAB. ALL WORK SPECIFIED IN THIS SECTION AND IN OTHER RELATED SECTIONS PERFORMED BY THE TAB SPECIALIST SHALL BE CONSIDERED INVALID IF THE TAB SPECIALIST LOSES ITS CERTIFICATION PRIOR TO CONTRACT COMPLETION AND MUST BE PERFORMED BY AN APPROVED SUCCESSOR.

3.4. TAB SPECIALIST SHALL BE IDENTIFIED BY THE GENERAL CONTRACTOR WITHIN 60 DAYS AFTER THE NOTICE TO PROCEED. THE TAB SPECIALIST WILL BE COORDINATING, SCHEDULING AND REPORTING ALL TAB WORK AND RELATED ACTIVITIES AND WILL PROVIDE NECESSARY INFORMATION AS REQUIRED BY THE OWNER. THE RESPONSIBILITIES WOULD SPECIFICALLY INCLUDE:

3.4.1. SHALL DIRECTLY SUPERVISE ALL TAB WORK.

3.4.2. SHALL SIGN THE TAB REPORTS THAT BEAR THE SEAL OF THE TAB STANDARD. THE REPORTS SHALL BE ACCOMPANIED BY REPORT FORMS AND SCHEMATIC DRAWINGS REQUIRED BY THE TAB STANDARD, AABC OR NEBB.

3.4.3. WOULD FOLLOW ALL TAB WORK THROUGH ITS SATISFACTORY COMPLETION.

3.4.4. SHALL PROVIDE FINAL MARKINGS OF SETTINGS OF ALL HVAC ADJUSTMENT DEVICES.

3.4.5. PERMANENTLY MARK LOCATION OF DUCT TEST PORTS.

3.5. ALL TAB TECHNICIANS PERFORMING ACTUAL TAB WORK SHALL BE EXPERIENCED AND MUST HAVE DONE SATISFACTORY WORK ON A MINIMUM OF 3 PROJECTS COMPARABLE IN SIZE AND COMPLEXITY TO THIS PROJECT. QUALIFICATIONS MUST BE CERTIFIED BY THE TAB AGENCY IN WRITING. THE LEAD TECHNICIAN SHALL BE CERTIFIED BY AABC OR NEBB

3.6. TEST EQUIPMENT CRITERIA: THE INSTRUMENTATION SHALL MEET THE ACCURACY/CALIBRATION REQUIREMENTS ESTABLISHED BY AABC NATIONAL STANDARDS OR BY NEBB PROCEDURAL STANDARDS FOR TESTING, ADJUSTING AND BALANCING OF ENVIRONMENTAL SYSTEMS AND INSTRUMENT MANUFACTURER. PROVIDE CALIBRATION HISTORY OF THE INSTRUMENTS TO BE USED FOR TEST AND BALANCE PURPOSE.

3.7. TAB CRITERIA:

3.7.1. ONE OR MORE OF THE APPLICABLE AABC, NEBB OR SMACNA PUBLICATIONS, SUPPLEMENTED BY ASHRAE HANDBOOK "HVAC APPLICATIONS" CHAPTER 38, AND REQUIREMENTS STATED HEREIN SHALL BE THE BASIS FOR PLANNING, PROCEDURES, AND REPORTS.

3.7.2. FLOW RATE TOLERANCE: FOLLOWING TOLERANCES ARE ALLOWED. FOR TOLERANCES NOT MENTIONED HEREIN FOLLOW 2011 ASHRAE HANDBOOK "HVAC APPLICATIONS", CHAPTER 38, AS A GUIDELINE. AIR FILTER RESISTANCE DURING TESTS, ARTIFICIALLY IMPOSED IF NECESSARY, SHALL BE AT LEAST 100 PERCENT OF MANUFACTURER RECOMMENDED CHANGE OVER PRESSURE DROP VALUES FOR PRE-FILTERS AND AFTER-FILTERS.

3.7.3. AIR HANDLING UNIT AND ALL OTHER FANS, CUBIC METERS/MIN (CUBIC FEET PER MINUTE): MINUS 0 PERCENT TO PLUS 10 PERCENT.

3.7.4. AIR TERMINAL UNITS (MAXIMUM VALUES): MINUS 2 PERCENT TO PLUS L0 PERCENT.

3.7.5. EXHAUST HOODS/CABINETS: 0 PERCENT TO PLUS L0 PERCENT.

3.7.6. MINIMUM OUTSIDE AIR: 0 PERCENT TO PLUS 10 PERCENT.

3.7.7. INDIVIDUAL ROOM AIR OUTLETS AND INLETS, AND AIR FLOW RATES NOT MENTIONED ABOVE: MINUS 5 PERCENT TO PLUS L0 PERCENT EXCEPT IF THE AIR TO A SPACE IS 100 CFM OR LESS THE TOLERANCE WOULD BE MINUS 5 TO PLUS 5 PERCENT.

3.7.8. HEATING HOT WATER PUMPS AND HOT WATER COILS: MINUS 5 PERCENT TO PLUS 5 PERCENT.

3.7.9. CHILLED WATER AND CONDENSER WATER PUMPS: MINUS 0 PERCENT TO PLUS 5 PERCENT.

3.7.10. CHILLED WATER COILS: MINUS 0 PERCENT TO PLUS 5 PERCENT.

3.8. SYSTEMS SHALL BE ADJUSTED FOR ENERGY EFFICIENT OPERATION AS DESCRIBED IN PART 3.

3.9. TYPICAL TAB PROCEDURES AND RESULTS SHALL BE DEMONSTRATED TO THE OWNER FOR ONE AIR DISTRIBUTION SYSTEM (INCLUDING ALL FANS, THREE TERMINAL UNITS, THREE ROOMS RANDOMLY SELECTED BY THE OWNER) AND ONE HYDRONIC SYSTEM (PUMPS AND THREE COILS) AS FOLLOWS:

3.10. WHEN FIELD TAB WORK BEGINS.

3.11. DURING EACH PARTIAL FINAL INSPECTION AND THE FINAL INSPECTION FOR THE PROJECT IF REQUESTED BY OWNER.

4. SUBMITTALS

4.1. SUBMIT FOLLOWING FOR REVIEW AND APPROVAL:

4.1.1. DESIGN REVIEW REPORT WITHIN 30 DAYS FOR CONVENTIONAL DESIGN PROJECTS AND WITHIN 30 DAYS FOR DESIGN-BUILD PROJECTS AFTER THE SYSTEM LAYOUT ON AIR AND WATER SIDE IS COMPLETED BY THE CONTRACTOR.

4.1.2. SYSTEMS INSPECTION REPORT ON EQUIPMENT AND INSTALLATION FOR CONFORMANCE WITH DESIGN.

4.1.3. DUCT AIR LEAKAGE TEST REPORT.

4.1.4. SYSTEMS READINESS REPORT.

4.1.5. INTERMEDIATE AND FINAL TAB REPORTS COVERING FLOW BALANCE AND ADJUSTMENTS, PERFORMANCE TESTS, VIBRATION TESTS AND SOUND TESTS.

4.1.6. INCLUDE IN FINAL REPORTS UNCORRECTED INSTALLATION DEFICIENCIES NOTED DURING TAB AND APPLICABLE EXPLANATORY COMMENTS ON TEST RESULTS THAT DIFFER FROM DESIGN REQUIREMENTS.

4.2. PRIOR TO REQUEST FOR FINAL OR PARTIAL FINAL INSPECTION, SUBMIT COMPLETED TEST AND BALANCE REPORT FOR THE AREA.

5. TEST-PORT PLUGS

5.1. PROVIDE PLASTIC PLUGS TO SEAL HOLES DRILLED IN DUCTWORK FOR TEST PURPOSES.

6. EXECTUON

6.1. OBTAIN APPLICABLE CONTRACT DOCUMENTS AND COPIES OF APPROVED SUBMITTALS FOR HVAC EQUIPMENT AND AUTOMATIC CONTROL SYSTEMS.

6.2. DESIGN REVIEW REPORT

6.2.1. THE TAB SPECIALIST SHALL REVIEW THE CONTRACT PLANS AND SPECIFICATIONS AND ADVISE THE OWNER OF ANY DESIGN DEFICIENCIES THAT WOULD PREVENT THE HVAC SYSTEMS FROM EFFECTIVELY OPERATING IN ACCORDANCE WITH THE SEQUENCE OF OPERATION SPECIFIED OR PREVENT THE EFFECTIVE AND ACCURATE TAB OF THE SYSTEM. THE TAB SPECIALIST SHALL PROVIDE A REPORT INDIVIDUALLY LISTING EACH DEFICIENCY AND THE CORRESPONDING PROPOSED CORRECTIVE ACTION NECESSARY FOR PROPER SYSTEM OPERATION.

6.3. SYSTEMS INSPECTION REPORT

6.3.1. INSPECT EQUIPMENT AND INSTALLATION FOR CONFORMANCE WITH DESIGN.

6.3.2. THE INSPECTION AND REPORT IS TO BE DONE AFTER AIR DISTRIBUTION EQUIPMENT IS ON SITE AND DUCT INSTALLATION HAS BEGUN, BUT WELL IN ADVANCE OF PERFORMANCE TESTING AND BALANCING WORK. THE PURPOSE OF THE INSPECTION IS TO IDENTIFY AND REPORT DEVIATIONS FROM DESIGN AND ENSURE THAT SYSTEMS WILL BE READY FOR TAB AT THE APPROPRIATE TIME.

6.3.3. REPORTS: FOLLOW CHECK LIST FORMAT DEVELOPED BY AABC, NEBB OR SMACNA, SUPPLEMENTED BY NARRATIVE COMMENTS, WITH EMPHASIS ON AIR HANDLING UNITS AND FANS. CHECK FOR CONFORMANCE WITH SUBMITTALS. VERIFY THAT DIFFUSER AND REGISTER SIZES ARE CORRECT. CHECK AIR TERMINAL UNIT INSTALLATION INCLUDING THEIR DUCT SIZES AND ROUTING.

6.4. DUCT AIR LEAKAGE TEST REPORT

6.4.1. TAB AGENCY SHALL PERFORM THE LEAKAGE TEST ACCORDING TO ASHRAE/SMACNA STANDARDS.

6.5. SYSTEM READINESS REPORT

6.5.1. THE TAB CONTRACTOR SHALL MEASURE EXISTING AIR AND WATER FLOW RATES ASSOCIATED WITH EXISTING SYSTEMS UTILIZED TO SERVE RENOVATED AREAS AS INDICATED ON DRAWINGS. SUBMIT REPORT OF FINDINGS TO OWNER.

6.5.2. INSPECT EACH SYSTEM TO ENSURE THAT IT IS COMPLETE INCLUDING INSTALLATION AND OPERATION OF CONTROLS. SUBMIT REPORT TO OWNER IN STANDARD FORMAT AND FORMS PREPARED AND OR APPROVED BY THE COMMISSIONING AGENT.

6.5.3. VERIFY THAT ALL ITEMS SUCH AS DUCTWORK PIPING, PORTS, TERMINALS, CONNECTORS, ETC., THAT IS REQUIRED FOR TAB ARE INSTALLED. PROVIDE A REPORT TO THE OWNER.

6.6. TAB REPORTS

6.6.1. SUBMIT AN INTERMEDIATE REPORT FOR 50 PERCENT OF SYSTEMS AND EQUIPMENT TESTED AND BALANCED TO ESTABLISH SATISFACTORY TEST RESULTS.

6.6.2. THE TAB CONTRACTOR SHALL PROVIDE RAW DATA IMMEDIATELY IN WRITING TO THE OWNER IF THERE IS A PROBLEM IN ACHIEVING INTENDED RESULTS BEFORE SUBMITTING A FORMAL REPORT.

6.6.3. IF OVER 20 PERCENT OF READINGS IN THE INTERMEDIATE REPORT FALL OUTSIDE THE ACCEPTABLE RANGE, THE TAB REPORT SHALL BE CONSIDERED INVALID AND ALL CONTRACT TAB WORK SHALL BE REPEATED AND RE-SUBMITTED FOR APPROVAL AT NO ADDITIONAL COST TO THE OWNER.

6.6.4. DO NOT PROCEED WITH THE REMAINING SYSTEMS UNTIL INTERMEDIATE REPORT IS APPROVED BY THE OWNER.

6.7. TAB PROCEDURES

6.7.1. TAB SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENT OF THE STANDARD UNDER WHICH TAB AGENCY IS CERTIFIED BY EITHER AABC OR NEBB.

6.7.2. GENERAL: DURING TAB ALL RELATED SYSTEM COMPONENTS SHALL BE IN FULL OPERATION. FAN AND PUMP ROTATION, MOTOR LOADS AND EQUIPMENT VIBRATION SHALL BE CHECKED AND CORRECTED AS NECESSARY BEFORE PROCEEDING WITH TAB. SET CONTROLS AND/OR BLOCK OFF PARTS OF DISTRIBUTION SYSTEMS TO SIMULATE DESIGN OPERATION OF VARIABLE VOLUME AIR OR WATER SYSTEMS FOR TEST AND BALANCE WORK.

6.7.3. COORDINATE TAB PROCEDURES WITH EXISTING SYSTEMS AND ANY PHASED CONSTRUCTION COMPLETION REQUIREMENTS FOR THE PROJECT. PROVIDE TAB REPORTS FOR PRE CONSTRUCTION AIR AND WATER FLOW RATE AND FOR EACH PHASE OF THE PROJECT PRIOR TO PARTIAL FINAL INSPECTIONS OF EACH PHASE OF THE PROJECT. RETURN EXISTING AREAS OUTSIDE THE WORK AREA TO PRE CONSTRUCTED CONDITIONS.

6.7.4. ALLOW TEN (10) DAYS TIME IN CONSTRUCTION SCHEDULE FOR TAB AND SUBMISSION OF ALL REPORTS FOR AN ORGANIZED AND TIMELY CORRECTION OF DEFICIENCIES.

6.7.5. AIR BALANCE AND EQUIPMENT TEST: INCLUDE AIR HANDLING UNITS, FANS, TERMINAL UNITS, FAN COIL UNITS, ROOM DIFFUSERS/OUTLETS/INLETS, COMPUTER ROOM AC UNITS, AND LABORATORY FUME HOODS AND BIOLOGICAL SAFETY CABINETS.

6.7.5.1. ARTIFICIALLY LOAD AIR FILTERS BY PARTIAL BLANKING TO PRODUCE AIR PRESSURE DROP OF MANUFACTURER'S RECOMMENDED PRESSURE DROP.

6.7.5.2. ADJUST FAN SPEEDS TO PROVIDE DESIGN AIR FLOW. .

6.7.5.3. TEST AND BALANCE SYSTEMS IN ALL SPECIFIED MODES OF OPERATION, INCLUDING VARIABLE VOLUME, ECONOMIZER, AND FIRE EMERGENCY MODES. VERIFY THAT DAMPERS AND OTHER CONTROLS FUNCTION PROPERLY.

6.7.5.4. VARIABLE AIR VOLUME (VAV) SYSTEMS:

6.7.5.4.1. COORDINATE TAB, INCLUDING SYSTEM VOLUMETRIC CONTROLS, WITH THE, DIRECT-DIGITAL CONTROL SYSTEM.

6.7.5.4.2. MAXIMUM AND MINIMUM FLOW RATES FOR AIR TERMINAL UNITS (ATU) BE FACTORY SET. CHECK AND READJUST ATU FLOW RATES IF NECESSARY. BALANCE AIR DISTRIBUTION FROM ATU ON FULL COOLING MAXIMUM SCHEDULED CUBIC METERS PER MINUTE (CUBIC FEET PER MINUTE). RESET ROOM THERMOSTATS AND CHECK ATU OPERATION FROM MAXIMUM TO MINIMUM COOLING, TO THE HEATING MODE, AND BACK TO COOLING. RECORD AND REPORT THE HEATING COIL LEAVING AIR TEMPERATURE WHEN THE ATU IS IN THE MAXIMUM HEATING MODE. RECORD AND REPORT OUTDOOR AIR FLOW RATES UNDER ALL OPERATING CONDITIONS (THE TEST SHALL DEMONSTRATE THAT THE MINIMUM OUTDOOR AIR VENTILATION RATE SHALL REMAIN CONSTANT UNDER AL OPERATING CONDITIONS).

6.7.5.4.3. ADJUST OPERATING PRESSURE CONTROL SETPOINT TO MAINTAIN THE DESIGN FLOW TO EACH SPACE WITH THE LOWEST SETPOINT.

6.7.5.4.4. RECORD FINAL MEASUREMENTS FOR AIR HANDLING EQUIPMENT PERFORMANCE DATA SHEETS.

6.7.5.5. WATER BALANCE AND EQUIPMENT TEST: INCLUDE CIRCULATING PUMPS, CONVERTORS, COILS, COOLERS AND CONDENSERS:

6.7.5.5.1. ADJUST FLOW RATES FOR EQUIPMENT. SET COILS AND EVAPORATOR TO VALUES ON EQUIPMENT SUBMITTALS, IF DIFFERENT FROM VALUES ON CONTRACT DRAWINGS.

6.7.5.5.2. PRIMARY_SECONDARY (VARIABLE VOLUME) SYSTEMS: COORDINATE TAB WITH THE DIRECT-DIGITAL CONTROL SYSTEM. BALANCE SYSTEMS AT DESIGN WATER FLOW AND THEN VERIFY THAT VARIABLE FLOW CONTROLS FUNCTION AS DESIGNED.

6.7.5.5.3. RECORD FINAL MEASUREMENTS FOR HYDRONIC EQUIPMENT ON PERFORMANCE DATA SHEETS. INCLUDE ENTERING AND LEAVING WATER TEMPERATURES FOR HEATING AND COOLING COILS, AND FOR CONVERTORS. INCLUDE ENTERING AND LEAVING AIR TEMPERATURES (DB/WB FOR COOLING COILS) FOR AIR HANDLING UNITS AND REHEAT COILS. MAKE AIR AND WATER TEMPERATURE MEASUREMENTS AT THE SAME TIME.

6.8. VIBRATION TESTING

6.8.1. FURNISH INSTRUMENTS AND PERFORM VIBRATION MEASUREMENTS PROVIDE MEASUREMENTS FOR ALL ROTATING HVAC EQUIPMENT OF 373 WATTS (1/2 HORSEPOWER) AND LARGER, INCLUDING CENTRIFUGAL/SCREW COMPRESSORS, COOLING TOWERS, PUMPS, FANS AND MOTORS.

6.8.2. RECORD INITIAL MEASUREMENTS FOR EACH UNIT OF EQUIPMENT ON TEST FORMS AND SUBMIT A REPORT TO THE OWNER. WHERE VIBRATION READINGS EXCEED THE ALLOWABLE TOLERANCE CONTRACTOR SHALL BE DIRECTED TO CORRECT THE PROBLEM. THE TAB AGENCY SHALL VERIFY THAT THE CORRECTIONS ARE DONE AND SUBMIT A FINAL REPORT TO THE OWNER.

6.9. MARKING OF SETTINGS

6.9.1. FOLLOWING APPROVAL OF TAB FINAL REPORT, THE SETTING OF ALL HVAC ADJUSTMENT DEVICES INCLUDING VALVES, SPLITTERS AND DAMPERS SHALL BE PERMANENTLY MARKED BY THE TAB SPECIALIST SO THAT ADJUSTMENT CAN BE RESTORED IF DISTURBED AT ANY TIME. STYLE AND COLORS USED FOR MARKINGS SHALL BE COORDINATED WITH THE OWNER.

6.10. IDENTIFICATION OF TEST PORTS

6.10.1. THE TAB SPECIALIST SHALL PERMANENTLY AND LEGIBLY IDENTIFY THE LOCATION POINTS OF DUCT TEST PORTS. IF THE DUCTWORK HAS EXTERIOR INSULATION, THE IDENTIFICATION SHALL BE MADE ON THE EXTERIOR SIDE OF THE INSULATION. ALL PENETRATIONS THROUGH DUCTWORK AND DUCTWORK INSULATION SHALL BE SEALED TO PREVENT AIR LEAKS AND MAINTAIN INTEGRITY OF VAPOR BARRIER.

6.11. PHASING

6.11.1. PHASED PROJECTS: TESTING AND BALANCING WORK TO FOLLOW PROJECT WITH AREAS SHALL BE COMPLETED PER THE PROJECT PHASING. UPON COMPLETION OF THE PROJECT ALL AREAS SHALL HAVE BEEN TESTED AND BALANCED PER THE CONTRACT DOCUMENTS.

6.11.2. EXISTING AREAS: SYSTEMS THAT SERVE AREAS OUTSIDE OF THE PROJECT SCOPE SHALL NOT BE ADVERSELY AFFECTED. MEASURE EXISTING PARAMETERS WHERE SHOWN TO DOCUMENT SYSTEM CAPACITY.

6.12. COMMISSIONING

6.12.1. PROVIDE COMMISSIONING DOCUMENTATION FOR PRE-FUNCTIONAL CHECKLISTS, FUNCTIONAL PERFORMANCE TESTS, ETC. FOR ALL INSPECTION, START UP, AND CONTRACTOR TESTING REQUIRED AND REQUIRED BY THE SYSTEM READINESS CHECKLIST PROVIDED BY THE COMMISSIONING AGENT.

6.12.2. COMPONENTS PROVIDED UNDER THIS SECTION OF THE SPECIFICATION WILL BE TESTED AS PART OF A LARGER SYSTEM.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004
CABLE BUILDING

STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO.	2021-32
DB:	
CB:	
DATE:	02/03/2022
SHEET NO:	**M201**

MECHANICAL SPECIFICATIONS

FOR CONSTRUCTION

REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:

1. REFRIGERANT PIPES AND FITTINGS.
2. REFRIGERANT PIPING VALVES AND SPECIALTIES.
3. REFRIGERANTS.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF VALVE, REFRIGERANT PIPING, AND REFRIGERANT PIPING SPECIALTY.

B. SHOP DRAWINGS:

1. SHOW PIPING SIZE AND PIPING LAYOUT, INCLUDING OIL TRAPS, DOUBLE RISERS, SPECIALTIES, AND PIPE AND TUBE SIZES TO ACCOMMODATE, AS A MINIMUM, EQUIPMENT PROVIDED, ELEVATION DIFFERENCE BETWEEN COMPRESSOR AND EVAPORATOR, AND LENGTH OF PIPING TO ENSURE PROPER OPERATION AND COMPLIANCE WITH WARRANTIES OF CONNECTED EQUIPMENT.
2. SHOW INTERFACE AND SPATIAL RELATIONSHIPS BETWEEN PIPING AND EQUIPMENT.
3. SHOP DRAWING SCALE: 1/4 INCH EQUALS 1 FOOT (1:50)

1.3 INFORMATIONAL SUBMITTALS

A. FIELD QUALITY-CONTROL REPORTS.

1.4 CLOSEOUT SUBMITTALS

A. OPERATION AND MAINTENANCE DATA: FOR REFRIGERANT VALVES AND PIPING SPECIALTIES TO INCLUDE IN MAINTENANCE MANUALS.

1.5 QUALITY ASSURANCE

A. COMPLY WITH ASHRAE 15, "SAFETY CODE FOR REFRIGERATION SYSTEMS."

B. COMPLY WITH ASME B31.5, "REFRIGERATION PIPING AND HEAT TRANSFER COMPONENTS."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. LINE TEST PRESSURE FOR REFRIGERANT R-134A:

1. SUCTION LINES FOR AIR-CONDITIONING APPLICATIONS: 115 PSIG (793 KPA).
2. SUCTION LINES FOR HEAT-PUMP APPLICATIONS: 225 PSIG (1551 KPA).
3. HOT-GAS AND LIQUID LINES: 225 PSIG (1551 KPA).

B. LINE TEST PRESSURE FOR REFRIGERANT R-407C:

1. SUCTION LINES FOR AIR-CONDITIONING APPLICATIONS: 230 PSIG (1586 KPA).
2. SUCTION LINES FOR HEAT-PUMP APPLICATIONS: 380 PSIG (2620 KPA).
3. HOT-GAS AND LIQUID LINES: 380 PSIG (2620 KPA).

C. LINE TEST PRESSURE FOR REFRIGERANT R-410A:

1. SUCTION LINES FOR AIR-CONDITIONING APPLICATIONS: 300 PSIG (2068 KPA).
2. SUCTION LINES FOR HEAT-PUMP APPLICATIONS: 535 PSIG (3689 KPA).
3. HOT-GAS AND LIQUID LINES: 535 PSIG (3689 KPA).

2.2 COPPER TUBE AND FITTINGS

A. COPPER TUBE: ASTM B 88, TYPE K OR L OR ASTM B 280, TYPE ACR.

B. WROUGHT-COPPER FITTINGS: ASME B16.22.

C. WROUGHT-COPPER UNIONS: ASME B16.22.

D. SOLDER FILLER METALS: ASTM B 32. USE 95-5 TIN ANTIMONY OR ALLOY HB SOLDER TO JOIN COPPER SOCKET FITTINGS ON COPPER PIPE.

E. BRAZING FILLER METALS: AWS A5.8/A5.8M.

F. FLEXIBLE CONNECTORS:

1. BODY: TIN-BRONZE BELLOWS WITH WOVEN, FLEXIBLE, TINNED-BRONZE-WIRE-REINFORCED PROTECTIVE JACKET.
2. END CONNECTIONS: SOCKET ENDS.
3. OFFSET PERFORMANCE: CAPABLE OF MINIMUM 3/4-INCH (20-MM) MISALIGNMENT IN MINIMUM 7-INCH- (180-MM-) LONG ASSEMBLY.
4. WORKING PRESSURE RATING: FACTORY TEST AT MINIMUM 500 PSIG (3450 KPA).
5. MAXIMUM OPERATING TEMPERATURE: 250 DEG F (121 DEG C).

2.3 VALVES AND SPECIALTIES

A. DIAPHRAGM PACKLESS VALVES:

1. BODY AND BONNET: FORGED BRASS OR CAST BRONZE; GLOBE DESIGN WITH STRAIGHT-THROUGH OR ANGLE PATTERN.
2. DIAPHRAGM: PHOSPHOR BRONZE AND STAINLESS STEEL WITH STAINLESS-STEEL SPRING.
3. OPERATOR: RISING STEM AND HAND WHEEL.
4. SEAT: NYLON.
5. END CONNECTIONS: SOCKET, UNION, OR FLANGED.
6. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).
7. MAXIMUM OPERATING TEMPERATURE: 275 DEG F (135 DEG C).

B. PACKED-ANGLE VALVES:

1. BODY AND BONNET: FORGED BRASS OR CAST BRONZE.
2. PACKING: MOLDED STEM, BACK SEATING, AND REPLACEABLE UNDER PRESSURE.
3. OPERATOR: RISING STEM.
4. SEAT: NONROTATING, SELF-ALIGNING POLYTETRAFLUOROETHYLENE.
5. SEAL CAP: FORGED-BRASS OR VALOX HEX CAP.
6. END CONNECTIONS: SOCKET, UNION, THREADED, OR FLANGED.
7. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).
8. MAXIMUM OPERATING TEMPERATURE: 275 DEG F (135 DEG C).

C. CHECK VALVES:

1. BODY: DUCTILE IRON, FORGED BRASS, OR CAST BRONZE; GLOBE PATTERN.
2. BONNET: BOLTED DUCTILE IRON, FORGED BRASS, OR CAST BRONZE; OR BRASS HEX PLUG.
3. PISTON: REMOVABLE POLYTETRAFLUOROETHYLENE SEAT.
4. CLOSING SPRING: STAINLESS STEEL.
5. MANUAL OPENING STEM: SEAL CAP, PLATED-STEEL STEM, AND GRAPHITE SEAL.
6. END CONNECTIONS: SOCKET, UNION, THREADED, OR FLANGED.
7. MAXIMUM OPENING PRESSURE: 0.50 PSIG (3.4 KPA).
8. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).
9. MAXIMUM OPERATING TEMPERATURE: 275 DEG F (135 DEG C).

D. SERVICE VALVES:

1. BODY: FORGED BRASS WITH BRASS CAP INCLUDING KEY END TO REMOVE CORE.
2. CORE: REMOVABLE BALL-TYPE CHECK VALVE WITH STAINLESS-STEEL SPRING.
3. SEAT: POLYTETRAFLUOROETHYLENE.
4. END CONNECTIONS: COPPER SPRING.
5. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).

E. SOLENOID VALVES: COMPLY WITH AHRI 760 AND UL 429; LISTED AND LABELED BY A NATIONAL RECOGNIZED TESTING LABORATORY (NRTL).

1. BODY AND BONNET: PLATED STEEL.
2. SOLENOID TUBE, PLUNGER, CLOSING SPRING, AND SEAT ORIFICE: STAINLESS STEEL.
3. SEAT: POLYTETRAFLUOROETHYLENE.
4. END CONNECTIONS: THREADED.
5. ELECTRICAL: MOLDED, WATERTIGHT COIL IN NEMA 250 ENCLOSURE OF TYPE REQUIRED BY LOCATION WITH 1/2-INCH (16-GRC) CONDUIT ADAPTER, AND 24-V AC COIL.
6. WORKING PRESSURE RATING: 400 PSIG (2760 KPA).
7. MAXIMUM OPERATING TEMPERATURE: 240 DEG F (116 DEG C).

F. SAFETY RELIEF VALVES: COMPLY WITH 2010 ASME BOILER AND PRESSURE VESSEL CODE; LISTED AND LABELED BY AN NRTL.

1. BODY AND BONNET: DUCTILE IRON AND STEEL, WITH NEOPRENE O-RING SEAL.
2. PISTON, CLOSING SPRING, AND SEAT INSERT: STAINLESS STEEL.
3. SEAT: POLYTETRAFLUOROETHYLENE.
4. END CONNECTIONS: THREADED.
5. WORKING PRESSURE RATING: 400 PSIG (2760 KPA).
6. MAXIMUM OPERATING TEMPERATURE: 240 DEG F (116 DEG C).

G. THERMOSTATIC EXPANSION VALVES: COMPLY WITH AHRI 750.

1. BODY, BONNET, AND SEAL CAP: FORGED BRASS OR STEEL.
2. DIAPHRAGM, PISTON, CLOSING SPRING, AND SEAT INSERT: STAINLESS STEEL.
3. PACKING AND GASKETS: NON-ASBESTOS.
4. CAPILLARY AND BULB: COPPER TUBING FILLED WITH REFRIGERANT CHARGE.
5. SUCTION TEMPERATURE: 40 DEG F.
6. SUPERHEAT: ADJUSTABLE.
7. REVERSE-FLOW OPTION (FOR HEAT-PUMP APPLICATIONS).
8. END CONNECTIONS: SOCKET, FLARE, OR THREADED UNION.
9. WORKING PRESSURE RATING: 700 PSIG.

H. HOT-GAS BYPASS VALVES: COMPLY WITH UL 429; LISTED AND LABELED BY AN NRTL.

1. BODY, BONNET, AND SEAL CAP: DUCTILE IRON OR STEEL.
2. DIAPHRAGM, PISTON, CLOSING SPRING, AND SEAT INSERT: STAINLESS STEEL.
3. PACKING AND GASKETS: NON-ASBESTOS.
4. SOLENOID TUBE, PLUNGER, CLOSING SPRING, AND SEAT ORIFICE: STAINLESS STEEL.
5. SEAT: POLYTETRAFLUOROETHYLENE.
6. EQUALIZER: INTERNAL.
7. ELECTRICAL: MOLDED, WATERTIGHT COIL IN NEMA 250 ENCLOSURE OF TYPE REQUIRED BY LOCATION WITH 1/2-INCH (16-GRC) CONDUIT ADAPTER AND 24-V AC COIL.
8. END CONNECTIONS: SOCKET.
9. SET PRESSURE: PER MFGR.
10. THROTTLING RANGE: MAXIMUM 5 PSIG (34 KPA).
11. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).
12. MAXIMUM OPERATING TEMPERATURE: 240 DEG F (116 DEG C).

I. STRAIGHT-TYPE STRAINERS:

1. BODY: WELDED STEEL WITH CORROSION-RESISTANT COATING.
2. SCREEN: 100-MESH STAINLESS STEEL.
3. END CONNECTIONS: SOCKET OR FLARE.
4. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).
5. MAXIMUM OPERATING TEMPERATURE: 275 DEG F (135 DEG C).

J. ANGLE-TYPE STRAINERS:

1. BODY: FORGED BRASS OR CAST BRONZE.
2. DRAIN PLUG: BRASS HEX PLUG.
3. SCREEN: 100-MESH MONEL.
4. END CONNECTIONS: SOCKET OR FLARE.
5. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).
6. MAXIMUM OPERATING TEMPERATURE: 275 DEG F (135 DEG C).

K. MOISTURE/LIQUID INDICATORS:

1. BODY: FORGED BRASS.
2. WINDOW: REPLACEABLE, CLEAR, FUSED GLASS WINDOW WITH INDICATING ELEMENT PROTECTED BY FILTER SCREEN.
3. INDICATOR: COLOR CODED TO SHOW MOISTURE CONTENT IN PARTS PER MILLION (PPM).
4. MINIMUM MOISTURE INDICATOR SENSITIVITY: INDICATE MOISTURE ABOVE 60 PPM.
5. END CONNECTIONS: SOCKET OR FLARE.
6. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).
7. MAXIMUM OPERATING TEMPERATURE: 240 DEG F (116 DEG C).

L. REPLACEABLE-CORE FILTER DRYERS: COMPLY WITH AHRI 730.

1. BODY AND COVER: PAINTED-STEEL SHELL WITH DUCTILE-IRON COVER, STAINLESS-STEEL SCREWS, AND NEOPRENE GASKETS.
2. FILTER MEDIA: 10 MICRON, PLEATED WITH INTEGRAL END RINGS; STAINLESS-STEEL SUPPORT.
3. DESICCANT MEDIA: ACTIVATED ALUMINA.
4. DESIGNED FOR REVERSE FLOW (FOR HEAT-PUMP APPLICATIONS).
5. END CONNECTIONS: SOCKET.
6. ACCESS PORTS: NPS 1/4 (DN 8) CONNECTIONS AT ENTERING AND LEAVING SIDES FOR PRESSURE DIFFERENTIAL MEASUREMENT.
7. MAXIMUM PRESSURE LOSS: 2 PSIG.
8. RATED FLOW: PER EQUIPMENT SCHEDULE.
9. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).
10. MAXIMUM OPERATING TEMPERATURE: 240 DEG F (116 DEG C).

M. PERMANENT FILTER DRYERS: COMPLY WITH AHRI 730.

1. BODY AND COVER: PAINTED-STEEL SHELL.
2. FILTER MEDIA: 10 MICRON, PLEATED WITH INTEGRAL END RINGS; STAINLESS-STEEL SUPPORT.
3. DESICCANT MEDIA: ACTIVATED ALUMINA.
4. DESIGNED FOR REVERSE FLOW (FOR HEAT-PUMP APPLICATIONS).
5. END CONNECTIONS: SOCKET.
6. ACCESS PORTS: NPS 1/4 (DN 8) CONNECTIONS AT ENTERING AND LEAVING SIDES FOR PRESSURE DIFFERENTIAL MEASUREMENT.
7. MAXIMUM PRESSURE LOSS: 2 PSIG.
8. RATED FLOW: PER EQUIPMENT SCHEDULE.
9. WORKING PRESSURE RATING: 500 PSIG (3450 KPA).
10. MAXIMUM OPERATING TEMPERATURE: 240 DEG F (116 DEG C).

2.4 REFRIGERANTS

A. ASHRAE 34, R-134A: TETRAFLUOROETHANE.

B. ASHRAE 34, R-407C: DIFLUOROMETHANE/PENTAFLUOROETHANE/1,1,1,2-TETRAFLUOROETHANE.

C. ASHRAE 34, R-410A: PENTAFLUOROETHANE/DIFLUOROMETHANE.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-134A

A. SUCTION LINES: COPPER, TYPE ACR, ANNEALED-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH BRAZED OR SOLDERED JOINTS.

B. HOT-GAS AND LIQUID LINES, AND SUCTION LINES FOR HEAT-PUMP APPLICATIONS: COPPER, TYPE ACR, ANNEALED-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH BRAZED OR SOLDERED JOINTS.

C. SAFETY-RELIEF-VALVE DISCHARGE PIPING: COPPER, TYPE ACR, TYPE K, TYPE L, DRAWN-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH SOLDERED JOINTS.

3.2 PIPING APPLICATIONS FOR REFRIGERANT R-407C

A. SUCTION LINES: COPPER, TYPE ACR, ANNEALED-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH BRAZED OR SOLDERED JOINTS.

B. HOT-GAS AND LIQUID LINES, AND SUCTION LINES FOR HEAT-PUMP APPLICATIONS: COPPER, TYPE ACR, ANNEALED-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH BRAZED OR SOLDERED JOINTS.

C. SAFETY-RELIEF-VALVE DISCHARGE PIPING: COPPER, TYPE ACR, TYPE K (A), TYPE L (B), DRAWN-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH SOLDERED JOINTS.

3.3 PIPING APPLICATIONS FOR REFRIGERANT R-410A

A. SUCTION LINES: COPPER, TYPE ACR, ANNEALED-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH BRAZED OR SOLDERED JOINTS.

B. HOT-GAS AND LIQUID LINES, AND SUCTION LINES FOR HEAT-PUMP APPLICATIONS: COPPER, TYPE ACR, TYPE L, ANNEALED- OR DRAWN-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH BRAZED OR SOLDERED JOINTS.

C. HOT-GAS AND LIQUID LINES, AND SUCTION LINES FOR HEAT-PUMP APPLICATIONS: COPPER, TYPE K (A), ANNEALED- OR DRAWN-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH BRAZED OR SOLDERED JOINTS.

D. HOT-GAS AND LIQUID LINES, AND SUCTION LINES FOR HEAT-PUMP APPLICATIONS: COPPER, TYPE ACR, TYPE K, TYPE L DRAWN-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH 95-5 TIN-ANTIMONY SOLDERED JOINTS.

E. HOT-GAS AND LIQUID LINES, AND SUCTION LINES FOR HEAT-PUMP APPLICATIONS: COPPER, TYPE ACR, TYPE K, TYPE L, DRAWN-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH ALLOY HB SOLDERED JOINTS.

F. SAFETY-RELIEF-VALVE DISCHARGE PIPING: COPPER, TYPE ACR OR TYPE L, ANNEALED- OR DRAWN-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH BRAZED OR SOLDERED JOINTS.

TUBING NOT LARGER THAN NPS 1 (DN 25) AND IT IS DESIRABLE TO HAVE ALL PIPING BE OF SAME TUBE TYPE AND JOINING METHOD.

G. SAFETY-RELIEF-VALVE DISCHARGE PIPING: COPPER, TYPE K (A), ANNEALED- OR DRAWN-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH BRAZED OR SOLDERED JOINTS.

TUBING NOT LARGER THAN NPS 1-1/4 (DN 32) AND IT IS DESIRABLE TO HAVE ALL PIPING BE OF SAME TUBE TYPE AND JOINING METHOD.

H. SAFETY-RELIEF-VALVE DISCHARGE PIPING: COPPER, TYPE ACR, TYPE K, OR TYPE L DRAWN-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH 95-5 TIN-ANTIMONY SOLDERED JOINTS.

TUBING NOT LARGER THAN NPS 2 (DN 50) AND IT IS DESIRABLE TO HAVE ALL PIPING BE OF SAME TUBE TYPE AND JOINING METHOD.

I. SAFETY-RELIEF-VALVE DISCHARGE PIPING: COPPER, TYPE ACR, TYPE K, OR TYPE L DRAWN-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH ALLOY HB SOLDERED JOINTS.

3.4 VALVE AND SPECIALTY APPLICATIONS

A. INSTALL DIAPHRAGM PACKLESS VALVES IN SUCTION AND DISCHARGE LINES OF COMPRESSOR.

B. INSTALL SERVICE VALVES FOR GAGE TAPS AT INLET AND OUTLET OF HOT-GAS BYPASS VALVES AND STRAINERS IF THEY ARE NOT AN INTEGRAL PART OF VALVES AND STRAINERS.

C. INSTALL A CHECK VALVE AT THE COMPRESSOR DISCHARGE AND A LIQUID ACCUMULATOR AT THE COMPRESSOR SUCTION CONNECTION.

D. EXCEPT AS OTHERWISE INDICATED, INSTALL DIAPHRAGM PACKLESS VALVES ON INLET AND OUTLET SIDE OF FILTER DRYERS.

E. INSTALL A FULL-SIZE, THREE-VALVE BYPASS AROUND FILTER DRYERS.

F. INSTALL SOLENOID VALVES UPSTREAM FROM EACH EXPANSION VALVE AND HOT-GAS BYPASS VALVE. INSTALL SOLENOID VALVES IN HORIZONTAL LINES WITH COIL AT TOP.

G. INSTALL THERMOSTATIC EXPANSION VALVES AS CLOSE AS POSSIBLE TO DISTRIBUTORS ON EVAPORATORS.

1. INSTALL VALVE SO DIAPHRAGM CASE IS WARMER THAN BULB.
2. SECURE BULB TO CLEAN, STRAIGHT, HORIZONTAL SECTION OF SUCTION LINE USING TWO BULB STRAPS. DO NOT MOUNT BULB IN A TRAP OR AT BOTTOM OF THE LINE.
3. IF EXTERNAL EQUALIZER LINES ARE REQUIRED, MAKE CONNECTION WHERE IT WILL REFLECT SUCTION-LINE PRESSURE AT BULB LOCATION.

H. INSTALL SAFETY RELIEF VALVES WHERE REQUIRED BY 2010 ASME BOILER AND PRESSURE VESSEL CODE. PIPE SAFETY-RELIEF-VALVE DISCHARGE LINE TO OUTSIDE ACCORDING TO ASHRAE 15.

I. INSTALL MOISTURE/LIQUID INDICATORS IN LIQUID LINE AT THE INLET OF THE THERMOSTATIC EXPANSION VALVE OR AT THE INLET OF THE EVAPORATOR COIL CAPILLARY TUBE.

J. INSTALL STRAINERS UPSTREAM FROM AND ADJACENT TO THE FOLLOWING UNLESS THEY ARE FURNISHED AS AN INTEGRAL ASSEMBLY FOR THE DEVICE BEING PROTECTED:

1. SOLENOID VALVES.
2. THERMOSTATIC EXPANSION VALVES.
3. HOT-GAS BYPASS VALVES.
4. COMPRESSOR.

K. INSTALL FILTER DRYERS IN LIQUID LINE BETWEEN COMPRESSOR AND THERMOSTATIC EXPANSION VALVE, AND IN THE SUCTION LINE AT THE COMPRESSOR.

L. INSTALL RECEIVERS SIZED TO ACCOMMODATE PUMP-DOWN CHARGE.

M. INSTALL FLEXIBLE CONNECTORS AT COMPRESSORS.

3.5 PIPING INSTALLATION

A. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF PIPING SYSTEMS; INDICATED LOCATIONS AND ARRANGEMENTS WERE USED TO SIZE PIPE AND CALCULATE FRICTION LOSS, EXPANSION, PUMP SIZING, AND OTHER DESIGN CONSIDERATIONS. INSTALL PIPING AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON SHOP DRAWINGS.

B. INSTALL REFRIGERANT PIPING ACCORDING TO ASHRAE 15.

C. INSTALL PIPING IN CONCEALED LOCATIONS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.

D. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.

E. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL.

F. INSTALL PIPING ADJACENT TO MACHINES TO ALLOW SERVICE AND MAINTENANCE.

G. INSTALL PIPING FREE OF SAGS AND BENDS.

H. INSTALL FITTINGS FOR CHANGES IN DIRECTION AND BRANCH CONNECTIONS.

I. SELECT SYSTEM COMPONENTS WITH PRESSURE RATING EQUAL TO OR GREATER THAN SYSTEM OPERATING PRESSURE.

J. REFER TO SECTION "DIRECT DIGITAL CONTROL (DDC) SYSTEM FOR HVAC" AND SECTION "SEQUENCE OF OPERATIONS FOR HVAC DDC" FOR SOLENOID VALVE CONTROLLERS, CONTROL WIRING, AND SEQUENCE OF OPERATION.

K. INSTALL PIPING AS SHORT AND DIRECT AS POSSIBLE, WITH A MINIMUM NUMBER OF JOINTS, ELBOWS, AND FITTINGS.

L. ARRANGE PIPING TO ALLOW INSPECTION AND SERVICE OF REFRIGERATION EQUIPMENT. INSTALL VALVES AND SPECIALTIES IN ACCESSIBLE LOCATIONS TO ALLOW FOR SERVICE AND INSPECTION. INSTALL ACCESS DOORS OR PANELS AS SPECIFIED IN SECTION "ACCESS DOORS AND FRAMES" IF VALVES OR EQUIPMENT REQUIRING MAINTENANCE IS CONCEALED BEHIND FINISHED SURFACES.

M. INSTALL REFRIGERANT PIPING IN PROTECTIVE CONDUIT WHERE INSTALLED BELOWGROUND.

N. INSTALL REFRIGERANT PIPING IN RIGID OR FLEXIBLE CONDUIT IN LOCATIONS WHERE EXPOSED TO MECHANICAL INJURY.

O. SLOPE REFRIGERANT PIPING AS FOLLOWS:

1. INSTALL HORIZONTAL HOT-GAS DISCHARGE PIPING WITH A UNIFORM SLOPE DOWNWARD AWAY FROM COMPRESSOR.
2. INSTALL HORIZONTAL SUCTION LINES WITH A UNIFORM SLOPE DOWNWARD TO COMPRESSOR.
3. INSTALL TRAPS AND DOUBLE RISERS TO ENTRAIN OIL IN VERTICAL RUNS.
4. LIQUID LINES MAY BE INSTALLED LEVEL.

P. WHEN BRAZING OR SOLDERING, REMOVE SOLENOID-VALVE COILS AND SIGHT GLASSES; ALSO REMOVE VALVE STEMS, SEATS, AND PACKING, AND ACCESSIBLE INTERNAL PARTS OF REFRIGERANT SPECIALTIES. DO NOT APPLY HEAT NEAR EXPANSION-VALVE BULB.

Q. INSTALL PIPING WITH ADEQUATE CLEARANCE BETWEEN PIPE AND ADJACENT WALLS AND HANGERS OR BETWEEN PIPES FOR INSULATION INSTALLATION.

R. IDENTIFY REFRIGERANT PIPING AND VALVES ACCORDING TO SECTION "IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT."

S. INSTALL SLEEVES FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FLOORS. COMPLY WITH REQUIREMENTS FOR SLEEVES SPECIFIED IN SECTION "SLEEVES AND SLEEVE SEALS FOR HVAC PIPING."

T. INSTALL SLEEVE SEALS FOR PIPING PENETRATIONS OF CONCRETE WALLS AND SLABS. COMPLY WITH REQUIREMENTS FOR SLEEVE SEALS SPECIFIED IN SECTION "SLEEVES AND SLEEVE SEALS FOR HVAC PIPING."

U. INSTALL ESCUTCHEONS FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FLOORS. COMPLY WITH REQUIREMENTS FOR ESCUTCHEONS SPECIFIED IN SECTION "ESCUTCHEONS FOR HVAC PIPING."

3.6 PIPE JOINT CONSTRUCTION

A. REAM ENDS OF PIPES AND TUBES AND REMOVE BURRS.

B. REMOVE SCALE, SLAG, DIRT, AND DEBRIS FROM INSIDE AND OUTSIDE OF PIPE AND FITTINGS BEFORE ASSEMBLY.

C. SOLDERED JOINTS: CONSTRUCT JOINTS ACCORDING TO ASTM B 828 OR CDA'S "COPPER TUBE HANDBOOK."

D. BRAZED JOINTS: CONSTRUCT JOINTS ACCORDING TO AWS'S "BRAZING HANDBOOK," CHAPTER "PIPE AND TUBE."

1. USE TYPE BCUP (COPPER-PHOSPHORUS) ALLOY FOR JOINING COPPER SOCKET FITTINGS WITH COPPER PIPE.
2. USE TYPE BAG (CADMIUM-FREE SILVER) ALLOY FOR JOINING COPPER WITH BRONZE OR STEEL.

3.7 HANGERS AND SUPPORTS

A. COMPLY WITH REQUIREMENTS FOR PIPE HANGERS AND SUPPORTS SPECIFIED IN SECTION 230529 "HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT."

B. INSTALL THE FOLLOWING PIPE ATTACHMENTS:

1. ADJUSTABLE STEEL CLEVIS HANGERS FOR INDIVIDUAL HORIZONTAL RUNS LESS THAN 20 FEET (6 M) LONG.
2. ROLLER HANGERS AND SPRING HANGERS FOR INDIVIDUAL HORIZONTAL RUNS 20 FEET (6 M) OR LONGER.
3. PIPE ROLLER: MSS SP-58, TYPE 44 FOR MULTIPLE HORIZONTAL PIPING 20 FEET (6 M) OR LONGER, SUPPORTED ON A TRAPEZE.
4. SPRING HANGERS TO SUPPORT VERTICAL RUNS.
5. COPPER-CLAD HANGERS AND SUPPORTS FOR HANGERS AND SUPPORTS IN DIRECT CONTACT WITH COPPER PIPE.

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

1. NPS 1/2 (DN 15): MAXIMUM SPAN, 60 INCHES (1500 MM); MINIMUM ROD, 1/4 INCH (6.4 MM).
2. NPS 5/8 (DN 18): MAXIMUM SPAN, 60 INCHES (1500 MM); MINIMUM ROD, 1/4 INCH (6.4 MM).
3. NPS 1 (DN 25): MAXIMUM SPAN, 72 INCHES (1800 MM); MINIMUM ROD, 1/4 INCH (6.4 MM).
4. NPS 1-1/4 (DN 32): MAXIMUM SPAN, 96 INCHES (2400 MM); MINIMUM ROD, 3/8 INCH (9.5 MM).
5. NPS 1-1/2 (DN 40): MAXIMUM SPAN, 96 INCHES (2400 MM); MINIMUM ROD, 3/8 INCH (9.5 MM).
6. NPS 2 (DN 50): MAXIMUM SPAN, 96 INCHES (2400 MM); MINIMUM ROD, 3/8 INCH (9.5 MM).
7. NPS 2-1/2 (DN 65): MAXIMUM SPAN, 108 INCHES (2700 MM); MINIMUM ROD, 3/8 INCH (9.5 MM).
8. NPS 3 (DN 80): MAXIMUM SPAN, 10 FEET (3 M); MINIMUM ROD, 3/8 INCH (9.5 MM).
9. NPS 4 (DN 100): MAXIMUM SPAN, 12 FEET (3.7 M); MINIMUM ROD, 1/2 INCH (13 MM).

D. SUPPORT MULTIFLOOR VERTICAL RUNS AT LEAST AT EACH FLOOR.

3.8 FIELD QUALITY CONTROL

A. PERFORM THE FOLLOWING TESTS AND INSPECTIONS:

1. COMPLY WITH ASME B31.5, CHAPTER VI.
2. TEST REFRIGERANT PIPING, SPECIALTIES, AND RECEIVERS. ISOLATE COMPRESSOR, CONDENSER, EVAPORATOR, AND SAFETY DEVICES FROM TEST PRESSURE IF THEY ARE NOT RATED ABOVE THE TEST PRESSURE.
3. TEST HIGH- AND LOW-PRESSURE SIDE PIPING OF EACH SYSTEM SEPARATELY AT NOT LESS THAN THE PRESSURES INDICATED IN "PERFORMANCE REQUIREMENTS" ARTICLE.
   a. FILL SYSTEM WITH NITROGEN TO THE REQUIRED TEST PRESSURE.
   b. SYSTEM SHALL MAINTAIN TEST PRESSURE AT THE MANIFOLD GAGE THROUGHOUT DURATION OF TEST.
   c. TEST JOINTS AND FITTINGS WITH ELECTRONIC LEAK DETECTOR OR BY BRUSHING A SMALL AMOUNT OF SOAP AND GLYCERIN SOLUTION OVER JOINTS.
   d. REMAKE LEAKING JOINTS USING NEW MATERIALS, AND RETEST UNTIL SATISFACTORY RESULTS ARE ACHIEVED.

B. PREPARE TEST AND INSPECTION REPORTS.

3.9 SYSTEM CHARGING

A. CHARGE SYSTEM USING THE FOLLOWING PROCEDURES:

1. INSTALL CORE IN FILTER DRYERS AFTER LEAK TEST BUT BEFORE EVACUATION.
2. EVACUATE ENTIRE REFRIGERANT SYSTEM WITH A VACUUM PUMP TO 500 MICROMETERS (67 PA). IF VACUUM HOLDS FOR 12 HOURS, SYSTEM IS READY FOR CHARGING.
3. BREAK VACUUM WITH REFRIGERANT GAS, ALLOWING PRESSURE TO BUILD UP TO 2 PSIG (14 KPA).
4. CHARGE SYSTEM WITH A NEW FILTER-DRYER CORE IN CHARGING LINE.

3.10 ADJUSTING

RETAIN FIRST PARAGRAPH BELOW FOR ADJUSTABLE THERMOSTATIC EXPANSION VALVES.

A. ADJUST THERMOSTATIC EXPANSION VALVE TO OBTAIN PROPER EVAPORATOR SUPERHEAT.

B. ADJUST HIGH- AND LOW-PRESSURE SWITCH SETTINGS TO AVOID SHORT CYCLING IN RESPONSE TO FLUCTUATING SUCTION PRESSURE.

C. ADJUST SET-POINT TEMPERATURE OF AIR-CONDITIONING OR CHILLED-WATER CONTROLLERS TO THE SYSTEM DESIGN TEMPERATURE.

D. PERFORM THE FOLLOWING ADJUSTMENTS BEFORE OPERATING THE REFRIGERATION SYSTEM, ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS:

1. OPEN SHUTOFF VALVES IN CONDENSER WATER CIRCUIT.
2. VERIFY THAT COMPRESSOR OIL LEVEL IS CORRECT.
3. OPEN COMPRESSOR SUCTION AND DISCHARGE VALVES.
4. OPEN REFRIGERANT VALVES EXCEPT BYPASS VALVES THAT ARE USED FOR OTHER PURPOSES.
5. CHECK OPEN COMPRESSOR-MOTOR ALIGNMENT AND VERIFY LUBRICATION FOR MOTORS AND BEARINGS.

E. REPLACE CORE OF REPLACEABLE FILTER DRYER AFTER SYSTEM HAS BEEN ADJUSTED AND AFTER DESIGN FLOW RATES AND PRESSURES ARE ESTABLISHED.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

STATE OF KENTUCKY
JEFFREY E MCBRIDE
28473
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32

DB:

CB:

DATE: 02/03/2022

SHEET NO: **M202**

MECHANICAL SPECIFICATIONS

FOR CONSTRUCTION

HVAC EQUIPMENT

FANS

1. QUALITY ASSURANCE
1.1. FANS AND POWER VENTILATORS SHALL BE LISTED IN THE CURRENT EDITION OF AMCA 26L, AND SHALL BEAR THE AMCA PERFORMANCE SEAL.

1.2. OPERATING LIMITS FOR CENTRIFUGAL FANS: AMCA 99 (CLASS I, II, AND III).

1.3. FANS AND POWER VENTILATORS SHALL COMPLY WITH THE FOLLOWING STANDARDS:

1.3.1. TESTING AND RATING: AMCA 2L0.

1.3.2. SOUND RATING: AMCA 300.

1.4. SAFETY CRITERIA: PROVIDE MANUFACTURER'S STANDARD SCREEN ON FAN INLET AND DISCHARGE WHERE EXPOSED TO OPERATING AND MAINTENANCE PERSONNEL.

1.5. CORROSION PROTECTION:

1.5.1. EXCEPT FOR FANS IN FUME HOOD EXHAUST SERVICE, ALL STEEL SHALL BE MILL_GALVANIZED, OR PHOSPHATIZED AND COATED WITH MINIMUM TWO COATS, CORROSION RESISTANT ENAMEL PAINT. MANUFACTURERS PAINT AND PAINT SYSTEM SHALL MEET THE MINIMUM SPECIFICATIONS OF: ASTM D1735 WATER FOG; ASTM B117 SALT SPRAY; ASTM D3359 ADHESION; AND ASTM G152 AND G153 FOR CARBON ARC LIGHT APPARATUS FOR EXPOSURE OF NON-METALLIC MATERIAL.

1.5.2. FANS FOR GENERAL PURPOSE FUME HOODS, OR CHEMICAL HOODS, AND RADIOISOTOPE HOODS SHALL BE CONSTRUCTED OF MATERIALS COMPATIBLE WITH THE CHEMICALS BEING TRANSPORTED IN THE AIR THROUGH THE FAN.

1.6. SPARK RESISTANT CONSTRUCTION: IF FLAMMABLE GAS, VAPOR OR COMBUSTIBLE DUST IS PRESENT IN CONCENTRATIONS ABOVE 20% OF THE LOWER EXPLOSIVE LIMIT (LEL), THE FAN CONSTRUCTION SHALL BE AS RECOMMENDED BY AMCA'S CLASSIFICATION FOR SPARK RESISTANT CONSTRUCTION. DRIVE SET SHALL BE COMPRISED OF NON-STATIC BELTS FOR USE IN AN EXPLOSIVE.

2. SUBMITTALS
2.1. MANUFACTURERS LITERATURE AND DATA:
2.1.1. FAN SECTIONS, MOTORS AND DRIVES.

2.1.2. CENTRIFUGAL FANS, MOTORS, DRIVES, ACCESSORIES AND COATINGS.

2.1.3. IN_LINE CENTRIFUGAL FANS, TUBULAR CENTRIFUGAL FANS, INDUSTRIAL FANS, UTILITY SET FANS, UP-BLAST KITCHEN EXHAUST FANS.

2.1.4. POWER ROOF AND WALL VENTILATORS, CENTRIFUGAL CEILING FANS, VANE AXIAL FANS, TUBE-AXIAL FANS.

2.1.5. PREFABRICATED ROOF CURBS.

2.1.6. AIR CURTAIN UNITS.

2.2. CERTIFIED SOUND POWER LEVELS FOR EACH FAN.

2.3. MOTOR RATINGS TYPES, ELECTRICAL CHARACTERISTICS AND ACCESSORIES.

2.4. ROOF CURBS.

2.5. BELT GUARDS.

2.6. MAINTENANCE AND OPERATING MANUALS.

2.7. CERTIFIED FAN PERFORMANCE CURVES FOR EACH FAN SHOWING CUBIC FEET PER MINUTE (CFM) VERSUS STATIC PRESSURE, EFFICIENCY, AND HORSEPOWER FOR DESIGN POINT OF OPERATION.

3. EXTRA MATERIALS
3.1. PROVIDE ONE ADDITIONAL SET OF BELTS FOR ALL BELT-DRIVEN FANS.

4. CENTRIFUGAL FANS
4.1. STANDARDS AND PERFORMANCE CRITERIA: REFER TO PARAGRAPH, QUALITY ASSURANCE. RECORD FACTORY VIBRATION TEST RESULTS ON THE FAN OR FURNISH TO THE CONTRACTOR.

4.2. FAN ARRANGEMENT, UNLESS NOTED OR APPROVED OTHERWISE:

4.2.1. DWDL FANS: ARRANGEMENT 3.

4.2.2. SWSL FANS: ARRANGEMENT L, 3, 9 OR L0 - EXHAUST FANS ARRANGEMENT 3 SHALL NOT BE ACCEPTABLE.

4.3. CONSTRUCTION: WHEEL DIAMETERS AND OUTLET AREAS SHALL BE IN ACCORDANCE WITH AMCA STANDARDS.
4.3.1. HOUSING: LOW CARBON STEEL, ARC WELDED THROUGHOUT, BRACED AND SUPPORTED BY STRUCTURAL CHANNEL OR ANGLE IRON TO PREVENT VIBRATION OR PULSATION, FLANGED OUTLET, INLET FULLY STREAMLINED. PROVIDE LIFTING CLIPS, AND CASING DRAIN. PROVIDE MANUFACTURER'S STANDARD ACCESS DOOR. PROVIDE 12.5 MM (1/2 INCHES) WIRE MESH SCREENS FOR FAN INLETS WITHOUT DUCT CONNECTIONS.

4.3.2. WHEEL: STEEL PLATE WITH DIE FORMED BLADES WELDED OR RIVETED IN PLACE, FACTORY BALANCED STATICALLY AND DYNAMICALLY.

4.3.3. SHAFT: DESIGNED TO OPERATE AT NO MORE THAN 70 PERCENT OF THE FIRST CRITICAL SPEED AT THE TOP OF THE SPEED RANGE OF THE FANS CLASS.

4.3.4. BEARINGS: HEAVY DUTY BALL OR ROLLER TYPE SIZED TO PRODUCE A BL0 LIFE OF NOT LESS THAN 50,000 HOURS, AND AN AVERAGE FATIGUE LIFE OF 200,000 HOURS. EXTEND FILLED LUBRICATION TUBES FOR INTERIOR BEARINGS OR DUCTED UNITS TO OUTSIDE OF HOUSING.

4.3.5. BELTS: OIL RESISTANT, NON-SPARKING AND NON-STATIC.

4.3.6. BELT DRIVES: FACTORY INSTALLED WITH FINAL ALIGNMENT BELT ADJUSTMENT MADE AFTER INSTALLATION.

4.3.7. MOTORS AND FAN WHEEL PULLEYS: ADJUSTABLE PITCH FOR USE WITH MOTORS THROUGH 15HP, FIXED PITCH FOR USE WITH MOTORS LARGER THAN 15HP. SELECT PULLEYS SO THAT PITCH ADJUSTMENT IS AT THE MIDDLE OF THE ADJUSTMENT RANGE AT FAN DESIGN CONDITIONS.

4.3.8. MOTOR, ADJUSTABLE MOTOR BASE, DRIVE AND GUARD: FURNISH FROM FACTORY WITH FAN. PROVIDE PROTECTIVE SHEET METAL ENCLOSURE FOR FANS LOCATED OUTDOORS.

4.3.9. FURNISH VARIABLE SPEED FAN MOTOR CONTROLLERS WHERE SHOWN ON THE DRAWINGS.

4.4. INLINE CENTRIFUGAL FANS: PROVIDE MINIMUM 18 GAUGE GALVANIZED STEEL HOUSING WITH INLET AND OUTLET FLANGES, BACKWARD INCLINED ALUMINUM CENTRIFUGAL FAN WHEEL, BOLTED ACCESS DOOR AND SUPPORTS AS REQUIRED. MOTORS SHALL BE FACTORY PRE-WIRED TO AN EXTERNAL JUNCTION BOX. PROVIDE FACTORY WIRED DISCONNECT SWITCH.

5. POWER ROOF VENTILATOR
5.1. STANDARDS AND PERFORMANCE CRITERIA: REFER TO PARAGRAPH, QUALITY ASSURANCE.

5.2. TYPE: CENTRIFUGAL FAN, BACKWARD INCLINED BLADES. PROVIDE DOWN-BLAST OR UP-BLAST TYPE AS INDICATED.

5.3. CONSTRUCTION: STEEL OR ALUMINUM, COMPLETELY WEATHERPROOF, FOR CURB MOUNTING, EXHAUST COWL OR ENTIRE DRIVE ASSEMBLY READILY REMOVABLE FOR SERVICING, ALUMINUM BIRD SCREEN ON DISCHARGE, UL APPROVED SAFETY DISCONNECT SWITCH, CONDUIT FOR WIRING, VIBRATION ISOLATORS FOR WHEEL, MOTOR AND DRIVE ASSEMBLY. PROVIDE SELF ACTING BACK DRAFT DAMPER. PROVIDE ELECTRIC MOTOR OPERATED DAMPER WHERE INDICATED.

5.4. MOTOR AND DRIVE: PREMIUM EFFICIENCY. BEARINGS SHALL BE PILLOW BLOCK BALL TYPE WITH A MINIMUM L-50 LIFE OF 200,000 HOURS. MOTOR SHALL BE LOCATED OUT OF AIR STREAM.

5.5. PREFABRICATED ROOF CURB: AS SPECIFIED IN PARAGRAPH 2.3 OF THIS SECTION.

5.6. UP-BLAST TYPE: TOP DISCHARGE EXHAUSTER, MOTOR OUT OF AIR STREAM. FOR KITCHEN HOOD EXHAUST APPLICATIONS, PROVIDE GREASE TROUGH ON BASE AND THREADED DRAIN. THE MOUNTING HEIGHT OF THE KITCHEN UP-BLAST EXHAUST FAN SHALL BE IN COMPLIANCE WITH NFPA 96. (PROVIDE VENTED CURB EXTENSION IF REQUIRED TO MAINTAIN REQUIRED CLEARANCES.)

6. POWER WALL VENTILATOR
6.1. STANDARDS AND PERFORMANCE CRITERIA: REFER TO PARAGRAPH, QUALITY ASSURANCE.

6.2. TYPE: CENTRIFUGAL FAN, BACKWARD INCLINED BLADES.

6.3. CONSTRUCTION: STEEL OR ALUMINUM, COMPLETELY WEATHERPROOF, FOR WALL MOUNTING, EXHAUST COWL OR ENTIRE DRIVE ASSEMBLY READILY REMOVABLE FOR SERVICING, ALUMINUM BIRD SCREEN ON DISCHARGE, UL APPROVED SAFETY DISCONNECT SWITCH, CONDUIT FOR WIRING, VIBRATION ISOLATORS FOR WHEEL, MOTOR AND DRIVE ASSEMBLY. PROVIDE SELF ACTING BACK DRAFT DAMPER.

6.4. MOTOR AND DRIVE: PREMIUM EFFICIENCY. BEARINGS SHALL BE PILLOW BLOCK BALL TYPE WITH A MINIMUM L-50 LIFE OF 200,000 HOURS. MOTOR SHALL BE LOCATED OUT OF AIR STREAM.

7. CENTRIFUGAL CEILING FANS (SMALL CABINET FAN)
7.1. STANDARDS AND PERFORMANCE CRITERIA: REFER TO PARAGRAPH, QUALITY ASSURANCE.

7.2. STEEL HOUSING, BAKED ENAMEL FINISH, DIRECT CONNECTED FAN ASSEMBLY, ATTACHED GRILLE. PROVIDE GRAVITY BACK DRAFT ASSEMBLY, ALUMINUM WALL CAP AND BIRD OR INSECT SCREEN. PROVIDE ELECTRIC MOTOR OPERATED DAMPER WHERE INDICATED.

7.3. ACOUSTICAL LINING: 12.5 MM (1/2 INCH) THICK MINERAL FIBER, DARK FINISH. COMPLY WITH UL 181 FOR EROSION.

7.4. MOTOR: SHADED POLE OR PERMANENT SPLIT CAPACITOR, SLEEVE BEARINGS, SUPPORTED BY STEEL BRACKETS IN COMBINATION WITH RUBBER ISOLATORS.

7.5. CEILING GRILLE, (WHERE INDICATED): WHITE PLASTIC EGG CRATE DESIGN, 80 PERCENT FREE AREA.

7.6. CONTROL: PROVIDE SOLID STATE SPEED CONTROL (LOCATED AT UNIT) FOR FINAL AIR BALANCING.

8. INSTALLATION
8.1. INSTALL FAN, MOTOR AND DRIVE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

8.2. ALIGN FAN AND MOTOR SHEAVES TO ALLOW BELTS TO RUN TRUE AND STRAIGHT.|

8.3. BOLT EQUIPMENT TO CURBS WITH GALVANIZED LAG BOLTS.

8.4. INSTALL VIBRATION CONTROL DEVICES AS SHOWN ON DRAWINGS AND SPECIFIED.

9. PRE_OPERATION MAINTENANCE
9.1. LUBRICATE BEARINGS, PULLEYS, BELTS AND OTHER MOVING PARTS WITH MANUFACTURER RECOMMENDED LUBRICANTS.

9.2. ROTATE IMPELLER BY HAND AND CHECK FOR SHIFTING DURING SHIPMENT AND CHECK ALL BOLTS, COLLARS, AND OTHER PARTS FOR TIGHTNESS.

9.3. CLEAN FAN INTERIORS TO REMOVE FOREIGN MATERIAL AND CONSTRUCTION DIRT AND DUST.

10. START_UP AND INSTRUCTIONS
10.1. VERIFY OPERATION OF MOTOR, DRIVE SYSTEM AND FAN WHEEL ACCORDING TO THE DRAWINGS AND SPECIFICATIONS.
10.2. CHECK VIBRATION AND CORRECT AS NECESSARY FOR AIR BALANCE WORK.
10.3. AFTER AIR BALANCING IS COMPLETE AND PERMANENT SHEAVES ARE IN PLACE PERFORM NECESSARY FIELD MECHANICAL BALANCING TO MEET VIBRATION TOLERANCES.

UNIT HEATERS

1. GENERAL: HORIZONTAL OR VERTICAL DISCHARGE TYPE FOR STEAM, HOT WATER OR ELECTRIC HEATING MEDIUM, AS INDICATED.

2. CASING: STEEL SHEET, PHOSPHATIZED TO RESIST RUST AND FINISHED IN BAKED ENAMEL. PROVIDE HANGER SUPPORTS.

3. FAN: PROPELLER TYPE, DIRECT DRIVEN BY MANUFACTURER'S STANDARD ELECTRIC MOTOR. PROVIDE RESILIENT MOUNTING. PROVIDE FAN GUARD FOR HORIZONTAL DISCHARGE UNITS.

4. DISCHARGE AIR CONTROL:
4.1. HORIZONTAL DISCHARGE: HORIZONTAL, ADJUSTABLE LOUVERS.
4.2. VERTICAL DISCHARGE: RADIAL LOUVER DIFFUSER.

5. HOT WATER COIL: ALUMINUM FINS BONDED TO SEAMLESS COPPER TUBING BY MECHANICAL EXPANSION OF THE TUBING, DESIGNED FOR 517 KPA (75 PSIG) STEAM WORKING PRESSURE.

5.1. CORROSION CONTROL: PROVIDE CORROSION CONTROL FOR COILS IN HIGH-HUMIDITY LOCATIONS BY USING A MULTI-STAGE, EPOXY IMMERSION COATING (ELECTRICALLY DEPOSITED) PROCESS.

6. ELECTRIC UNITS: UL LISTED, FACTORY WIRED TO TERMINAL STRIPS FOR FIELD CONNECTION OF POWER AND CONTROL WIRING.

6.1. HEATING ELEMENTS: NICKEL CHROMIUM ALLOY RESISTANCE WIRE EMBEDDED IN A MAGNESIUM OXIDE INSULATING REFRACTORY AND SEALED IN CORROSION RESISTING METALLIC SHEATH WITH FINS. THREE PHASE HEATERS SHALL HAVE BALANCED PHASES.

6.2. THERMAL CUTOUT: MANUAL RESET TYPE, WHICH DISCONNECTS ELEMENTS, AND MOTOR IN THE EVENT NORMAL OPERATING TEMPERATURES ARE EXCEEDED.

6.3. MAGNETIC CONTACTOR: FACTORY INSTALLED WITH LOW VOLTAGE RELAY FOR REMOTE PILOT DUTY THERMOSTAT OPERATION.

7. CONTROLS: PROVIDE FIELD INSTALLED REMOTE WALL MOUNTED LINE VOLTAGE ELECTRIC SPACE THERMOSTATS OR UNIT MOUNTED RETURN AIR THERMOSTATS, WHERE SHOWN OR SPECIFIED TO CONTROL THE UNIT FAN. PROVIDE AN AQUASTAT ON HOT WATER UNITS TO PREVENT FAN OPERATION WHEN THE HEATING SYSTEM IS OFF.

CABINET UNIT HEATERS

1. GENERAL: HORIZONTAL OR VERTICAL DISCHARGE TYPE FOR STEAM, HOT WATER OR ELECTRIC HEATING MEDIUM, AS INDICATED.

2. CASING: STEEL SHEET, PHOSPHATIZED TO RESIST RUST AND FINISHED IN BAKED ENAMEL. PROVIDE HANGER SUPPORTS.

3. GENERAL: VERTICAL OR HORIZONTAL TYPE FOR STEAM, HOT WATER OR ELECTRIC HEATING MEDIUM, AS INDICATED.

4. CABINET: NOT LESS THAN 1.3 MM (L8 GAGE) STEEL WITH FRONT PANEL FOR VERTICAL UNITS AND HINGED FRONT PANEL FOR HORIZONTAL UNITS. FINISH ON EXPOSED CABINET SHALL BE FACTORY_BAKED ENAMEL IN MANUFACTURER'S STANDARD COLOR AS SELECTED BY THE ARCHITECT. PROVIDE 76 MM (3_INCH) HIGH SUB_BASE FOR VERTICAL FLOOR MOUNTED UNITS.

5. FAN: CENTRIFUGAL BLOWER, DIRECT DRIVEN BY A SINGLE PHASE, TWO_SPEED, ELECTRIC MOTOR WITH INHERENT OVERLOAD PROTECTION. PROVIDE RESILIENT MOTOR/FAN MOUNT.

6. FILTER: MANUFACTURER'S STANDARD, ONE-INCH THICK, THROWAWAY TYPE MERV 7 FILTERS.

7. HOT WATER COIL: ALUMINUM FINS BONDED TO SEAMLESS COPPER TUBING BY MECHANICAL EXPANSION OF THE TUBING, DESIGNED FOR 100 PSI WORKING PRESSURE.

7.1. PROVIDE CORROSION CONTROL FOR COILS IN HIGH-HUMIDITY LOCATIONS BY USING A MULTI-STAGE, EPOXY IMMERSION COATING (ELECTRICALLY DEPOSITED) PROCESS.

8. ELECTRIC COIL: SPIRAL SHEATH OR FINNED_TUBE CONSTRUCTION WITH CAL-ROD RESISTANCE ELEMENTS IN ALUMINUM TUBES. UNITS SHALL BE UL LISTED AND FACTORY WIRED WITH UNIT MOUNTED HEAT SWITCH, MAGNETIC CONTACTORS, HIGH TEMPERATURE CUTOUT SAFETY CONTROL, AND FAN OVERRIDE THERMOSTAT.

9. FACTORY MOUNTED CONTROLS: MANUAL FAN STARTER AND THREE_POSITION (LOW, HIGH AND OFF) FAN SPEED SWITCH. PROVIDE FIELD INSTALLED REMOTE WALL MOUNTED LINE VOLTAGE ELECTRIC SPACE THERMOSTATS OR UNIT MOUNTED RETURN AIR THERMOSTATS, WHERE SHOWN OR SPECIFIED TO CONTROL THE UNIT FAN. PROVIDE AN AQUASTAT ON HOT WATER UNITS TO PREVENT FAN OPERATION WHEN THE HEATING SYSTEM IS OFF.

WALL-MOUNTED UNIT HEATERS

1. GENERAL: ELECTRIC HEAT, FAN DRIVEN, THERMOSTATIC CONTROL, UL LISTED.

2. ENCLOSURE:

2.1. WALL BOX: NOT LESS THAN 1.3 MM (L8 GAGE) STEEL, RECESSED TYPE. RIBBED 1.6 MM (L6 GAGE) STEEL FRONT COVER. CLOSELY SPACED DISCHARGE LOUVERS. CONCEALED SCREWS FOR LOCKING TRIM FRAME TO FRONT COVER. FINISHED IN BAKED ENAMEL OF MANUFACTURER'S STANDARD COLOR WITH SATIN FINISH ANODIZED ALUMINUM TRIM FRAME.

3. HEATING ELEMENTS: STEEL SHEATH ENCLOSED FINNED_TUBE TYPE.

4. INTEGRAL CONTROLS:

4.1. TWO_POLE TERMINAL BLOCK; BUILT_IN FAN DELAY SWITCH; AUTOMATIC RESET LINE VOLTAGE INTERNAL THERMAL OVERHEATS PROTECTION.

4.2. BUILT_IN THERMOSTAT COMFORT CONTROL WITH ADJUSTMENT RANGE BETWEEN -1 TO 32 DEGREE C (30_90 DEGREES F), AND MANUALLY SET "NO HEAT" POSITION; TAMPER RESISTANT ADJUSTMENT BY INSERTING SCREWDRIVER THROUGH FRONT COVER LOUVERS.

UNITARY HVAC EQUIPMENT - ROOF-TOP UNITS AND SPLIT SYSTEMS

1. QUALITY ASSURANCE
1.1. SAFETY STANDARDS: ASHRAE STANDARD 15, SAFETY CODE FOR MECHANICAL REFRIGERATION.

2. SUBMITTALS
2.1. MANUFACTURER'S LITERATURE AND DATA:

2.1.1. SUFFICIENT INFORMATION, INCLUDING CAPACITIES, PRESSURE DROPS AND PIPING CONNECTIONS CLEARLY PRESENTED, SHALL BE INCLUDED TO DETERMINE COMPLIANCE WITH DRAWINGS AND SPECIFICATIONS.

2.1.2. UNIT DIMENSIONS REQUIRED CLEARANCES, OPERATING WEIGHTS ACCESSORIES AND START-UP INSTRUCTIONS.

2.1.3. ELECTRICAL REQUIREMENTS, WIRING DIAGRAMS, INTERLOCKING AND CONTROL WIRING SHOWING FACTORY INSTALLED AND PORTIONS TO BE FIELD INSTALLED.

2.1.4. MOUNTING AND FLASHING OF THE ROOF CURB TO THE ROOFING STRUCTURE WITH COORDINATING REQUIREMENTS FOR THE ROOF MEMBRANE SYSTEM.

2.2. CERTIFICATION: SUBMIT PROOF OF SPECIFIED ARI CERTIFICATION.

2.3. OPERATING AND MAINTENANCE MANUAL: SUBMIT THREE COPIES OF OPERATING AND MAINTENANCE MANUAL TO OWNER.

2.4. COMPLETED SYSTEM READINESS CHECKLISTS PROVIDED BY THE COMMISSIONING AGENT AND COMPLETED BY THE CONTRACTOR, SIGNED BY A QUALIFIED TECHNICIAN AND DATED ON THE DATE OF COMPLETION.

3. UNITARY AIR CONDITIONERS - GENERAL
3.1. APPLICABLE ARI STANDARDS:

3.1.1. COOLING CAPACITY 39.6 KW (135,000 BTU/H) AND MORE: AHRI 340/ 360.

3.1.2. COOLING CAPACITY LESS THAN 39.6 KW (135,000 BTU/H): AHRI 210/240. UNITS SHALL BE LISTED IN THE ARI DIRECTORY OF CERTIFIED UNITARY AIR-CONDITIONERS.

3.2. PERFORMANCE RATING: COOLING CAPACITY OF UNITS SHALL MEET THE SENSIBLE HEAT AND TOTAL HEAT REQUIREMENTS SHOWN IN THE CONTRACT DOCUMENTS. IN SELECTING UNIT SIZE, MAKE TRUE ALLOWANCE FOR "SENSIBLE TO TOTAL HEAT RATIO" TO SATISFY REQUIRED SENSIBLE COOLING CAPACITY.

3.3. MACHINERY GUARDS: PROVIDE GUARDS AS SHOWN IN AMCA 410 FOR BELTS, CHAINS, COUPLINGS, PULLEYS, SHEAVES, SHAFTS, GEARS AND OTHER MOVING PARTS REGARDLESS OF HEIGHT ABOVE THE FLOOR. DRIVE GUARDS MAY BE EXCLUDED WHERE MOTORS AND DRIVES ARE INSIDE FACTORY FABRICATED CASINGS.

3.4. CORROSION PREVENTION: UNLESS SPECIFIED OTHERWISE, EQUIPMENT FABRICATED FROM FERROUS METALS THAT DO NOT HAVE A ZINC COATING OR A DUPLEX COATING OF ZINC AND PAINT SHALL BE TREATED FOR PREVENTION OF RUST WITH A FACTORY COATING OR PAINT SYSTEM THAT WILL WITHSTAND 125 HOURS IN A SALT-SPRAY FOG TEST, EXCEPT THAT EQUIPMENT LOCATED OUTDOORS SHALL BE TESTED FOR 500 HOURS. THE SALT-SPRAY FOG TEST SHALL BE IN ACCORDANCE WITH ASTM B117 USING A 20 PERCENT SODIUM CHLORIDE SOLUTION. IMMEDIATELY AFTER COMPLETION OF THE TEST, THE COATING SHALL SHOW NO SIGNS OF BLISTERING, WRINKLING OR CRACKING, NO LOSS OF ADHESION, AND THE SPECIMEN SHALL SHOW NO SIGNS OF RUST BEYOND 3 MM (1/8-INCH) ON BOTH SIDES FROM THE SCRATCH MARK. FOR UNITS LOCATED IN HIGH HUMIDITY OR MARINE AREAS, PROVIDE FACTORY-COATED COILS FOR PROTECTION FROM CORROSION BY USING MULTIPLE STAGE ELECTRO-DEPOSITION COATING PROCESS.

4. SPLIT-SYSTEM AIR CONDITIONERS
4.1. DESCRIPTION: FACTORY ASSEMBLED AND TESTED, AIR HANDLING UNIT, AN AIR- COOLED REMOTE CONDENSING UNIT, AND FIELD-INSTALLED REFRIGERATION PIPING. UNIT SHALL INCLUDE AN ELECTRIC-RESISTANCE HEATING COIL.

4.2. FLOOR-MOUNTING, EVAPORATOR-FAN COMPONENTS:

4.2.1. CABINET: ENAMELED STEEL WITH REMOVABLE PANELS ON FRONT AND ENDS IN COLOR SELECTED BY ARCHITECT.

4.2.2. INSULATION: FACTORY-INSTALLED DUCT LINER.

4.2.3. DRAIN PANS: GALVANIZED STEEL, WITH CONNECTION FOR DRAIN; INSULATED AND COMPLYING WITH ASHRAE 62.1-2007.

4.2.4. AIRSTREAM SURFACES: SURFACES IN CONTACT WITH THE AIRSTREAM SHALL COMPLY WITH REQUIREMENTS IN ASHRAE 62.1-2007.

4.2.5. COILS:
4.2.5.1. REFRIGERANT COIL: COPPER TUBE, WITH MECHANICALLY BONDED ALUMINUM FINS, COMPLYING WITH AHRI 210/240, AND WITH THERMAL-EXPANSION VALVE.

4.2.5.2. ELECTRIC-RESISTANCE HEATING COIL: HELICAL, NICKEL-CHROME, RESISTANCE-WIRE HEATING ELEMENTS WITH REFRACTORY CERAMIC SUPPORT BUSHINGS; AUTOMATIC-RESET THERMAL CUTOUT; BUILT-IN MAGNETIC CONTACTORS; MANUAL-RESET THERMAL CUTOUT; AIRFLOW PROVING DEVICE; AND ONE-TIME FUSES IN TERMINAL BOX FOR OVERCURRENT PROTECTION. PROVIDE MINIMUM TWO-STAGE OR SCR CONTROL OF ELECTRIC HEATING COILS AS INDICATED.
4.2.5.3. FAN: DIRECT DRIVE, CENTRIFUGAL.
4.2.5.4. FAN MOTORS: MULTI-TAPPED, MULTI-SPEED MOTORS WITH INTERNAL THERMAL PROTECTION AND PERMANENT LUBRICATION.
4.2.5.5. FILTERS: DISPOSABLE, WITH MERV RATING OF 7 OR HIGHER ACCORDING TO ASHRAE 52.2.

4.2.6. AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS:
4.2.6.1. CASING: STEEL, FINISHED WITH BAKED ENAMEL IN COLOR SELECTED BY ARCHITECT, WITH REMOVABLE PANELS FOR ACCESS TO CONTROLS, WEEP HOLES FOR WATER DRAINAGE, AND MOUNTING HOLES IN BASE. SERVICE VALVES, FITTINGS, AND GAGE PORTS SHALL BE BRASS AND LOCATED OUTSIDE OF THE CASING.
4.2.6.2. COMPRESSOR: HERMETICALLY SEALED SCROLL WITH CRANKCASE HEATER AND MOUNTED ON VIBRATION ISOLATION. COMPRESSOR MOTOR SHALL HAVE THERMAL- AND CURRENT-SENSITIVE OVERLOAD DEVICES, START CAPACITOR, RELAY, AND CONTACTOR.
4.2.6.3. COMPRESSOR MOTOR WITH MANUAL-RESET, HIGH-PRESSURE SWITCH AND AUTOMATIC-RESET, LOW-PRESSURE SWITCH.
4.2.6.4. REFRIGERANT: R-407C OR R-410A UNLESS OTHERWISE INDICATED.
4.2.6.5. REFRIGERANT COIL: COPPER TUBE, WITH MECHANICALLY BONDED ALUMINUM FINS, COMPLYING WITH AHRI 210/240, AND WITH LIQUID SUBCOOLER.
4.2.6.6. FAN: ALUMINUM, PROPELLER TYPE, DIRECTLY CONNECTED TO MOTOR.
4.2.6.7. MOTOR: PERMANENTLY LUBRICATED, WITH INTEGRAL THERMAL-OVERLOAD PROTECTION.
4.2.6.8. LOW AMBIENT KIT: PERMIT OPERATION DOWN TO MINUS 18 DEG C (0 DEG F).
4.2.6.9. MOUNTING BASE: POLYETHYLENE.

5. ROOFTOP AIR CONDITIONERS
5.1. CASING: FORMED AND REINFORCED DOUBLE-WALL INSULATED PANELS, FABRICATED TO ALLOW REMOVAL FOR ACCESS TO INTERNAL PARTS AND COMPONENTS, WITH JOINTS BETWEEN SECTIONS SEALED. EXTERIOR CASING OF 1.6 MM (0.0626 INCH) THICK GALVANIZED STEEL WITH FACTORY-PAINTED FINISH, WITH PITCHED ROOF PANELS AND KNOCKOUTS WITH GROMMET SEALS FOR ELECTRICAL AND PIPING CONNECTIONS AND LIFTING LUGS. GALVANIZED INNER CASING OF 0.86 MM (0.034 INCH). CASING INSULATION AND ADHESIVE SHALL COMPLY WITH NFPA 90A OR NFPA 90B AND COMPLY WITH ASTM C 1071, TYPE I AND SHALL BE (1 INCH) THICK. SPACE BETWEEN DOUBLE WALL PANELS FILLED WITH FOAM INSULATION AND SEALED MOISTURE TIGHT. REMOVABLE CAM LATCHED ACCESS PANEL TO ALLOW ACCESS TO INTERNAL PARTS.

5.2. CORROSION PREVENTION: PAINT SHALL BE TREATED FOR PREVENTION OF RUST WITH A FACTORY COATING OR PAINT SYSTEM THAT WILL WITHSTAND 500 HOURS IN A SALT-SPRAY FOG TEST. THE SALT-SPRAY FOG TEST SHALL BE IN ACCORDANCE WITH ASTM B117 USING A 20 PERCENT SODIUM CHLORIDE SOLUTION. FOR UNITS LOCATED IN HIGH HUMIDITY OR MARINE AREAS, PROVIDE FACTORY-COATED COILS FOR PROTECTION FROM CORROSION BY USING MULTIPLE STAGE ELECTRO-DEPOSITION COATING PROCESS.

5.3. AIRSTREAM SURFACES: SURFACES IN CONTACT WITH THE AIRSTREAM SHALL COMPLY WITH REQUIREMENTS IN ASHRAE 62.1-2007.

5.4. CONDENSER-COIL FAN: PROPELLER, MOUNTED ON SHAFT OF PERMANENTLY LUBRICATED MOTOR.

5.5. RELIEF-AIR FAN: FORWARD CURVED OR BACKWARD INCLINED, SHAFT MOUNTED ON PERMANENTLY LUBRICATED MOTOR.

5.6. FAN MOTOR: PREMIUM EFFICIENCY.

5.7. SUPPLY-AIR REFRIGERANT COIL: ALUMINUM -PLATE FINS AND SEAMLESS INTERNALLY GROOVED COPPER TUBE IN STEEL CASING WITH EQUALIZING-TYPE VERTICAL DISTRIBUTOR. POLYMER STRIP SHALL PREVENT ALL COPPER COIL FROM CONTACTING STEEL COIL FRAME OR CONDENSATE PAN. COIL SPLIT SHALL BE INTERLACED. COIL SHALL HAVE BAKED PHENOLIC OR CATHODIC EPOXY COATING.

5.8. CONDENSATE DRAIN PAN: FORMED SECTIONS OF STAINLESS-STEEL SHEET, A MINIMUM OF 50 MM (2 INCHES) DEEP, AND COMPLYING WITH ASHRAE 62.1-2007. DRAIN CONNECTIONS SHALL BE THREADED NIPPLE // BOTH SIDES OF DRAIN PAN.

5.9. OUTDOOR-AIR REFRIGERANT COIL: ALUMINUM-PLATE FINS AND SEAMLESS INTERNALLY GROOVED COPPER TUBE IN STEEL CASING WITH EQUALIZING-TYPE VERTICAL DISTRIBUTOR. POLYMER STRIP SHALL PREVENT COPPER COIL FROM CONTACTING STEEL COIL FRAME OR CONDENSATE PAN. COIL SHALL HAVE BAKED PHENOLIC OR CATHODIC EPOXY COATING.

5.10. HOT-GAS REHEAT REFRIGERANT COIL: ALUMINUM-PLATE FINS AND SEAMLESS INTERNALLY GROOVED COPPER TUBE IN STEEL CASING WITH EQUALIZING-TYPE VERTICAL DISTRIBUTOR. POLYMER STRIP SHALL PREVENT COPPER COIL FROM CONTACTING STEEL COIL FRAME OR CONDENSATE PAN. COIL SHALL HAVE BAKED PHENOLIC OR CATHODIC EPOXY COATING.

5.11. ELECTRIC-RESISTANCE HEATING COIL: RESISTANCE WIRE OF 80 PERCENT NICKEL AND 20 PERCENT CHROMIUM, SUPPORTED AND INSULATED BY FLOATING CERAMIC BUSHINGS RECESSED INTO CASING OPENINGS, FASTENED TO SUPPORTING BRACKETS, AND MOUNTED IN GALVANIZED-STEEL FRAME.

5.11.1. TERMINALS: STAINLESS-STEEL MACHINE-STAKED TERMINALS SECURED WITH STAINLESS-STEEL HARDWARE.

5.11.2. OVERTEMPERATURE PROTECTION: DISK-TYPE, AUTOMATICALLY RESET, THERMAL-CUTOUT, SAFETY DEVICE; SERVICEABLE THROUGH TERMINAL BOX.

5.11.3. OVERCURRENT PROTECTION: MANUAL-RESET THERMAL CUTOUTS, FACTORY WIRED IN EACH HEATER STAGE.

5.11.4. CONTROL PANEL: UNIT MOUNTED WITH DISCONNECTING MEANS AND OVERCURRENT PROTECTION AND SHALL INCLUDE MAGNETIC CONTACTORS.

5.11.5. STEP CONTROLLER: HAVE PILOT LIGHTS AND OVERRIDE TOGGLE SWITCH FOR EACH STEP.

5.11.6. SCR CONTROLLER: HAVE PILOT LIGHTS OPERATE ON LOAD RATIO, A MINIMUM OF FIVE STEPS.

5.11.7. TIME-DELAY RELAY.

5.11.8. AIRFLOW PROVING SWITCH.

5.12. REFRIGERANT CIRCUIT COMPONENTS:

5.12.1. NUMBER OF INDEPENDENT REFRIGERANT CIRCUITS: TWO.

5.12.2. COMPRESSOR: HERMETIC, SCROLL, MOUNTED ON VIBRATION ISOLATORS; WITH INTERNAL OVERCURRENT AND HIGH-TEMPERATURE PROTECTION, INTERNAL PRESSURE RELIEF , AND CRANKCASE HEATER.

5.12.3. REFRIGERANT: R-407C OR R-410A UNLESS OTHERWISE INDICATED.

5.12.4. REFRIGERATION SPECIALTIES:

5.12.4.1. EXPANSION VALVE WITH REPLACEABLE THERMOSTATIC ELEMENT; REFRIGERANT FILTER/DRYER; MANUAL-RESET HIGH-PRESSURE SAFETY SWITCH; AUTOMATIC-RESET LOW-PRESSURE SAFETY SWITCH; MINIMUM OFF-TIME RELAY; AUTOMATIC-RESET COMPRESSOR MOTOR THERMAL OVERLOAD.

5.12.4.2. BRASS SERVICE VALVES INSTALLED IN COMPRESSOR SUCTION AND LIQUID LINES; LOW-AMBIENT KIT HIGH-PRESSURE SENSOR; HOT-GAS REHEAT SOLENOID VALVE WITH A REPLACEABLE MAGNETIC COIL; HOT-GAS BYPASS SOLENOID VALVE WITH A REPLACEABLE MAGNETIC COIL; FOUR-WAY REVERSING VALVE WITH A REPLACEABLE MAGNETIC COIL, THERMOSTATIC EXPANSION VALVES WITH BYPASS CHECK VALVES, AND A SUCTION LINE ACCUMULATOR.

5.13. GAS FURNACE: FACTORY ASSEMBLED, PIPED, AND WIRED; COMPLYING WITH ANSI Z21.47 AND NFPA 54. FURNACE SHALL BE DESIGNED AND CERTIFIED BY AND BEARING LABEL OF CSA.

5.13.1. BURNERS: STAINLESS STEEL.

5.13.2. IGNITION: ELECTRONICALLY CONTROLLED ELECTRIC SPARK OR HOT-SURFACE IGNITER WITH FLAME SENSOR.

5.13.3. HIGH-ALTITUDE MODEL OR KIT: FOR PROJECT ELEVATIONS MORE THAN 610 M (2000 FEET) ABOVE SEA LEVEL.

5.13.4. HEAT-EXCHANGER AND DRAIN PAN: STAINLESS STEEL.

5.13.5. VENTING: GRAVITY VENTED WITH VERTICAL EXTENSION.

5.13.6. POWER VENT: INTEGRAL, MOTORIZED CENTRIFUGAL FAN INTERLOCKED WITH GAS VALVE WITH VERTICAL EXTENSION.

5.13.7. SAFETY CONTROLS:

5.13.7.1. GAS CONTROL VALVE: MODULATING.

5.13.7.2. GAS TRAIN: SINGLE-BODY, REGULATED, REDUNDANT, 24-V AC GAS VALVE ASSEMBLY CONTAINING PILOT SOLENOID VALVE, PILOT FILTER, PRESSURE REGULATOR, PILOT SHUTOFF, AND MANUAL SHUTOFF.

5.14. OUTDOOR-AIR DAMPERS: ONE (1) MINIMUM OUTSIDE AIR DAMPER, LINKED DAMPER BLADES, FOR 0 TO 25 PERCENT OUTDOOR AIR, WITH MOTORIZED DAMPER OPERATOR. ONE (1) ECONOMIZER OUTSIDE AIR DAMPER.

5.15. OUTDOOR- AND RETURN-AIR MIXING DAMPERS: PARALLEL- OR OPPOSED-BLADE GALVANIZED-STEEL DAMPERS MECHANICALLY FASTENED TO CADMIUM PLATED FOR GALVANIZED-STEEL OPERATING ROD IN REINFORCED CABINET. CONNECT OPERATING RODS WITH COMMON LINKAGE AND INTERCONNECT LINKAGES SO DAMPERS OPERATE SIMULTANEOUSLY.

5.16. DAMPER MOTOR: MODULATING WITH ADJUSTABLE MINIMUM POSITION.

5.17. RELIEF-AIR DAMPER: GRAVITY ACTUATED OR MOTORIZED, COMPLYING WITH ASHRAE/IESNA 90.1-2004, AND HAVING BIRD SCREEN AND HOOD.

5.18. ELECTRICAL POWER CONNECTION: A SINGLE CONNECTION OF POWER TO UNIT WITH // UNIT-MOUNTED DISCONNECT SWITCH ACCESSIBLE FROM OUTSIDE UNIT AND // CONTROL-CIRCUIT TRANSFORMER WITH BUILT-IN OVERCURRENT PROTECTION.

6. CONTROLS:
6.1. BASIC UNIT CONTROLS:

6.1.1. CONTROL-VOLTAGE TRANSFORMER.

6.1.2. WALL-MOUNTED THERMOSTAT OR SENSOR WITH HEAT-COOL-OFF SWITCH.

6.1.3. FAN ON-AUTO SWITCH; FAN-SPEED SWITCH; AUTOMATIC CHANGEOVER; ADJUSTABLE DEADBAND; EXPOSED SET POINT; EXPOSED INDICATION; DEGREE F INDICATION; UNOCCUPIED-PERIOD-OVERRIDE PUSH BUTTON.

6.1.4. DATA ENTRY AND ACCESS PORT TO INPUT TEMPERATURE SET POINTS, OCCUPIED AND UNOCCUPIED PERIODS, AND OUTPUT ROOM TEMPERATURE, SUPPLY-AIR TEMPERATURE, OPERATING MODE, AND STATUS.

6.1.5. REMOTE WALL-MOUNTED ANNUNCIATOR PANEL WITH LIGHTS TO INDICATE POWER ON, COOLING, HEATING, FAN RUNNING, FILTER DIRTY, AND UNIT ALARM OR FAILURE.

6.1.6. DDC CONTROLLER OR PROGRAMMABLE TIMER AND INTERFACE WITH HVAC INSTRUMENTATION AND CONTROL SYSTEM AND TO DIGITAL DISPLAY OUTDOOR-AIR TEMPERATURE, SUPPLY-AIR TEMPERATURE, RETURN-AIR TEMPERATURE, ECONOMIZER DAMPER POSITION, INDOOR-AIR QUALITY, AND CONTROL PARAMETERS. INTERFACE WITH BMS/DDC SYSTEM VIA BACNET OPEN PROTOCOL.

6.1.7. DDC CONTROLLER SHALL HAVE VOLATILE-MEMORY BACKUP.

6.1.8. SAFETY CONTROL OPERATION:

6.1.8.1. SMOKE DETECTORS: STOP FAN AND CLOSE OUTDOOR-AIR DAMPER IF SMOKE IS DETECTED AND WITH ADDITIONAL CONTACTS FOR ALARM INTERFACE TO FIRE ALARM CONTROL PANEL.

6.1.8.2. FIRE STATS: STOP FAN AND CLOSE OUTDOOR-AIR DAMPER IF AIR GREATER THAN 54 DEG C (130 DEG F)] ENTERS UNIT AND WITH ADDITIONAL CONTACTS FOR ALARM INTERFACE TO FIRE ALARM CONTROL PANEL.

6.1.8.3. LOW-DISCHARGE TEMPERATURE: STOP FAN AND CLOSE OUTDOOR-AIR DAMPER IF SUPPLY AIR TEMPERATURE IS LESS THAN 4 DEG C (40 DEG F)].

6.1.8.4. DEFROST CONTROL FOR CONDENSER COIL: PRESSURE DIFFERENTIAL SWITCH TO INITIATE DEFROST SEQUENCE.

6.1.9. SCHEDULED OPERATION: OCCUPIED AND UNOCCUPIED PERIODS ON 7-DAY CLOCK WITH A MINIMUM OF 4 PROGRAMMABLE PERIODS PER DAY.

6.1.9.1. UNOCCUPIED PERIOD: HEATING SETBACK: 5.6 DEG C (10 DEG F)].

6.1.9.2. COOLING SETBACK: SYSTEM OFF.

6.1.9.3. OVERRIDE OPERATION: TWO HOURS UNLESS OTHERWISE INDICATED.

6.1.9.4. SUPPLY FAN OPERATION:

6.1.9.5. OCCUPIED PERIODS: RUN FAN CONTINUOUSLY.

6.1.9.6. UNOCCUPIED PERIODS: CYCLE FAN TO MAINTAIN SETBACK TEMPERATURE.

6.1.10. REFRIGERANT CIRCUIT OPERATION:

6.1.10.1. OCCUPIED PERIODS: CYCLE OR STAGE COMPRESSORS, AND OPERATE HOT-GAS BYPASS TO MATCH COMPRESSOR OUTPUT TO COOLING LOAD TO MAINTAIN DISCHARGE TEMPERATURE. CYCLE CONDENSER FANS TO MAINTAIN MAXIMUM HOT-GAS PRESSURE. OPERATE LOW-AMBIENT CONTROL KIT TO MAINTAIN MINIMUM HOT-GAS PRESSURE.

6.1.10.2. UNOCCUPIED PERIODS: COMPRESSORS OFF

6.1.11. GAS FURNACE OPERATION:

6.1.11.1. OCCUPIED PERIODS: MODULATE BURNER TO MAINTAIN DISCHARGE TEMPERATURE.

6.1.11.2. UNOCCUPIED PERIODS: CYCLE BURNER TO MAINTAIN SETBACK TEMPERATURE.

6.1.12. ELECTRIC-RESISTANCE HEATING-COIL OPERATION:

6.1.12.1. OCCUPIED PERIODS: MODULATE COIL TO MAINTAIN DISCHARGE TEMPERATURE.

6.1.12.2. UNOCCUPIED PERIODS: ENERGIZE COIL TO MAINTAIN SETBACK TEMPERATURE.

6.1.12.3. SUPPLEMENTAL ELECTRIC HEAT OPERATION: ELECTRIC-RESISTANCE HEATING COIL WITH COMPRESSOR FOR HEATING WITH OUTDOOR TEMPERATURE BELOW MINUS 4 DEG C (25 DEG F).

6.1.13. FIXED MINIMUM OUTDOOR-AIR DAMPER OPERATION:

6.1.13.1. OCCUPIED PERIODS: OPEN TO 25 PERCENT.

6.1.13.2. UNOCCUPIED PERIODS: CLOSE THE OUTDOOR-AIR DAMPER.

6.1.14. ECONOMIZER OUTDOOR-AIR DAMPER OPERATION:

6.1.14.1. OCCUPIED PERIODS: OPEN TO 10 PERCENT FIXED MINIMUM INTAKE, AND MAXIMUM 100 PERCENT OF THE FAN CAPACITY TO COMPLY WITH ASHRAE CYCLE II. CONTROLLER SHALL PERMIT AIR-SIDE ECONOMIZER OPERATION WHEN OUTDOOR AIR IS LESS THAN 15 DEG C (60 DEG F). USE OUTDOOR-AIR TEMPERATURE MIXED-AIR TEMPERATURE AND SELECT BETWEEN OUTDOOR-AIR AND RETURN-AIR ENTHALPY TO ADJUST MIXING DAMPERS.// START RELIEF-AIR FAN WITH END SWITCH ON OUTDOOR-AIR DAMPER.

6.1.14.2. UNOCCUPIED PERIODS: CLOSE OUTDOOR-AIR DAMPER AND OPEN RETURN-AIR DAMPER.

6.1.15. OUTDOOR-AIRFLOW MONITOR: ACCURACY MAXIMUM PLUS OR MINUS 5 PERCENT WITHIN 15 AND 100 PERCENT OF TOTAL OUTDOOR AIR. MONITOR MICROPROCESSOR SHALL ADJUST FOR TEMPERATURE, AND OUTPUT SHALL RANGE FROM 2- TO 10-V DC OR 4 TO 20 MA.

6.1.16. CARBON DIOXIDE SENSOR OPERATION:

6.1.16.1. OCCUPIED PERIODS: RESET MINIMUM OUTDOOR-AIR RATIO DOWN TO MINIMUM 10 PERCENT TO MAINTAIN MAXIMUM 1000-PPM CONCENTRATION.

6.1.16.2. UNOCCUPIED PERIODS: CLOSE OUTDOOR-AIR DAMPER AND OPEN RETURN-AIR DAMPER.

6.1.17. INTERFACE REQUIREMENTS FOR HVAC INSTRUMENTATION AND CONTROL SYSTEM:
6.1.17.1. INTERFACE RELAY FOR SCHEDULED OPERATION.

6.1.17.2. INTERFACE RELAY TO PROVIDE INDICATION OF FAULT AT THE CENTRAL WORKSTATION AND DIAGNOSTIC CODE STORAGE.

6.1.17.3. COMPATIBLE WITH BACNET FOR CENTRAL HVAC CONTROL WORKSTATION FOR ADJUSTING SET POINTS, MONITORING SUPPLY FAN START, STOP, AND OPERATION, INQUIRING DATA TO INCLUDE // OUTDOOR-AIR DAMPER POSITION, // SUPPLY- AND ROOM-AIR TEMPERATURE // AND HUMIDITY //, MONITORING OCCUPIED AND UNOCCUPIED OPERATIONS, MONITORING CONSTANT AND VARIABLE MOTOR LOADS, MONITORING VARIABLE-FREQUENCY DRIVE OPERATION, MONITORING COOLING LOAD, MONITORING ECONOMIZER CYCLES AND MONITORING AIR-DISTRIBUTION STATIC PRESSURE AND VENTILATION AIR VOLUME.

7. ACCESSORIES:
7.1. ELECTRIC HEATER WITH INTEGRAL THERMOSTAT MAINTAINS MINIMUM 10 DEG C (50 DEG F) TEMPERATURE IN GAS BURNER COMPARTMENT.

7.2. DUPLEX, 115-V, GROUND-FAULT-INTERRUPTER OUTLET WITH 15-A OVERCURRENT PROTECTION. INCLUDE TRANSFORMER IF REQUIRED. OUTLET SHALL BE ENERGIZED EVEN IF THE UNIT MAIN DISCONNECT IS OPEN.

7.3. LOW-AMBIENT KIT FOR OPERATION DOWN TO 28 DEG F.

7.4. FILTER DIFFERENTIAL PRESSURE SWITCH WITH SENSOR TUBING ON BOTH SIDES OF FILTER. SET FOR FINAL FILTER PRESSURE LOSS.

7.5. COIL GUARDS OF PAINTED, GALVANIZED-STEEL WIRE.

7.6. HAIL GUARDS OF GALVANIZED STEEL, PAINTED TO MATCH CASING.

7.7. CONCENTRIC DIFFUSER WITH WHITE LOUVERS AND POLISHED ALUMINUM RETURN GRILLES, INSULATED DIFFUSER BOX WITH MOUNTING FLANGES, AND INTERIOR TRANSITION.

8. ROOF CURBS: VIBRATION ISOLATORS AND WIND OR SEISMIC RESTRAINTS SHALL BE AS SPECIFIED IN SECTION 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT. MANUFACTURER'S STANDARD CURBS CONSTRUCTED OF GALVANIZED STEEL WITH CORROSION-PROTECTION COATING, WATERTIGHT GASKETS, AND FACTORY-INSTALLED WOOD NAILER; COMPLYING WITH NRCA STANDARDS.

8.1. CURB INSULATION AND ADHESIVE: FACTORY APPLIED AND COMPLYING WITH NFPA 90A OR NFPA 90B AND ASTM C 1071, TYPE I OR II. THICKNESS SHALL BE 25 MM 1-1/2 INCHES MINIMUM. INSULATION SHALL BE APPLIED WITH ADHESIVE AND MECHANICAL FASTENERS TO THE INTERNAL SURFACE OF CURB. LINER ADHESIVE SHALL COMPLY WITH ASTM C 916, TYPE I. LINER SHALL BE FASTENED WITH MECHANICAL FASTENERS OF GALVANIZED STEEL, SUITABLE FOR ADHESIVE ATTACHMENT, MECHANICAL ATTACHMENT, OR WELDING ATTACHMENT TO DUCT WITHOUT DAMAGING LINER WHEN APPLIED WITHOUT CAUSING LEAKAGE IN CABINET. LINER MATERIALS SHALL HAVE AIR-STREAM SURFACE COATED WITH A TEMPERATURE-RESISTANT COATING OR FACED WITH A PLAIN OR COATED FIBROUS MAT OR FABRIC DEPENDING ON SERVICE AIR VELOCITY. LINER ADHESIVE SHALL COMPLY WITH ASTM C 916, TYPE I.

8.2. CURB HEIGHT: (24 INCHES).

8.3. WIND AND SEISMIC RESTRAINTS: METAL BRACKETS COMPATIBLE WITH THE CURB AND CASING, PAINTED TO MATCH RTU, USED TO ANCHOR UNIT TO THE CURB, AND DESIGNED FOR LOADS AT PROJECT SITE.

9. INSTALLATION
9.1. ROOF CURB: INSTALL ON ROOF STRUCTURE OR CONCRETE BASE, LEVEL AND SECURE, ACCORDING TO NRCA'S "LOW-SLOPE MEMBRANE ROOFING CONSTRUCTION DETAILS MANUAL," ILLUSTRATION "RAISED CURB DETAIL FOR ROOFTOP AIR HANDLING UNITS AND DUCTS." ARI GUIDELINE B. INSTALL RTUS ON CURBS AND COORDINATE ROOF PENETRATIONS AND FLASHING WITH ROOF CONSTRUCTION . SECURE RTUS TO UPPER CURB RAIL, AND SECURE CURB BASE TO ROOF FRAMING OR CONCRETE BASE WITH ANCHOR BOLTS.

9.2. ROOFTOP UNIT SUPPORT: INSTALL UNIT LEVEL ON STRUCTURAL CURBS OR PILINGS. COORDINATE WALL PENETRATIONS AND FLASHING WITH WALL CONSTRUCTION. SECURE ROOFTOP UNITS TO STRUCTURAL SUPPORT WITH ANCHOR BOLTS.

9.3. INSTALL WIND AND SEISMIC RESTRAINTS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.

9.4. INSTALL UNITS LEVEL AND PLUMB MAINTAINING MANUFACTURER'S RECOMMENDED CLEARANCES AND TOLERANCES.

9.5. INSTALL GROUND-MOUNTING, COMPRESSOR-CONDENSER COMPONENTS ON 100 MM (4-INCH) THICK, REINFORCED CONCRETE BASE; 100 MM (4 INCHES) LARGER ON EACH SIDE THAN UNIT. COORDINATE ANCHOR INSTALLATION WITH CONCRETE BASE.

9.6. INSTALL ROOF-MOUNTING COMPRESSOR-CONDENSER COMPONENTS ON EQUIPMENT SUPPORTS. ANCHOR UNITS TO SUPPORTS WITH REMOVABLE, CADMIUM-PLATED FASTENERS.

9.7. INSTALL SEISMIC RESTRAINTS.

9.8. INSTALL COMPRESSOR-CONDENSER COMPONENTS ON RESTRAINED, SPRING ISOLATORS WITH A MINIMUM STATIC DEFLECTION OF 25 MM (1 INCH) UNLESS OTHERWISE INDICATED.

9.9. INSTALL AND CONNECT PRECHARGED REFRIGERANT TUBING TO COMPONENT'S QUICK-CONNECT FITTINGS. INSTALL TUBING TO ALLOW ACCESS TO UNIT.

9.10. INSTALL WALL SLEEVES IN FINISHED WALL ASSEMBLY AND WEATHERPROOF. INSTALL AND ANCHOR WALL SLEEVES TO WITHSTAND, WITHOUT DAMAGE SEISMIC FORCES AS REQUIRED BY CODE.

10.CONNECTIONS
10.1. VERIFY CONDENSATE DRAINAGE REQUIREMENTS.

10.2. INSTALL CONDENSATE DRAIN, MINIMUM CONNECTION SIZE, WITH TRAP AND INDIRECT CONNECTION TO NEAREST ROOF DRAIN OR AREA DRAIN.

10.3. INSTALL PIPING ADJACENT TO UNITS TO ALLOW SERVICE AND MAINTENANCE.

10.4. GAS PIPING: CONNECT GAS PIPING TO BURNER, FULL SIZE OF GAS TRAIN INLET, AND CONNECT WITH UNION AND SHUTOFF VALVE WITH SUFFICIENT CLEARANCE FOR BURNER REMOVAL AND SERVICE.

10.5. INSTALL DUCTS TO TERMINATION AT TOP OF ROOF CURB. CUT ROOF DECKING ONLY AS REQUIRED FOR PASSAGE OF DUCTS. DO NOT CUT OUT DECKING UNDER ENTIRE ROOF CURB.

10.6. INSTALL RETURN-AIR DUCT CONTINUOUSLY THROUGH ROOF STRUCTURE.

10.7. INSTALL NORMAL-WEIGHT, 20.7-MPA (3000-PSI), COMPRESSIVE STRENGTH (28-DAY) CONCRETE MIX INSIDE ROOF CURB, 100 MM (4 INCHES) THICK.

10.8. GROUND EQUIPMENT AND INSTALL POWER WIRING, SWITCHES, AND CONTROLS FOR SELF CONTAINED AND SPLIT SYSTEMS.

10.9. CONNECT REFRIGERANT PIPING TO COILS WITH SHUTOFF VALVES ON THE SUCTION AND LIQUID LINES AT THE COIL AND A UNION OR FLANGE AT EACH CONNECTION AT THE COIL AND CONDENSER.

10.10. INSTALL DUCTS TO THE UNITS WITH FLEXIBLE DUCT CONNECTIONS.

11.FIELD QUALITY CONTROL
11.1. PERFORM TESTS AND INSPECTIONS AND PREPARE TEST REPORTS.

11.2. TESTS AND INSPECTIONS: AFTER INSTALLING UNITS AND AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, TEST UNITS FOR COMPLIANCE WITH REQUIREMENTS. INSPECT FOR AND REMOVE SHIPPING BOLTS, BLOCKS, AND TIE-DOWN STRAPS. AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, START UNITS TO CONFIRM PROPER MOTOR ROTATION AND UNIT OPERATION. TEST AND ADJUST CONTROLS AND SAFETIES. REPLACE DAMAGED AND MALFUNCTIONING CONTROLS AND EQUIPMENT. REMOVE AND REPLACE MALFUNCTIONING UNITS AND RETEST AS SPECIFIED ABOVE.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004
CABLE BUILDING

STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO.	2021-32
DB:	
CB:	
DATE:	02/03/2022
SHEET NO:	**M203**

MECHANICAL SPECIFICATIONS

FOR CONSTRUCTION

PLUMBING LEGEND

WC	WATER CLOSET – WALL HUNG FLUSH VALVE	
WC	WATER CLOSET – FLOOR SET FLUSH VALVE	
WC	WATER CLOSET – FLOOR SET FLUSH TANK	
U	URINAL	
L	LAVATORY – WALL HUNG	
S	SINK – WALL HUNG	
S	SINK – DROP–IN	
MB	MOP BASIN	
SH	SHOWER	
DF	DRINKING FOUNTAIN	
FD	FLOOR DRAIN	
TMV	THERMOSTATIC MIXING VALVE	

RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
SB	COLD WATER SUPPLY BOX
CO	CLEANOUT
WCO	WALL CLEANOUT
FCO	FLOOR CLEANOUT
YCO	YARD CLEANOUT
VTR	VENT THRU ROOF
RD	ROOF DRAIN
OD	OVERFLOW DRAIN
OR	OPEN RECEPTOR
EXST	EXISTING
BFF	BELOW FINISH FLOOR
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
S.S.	STORM SEWER
F.F.E.	FINISHED FLOOR ELEVATION
I.E.	INVERT ELEVATION
	RECIRCULATING PUMP
	CONNECTION POINT– NEW TO EXISTING
	LIMIT OF REMOVAL
	WALL HYDRANT
A	WATER HAMMER ARRESTER ZURN Z–1700 SIZE A–(100), B–(200), C–(300), D–(400)

	SANITARY WASTE
	SANITARY VENT
CW	DOMESTIC COLD WATER
HW	DOMESTIC HOT WATER
HWR	DOMESTIC HOT WATER RETURN
G	NATURAL GAS
SD	STORM DRAINAGE
OD	OVERFLOW DRAINAGE
	BALL VALVE
	SHUT–OFF VALVE
	PRESSURE REDUCING VALVE
	BALANCING STATION SEE DETAIL
	STRAINER
	REDUCED PRESSURE BACKFLOW PREVENTER
	FLOW–IN DIRECTION OF ARROW
	VALVE IN VERTICAL
	RISER OR DROP
	BRANCH CONNECTION OFF TOP
	RISER DOWN
	RISER UP

NATURAL GAS LOADS (NEW)

EQUIPMENT	NATURAL GAS INPUT
(1) NEW AHU @ 60,000	60,000 BTUH
(1) NEW AHU @ 100,000	100,000 BTUH
(4) NEW UNIT HEATERS @ 100,000	400,000 BTUH
(1) NEW WATER HEATER @ 50,000	76,000 BTUH
CONNECTED SUBTOTAL:	636,000 BTUH
TOTAL W/ 50% SAFTEY FACTOR:	954,000 BTUH

PLUMBING GENERAL NOTES

GENERAL PROJECT REQUIREMENTS

A. ALL MATERIALS FURNISHED AND ALL WORK PERFORMED SHALL BE IN ACCORDANCE WITH THE LATEST ADOPTED CODES, RULES AND REGULATIONS, INCLUDING BUT NOT LIMITED TO: MECHANICAL, ELECTRICAL, PLUMBING, ENERGY CONSERVATION, BUILDING, NFPA, ASHRAE 62.1 & 90.1, OSHA, UTILITY PROVIDERS, AS WELL AS ALL LOCAL AND STATE CODES. IN ALL CASES, THE MOST STRINGENT SHALL APPLY.

B. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FEES, PERMITS, INSPECTIONS AND LICENSES FOR THE COMPLETE INSTALLATION OF HIS WORK. DRAWINGS ARE DIAGRAMMATIC REPRESENTATION OF THE WORK AND INDICATES GENERAL ARRANGEMENT. SEE ARCHITECTURAL AND/OR FOOD SERVICE DRAWINGS FOR EXACT DIMENSIONS.

C. COORDINATE EXACT PHASING OF ALL WORK WITH GENERAL CONTRACTOR. PREPARE SHOP DRAWINGS TO VERIFY COORDINATION OF WORK BETWEEN TRADES, PRIOR TO INSTALLATION OR PURCHASE OF MATERIAL.

D. INSTALL EQUIPMENT, MATERIALS, ETC., IN STRICT ACCORD WITH MANUFACTURERS' RECOMMENDATIONS AND DIRECTIONS. ALL INSTALLED COMPONENTS/EQUIPMENT SHALL BE LABELED BY UNDERWRITER'S LABORATORIES OR OTHER APPROVED LISTING AGENCY. APPROVED AND LABELING OF INDIVIDUAL COMPONENTS ON AN ASSEMBLY IS NOT ACCEPTABLE AS MEETING THIS REQUIREMENT, UNLESS WAIVED BY THE ENGINEER IN WRITING.

E. ALL ROOF VENTS, DRAINS, CURBS, PIPE PORTALS, ETC. SHALL BE COMPATIBLE WITH THE ROOFING SYSTEM (EITHER EXISTING OR NEW). SEE ARCHITECTURAL PLANS/SPECIFICATIONS FOR MORE INFORMATION. COORDINATE ALL ROOF ACCESSORIES WITH G.C.

F. ALL SUPPORTS FOR EQUIPMENT, DEVICES OR FIXTURES SHALL BE UNIQUE, FROM THE BUILDING STRUCTURE. DO NOT SUPPORT WORK FROM OTHER TRADES, EQUIPMENT OR SUPPORTS WITHOUT WRITTEN PERMISSION FROM THE ENGINEER AND CONSENT OF THE OTHER TRADE, IN WRITING. SUPPORTING FROM CROSS BRACING OR ROOF DECK WILL NOT BE ALLOWED.

G. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR HIS WORK. ALL CUTTING AND PATCHING SHALL BE IN ACCORDANCE WITH THE ARCHITECT'S STANDARDS FOR SUCH WORK. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. IF IN DOUBT, CONTACT THE OWNER/ARCHITECT AND ENGINEERS FOR CLARIFICATIONS PRIOR TO INSTALLING ANY SUCH WORK.

H. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. ANY EXPOSED WORK THAT COULD PRESENT AN ENVIRONMENTAL HAZARD (E.G. CONTACT WITH STEAM PIPING, EXPOSED DUCT JOINTS IN A LOW CEILING) SHALL BE PROVIDED WITH ALL REQUIRED PROTECTIVE MEASURES.

I. DO NOT SCALE FROM DRAWINGS, AS PRINTING DISTORTS SCALE. WORK SHALL BE LAID OUT FROM DIMENSIONED DRAWINGS, OR DIMENSIONS SUPPLIED TO THE CONTRACTOR.

J. THE PURPOSE AND INTENT OF ALL OF THE DOCUMENTS PERTAINING TO THIS PROJECT IS TO PROVIDE A COMPLETE, FUNCTIONAL, SAFE, LIKE NEW FACILITY. ANYTHING LESS SHALL BE UNACCEPTABLE. FURNISH ALL REQUIRED ITEMS EVEN IF NOT SPECIFICALLY SHOWN ON THE DRAWINGS (E.G. OFFSETS, ISOLATION AND BALANCING DEVICES, MAINTENANCE CLEARANCES, ETC.) ALL SYSTEMS, EQUIPMENT AND MATERIALS ARE TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. WORK NOT MEETING THIS CRITERION SHALL BE REMOVED AND REINSTALLED SATISFACTORILY. FINAL DETERMINATION OF THE ACCEPTABILITY OF THE QUALITY OF WORK RESIDES WITH THE ENGINEER.

K. MAINTAIN ALL MANUFACTURER AND CODE-REQUIRED SERVICE CLEARANCES, INTAKE/EXHAUST CLEARANCES, ROOF EDGE CLEARANCES FOR ALL NEW AND EXISTING EQUIPMENT, DUCTWORK AND PLUMBING VENTS.

EXISTING CONDITIONS AND UTILITIES

A. CONTRACTOR SHALL VISIT AND EXAMINE THE SITE PRIOR TO SUBMITTING BID TO BECOME FAMILIAR WITH EXISTING CONDITIONS. NO ALLOWANCE SHALL BE MADE FOR EXISTING CONDITIONS NOT KNOWN TO THE CONTRACTOR. EXISTING EQUIPMENT, DUCT/PIPING (SIZES AND LOCATIONS), ETC. ARE SHOWN FOR REFERENCE ONLY. ADJUST EXACT INSTALLATION AND CONNECTION OF NEW ITEMS ACCORDING TO FIELD CONDITIONS.

B. CONTRACTOR SHALL EXERCISE EXTREME CARE IN THE COURSE OF THEIR WORK SO AS TO ENSURE THAT THEY DO NOT INTERRUPT ANY EXISTING BUILDING SERVICES. FOR SAFETY PURPOSES, PARTICULAR ATTENTION SHALL BE PAID TO THIS PRECAUTION RELATIVE TO STEAM, WASTE, HYDRONIC PIPING, NATURAL GAS AND ELECTRICAL LINES. VERIFY THE LOCATION, SIZE, TYPE, ETC., OF EACH UNDERGROUND OR OVERHEAD UTILITY.

C. CARE SHALL BE TAKEN BY ALL CONTRACTORS TO AVOID DAMAGING OR DISTURBING EXISTING CONSTRUCTION WHICH IS TO REMAIN. CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING ANY REPAIRS NECESSARY TO RECTIFY DAMAGE AND RESTORE EXISTING CONSTRUCTION TO AN UNDAMAGED STATE UPON COMPLETION OF WORK - THIS SHALL BE PERFORMED AT NO ADDITIONAL COST TO OWNER. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING/PATCHING ANY ABANDONED PENETRATIONS, UNLESS DIRECTED OTHERWISE BY OWNER. CONTRACTOR SHALL BE RESPONSIBLE FOR STORAGE OF RELOCATED/RETAINED EQUIPMENT AND MATERIALS DURING CONSTRUCTION. ITEMS DAMAGED DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

D. INTERRUPTION OF ANY EXISTING SERVICES SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR, UTILITY PROVIDER, OWNER'S DESIGNATED REPRESENTATIVE, AND THE ARCHITECT, AT LEAST TWO WEEKS IN ADVANCE OF THE ANTICIPATED INTERRUPTION. A SCHEDULE FOR THESE OUTAGES SHALL BE DEVELOPED AND AGREED UPON BETWEEN THE PARTIES MENTIONED, TO AVOID UNNECESSARY INCONVENIENCE TO THE OWNER OR ANY AFFECTED PARTY. NOTIFY THE UTILITY COMPANY OF ANY ANTICIPATED SERVICES REQUIRED TWO WEEKS IN ADVANCE, IN WRITING. IF UTILITY COMPANY REQUIRES A LONGER NOTIFICATION PERIOD, SO PROVIDE. WHERE INTERRUPTING AN EXISTING UTILITY OR SERVICE DELIBERATELY OR ACCIDENTALLY, THE RESPONSIBLE CONTRACTOR SHALL WORK CONTINUOUSLY AS NEEDED TO RESTORE SAME, PROVIDING PREMIUM TIME AS NEEDED.

E. CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING OWNER/ARCHITECT AND ENGINEER OF ANY AND ALL HAZARDOUS MATERIAL ABATEMENT (LEAD, ASBESTOS, ETC.) REQUIRED FOR DEMOLITION AND/OR NEW WORK. IF ANY HAZARDOUS MATERIALS ARE FOUND, THESE CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF OWNER/G.C. IMMEDIATELY AFTER DISCOVERY. ABATEMENT WORK WILL BE COVERED UNDER A SEPARATE CONTRACT.

COORDINATION WITH FIRE ALARM AND FIRE/SMOKE-RATED ASSEMBLIES

A. PROVIDE FIRE STOP PER BUILDING CODE TO ALL CONDUITS PENETRATING THROUGH FIRE RATED WALLS/PARTITION, FLOORS AND CEILINGS. COORDINATION WITH THE GENERAL CONTRACTOR SHALL BE MAINTAINED TO INSURE THAT FIRE STOPPING IS ACCOMPLISHED. USE APPROVED U.L. OR EQUIVALENT SEALANT. CONTRACTOR SHALL BE RESPONSIBLE FOR SEALING/PATCHING ANY PENETRATIONS IN FLOOR/SLAB/WALL AFTER DEMOLITION. REFER TO ARCHITECTURAL PLANS FOR WALL RATINGS.

COORDINATION WITH OTHER TRADES

A. CONTRACTOR SHALL VERIFY EXACT MOUNTING LOCATION AND CONNECTION REQUIREMENTS OF ALL PLUMBING/MECHANICAL/FOOD SERVICE EQUIPMENT WITH ALL OTHER INVOLVED TRADES PRIOR TO ROUGH-IN.

B. CONTRACTOR SHALL COORDINATE LOCATION OF GRILLES/REGISTERS/DIFFUSERS, DUCTWORK, PIPING, ETC. WITH ALL OTHER TRADES TO AVOID CONFLICT WITH CONDUIT, LIGHTING, DUCTWORK, CABLE TRAYS, PIPING AND SPRINKLER PIPING, ETC.

C. ALL EXTERIOR ELECTRICAL DEVICES AND EQUIPMENT SHALL BE WEATHERPROOF TYPE NEMA 3R. COORDINATE INSTALLATION WITH ELECTRICAL CONTRACTOR.

D. REFER TO ARCHITECTURAL WALL ELEVATIONS (WHERE GIVEN) FOR HEIGHTS AND MOUNTING RELATIONSHIP OF AIR DEVICES, ACCESS PANELS, THERMOSTATS AND OTHER SENSORS, ETC. WHERE MOUNTING HEIGHTS ARE NOT INDICATED OR ARE IN CONFLICT WITH ANY OTHER BUILDING SYSTEMS, CONTACT THE ARCHITECT AND ENGINEER PRIOR TO INSTALLATION. IF APPLICABLE, REFER TO ARCHITECTURAL WALL ELEVATIONS, CEILING HEIGHTS, REFLECTED CEILING PLAN, AND OTHER DETAILS IN THESE DOCUMENTS (AS APPLICABLE).

E. WHERE PENETRATING NEW OR EXISTING ROOFING MEMBRANE OR OTHER MATERIALS USED FOR WEATHERPROOFING THE BUILDING, MAKE SUCH PENETRATION IN A WAY THAT WILL NOT VOID OR DIMINISH THE ROOFING WARRANTY OR INTEGRITY IN ANYWAY. ROOFING CONTRACTOR SHALL MAKE ALL ROOF PENETRATIONS.

F. CONTRACTOR SHALL COORDINATE WITH ELECTRICAL/FIRE ALARM CONTRACTOR FOR PROVISION OF POWER WIRING, DISCONNECTS, SMOKE DETECTORS, INTERRUPTERS, CONTACTS, ETC.

PLUMBING WORK

A. ALL VALVES, SENSORS, OPERATORS, DEVICES, CLEAN OUTS, ETC.SHALL BE ACCESSIBLE. PROVIDE ACCESS PANEL(S) AS REQUIRED WITH PRIOR APPROVAL OF ARCHITECT.

B. CONTROLS AND OTHER LOW VOLTAGE WIRING SHALL BE PLENUM RATED IF CONDUCTORS PASS THROUGH AN AIR PLENUM.

C. ALL STRUCTURAL SUPPORTS FOR PLUMBING EQUIPMENT SHALL BE PROVIDED AND INSTALLED BY PLUMBING CONTRACTOR. PLUMBING CONTRACTOR SHALL INCLUDE DESIGN FOR ALL STRUCTURAL SUPPORT.

D. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY BALANCING ALL PIPING, EQUIPMENT, AND ANY OTHER APPURTENANCES OF THE BUILDING'S MECHANICAL/PLUMBING SYSTEMS. PROVIDE TEST AND BALANCE REPORT TO ENGINEER.

E. PLUMBING CONTRACTOR SHALL PROVIDE PIPING/DUCT SLEEVES FOR UTILITY ROUTING, AS NECESSARY, IN WALLS, FLOORS AND CEILINGS.

F. ALL PIPING SYSTEMS SHALL BE INSTALLED WITH A MINIMUM OF FITTINGS, BENDS, POINTS OF CONSTRICTION, ETC. ALL PIPING SHALL BE INSTALLED AT RIGHT ANGLES, WITH LONG-SWEEP ELBOWS. PROVIDE PIPING WITH EXPANSION LOOPS AND APPROPRIATE HANGERS/SUPPORTS.

G. PROVIDE GAS-FIRED EQUIPMENT WITH DUST/DRIP LEG, SHUT-OFF VALVE(S), REGULATOR, EMERGENCY SHUT-OFF SWITCH, EARTH-QUAKE SWITCH AND ANY OTHER ACCESSORIES AS DICTATED BY THE CONSTRUCTION DOCUMENTS AND ANY APPLICABLE CODES OR SAFETY STANDARDS.

H. INSTALL NO PIPING, ETC., IN A LOCATION OR IN A MANNER WHICH WILL ALLOW FREEZING AND THE COLLECTION OF CONDENSATION THEREON.

I. UNLESS OTHERWISE DIRECTED BY THE OWNER, ALL NEW EQUIPMENT, SENSORS, CONTROLLERS, ETC. SHALL BE FULLY INTEGRATED AND INTEROPERABLE WITH EXISTING CONTROLS SYSTEM.

J. CONTRACTOR SHALL COORDINATE LOCATION OF PIPING, FIXTURES, LINT TRAPS, GREASE TRAPS, ETC. WITH ALL OTHER TRADES TO AVOID CONFLICT WITH CONDUIT, LIGHTING, DUCTWORK, PIPING AND SPRINKLER PIPING, ETC.

K. ALL PIPING SHALL BE RUN INSIDE OF THE BUILDING AND AWAY FROM EXTERIOR WALLS. ANY PIPE THAT MUST BE INSTALLED WHERE EXPOSED TO THE OUTDOORS SHALL BE PROVIDED WITH HEAT TAPE - MINIMUM OF EIGHT (8) WATTS PER LINEAR FOOT. COORDINATE POWER WITH ELECTRICAL CONTRACTOR.

L. ALL PIPING RUNS ARE REPRESENTATIVE ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY CONDITIONS IN THE FIELD (EXISTING, OR PREDICATED BY NEW CONSTRUCTION) THAT MAKE NECESSARY ALTERNATE ROUTING OF PIPING.

M. CONTRACTOR SHALL PROVIDE AND INSTALL ALL CODE-REQUIRED WALL, FLOOR AND YARD CLEAN OUTS TO ENSURE COMPLIANCE WITH CODE AUTHORITY, LOCAL AHJ, ETC. AND TO ENSURE EASE OF MAINTENANCE FOR FACILITY STAFF.

PLUMBING BASIS OF DESIGN

A. THE PLUMBING DESIGN AND SUBSEQUENT CONSTRUCTION, INCLUDING BUT NOT LIMITED TO: WASTE/VENT SIZING AND LAYOUT, FITTINGS AND CONNECTIONS, FIXTURE UNIT COUNTS, HW/CW REQUIREMENTS, ETC. IS BASED UPON COMPLIANCE WITH THE LATEST EDITIONS OF THE INDIANA PLUMBING CODE.

B. PLUMBING LINES SHALL NOT BE PERMITTED TO BE RUN ABOVE ELECTRICAL ROOMS, TELECOMMUNICATION ROOMS, OR ELECTRICAL EQUIPMENT/PANELS.

C. AT THE TIME OF DESIGN, NO DOMESTIC WATER FLOW TEST DATA WAS AVAILABLE AND/OR PROVIDED TO THE ENGINEER. THIS DESIGN ASSUMES A MINIMUM OF 60 PSIG INCOMING DOMESTIC WATER PRESSURE. INCOMING DOMESTIC WATER PIPING SHALL BE SIZED BASED UPON AVAILABLE WATER PRESSURE - PROVIDE PRESSURE REDUCING VALVE ASSEMBLY AS REQUIRED. NEW WATER METER(S) SHALL BE SIZED FOR A MINIMUM OF 150% OF THE TOTAL DEMAND OF THE FIXCTURES SHOWN IN THESE CONSTRUCTION DOCUMENTS. COORDINATE METER INSTALLATION ENGINEER ASSUMES NO LIABILITY FOR INSUFFICIENT WATER PRESSURE.

D. PLUMBING FIXTURE FLOW REQUIREMENTS ARE BASED UPON THE VALUES GIVEN IN THE SCHEDULES. SUBSTITUTION OF FIXTURES WITH DIFFERENT PERFORMANCE MAY ADVERSELY AFFECT THE GAS. WASTE/VENT, AND DOMESTIC WATER PIPE SIZING. IN CASES WHERE THIS REQUIRES LARGER PIPING AND/OR DIFFERING LAYOUT, CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIAL REQUIRED TO ENSURE CODE COMPLIANCE AND ACCEPTABLE PERFORMANCE. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LABOR AND MATERIAL TO PROVIDE DOMESTIC WATER AND WASTE SERVICE TO THE BUILDING - COORDINATE AS REQUIRED WITH WATER/SEWER UTILITY.

E. CONTRACTOR SHALL PROVIDE AND INSTALL A FULLY WORKING PLUMBING SYSTEM INCLUDING: WASTE/VENT PIPING, HW/CW PIPING, WATER HEATERS(S), FLUE AND VENT, ETC.

SPACE MODIFICATIONS AND IMPROVEMENTS

A. CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIAL REQUIRED TO PROVIDE NEW PLUMBING FIXTURES AS SHOWN ON PLANS, INCLUDING: DOMESTIC WATER PIPING, WASTE/VENT PIPING, TRAPS, HANGERS/SUPPORTS, ETC. FIXTURES AND UTILITIES SHALL BE INSTALLED AS SHOWN ON PLANS AND AS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION OF ALL NEW SYSTEMS.

B. A NEW WATER METER, BACKFLOW PREVENTER, SUPPLY LINES, ETC. SHALL BE PROVIDED. NEW DOMESTIC WATER PIPING MAINS AND BRANCH LINES SHALL BE PROVIDED TO SERVE THE NEW FIXTURES. PROVIDE NEW PIPING AS SHOWN ON PLANS, AND AS REQUIRED FOR ALL NEW FIXTURES, INCLUDING FOOD SERVICE AND OTHER SPECIALIZED EQUIPMENT.

C. A NEW GAS METER SHALL BE PROVIDED AND PIPING EXTENDED TO HVAC AND/OR PLUMBING EQUIPMENT.

D. A NEW GAS-FIRED WATER HEATER SHALL BE PROVIDED. CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIAL REQUIRED, INCLUDING, BUT NOT LIMITED TO: FLUE/VENT, DRAINS, ELECTRICAL CONNECTIONS, CIRCULATION PUMPS, GAS PIPING AND ACCESSORIES, ETC.

E. A NEW MODULAR TRENCH DRAIN SHALL BE PROVIDED FOR THE STORAGE AREA - DRAINS SHALL BE PROVIDED WITH TRAFFIC-RATED (40,000 POUND) GRATE. STORAGE AREA FLOOR DRAIN SYSTEM IS DESIGNED TO BE, AND SHALL BE INSTALLED AS, A MANUFACTURER'S FLOOR DRAIN SYSTEM.

F. NEW SANITARY WASTE LINE BE PROVIDED AND TIED-IN TO THE EXISTING SEWER MAIN - SEE SITE/CIVIL PLAN FOR MORE INFORMATION.

F.1. SEE OWNER-PROVIDED SITE PLAN FOR EXISTING SANITARY MAIN DEPTH/LOCATION, STORM SEWER UTILITIES, EASEMENTS, AND ALL OTHER SITE UTILITIES. ESTIMATED INVERT DEPTHS FOR SANITARY MAIN (FIVE FEET OUTSIDE OF BUILDING) HAVE BEEN PROVIDED ON THE RISER DIAGRAM. PROVIDE ALL LABOR AND MATERIAL REQUIRED TO INSTALL NEW SANITARY MAIN, TIE-IN, ETC. INCLUDING EJECTOR PUMP.

F.2. A NEW SEWAGE EJECTOR PUMP SHALL BE PROVIDED. COORDINATE WITH SITE/CIVIL ENGINEER, LOCAL UTILITY, AND AHJ . COORDINATE PROVISION OF POWER WITH ELECTRICAL CONTRACTOR. COST OF INSTALLATION FOR EJECTOR PUMP SHALL BE PROVIDED TO OWNER AS SEPARATE LINE ITEM/ALTERNATE PRICING.

F.3. BUILDING IS FOR VEHICLE STORAGE ONLY AND IT IS NOT INTENDED THAT ANY MAINTENANCE WILL BE CONDUCTED WITHIN THE BUILDING, SPECIFICALLY THE CHANGING OF OIL, HYDRAULIC FLUID, ETC. OR ANY OTHER ACTIVITY THAT WILL NECESSITATE AND/OR GENERATE THE PRODUCTION OR STORAGE OF OILS, GREASES, HYDRAULIC, OR ANY OTHER SIMILAR FLUID.

THOUGH THE TRENCH DRAIN IS FOR REMOVAL OF RAIN WATER, FLOOR WASHING, OR WATER THAT IS BROUGHT IN ON VEHICLES AFTER RAIN EVENTS, A BURIED OIL-WATER AND/OR SOLIDS SEPARATOR SHALL BE PROVIDED FOR THE STORAGE AREA'S FLOOR DRAIN SYSTEM.

NATURAL GAS

A. TOTAL DEMAND OF 636 MBH AT A MAXIMUM DEVELOPED LENGTH OF 150 FEET. UNLESS DIRECTED OTHERWISE BY OWNER/ENGINEER OR UTILITY, ALL NEW GAS METERS SHALL BE SIZED FOR A MINIMUM OF 150% OF THE LISTED DEMAND. THE EXISTING UTILITY IS VECTREN AND THE NEAREST GAS MAIN IS MEDIUM PRESSURE - THE NEW DESIGN IS INTENDED TO HAVE 11" W.C. DELIVERY PRESSURE (AFTER THE METER), WITH A MAXIMUM PRESSURE LOSS OF 3" W.C. PROVIDE AND INSTALL PRESSURE REGULATOR AT EACH PIECE OF EQUIPMENT TO REDUCE TO MAXIMUM ALLOWABLE PRESSURE (TYPICALLY 4-11" W.C.). CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LABOR AND MATERIAL TO PROVIDE A NEW NATURAL GAS METER AND/OR SERVICE TO THE BUILDING - COORDINATE AS REQUIRED WITH NATURAL GAS UTILITY. ENGINEER ASSUMES NO LIABILITY FOR INSUFFICIENT GAS PRESSURE.

B. ALL FLUE/VENT AND PIPING PENETRATIONS THROUGH RATED WALL/CEILING ASSEMBLIES SHALL BE FIRE-STOPPED AND PROTECTED PER CODE, CONSTRUCTION DETAILS, AND SPECIFICATIONS. THIS INCLUDES BUT IS NOT LIMITED TO: FIRE-STOPPING, SEALING OF SMOKE WALLS, ETC. FLOOR PLANS ARE SUBJECT TO CHANGE, AND CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL REQUIRED FIRE-STOPPING, WHETHER OR NOT THEY HAVE BEEN SHOWN ON THE DRAWINGS. SEE LATEST ARCHITECTURAL/LIFE SAFETY PLANS FOR MORE INFORMATION.

C. ALL GAS PIPING SHALL BE LABELED AT THE BEGINNING, ALL ENDS/EQUIPMENT TERMINATIONS, AND AT 6'-0" INTERVALS DESIGNATING GAS AND PRESSURE. ALL UNDERGROUND PIPING SHALL BE INSTALLED WITH TRACER WIRE PER INTERNATIONAL FUEL GAS CODE.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: **P001**

PLUMBING GENERAL INFORMATION

FOR CONSTRUCTION

SCHEDULE OF PLUMBING FIXTURES AND CONNECTIONS

MARK	FIXTURE	BASIS OF DESIGN MANUFACTURER	MODEL NO.	TYPE	MATERIAL	STYLE	FAUCET / VALVE				SUPPLY STOPS MANUFACTURER AND MODEL	DRAIN				DOMESTIC CW	DOMESTIC HW	DOMESTIC TW	SANITARY WASTE	SANITARY VENT	REMARKS	MARK
							MANUFACTURER & MODEL	SPOUT	HANDLES	CENTERS		TYPE	SIZE	P-TRAP	TAILPIECE							
WC1 (ADA)	WATER CLOSET	SLOAN	WETS-8029	FLOOR SET PRESSURE ASSIST	VITREOUS CHINA	A.D.A. ELONGATED SIPHON-JET	---	---	LEVER	---	---	---	---	---	---	1"	---	---	4"	2"	FLOOR MOUNTED, PRESSURE ASSIST WATER CLOSET, 1.28 GPF, ADA HEIGHT, OPEN FRONT HEAVY-DUTY SEAT - LESS COVER, AND LOOSE KEY STOP. FLANGE BOLTS SHALL BE DOUBLE NUTTED.	WC1 (ADA)
U1 (ADA)	URINAL	SLOAN	SU-1009	WALL HUNG FLUSH VALVE	VITREOUS CHINA	A.D.A. HEIGHT WASH-OUT FLUSH	SLOAN MODEL 186-0.25 DBP ESS	---	---	---	---	---	---	---	---	¾"	---	---	2"	1½"	¾" TOP SPUD, 0.25 GPF, FULLY ADJUSTABLE CARRIER, STRAINER. URINAL TO BE MOUNTED AT ADA HEIGHT.	U1 (ADA)
L1 (ADA)	LAVATORY	KOHLER	K-2214	UNDER MOUNT	VITREOUS CHINA	---	SLOAN MODEL 2350	INTEGRAL WITH FAUCET	SENSOR	PER ARCH.	ZURN Z8804-XL-LK-Q-PC	ZURN Z8746-PC	1¼"	17 GAUGE 1¼" X 1½"	OFFSET	½"	½"	---	1½"	1½"	0.5 GPM, BATTERY OPERATED FAUCET WITH GRID DRAIN, FLEXIBLE SUPPLY LINES AND STOPS. INSTALL LEONARD MODEL 170-LF THERMOSTATIC MIXING VALVE AND MOUNT TO WALL.	L1 (ADA)
S1	HAND SINK	ELKAY	LRAD332265PD	DOUBLE BOWL DROP IN	STAINLESS STEEL	SELF-RIMMING	ZURN MODEL Z831B4-XL	INTEGRAL WITH FAUCET	4" WRIST BLADES	8"	ZURN Z8804-XL-LK-Q-PC	ZURN Z8739-17-PC	1½"	17 GAUGE 1½" X 1½"	OFFSET	½"	½"	---	1½"	1½"	DROP-IN, DOUBLE BOWL, 7" DEEP SELF-RIMMING STAINLESS STEEL SINK. PROVIDE WITH ADJUSTABLE CENTERS FAUCET, GRID DRAIN, LOOSE KEY STOPS.	S2
YH1	YARD HYDRANT	WOODFORD	67	NON-FREEZE	CHROME-PLATED BRONZE - BRONZE VALVE	LOOSE KEY	---	---	---	---	---	---	---	---	---	¾"	---	---	---	---	ANTI-SIPHON, AUTOMATIC DRAINING, NON FREEZE w/INTEGRAL BACKFLOW PREVENTER, WALL CLAMP. INCLUDE OPERATING KEY.	YH1
SB1	WATER SUPPLY BOX	GUY GRAY	BIM875QTSAB	---	GALVANIZED STEEL	---	---	---	---	---	1/4 TURN VALVE SUPPLIED WITH BOX	---	---	---	---	½"	---	---	---	---	PROVIDE WITH BACKFLOW PREVENTER AND FILTER FOR CONNECTION TO EQUIPMENT. PROVIDE ADDITIONAL FRAMING AROUND BOX FOR SECURE MOUNTING.	SB1
MS1	JANITOR SINK	ZURN	Z1996-24-MH-WG	FLOOR SET	HIGH DENSITY COMPOSITE BASIN	24"x24"x10"	ZURN MODEL Z841M1-RC	¾" HOSE SPOUT WITH VACUUM BREAKER	INDEXED HANDLES	8"	---	STAINLESS STEEL STRAINER	3"	17 GAUGE 1¼"-X-1½"	---	¾"	¾"	---	3"	1½"	WHITE FINISH WITH BLACK ACCENTS, FACTORY INSTALLED DRAIN BODY, ROUGH CHROME FAUCET, VACUUM BREAKER, INTEGRAL STOPS, ADJUSTABLE WALL BRACE, WITH 60" VINYL HOSE, HOSE BRACKET, VINYL BUMPER GUARD, 24"X24" WALL GUARDS, COMPLETE WITH PAIL HOOK AND WALL BRACE.	MS1
SH1	SHOWER	CLARION	3636SD	---	COMPOSITE	---	CLARION: CH-SSMW-1 VALVE & HHS-30CE SHOWER	SLIP-ON DIVERTER	LEVER	---	ZURN Z8804-XL-LK-Q-PC	ZURN Z8746-PC	1¼"	17 GAUGE 1¼" X 1½"	OFFSET	½"	½"	---	2"	1½"	PROVIDE WITH ZURN Z-415 2" DRAIN WITH POLISHED STAINLESS STEEL STRAINER. PROVIDE LH/RH DRAIN CONNECTIONS PER ARCHITECTURAL PLANS.	SH1

NOTES:
1. UNLESS NOTED OTHERWISE, PLUMBING FIXTURES SHALL BE BATTERY POWERED.
2. PLUMBING CONTRACTOR SHALL PROVIDE AND INSTALL TRUE-BIO PRODUCTS, INC. "TRAP WRAP" KIT ON ALL EXPOSED LAVATORY OR SINK TRAPS AND SUPPLIES. KIT SHALL INCLUDE TAILPIECE, P-TRAP, WASTE ARM, HOT AND COLD WATER VALVES AND LINE COVERS.
3. PLUMBING FIXTURES AND TRIM SPECIFIED IN SCHEDULE ARE TO ESTABLISH A MINIMUM LEVEL OF QUALITY/PERFORMANCE. OTHER MANUFACTURER'S MAY BE CONSIDERED EQUAL IN QUALITY AND FUNCTION. DIFFERING MANUFACTURER'S MAY BE SUBMITTED AS PART OF A BID PACKAGE, WITH WRITTEN APPROVAL FROM ARCHITECT AND/OR ENGINEER, IF APPROVALS ARE OBTAINED TEN (10) DAYS BEFORE BIDS ARE DUE.
4. SEE ARCHITECTURAL PLANS FOR MOUNTING HEIGHTS OF PLUMBING FIXTURES.
5. UNLESS NOTED OTHERWISE, PLUMBING FIXTURE COLORS SHALL BE SELECTED FROM FACTORY-STANDARD FINISHED - COLOR/FINISH SELECTION BY ARCHITECT.
6. PLUMBING CONTRACTOR SHALL PROVIDE AND INSTALL ALL NECESSARY HANGERS, SUPPORTS, ETC. TO MEET MANUFACTURER'S INSTALLATION REQUIREMENTS AND TO LEAVE THE OWNER WITH A COMPLETE AND FULLY FUNCTIONAL PLUMBING SYSTEM.

PLUMBING INSULATION

FLUID OPERATING TEMPERATURE, DEG. F	CONDUCTIVITY, BTU*IN / (HR-F2*F)	MEAN RATING TEMP, DEG. F	NOMINAL PIPE OR TUBE SIZE, INCHES				
			<1"	1" TO <1-1/2"	1-1/2" TO <4"	4" TO <8"	>8"
			MINIMUM INSULATION THICKNESS, INCHES				
105-140 DEG. F	0.22-0.28	100	1.0	1.0	1.5	1.5	1.5
141-200 DEG. F	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0

NOTES:
1. EXPOSED PIPING SUBJECT TO DAMAGE SHALL BE PROVIDED WITH PROTECTIVE CLADDING/SHEATHING - CONFIRM LOCATIONS WITH OWNER.
2. FIBERGLASS INSULATION SHALL BE PROVIDED WITH ASJ.

SCHEDULE OF SOLIDS INTERCEPTORS

MARK	MANUFACTURER	MODEL	TYPE	SOLIDS CAPACITY (POUNDS)	LIQUIDS CAPACITY (GALLONS)	FLOW RATE (GPM)	INLET SIZE	DISCHARGE SIZE	REMARKS
SS1	ZURN	GMC-250	INDOOR/OUTDOOR; COMPOSITE	200	277	100	4"	3 X 4"	ALL

REMARKS:
1. ROTATION-MOLDED POLYETHYLENE COMPOSITE; 24" DIAMETER CAST IRON, PICKABLE COVERS. H-20 RATED TO 40,000 LBS LOAD; ACCESS RESTRICTION DEVICE UNDER MANHOLES; INTEGRAL AIR RELIEF/ANTI-SIPHON.
2. PROVIDE WITH RISER EXTENSIONS AS REQUIRED TO MEET GRADE/FINISHED FLOOR. COORDINATE WITH OWNER, ARCHITECT, SITE/CIVIL ENGINEER, AND G.C.
3. MAXIMUM OPERATING TEMPERATURE - 150 DEG. F.
4. UNIT SHALL BE PROVIDED WITH PUMP-OUT PORT.
5. IF REQUIRED, UNIT SHALL BE PROVIDED WITH HIGH WATER ANCHOR KIT.

SCHEDULE OF DOMESTIC WATER HEATERS

MARK	MANUFACTURER	MODEL NO.	TANK CAPACITY (GALLONS)	RECOVERY @ 100 °F TEMPERATURE RISE	BTUH INPUT	HOT WATER TEMP OUT	EFFICIENCY	REMARKS
WH1	A.O. SMITH	BTX-80	80	86	76,000	140	94%	SEE BELOW

NOTES:
1. PROVIDE ASME RATED RELIEF VALVE AND CONDENSATE NEUTRALIZATION KIT FOR WATER HEATER.
2. PROVIDE ALL REQUIRED CLEARANCES AROUND WATER HEATER. CONTRACTOR SHALL VERIFY WATER HEATER WILL FIT IN ALLOTTED SPACE.
3. FURNISH AND INSTALL OUTSIDE AIR PIPE, EXHAUST PIPE, AND COMPLETE SYSTEM FOR WATER HEATER COMBUSTION AND VENTING REQUIREMENTS.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL STATE FORMS, SUBMITTALS, FEES, PERMITS, ETC. AS REQUIRED FOR WATER HEATER INSTALLATION.
5. BASIS OF DESIGN IS INDICATED IN SCHEDULE, REFER TO SPECIFICATIONS FOR OTHER APPROVED MANUFACTURERS. EQUIPMENT MUST MEET ALL THE PERFORMANCE REQUIREMENTS INDICATED

SCHEDULE OF PACKAGED SEWAGE EJECTOR PUMP AND BASINS

MARK	MANUFACTURER	MODEL	SERVICE	MAXIMUM FLOW, GPM	MAXIMUM HEAD	MOTOR H.P.	DISCHARGE SIZE	ELECTRICAL	REMARKS
SEP1	ZOELER	QLS 922 SERIES	PACKAGED GRINDER PUMP AND BASIN	46 @ 100 FT	107	2.0	4"	208 / 1 PH	ALL

NOTES:
1. ALL EQUIPMENT SHALL BE UL-LISTED FOR APPROVED SYSTEMS FOR SEWAGE EJECTOR/GRINDER PUMPS AND BASINS.
2. EQUIPMENT SHALL FEATURE:SOLID STATE DEVICES AND CONTROLS WITH NEMA 4X ENCLOSURE; SINGLE POINT POWER CONNECTION;REMOTE MONITORING PANEL WITH ALARMS/LIGHTS/SILENCING; HIGH LEVEL/HIGH AMPERAGE ALARMS; FLOAT SWITCHES.
3. PACKAGED SYSTEM SHALL BE PROVIDED WITH COMPOSITE BASIN AND DUPLEX PUMPING SYSTEM - MINIMUM 36" DEPTH (OR PER LOCAL CODE).
4. BASIN SHALL BE PROVIDED WITH WATER-TIGHT STEEL HATCH COVER - PROVIDE COMPOSITE OR ALUMINUM COVER WITH OWNER.
5. FACTORY PIPE SEAL HUB AND FLEX-BOOT DISCHARGE CONNECTION.
6. FACTORY 3-WAY BALL VALVES FOR PUMP ISOLATION/SERVICING.
7. FACTORY BACKFLOW PREVENTER / CHECK VALVE. FIELD INSTALL AS REQUIRED.
8. BASINS DEEPER THAN 36" SHALL BE PROVIDED WITH DUAL-RAIL PUMP LIFTING/REMOVAL SYSTEM.
9. PROVIDE WITH MINIMUM 20' CORD OR JUNCTION BOX OPTION, AS REQUIRED FOR INSTALLED LOCATION AND AVAILABLE POINTS OF CONNECTION. COORDINATE PROVISION OF POWER WITH ELECTRICAL CONTRACTOR.
10. ANTI-FLOTATION COLLAR.

SCHEDULE OF PUMPS

MARK	MANUFACTURER	MODEL	SERVICE	GPM	HEAD	MOTOR H.P.	RPM	INLET SIZE	DISCHARGE SIZE	ELEC.	MARK
CP1	BELL & GOSSETT	NBF-18S	DOMESTIC HOT WATER RECIRULATION	1	15	90 WATTS	3000	½"	½"	115/1/60	CP1

REMARKS:
BRONZE BODY, CERAMIC SHAFT, CARBON BEARINGS, NORYL IMPELLER, MAXIMUM WORKING PRESSURE 150 PSI, 230° F MAXIMUM OPERATING TEMPERATURE, PROVIDE WITH TIME CLOCK.

SCHEDULE OF PLUMBING DRAINS AND CLEANOUTS

MARK	FIXTURE	MANUFACTURER	MODEL NUMBER	TYPE	MATERIAL	STYLE	DRAIN SIZE	REMARKS	MARK
FD1	FLOOR DRAIN	ZURN	ZN415B	NO HUB OR NEO-LOCK	CAST IRON / NICKEL BRONZE TOP	6" ROUND	PER DWGS.	PROVIDE WITH DEEP SEAL P-TRAP. INSTALL ZURN ZSHIELD BARRIER TRAP SEAL.	FD1
FCO	CLEANOUT	ZURN	ZN1400-VP	NO HUB OR NEO-LOCK	CAST IRON / NICKEL BRONZE TOP	SCORIATED ROUND TOP	PER DWGS.	VANDAL RESISTANT SECURED TOP. PROVIDE NICKEL BRONZE TOP IN FINISHED AREAS, BRONZE TOP IN UNFINISHED.	FCO
WCO	WALL CLEANOUT	ZURN	Z1446	NO HUB OR NEO-LOCK	CAST IRON / STAINLESS STEEL COVER	ROUND COVER	PER DWGS.		WCO
OB1	OUTLET BOX	GUY GRAY	B200	-	GALVANIZED STEEL	DRAIN BOX	PER DWGS.	1/2" VALVES AND 2" THREADED DRAIN OUTLET WITH HOSE RETENTION DEVICE.	OB1
TD1	TRENCH DRAIN	ZURN	Z886-HD-HPDE	NO HUB OR NEO-LOCK	HDPE W/ IRON GRATE	MODULAR	4"	END DISCHARGE MODEL, PROVIDE WITH TRAFFIC-RATED GRATE (MIN. 40,000 LBS) AND BOTTOM DOME STRAINER.	TD1

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

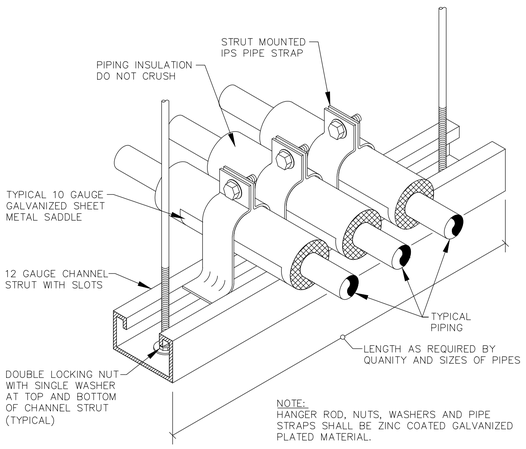
STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: **P002**

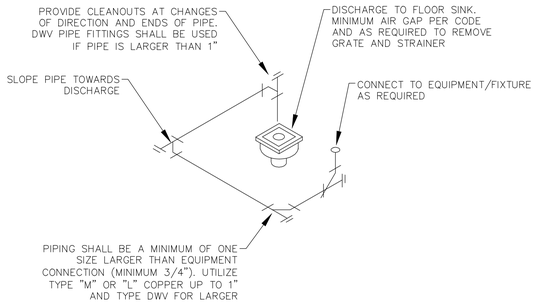
PLUMBING SCHEDULES

FOR CONSTRUCTION



TRAPEZE INSULATED PIPE HANGER DETAIL

SCALE: NONE

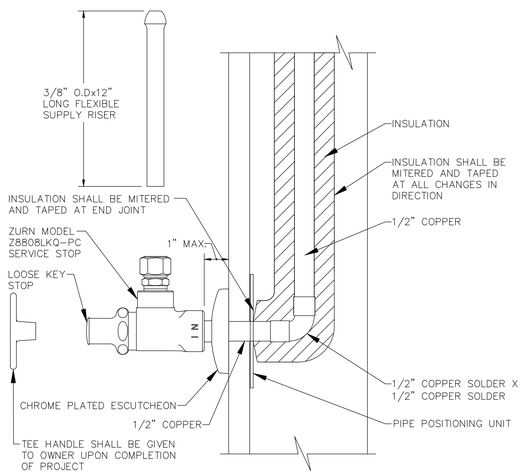


NOTES:

1. VERIFY WITH LOCAL CODE/AHJ IF AND WHEN INDIRECT DRAINS ARE REQUIRED, AND FOR WHAT SPECIFIC FIXTURES. PROVIDE FLOOR SINKS/DRAINS/HUB DRAINS AS REQUIRED.
2. VERIFY WITH LOCAL CODE/AHJ IF AND WHEN TRAPS AND/OR VENTS ARE REQUIRED.
3. PIPING SHALL ROUTED IN AN UNOBTRUSIVE AND INCONSPICUOUS MANNER. SUPPORT PIPING AS REQUIRED. INSTALL/OMIT INSULATION AS DICTATED BY LOCAL CODE/AHJ.

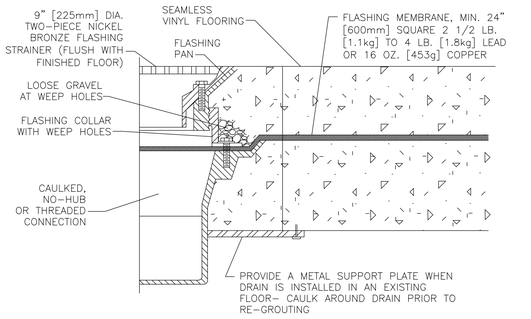
INDIRECT DRAIN DETAIL

SCALE: NONE



TYPICAL SERVICE STOP INSTALLATION DETAIL

SCALE: NONE

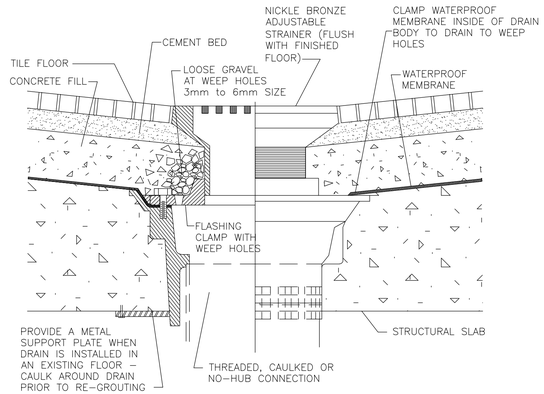


NOTES:

1. SLOPE MEMBRANE LINER 2% TO DRAIN.
2. PROVIDE FLASHING MEMBRANE WHEN DRAIN IS INSTALLED IN A NON-MEMBRANE FLOOR.

TYPE "F" FLOOR DRAIN DETAIL

SCALE: NONE

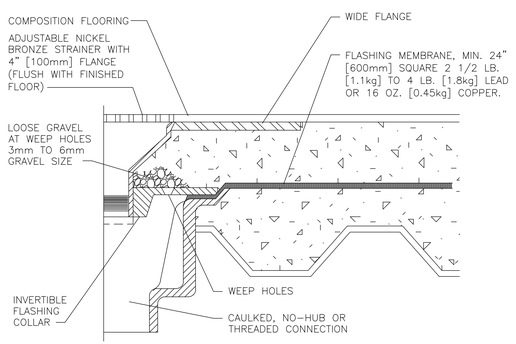


NOTES:

1. SLOPE MEMBRANE LINER 2% TO DRAIN.

TYPE "C" FLOOR DRAIN DETAIL

SCALE: NONE

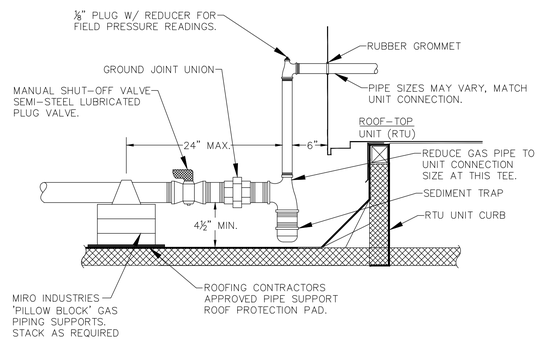


NOTE:

1. SLOPE MEMBRANE LINER 2% TO DRAIN.
2. PROVIDE FLASHING MEMBRANE WHEN DRAIN IS INSTALLED IN A NON MEMBRANE FLOOR

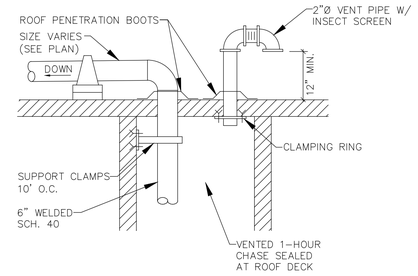
TYPE "D" FLOOR DRAIN DETAIL

SCALE: NONE



TYPICAL GAS PIPING CONNECTION DETAIL

SCALE: NONE

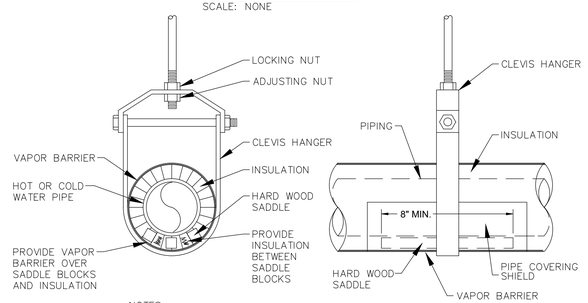


GAS SERVICE CHASE DETAIL

SCALE: NONE

MOP SINK DETAIL

SCALE: NONE

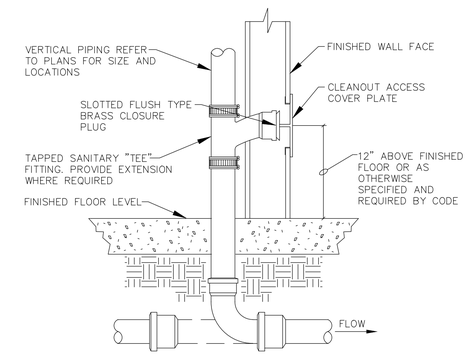


NOTES:

1. PROVIDE PIPE COVERING SHIELD AT EACH CLEVIS HANGER. INSTALL SHIELD BETWEEN VAPOR BARRIER AND CLEVIS HANGER.
2. THIS DETAIL IS TYPICAL FOR ALL OTHER HANGERS AND SUPPORTS.

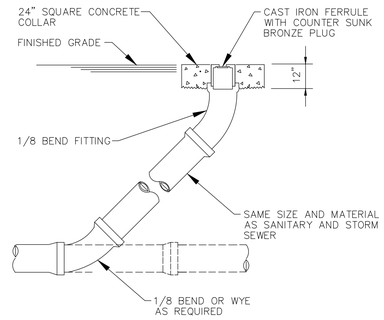
TYPICAL INSULATED PIPE HANGER DETAIL

SCALE: NONE



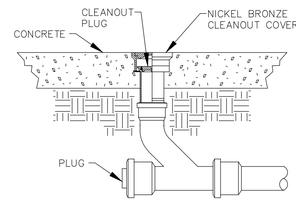
WALL CLEANOUT DETAIL (WCO)

SCALE: NONE



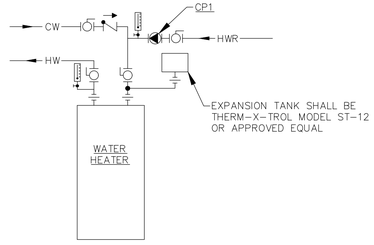
TYPICAL YARD CLEANOUT (YCO)

SCALE: NONE



FLOOR CLEANOUT DETAIL (FCO)

SCALE: NONE



DOMESTIC WATER HEATER PIPING DIAGRAM

SCALE: NONE

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

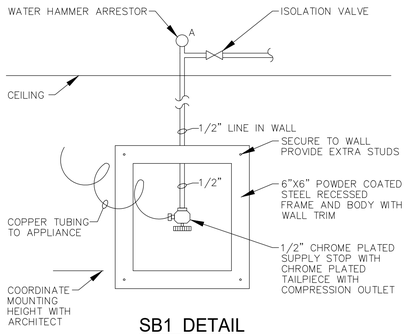
STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

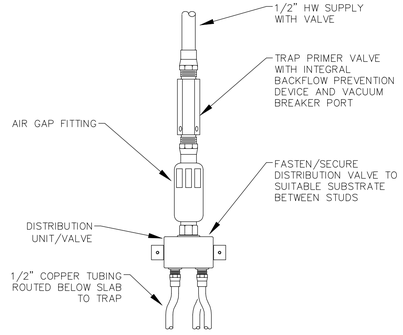
SHEET NO: **P003**

PLUMBING DETAILS

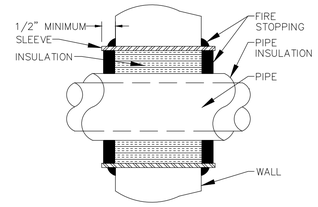
FOR CONSTRUCTION



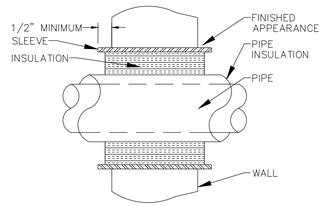
SB1 DETAIL
SCALE: NONE



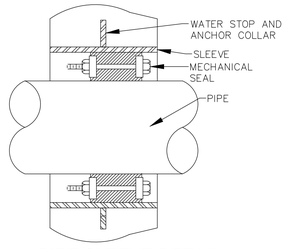
TRAP PRIMER DETAIL
SCALE: NONE



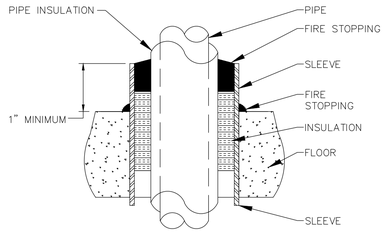
INTERIOR RATED WALL PIPE SLEEVE DETAIL
SCALE: NONE



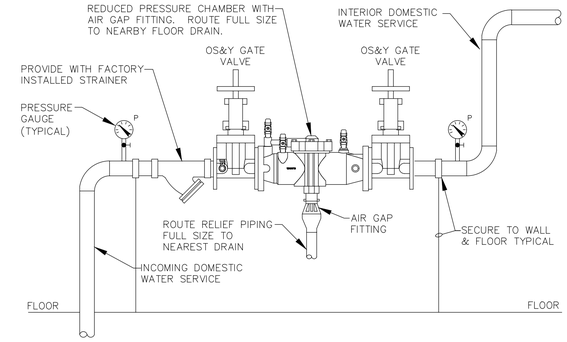
INTERIOR NON-RATED WALL PIPE SLEEVE DETAIL
SCALE: NONE



PIPE SLEEVE DETAIL
SCALE: NONE

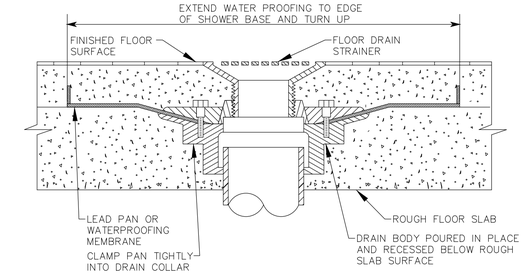


FLOOR PIPE SLEEVE DETAIL
SCALE: NONE

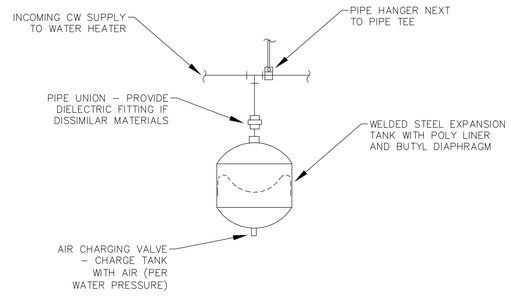


REDUCED PRESSURE BACKFLOW PREVENTER
SCALE: NONE

PROVIDE WATTS MODEL 009-QSY. BACKFLOW PREVENTER SHALL BE WATTS, AMES, FEBCO, WILKINS, OR APPROVED EQUAL.

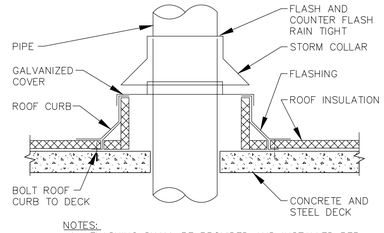


SHOWER UNIT DRAIN WATER PROOFING DETAIL
SCALE: NONE



NOTES:
1. PIPING ARRANGMENT SHOWN IS SCHEMATIC IN NATURE, AND SHALL BE ADJUSTED TO SUIT CONDITIONS IN THE FIELD.
2. PIPE CONNECTIONS SHALL BE THE SAME SIZE AS TANK FITTINGS. INSTALL PER MANUFACTURER'S STANDARDS AND VERIFY PROPER OPERATION AFTER INSTALLATION IS COMPLETE.

EXPANSION TANK DETAIL
SCALE: NONE



NOTES:
1. FLASHING SHALL BE PROVIDED AND INSTALLED PER ROOFING MANUFACTURERS RECOMMENDATIONS.
2. SEE STRUCTURAL DRAWINGS FOR ROOF OPENING.

PIPE ROOF PENETRATION DETAIL
SCALE: NONE

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

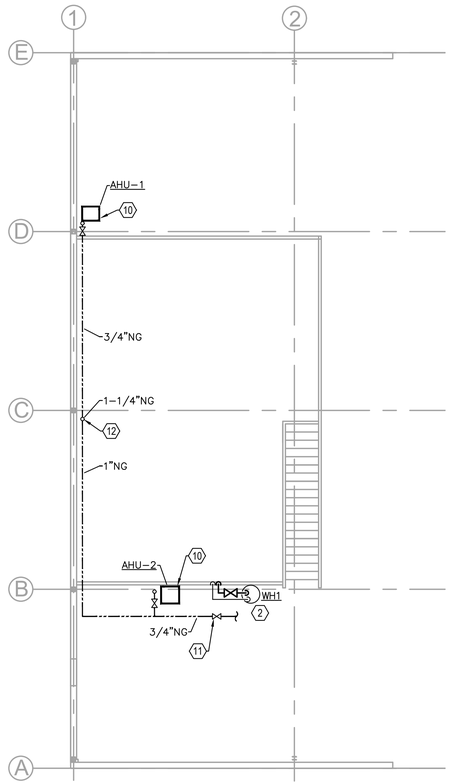
STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

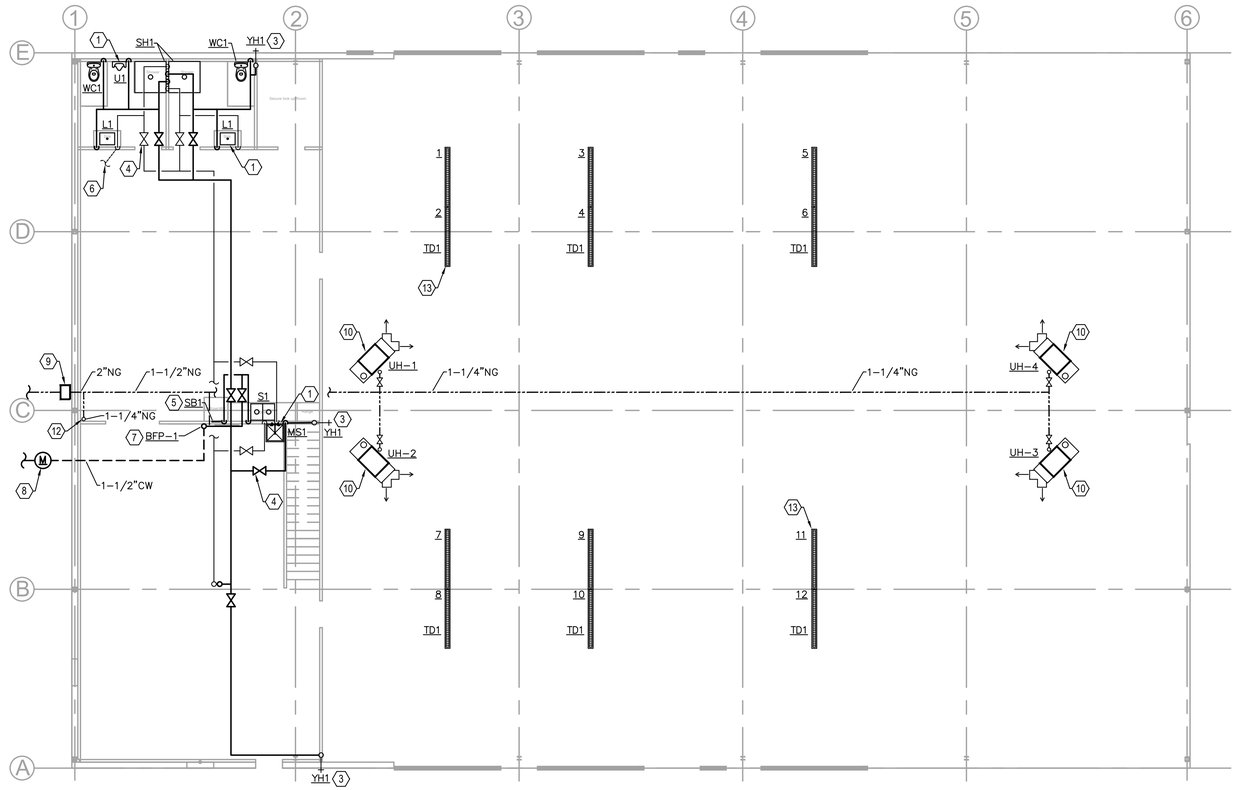
JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: **P004**

PLUMBING DETAILS

FOR CONSTRUCTION





N
W E
S

2 P100 MEZZANINE NEW WORK PLAN

SCALE: 1/8" = 1'-0"

N
W E
S

1 P100 FIRST FLOOR NEW WORK PLAN

SCALE: 1/8" = 1'-0"

GENERAL PLUMBING NOTES

1. COORDINATE ALL SLAB/FLOOR, WALL AND TRUSS PENETRATIONS WITH ARCHITECT, STRUCTURAL ENGINEER AND/OR JOIST/TRUSS MANUFACTURER. RE-ROUTE PIPING AS REQUIRED TO ACCOMMODATE FOOTINGS, TRUSS WEBBING, STRUCTURAL STEEL/CONCRETE, ETC. PROVIDE STRUCTURAL REINFORCEMENT AS REQUIRED FOR PENETRATIONS.
2. COORDINATE ALL FLOOR CUTTING/PATCHING WITH OWNER, G.C. AND/OR ARCHITECT. ALL EFFORTS SHALL BE MADE TO COORDINATE WITH OTHER TRADES AND MINIMIZE THE EXTENT OF CUTTING AND PATCHING.
3. FLUSH VALVES FOR TOILETS SHALL BE ON "OPEN" SIDE OF FIXTURE. CONFIRM FIXTURE HANDEDNESS WITH OWNER, ARCHITECT AND ENGINEER PRIOR TO PURCHASING
4. ALL VALVES, MIXING VALVES, MANIFOLDS, ACCESSORIES, OR ANY ITEMS REQUIRING MAINTENANCE OR INSPECTION SHALL BE FULLY ACCESSIBLE. IN AREAS WITH HARD CEILINGS, PROVIDE ACCESS PANELS - CONFIRM FINISH, SIZE, AND MOUNTING STYLE WITH ARCHITECT. WHERE POSSIBLE, AND WHERE ALL REQUIRED CLEARANCES CAN BE MAINTAINED, A SINGLE ACCESS PANEL SHALL BE UTILIZED FOR MULTIPLE, ADJACENT ITEMS.
5. PROVIDE CODE-REQUIRED INSULATION/JACKETING FOR EXPOSED WASTE AND SUPPLY PIPING TO COMPLY WITH ADA REQUIREMENTS.
6. PROVIDE INDIRECT DRAINS FOR FIXTURES, AS REQUIRED BY KENTUCKY PLUMBING CODE. COORDINATE DRAIN TYPE (FLOOR DRAIN, SINK, FUNNEL, ETC.) AND LOCATION WITH ARCHITECT/OWNER. ENSURE THAT FIXTURE TYPE ALLOWS FOR MINIMUM AIR GAPS, PER FIXTURE TYPE.
7. COORDINATE CONDENSATE HUB DRAINS/CONNECTIONS FOR HVAC EQUIPMENT WITH MECHANICAL CONTRACTOR.
8. FOR PEX WATER SYSTEMS, PROVIDE AND INSTALL EXPANSION JOINT PER MANUFACTURER'S INSTRUCTIONS. BASIS OF DESIGN: FLEXICRAFT, MODEL CP. INSTALL AS REQUIRED THROUGHOUT THE DOMESTIC WATER SYSTEM
9. COORDINATE NEW FLOOR DRAIN AND/OR FLOOR CLEAN OUT LOCATIONS WITH ARCHITECT. FLOOR SHALL SLOPE TOWARDS FLOOR DRAIN TO ENSURE ADEQUATE DRAINAGE OF SPACE SERVED. IF APPLICABLE, COORDINATE INSTALLATION WITH FLOORING CONTRACTOR TO ENSURE THAT DRAIN INSTALLATION IS COMPLIANT AND COORDINATED WITH ANY FLOOR MEMBRANE. UNLESS OTHERWISE NOTED OR DIRECTED BY ARCHITECT/OWNER, PROVIDE FLOOR DRAINS/SINKS WITH DIAPHRAGM SEALS.

PLUMBING KEY NOTES

1. PROVIDE FIXTURE WITH NEW WASTE, VENT, TRAPS AND DOMESTIC HW/CW PIPING. DOMESTIC WATER PIPING SHALL BE PROVIDED WITH SHUT-OFF VALVES LOCATED ABOVE CEILING IN AN ACCESSIBLE LOCATION (PROVIDE ACCESS PANELS AS REQUIRED), OR BELOW COUNTER. WHERE REQUIRED (E.G. LAVATORIES), INSTALL THERMOSTATIC MIXING VALVE WITH A MAXIMUM OUTLET TEMPERATURE OF 110 DEG. F. INSTALL INSULATED TRAP WRAP ON ALL EXPOSED SANITARY WASTE PIPING BELOW SINKS, AS REQUIRED PER ADA GUIDELINES. (TYPICAL FOR ALL PLUMBING FIXTURES)
2. PROVIDE ALL LABOR AND MATERIAL REQUIRED FOR INSTALLATION OF NEW WATER HEATER, INCLUDING ALL REQUIRED WATER/GAS/ELECTRICAL/DRAIN CONNECTIONS, EXPANSION TANKS, AND ACCESSORIES. COORDINATE PROVISION OF POWER FOR HEATER/BLOWER AND CIRCULATION PUMP WITH ELECTRICAL CONTRACTOR. COORDINATE SERVICE CLEARANCES, PIPING MAINS, ETC. WITH STRUCTURE, OTHER FIXTURES, ETC.

   WATER HEATER SHALL BE PROVIDED WITH GALVANIZED STEEL WATER HEATER PAN WITH DRAIN CONNECTION. ROUTE DRAIN PAN AND P/T BLOW-OFF PIPING TO OPEN RECEPTACLE - SEE WASTE/VENT PLAN FOR MORE INFORMATION. WATER HEATER SHALL BE PROVIDED WITH METAL SUPPORT STAND - MINIMUM 16" A.F.F. (CONFIRM HEIGHT WITH OWNER AND DRAIN/TRAP REQUIREMENTS).

   ROUTE FLUE/VENT TO ROOF AND PROVIDE WITH RAIN CAP - SEAL ALL PENETRATIONS WEATHER-TIGHT. COORDINATE FLUE LOCATIONS WITH ALL ROOF-MOUNTED INTAKES. SEE ARCHITECTURAL AND STRUCTURAL SHEETS FOR MORE INFORMATION. PROVIDE WITH CIRCULATION PUMP/SENSOR, PER ENERGY/PLUMBING CODE. (TYPICAL FOR ALL WATER HEATERS)
3. FREEZE-PROOF YARD HYDRANT - PROVIDE ISOLATION VALVE ABOVE CEILING. ROUTE PIPING DOWN WALL AND THRU EXTERIOR - SEAL ALL PENETRATIONS WEATHER TIGHT. INSTALL YARD HYDRANT 18" ABOVE FINISHED GRADE - CONFIRM FINAL HEIGHT WITH ARCHITECT. (TYPICAL)
4. PROVIDE EACH DOMESTIC WATER (HOT AND COLD) BRANCH LINE WITH AN ISOLATION VALVE. FOR CLARITY, NOT ALL VALVES HAVE BEEN SHOWN - SEE RISER DIAGRAM FOR MORE INFORMATION. (TYPICAL)
5. PROVIDE ALL LABOR AND MATERIAL TO INSTALL OUTLET/SUPPLY BOX. COORDINATE FINAL MOUNTING HEIGHT WITH ARCHITECT AND EQUIPMENT. SEE ARCHITECTURAL PLANS FOR MORE INFORMATION. (TYPICAL)
6. ROUTE HOT WATER RETURN LINE BACK TO HEATER/MANIFOLD (LINES NOT SHOWN FOR CLARITY).
7. DOMESTIC WATER BACKFLOW PREVENTER - PROVIDE TEST OUTLET, VALVES, DRAIN, ETC. COORDINATE REQUIREMENTS WITH AHJ.
8. NEW DOMESTIC WATER METER AND SERVICE CONNECTIONS. COORDINATE PROVISION OF NEW METER AND SERVICE LINE WITH LOCAL UTILITY. SEE SITE PLAN FOR CONTINUATION OF UTILITIES
9. NEW GAS METER AND SERVICE CONNECTIONS - PROVIDE MINIMUM 7" W.C DELIVERY PRESSURE AFTER METER. CONTRACTOR SHALL PROVIDE AND INSTALL INLINE REGULATOR AS REQUIRED TO ENSURE REQUIRED OUTGOING PRESSURE. ROUTE PIPING UP INTO BUILDING ABOVE CEILING AND TURN UP. SEAL ALL PENETRATIONS WEATHER-TIGHT. COORDINATE PROVISION OF NEW METER AND SERVICE LINE WITH LOCAL UTILITY. SEE SITE PLAN FOR CONTINUATION OF UTILITIES.
10. EXTEND NATURAL GAS PIPING TO NEW HVAC EQUIPMENT. PROVIDE ISOLATION VALVE, REGULATOR (IF REQUIRED), DRIP/DUST LEG, AND ANY REQUIRED ACCESSORIES OR APPURTENANCES.

    COORDINATE ROUTING, SIZING AND FINAL LOCATION/HEIGHT OF NEW PIPING WITH HVAC CONTRACTOR AND INSTALLED EQUIPMENT.
11. EXTEND NATURAL GAS PIPING TO NEW WATER HEATER. PROVIDE ISOLATION VALVE, REGULATOR (IF REQUIRED), DRIP/DUST LEG, AND ANY REQUIRED ACCESSORIES OR APPURTENANCES.
12. ROUTE NEW GAS PIPING UP INTO MEZZANINE. SEAL ALL PENETRATIONS WEATHER-TIGHT - COORDINATE WITH ARCHITECT, OWNER, AND G.C.
13. TRENCH DRAIN TRAPS TO BE PROVIDED WITH TRAP PRIMER SYSTEM - PROVIDE ALL LABOR AND MATERIAL REQUIRED TO INSTALL SAME. (TYPICAL)

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004
CABLE BUILDING

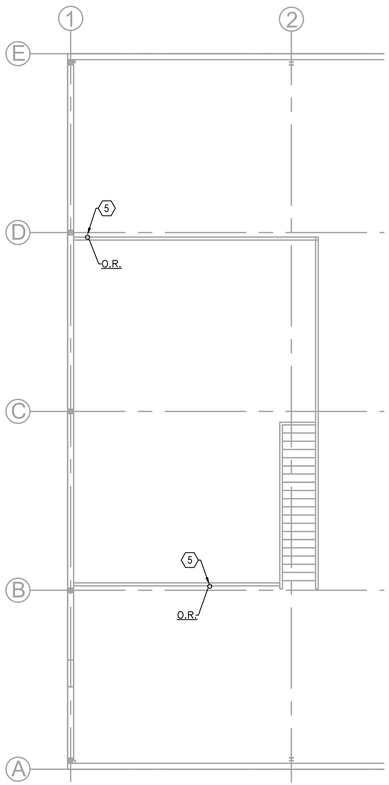
STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

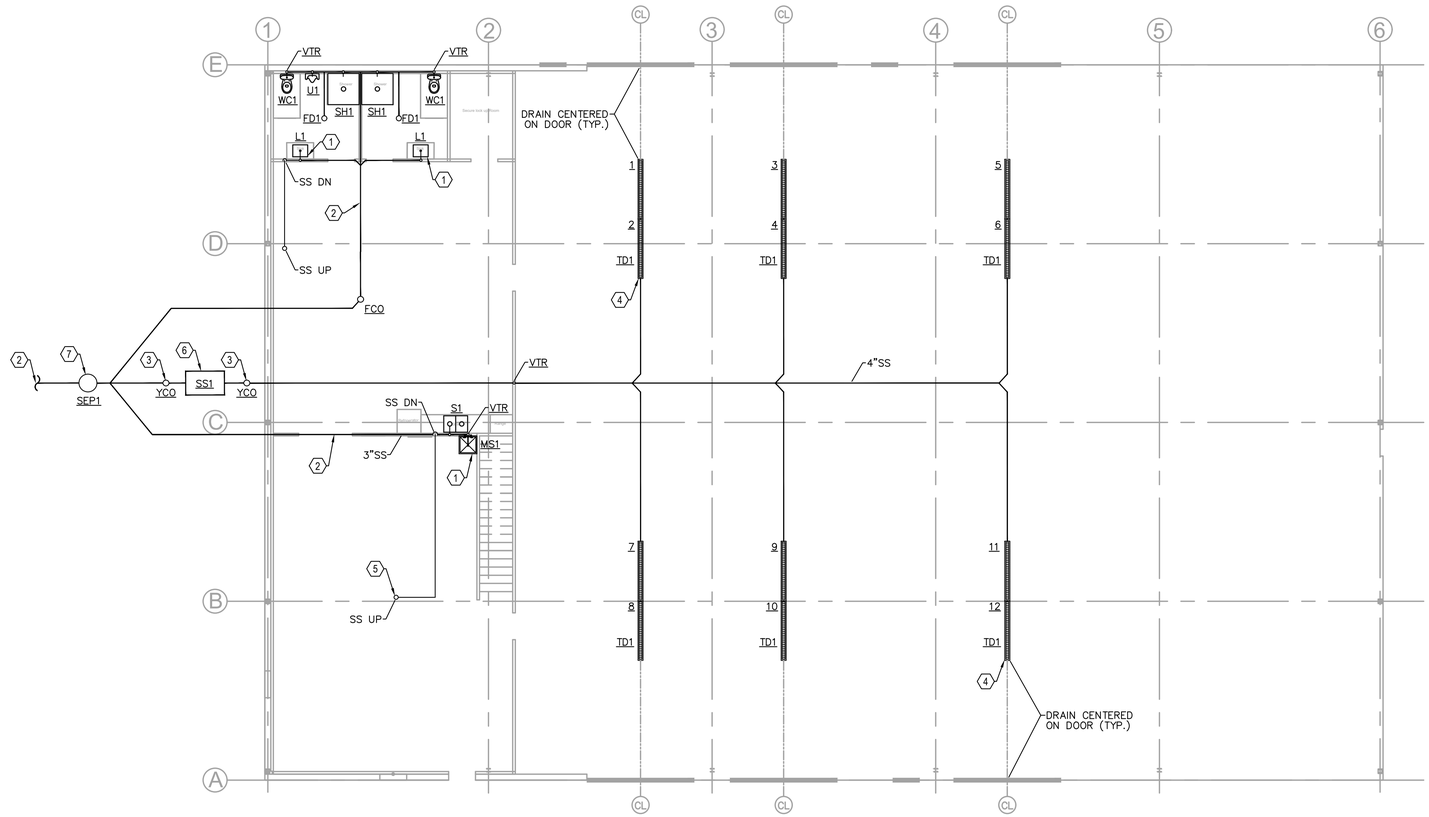
JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: P100

NEW DOMESTIC WATER AND GAS PLAN

FOR CONSTRUCTION





N
W E
S

2 P101 SCALE: 1/8" = 1'-0"

MEZZANINE NEW WORK PLAN

N
W E
S

1 P101 SCALE: 1/8" = 1'-0"

FIRST FLOOR NEW WORK PLAN

GENERAL PLUMBING NOTES

1. COORDINATE ALL SLAB/FLOOR, WALL AND TRUSS PENETRATIONS WITH ARCHITECT, STRUCTURAL ENGINEER AND/OR JOIST/TRUSS MANUFACTURER. RE-ROUTE PIPING AS REQUIRED TO ACCOMMODATE FOOTINGS, TRUSS WEBBING, STRUCTURAL STEEL/CONCRETE, ETC. PROVIDE STRUCTURAL REINFORCEMENT AS REQUIRED FOR PENETRATIONS.
2. COORDINATE ALL FLOOR CUTTING/PATCHING WITH OWNER, G.C. AND/OR ARCHITECT. ALL EFFORTS SHALL BE MADE TO COORDINATE WITH OTHER TRADES AND MINIMIZE THE EXTENT OF CUTTING AND PATCHING.
3. FLUSH VALVES FOR TOILETS SHALL BE ON "OPEN" SIDE OF FIXTURE. CONFIRM FIXTURE HANDEDNESS WITH OWNER, ARCHITECT AND ENGINEER PRIOR TO PURCHASING
4. ALL VALVES, MIXING VALVES, MANIFOLDS, ACCESSORIES, OR ANY ITEMS REQUIRING MAINTENANCE OR INSPECTION SHALL BE FULLY ACCESSIBLE. IN AREAS WITH HARD CEILINGS, PROVIDE ACCESS PANELS - CONFIRM FINISH, SIZE, AND MOUNTING STYLE WITH ARCHITECT. WHERE POSSIBLE, AND WHERE ALL REQUIRED CLEARANCES CAN BE MAINTAINED, A SINGLE ACCESS PANEL SHALL BE UTILIZED FOR MULTIPLE, ADJACENT ITEMS.
5. PROVIDE CODE-REQUIRED INSULATION/JACKETING FOR EXPOSED WASTE AND SUPPLY PIPING TO COMPLY WITH ADA REQUIREMENTS.
6. PROVIDE INDIRECT DRAINS FOR FIXTURES, AS REQUIRED BY KENTUCKY PLUMBING CODE. COORDINATE DRAIN TYPE (FLOOR DRAIN, SINK, FUNNEL, ETC.) AND LOCATION WITH ARCHITECT/OWNER. ENSURE THAT FIXTURE TYPE ALLOWS FOR MINIMUM AIR GAPS, PER FIXTURE TYPE.
7. COORDINATE CONDENSATE HUB DRAINS/CONNECTIONS FOR HVAC EQUIPMENT WITH MECHANICAL CONTRACTOR.
8. FOR PEX WATER SYSTEMS, PROVIDE AND INSTALL EXPANSION JOINT PER MANUFACTURER'S INSTRUCTIONS. BASIS OF DESIGN: FLEXICRAFT, MODEL CP. INSTALL AS REQUIRED THROUGHOUT THE DOMESTIC WATER SYSTEM
9. COORDINATE NEW FLOOR DRAIN AND/OR FLOOR CLEAN OUT LOCATIONS WITH ARCHITECT. FLOOR SHALL SLOPE TOWARDS FLOOR DRAIN TO ENSURE ADEQUATE DRAINAGE OF SPACE SERVED. IF APPLICABLE, COORDINATE INSTALLATION WITH FLOORING CONTRACTOR TO ENSURE THAT DRAIN INSTALLATION IS COMPLIANT AND COORDINATED WITH ANY FLOOR MEMBRANE. UNLESS OTHERWISE NOTED OR DIRECTED BY ARCHITECT/OWNER, PROVIDE FLOOR DRAINS/SINKS WITH DIAPHRAGM SEALS.

PLUMBING KEY NOTES

1. PROVIDE FIXTURE WITH NEW WASTE, VENT, TRAPS AND DOMESTIC HW/CW PIPING. DOMESTIC WATER PIPING SHALL BE PROVIDED WITH SHUT-OFF VALVES LOCATED ABOVE CEILING IN AN ACCESSIBLE LOCATION (PROVIDE ACCESS PANELS AS REQUIRED), OR BELOW COUNTER. WHERE REQUIRED (E.G. LAVATORIES, SINKS, ETC.), INSTALL THERMOSTATIC MIXING VALVE WITH A MAXIMUM OUTLET TEMPERATURE OF 110 DEG. F. INSTALL INSULATED TRAP WRAP ON ALL EXPOSED SANITARY WASTE PIPING BELOW SINKS, AS REQUIRED PER ADA GUIDELINES. (TYPICAL FOR ALL PLUMBING FIXTURES)
2. NEW SANITARY MAIN - SEE CIVIL/SITE PLANS FOR MORE INFORMATION. COORDINATE PIPING WITH OTHER UTILITIES, FOOTINGS, ETC.

   SEE ESTIMATED INVERT DEPTH REQUIREMENTS (ON RISER DIAGRAM) AND COORDINATE WITH SITE/CIVIL ENGINEER AND LOCAL UTILITY AS REQUIRED. INVERTS GIVEN ARE FOR MINIMUM DEPTH BELOW FINISHED SLAB AT REQUIRED PIPE SLOPES. COORDINATE ALL INVERT DEPTHS WITH FOOTERS, FOUNDATIONS, AND INVERT DEPTH FOR SANITARY CONNECTIONS TO MAINS.

   PROVIDE EJECTOR PUMP AS REQUIRED - SEE PLUMBING BASIS OF DESIGN ON POO1 FOR MORE INFORMATION. COORDINATE WITH OWNER, SITE/CIVIL ENGINEER, UTILITY, AND LOCAL AHJ AS REQUIRED FOR INSTALLATION OF EJECTOR PUMP.
3. COORDINATE YARD CLEAN OUT WITH FINISHED GRADE.
4. PROVIDE ALL LABOR AND MATERIAL REQUIRED TO INSTALL NEW MODULAR TRENCH DRAIN SYSTEM. COORDINATE INSTALLATION WITH FINISHED CONCRETE FLOOR SLOPE, ETC. COORDINATE TRENCH DRAIN OUTLET INVERT DEPTH WITH NEW SANITARY MAINS AND SOLIDS INTERCEPTOR (BOTH INSIDE AND OUTSIDE OF BUILDING). COORDINATE WITH G.C.
5. PROVIDE ALL LABOR AND MATERIAL TO INSTALL OPEN RECEPTACLE AND DRAIN PIPING FOR EQUIPMENT CONDENSATE. COORDINATE EXACT LOCATION/HEIGHT WITH OWNER, ARCHITECT, AND HVAC EQUIPMENT/WATER HEATER.
6. PROVIDE ALL LABOR AND MATERIAL REQUIRED TO INSTALL NEW OIL-WATER/SOILDS SEPARATOR. COORDINATE WITH SITE/CIVIL ENGINEER AND CONTRACTOR. INTERCEPTOR REQUIREMENTS SHALL BE BASED UPON LOCAL AHJ - SEE SITE PLAN(S) FOR MORE INFORMATION.
7. PROVIDER ALL LABOR AND MATERIAL REQUIRED TO INSTALL NEW SEWAGE EJECTOR AND BASIN. COORDINATE WITH SITE/CIVIL ENGINEER AND CONTRACTOR. INTERCEPTOR REQUIREMENTS SHALL BE BASED UPON LOCAL AHJ - SEE SITE PLAN(S) FOR MORE INFORMATION. COORDINATE PROVISION OF POWER WITH ELECTRICAL CONTRACTOR.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004
CABLE BUILDING

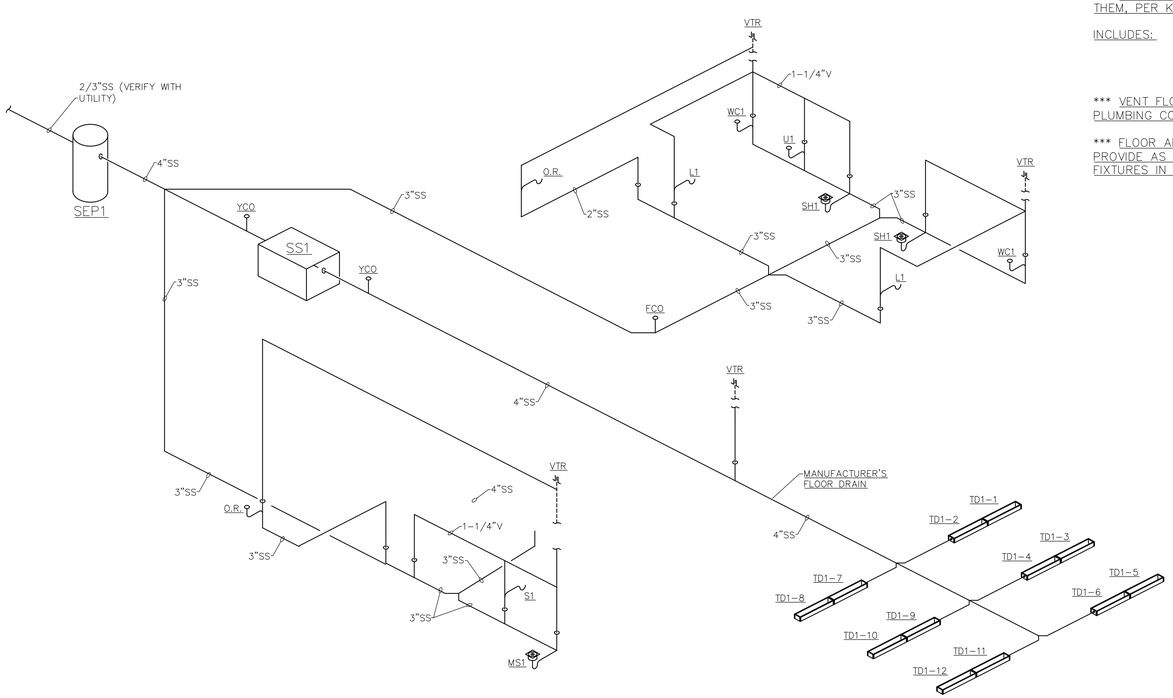
STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: **P101**

NEW SANITARY WASTE AND VENT PLAN

FOR CONSTRUCTION

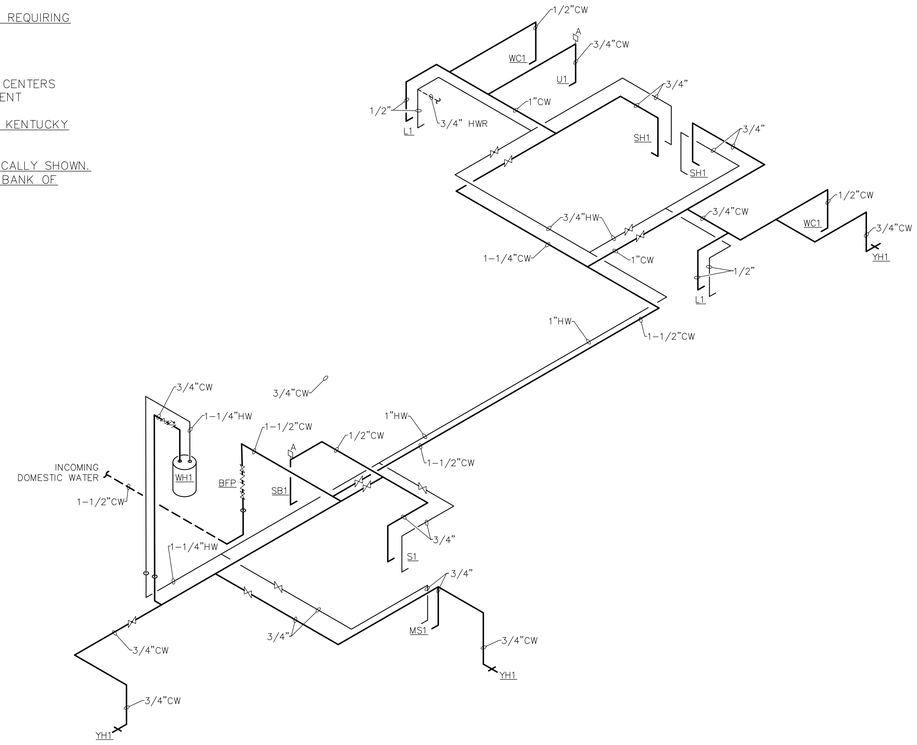


*** PROVIDE INDIRECT DRAINS FOR ALL FIXTURES REQUIRING THEM, PER KENTUCKY PLUMBING CODE ***

INCLUDES: ICE MAKERS
DISHWASHERS
DRINK DISPENSERS AND BEVERAGE CENTERS
CONDENSATE DRAINS FROM EQUIPMENT

*** VENT FLOOR DRAINS/SINKS AS REQUIRED BY KENTUCKY PLUMBING CODE ***

*** FLOOR AND/OR WALL CLEAN-OUTS NOT TYPICALLY SHOWN. PROVIDE AS REQUIRED BY CODE AND FOR EACH BANK OF FIXTURES IN PUBLIC RESTROOMS ***



1 P102 DOMESTIC WATER RISER DIAGRAM
SCALE: NO SCALE

2 P102 STORM AND SANITARY WASTE/VENT RISER DIAGRAMS
SCALE: NO SCALE

MAXIMUM DISTANCE FROM TRAP TO VENT (KPC)

SIZE OF FIXTURE DRAIN, INCHES	DISTANCE FROM TRAP TO VENT, FEET
1-1/4	2'-6"
1-1/4	3'-6"
2	5'-0"
3	6'-0"
4	10'-0"

A FIXTURE BRANCH ON A WATER CLOSET SHALL NOT BE MORE THAN 4'-6".

SOIL AND WASTE PIPE SIZING, FIXTURE UNITS ON A SINGLE STACK (KPC)

PIPE SIZE, INCHES	MAXIMUM DEVELOPED LENGTH	FIXTURE UNITS
1-1/4	25 FEET	1
1-1/2	60 FEET	2
2	80 FEET	6
2-1/2	100 FEET	12
3	225 FEET	36
4	UNLIMITED	172
5	UNLIMITED	342
6	UNLIMITED	576

1. WATER CLOSET SHALL BE ON A MINIMUM OF A THREE (3) INCH SOIL AND WASTE PIPE WITH A MAXIMUM OF THREE (3) WATER CLOSETS OR SOIL DISCHARGING FIXTURES PER THREE (3) INCH SOIL AND WASTE PIPE.
2. FOUR (4) WATER CLOSETS WITH A MAXIMUM FLUSHING RATE OF 1.6 GALLONS PER FLUSH PER WATER CLOSET SHALL BE ALLOWED TO DISCHARGE INTO A THREE (3) SOIL AND WASTE PIPE.

SOIL AND WASTE PIPE SIZING, FIXTURE UNITS ON A SINGLE STACK (KPC)

PIPE SIZE, INCHES	MAXIMUM DEVELOPED LENGTH	FIXTURE UNITS
1-1/4	25 FEET	1
1-1/2	60 FEET	2
2	80 FEET	6
2-1/2	100 FEET	12
3	225 FEET	36
4	UNLIMITED	172
5	UNLIMITED	342
6	UNLIMITED	576

1. WATER CLOSET SHALL BE ON A MINIMUM OF A THREE (3) INCH SOIL AND WASTE PIPE WITH A MAXIMUM OF THREE (3) WATER CLOSETS OR SOIL DISCHARGING FIXTURES PER THREE (3) INCH SOIL AND WASTE PIPE.
2. FOUR (4) WATER CLOSETS WITH A MAXIMUM FLUSHING RATE OF 1.6 GALLONS PER FLUSH PER WATER CLOSET SHALL BE ALLOWED TO DISCHARGE INTO A THREE (3) SOIL AND WASTE PIPE.

MINIMUM SIZING FOR TRAPS, SOIL AND WASTE BRANCH PIPING (KPC)

FIXTURE	MINIMUM SIZE, INCHES		
	TRAP	BRANCH	FIXTURE UNITS
AUTOMATIC CLOTHES WASHER	2	2	2
BASEMENT FLOOR DRAIN	3	3	3
BATHTUB	1-1/2	1-1/2	1-1/2
DISHWASHERS	1-1/2	1-1/2	1-1/2
DISPOSAL UNIT	1-1/2	1-1/2	1-1/2
DRINKING FOUNTAIN	1-1/4	1-1/4	1
FLOOR DRAIN (RES. LAUNDRY)	2	2	2
FLOOR DRAIN (TOILET ROOM)	3	3	3
FLOOR DRAIN (UTILITY ROOM)	3	3	3
KITCHEN SINK UNIT	1-1/2	1-1/2	1-1/2
LAVATORIES	1-1/4	1-1/4	1
SHOWER STALL	1-1/2	1-1/2	1-1/2
SINKS: KITCHEN, RESIDENCE	1-1/2	1-1/2	1-1/2
SINKS: SERVICE	3	3	3
SINKS: SERVICE, WALL TYPE	2	2	2
SINKS: THREE-COMPARTMENT	2	2	2
URINAL: LIP	1-1/2	1-1/2	1-1/2
WATER CLOSET:1.6 GPM/FLUSH	3	3 OR 4	4

MINIMUM WATER SUPPLY PIPING SIZES (KPC)

FIXTURE BRANCHES	NOMINAL PIPE SIZING, INCHES
BATH TUBS	1/2"
DRINKING FOUNTAIN	1/2"
DISHWASHING (DOMESTIC)	1/2"
KITCHEN SINK (RESIDENTIAL)	1/2" OR 3/4" AS REQUIRED
KITCHEN SINK (COMMERCIAL)	1/2"
LAVATORY	1/2"
SINKS (SERVICE, SLOP)	3/4"
URINAL (FLUSH VALVE)	1/2" OR 3/4" AS REQUIRED
WATER CLOSET (TANK TYPE)	1/2"
WATER CLOSET (FLUSH VALVE)	1"
HOT WATER HEATERS	3/4"
HOSE BIBBS	1/2"
WALL HYDRANT	1/2"
DOMESTIC CLOTHES WASHER	1/2"
SHOWER (SINGLE HEAD)	3/4"

1. IF THE EQUIPMENT/FIXTURE MANUFACTURER REQUIRES OR RECOMMENDS LARGER PIPING FOR THEIR PARTICULAR ITEM, THEN THE LARGER PIPE SIZE SHALL BE PROVIDED.
2. MORE THAN THREE (3) 1/2" FIXTURE BRANCHES SHALL NOT BE SUPPLIED FROM A 1/2" PIPE.
3. THE BRANCH PIPE TO A FIXTURE SHALL TERMINATE NOT MORE THAN THIRTY (30) INCHES FROM THE POINT OF CONNECTION TO THE FIXTURE AND SHALL BE BROUGHT TO THE FLOOR OR WALL ADJACENT TO THE FIXTURE.
4. ANY CONCEALED WATER BRANCH PIPING SHALL NOT BE LESS THAN 1/2" NOMINAL PIPE SIZE.
5. WATER HAMMER:
   - 5.1. IN A BUILDING SUPPLY SYSTEM IN WHICH A DEVICE OR APPURTENANCE IS INSTALLED UTILIZING A QUICK ACTING VALVE THAT CAUSES NOISE DUE TO WATER HAMMER, A PROTECTIVE DEVICE, INCLUDING AN AIR CHAMBER OR APPROVED MECHANICAL SHOCK ABSORBER, SHALL BE INSTALLED AS CLOSE AS POSSIBLE TO THE QUICK ACTING VALVE CAUSING THE WATER HAMMER.
   - 5.2. IF A MECHANICAL SHOCK ABSORBER IS INSTALL, IT SHALL BE IN AN ACCESSIBLE PLACE. FOLLOW MFGR'S INSTALLATION INSTRUCTIONS.

CRITICAL LEVEL (CL) SETTINGS FOR ATMOSPHERIC-TYPE VACUUM BREAKERS (KPC)

FIXTURE OR EQUIPMENT	METHOD OF INSTALLATION
ASPIRATORS, EJECTORS, SHOWERS	CL AT LEAST 6" ABOVE FLOOD LEVEL OF RECEPTACLE
ON MODELS WITH BUILT-IN VACUUM BREAKERS:	
DISHWASHING MACHINES	CL AT LEAST 6" ABOVE FLOOD LEVEL OF MACHINE
FLUSHOMETERS (WC AND URINAL)	CL AT LEAST 6" ABOVE TOP OF FIXTURE SUPPLIED
HOSE BIBBS	CL AT LEAST 6" ABOVE FLOOD LEVEL OF RECEPTACLE SERVED
HOSE OUTLETS	CL AT LEAST 6" ABOVE HIGHEST POINT ON HOSE LINE
LAUNDRY MACHINES	CL AT LEAST 6" ABOVE FLOOD LEVEL OF MACHINE
LAWN SPRINKLERS	CL AT LEAST 12" ABOVE HIGHEST SPRINKLER OR DISCHARGE OUTLET

MAXIMUM PERMISSIBLE VENT LENGTH (KPC)

PIPE SIZE, INCHES	MAXIMUM LENGTH	FIXTURE UNITS
1-1/4	30 FEET	2
1-1/2	150 FEET	10
2	200 FEET	24
2-1/2	250 FEET	36
3	300 FEET	72
4	400 FEET	240
5	800 FEET	720

EXCEPT FOR RESIDENTIAL INSTALLATIONS, IF A FIXTURE OPENING IS INSTALLED MORE THAN TWENTY-FIVE (25) FEET OF DEVELOPED LENGTH FROM THE POINT WHERE IT IS CONNECTED TO THE MAIN SOIL OR WASTE SYSTEM, OR IF MORE THAN TEN (10) FEET OF VERTICAL PIPING IS USED, THE VENT SHALL BE CONTINUED FULL SIZE THROUGH THE ROOF OR RETURNED FULL SIZE TO THE MAIN VENT.

MINIMUM SIZING FOR TRAPS, SOIL AND WASTE BRANCH PIPING (KPC)

FIXTURE	MINIMUM SIZE, INCHES		
	TRAP	BRANCH	FIXTURE UNITS
DISHWASHERS	1-1/2	1-1/2	1-1/2
DISPOSAL UNIT	1-1/2	1-1/2	1-1/2
FLOOR DRAIN (TOILET ROOM)	3	3	3
FLOOR DRAIN (UTILITY ROOM)	3	3	3
INDUSTRIAL FLOOR DRAIN	4	4	4
KITCHEN SINK UNIT	1-1/2	1-1/2	1-1/2
LAVATORIES	1-1/4	1-1/4	1
SHOWER STALL	1-1/2	1-1/2	1-1/2
SINKS: SERVICE	3	3	3
URINAL: LIP	1-1/2	1-1/2	1-1/2
WATER CLOSET:1.6 GPM/FLUSH	3	3 OR 4	4

MINIMUM AIR GAP FOR PLUMBING FIXTURES (KPC)

FIXTURE	MINIMUM AIR GAP	
	WHEN NOT AFFECTED BY NEAR WALL, INCHES	WHEN AFFECTED BY NEAR WALL, INCHES
LAVATORIES AND OTHER FIXTURES WITH EFFECTIVE OPENING NOT GREATER THAN 1/2" DIAMETER	1	1-1/2
SINK, LAUNDRY TRAYS, GOOSENECK BATH FAUCETS AND OTHER FIXTURES WITH EFFECTIVE OPENINGS NOT GREATER THAN 3/4" DIAMETER	1-1/2	2-1/4
OVER RIM BATH FILLERS AND OTHER FIXTURES WITH EFFECTIVE OPENINGS NOT GREATER THAN 1" DIAMETER	2	3
DRINKING FOUNTAINS - SINGLE ORIFICE NOT GREATER THAN 7/16" DIAMETER OR HAVING MULTIPLE ORIFICES HAVING TOTAL AREA OF 0.15 SQ. INCHES	1	1-1/2
EFFECTIVE OPENINGS GREATER THAN 1 INCH	2 X DIAMETER OF EFFECTIVE OPENING	3 X DIAMETER OF EFFECTIVE OPENING

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004
CABLE BUILDING

STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: **P102**

PLUMBING RISER DIAGRAMS

FOR CONSTRUCTION

PLUMBING SYSTEMS

1. GENERAL

1.1. APPLICABLE PROVISIONS OF THE MECHANICAL AND ELECTRICAL GENERAL REQUIREMENTS, GENERAL AND SPECIAL CONDITIONS, AND ALL OTHER CONTRACT DOCUMENTS GOVERN WORK UNDER THIS SECTION.

1.2. THE FRONT END REQUIREMENTS, BID REQUIREMENTS AND BID FORM DOCUMENTS AND ALL OTHER CONTRACT DOCUMENTS APPLY TO THESE BRANCHES OF THE WORK, AS DO ALL OTHER SECTIONS OF THE SPECIFICATIONS.

1.3. THE CONTRACTOR SHALL PROVIDE ALL ITEMS, ARTICLES, MATERIALS, OPERATIONS OR METHODS LISTED, MENTIONED OR SCHEDULED ON THE DRAWINGS AND/OR HEREIN, INCLUDING ALL LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS NECESSARY AND REQUIRED FOR THEIR COMPLETION.

1.4. EACH SUB-CONTRACTOR SHALL BE GOVERNED BY ANY ALTERNATES AND UNIT PRICES CALLED FOR IN THE ARCHITECTURAL SPECIFICATIONS OR CONTRACT DRAWINGS INSOFAR AS THEY AFFECT HIS PART OF THE WORK.

1.5. ALL WORK TO BE INSPECTED AND APPROVED BY THE LOCAL PLUMBING INSPECTOR AND THE PLUMBING OFFICE OF THE STATE BOARD OF HEALTH.

1.6. SPECIAL REFERENCE TO BE MADE TO PAINTING, MARKING AND IDENTIFICATION IN THIS SECTION OF THE SPECIFICATIONS AS WELL AS IN THE GENERAL MECHANICAL SECTION OF THE SPECIFICATIONS.

1.7. ALL PIPING, PLUMBING FIXTURES AND APPURTENANCES SHALL MEET THE LEAD-LEACHING TEST SPECIFICATIONS OF THE NATIONAL SANITATION FOUNDATION (N.S.F.), STANDARD 61, SECTION 9.

2. WORK INCLUDED

2.1. THIS SECTION INCLUDES THE FURNISHING AND INSTALLATION OF ALL NECESSARY LABOR, MATERIALS, TESTS AND FEES AND EQUIPMENT INCIDENTAL TO COMPLETE INSTALLATION OF ALL PLUMBING AND DRAINAGE AS SHOWN ON DRAWINGS AND HEREIN SPECIFIED.

2.2. THIS SECTION INCLUDES THE REMOVAL OF ALL EXISTING PLUMBING FROM THE PREMISES. WHERE DEMOLITION IS REQUIRED IN AN EXISTING BUILDING, ALL MATERIALS SHALL BE DISPOSED OF IN A LEGAL MANNER.

2.3. ALSO, INCLUDED ARE ANY MATERIALS OR DEVICES IN ACCORDANCE WITH THE BEST METHODS OF FIRST-CLASS PRACTICE AND ALL APPLICABLE LAWS OF THE STATE BOARD OF HEALTH.

2.4. OBTAIN AND PAY FOR ALL PERMITS AND INSPECTION FEES REQUIRED. DELIVER TO THE ARCHITECT CERTIFICATES OF INSPECTIONS ISSUED BY THE GOVERNING AUTHORITIES.

2.5. PIPING TO BE REMOVED:

2.5.1. VENT LINES SHALL BE REMOVED BACK TO MAIN VENT LINE OR STACK AND CAPPED WITH SAME OR COMPATIBLE PIPING MATERIAL.

2.5.2. SANITARY OR WASTE PIPING SHALL BE REMOVED TO BELOW FLOOR SLAB AND CAPPED AND ABANDONED IN PLACE. CAP PIPING WITH SAME OR COMPATIBLE MATERIAL.

2.5.3. WATER LINES SHALL BE REMOVED BACK TO NEAREST ACTIVE MAIN, VALVE OR BRANCH. PROVIDE NEW BALL VALVE AND CAP WITH SAME OR COMPATIBLE PIPING MATERIAL.

2.5.4. ALL PIPING INSULATION ON LINES TO BE DEMOLISHED SHALL BE REMOVED COMPLETE.

2.6. GAS PIPING SHALL BE REMOVED BACK TO NEAREST ACTIVE MAIN OR BRANCH AND BE CAPPED. PROVIDE NEW PLUG VALVE AND THREADED PIPE CAP. CAP PIPING WITH SAME MATERIAL OR COMPATIBLE MATERIAL.

2.7. ALL PIPE HANGERS, SUPPORTS, CLIPS, RODS AND ETC. SUPPORTING PIPING TO BE DEMOLISHED SHALL BE REMOVED COMPLETE.

2.8. ANY PIPING LEFT IN PLACE THAT EXCEEDS 1'-0" IN LENGTH SHALL BE RE-SUPPORTED AS REQUIRED TO PROPERLY SECURE PIPING.

2.9. ANY PIPING REQUIRED TO REMAIN THAT CONNECTS TO FIXTURES OR EQUIPMENT THAT IS TO REMAIN SHALL BE PROTECTED DURING THIS PHASE OF THE WORK. ALL INSULATION, HANGERS, ETC. DAMAGED DURING PROJECT SHALL BE REPAIRED TO MATCH EXISTING.

2.10. ALL FLOOR PENETRATIONS OR OPENINGS LEFT AFTER PIPING HAS BEEN DEMOLISHED SHALL BE REPAIRED. FILL WITH NON-SHRINK GROUT FLUSH WITH ADJACENT FLOOR. DOWELL OR PIN NEW SLAB TO EXISTING SLAB.

2.11. ALL FLOOR OPENINGS OR DAMAGE LEFT BY PIPING OR PIPE HANGER DEMOLITION THAT IS LOCATED IN AREAS THAT WILL BE VISIBLE FROM BELOW DUE TO AREA NOT HAVING CEILINGS SHALL BE FINISHED AS DIRECTED BY ARCHITECT. VERIFY LOCATION ON SITE WITH G.C. AND ARCHITECT.

2.12. ALL OPENINGS LEFT IN WALLS, INTERIOR OR EXTERIOR, AFTER PIPING OR EQUIPMENT HAS BEEN REMOVED SHALL BE PATCHED AS DIRECTED BY ARCHITECT.

3. STORED MATERIALS

3.1. THE CONTRACTOR SHALL DELIVER, STORE AND PROTECT ALL MATERIALS RELATED TO THE COMPLETION OF ALL PLUMBING WORK.

3.2. ANY DAMAGE OCCURRING TO STORED MATERIALS EITHER ON OR OFF SITE SHALL BE THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR.

4. ROUGH-IN CONNECTIONS

4.1. WATER SUPPLY AND WASTE CONNECTIONS TO FIXTURES, INCLUDING TRAP ARM AND P-TRAP, SHALL BE CHROME PLATED WHEN EXPOSED. UNLESS OTHERWISE SPECIFIED, SUPPLIES TO HAVE CHROME PLATED WHEEL HANDLE STOP WITH MONEL SEAL.

4.2. WATER SUPPLY LINES SHALL BE RUN FULL SIZE IN UTILITY SPACES, UNLESS OTHERWISE SHOWN ON DRAWINGS.

4.3. PROVIDE ROUGH-IN AND FINAL CONNECTION FOR ALL EQUIPMENT TO BE FURNISHED BY OTHERS THAT REQUIRES WATER, WASTE, VENT OR GAS CONNECTIONS. CONTRACTOR SHALL REQUEST AND RECEIVE SHOP DRAWINGS ON ALL EQUIPMENT FURNISHED BY OTHERS TO VERIFY EXACT CONNECTION REQUIREMENTS. INSTALL ALL FAUCETS, COCKS, VALVES, TRAPS, ETC. FURNISHED WITH EQUIPMENT (BY OTHERS) AS REQUIRED. CONTRACTOR TO PROVIDE ALL TRAPS, UNIONS, ETC. REQUIRED TO COMPLETE INSTALLATION. INSTALL STOPS IN HOT AND COLD WATER SUPPLIES OF EACH FIXTURE OR ITEM OF EQUIPMENT.

4.4. ALL WASTE, VENT AND WATER PIPING TO EXTEND INTO WALLS, FURRINGS, OR CHASE IN A CONCEALED MANNER TO FIXTURES, UNLESS NOTED OR INDICATED OTHERWISE.

4.5. LAVATORY AND SINK SUPPLY LINES (BOTH HOT AND COLD WATER) TO ENTER FROM BOTTOM OF UNIT, NOT WALL. THIS IS TO APPLY ON EXTERIOR WALLS ONLY. COORDINATE ROUTING OF THIS PIPING WITH CABINETRY AND GENERAL CONTRACTOR PRIOR TO INSTALLATION. IF CONDITIONS MANDATE PIPING MUST BE ROUTED IN AN OUTSIDE WALL, PLUMBING CONTRACTOR SHALL ENSURE BUILDING INSULATION IS INSTALLED BETWEEN THE PIPING AND EXTERIOR FACE OF THE OUTSIDE WALL.

4.6. PLUMBING CONTRACTOR SHALL CAULK AROUND WALL HUNG AND FLOOR SET PLUMBING FIXTURES. VERIFY COLOR OF CAULK WITH GENERAL CONTRACTOR AND/OR ARCHITECT PRIOR TO INSTALLATION.

4.7. KITCHEN EQUIPMENT WHERE INDICATED, WILL BE FURNISHED AND CONNECTED AS INDICATED ON THE DRAWINGS. CONTRACTOR SHALL REFER TO REFERENCE DRAWINGS AND THE ASSOCIATED EQUIPMENT LIST AS FURNISHED BY THE GENERAL CONTRACTOR FOR THE TYPE, SIZE AND LOCATION OF EQUIPMENT. IT WILL BE THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO ACCOUNT AND INVENTORY ALL PARTS TO EACH PIECE OF EQUIPMENT WHICH IS TO BE CONNECTED BY THE PLUMBING CONTRACTOR AND ADVISE THE OWNER IF ANY COMPONENTS ARE MISSING.

5. FLOOR DRAINS

5.1. FLOOR DRAINS SHALL HAVE P-TRAP OF SAME SIZE AS OUTLET, UNLESS OTHERWISE INDICATED. TOPS OF DRAINS SHALL BE LEVEL AND CONFORM TO SURFACE OF FINISHED FLOOR. DRAINS SHALL HAVE CAST IRON BODY. INSTALL TEST PLUG IN FLOOR DRAINS UNTIL SLABS ARE FINISHED, CLEANED AND COMPLETED.

5.2. DRAINS SHALL BE OF TYPE AND SIZE INDICATED ON DRAWINGS AND SHALL BE ZURN, WADE, SMITH, JOSAM OR EQUAL TO HEREINAFTER SCHEDULED PRODUCTS BY ZURN.

5.3. ALL DRAINS NOT INSTALLED ON GRADE SHALL HAVE A THIRTY-SIX INCH BY THIRTY-SIX INCH (36" X 36") CHLORALOY PAN.

5.4. REFER TO DRAWINGS FOR DRAIN SCHEDULE/SPECIFICATIONS.

5.5. FLOOR SLABS TO HAVE UNIFORM SLOPE TO DRAINS. COORDINATE WITH GENERAL CONTRACTOR.

6. CLEANOUTS AND ACCESS COVERS

6.1. ZURN INDUSTRIES INC., WADE, SMITH OR JOSAM MANUFACTURING COMPANY EQUAL TO THE FOLLOWING LISTED PRODUCTS BY ZURN.

6.2. INTERIOR CLEANOUTS SHALL BE LOCATED IN RUN NOT MORE THAN FIFTY FEET (50'-0") ON CENTERS AND AT EACH CHANGE IN DIRECTION. ALSO, CLEANOUTS SHALL BE PROVIDED AT THE BASE OF EACH SOIL OR WASTE STACK, EACH RAINWATER LEADER AND WHEREVER NECESSARY (WHETHER OR NOT INDICATED ON PLANS) TO MAKE ACCESSIBLE ALL PARTS OF THE SOIL, WASTE AND RAINWATER SYSTEMS.

6.3. CLEANOUTS IN CERAMIC TILE AND FINISHED AREAS SHALL BE ZURN SUPREME ZN-1400-X WITH SCORIATED NICKEL BRONZE ACCESS COVER. CLEANOUT PLUG SHALL BE STRAIGHT THREADED WITH TAPERED SHOULDER THAT SEALS AGAINST CAULK LEAD SEAT IN BODY.

6.4. CLEANOUTS IN FLOORS FINISHED WITH VINYL TILE SHALL BE ZURN SUPREME ZN-1400-X WITH INLAY TYPE NICKEL BRONZE ACCESS COVER. CLEANOUT PLUG SAME AS SPECIFIED ABOVE.

6.5. CLEANOUTS IN TERRAZZO FLOORS SHALL BE ZURN SUPREME ZN-1400-Z WITH RECESSED NICKEL BRONZE ACCESS COVER. CLEANOUT PLUG SAME AS SPECIFIED ABOVE.

6.6. CLEANOUTS IN FINISHED WALLS SHALL BE ZURN SUPREME Z-1446-A (CLEANOUT TEE) COMPLETE WITH STAINLESS STEEL, ROUND ACCESS COVER, AND SECURING SCREW. CLEANOUT PLUG SHALL HAVE TAPERED SHOULDER, STRAIGHT THREADED THAT SEALS AGAINST CAULK LEAD SET IN TEE. CLEANOUT TEE SHALL BE DURACOATED CAST-IRON. RAISED HEAD PLUG SHALL BE BRONZE. WHERE FACE OF CLEANOUT IS 12" OR MORE FROM FACE OF WALL, FURNISH AND INSTALL ZURN ZANB ACCESS PANEL (11" X 11") NON-RATED WALLS OR MILCOR ACCESS DOOR (12" X 12") FOR FIRE RATED WALLS.

6.7. CLEANOUTS ON EXPOSED VERTICAL STACKS SHALL BE ZURN SUPREME Z-1445-A (CLEANOUT TEE) WITH RAISED HEX HEAD PLUG. CLEANOUT PLUG SHALL HAVE TAPERED SHOULDER, STRAIGHT THREADED THAT SEALS AGAINST CAULK LEAD SEAT IN TEE. CLEANOUT TEE SHALL BE DURACOATED CAST-IRON. RAISED HEAD PLUG SHALL BE BRONZE.

6.8. CLEANOUTS IN HORIZONTAL CHANGE OF DIRECTION SHALL BE ZURN Z-1440 WITH BRONZE COUNTERSUNK PLUG AND DURACOATED CAST-IRON FERRULE. PLUG SHALL BE STRAIGHT THREADED WITH TAPERED SHOULDER THAT SEALS AGAINST CAULK LEAD SEAT.

6.9. UNLESS NOTED OR INDICATED OTHERWISE, CLEANOUTS SHALL BE SAME SIZE AS PIPE SERVED UP TO 6". FOR PIPE OVER 6", CLEANOUTS SHALL BE 6".

7. PLUMBING FIXTURES AND ACCESSORIES

7.1. CONTRACTOR SHALL REQUEST AND RECEIVE ALL FOOD SERVICE SHOP DRAWINGS AS REQUIRED TO VERIFY DIMENSIONS AND COORDINATE WITH PLUMBING FIXTURES REQUIRED FOR THE PROJECT. THIS SHALL BE DONE PRIOR TO PLACING FIXTURES ON ORDER. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT AND ENGINEER.

7.2. REFER TO DRAWINGS FOR PLUMBING FIXTURE SPECIFICATIONS AND FIXTURE SCHEDULE.

8. TRAPS

8.1. UNLESS NOTED OR INDICATED OTHERWISE, EACH PLUMBING FIXTURE AND PIECE OF EQUIPMENT REQUIRING CONNECTIONS TO SEWAGE SHALL BE SEPARATELY TRAPPED AND VENTED.

8.2. TRAPS SHALL BE PLACED AS NEAR THE FIXTURE AS POSSIBLE AND ALWAYS WITHIN THE LIMITS PERMITTED BY THE STATE CODE.

8.3. TRAPS FOR CAST-IRON HUB AND SPIGOT PIPE SHALL BE SERVICE WEIGHT CAST-IRON. TRAPS ON THREADED STEEL PIPE SHALL BE CAST-IRON, SCREWED, RECESSED DRAINAGE PATTERN. NO FLAT VENTS WILL BE PERMITTED.

8.4. WHERE TRAPS AND/OR TRAP ARMS ARE 1-1/4" OR 1-1/2", MINIMUM WASTE AND/OR VENT PIPE SIZE SHALL BE 1-1/2". HOWEVER, WHERE THE ABOVE PLUMBING FIXTURES ARE ON SLAB ON GRADE, MINIMUM WASTE PIPE SIZE SHALL BE 2".

9. GREASE TRAPS, SUMP PUMPS, AND SEWAGE EJECTORS:

9.1. ALL GREASE TRAPS, SUMP PUMPS AND SEWAGE EJECTOR PUMPS INDICATED TO BE DEMOLISHED SHALL BE REMOVED COMPLETE.

9.2. ALL PUMPS, CONTROLS, VENTS AND ASSOCIATED ACCESSORIES SHALL BE REMOVED AND TURNED OVER TO OR DISPOSED OF AS DIRECTED BY OWNER.

9.3. ALL SEWAGE EJECTOR AND GREASE TRAP BASINS SHALL BE REMOVED COMPLETE.

9.4. CAP AND ABANDON ALL INLET AND OUTLET LINES WITH SAME OR COMPATIBLE MATERIAL.

9.5. EXCAVATIONS REMAINING AFTER DEMOLITION OF BASINS SHALL BE FILLED WITH SUITABLE BACKFILL MATERIAL AND TAMPED IN 6" LAYERS. PROVIDE 6" AGGREGATE FILL UP TO BOTTOM OF EXISTING FLOOR SLAB. POUR NEW FLOOR SLAB TO MATCH EXISTING. DOWELL OR PIN NEW SLAB TO EXISTING SLAB MINIMUM 12" ON CENTER.

10. FLOOR DRAINS, HUB DRAINS AND FLOOR SINKS:

10.1. ALL FLOOR DRAINS, HUB DRAINS AND FLOOR SINKS AND ETC INDICATED TO BE DEMOLISHED SHALL BE REMOVED COMPLETE. CAP LINES BELOW FLOOR WITH SAME OR COMPATIBLE MATERIAL. PATCH FLOOR TO MATCH EXISTING.

11. HANGERS

11.1. ALL HORIZONTAL AND VERTICAL PIPING ABOVE GROUND SUPPORTED AS HEREIN SPECIFIED OR DETAILED ON DRAWINGS.

11.2. HORIZONTAL PIPING SHALL BE SUPPORTED AS PER THE FOLLOWING SCHEDULES OR PER STATE AND LOCAL CODES; WHICHEVER HAS MORE STRINGENT REQUIREMENTS:

11.2.1. HORIZONTAL STEEL PIPE

NOMINAL PIPE SIZE (INCHES)	MAXIMUM SPAN (FT)	MINIMUM ROD DIAMETER (INCHES)
1/2	5.00	1/4
3/4	6.00	3/8
1	7.00	3/8
1 1/2	9.00	3/8
2	10.00	3/8
3	12.00	1/2

11.2.2. HORIZONTAL COPPER PIPE

NOMINAL PIPE SIZE (INCHES)	MAXIMUM SPAN (FT)	MINIMUM ROD DIAMETER (INCHES)
1/2	5.00	3/8
3/4	5.00	3/8
1	6.00	3/8
1 1/4	6.00	3/8
1 1/2	8.00	3/8
2	8.00	3/8

11.2.3. INSTALL HANGERS FOR CAST-IRON SOIL PIPING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:

11.2.3.1. NPS 1-1/2 AND NPS 2: 60 INCHES WITH 3/8-INCH ROD.

11.2.3.2. NPS 3: 60 INCHES WITH 1/2-INCH ROD.

11.2.3.3. NPS 4 60 INCHES WITH 5/8-INCH ROD.

11.2.3.4. SPACING FOR 10-FOOT LENGTHS MAY BE INCREASED TO 10 FEET. SPACING FOR FITTINGS IS LIMITED TO 60 INCHES.

11.2.4. HANGER RODS SUPPORTED FROM CONCRETE INSERTS, BEAM CLAMPS, PHILLIPS SHIELDS, EXPANSION BOLTS OR LAG SCREWS AS DIRECTED OR DETAILED.

11.2.5. HORIZONTAL PIPE HANGERS EQUAL TO ELCEN FIGURE 10-C (SPLIT RING HANGER WITH SWIVEL ADJUSTER) OR FIGURE 12 (ADJUSTABLE STEEL CLEVIS HANGER) FOR COPPER PIPE SHALL BE COPPER PLATED AND SIZED SO THAT THEY FIT SNUGLY AROUND THE PIPE.

11.2.6. THIS CONTRACTOR SHALL FURNISH AND INSTALL ANY ADDITIONAL STEEL SUPPORTS WHICH MAY BE REQUIRED TO SPAN STRUCTURAL MEMBERS IN ORDER TO PROVIDE MEANS OF SUPPORTING HANGER RODS.

11.2.7. ALL EXPOSED RISERS SHALL BE SECURELY ANCHORED TO THE WALLS WITH EXTENDED RING HANGERS OR OTHER APPROVED MANNER.

11.2.8. COLD, HOT WATER, TEMPERED WATER SUPPLY AND RETURN, AND HOT WATER RETURN LINES SHALL BE INSULATED PER OTHER SECTIONS OF THIS SPECIFICATION. HANGERS TO BE ENLARGED TO ACCEPT INSULATION. ALL WATER LINES TO RECEIVE SADDLES TWELVE INCHES (12") LONG (SIZED FOR INCREASE FROM INSULATION).

11.2.9. WHERE COPPER PIPING IS INSTALLED AND IN DIRECT CONTACT WITH A PIPE HANGER SUPPORT, COPPER PIPE HANGERS SHALL BE USED.

12. WATER VALVES

12.1. FURNISH AND INSTALL VALVES WHERE INDICATED ON DRAWINGS. ALSO, INSTALL CUTOFF VALVE ON EACH PIECE OF EQUIPMENT SO THAT SAME MAY BE ISOLATED FROM THE SYSTEM.

12.2. VALVES SHALL BE PRESSURE RATED AS SPECIFIED BELOW, UNLESS OTHERWISE INDICATED ON DRAWINGS. WHERE VALVE SPECIFICATION NUMBERS ARE BASED ON NIBCO, ALTERNATE MANUFACTURERS WILL BE APPROVED PROVIDED THEY ARE EQUAL IN ALL RESPECTS.

12.2.1. BALL VALVES (SHUT-OFF TYPE)
COPPER PIPE: ONE-HALF INCH TO TWO INCHES (1/2" TO 2") - NIBCO S-585-70.
COPPER PIPE: TWO AND ONE-HALF INCHES TO FOUR INCHES (2-1/2" TO 4") - RED WHITE 5044F OR 5049F.

12.2.2. BALL VALVES (BALANCING TYPE) - COPPER PIPE: ONE-HALF INCH TO TWO INCHES (1/2" TO 2") - NIBCO S-585-70M

12.2.3. STOP AND WASTE VALVES - COPPER PIPE: ONE-HALF INCH TO ONE INCH (1/2" TO 1") - NIBCO 726 OR 76.

12.2.4. CHECK VALVES
COPPER PIPE: ONE-HALF INCH TO THREE INCHES (1/2" TO 3") - NIBCO S-413-B.
COPPER PIPE: TWO INCHES AND LARGER (2" AND LARGER) - NIBCO F918 OR F968-B.

12.2.5. DRAIN VALVES - COPPER PIPE: ONE-HALF INCH TO ONE AND ONE-HALF INCHES (1/2" TO 1-1/2") - NIBCO T-113-HC.

12.3. ALL VALVES LISTED HEREIN BEFORE SHALL HAVE RISING STEM OR OUTSIDE SCREW AND YOKE PATTERN. EXCEPTIONS WOULD BE IN LOCATIONS WHERE SPACE AND ACCESS ARE LIMITED. IN THESE INSTANCES, NON-RISING STEMS IN VALVES WITH THE SAME RATING AND PATTERN WILL BE PERMISSIBLE. ALL BRONZE GATE VALVES SHALL BE OF THE TYPE AND DESIGN WHICH CAN BE REPLACED UNDER PRESSURE WHEN FULLY OPEN.

12.4. VALVING TO BE ACCESSIBLE.

13. ACCESS PANELS

13.1. FURNISH AND INSTALL ZURN ZANB-1460 ACCESS PANELS (11" X 11"), WHERE APPLICABLE, FOR WALL CLEANOUTS AND VALVES CONCEALED WITHIN THE BUILDING STRUCTURE. WHERE FIRE RATED WALLS ARE ENCOUNTERED, CONTRACTOR SHALL FURNISH AND INSTALL ACCESS DOORS (12" X 12"). REFER TO MECHANICAL GENERAL REQUIREMENTS, DIVISION 23, ACCESS DOORS.

13.2. PLANS (SIMILAR TO SHOP DRAWINGS) SHOWING SIZE AND LOCATION OF ALL REQUIRED ACCESS PANELS AND/OR DOORS SHALL BE SUBMITTED TO THE ARCHITECT PRIOR TO INSTALLATION FOR REVIEW.

14. WATER PIPING

14.1. UNLESS NOTED OR INDICATED OTHERWISE, WATER PIPING SHALL BE TYPE "L" HARD COPPER WITH WROUGHT SOLDER FITTINGS. LEAD-FREE SOLDER SHALL BE USED THROUGHOUT.

14.2. HOT AND COLD WATER PIPING TO EXTEND THROUGH BUILDING AND TO CONNECT TO ALL FIXTURES.

14.3. EACH FIXTURE SHALL HAVE A STOP VALVE FOR ALL SUPPLIES.

14.4. ALL INTERIOR WATER PIPING SHALL BE PITCHED AND ROUTED SO COMPLETE DRAINAGE MAY BE OBTAINED. PROVIDE ACCESSIBLE HOSE END DRAIN VALVES WHERE REQUIRED TO DRAIN SYSTEM.

14.5. PIPE, FITTINGS, VALVES, AND FLANGES

14.5.1. ALL THREADS ON PIPE, FITTINGS, VALVES, FLANGES, AND SIMILAR APPURTENANCES SHALL CONFORM TO THE AMERICAN STANDARD FOR PIPE THREADS, ANSI B2.1 AND SHALL BE MADE UP WITH AN APPROVED THREAD COMPOUND OR LUBRICANT.

14.5.2. REQUIRED GASKETS SHALL BE MADE OF MATERIAL APPROVED FOR THE PRESSURE AND TEMPERATURE TO WHICH THEY ARE TO BE SUBJECTED. RUBBER SHALL NOT BE USED WHERE PRESSURE EXCEEDS 15 PSIG STEAM AND 125 PSIG WATER OR ON TEMPERATURE GREATER THAN 250 F.

14.5.3. FLANGES, SCREW TYPE, CAST IRON OR STEEL, OR OF THE FORGED INTEGRAL TYPE MAY BE USED TO THEIR WORKING PRESSURE AND TEMPERATURE RATINGS. ALL COMPANION FLANGES SHALL HAVE MATCHING FACING AND DRILLING.

14.5.4. ALL PIPE FITTINGS AND VALVES SHALL BE OF THE TYPE DESIGNED FOR THE PRESSURES AND TEMPERATURES OF THE INSTALLATION.

14.6. INSTALL ALL WATER PIPING PER MANUFACTURER'S RECOMMENDATIONS.

15. TESTING

15.1. WATER PIPING SHALL BE TESTED TO ONE HUNDRED FIFTY (150) POUND HYDROSTATIC PRESSURE AND MADE TIGHT. THE PRESSURE SHALL BE HELD FOR A MINIMUM OF THIRTY (30) MINUTES OR AS LONG AS REQUIRED TO PERMIT THE INSPECTION OF ALL JOINTS. TESTING SHALL COMPLY WITH ALL STATE/LOCAL CODES.

15.2. SOIL, WASTE AND VENT PIPING SHALL BE GIVEN A WATER TEST BEFORE FIXTURES ARE INSTALLED AND A SMOKE TEST AFTER THEY ARE INSTALLED. ALL TESTS SHALL MEET THE REQUIREMENTS OF THE LOCAL AND STATE HEALTH DEPARTMENTS.

15.3. BACKFLOW PREVENTION DEVICES AND VALVES SHALL BE TESTED PRIOR TO COMPLETION OF THE PROJECT. TEST REPORT SHALL BE GIVEN TO THE GENERAL CONTRACTOR AND ONE COPY INCLUDED IN OPERATION AND MAINTENANCE MANUALS. WHERE REQUIRED BY THE LOCAL WATER COMPANY OR HEALTH DEPARTMENT, THE PLUMBING CONTRACTOR SHALL FORWARD A COPY OF THE TEST REPORT TO THESE AGENCIES.

16. CLEANING AND FINISHING

16.1. AFTER ALL FIXTURES ARE INSTALLED AND BEFORE FINAL ACCEPTANCE OF WORK, THE CONTRACTOR SHALL GO OVER ALL FIXTURES, CLEANING UP AND POLISHING ALL METAL PARTS, CHECKING AND ADJUSTING ALL FITTINGS, FAUCETS, VALVES, ETC. CHECK OVER THE ENTIRE SYSTEM TO GUARANTEE THAT ALL VALVES, CONTROLS AND OTHER OPERATING PARTS ARE IN GOOD WORKING CONDITION.

16.2. CLEAN UP ALL RUBBISH CAUSED BY THE PLUMBING WORK AND REMOVE ALL RUBBISH, SURPLUS MATERIALS, ETC. FROM THE PREMISES.

17. INSULATION

17.1. THE FOLLOWING LINES AND MATERIAL SHALL BE INSULATED AS HEREIN SPECIFIED:

17.2. ALL HOT, COLD, TEMPERED, SUPPLY & RETURN LINES.

17.3. UNLESS SPECIFIED OTHERWISE IN THE INSULATION SCHEDULE, WATER PIPING SPECIFIED ABOVE SHALL BE COVERED WITH 1" THICK FIBERGLASS INSULATION WITH ALL SERVICE JACKET. ANY CONFLICTS SHALL REVERT TO MORE STRINGENT REQUIREMENT. ALL JOINTS TO BE SEALED AND TAPED IN A NEAT MANNER.

17.4. WHERE PIPE PENETRATIONS MEET FLOOR SLAB ABOVE, CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIAL REQUIRED TO MAKE AIR/WEATHER-TIGHT SEALS BETWEEN THE INSULATION AND THE SLAB. THIS INCLUDES FLEXIBLE FITTINGS, COLLARS, MECHANICAL FASTENERS/CLAMPS, ETC.

17.5. INSULATION MUST BE APPLIED BY A REPRESENTATIVE OF THE MANUFACTURER OR A CONTRACTOR REGULARLY ENGAGED IN THE APPLICATION OF INSULATION WITH A MINIMUM OF 5 YEARS OF EXPERIENCE ON PROJECTS OF SIMILAR SIZE.

17.6. INSULATION SHALL BE TESTED IN ACCORDANCE WITH ASTM E84, NFPA 255 AND UL 723. INSULATION SHALL NOT EXCEED 25 FLAME SPREAD OR 50 SMOKE DEVELOPED.

17.7. ALL PIPING SHALL BE TESTED AND FREE FROM LEAKS PRIOR TO APPLICATION OF INSULATION.

18. PAINTING

18.1. PAINT ALL UNFINISHED METAL AND PIPING EXPOSED TO WEATHER WITH TWO (2) COATS OF "RUST-O-LEUM" OR EQUAL RUST INHIBITIVE PAINT. COLOR TO BE SELECTED BY THE ARCHITECT.

19. IDENTIFICATION

19.1. GENERAL REQUIREMENTS FOR MANUFACTURED PIPE LABELS: PREPRINTED, COLOR-CODED, WITH LETTERING INDICATING SERVICE, AND SHOWING FLOW DIRECTION.

19.2. PIPE LABEL CONTENTS: INCLUDE IDENTIFICATION OF PIPING SERVICE USING SAME DESIGNATIONS OR ABBREVIATIONS AS USED ON DRAWINGS, PIPE SIZE, AND AN ARROW INDICATING FLOW DIRECTION.

19.2.1. FLOW-DIRECTION ARROWS: INTEGRAL WITH PIPING SYSTEM SERVICE LETTERING TO ACCOMMODATE BOTH DIRECTIONS OR AS SEPARATE UNIT ON EACH PIPE LABEL TO INDICATE FLOW DIRECTION.

19.2.2. LETTERING SIZE: AT LEAST 1-1/2 INCHES HIGH.

19.3. LOCATE PIPE LABELS WHERE PIPING IS EXPOSED OR ABOVE ACCESSIBLE CEILINGS IN FINISHED SPACES; MACHINE ROOMS; ACCESSIBLE MAINTENANCE SPACES SUCH AS SHAFTS, TUNNELS, AND PLENUMS; AND EXTERIOR EXPOSED LOCATIONS AS FOLLOWS:

19.3.1. NEAR EACH VALVE AND CONTROL DEVICE.

19.3.2. NEAR EACH BRANCH CONNECTION, EXCLUDING SHORT TAKEOFFS FOR FIXTURES AND TERMINAL UNITS. WHERE FLOW PATTERN IS NOT OBVIOUS, MARK EACH PIPE AT BRANCH.

19.3.3. NEAR PENETRATIONS THROUGH WALLS, FLOORS, CEILINGS, AND INACCESSIBLE ENCLOSURES.

19.3.4. NEAR MAJOR EQUIPMENT ITEMS AND OTHER POINTS OF ORIGINATION AND TERMINATION.

19.3.5. SPACED AT MAXIMUM INTERVALS OF 50 FEET ALONG EACH RUN. REDUCE INTERVALS TO 25 FEET IN AREAS OF CONGESTED PIPING AND EQUIPMENT. AND AT LEAST ONCE IN EVERY ROOM

19.3.6. AT LEAST ONCE IN EVERY ROOM/AREA.

19.4. PIPE LABEL COLOR SCHEDULE:

19.4.1. USE THE FOLLOWING PIPE LABEL COLOR SCHEDULE UNLESS OTHERWISE NOTED, OR THE OWNER HAS A FACILITY PIPE LABELING STANDARD IN WHICH CASE THAT STANDARD SHALL BE ADHERED TO:

19.4.2. DOMESTIC WATER PIPING: BACKGROUND COLOR: BLUE ; LETTER COLOR: WHITE

19.4.3. SANITARY WASTE DRAINAGE PIPING: BACKGROUND COLOR: BLACK ; LETTER COLOR: YELLOW

20. SOIL, WASTE, VENT AND SANITARY SEWER PIPING

20.1. SOIL, WASTE AND VENT PIPING INSIDE BUILDING SHALL BE PVC PIPE AND FITTINGS PER DEPARTMENT OF HEALTH STANDARDS.

20.2. FITTINGS AND CONNECTING METHODS SHALL BE AS STIPULATED BY PLUMBING CODE AND BUILDING CODE.

20.3. CONNECTIONS SHALL BE IN CONJUNCTION WITH STATE AND LOCAL PLUMBING CODE AND PIPE MANUFACTURER'S RECOMMENDATIONS.

20.4. UNLESS NOTED OR INDICATED OTHERWISE, HORIZONTAL PIPING SHALL BE PITCHED WITH A MINIMUM OF ONE EIGHTH INCH (1/8") PER FOOT. ALL BRANCHES SHALL BE MADE WITH "Y" BRANCH FITTINGS.

20.5. ALL FIXTURES REVENTED ACCORDING TO CODE.

20.6. ALL DRAINAGE AND VENT SYSTEM PIPING SHALL BE ROUTED IN PIPE SPACES, FURRED SPACES, CHASES, WALLS AND PARTITIONS, UNLESS OTHERWISE SHOWN OR PERMITTED.

20.7. VERTICAL STACKS SHALL BE FIRMLY SUPPORTED AT EACH FLOOR.

20.8. MATERIALS AND EQUIPMENT - ALL MATERIALS AND EQUIPMENT INSTALLED SHALL BE NEW AND FREE OF DEFECTS, AND SHALL BE THE PRODUCT OF REPUTABLE MANUFACTURERS AND SUBJECT TO APPROVAL OF THE ENGINEER AND ARCHITECT. WHERE ASTM REFERENCE IS MADE, USE THE LATEST STANDARD.

20.9. CAST IRON PIPE AND FITTINGS - SANITARY, STORM, AND OTHER DRAIN AND VENT LINES SHALL CONFORM TO ASTM DESIGNATION A74 AND CAST IRON SOIL PIPE INSTITUTE STANDARDS. PIPE AND FITTINGS SHALL BE COATED INSIDE AND OUT WITH ASPHALTUM OR COAL TAR PITCH AND SHALL BE SERVICE WEIGHT, AND HUBLESS OR HUB AND SPIGOT TYPE AS SPECIFIED HEREINAFTER.

21. GAS PIPING

21.1. ALL GAS PIPING SHALL BE STANDARD WEIGHT BLACK STEEL AND USING BLACK MALLEABLE IRON FITTINGS OR STANDARD WEIGHT STEEL WELD FITTINGS AND INSTALLED PER LOCAL GAS COMPANY REQUIREMENTS.

21.2. CONTRACTOR SHALL HAVE ON SITE ONE (1) COPY OF THE LOCAL UTILITY COMPANY'S "INSTALLATION AND INSPECTION MANUAL FOR CUSTOMER'S GAS PIPING" (LATEST EDITION) AND SHALL FOLLOW THE DIRECTIONS OF THE GAS UTILITY.

21.3. GAS PIPING INSIDE BUILDING TO BE WELDED CONSTRUCTION FOR TWO AND ONE-HALF INCHES (2-1/2") AND LARGER. SCREWED PIPE CARBON STEEL FOR TWO INCHES (2") AND SMALLER.

21.4. ALL GAS PIPING 1.0 PSI AND HIGHER SHALL BE WELDED WHERE BLACK STEEL IS INSTALLED.

21.5. FURNISH AND INSTALL GAS SHUTOFF VALVES WHERE SHOWN ON THE DRAWINGS AND AT EACH PIECE OF EQUIPMENT REQUIRING GAS SERVICE. ALSO, ALL NECESSARY VALVES AT GAS METER (ALONG WITH BYPASS, ETC.) AS REQUIRED BY THE GAS COMPANY.

21.6. GAS VALVES

21.6.1. ONE-HALF INCH TO ONE INCH (1/2" TO 1") - MCDONALD MODEL 525B.

21.6.2. ONE AND ONE-FOURTH INCHES TO TWO INCHES (1-1/4" TO 2") - MCDONALD MODEL 560 SERIES.

21.6.3. TWO AND ONE-HALF INCHES AND LARGER (2-1/2" AND LARGER) - POWELL MODEL 2201.

21.7. FINAL CONNECTION TO GAS-FIRED EQUIPMENT, INCLUDING HVAC EQUIPMENT SHALL BE BY THE PLUMBING CONTRACTOR.

21.8. A 6" LONG DIRT LEG AND GAS SHUT-OFF VALVE SHALL BE INSTALLED AT EACH GAS-FIRED APPLIANCE.

21.9. GAS PIPING SHALL BE TESTED AS REQUIRED BY THE LOCAL UTILITY COMPANY.

21.10. ALL GAS PIPING SHALL BE PAINTED TO MATCH EXISTING BUILDING STANDARDS. CONTRACTOR SHALL VISIT SITE TO DETERMINE EXISTING CONDITIONS.

21.11. INSTALL NATURAL GAS METER LOOP, BYPASS, FITTINGS, ETC. AS PER LOCAL GAS COMPANY REQUIREMENTS.

22. WALL, FLOOR AND CEILING PLATES

22.1. ALL PIPES THROUGH WALLS, FLOORS, AND CEILINGS, WITHIN THE BUILDING, SHALL BE FURNISHED WITH CHROME PLATED ESCUTCHEON PLATES. THIS SHALL INCLUDE ALL BRANCH CONNECTIONS TO FIXTURES AND EQUIPMENT. PLATES ON PIPING IN FINISHED AREAS INCLUDING PIPING BELOW COUNTER TOPS AND IN CABINET WORK SHALL BE ONE PIECE, BRASS CHROMIUM PLATED, OF THE PROPER SIZE TO FIT THE PIPE AND OF THE SIZE TO CONCEAL THE OPENING IN THE WALL.

23. FIELD QUALITY CONTROL|

23.1. TESTS SHALL BE CONDUCTED AT SUCH PLACES AND WITH TIMING TO PERMIT THE WORK TO PROCEED WITH AS LITTLE INTERRUPTION AS POSSIBLE. TESTS SHALL BE MADE BEFORE ANY OF THE WORK IS CONCEALED OR COVERED. ALL TESTING EQUIPMENT SHALL BE FURNISHED BY THE CONTRACTOR WHO SHALL CONDUCT THE TESTS IN THE PRESENCE OF THE ARCHITECT, ENGINEER OR GENERAL CONTRACTOR.

24. STERILIZATION

24.1. AFTER WATER PIPING HAS BEEN TESTED, ALL POTABLE WATER PIPING SHALL BE DISINFECTED BY A MIXTURE CONTAINING NOT LESS THAN 0.6 POUNDS OF HIGH-TEST CALCIUM HYPOCHLORITE, OR 2 POUNDS OF CHLORINATED LIME TO EACH 1000 GALLONS OF WATER TO PROVIDE NOT LESS THAN 50 PPM OF AVAILABLE CHLORINE. THE MIXTURE SHALL BE INJECTED INTO THE SYSTEM SHALL THEN BE DRAINED, FLUSHED WITH POTABLE WATER AND PLACED IN THE SERVICE. TWO OR MORE SAMPLES OF WATER WILL BE TAKEN BY THE MEDICAL DEPARTMENT OR LOCAL HEALTH DEPARTMENT FOR CHLOROFORM BACTERIA EXAMINATION. IF THE SAMPLES ARE POSITIVE, THE STERILIZATION SHALL BE REPEATED UNTIL WATER QUALITY IS SATISFACTORY.

25. AS-BUILT DRAWINGS

25.1. EACH CONTRACTOR SHALL MAINTAIN "AS-BUILT" DRAWINGS ON AN ONGOING MANNER DURING CONSTRUCTION. PROVIDE AND COORDINATE AS-BUILTS WITH GENERAL CONTRACTOR.

25.2. "AS-BUILT" DRAWINGS SHALL BE TURNED OVER TO THE GENERAL CONTRACTOR PRIOR TO FINAL PAYMENT.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004
CABLE BUILDING

STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022
SHEET NO: **P200**

PLUMBING SPECIFICATIONS

FOR CONSTRUCTION

PLUMBING COMMON WORK REQUIREMENTS

1. SUMMARY
THIS SECTION INCLUDES THE FOLLOWING:

1.1. PIPING MATERIALS AND INSTALLATION INSTRUCTIONS COMMON TO MOST PIPING SYSTEMS.
1.2. DIELECTRIC FITTINGS.
1.3. MECHANICAL SLEEVE SEALS.
1.4. SLEEVES.
1.5. ESCUTCHEONS.
1.6. GROUT.
1.7. EQUIPMENT INSTALLATION REQUIREMENTS COMMON TO EQUIPMENT SECTIONS.
1.8. CONCRETE BASES.
1.9. SUPPORTS AND ANCHORAGES.

2. DEFINITIONS

2.1. FINISHED SPACES: SPACES OTHER THAN PLUMBING AND ELECTRICAL EQUIPMENT ROOMS, FURRED SPACES, PIPE CHASES, UNHEATED SPACES IMMEDIATELY BELOW ROOF, SPACES ABOVE CEILINGS, UNEXCAVATED SPACES, CRAWLSPACES, AND TUNNELS.

2.2. EXPOSED, INTERIOR INSTALLATIONS: EXPOSED TO VIEW INDOORS. EXAMPLES INCLUDE FINISHED OCCUPIED SPACES AND PLUMBING EQUIPMENT ROOMS.

2.3. EXPOSED, EXTERIOR INSTALLATIONS: EXPOSED TO VIEW OUTDOORS OR SUBJECT TO OUTDOOR AMBIENT TEMPERATURES AND WEATHER CONDITIONS. EXAMPLES INCLUDE ROOFTOP LOCATIONS.

2.4. CONCEALED, INTERIOR INSTALLATIONS: CONCEALED FROM VIEW AND PROTECTED FROM PHYSICAL CONTACT BY BUILDING OCCUPANTS. EXAMPLES INCLUDE ABOVE CEILINGS AND IN CHASES.

2.5. CONCEALED, EXTERIOR INSTALLATIONS: CONCEALED FROM VIEW AND PROTECTED FROM WEATHER CONDITIONS AND PHYSICAL CONTACT BY BUILDING OCCUPANTS BUT SUBJECT TO OUTDOOR AMBIENT TEMPERATURES. EXAMPLES INCLUDE INSTALLATIONS WITHIN UNHEATED SHELTERS.

3. QUALITY ASSURANCE

3.1. STEEL SUPPORT WELDING: QUALIFY PROCESSES AND OPERATORS ACCORDING TO AWS D1.1, "STRUCTURAL WELDING CODE--STEEL."\

3.2. STEEL PIPE WELDING: QUALIFY PROCESSES AND OPERATORS ACCORDING TO ASME BOILER AND PRESSURE VESSEL CODE: SECTION IX, "WELDING AND BRAZING QUALIFICATIONS."

3.2.1. COMPLY WITH PROVISIONS IN ASME B31 SERIES, "CODE FOR PRESSURE PIPING."

3.2.2. CERTIFY THAT EACH WELDER HAS PASSED AWS QUALIFICATION TESTS FOR WELDING PROCESSES INVOLVED AND THAT CERTIFICATION IS CURRENT.

3.3. ELECTRICAL CHARACTERISTICS FOR PLUMBING EQUIPMENT: EQUIPMENT OF HIGHER ELECTRICAL CHARACTERISTICS MAY BE FURNISHED PROVIDED SUCH PROPOSED EQUIPMENT IS APPROVED IN WRITING AND CONNECTING ELECTRICAL SERVICES, CIRCUIT BREAKERS, AND CONDUIT SIZES ARE APPROPRIATELY MODIFIED. IF MINIMUM ENERGY RATINGS OR EFFICIENCIES ARE SPECIFIED, EQUIPMENT SHALL COMPLY WITH REQUIREMENTS.

4. PRODUCT DELIVERY, STORAGE AND HANDLING

4.1. DELIVER, STORE, AND HANDLE PRODUCTS USING MEANS AND METHODS THAT WILL PREVENT DAMAGE, DETERIORATION, AND LOSS, INCLUDING THEFT AND VANDALISM. COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.

4.2. DELIVERY AND HANDLING:

4.2.1. SCHEDULE DELIVERY TO MINIMIZE LONG-TERM STORAGE AT PROJECT SITE AND TO PREVENT OVERCROWDING OF CONSTRUCTION SPACES.

4.2.2. COORDINATE DELIVERY WITH INSTALLATION TIME TO ENSURE MINIMUM HOLDING TIME FOR ITEMS THAT ARE FLAMMABLE, HAZARDOUS, EASILY DAMAGED, OR SENSITIVE TO DETERIORATION, THEFT, AND OTHER LOSSES.

4.2.3. DELIVER PRODUCTS TO PROJECT SITE IN AN UNDAMAGED CONDITION IN MANUFACTURER'S ORIGINAL SEALED CONTAINER OR OTHER PACKAGING SYSTEM, COMPLETE WITH LABELS AND INSTRUCTIONS FOR HANDLING, STORING, UNPACKING, PROTECTING, AND INSTALLING.

4.2.4. INSPECT PRODUCTS ON DELIVERY TO DETERMINE COMPLIANCE WITH THE CONTRACT DOCUMENTS AND TO DETERMINE THAT PRODUCTS ARE UNDAMAGED AND PROPERLY PROTECTED.

5. STORAGE
5.1. STORE PRODUCTS TO ALLOW FOR INSPECTION AND MEASUREMENT OF QUANTITY OR COUNTING OF UNITS.

5.2. STORE MATERIALS IN A MANNER THAT WILL NOT ENDANGER PROJECT STRUCTURE.

5.3. STORE PRODUCTS THAT ARE SUBJECT TO DAMAGE BY THE ELEMENTS, UNDER COVER IN A WEATHER TIGHT ENCLOSURE ABOVE GROUND, WITH VENTILATION ADEQUATE TO PREVENT CONDENSATION.

5.4. PROTECT FOAM PLASTIC FROM EXPOSURE TO SUNLIGHT, EXCEPT TO EXTENT NECESSARY FOR PERIOD OF INSTALLATION AND CONCEALMENT.

5.4.1. COMPLY WITH PRODUCT MANUFACTURER'S WRITTEN INSTRUCTIONS FOR TEMPERATURE, HUMIDITY, VENTILATION, AND WEATHER-PROTECTION REQUIREMENTS FOR STORAGE.

5.4.2. PROTECT STORED PRODUCTS FROM DAMAGE AND LIQUIDS FROM FREEZING.

5.4.3. PROVIDE A SECURE LOCATION AND ENCLOSURE AT PROJECT SITE FOR STORAGE OF MATERIALS AND EQUIPMENT BY OWNER'S CONSTRUCTION FORCES. COORDINATE LOCATION WITH OWNER.

6. PRODUCTS

6.1. PIPE, TUBE, AND FITTINGS

6.1.1. REFER TO PIPING SECTIONS FOR PIPE, TUBE, AND FITTING MATERIALS AND JOINING METHODS.

6.1.2. PIPE THREADS: ASME B1.20.1 FOR FACTORY-THREADED PIPE AND PIPE FITTINGS.

6.2. JOINING MATERIALS

6.2.1. PIPE-FLANGE GASKET MATERIALS: ASME B16.21, NONMETALLIC, FLAT, ASBESTOS-FREE, 1/8-INCH MAXIMUM THICKNESS UNLESS THICKNESS OR SPECIFIC MATERIAL IS INDICATED.

6.2.2. PLASTIC, PIPE-FLANGE GASKET, BOLTS, AND NUTS: TYPE AND MATERIAL RECOMMENDED BY PIPING SYSTEM MANUFACTURER, UNLESS OTHERWISE INDICATED.

6.2.3. SOLDER FILLER METALS: ASTM B 32, LEAD-FREE ALLOYS. INCLUDE WATER-FLUSHABLE FLUX ACCORDING TO ASTM B 813.

6.2.4. WELDING FILLER METALS: COMPLY WITH AWS D10.12.

6.2.5. SOLVENT CEMENTS FOR JOINING PLASTIC PIPING:
6.2.5.1. CPVC PIPING: ASTM F 493.
6.2.5.2. PVC PIPING: ASTM D 2564. INCLUDE PRIMER ACCORDING TO ASTM F 656.

6.3. DIELECTRIC FITTINGS
6.3.1. DESCRIPTION: COMBINATION FITTING OF COPPER ALLOY AND FERROUS MATERIALS WITH THREADED, SOLDER-JOINT, PLAIN, OR WELD-NECK END CONNECTIONS THAT MATCH PIPING SYSTEM MATERIALS.

6.3.2. INSULATING MATERIAL: SUITABLE FOR SYSTEM FLUID, PRESSURE, AND TEMPERATURE.

6.3.3. DIELECTRIC UNIONS: FACTORY-FABRICATED, UNION ASSEMBLY, FOR 250-PSIG MINIMUM WORKING PRESSURE AT 180 DEG F.

6.3.4. DIELECTRIC FLANGES: FACTORY-FABRICATED, COMPANION-FLANGE ASSEMBLY, FOR 150- OR 300-PSIG MINIMUM WORKING PRESSURE AS REQUIRED TO SUIT SYSTEM PRESSURES.

6.3.5. DIELECTRIC COUPLINGS: GALVANIZED-STEEL COUPLING WITH INERT AND NONCORROSIVE, THERMOPLASTIC LINING; THREADED ENDS; AND 300-PSIG MINIMUM WORKING PRESSURE AT 225 DEG F.

6.3.6. DIELECTRIC NIPPLES: ELECTROPLATED STEEL NIPPLE WITH INERT AND NONCORROSIVE, THERMOPLASTIC LINING; PLAIN, THREADED, OR GROOVED ENDS; AND 300-PSIG MINIMUM WORKING PRESSURE AT 225 DEG F.

6.4. MECHANICAL SLEEVE SEALS
6.4.1. DESCRIPTION: MODULAR SEALING ELEMENT UNIT, DESIGNED FOR FIELD ASSEMBLY, TO FILL ANNULAR SPACE BETWEEN PIPE AND SLEEVE.

6.4.2. SEALING ELEMENTS: EPDM INTERLOCKING LINKS SHAPED TO FIT SURFACE OF PIPE. INCLUDE TYPE AND NUMBER REQUIRED FOR PIPE MATERIAL AND SIZE OF PIPE.

6.4.3. PRESSURE PLATES: CARBON STEEL. INCLUDE TWO FOR EACH SEALING ELEMENT.

6.4.4. CONNECTING BOLTS AND NUTS: CARBON STEEL WITH CORROSION-RESISTANT COATING OF LENGTH REQUIRED TO SECURE PRESSURE PLATES TO SEALING ELEMENTS. INCLUDE ONE FOR EACH SEALING ELEMENT.

6.5. SLEEVES

6.5.1. GALVANIZED-STEEL SHEET: 0.0239-INCH MINIMUM THICKNESS; ROUND TUBE CLOSED WITH WELDED LONGITUDINAL JOINT.

6.5.2. STEEL PIPE: ASTM A 53, TYPE E, GRADE B, SCHEDULE 40, GALVANIZED, PLAIN ENDS.

6.5.3. CAST IRON: CAST OR FABRICATED "WALL PIPE" EQUIVALENT TO DUCTILE-IRON PRESSURE PIPE, WITH PLAIN ENDS AND INTEGRAL WATERSTOP, UNLESS OTHERWISE INDICATED.

6.5.4. STACK SLEEVE FITTINGS: MANUFACTURED, CAST-IRON SLEEVE WITH INTEGRAL CLAMPING FLANGE. INCLUDE CLAMPING RING AND BOLTS AND NUTS FOR MEMBRANE FLASHING.

6.5.5. UNDERDECK CLAMP: CLAMPING RING WITH SET SCREWS.

6.6. GROUT

6.6.1. DESCRIPTION: ASTM C 1107, GRADE B, NONSHRINK AND NONMETALLIC, DRY HYDRAULIC-CEMENT GROUT.

6.6.1.1. CHARACTERISTICS: POST-HARDENING, VOLUME-ADJUSTING, NONSTAINING, NONCORROSIVE, NONGASEOUS, AND RECOMMENDED FOR INTERIOR AND EXTERIOR APPLICATIONS.

6.6.1.2. DESIGN MIX: 5000-PSI (34.5-MPA), 28-DAY COMPRESSIVE STRENGTH.

6.6.1.3. PACKAGING: PREMIXED AND FACTORY PACKAGED.

7. EXECUTION

7.1. PLUMBING DEMOLITION

7.1.1. PIPING TO BE ABANDONED IN PLACE: DRAIN PIPING AND CAP OR PLUG PIPING WITH SAME OR COMPATIBLE PIPING MATERIAL.

7.1.2. EQUIPMENT TO BE REMOVED AND SALVAGED: DISCONNECT AND CAP SERVICES AND REMOVE EQUIPMENT AND DELIVER TO OR DISPOSE OF AS DIRECTED BY OWNER.

7.1.3. PLUMBING FIXTURES: ALL PLUMBING FIXTURES INDICATED TO BE DEMOLISHED SHALL BE REMOVED COMPLETE. ALL FAUCETS, TRAPS, WASTE ARMS, CARRIERS AND ASSOCIATED TRIM SHALL BE REMOVED COMPLETE AND DISPOSED OF.

7.1.4. ROOF DRAINS, PIPE CURBS, PITCH POCKETS:ALL ROOF DRAINS, PIPE CURBS, PITCH POCKETS AND ETC. INDICATED TO BE DEMOLISHED SHALL BE REMOVED COMPLETE. ALL CUTTING AND PATCHING OF ROOF SHALL BE COORDINATED WITH ARCHITECT, G.C. AND ROOFING CONTRACTOR.

7.1.5. IF PIPE, INSULATION, OR EQUIPMENT TO REMAIN IS DAMAGED IN APPEARANCE OR IS UNSERVICEABLE, REMOVE DAMAGED OR UNSERVICEABLE PORTIONS AND REPLACE WITH NEW PRODUCTS OF EQUAL CAPACITY AND QUALITY.

8. PIPING SYSTEMS - COMMON REQUIREMENTS

8.1. INSTALL PIPING ACCORDING TO THE FOLLOWING REQUIREMENTS AND SECTIONS SPECIFYING PIPING SYSTEMS.

8.2. PIPING SHALL BE PAINTED AND IDENTIFIED IN ACCORDANCE WITH ANSI/ASME A13.1

8.3. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF PIPING SYSTEMS. INDICATED LOCATIONS AND ARRANGEMENTS WERE USED TO SIZE PIPE AND CALCULATE FRICTION LOSS, EXPANSION, PUMP SIZING, AND OTHER DESIGN CONSIDERATIONS. INSTALL PIPING AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON COORDINATION DRAWINGS.

8.4. INSTALL PIPING IN CONCEALED LOCATIONS, UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.

8.5. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.

8.6. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL.

8.7. INSTALL PIPING TO PERMIT VALVE SERVICING.

8.8. INSTALL PIPING AT INDICATED SLOPES.

8.9. INSTALL PIPING FREE OF SAGS AND BENDS.

8.10. INSTALL FITTINGS FOR CHANGES IN DIRECTION AND BRANCH CONNECTIONS.

8.11. INSTALL PIPING TO ALLOW APPLICATION OF INSULATION.

8.12. SELECT SYSTEM COMPONENTS WITH PRESSURE RATING EQUAL TO OR GREATER THAN SYSTEM OPERATING PRESSURE.

8.13. INSTALL ESCUTCHEONS FOR PENETRATIONS OF WALLS, CEILINGS, AND FLOORS.

8.14. INSTALL SLEEVES FOR PIPES PASSING THROUGH CONCRETE AND MASONRY WALLS, GYPSUM-BOARD PARTITIONS, AND CONCRETE FLOOR AND ROOF SLABS.

8.15. ABOVEGROUND, EXTERIOR-WALL PIPE PENETRATIONS: SEAL PENETRATIONS USING SLEEVES AND MECHANICAL SLEEVE SEALS. SELECT SLEEVE SIZE TO ALLOW FOR 1-INCH ANNULAR CLEAR SPACE BETWEEN PIPE AND SLEEVE FOR INSTALLING MECHANICAL SLEEVE SEALS.

8.15.1. INSTALL STEEL PIPE FOR SLEEVES SMALLER THAN 6 INCHES IN DIAMETER.

8.15.2. INSTALL CAST-IRON "WALL PIPES" FOR SLEEVES 6 INCHES AND LARGER IN DIAMETER.

8.15.3. MECHANICAL SLEEVE SEAL INSTALLATION: SELECT TYPE AND NUMBER OF SEALING ELEMENTS REQUIRED FOR PIPE MATERIAL AND SIZE. POSITION PIPE IN CENTER OF SLEEVE. ASSEMBLE MECHANICAL SLEEVE SEALS AND INSTALL IN ANNULAR SPACE BETWEEN PIPE AND SLEEVE. TIGHTEN BOLTS AGAINST PRESSURE PLATES THAT CAUSE SEALING ELEMENTS TO EXPAND AND MAKE WATERTIGHT SEAL.

8.16. UNDERGROUND, EXTERIOR-WALL PIPE PENETRATIONS: INSTALL CAST-IRON "WALL PIPES" FOR SLEEVES. SEAL PIPE PENETRATIONS USING MECHANICAL SLEEVE SEALS. SELECT SLEEVE SIZE TO ALLOW FOR 1-INCH ANNULAR CLEAR SPACE BETWEEN PIPE AND SLEEVE FOR INSTALLING MECHANICAL SLEEVE SEALS.

8.16.1. MECHANICAL SLEEVE SEAL INSTALLATION: SELECT TYPE AND NUMBER OF SEALING ELEMENTS REQUIRED FOR PIPE MATERIAL AND SIZE. POSITION PIPE IN CENTER OF SLEEVE. ASSEMBLE MECHANICAL SLEEVE SEALS AND INSTALL IN ANNULAR SPACE BETWEEN PIPE AND SLEEVE. TIGHTEN BOLTS AGAINST PRESSURE PLATES THAT CAUSE SEALING ELEMENTS TO EXPAND AND MAKE WATERTIGHT SEAL.

8.17. FIRE-BARRIER PENETRATIONS: MAINTAIN INDICATED FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT PIPE PENETRATIONS. SEAL PIPE PENETRATIONS WITH FIRESTOP MATERIALS.

8.18. VERIFY FINAL EQUIPMENT LOCATIONS FOR ROUGHING-IN.

8.19. REFER TO EQUIPMENT SPECIFICATIONS IN OTHER SECTIONS OF THESE SPECIFICATIONS FOR ROUGHING-IN REQUIREMENTS.

8.20. PIPING JOINT CONSTRUCTION
8.20.1. JOIN PIPE AND FITTINGS ACCORDING TO THE FOLLOWING REQUIREMENTS AND DIVISION 22 SECTIONS SPECIFYING PIPING SYSTEMS.

8.20.2. REAM ENDS OF PIPES AND TUBES AND REMOVE BURRS. BEVEL PLAIN ENDS OF STEEL PIPE.

8.20.3. REMOVE SCALE, SLAG, DIRT, AND DEBRIS FROM INSIDE AND OUTSIDE OF PIPE AND FITTINGS BEFORE ASSEMBLY.

8.20.4. SOLDERED JOINTS: APPLY ASTM B 813, WATER-FLUSHABLE FLUX, UNLESS OTHERWISE INDICATED, TO TUBE END. CONSTRUCT JOINTS ACCORDING TO ASTM B 828 OR CDA'S "COPPER TUBE HANDBOOK," USING LEAD-FREE SOLDER ALLOY COMPLYING WITH ASTM B 32.

8.20.5. THREADED JOINTS: THREAD PIPE WITH TAPERED PIPE THREADS ACCORDING TO ASME B1.20.1. CUT THREADS FULL AND CLEAN USING SHARP DIES. REAM THREADED PIPE ENDS TO REMOVE BURRS AND RESTORE FULL ID. JOIN PIPE FITTINGS AND VALVES AS FOLLOWS:

8.20.5.1. APPLY APPROPRIATE TAPE OR THREAD COMPOUND TO EXTERNAL PIPE THREADS UNLESS DRY SEAL THREADING IS SPECIFIED.

8.20.5.2. DAMAGED THREADS: DO NOT USE PIPE OR PIPE FITTINGS WITH THREADS THAT ARE CORRODED OR DAMAGED. DO NOT USE PIPE SECTIONS THAT HAVE CRACKED OR OPEN WELDS.

8.20.6. WELDED JOINTS: CONSTRUCT JOINTS ACCORDING TO AWS D10.12, USING QUALIFIED PROCESSES AND WELDING OPERATORS ACCORDING TO PART 1 "QUALITY ASSURANCE" ARTICLE.

8.20.7. FLANGED JOINTS: SELECT APPROPRIATE GASKET MATERIAL, SIZE, TYPE, AND THICKNESS FOR SERVICE APPLICATION. INSTALL GASKET CONCENTRICALLY POSITIONED. USE SUITABLE LUBRICANTS ON BOLT THREADS.

8.20.8. PLASTIC PIPING SOLVENT-CEMENT JOINTS: CLEAN AND DRY JOINING SURFACES. JOIN PIPE AND FITTINGS ACCORDING TO THE FOLLOWING:

8.20.8.1. COMPLY WITH ASTM F 402, FOR SAFE-HANDLING PRACTICE OF CLEANERS, PRIMERS, AND SOLVENT CEMENTS.

8.20.8.2. CPVC PIPING: JOIN ACCORDING TO ASTM D 2846/D 2846M APPENDIX.

8.20.9. PVC PRESSURE PIPING: JOIN SCHEDULE NUMBER ASTM D 1785, PVC PIPE AND PVC SOCKET FITTINGS ACCORDING TO ASTM D 2672. JOIN OTHER-THAN-SCHEDULE-NUMBER PVC PIPE AND SOCKET FITTINGS ACCORDING TO ASTM D 2855.

8.20.10. PVC NONPRESSURE PIPING: JOIN ACCORDING TO ASTM D 2855.

8.20.11. PLASTIC PRESSURE PIPING GASKETED JOINTS: JOIN ACCORDING TO ASTM D 3139.

8.20.12. PLASTIC NONPRESSURE PIPING GASKETED JOINTS: JOIN ACCORDING TO ASTM D 3212.

8.20.13. PE PIPING HEAT-FUSION JOINTS: CLEAN AND DRY JOINING SURFACES BY WIPING WITH CLEAN CLOTH OR PAPER TOWELS. JOIN ACCORDING TO ASTM D 2657.

8.20.13.1. PLAIN-END PIPE AND FITTINGS: USE BUTT FUSION.

8.20.13.2. PLAIN-END PIPE AND SOCKET FITTINGS: USE SOCKET FUSION.

8.21. PIPING CONNECTIONS

8.21.1. MAKE CONNECTIONS ACCORDING TO THE FOLLOWING, UNLESS OTHERWISE INDICATED:

8.21.1.1. INSTALL UNIONS, IN PIPING NPS 2 AND SMALLER, ADJACENT TO EACH VALVE AND AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT.

8.21.1.2. INSTALL FLANGES, IN PIPING NPS 2-1/2 AND LARGER, ADJACENT TO FLANGED VALVES AND AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT.

8.21.2. DRY PIPING SYSTEMS: INSTALL DIELECTRIC UNIONS AND FLANGES TO CONNECT PIPING MATERIALS OF DISSIMILAR METALS.

8.21.3. WET PIPING SYSTEMS: INSTALL DIELECTRIC COUPLING AND NIPPLE FITTINGS TO CONNECT PIPING MATERIALS OF DISSIMILAR METALS.

8.22. EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

8.22.1. INSTALL EQUIPMENT TO ALLOW MAXIMUM POSSIBLE HEADROOM UNLESS SPECIFIC MOUNTING HEIGHTS ARE NOT INDICATED.

8.22.2. INSTALL EQUIPMENT LEVEL AND PLUMB, PARALLEL AND PERPENDICULAR TO OTHER BUILDING SYSTEMS AND COMPONENTS IN EXPOSED INTERIOR SPACES, UNLESS OTHERWISE INDICATED.

8.22.3. INSTALL PLUMBING EQUIPMENT TO FACILITATE SERVICE, MAINTENANCE, AND REPAIR OR REPLACEMENT OF COMPONENTS. CONNECT EQUIPMENT FOR EASE OF DISCONNECTING, WITH MINIMUM INTERFERENCE TO OTHER INSTALLATIONS. EXTEND GREASE FITTINGS TO ACCESSIBLE LOCATIONS.

8.22.4. INSTALL EQUIPMENT TO ALLOW RIGHT OF WAY FOR PIPING INSTALLED AT REQUIRED SLOPE.

8.23. CONCRETE BASES

8.23.1. CONCRETE BASES: ANCHOR EQUIPMENT TO CONCRETE BASE ACCORDING TO EQUIPMENT MANUFACTURER'S WRITTEN INSTRUCTIONS AND ACCORDING TO SEISMIC CODES AT PROJECT.

8.23.1.1. CONSTRUCT CONCRETE BASES OF DIMENSIONS INDICATED, BUT NOT LESS THAN 4 INCHES LARGER IN BOTH DIRECTIONS THAN SUPPORTED UNIT.

8.23.1.2. INSTALL DOWEL RODS TO CONNECT CONCRETE BASE TO CONCRETE FLOOR. UNLESS OTHERWISE INDICATED, INSTALL DOWEL RODS ON 18-INCH CENTERS AROUND THE FULL PERIMETER OF THE BASE.

8.23.2. INSTALL EPOXY-COATED ANCHOR BOLTS FOR SUPPORTED EQUIPMENT THAT EXTEND THROUGH CONCRETE BASE, AND ANCHOR INTO STRUCTURAL CONCRETE FLOOR.

8.23.3. PLACE AND SECURE ANCHORAGE DEVICES. USE SUPPORTED EQUIPMENT MANUFACTURER'S SETTING DRAWINGS, TEMPLATES, DIAGRAMS, INSTRUCTIONS, AND DIRECTIONS FURNISHED WITH ITEMS TO BE EMBEDDED.

8.23.4. INSTALL ANCHOR BOLTS TO ELEVATIONS REQUIRED FOR PROPER ATTACHMENT TO SUPPORTED EQUIPMENT.

8.23.5. INSTALL ANCHOR BOLTS ACCORDING TO ANCHOR-BOLT MANUFACTURER'S WRITTEN INSTRUCTIONS.

8.23.6. USE 3000-PSI, 28-DAY COMPRESSIVE-STRENGTH CONCRETE AND REINFORCEMENT AS SPECIFIED IN DIVISION 03 SECTION "CAST-IN-PLACE CONCRETE."

8.24. ERECTION OF METAL SUPPORTS AND ANCHORAGES

8.24.1. CUT, FIT, AND PLACE MISCELLANEOUS METAL SUPPORTS ACCURATELY IN LOCATION, ALIGNMENT, AND ELEVATION TO SUPPORT AND ANCHOR PLUMBING MATERIALS AND EQUIPMENT.

8.24.2. FIELD WELDING: COMPLY WITH AWS D1.1.

8.25. ERECTION OF WOOD SUPPORTS AND ANCHORAGES
8.25.1. CUT, FIT, AND PLACE WOOD GROUNDS, NAILERS, BLOCKING, AND ANCHORAGES TO SUPPORT, AND ANCHOR PLUMBING MATERIALS AND EQUIPMENT.

8.25.2. SELECT FASTENER SIZES THAT WILL NOT PENETRATE MEMBERS IF OPPOSITE SIDE WILL BE EXPOSED TO VIEW OR WILL RECEIVE FINISH MATERIALS. TIGHTEN CONNECTIONS BETWEEN MEMBERS. INSTALL FASTENERS WITHOUT SPLITTING WOOD MEMBERS.

8.25.3. ATTACH TO SUBSTRATES AS REQUIRED TO SUPPORT APPLIED LOADS.

8.26. GROUTING

8.26.1. MIX AND INSTALL GROUT FOR PLUMBING EQUIPMENT BASE BEARING SURFACES, PUMP AND OTHER EQUIPMENT BASE PLATES, AND ANCHORS.

8.26.2. CLEAN SURFACES THAT WILL COME INTO CONTACT WITH GROUT.

8.26.3. PROVIDE FORMS AS REQUIRED FOR PLACEMENT OF GROUT.

8.26.4. AVOID AIR ENTRAPMENT DURING PLACEMENT OF GROUT.

8.26.5. PLACE GROUT, COMPLETELY FILLING EQUIPMENT BASES.

8.26.6. PLACE GROUT ON CONCRETE BASES AND PROVIDE SMOOTH BEARING SURFACE FOR EQUIPMENT.

8.26.7. PLACE GROUT AROUND ANCHORS.

SEWAGE INTERCEPTORS

PART 1 -

1.1 DESCRIPTION

A. THIS SECTION PERTAINS TO CONCRETE, POLYETHYLENE, AND METAL SANITARY WASTE INTERCEPTORS USED FOR THE REMOVAL OF OIL, GREASE AND SEDIMENT FROM WASTE STREAMS FOR INSTALLATIONS WITHIN THE BUILDING ENVELOPE.

1.2 SUBMITTALS

A. SUBMITTALS, INCLUDING NUMBER OF REQUIRED COPIES, SHALL BE SUBMITTED TO OWNER/ENGINEER.
B. MANUFACTURER'S LITERATURE AND DATA INCLUDING: FOR EACH TYPE OF INTERCEPTOR INDICATED, THE SUBMITTAL SHALL INCLUDE MATERIALS OF FABRICATION, DIMENSIONS, RATED CAPACITIES, RETENTION CAPACITIES, OPERATING CHARACTERISTICS, SIZE AND LOCATION OF EACH PIPE CONNECTION, FURNISHED SPECIALTIES, AND ACCESSORIES.
C. DETAILED SHOP DRAWING OF CLAMPING DEVICE AND EXTENSIONS WHEN REQUIRED IN CONNECTION WITH THE WATERPROOFING MEMBRANE OR THE FLOOR DRAIN SHALL BE SUBMITTED.
D. COMPLETE OPERATING AND MAINTENANCE MANUALS INCLUDING WIRING DIAGRAMS, TECHNICAL DATA SHEETS, INFORMATION FOR ORDERING REPLACEABLE PARTS, AND TROUBLESHOOTING GUIDE:
1. INCLUDE COMPLETE LIST INDICATING ALL COMPONENTS OF THE SYSTEMS.
2. INCLUDE COMPLETE DIAGRAMS OF THE INTERNAL WIRING FOR EACH ITEM OF EQUIPMENT.
3. DIAGRAMS SHALL HAVE THEIR TERMINALS IDENTIFIED TO FACILITATE INSTALLATION, OPERATION AND MAINTENANCE.

PART 2 - PRODUCTS

2.1 GREASE INTERCEPTOR

A. PRECAST CONCRETE GREASE INTERCEPTORS: COMPLY WITH ASTM C913.
1. INCLUDE RUBBER_GASKETED JOINTS, VENT CONNECTIONS, MANHOLES, COMPARTMENTS OR BAFFLES, AND PIPING OR OPENINGS TO RETAIN GREASE AND TO PERMIT WASTEWATER FLOW.
2. STRUCTURAL DESIGN LOADS:
a. LIGHT-TRAFFIC LOAD: COMPLY WITH ASTM C890, A-8.
b. MEDIUM-TRAFFIC LOAD: COMPLY WITH ASTM C890, A-12.
c. HEAVY-TRAFFIC LOAD: COMPLY WITH ASTM C890, A-16.
d. WALKWAY LOAD: COMPLY WITH ASTM C890, A-03.
3. RESILIENT PIPE CONNECTORS: ASTM C923 (ASTM C923M), CAST OR FITTED INTO INTERCEPTOR WALLS, FOR EACH PIPE CONNECTION.
4. STEPS: INDIVIDUAL FRP STEPS, FRP LADDER, OR ASTM A615/A615M, DEFORMED, 13 MM (1/2 INCH) STEEL REINFORCING RODS, WIDE ENOUGH TO ALLOW WORKER TO PLACE BOTH FEET ON ONE STEP AND DESIGNED TO PREVENT LATERAL SLIPPAGE OFF STEP. CAST OR ANCHOR STEPS INTO SIDEWALLS AT 305 TO 406 MM (12 TO 16 INCH) INTERVALS. OMIT STEPS IF TOTAL DEPTH FROM FLOOR OF INTERCEPTOR TO FINISHED GRADE IS LESS THAN 1524 MM (60 INCHES).
5. GRADE RINGS: REINFORCED_CONCRETE RINGS, 152 TO 228 MM (6 TO 9 INCHES) TOTAL THICKNESS, TO MATCH DIAMETER OF MANHOLE FRAME AND COVER.
6. MANHOLE FRAMES AND COVERS: FERROUS; 610 MM (24 INCH) ID BY 178 TO 228 MM (7 TO 9 INCH) RISER WITH 100 MM (4 INCH) MINIMUM WIDTH FLANGE AND 660 MM (26 INCH) DIAMETER COVER.
a. DUCTILE IRON: ASTM A536, GRADE 60_40_18, UNLESS OTHERWISE INDICATED.
b. GRAY IRON: ASTM A48/A48M, CLASS 35, UNLESS OTHERWISE INDICATED.
c. INCLUDE INDENTED TOP DESIGN WITH LETTERING CAST INTO COVER, USING WORDING EQUIVALENT TO "GREASE INTERCEPTOR."

B. CAST_IRON OR STEEL GREASE INTERCEPTORS:
1. STANDARD: ASME A112.14.3 AND PDI_G101, FOR INTERCEPTING AND RETAINING FATS, OILS, AND GREASES FROM FOOD_PREPARATION OR PROCESSING WASTEWATER.
2. PLUMBING AND DRAINAGE INSTITUTE SEAL: REQUIRED.
3. BODY MATERIAL: CAST_IRON OR STEEL.
4. INTERIOR LINING: CORROSION_RESISTANT ENAMEL.
5. EXTERIOR COATING: CORROSION_RESISTANT ENAMEL.
6. BODY EXTENSION: AS REQUIRED.

C. PLASTIC GREASE INTERCEPTORS:
1. STANDARD: ASME A112.14.3 AND PDI_G101, FOR INTERCEPTING AND RETAINING FATS, OILS, AND GREASES FROM FOOD_PREPARATION OR PROCESSING WASTEWATER.
2. PLUMBING AND DRAINAGE INSTITUTE SEAL: REQUIRED.
3. BODY MATERIAL: PLASTIC.
4. BODY EXTENSION: AS REQUIRED.

2.2 GREASE/OIL REMOVAL UNIT

A. GREASE/OIL REMOVAL UNIT SHALL COMPLY WITH PDI_G101 AND ASME A112.14.3.
B. THE GREASE/OIL REMOVAL UNIT SHALL BE WELDED STAINLESS_STEEL, AUTOMATIC SELF_CLEANING INTERCEPTOR WITH A ROTATING GEAR WHEEL ASSEMBLY FOR AUTOMATIC GREASE/OIL REMOVAL.
C. THE GREASE/OIL REMOVAL UNIT SHALL HAVE A FLOW CONTROL DEVICE.
D. THE GREASE/OIL REMOVAL UNIT SHALL HAVE QUICK RELEASE, STAINLESS_STEEL LID CLAMPS, A GASKETED AND FULLY REMOVABLE STAINLESS_STEEL LID, A SEPARATE GREASE/OIL COLLECTION CONTAINER AND AN INTERNAL
E. STAINLESS_STEEL STRAINER BASKET FOR COLLECTION OF SOLIDS AND SEDIMENT.
F. GREASE/OIL COLLECTION CONTAINER SHALL BE CONSTRUCTED OF CORROSIVE RESISTANT MATERIALS, WITH LID, AND MINIMUM 55 GALLONS)GALLONS) CAPACITY.

2.3 SAND AND SOLID INTERCEPTOR

A. PROVIDE SAND AND SOLID INTERCEPTOR TO INTERCEPT AND COLLECT SAND, GRIT, AND/OR SEDIMENT IN A WASTEWATER FLOW TO PREVENT ENTRY INTO THE SANITARY SEWER SYSTEM. FACTORY_FABRICATED, POLYETHYLENE OR STEEL BODY AND CAST_IRON OR STEEL INLET GRATE; WITH SETTLEMENT CHAMBER AND REMOVABLE BASKET OR STRAINER. OUTLET PIPING CONNECTION TO BE HUB, HUBLESS OR THREADED, UNLESS OTHERWISE INDICATED.

2.4 OIL INTERCEPTOR

A. PROVIDE OIL INTERCEPTOR TO INTERCEPT AND COLLECT FREE OIL IN A WASTEWATER FLOW TO PREVENT ENTRY INTO THE SANITARY SEWER SYSTEM. FACTORY_FABRICATED, DOUBLE WALL POLYETHYLENE OR STEEL BODY AND CAST_IRON OR STEEL GASKETED LID; WITH SETTLEMENT CHAMBER AND REMOVABLE BASKET OR STRAINER; VENTS; AND FLOW_CONTROL FITTING ON INLET. OUTLET PIPING CONNECTION TO BE HUB, HUBLESS OR THREADED, UNLESS OTHERWISE INDICATED.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INTERCEPTORS AND GREASE/OIL REMOVAL UNITS SHALL BE SET LEVEL AND PLUMB.
B. INSTALL INTERCEPTOR AND GREASE/OIL REMOVAL UNIT, INCLUDING TRAPPING, VENTING, AND FLOW_CONTROL FITTINGS ACCORDING TO THE MANUFACTURE'S INSTALLATION INSTRUCTIONS AND WITH RECOMMENDED SERVICE CLEARANCES.
C. INSTALL INTERCEPTOR AND GREASE/OIL REMOVAL UNIT WITH CLEANOUT IMMEDIATELY DOWNSTREAM FROM UNIT THAT DO NOT HAVE INTEGRAL CLEANOUT ON THE UNIT.
D. INTERCEPTOR AND GREASE/OIL REMOVAL UNIT COVERS SHALL BE SET FLUSH WITH FINISHED SURFACE IN PAVEMENTS AND THE TOPS SHALL BE TRAFFIC_RATED. SET TOPS 3 INCHES ABOVE FINISHED SURFACE ELSEWHERE UNLESS OTHERWISE INDICATED.
E. IF AN INSTALLATION IS UNSATISFACTORY TO THE OWNER, THE CONTRACTOR SHALL CORRECT THE INSTALLATION AT NO COST OR TIME TO THE OWNER.

3.2 CONNECTIONS

A. PIPING CONNECTIONS SHALL BE MADE BETWEEN INTERCEPTOR/GREASE/OIL REMOVAL UNITS AND PIPING SYSTEMS IN ACCORDANCE WITH MANUFACTURER'S WRITTEN GUIDELINES.

3.3 WARNING TAPE

A. WARNING TAPE SHALL BE PLACED OVER FERROUS PIPING.
B. DETECTABLE WARNING TAPE SHALL BE USED OVER NONFERROUS PIPE AND OVER THE EDGES OF UNDERGROUND STRUCTURES.

3.4 STARTUP AND TESTING

A. PERFORM TESTS AS RECOMMENDED BY PRODUCT MANUFACTURER AND LISTED STANDARDS AND UNDER ACTUAL OR SIMULATED OPERATING CONDITIONS AND PROVE FULL COMPLIANCE WITH DESIGN AND SPECIFIED REQUIREMENTS. TESTS OF THE VARIOUS ITEMS OF EQUIPMENT SHALL BE PERFORMED SIMULTANEOUSLY WITH THE SYSTEM OF WHICH EACH ITEM IS AN INTEGRAL PART.
B. THE TESTS SHALL INCLUDE SYSTEM CAPACITY, CONTROL FUNCTION, AND ALARM FUNCTIONS.
C. WHEN ANY DEFECTS ARE DETECTED, CORRECT DEFECTS AND REPEAT TEST AT NO ADDITIONAL COST OR TIME TO THE OWNER.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004
CABLE BUILDING

STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO.	2021-32
DB:	
CB:	
DATE:	02/03/2022
SHEET NO:	**P201**

PLUMBING SPECIFICATIONS

FOR CONSTRUCTION

PLUMBING GENERAL REQUIREMENTS

1. GENERAL

1.1. THE FRONT END REQUIREMENTS, BID REQUIREMENTS AND BID FORM DOCUMENTS AND ALL OTHER CONTRACT DOCUMENTS APPLY TO THESE BRANCHES OF THE WORK, AS DO ALL OTHER SECTIONS OF THE SPECIFICATIONS.

1.2. EACH SUB-CONTRACTOR SHALL BE GOVERNED BY ANY ALTERNATES AND UNIT PRICES CALL FOR IN THE "FORM OF PROPOSAL" INSOFAR AS THEY AFFECT HIS PART OF THE WORK.

1.3. THIS SECTION APPLIES EQUALLY TO HEATING, VENTILATION, AIR CONDITIONING, PLUMBING AND ELECTRICAL.

1.4. THE OWNER WILL RETAIN OCCUPANCY AND USE OF ADJACENT SPACES IN THE COURSE OF THE WORK. CONTRACTORS WILL WORK TO MINIMIZE ANY IMPACT ON THE OWNER'S ONGOING ACTIVITIES. INTERRUPTIONS TO UTILITIES WILL NEED TO BE COORDINATED IN ADVANCE WITH G.C. AND OWNER.

2. SCOPE

2.1. THE WORK COVERED BY THIS DIVISION OF THE SPECIFICATIONS CONSISTS OF FURNISHING ALL MATERIALS, LABOR, EQUIPMENT, INCIDENTALS, AND PERFORMING ALL OPERATIONS REQUIRED FOR A COMPLETE INSTALLATION OF ALL PLUMBING SYSTEMS IN ACCORDANCE WITH THE APPLICABLE DRAWINGS AND SPECIFICATIONS.

3. INTENT

3.1. THIS CONTRACTOR SHALL FURNISH ALL EQUIPMENT, MATERIAL AND LABOR MENTIONED IN THIS SPECIFICATION OR ON THE DRAWINGS, UNLESS IT IS SPECIFICALLY STATED OTHERWISE.

3.2. THIS CONTRACTOR SHALL FURNISH AND INSTALL ALL MISCELLANEOUS EQUIPMENT, MATERIAL AND LABOR WHICH (THOUGH NOT SPECIFICALLY CALLED FOR IN THE CONTRACT DOCUMENTS) IS NECESSARY FOR A COMPLETE AND SATISFACTORILY OPERATING INSTALLATION. THIS CONTRACTOR SHALL LEAVE HIS WORK IN OPERATING CONDITION.

4. DRAWINGS AND SPECIFICATIONS

4.1. FOR PURPOSES OF CLARIFY AND LEGIBILITY, THE DRAWINGS ARE NECESSARILY DIAGRAMMATIC. ALTHOUGH SIZE AND LOCATION OF THE EQUIPMENT IS DRAWN TO SCALE WHEREVER POSSIBLE, CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING ALL SERVICE CLEARANCES, MAINTENANCE ACCESSES, SERVICEABILITY, ETC. IS MAINTAINED.

4.2. THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO COVER ALL WORK ENUMERATED UNDER THE RESPECTIVE HEADINGS. THE SUB-CONTRACTORS SHALL NOT TAKE ADVANTAGE OF CONFLICT OR ERROR BETWEEN THE DRAWINGS AND SPECIFICATIONS, BUT SHALL REQUEST A CLARIFICATION OF SUCH BEFORE MAKING HIS PROPOSAL SHOULD THIS CONDITION EXIST. FAILURE TO ISSUE THIS REQUEST FOR CLARIFICATION SHALL BE GROUNDS FOR DISMISSAL FOR ANY AND ALL CLAIMS ON THE PART OF THE CONTRACTOR RELATED TO THE ITEMS IN QUESTION.

4.3. IT IS ESPECIALLY REQUIRED THAT THE PLUMBING, MECHANICAL AND ELECTRICAL SUB-CONTRACTORS SHALL OBTAIN A SET OF THE ARCHITECTURAL, STRUCTURAL, AND ANY OTHER TRADES' DRAWINGS AND SPECIFICATIONS, AND CONSULT WITH THE ARCHITECT AND GENERAL CONTRACTOR AS TO THE GENERAL CONSTRUCTION OF THE BUILDING. THIS INCLUDES, BUT IS NOT LIMITED TO: LOCATION OF PLUMBING FIXTURE; SIZE/LOCATION/HEAD ROOM OF PIPE CHASES; LOCATION OF WALLS, PARTITIONS, BEAMS, ETC. ; SWING OF DOORS; LOCATION AND MOUNTING HEIGHT OF SWITCHES AND RECEPTACLES; AND THE ORDER AND TIME OF PLACEMENT OF ALL MECHANICAL WORK.

4.4. THE DRAWINGS ACCOMPANYING THESE SPECIFICATIONS DETERMINE THE GENERAL DESIGN OF THE EQUIPMENT. EXACT DISPOSITION OF THE EQUIPMENT IS SUBJECT TO THE REQUIREMENTS AND CONSTRUCTION OF THE MANUFACTURER'S STANDARD, BUT THE SPACE OCCUPIED AND GENERAL DESIGN SHALL CORRESPOND TO THAT SHOWN ON THE PLANS.

4.5. NO CONTRACTOR SHALL, UNDER ANY CIRCUMSTANCES, SCALE DRAWINGS FOR THE LOCATION OF EQUIPMENT AND WORK.

4.6. THE DRAWINGS INDICATE SIZE AND POINTS OF TERMINATION OF PIPES, AND SUGGEST PROPER ROUTING TO CONFORM TO STRUCTURE, AVOID OBSTRUCTIONS AND PRESERVE CLEARANCES, BUT IT IS NOT THE INTENTION OF THE DRAWINGS TO INDICATE ALL NECESSARY OFFSETS. INSTALL WORK IN A MANNER THAT CONFORMS TO STRUCTURE, AVOIDS OBSTRUCTIONS, PRESERVES CLEAR SPACE ABOVE CEILINGS, AND KEEPS OPENINGS AND PASSAGEWAYS CLEAR WITHOUT FURTHER INSTRUCTIONS OR COST TO THE OWNER.

4.7. IT IS INTENDED THAT MATERIALS SHALL BE LOCATED SYMMETRICALLY WITH ALL ARCHITECTURAL ELEMENTS, ALTHOUGH THE LOCATIONS INDICATED ON THE DRAWINGS MAY BE DISTORTED FOR CLEARNESS OR LEGIBILITY.

5. GENERAL FOR ALL PLUMBING INSTALLATIONS

5.1. THE DRAWINGS PERTAINING TO THE INSTALLATION S AND SERVICES GENERALLY INDICATE THE LOCATION OF ACCESSORIES, PIPING, UNDERGROUND WORK, PLUMBING FIXTURES, DITCHES, ETC. AND OTHER DETAILS NECESSARY TO COMPLETE THE INSTALLATION OF EACH TRADE'S WORK. BIDDERS ARE URGED TO ACQUAINT THEMSELVES WORKING CONDITIONS, LIMITATIONS AND REQUIREMENTS AT THE BUILDING SITE AS ANY AND ALL CONTRACTS FOR THIS WORK WILL BE BASED UPON FURNISHING ALL LABOR AND MATERIALS REQUIRED TO ENTIRELY COMPLETE EACH INSTALLATION READY FOR USE.

5.2. EACH CONTRACTOR IS URGED, BEFORE SUBMITTING A PROPOSAL, TO VERIFY THE SIZE AND LOCATION OF ALL SERVICES AND THE LIMITATIONS OF SAME.

6. SITE VISIT

6.1. EACH CONTRACTOR SHALL (BEFORE SUBMITTING A PROPOSAL) VISIT AND EXAMINE THE SITE TO SATISFY HIMSELF AS TO THE MATERIALS AND SCOPE OF CONSTRUCTION, ALTERATIONS AND REMODELING, ANY DIFFICULTY ATTENDING TO THE PERFORMANCE OF THE WORK, STORAGE OF MATERIAL, ACCESS TO ANY AND ALL AREAS, ETC.

6.2. THE SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE. CLAIMS MADE SUBSEQUENT TO THE TIME OF SUBMISSION OF THE PROPOSAL FOR LABOR, EQUIPMENT AND MATERIAL REQUIRED FOR DIFFICULTIES ENCOUNTERED (WHICH COULD HAVE BEEN FORESEEN HAD A THOROUGH SITE EXAMINATION BEEN MADE) WILL NOT BE RECOGNIZED AS VALID. ANY AND ALL WORK ASSOCIATED WITH THOSE CLAIMS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.

7. MATERIALS, EQUIPMENT AND WORKMANSHIP

7.1. MATERIALS AND EQUIPMENT USED THROUGHOUT SHALL BE NEW AND THE BEST OF THE RESPECTIVE KINDS. NO SUBSTITUTIONS (OTHER THAN EXPLICITLY SPECIFIED) SHALL BE USED UNLESS APPROVED BY THE ARCHITECT/ENGINEER. ALL WORK SHALL BE EXECUTED IN A TIMELY MANNER, AND SHALL BE CONSISTENT WITH SAFETY REQUIREMENTS AND GOOD WORKMANSHIP.

7.2. COMPETENT WORKMEN SHALL BE EMPLOYED ON ALL PHASES OF THE WORK. POOR WORKMANSHIP WILL BE REJECTED AND WILL CONSTITUTE CAUSE FOR REMOVAL OF THE INDIVIDUAL PERFORMING THE WORK.

7.3. SHOULD ANY DISPUTE ARISE AS TO THE QUALITY OR FITNESS OF MATERIALS, EQUIPMENT OR WORKMANSHIP, THE DECISION RESTS STRICTLY WITH THE ARCHITECT, OWNER AND ENGINEER(S) OF RECORD.

8. SHOP DRAWINGS AND LIST OF MATERIALS

8.1. EACH SUB-CONTRACTOR SHALL SUBMIT TO THE GENERAL CONTRACTOR FOR APPROVAL WITHIN THIRTY (30) DAYS AFTER THE DATE OF THIS CONTRACT, SIX (6) SETS OF COMPLETE CATALOG DATA AND/OR SHOP DRAWINGS FOR EACH ITEM OF MATERIAL OR PIECE OF EQUIPMENT. CATALOG DATA SHALL INCLUDE NAME OF THE MANUFACTURER, CATALOG NUMBERS, TRADE NAMES, PERFORMANCE DATA, DESCRIPTIVE MATERIAL (SUFFICIENT TO IDENTIFY EACH ITEM), AND SPECIFY PERFORMANCE OF THE PRODUCTS SUBMITTED. SHOP DRAWINGS SHALL INCLUDE SPECIFIED CATALOG DATA AND SHALL SHOW EQUIPMENT IN DETAIL, ARRANGEMENT AND DISPOSITION FOR THIS PARTICULAR PROJECT DESIGN.

8.2. THE ARCHITECTS AND/OR ENGINEERS REVIEW AND APPROVAL OF THE (SUB)CONTRACTORS' DRAWINGS OR EQUIPMENT DETAILS DOES NOT RELIEVE THE (SUB)CONTRACTORS FROM RESPONSIBILITY FOR ERRORS, OMISSIONS OR EQUIPMENT FURNISHED IN ACCORDANCE WITH SUCH CHECKED OR APPROVED DRAWINGS. WHERE SUCH ERRORS OR OMISSIONS ARE LATER DISCOVERED, THEY SHALL BE MADE GOOD BY THE RESPECTIVE SUB-CONTRACTOR, IRRESPECTIVE OR ANY APPROVAL BY THE ARCHITECT. THIS WORK SHALL BE PERFORMED AT NO ADDITIONAL COST TO THE OWNER.

9. WORKING SPACE

9.1. IN THE INSTALLATION FOR IN THESE CONTRACTS, SPECIAL ATTENTION SHALL BE GIVEN TO THE ACCESSIBILITY OF THE PARTS AND EQUIPMENT. ADEQUATE SPACE MUST BE PROVIDED FOR OPERATION AND REMOVAL OF ANY PARTS THAT MAY HAVE TO BE EXAMINED, SERVICED, REPLACED IN THE FUTURE.

10. CONCEALED WORK

10.1. NO WORK OF ANY KIND SHALL BE COVERED UP OR CONCEALED BEFORE IT HAS BEEN TESTED, EXAMINED AND APPROVED.

10.2. ALL PLUMBING INSTALLATIONS SHALL BE INSPECTED BY THE PROPER ADMINISTRATIVE AUTHORITY TO ENSURE COMPLIANCE WITH THE REQUIREMENTS OF THE STATE PLUMBING CODE AND ANY/ALL LOCAL ORDINANCES.

11. EQUIPMENT

11.1. IT SHALL BE THE RESPONSIBILITY OF THE RESPECTIVE SUB-CONTRACTORS TO DETERMINE THAT THE EQUIPMENT AND APPLIANCES (WHICH THEY PROPOSE TO FURNISH) CAN BE INSTALLED IN THE AVAILABLE SPACE AND CAN BE BROUGHT IN TO THE BUILDING. EQUIPMENT MUST BE INSTALLED SO THAT ALL PARTS ARE READILY ACCESSIBLE FOR INSPECTION AND MAINTENANCE. NO EXTRA COMPENSATION WILL BE ALLOWED FOR DISMANTLING OF EQUIPMENT TO INSTALL IN THE AVAILABLE SPACE OR TO OBTAIN ENTRANCE INTO THE BUILDING. THIS PROVISION SHALL ALSO APPLY TO DEMOLITION/REPAIR OF ARCHITECTURAL/STRUCTURAL ELEMENTS IN ORDER TO PERMIT INSTALLATION OR ENTRANCE IN TO THE BUILDING.

11.2. THE CONTRACTOR SHALL USE EXTREME CARE IN SELECTION OF EQUIPMENT AND ITS INSTALLATION TO ENSURE THAT NOISES AND VIBRATION WILL BE HELD TO A MINIMUM. IT IS THE INTENTION THAT THE ENTIRE SYSTEM SHALL OPERATE WITHOUT OBJECTIONABLE NOISE OR VIBRATION, AND IF OBJECTIONABLE NOISE OR VIBRATION DOES DEVELOP, IT SHALL BE CORRECTED BY THE CONTRACTOR WITHOUT ADDITIONAL COMPENSATION.

12. PROTECTION

12.1. NO PLUMBING OR HEATING PIPING SHALL BE INSTALLED IN ANY PART OF THE BUILDING WHERE DANGER OF FREEZING MAY EXIST WITHOUT ADEQUATE PROTECTION BEING GIVEN BY THE CONTRACTOR INSTALLING THE PIPE. ALL DAMAGES RESULTING FROM LEAKING PIPES SHALL BE BORNE BY THE CONTRACTOR WHOSE WORK IS AT FAULT.

12.2. ALL WORK SHALL BE PROTECTED AT ALL TIMES. ALL PIPE OPENINGS SHALL BE CLOSED WITH CAPS OR PLUGS DURING CONSTRUCTION. ALL EQUIPMENT ACCESSORIES SHALL BE TIGHTLY COVERED AND PROTECTED AGAINST DIRT, WATER OR OTHER INJURY DURING THE PERIOD OF THE RESPECTIVE CONTRACT.

13. TEMPORARY USE OF EQUIPMENT

13.1. IF IT SHOULD BE NECESSARY TO OPERATE THE EQUIPMENT BEFORE FINAL ACCEPTANCE, OWNER OR CONTRACTOR SHALL BE ALLOWED TO DO SO, BUT ONLY AFTER PROPER ADJUSTMENT AND TRIAL OPERATION AS HEREINAFTER SPECIFIED.

13.2. OWNER OR CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER CARE AND SUPERVISION OF OPERATION OF EQUIPMENT THAT IS USED BEFORE ACCEPTANCE AND SAFEGUARD THE EQUIPMENT IN EVERY WAY.

14. JOB CONDITIONS

14.1. EXISTING UTILITIES - LOCATE AND PROTECT EXISTING UTILITIES AND OTHER WORK IN A MANNER WHICH WILL ENSURE THAT NO DAMAGE OR INTERRUPTION OF SERVICE WILL RESULT.

14.2. PROTECT PROPERTY FROM DAMAGE WHICH MIGHT RESULT FROM DEMOLITION.

14.3. PROTECT PERSONS FROM INJURY AT EXCAVATIONS BY BARRICADES, WARNINGS AND ILLUMINATION.

15. COOPERATION AMONGST CONTRACTORS

15.1. OWING TO THE NATURE OF THE CONSTRUCTION INVOLVED, AND TO PREVENT CONFUSION AND DISCREPANCIES, ONLY APPROXIMATE OR GENERAL DIMENSIONS ARE GIVEN IN SEVERAL CASES. IT BEING INTENDED THAT IN SOME INSTANCES A REASONABLE LIMIT OF VARIATION BE PERMITTED IN ORDER THAT THE MAKING AND THE ERECTION OF THE WORK OF THE SUB-CONTRACTORS MAY BE THEREBY EXPEDITED AND THE BEST INTERESTS OF THE WORK AS A WHOLE BE SERVED. THOSE SEVERAL SUB-CONTRACTORS WILL BE REQUIRED TO ESTABLISH THEIR OWN DIMENSIONS (EACH BY PROMPT CONSULTATION AS TO THE METHODS AND SIZE OF CONSTRUCTION, TIME OF COMMENCING AND SEQUENCE OF OPERATIONS AND EXCHANGE OF DRAWINGS AND DETAILS) WITH ONE ANOTHER AS THE GREATEST MEASURE OF COOPERATION AMONGST THE INTERESTS INVOLVED WILL BE DEMAND AND EXPECTED BY THE OWNER AT ALL TIMES.

15.2. ALL MECHANICAL, PLUMBING AND ELECTRICAL SUB-CONTRACTORS SHALL CONSULT FULLY WITH THE GENERAL CONTRACTOR'S SUPERINTENDENT REGARDING ALL MATTERS AFFECTING THEIR WORK.

15.3. COOPERATE WITH OTHER TRADES TO OBTAIN THE MOST PRACTICAL ARRANGEMENT OF WORK.

15.4. MAKE KNOWN TO OTHER TRADES THE INTENDED POSITIONING OF MATERIALS AND INTENDED ORDER OF WORK. COORDINATE WORK WITH OTHER TRADES AND PROCEED WITH INSTALLATION TO ENSURE NO DELAYS TO OTHER TRADES. DETERMINE INTENDED POSITIONS OF WORK OF OTHER TRADES AND INTENDED ORDER OF INSTALLATION.

15.5. AGREE TO THE MOST PRACTICAL ARRANGEMENT OF WORK WITHIN REQUIREMENTS OF CONTRACT AND CONSULT WITH ARCHITECT/ENGINEER WHEN THERE ARE REASONS FOR DEVIATIONS FROM DRAWINGS OR SPECIFICATIONS, DIFFERENCES OF OPINION BETWEEN CONTRACTORS, OR QUESTIONS CONCERNING THE INTENT OF DRAWINGS OR SPECIFICATIONS.

15.6. FAILURE OF CONTRACTOR TO MAKE KNOWN HIS NEEDS OR DETERMINE REQUIREMENTS OF OTHERS WILL NOT BE CAUSE FOR ADDITIONAL TIME/COMPENSATION TO CORRECT INTERFERENCES.

16. SUB-CONTRACTOR'S RESPONSIBILITY FOR PROMPTNESS OF EXECUTION

16.1. IT IS NOT INCUMBENT UPON THE ARCHITECT TO NOTIFY THE SUB-CONTRACTOR WHEN TO BEGIN, TO CEASE OR RESUME WORK, NOR TO GIVE EARLY NOTIFICATION OF THE REJECTION OF FAULTY WORK, NOR IN ANY WAY TO SUPERINTEND THE WORK, IN ORDER TO RELIEVE THE SUB-CONTRACTOR OF RESPONSIBILITY OR OF ANY CONSEQUENCE OF CARELESSNESS BY HIM OR HIS SUBORDINATES.

16.2. ALL MATERIALS AND LABOR SHALL BE FURNISHED AT SUCH TIMES (TO THE BEST INTEREST OF ALL CONTRACTORS AND SUB-CONTRACTORS CONCERNED) TO THE END THAT THE COMBINED WORK MAY BE PROPERLY AND FULLY COMPLETED ON CONTRACT TIME.

17. PERMITS, CODES AND APPROVALS

17.1. PERMITS: ALL PERMITS NECESSARY FOR THE COMPLETE HEATING, VENTILATION, AIR CONDITIONING, PLUMBING, FIRE PROTECTION AND ELECTRICAL SYSTEMS SHALL BE OBTAINED BY THE RESPECTIVE CONTRACTORS FROM THE AUTHORITIES GOVERNING THE WORK. THE COST OF ALL PERMITS SHALL BE BORNE BY THE CONTRACTOR.

17.2. CODES:

17.2.1. PLUMBING WORK SHALL BE DONE IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), THE LATEST STANDARDS RECOGNIZED BY THE AMERICAN SOCIETY OF PLUMBING ENGINEERS (ASPE), PER THE LATEST EDITION ENFORCED FOR STATE AND LOCAL PLUMBING WORK.

17.2.2. ALL PLUMBING WORK SHALL BE INSTALLED ACCORDING TO THE REQUIREMENTS OF THE STATE, CITY, AND COUNTY PLUMBING LAWS, CODES, RULES AND REGULATIONS, AND ANY LOCAL ORDINANCES.

17.2.3. THE MINIMUM STANDARD FOR ALL ELECTRICAL WORK SHALL BE THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC). ALL ELECTRICAL WORK SHALL CONFORM TO THE LOCAL GOVERNING UTILITY COMPANY. HOWEVER, THEIR REQUEST SHALL NOT AUTHORIZE ANY CHANGES IN THE PLANS WITHOUT CONSULTING WITH THE ARCHITECT AND ENGINEERS OF RECORD.

17.2.4. ALL WORK SHALL MEET THE REQUIREMENTS OF THE LIFE SAFETY CODE, STATE AND CITY FIRE MARSHALS, DEPARTMENT OF HOUSING, BUILDINGS AND CONSTRUCTION.

18. INSPECTIONS

18.1. THE RESPECTIVE CONTRACTOR SHALL NOTIFY THE ELECTRICAL AND PLUMBING INSPECTORS, IN WRITING, IMMEDIATELY UPON THE START OF HIS WORK AND A COPY OF THE NOTICE SHALL BE SENT TO THE ARCHITECT/ENGINEER.

18.2. ALL COSTS INCIDENTAL TO THE INSPECTIONS SHALL BE BORNE BY THE RESPECTIVE CONTRACTOR.

18.3. THE INSPECTION SHALL BE SCHEDULED FOR ROUGH AS WELL AS FINISHED WORK. THE ROUGH INSPECTION SHALL BE DIVIDED INTO AS MANY INSPECTIONS AS MAY BECOME NECESSARY TO COVER ALL ROUGH-INS.

18.4. ALL INSPECTIONS TO BE BY THE INSPECTOR HAVING JURISDICTION.

19. REMOVAL OF RUBBISH

19.1. EACH CONTRACTOR SHALL REMOVE HIS OWN RUBBISH, BUT IN CASE OF DISPUTE, THE ARCHITECT/ENGINEER SHALL HAVE THE RIGHT TO ORDER THE GENERAL CONTRACTOR TO REMOVE SAID RUBBISH AND THE COST OF REMOVING SAME SHALL BE CHARGED TO THE GUILTY PARTY, AS MAY BE DECIDED BY THE ARCHITECT/ENGINEER. THE RUBBISH SHALL BE REMOVED IMMEDIATELY WHEN ORDERED BY THE ARCHITECT/ENGINEER OR OWNER'S REPRESENTATIVE. THE BUILDING SHALL BE KEPT AS CLEAN AS POSSIBLE DURING THE PROGRESS OF THE WORK.

20. ADJUSTMENTS AND OPERATION OF SYSTEM

20.1. WHEN ANY WORK INCLUDED IN THE CONTRACT DOCUMENTS IS COMPLETED, AND AT SUCH TIME(S) AS DIRECTED BY THE ARCHITECT/ENGINEER, THE RESPECTIVE EQUIPMENT MANUFACTURER OF CONTRACTOR SHALL CAREFULLY ADJUST ALL PARTS OF HIS EQUIPMENT AND THE SYSTEM, ADVISING THE ARCHITECT/ENGINEER WHEN SAME IS COMPLETE AND READY FOR FINAL TESTING.

20.2. THE RESPECTIVE CONTRACTORS SHALL, AFTER THE WORK IS COMPLETED, FULLY AND CAREFULLY INSTRUCT THE OWNER'S OPERATOR HAVING RESPONSIBILITY FOR THE SYSTEM AS TO ADJUSTMENT AND EFFICIENT/PROPER METHODS OF OPERATING THE SYSTEM AND ITS VARIOUS APPARATUSES.

21. BUILDING CONSTRUCTION MATERIALS

21.1. BIDDERS SHALL CAREFULLY EXAMINE THE GENERAL CONSTRUCTION DOCUMENTS AND ASSURE THEMSELVES OF THE TYPE OF MATERIALS USED THROUGHOUT THE BUILDING THAT MAY IN ANY WAY AFFECT THE WORK TO BE INSTALLED UNDER THEIR CONTRACT, AND THE PROPER PREPARATION OF THEIR PROPOSALS, AS NO CONTRACT ALLOWANCE WILL BE MADE FOR BIDDERS' FAILURE TO ACQUAINT THEMSELVES WITH THE TYPES OF CONSTRUCTION.

22. FINAL CONNECTIONS TO EQUIPMENT FURNISHED BY OTHERS

22.1. THE OWNER AND OTHER CONTRACTORS MAY/SHALL FURNISH AND SET IN PLACE VARIOUS PIECES OF EQUIPMENT.

22.2. THE MECHANICAL, PLUMBING AND ELECTRICAL SUB-CONTRACTORS SHALL INCLUDE IN THEIR BIDS ALL REQUIRED ROUGHING, FINISHED MATERIALS AND LABOR FOR FINAL CONNECTIONS TO ALL EQUIPMENT FURNISHED AND SPECIFIED UNDER OTHER SECTIONS OF THE CONTRACT DOCUMENTS AND/OR FURNISHED BY THE OWNER OR THEIR REPRESENTATIVES.

22.3. THE EQUIPMENT FURNISHED BY OTHER CONTRACTORS SHALL BE PROVIDED (BY PLUMBING CONTRACTOR) WITH TAILPIECES, FAUCETS, AND SPECIAL VALVES, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

22.4. THE MECHANICAL, PLUMBING AND ELECTRICAL CONTRACTORS SHALL FURNISH AND INSTALL ALL TRAPS, SHUT-OFF VALVES, ELECTRICAL BOXES, ELECTRICAL SWITCHES, CONDUIT, WIRING, PIPING, ADAPTERS, AND ANY OTHER MATERIAL REQUIRED FOR MAKING FINAL CONNECTIONS TO EQUIPMENT FURNISHED BY OTHER CONTRACTORS.

22.5. RESPECTIVE CONTRACTORS SHALL OBTAIN ROUGH-IN DATA FROM EQUIPMENT SUPPLIERS PRIOR TO INSTALLING ANY ROUGH-IN WORK. ALL LOCATIONS OF EQUIPMENT AND CONNECTIONS SHALL BE VERIFIED.

23. MAINTENANCE OF UTILITIES

23.1. THE LOCATIONS OF ALL PIPING, CONDUITS, CABLES, UTILITIES AND MAN-HOLES, EXISTING TEMPORARILY OR OTHERWISE THAT COME WITHIN THE CONTRACT CONSTRUCTION SITE, SHALL BE SUBJECT TO CONTINUOUS UNINTERRUPTED MAINTENANCE WITH NO OTHER EXCEPTION THAN THE OWNER'S PERMISSION TO CUT SAME IF THE NEED ARISES.

23.2. CONTRACTOR'S ATTENTION IS DIRECTED TO THE FACT THAT ALL OF THESE UTILITIES AND LINES ARE NOT INDICATED ON THE DRAWINGS; HOWEVER, IT IS REQUIRED THAT PRIOR TO ANY EXCAVATION BEING PERFORMED, THAT THE CONTRACTOR CONSULT THE OWNER'S PERSONNEL AND/OR LOCAL UTILITY LOCATION SERVICES TO ASCERTAIN WHETHER ANY UTILITIES OR LINES ARE ENDANGERED BY THE EXCAVATION.

23.3. IF THE ABOVE-MENTIONED UTILITIES OR LINES OCCUR IN THE EARTH WITHIN THE CONSTRUCTION SITE, IT IS SUGGESTED THAT THE CONTRACTOR FIRST PROBE AND MAKE EVERY EFFORT TO LOCATE THE LINES PRIOR TO EXCAVATING IN THE RESPECTIVE AREA.

24. WARRANTY

24.1. THE CONTRACTOR SHALL WARRANT THE SYSTEMS, EQUIPMENT, AND APPARATUSES TO BE BALANCED, FREE FROM ANY DEFECTS IN MATERIAL/WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR FROM DATE OF ACCEPTANCE. THIS WARRANTY SHALL COVER THE COST OF BOTH LABOR AND MATERIALS TO RECTIFY ANY ISSUES.

25. "OR EQUAL" CLAUSE

25.1. WHEREVER THE WORDS "OR APPROVED EQUAL" APPEAR IN THE CONTRACT DOCUMENTS, THEY SHALL BE INTERPRETED TO MEAN AN ITEM OF MATERIAL OR EQUIPMENT OF EQUAL QUALITY TO THE NAMED, WHICH IS SUITED TO THE SAME USE AND CAPABLE OF PERFORMING THE SAME FUNCTION AS THAT NAMED. THE BURDEN OF PROOF OF EQUAL QUALITY, SERVICE OR PERFORMANCE SHALL BE ON THE SUB-CONTRACTOR. PROOF OF INEQUALITY IS NOT IMPLIED BY THE CONTRACT DOCUMENTS AND IS NOT A BURDEN OF THE ENGINEER. HIS DUTY SHALL BE TO PROPERLY WEIGH THE PROVEN FACTS OF EQUALITY IN FAIRNESS TO ALL PARTIES INVOLVED. INCLUSION OF A CERTAIN MAKE OF TYPE OF MATERIALS OR EQUIPMENT IN THE SUB-CONTRACTOR'S BID OR ESTIMATE SHALL NOT OBLIGATE THE OWNER TO ACCEPT MATERIAL OR EQUIPMENT IF IT DOES NOT, IN THE OPINION OF THE ENGINEER, MEET THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS.

26. STARTERS, ETC.

26.1. ANY NECESSARY STARTERS OR OVERLOAD PROTECTION FOR PLUMBING FIXTURES/EQUIPMENT SHALL BE FURNISHED BY THE PLUMBING CONTRACTOR FOR EQUIPMENT FURNISHED BY HIM OR THE OWNER, UNLESS OTHERWISE SPECIFIED.

27. ELECTRICAL CONNECTIONS

27.1. THE PLUMBING CONTRACTOR SHALL (REGARDLESS OF VOLTAGE) FURNISH AND INSTALL ALL CONTROL WIRING, AND ALL INTERLOCK WIRING, AND EQUIPMENT CONTROL WIRING FOR THE EQUIPMENT THAT THE PLUMBING CONTRACTOR FURNISHES. UNLESS OTHERWISE SPECIFIED, THE PLUMBING CONTRACTOR SHALL FURNISH STARTERS FOR ALL EQUIPMENT FURNISHED BY HIM TO THE ELECTRICAL CONTRACTOR FOR INSTALLATION OF SAME. THE PLUMBING CONTRACTOR SHALL PROVIDE AND BE RESPONSIBLE FOR THE HEATER IN ALL STARTERS THAT THE PLUMBING CONTRACTOR FURNISHES.

28. PREMISES

28.1. THE SUB-CONTRACTOR SHALL TAKE THE PREMISES AS THEY ARE NOW AND WILL BE REQUIRED TO DO ALL THE WORK SHOWN OR IMPLIED IN THE CONTRACT DOCUMENTS, SO THAT WHEN THE BUILDING/PROJECT IS COMPLETED, IT SHALL BE COMPLETE IN EVERY RESPECT, EXCEPT SUCH PARTS AS ARE DISTINCTLY MENTIONED AS NOT BEING COVERED UNDER THESE SPECIFICATIONS.

29. QUALIFICATIONS

29.1. CONTRACTORS MUST HAVE FIVE (5) YEARS MINIMUM EXPERIENCE, HAVE A SATISFACTORY WORK RESUME WITH COMPARABLE PROJECTS LISTED, HAVE A SOUND FINANCIAL BASIS AND BE TECHNICALLY COMPETENT.

29.2. EQUIPMENT MANUFACTURERS MUST HAVE EIGHT (8) YEARS OF SUCCESSFUL EXPERIENCE, BE TECHNICALLY COMPETENT AND BE FINANCIALLY STABLE.

29.3. OWNER RESERVES THE RIGHT TO REVIEW AND DETERMINE IF THE CONTRACTORS AND MANUFACTURERS MEET THE ABOVE CATEGORIES TO HIS SATISFACTION. THE OWNER HAS THE AUTHORITY TO REJECT ANY EQUIPMENT AND BIDS IF THE ABOVE STANDARDS ARE NOT MET.

30. QUALITY ASSURANCE

30.1. FIRE-STOPPING SYSTEMS (MATERIALS AND DESIGN):

30.1.1. SHALL CONFORM TO BOTH FLAME AND TEMPERATURE RATINGS AS REQUIRED BY LOCAL BUILDING CODES AND AS TESTED BY NATIONALLY ACCEPTED TESTING AGENCIES PER ASTM E814 OR UL 1479 FIRE TESTS, IN A CONFIGURATION THAT IS REPRESENTATIVE OF FIELD CONDITIONS.

30.1.2. THE FLAME RATING MUST BE A MINIMUM OF ONE (1) HOUR BUT NOT LESS THAN THE FIRE RESISTANCE RATING OF THE ASSEMBLY BEING PENETRATED. THE TEMPERATURE RATING, WHEN REQUIRED BY CODE AUTHORITY, SHALL BE EQUAL TO THE REQUIRED FIRE RATING.

30.1.3. FOR JOINTS WITH MOVEMENT CAPABILITIES, THE ASSEMBLIES MUST BE TESTED TO UL 2079.

30.2. FIRE-STOPPING MATERIALS AND SYSTEMS MUST BE CAPABLE OF CLOSING OR FILLING THROUGH-OPENINGS CREATED BY:

30.2.1. THE BURNING OR MELTING OF COMBUSTIBLE PIPES, CABLE JACKETING, OR PIPE INSULATION MATERIALS, OR:

30.2.2. DEFLECTION OF SHEET METAL DUE TO THERMAL EXPANSION.

30.2.3. FIRE-STOPPING MATERIAL SHALL BE ASBESTOS AND LEAD-FREE AND SHALL NOT INCORPORATE NOR REQUIRE THE USE OF HAZARDOUS SOLVENTS.

30.2.4. FIRE-STOPPING SEALANTS MUST BE FLEXIBLE, ALLOWING FOR NORMAL MOVEMENT OF THE UTILITIES WHICH THEY PROTECT.

30.2.5. FIRE-STOPPING SEALANTS SHALL NOT SHRINK UPON DRYING, AS EVIDENCED BY CRACKING OR PULLING BACK FROM CONTACT SURFACES.

30.2.6. FIRE-STOPPING MATERIALS SHALL BE MOISTURE RESISTANT, AND MAY NOT DISSOLVE IN WATER AFTER CURING.

30.2.7. TO THE EXTENT THAT IS POSSIBLE, ALL FIRE-STOPPING MATERIALS SHALL BE MANUFACTURED BY ONE MANUFACTURER.

30.2.8. INSTALLATION OF FIRE-STOPPING SYSTEMS SHALL BE PERFORMED BY A CONTRACTOR TRAINED OR CERTIFIED BY THE FIRE-STOPPING MANUFACTURER.

30.2.9. MATERIAL USED SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS.

31. PROJECT CONDITIONS

31.1. CONFORM TO MANUFACTURER'S PRINTED INSTRUCTIONS FOR INSTALLATION AND WHEN APPLICABLE, CURING IN ACCORDANCE WITH TEMPERATURE AND HUMIDITY. CONFORM TO VENTILATION AND SAFETY REQUIREMENTS.

31.2. VERIFY THE CONDITION OF THE SUBSTRATES BEFORE STARTING WORK.

31.3. WEATHER CONDITIONS: DO NOT PROCEED WITH INSTALLATION OF FIRE-STOP MATERIALS WHEN TEMPERATURES FALL OUTSIDE OF THE MANUFACTURER'S SUGGESTED LIMITS.

31.4. CARE SHOULD BE TAKEN TO ENSURE THAT FIRE-STOPPING MATERIALS ARE INSTALLED SO AS NOT TO CONTAMINATE ADJACENT SURFACES.

32. CONDITIONS REQUIRING FIRE-STOPPING

32.1. GENERAL: PROVIDE FIRE-STOPPING FOR CONDITIONS SPECIFIED WHETHER OR NOT FIRE-STOPPING IS INDICATED, AND IF INDICATED, WHETHER SUCH MATERIAL IS DESIGNED AS INSULATION, SAFING OR OTHERWISE.

32.2. THROUGH-PENETRATIONS: FIRE-STOPPING SHALL BE INSTALLED IN ALL OPEN PENETRATIONS AND IN THE ANNULAR SPACE IN ALL PENETRATIONS IN ANY BEARING OR NON-BEARING FIRE-RATED BARRIER.

32.3. MEMBRANE PENETRATIONS: ALL MEMBRANE PENETRATIONS IN RATED WALLS SHALL BE PROTECTED WITH FIRE-STOPPING PRODUCTS THAT MEET THE REQUIREMENTS OF THIRD PARTY TIME/TEMPERATURE TESTING.

32.4. SMOKE-STOPPING: AS REQUIRED BY THE OTHER SECTIONS, SMOKE-STOPS SHALL BE PROVIDED FOR THROUGH-PENETRATIONS AND MEMBRANE PENETRATIONS, WITH A MATERIAL APPROVED AND TESTED FOR SUCH APPLICATIONS.

32.5. INSTALLATION

32.1.1. GENERAL: INSTALLATION OF FIRE-STOPS SHALL BE PERFORMED BY AN APPLICATOR/INSTALLER QUALIFIED AND TRAINED BY THE MANUFACTURER, BUT IS ULTIMATELY THE RESPONSIBILITY OF EACH TRADE. INSTALLATION SHALL BE PERFORMED IN STRICT ACCORDANCE WITH MANUFACTURER'S DETAILED INSTALLATION PROCEDURES.

33. FIELD QUALITY CONTROL

33.1. PREPARE AND INSTALL FIRE-STOPPING SYSTEMS IN ACCORDANCE WITH MANUFACTURER'S PRINTED INSTRUCTIONS AND RECOMMENDATIONS.

33.2. FOLLOW SAFETY PROCEDURES RECOMMENDED IN THE MATERIAL SAFETY DATA SHEETS.

33.3. FINISH SURFACES OF FIRE-STOPPING WHICH ARE TO REMAIN EXPOSED IN THE COMPLETED WORK TO A UNIFORM AND LEVEL CONDITION.

33.4. ALL AREAS OF WORK MUST BE ACCESSIBLE UNTIL INSPECTION BY THE APPLICABLE CODE AUTHORITIES.

33.5. CORRECT UNACCEPTABLE FIRE-STOPS AND PROVIDE ADDITIONAL INSPECTION TO VERIFY COMPLIANCE WITH THIS SPECIFICATION.

34. CLEANING

34.1. REMOVE SPILLED AND EXCESS MATERIALS ADJACENT TO FIRE-STOPPING WITHOUT DAMAGING ADJACENT SURFACES.

34.2. LEAVE FINISHED WORK IN NEAT, CLEAN CONDITION WITH NO EVIDENCE OF SPILL OVERS OR DAMAGE TO ADJACENT SURFACES.

35. PROJECT CLOSEOUT, START UP OF SYSTEMS AND TRADE COMPLETION

35.1. EACH TRADE CONTRACTOR SHALL COMPLETE ALL WORK AS HEREIN SPECIFIED AND INDICATED ON DOCUMENTS.

35.2. UPON COMPLETION, CONTRACTOR SHALL NOTIFY, IN WRITING, THAT THE WORK HAS BEEN COMPLETED AND REVIEWED FOR COMPLIANCE BY THEIR SUPERVISORY STAFF AND IS READY FOR FINAL REVIEW (PUNCH LIST).

35.3. AN INTEGRAL PART OF THE CONTRACTOR'S COMPLETION PROCESS IS A START-UP LOG PER MANUFACTURER'S INSTALLATION RECOMMENDATIONS FOR EACH PIECE OF EQUIPMENT.

35.4. UPON RECEIPT OF THE ABOVE, THE ENGINEER WILL VISIT THE SITE AND PREPARE THE FINAL REVIEW COMMENTS (PUNCH LIST).

35.5. THIS LIST WILL BE RETURNED TO THE CONTRACTOR AND OWNER. AFTER EACH ITEM HAS BEEN CORRECTED, THE CONTRACTOR SHALL INITIAL/SIGN OFF THAT THE WORK HAS BEEN COMPLETED PRIOR TO FINAL PAYMENT.

SANITARY SEWAGE/GRINDER PUMPS

PART 1 -

1.1 DESCRIPTION

A. SANITARY GRINDER TYPE SEWAGE PUMPS UTILIZING AN INTEGRAL STAINLESS-STEEL CUTTING DEVICE SYSTEM. SEE SCHEDULE ON DRAWINGS FOR PUMPS CAPACITY AND HEAD.

1.2 SUBMITTALS

A. MANUFACTURER'S LITERATURE AND DATA INCLUDING: FULL ITEM DESCRIPTION AND OPTIONAL FEATURES AND ACCESSORIES. INCLUDE DIMENSIONS, WEIGHTS, MATERIALS, APPLICATIONS, STANDARD COMPLIANCE, MODEL NUMBERS, SIZE, AND CAPACITY.

1. PUMP:
   a. MANUFACTURER AND MODEL.
   b. OPERATING SPEED.
   c. CAPACITY.
   d. CHARACTERISTIC PERFORMANCE CURVES.

2. MOTOR:
   a. MANUFACTURER, FRAME AND TYPE.
   b. SPEED.
   c. CURRENT CHARACTERISTICS AND W (HP).
   d. EFFICIENCY.

3. CONTROLS AND DISCONNECT APPARATUS:
   a. STARTING SWITCH.
   b. AUTOMATIC CONTROL AND LEVEL ALARM.
   c. ALTERNATING RELAY.
   d. CIRCUITING OF CONTROL PANEL.
   e. SENSORS.

4. REMOVAL/DISCONNECT SYSTEM.

B. CERTIFIED COPIES OF ALL THE FACTORY AND CONSTRUCTION SITE TEST DATA SHEETS AND REPORTS.

C. COMPLETE OPERATING AND MAINTENANCE MANUALS INCLUDING WIRING DIAGRAMS, TECHNICAL DATA SHEETS, AND INFORMATION FOR ORDERING REPLACEABLE PARTS, AND TROUBLESHOOTING GUIDE:

1. INCLUDE COMPLETE LIST INDICATING ALL COMPONENTS OF THE SYSTEMS.
2. INCLUDE COMPLETE DIAGRAMS OF THE INTERNAL WIRING FOR EACH ITEM OF EQUIPMENT.
3. DIAGRAMS SHALL HAVE THEIR TERMINALS IDENTIFIED TO FACILITATE INSTALLATION, OPERATION AND MAINTENANCE.

D. SUBMIT TRAINING PLANS AND INSTRUCTOR.

PART 2 - PRODUCTS

2.1 SANITARY SEWERAGE PUMP

A. DUPLEX OR MULTIPLEX PUMPS GRINDER TYPE DESIGNED FOR 60 DEGREES C (140 DEGREES F) MAXIMUM WATER SERVICE. DRIVER SHALL BE ELECTRIC MOTOR. SUPPORT SHALL BE RIGID TYPE. WHERE HAZARDOUS ENVIRONMENT CONDITION EXISTS, EXPLOSION PROOF PUMPS SHALL BE INSTALLED.

1. PUMP HOUSINGS SHALL BE CAST_IRON, BRONZE, OR STAINLESS_STEEL. CAST_IRON HOUSINGS FOR SUBMERSIBLE PUMPS SHALL BE EPOXY COATED.

B. IMPELLER: CAST_IRON, NON_CLOG, TO ACCOMMODATE 50 MM (2 INCH) SOLIDS, 316 SS IMPELLER, 440 SS CUTTER AND CUTTER PLATES.

C. SHAFT: STAINLESS_STEEL.

D. BEARINGS: AS PER MANUFACTURER'S RECOMMENDATIONS TO HOLD SHAFT ALIGNMENT, ANTI_FRICTION TYPE FOR THRUST AND PERMANENTLY LUBRICATED.

E. MOTOR: MAXIMUM 40 DEGREES C (72 DEGREES F) AMBIENT TEMPERATURE RISE, DRIP-PROOF, VOLTAGE AND PHASE AS SHOWN IN SCHEDULE ON ELECTRICAL DRAWINGS CONFORMING TO NEMA 250, TYPE 4. SIZE THE MOTOR CAPACITY TO OPERATE PUMP WITHOUT OVERLOADING THE MOTOR AT ANY POINT ON THE PUMP CURVE.

F. STARTING SWITCH: MANUALLY_OPERATED, TUMBLER TYPE.

G. AUTOMATIC CONTROL AND LEVEL ALARM: PROVIDE CONTROL PANEL IN A NEMA 4X ENCLOSURE FOR OUTDOORS.

1. THE CONTROLS SHALL BE SUITABLE FOR OPERATION WITH THE ELECTRICAL CHARACTERISTICS LISTED ON THE ELECTRICAL DRAWINGS.
2. THE CONTROL PANEL SHALL HAVE A LEVEL CONTROL SYSTEM WITH SWITCHES TO START AND STOP PUMPS AUTOMATICALLY, AND TO ACTIVATE A HIGH WATER ALARM.
3. THE LEVEL CONTROL SYSTEM SHALL INCLUDE SENSORS IN THE SUMP THAT DETECT THE LEVEL OF THE LIQUID.
4. THE SENSORS SHALL BE FLOAT TYPE SWITCHES, TRANSDUCERS, OR OTHER APPROPRIATE EQUIPMENT.
5. THE HIGH WATER ALARM SHALL HAVE A RED BEACON LIGHT AT THE CONTROL PANEL AND A BUZZER, HORN, OR BELL.
6. THE ALARM SHALL HAVE A SILENCING SWITCH.

H. PROVIDE AN ALTERNATING RELAY TO AUTOMATICALLY ALTERNATE LEADOFF AND STANDBY DUTIES OF EACH PUMP AT THE END OF EACH PUMPING CYCLE. STANDBY PUMP SHALL START WHEN WATER LEVEL IN SUMP RISES TO A PREDETERMINED LEVEL THAT INDICATES EXCESSIVE INFLOW OR FAILURE OF THE LEAD PUMP.

I. THE CIRCUITRY OF THE CONTROL PANEL SHALL INCLUDE:

1. POWER SWITCH TO TURN ON/OFF THE AUTOMATIC CONTROL MECHANISM.
2. HOA SWITCHES TO MANUALLY OVERRIDE AUTOMATIC CONTROL MECHANISM.
3. RUN LIGHTS TO INDICATE WHEN PUMPS ARE POWERED UP.
4. LEVEL STATUS LIGHTS TO INDICATE WHEN WATER IN SUMP HAS REACHED THE PREDETERMINED ON/OFF AND ALARM LEVELS.
5. MAGNETIC MOTOR CONTACTORS.
6. DISCONNECT/BREAKER FOR EACH PUMP.
7. AUTOMATIC MOTOR OVERLOAD PROTECTION.
8. PROVIDE AUXILIARY CONTACTS FOR REMOTE ALARMING TO THE BAS AND BACNET COMPATIBLE OPEN-PROTOCOL TYPE INTERFACE TO DDC CONTROLS SYSTEM.

J. SENSORS THAT DETECT THE LEVEL OF WATER IN THE SUMP SHALL BE ARRANGED AS TO ALLOW THE ACCUMULATION OF ENOUGH VOLUME OF LIQUID SO THAT THE PUMP WILL RUN FOR A MINIMUM CYCLE TIME OF TWO MINUTES. SENSORS SHALL BE LOCATED TO ACTIVATE THE ALARM ADEQUATELY BEFORE THE WATER LEVEL RISES TO THE INLET PIPE.

K. PROVIDE TWO SEPARATE POWER SUPPLIES TO THE CONTROL PANEL, ONE FOR THE CONTROL/ALARM CIRCUITRY AND ONE FOR POWER TO THE PUMP MOTORS. EACH POWER SUPPLY IS TO BE FED FROM ITS OWN BREAKER. IF A PUMP OVERLOAD TRIPS A BREAKER, THE ALARM SYSTEM SHALL STILL FUNCTION. EACH POWER SUPPLY WILL BE WIRED IN ITS OWN CONDUIT. WIRING FROM THE SUMP TO THE CONTROL PANEL SHALL HAVE SEPARATE CONDUITS FOR THE PUMP POWER AND FOR THE SENSOR SWITCHES. ALL CONDUITS ARE TO BE SEALED AT THE SUMP BASIN AND AT THE CONTROL PANEL TO PREVENT THE INTRUSION OF MOISTURE AND OF FLAMMABLE AND/OR CORROSIVE GASES.

L. PROVIDE A UNION, AND CHECK AND SHUT-OFF VALVE IN THE DISCHARGE FROM EACH PUMP. LOCATE OUTSIDE THE SUMP BASIN IN A DEDICATED VALVE BOX.

M. REMOVAL/DISCONNECT SYSTEM: SYSTEM TO BE COMPATIBLE WITH AND FURNISHED BY THE PUMP MANUFACTURER. WHERE INDICATED ON DRAWINGS, OR WHERE SUMP DEPTH, PUMP SIZE OR OTHER CONDITIONS MAKE REMOVAL OF THE PUMP DIFFICULT OR UNSAFE, A REMOVAL/DISCONNECT SYSTEM SHALL BE PROVIDED. THE REMOVAL/DISCONNECT SYSTEM WILL CONSIST OF A DISCHARGE FITTING MOUNTED ON VERTICAL GUIDE RAILS ATTACHED TO THE SUMP. THE PUMP SHALL BE FITTED WITH AN ADAPTER FITTING THAT EASILY CONNECTS/DISCONNECTS FROM THE DISCHARGE FITTING. THE DISCHARGE PIPING WILL CONNECT TO THE DISCHARGE FITTING SO THAT IT IS NOT NECESSARY TO DISCONNECT ANY PIPING IN ORDER TO REMOVE THE PUMP.

1. THE REMOVAL/DISCONNECT SYSTEM SHALL INCLUDE A RAIL GUIDED QUICK DISCONNECT APPARATUS TO ALLOW THE PUMP TO BE PULLED UP OUT OF THE SUMP WITHOUT WORKERS ENTERING THE SUMP AND WITHOUT DISCONNECTING THE PIPING.

PART 3 - EXECUTION

3.1 INSTALLATION

A. IF AN INSTALLATION IS UNSATISFACTORY TO THE OWNER, THE CONTRACTOR SHALL CORRECT THE INSTALLATION AT NO ADDITIONAL COST OR TIME TO THE OWNER.

3.2 STARTUP AND TESTING

A. PERFORM TESTS AS RECOMMENDED BY PRODUCT MANUFACTURER AND LISTED STANDARDS AND UNDER ACTUAL OR SIMULATED OPERATING CONDITIONS AND PROVE FULL COMPLIANCE WITH DESIGN AND SPECIFIED REQUIREMENTS. TESTS OF THE VARIOUS ITEMS OF EQUIPMENT SHALL BE PERFORMED SIMULTANEOUSLY WITH THE SYSTEM OF WHICH EACH ITEM IS AN INTEGRAL PART.

B. THE TESTS SHALL INCLUDE SYSTEM CAPACITY, CONTROL FUNCTION, AND ALARM FUNCTIONS.

C. WHEN ANY DEFECTS ARE DETECTED, CORRECT DEFECTS AND REPEAT TEST AT NO ADDITIONAL COST OR TIME TO THE GOVERNMENT.

D. COORDINATE THE STARTUP AND CONTRACTOR TESTING SCHEDULES WITH THE OWNER. PROVIDE A MINIMUM NOTICE OF 10 WORKING DAYS PRIOR TO STARTUP AND TESTING.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004
CABLE BUILDING

STATE OF KENTUCKY
JEFFREY E MCBRIDE
29473
LICENSED PROFESSIONAL ENGINEER

JOB NO.	2021-32
DB:	
CB:	
DATE:	02/03/2022
SHEET NO:	**P202**

PLUMBING SPECIFICATIONS

FOR CONSTRUCTION

ELECTRICAL SYMBOLS LEGEND

LIGHTING

- F1 / b / NL — 2' X 4' LIGHT FIXTURE
  - F1 - INDICATES FIXTURE TYPE (REFER TO SCHEDULE FOR INFO)
  - b - DENOTES SWITCH DESIGNATION
  - NL - DENOTES NITE LIGHT CIRCUIT
- 2' X 4' LIGHT FIXTURE
- 2' X 2' LIGHT FIXTURE
- RECESSED DOWNLIGHT FIXTURE
- TRACK LIGHT
- STRIP LIGHT FIXTURE
- PENDANT LIGHT FIXTURE
- EXIT SIGN
- COMBINATION EMERGENCY EXIT SIGN AND BATTERY LIGHT, SINGLE FACE WITH DUAL HEADS AND INTEGRAL BATTERY POWER SUPPLY
- WALL MOUNTED TWO HEAD EMERGENCY LIGHT.
- SINGLE POLE WALL SWITCH
- 3 — THREE-WAY WALL SWITCH
- OC — WALL MOUNTED OCCUPANCY SENSOR
- OR — OVER-RIDE SWITCH
- WALL MOUNTED LOW VOLTAGE DIMMING SWITCH
- DVS — CEILING MOUNTED LOW VOLTAGE DUAL TECHNOLOGY OCCUPANCY/VACANCY SENSOR.
- DVS D — CEILING MOUNTED LOW VOLTAGE DUAL TECHNOLOGY OCCUPANCY/VACANCY SENSOR WITH DIMMING CAPABILITY.

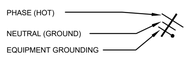
SYSTEMS

- TELEPHONE/DATA OUTLET - SINGLE GANG OUTLET BOX WITH 3/4" CONDUIT WITH PULLWIRE STUBBED UP ABOVE ACCESSIBLE CEILING SPACE
- IM — INDIVIDUAL ADDRESSABLE MODULE
- CR — CARD READER
- CCTV CAMERA
- KP — KEY PAD

POWER

- DUPLEX RECEPTACLE
- GF — GROUND FAULT PROTECTED DUPLEX RECEPTACLE
- AC — ABOVE COUNTER DUPLEX RECEPTACLE
- TV — DUPLEX RECEPTACLE FOR CONNECTION TO TV. COORDINATE MOUNTING HEIGHT WITH TV SUPPLIER/INSTALLER.
- WP — DUPLEX RECEPTACLE IN WEATHERPROOF BOX
- QUADRAPLEX RECEPTACLE
- SPECIAL PURPOSE RECEPTACLE
- FIRE RATED MULTI-SERVICE FLOOR BOX. COORDINATE EXACT LOCATION WITH ARCHITECTURAL FURNITURE PLAN PRIOR TO INSTALLATION.
- JUNCTION BOX WALL AND/OR CEILING, FLUSH MOUNT, 4" X 4" SQUARE UNLESS OTHERWISE NOTED. REFER TO ELECTRICAL DRAWING FOR MORE DETAILS.
- FUSIBLE DISCONNECT SWITCH
- SURFACE MOUNTED PANEL BOARD
- CONDUIT DOWN.
- CONDUIT UP.
- CONDUIT CAPPED

BRANCH CIRCUIT WIRING



TYPICAL DEVICE MOUNTING HEIGHTS

ALL DIMENSIONS FOR DEVICE MOUNTING HEIGHTS ARE MEASURED FROM FINISHED FLOOR TO CENTER OF DEVICE OUTLET BOX, UNLESS OTHERWISE INDICATED. MOUNTING HEIGHTS SHALL BE AS FOLLOWS:

- WALL SWITCH, DIMMER SWITCH, OVERRIDE SWITCH, LIGHT PRESET CONTROL STATION, - 46" AFF
- RECEPTACLE, DATA, DESK TOP TELEPHONE, TV OUTLET - 18" AFF
- ABOVE COUNTER RECEPTACLE/DEVICE - 3" ABOVE BACK SPLASH OF COUNTER OR 8" ABOVE FINISHED COUNTER TOP, WHICHEVER IS LOWER. (COORDINATE WITH ARCHITECT)
- REFRIGERATOR RECEPTACLE - 54"" AFF
- TELEPHONE - 18" AFF OR WALL - 54" AFF
- FIRE ALARM DEVICES
  - FIRE ALARM PULL STATION - 46" AFF
  - WALL MOUNTED FIRE ALARM HORN & STROBE LIGHT,
  - FIRE ALARM STROBE LIGHT - 80" AFF OR 6" BELOW CEILING
  - WHICHEVER IS LOWER.

FIRE ALARM

- FACP — MAIN FIRE ALARM CONTROL PANEL.
- FAA — FIRE ALARM REMOTE ANNUNCIATOR.
- FAC — FIRE ALARM COMMUNICATOR
- ICP — FOUR (4) CIRCUIT FIRE ALARM INDICATING CIRCUIT POWER EXTENDER.
- IIM — INITIATING CIRCUIT ISOLATION MODULE.
- AOM — ADDRESSABLE OUTPUT MODULE.
- IAM — INDIVIDUAL ADDRESSABLE MONITOR MODULE.
- CO — CARBON MONOXIDE DETECTOR
- CEILING MOUNTED SMOKE DETECTOR
- S SB — CEILING MOUNTED SINGLE STATION SMOKE DETECTOR WITH INTEGRAL SOUNDER AND STROBE FOR SLEEPING AREA. RATED FOR 120VAC WITH BATTERY BACKUP.
- S SB — WALL MOUNTED SINGLE STATION SMOKE DETECTOR WITH INTEGRAL SOUNDER AND STROBE FOR SLEEPING AREA. RATED FOR 120VAC WITH BATTERY BACKUP.
- WALL/CEILING-MOUNTED SMOKE DETECTOR WITH STANDARD ADDRESSABLE MOUNTING BASE. CONNECT TO FIRE ALARM SYSTEM.
- F — MANUAL FIRE ALARM DUAL-ACTION PULL STATION. MOUNT TOP OF PULL STATION @ 48" A.F.F.
- WALL MOUNTED FIRE ALARM HORN & STROBE LIGHT. MOUNT @ 80" A.F.F. OR 6" BELOW CEILING.
- WALL MOUNTED FIRE ALARM STROBE LIGHT. MOUNT @ 80" A.F.F. OR 6" BELOW CEILING.
- CEILING MOUNTED FIRE ALARM HORN & STROBE LIGHT.
- CEILING MOUNTED FIRE ALARM SPEAKER.
- S D — DUCT MOUNTED SMOKE DETECTOR
- H — HEAT DETECTOR
- FD/SD
- PIV — FIRE ALARM POST INDICATOR VALVE.
- FS — FIRE ALARM SPRINKLER FLOW SWITCH
- TS — FIRE ALARM SPRINKLER TAMPER SWITCH
- H — WALL MOUNTED ELECTRICAL OPERATED WATER FLOW BELL PROVIDED BY SPRINKLER CONTRACTOR - INSTALL AND WIRED BY ELECTRICAL CONTRACTOR. MOUNT AT A MINIMUM OF 80" AFF OR AT HEIGHT PER AHJ DIRECTION (SYSTEM SENSOR SSM/SSV SERIES ALARM BELL OR APPROVED EQUAL)

LUMINAIRE SCHEDULE

FIXTURE TYPE	DESCRIPTION	CATALOG NUMBER	LAMP	VOLTAGE	INPUT WATTS	BALLAST	LENS/REFLECTOR	MOUNTING	REMARKS
E1	2'X4' LED FLAT PANEL SURFACE MOUNTED	LITHONIA # EPANL 2X4 5400LM 80CRI 35K MIN10 ZT MVOLT, 2X4SMKSH	LED 3500K. 85 CRI, 5400 LUMENS	120	51	ELECTRONIC DRIVER 0-10V DIM	FROSTED ACRYLIC	SURFACE	
E1R	2'X4' LED FLAT PANEL RECESSES	LITHONIA # EPANL 2X4 5400LM 80CRI 35K MIN10 ZT MVOLT	LED 3500K. 85 CRI, 5400 LUMENS	120	51	ELECTRONIC DRIVER 0-10V DIM	FROSTED ACRYLIC	SURFACE	
E2	1'X4' LED FLAT PANEL SURFACE MOUNTED	LITHONIA # EPANL 1X4 4800LM 80CRI 35K MIN10 ZT MVOLT, 1X4SMKSH	LED3500K. 85 CRI, 4800 LUMENS	120	37	ELECTRONIC DRIVER 0-10V DIM	FROSTED ACRYLIC	SURFACE	
E2R	1'X4' LED FLAT PANEL RECESSED	LITHONIA # EPANL 1X4 4800LM 80CRI 35K MIN10 ZT MVOLT	LED3500K. 85 CRI, 4800 LUMENS	120	37	ELECTRONIC DRIVER 0-10V DIM	FROSTED ACRYLIC	SURFACE	
E3	2'X4' LED HIGH BAY SURFACE / SUSPENDED WITH TWIST LOCK PLUG AND SUSPENSION CABLE/KIT	LITHONIA #IBG18000LM-SEF-AFL-GND-MVOLT-GZ10-40K-80CRI-CS11WMP	LED4000K. 85 CRI, 18000 LUMENS	120	105	ELECTRONIC DRIVER 0-10V DIM	FROSTED ACRYLIC	SUSPENDED	
E4	4' LED SURFACE OR SUSPENDED LINEAR STRIP WITH SUSPENSION CABLE/KIT	LITHONIA #ZL2N L48 5000LM MDD MVOLT 40K 80CRI	LED 3500K. 80 CRI, 5000 LUMENS	120	46	ELECTRONIC DRIVER 0-10V DIM	FROSTED ACRYLIC	SURFACE/ SUSPENDED	
E5	SURFACE CEILING LED RECESSED ROUND DOWN LIGHT IN SHOWERS	JUNO #IC1 JB 4RLD G3 06LM 30K 90CRI 120 FRPC WWH	3000K. 90+ CRI, 600 LUMENS	120	10	LED DRIVER	ACRYLIC	RECESSED	
E6	EXTERIOR WALL MOUNTED LED FIXTURE WET LOCATION LISTED BRONZE FINISH	LITHONIA #WST LED P3 40K VW-MVOLT-DBLXD	LED 4000K. 85 CRI, 6000 LUMENS	120	50	ELECTRONIC DRIVER	FROSTED ACRYLIC	SURFACE/ WALL	VERIFY THE EXACT MOUNTING HEIGHT WITH THE ARCHITECT AND OWNER
RH	EXTERIOR REMOTE HEAD- EMERGENCY EGRESS LIGHT	LITHONIA #ERE B T RD WP	LED	120	5	-	ACRYLIC	SURFACE/ WALL	
EM	WALL MOUNTED LED EMERGENCY LIGHT, WHITE FINISH LOW PROFILE HOUSING, NI-CAD BATTERY CAPABLE OF 90 MINUTES OF ILLUMINATION BUILT IN TEST SWITCH	LITHONIA #ELM6L LED B SD	LED	120	5	-	ACRYLIC	SURFACE	
EX	LED EXIT SIGN WITH THERMO PLASTIC HOUSING, WHITE FINISH AND RED LETTERING, PROVIDE ARROWS AS NOTED ON DRAWINGS AND SINGLE OR DOUBLE SIDED AS NEEDED AND AS SHOWN ON DRAWINGS. PROVIDE TOP, BACK, OR SIDE MOUNT HARDWARE AS REQUIRED BY ARCHITECTURAL CONDITIONS. BATTERY CAPABLE OF 90 MINS OF EMERGENCY OPERATION	LITHONIA #LHQM-LED-B-R-HO	LED	120	5	-	ACRYLIC	SURFACE / WALL / CEILING	PROVIDE REMOTE CAPABLE - CORD AT EXTERIOR DOORS
X1	LED EXIT SIGN WITH BATTERY PACK WHITE THERMOPLASTIC WITH RED LED WITH REMOTE CAPACITY	LITHONIA # LQM-S-W-3-R-120/277-ELN	LED	120	5	-	ACRYLIC	UNIVERSAL MOUNTING	

GENERAL ELECTRICAL NOTES:

A. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST NATIONAL ELECTRICAL CODE, NFPA, ASHRAE 90.1, ALL LOCAL AND STATE CODES.

B. ELECTRICAL CONTRACTOR SHALL VISIT AND EXAMINE THE SITE PRIOR TO SUBMITTING BID TO BECOME FAMILIAR WITH EXISTING CONDITIONS. NO ALLOWANCE SHALL BE MADE FOR EXISTING CONDITIONS NOT KNOWN TO THE CONTRACTOR.

C. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FEES, PERMITS AND LICENSES FOR THE COMPLETE INSTALLATION OF HIS WORK. DRAWINGS ARE DIAGRAMMATIC REPRESENTATION OF THE WORK AND INDICATES GENERAL ARRANGEMENT. SEE ARCHITECTURAL DRAWINGS FOR EXACT DIMENSIONS.

D. ALL CUTTING AND PATCHING OF WALLS AND FLOOR FOR ELECTRICAL EQUIPMENT/WORK SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.

E. PROVIDE FIRE STOP PER BUILDING CODE TO ALL CONDUITS PENETRATING THROUGH FIRE RATED WALLS/PARTITION, FLOORS AND CEILINGS. COORDINATION WITH THE GENERAL CONTRACTOR SHALL BE MAINTAINED TO INSURE THAT FIRE STOPPING IS ACCOMPLISHED. USE APPROVED U.L. OR EQUIVALENT SEALANT. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR SEALING/PATCHING ANY CONDUITS OPENINGS IN FLOOR/SLAB/WALL AFTER DEMOLITION. REFER TO ARCHITECTURAL PLANS FOR WALL RATINGS.

F. COORDINATE EXACT PHASING OF ALL WORK WITH GENERAL CONTRACTOR.

G. ELECTRICAL CONTRACTOR SHALL VERIFY EXACT MOUNTING LOCATION AND CONNECTION REQUIREMENTS OF ALL PLUMBING/MECHANICAL EQUIPMENT WITH PLUMBING/MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.

H. ALL DEVICES AND JUNCTION BOXES SHALL BE ACCESSIBLE. PROVIDE ACCESS PANEL AS REQUIRED WITH PRIOR APPROVAL OF ARCHITECT.

I. WHERE MORE THAN ONE SWITCH OR DIMMER OCCURS AT A LOCATION, GANG THE SWITCHES TOGETHER WITH A COMMON JUNCTION BOX AND FACE PLATE.

J. ELECTRICAL CONTRACTOR SHALL COORDINATE LOCATION OF LIGHT FIXTURES WITH MECHANICAL CONTRACTOR, PLUMBING CONTRACTOR AND FIRE PROTECTION CONTRACTOR TO AVOID CONFLICT WITH DUCTWORK, PIPING AND SPRINKLER PIPING.

K. CONDUCTORS SHALL BE COPPER, RATED NOT LESS THAN 600VOLTS, MINIMUM WIRE SIZE SHALL BE #12 AWG, TYPE THHN OR THWN UNLESS OTHERWISE NOTED,

L. TELEPHONE, FIRE ALARM, DATA, COMMUNICATIONS AND OTHER LOW VOLTAGE WIRING SHALL BE PLENUM RATED IF CONDUCTORS PASS THROUGH AN AIR PLENUM.

M. DISCONNECT SWITCHES SHALL BE MOUNTED ON INDIVIDUAL STRUCTURAL SUPPORTS, OR OTHERWISE DIRECTLY ON EQUIPMENT, PROVIDED NO MODIFICATION TO EQUIPMENT IS NECESSARY. ALL STRUCTURAL SUPPORTS FOR ELECTRICAL EQUIPMENT SHALL BE PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR. ELECTRICAL CONTRACTOR SHALL INCLUDE DESIGN FOR ALL STRUCTURAL SUPPORT.

N. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY BALANCING ALL BRANCH CIRCUITS AMONG THE PHASES OF THE SYSTEM ACCORDING TO NEC AND PROVIDE LOAD BALANCING REPORT TO ENGINEER.

O. ALL EXTERIOR ELECTRICAL DEVICES AND EQUIPMENT SHALL BE WEATHERPROOF TYPE NEMA 3R MINIMUM.

P. EMERGENCY LIGHTING, IF SWITCHED, SHALL AUTOMATICALLY ILLUMINATE DURING A POWER OUTAGE.

Q. ELECTRICAL CONTRACTOR SHALL ARRANGE FOR A JOB WALK-THROUGH WITH THE BUILDING AND FIRE DEPARTMENT INSPECTORS TO DETERMINE IF ANY ADDITIONAL EXIT SIGNS ARE REQUIRED PRIOR TO COVER UP. VERIFY ARROW REQUIREMENTS.

R. PROVIDE PULL WIRE IN EACH EMPTY RACEWAY.

S. ELECTRICAL CONTRACTOR SHALL PROVIDE CONDUIT SLEEVES FOR CABLE ROUTING, AS NECESSARY, IN WALLS, FLOORS AND CEILINGS.

T. ELECTRICAL CONTRACTOR SHALL PROVIDE A TYPED LEDGER/CIRCUIT DIRECTORY IN PANELBOARD INDICATING TYPE OF LOAD AND LOCATION FOR EACH BRANCH CIRCUIT BREAKER. PROVIDE ENGRAVED PHENOLIC NAMEPLATES FOR ALL PANELBOARDS & DISCONNECT SWITCHES, UNLESS OTHERWISE NOTED.

U. ALL ELECTRICAL COMPONENTS OR EQUIPMENT SHALL BE LABELED BY UNDERWRITER'S LABORATORIES OR OTHER APPROVED LISTING AGENCY. APPROVED AND LABELING OF INDIVIDUAL COMPONENTS ON AN ASSEMBLY IS NOT ACCEPTABLE AS MEETING THIS REQUIREMENT. UNLESS WAIVED BY THE ENGINEER IN WRITING.

V. ALL WIRING SYSTEMS SHALL BE INSTALLED WITH A MINIMUM OF SPLICES. CONDUCTORS, WHETHER SINGLE OR MULTI-PAIR SHALL BE INSTALLED CONTINUOUS INSOFAR AS POSSIBLE FROM TERMINAL POINT TO TERMINAL POINT.

W. CONTRACTOR SHALL EXERCISE EXTREME CARE IN THE COURSE OF THEIR WORK SO AS TO INSURE THAT THEY DO NOT INTERRUPT ANY EXISTING SERVICE OR SUB-SERVICE FOR SAFETY PURPOSES, PAY PARTICULAR ATTENTION TO THIS PRECAUTION RELATIVE TO NATURAL GAS AND ELECTRICAL LINES. VERIFY THE LOCATION, SIZE, TYPE, ETC., OF EACH UNDERGROUND OR OVERHEAD UTILITY. ALL WORK SHALL BE PERFORMED IN ACCORD WITH ALL FEDERAL, STATE AND/OR LOCAL RULES, REGULATIONS, STANDARD AND SAFETY REQUIREMENTS. UTILITIES SHALL BE INSTALLED IN ACCORD WITH THE APPLICABLE MUNICIPALITY OR UTILITY COMPANY STANDARDS. IN ALL CASES, THE MOST STRINGENT REQUIREMENT SHALL APPLY. FINAL ELECTRICAL CONNECTIONS TO FOOD SERVICE EQUIPMENT BY ELECTRICAL CONTRACTOR (TYPICAL).

X. ALL SUPPORTS FOR EQUIPMENT, DEVICES OR FIXTURES SHALL BE UNIQUE, FROM THE BUILDING STRUCTURE. DO NOT SUPPORT WORK FROM OTHER TRADES, EQUIPMENT OR SUPPORTS WITHOUT WRITTEN PERMISSION FROM THE ENGINEER AND CONSENT OF THE OTHER TRADE, IN WRITING. SUPPORTING FROM CROSS BRACING OR ROOF DECK WILL NOT BE ALLOWED.

Y. WHERE INTERRUPTING AN EXISTING UTILITY OR SERVICE DELIBERATELY OR ACCIDENTALLY, THE RESPONSIBLE CONTRACTOR SHALL WORK CONTINUOUSLY AS NEEDED TO RESTORE SAME, PROVIDING PREMIUM TIME AS NEEDED.

Z. REFER TO ARCHITECTURAL WALL ELEVATIONS (WHERE GIVEN) FOR HEIGHTS AND MOUNTING RELATIONSHIP OF OUTLETS AND EQUIPMENT. IF IN DOUBT, CONTACT THE ENGINEER FOR DIRECTION PRIOR TO INSTALLING WORK.

AA. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR HIS WORK. ALL CUTTING AND PATCHING SHALL BE IN ACCORD WITH THE ARCHITECTS STANDARDS FOR SUCH WORK. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. IF IN DOUBT, CONTACT THE ENGINEERS FOR CLARIFICATIONS PRIOR TO INSTALLING ANY SUCH WORK.

AB. INTERRUPTION OF ANY EXISTING SERVICES SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR, UTILITY COMPANY AS NECESSARY, AND THE ARCHITECT, AT LEAST TWO WEEKS IN ADVANCE OF THE ANTICIPATED INTERRUPTION. A SCHEDULE FOR THESE OUTAGES SHALL BE DEVELOPED AND AGREED UPON BETWEEN THE PARTIES MENTIONED, TO AVOID UNNECESSARY INCONVENIENCE TO THE OWNER OR ANY AFFECTED PARTY. NOTIFY THE UTILITY COMPANY OF ANY ANTICIPATED SERVICES REQUIRED TWO WEEKS IN ADVANCE, IN WRITING. IF UTILITY COMPANY REQUIRES A LONGER NOTIFICATION PERIOD, SO PROVIDE.

AC. WHERE EXIT SIGNS OR EMERGENCY BATTERY PACKS ARE PROVIDED THEY SHALL BE CONNECTED TO AN UNSWITCHED LINE.

AD. ALL MATERIALS FURNISHED AND ALL WORK INSTALLED SHALL COMPLY WITH THE CURRENT EDITION OF THE NATIONAL ELECTRICAL CODES, NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, THE REQUIREMENTS OF LOCAL UTILITY COMPANIES, AND WITH THE REQUIREMENTS OF ALL GOVERNMENTAL AGENCIES OR DEPARTMENTS HAVING JURISDICTION. IF ANY CONFLICTS OR DISCREPANCIES OCCUR THE MOST STRINGENT SHALL APPLY.

AE. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED.

AF. DO NOT SCALE FROM DRAWINGS, AS PRINTING DISTORTS SCALE. WORK SHALL BE LAID OUT FROM DIMENSIONED DRAWINGS, OR DIMENSIONS SUPPLIED TO THE CONTRACTOR.

AG. INSTALL EQUIPMENT, MATERIALS, ETC., IN STRICT ACCORD WITH MANUFACTURERS' RECOMMENDATIONS AND DIRECTIONS.

AH. THE PURPOSE AND INTENT OF ALL OF THE DOCUMENTS PERTAINING TO THIS PROJECT IS TO PROVIDE A COMPLETE, FUNCTIONAL, SAFE, LIKE NEW FACILITY. ANYTHING LESS SHALL BE UNACCEPTABLE.

AI. ALL SYSTEMS, EQUIPMENT AND MATERIALS ARE TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. WORK NOT MEETING THIS CRITERION SHALL BE REMOVED AND REINSTALLED SATISFACTORILY. FINAL DETERMINATION OF THE ACCEPTABILITY OF THE QUALITY OF WORK RESIDES WITH THE ENGINEER.

AJ. CHECK ALL THREE PHASE MOTORS WITH 0 ROTATION METER, PRIOR TO PLACING IN SERVICE.

AK. WHERE PENETRATING NEW ROOFING MEMBRANE OR OTHER MATERIALS USED FOR WEATHERPROOFING THE BUILDING, MAKE SUCH PENETRATION IN A WAY THAT WILL NOT VOID OR DIMINISH THE ROOFING WARRANTY OR INTEGRITY IN ANYWAY. ROOFING CONTRACTOR SHALL MAKE ALL ROOF PENETRATIONS.

AL. CEILING-MOUNTED ELECTRICAL DEVICES SHALL BE CENTERED IN 2' X 2' CEILING TILE AND INSTALLED CENTERED ON 2' DIMENSION OF 2' X 4' TILE AND ON CENTERLINE OR A QUARTER POINT ON 4' DIMENSION, AS INDICATED.

AM. WHERE MOUNTING HEIGHTS ARE NOT INDICATED OR ARE IN CONFLICT WITH ANY OTHER BUILDING SYSTEMS, CONTACT THE ENGINEERS BEFORE AFFECTING INSTALLATION. REFER ALSO TO ARCHITECTURAL WALL INTERIOR AND EXTERIOR WALL ELEVATIONS, CEILING HEIGHTS, AND OTHER DETAILS OF THESE DOCUMENTS, AS APPLICABLE.

AN. OBSERVE ALL APPLICABLE CODES, RULES AND REGULATIONS THAT MAY APPLY TO THE WORK UNDER THIS CONTRACT. (CITY, COUNTY, LOCAL, STATE, FEDERAL, MUNICIPALITY, UTILITY COMPANY, OSHA, ETC.)

AO. INSTALL NO PIPING, CONDUIT, DUCTWORK, ETC., IN A LOCATION OR IN A MANNER WHICH WILL ALLOW FREEZING AND THE COLLECTION OF CONDENSATION THEREON.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

STATE OF KENTUCKY
JEFFREY THOMAS PATHAK
27689
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32

DB:

CB:

DATE: 02/03/2022

SHEET NO: **E001**

ELECTRICAL GENERAL INFORMATION
FOR CONSTRUCTION

ELECTRICAL GENERAL NOTES

A. ALL EXIT SIGNS, EMERGENCY EGRESS LIGHTS, EMERGENCY BATTERIES IN LIGHT FIXTURES, AND NIGHT LIGHT FIXTURES SHALL BE CONNECTED TO THE BRANCH CIRCUITS INDICATED AHEAD OF RESPECTIVE CONTROL SWITCH OR RELAY, IN ORDER TO PROVIDE UNSWITCHED POWER TO FIXTURES.

B. ALL LIGHTING CONTROLS SHALL BE 0-10V LOW VOLTAGE.

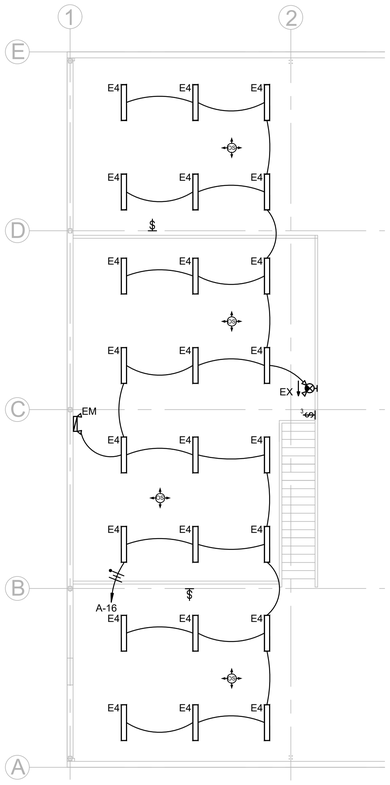
C. ELECTRICAL CONTRACTOR SHALL COORDINATE THE EXACT LOCATION AND ORIENTATION OF THE LIGHT FIXTURES IN THIS AREA WITH THE STRUCTURAL ENGINEER AND THE ARCHITECT.

ELECTRICAL KEY NOTES

1. PROVIDE LIGHTING RELAY PANEL, RELAYS WITH PHOTOCELL AND ASTRONOMICAL TIME CLOCK. COORDINATE LOCATION OF OVER RIDE SWITCH WITH ARCHITECT/OWNER. PROVIDE MANUAL OVER RIDE AT PANEL FOR EXTERIOR AND INTERIOR LIGHTS.

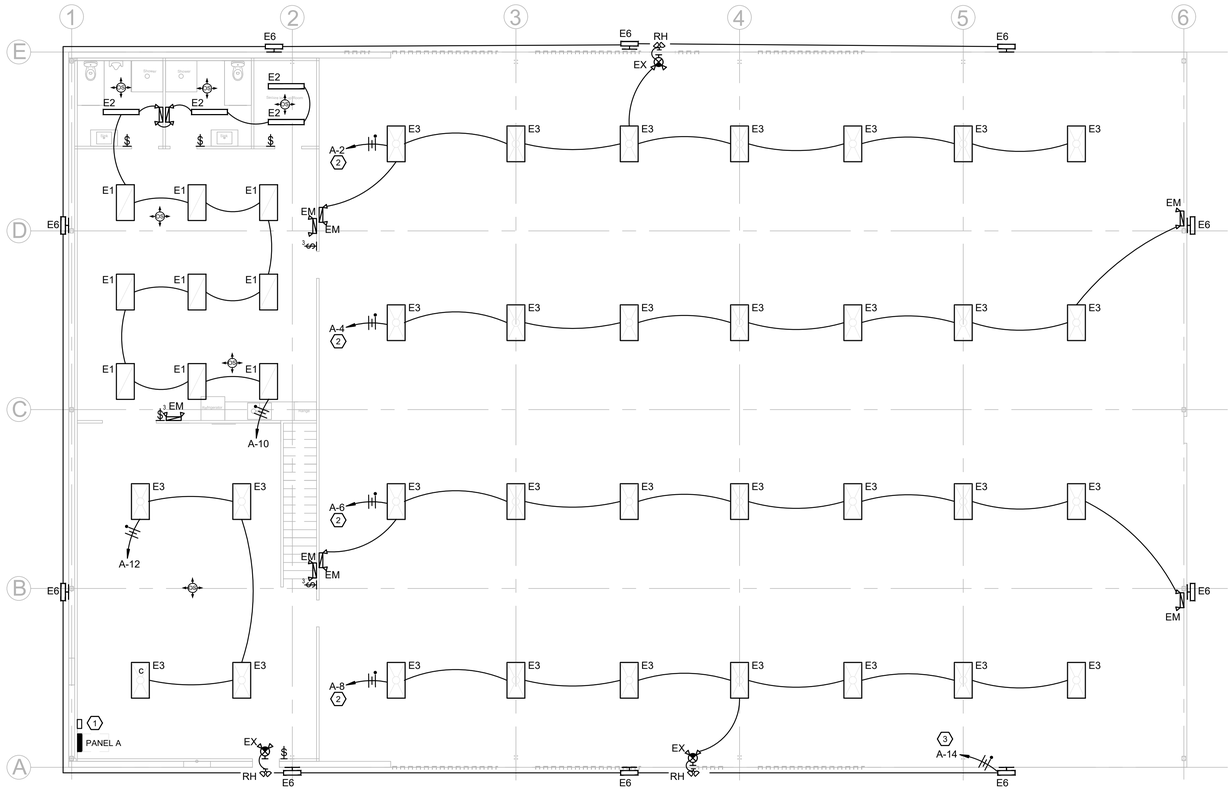
2. LIGHTING CIRCUIT THIS AREA SHALL BE ROUTED VIA LIGHTING CONTROL RELAY PANEL FOR SCHEDULED TIME CLOCK ON-OFF CONTROLS.

3. ROUTE CIRCUIT THROUGH PHOTOCELL/TIME CLOCK FOR DUSK TO DAWN CONTROLS OR SCHEDULED TIME ON-OFF.



2 MEZZANINE LIGHTING PLAN

E100 SCALE: 1/8" = 1'-0"



1 FIRST FLOOR LIGHTING PLAN

E100 SCALE: 1/8" = 1'-0"

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

STATE OF KENTUCKY
ELIAS PATHAK
27689
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32

DB:

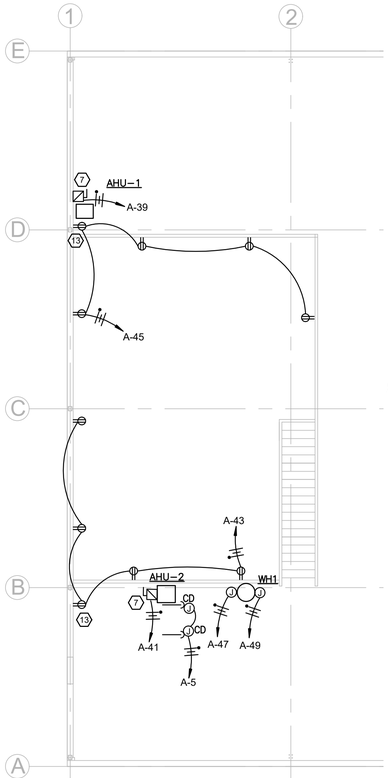
CB:

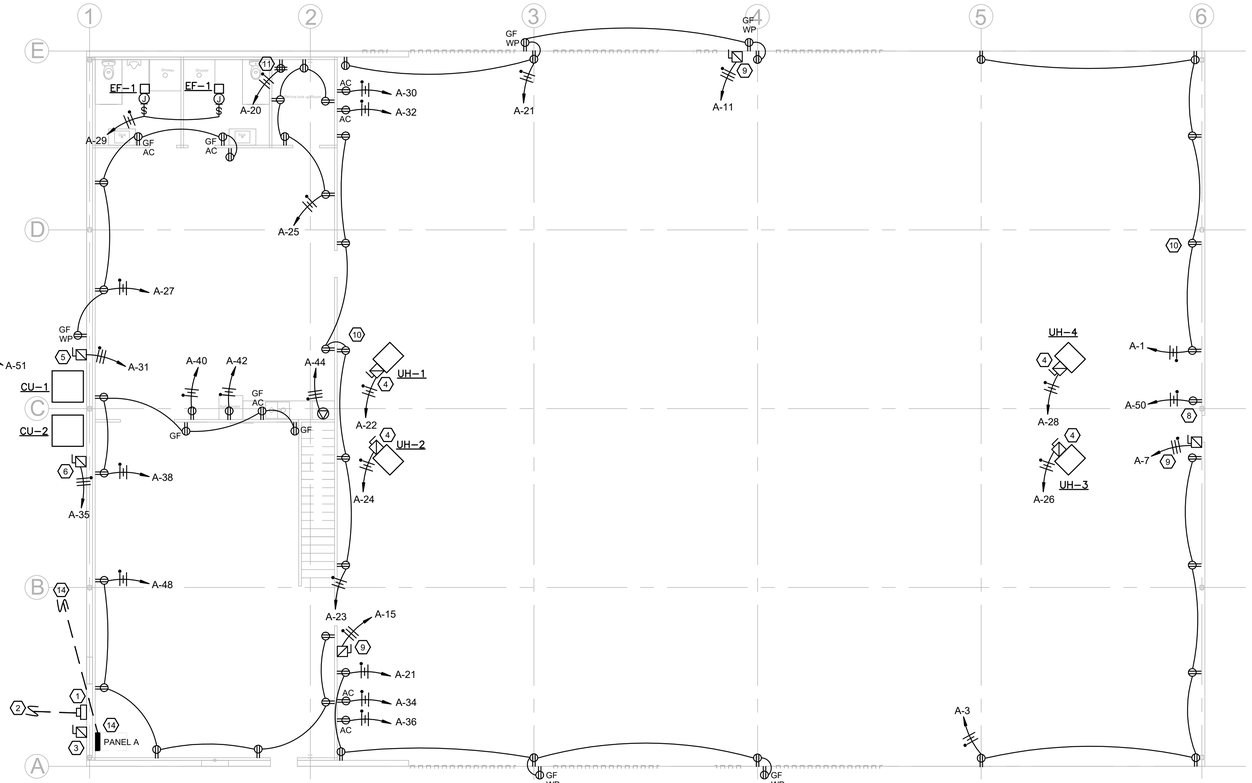
DATE: 02/03/2022

SHEET NO: **E100**

ELECTRICAL LIGHTING PLAN

FOR CONSTRUCTION





GENERAL ELECTRICAL NOTES

A. ELECTRICAL CONTRACTOR SHALL MAKE CONTACT WITH ELECTRIC SERVICE PROVIDER FOR ACTUAL LOCATION OF CONNECTION POINTS.

B. ALL THE DEVICE COVERPLATES WITHIN THE SHOP SHALL BE STAINLESS STEEL TYPE.

C. PROVIDE PULL WIRE IN EACH EMPTY CONDUIT.

D. ALL EXTERIOR ELECTRICAL DEVICES AND EQUIPMENT SHALL BE WEATHERPROOF TYPE NEMA 3R MINIMUM.

E. ALL ELECTRICAL COMPONENTS OR EQUIPMENT SHALL BE LABELED BY UNDERWRITER'S LABORATORIES OR OTHER APPROVED LISTING AGENCY. APPROVED AND LABELING OF INDIVIDUAL COMPONENTS ON AN ASSEMBLY IS NOT ACCEPTABLE AS MEETING THIS REQUIREMENT.

F. ALL WIRING SYSTEMS SHALL BE INSTALLED WITH A MINIMUM OF SPLICES. CONDUCTORS. WHETHER SINGLE OR MULTI-PAIR SHALL EB INSTALLED CONTINUOUS INSOFAR AS POSSIBLE FROM TERMINAL POINT TO TERMINAL POINT.

G. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED.

H. ALL SYSTEMS, EQUIPMENT AND MATERIALS ARE TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. WORK NOT MEETING THE CRITERION SHALL BE REMOVED AND REINSTALLED SATISFACTORILY. FINAL DETERMINATION OF THE ACCEPTABILITY OF THE QUALITY OF WORK RESIDED WITH THE ENGINEER.

ELECTRICAL KEY NOTES

1. VERIFY THE EXACT LOCATION OF UTILITY METER AND CT CABINET WITH THE ELECTRIC SERVICE PROVIDER.
2. EXTEND THE UNDERGROUND PRIMARY CONDUIT TO THE ELECTRIC SERVICE PROVIDER TRANSFORMER MINIMUM 36 INCHES BELOW GRADE. VERIFY THE EXACT SIZE AND ROUTING OF THE CONDUIT WITH THE ELECTRIC SERVICE PROVIDER.
3. SERVICE ENTRANCE RATED MAIN SERVICE DISCONNECT SWITCH.
4. FURNISH AND INSTALL 240V, 30 AMP, 2-POLE, FUSIBLE TYPE DISCONNECT SWITCH FOR UNIT HEATER. VERIFY THE EXACT LOCATION AND CONNECTION REQUIREMENTS WITH THE MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
5. FURNISH AND INSTALL 240V, 30 AMP, NEMA 3R, FUSIBLE TYPE DISCONNECT SWITCH FOR CU-1.VERIFY THE EXACT LOCATION AND CONNECTION REQUIREMENT WITH THE MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
6. FURNISH AND INSTALL 240V, 60 AMP, NEMA 3R, FUSIBLE TYPE DISCONNECT SWITCH FOR CU-2. VERIFY THE EXACT LOCATION AND CONNECTION REQUIREMENT WITH THE MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
7. FURNISH AND INSTALL 240V, 30 AMP, 2-POLE, FUSIBLE TYPE DISCONNECT SWITCH FOR AHU-1 AND AHU-2. VERIFY THE EXACT LOCATION AND CONNECTION REQUIREMENTS WITH THE MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
8. DEDICATED RECEPTACLE FOR AIR COMPRESSOR - VERIFY THE EXACT LOCATION OF THE RECEPTACLE WITH THE OWNER PRIOR TO ROUGH-IN.
9. WELDER CONNECTION - VERIFY THE EXACT CONNECTION TYPE AND REQUIREMENT FOR THE WELDER CONNECTION WITH THE OWNER PRIOR TO ROUGH-IN.
10. ALL THE DEVICE COVER PLATES WITHIN THE SHOP SHALL BE STAINLESS STEEL TYPE. (TYPICAL).
11. IT RECEPTACLE - VERIFY THE EXACT LOCATION WITH THE OWNER PRIOR TO ROUGH-IN.
12. VERIFY THE EXACT LOCATION AND CONNECTION REQUIREMENTS OF SEWAGE EJECTOR PUMP WITH THE PLUMBING CONTRACTOR.
13. INSTALL GENERAL PURPOSE DUPLEX RECEPTACLE IN THE ATTIC CLOSE TO HVAC AND PLUMBING EQUIPMENT. VERIFY THE EXACT LOCATION IN THE FIELD.
14. ELECTRICAL CONTRACTOR SHALL PROVIDE TWO (2) SPARE EMPTY CONDUITS WITH PULL WIRE FROM THE PANELBOARD TO THE PARKING LOT FOR FUTURE EV CHARGING STATION. VERIFY THE EXACT LOCATION WITH THE OWNER.

2 E200 MEZZANINE POWER PLAN

SCALE: 1/8" = 1'-0"

1 E200 FIRST FLOOR POWER PLAN

SCALE: 1/8" = 1'-0"

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

STATE OF KENTUCKY
JEFFREY TEAS PATJAK
27689
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

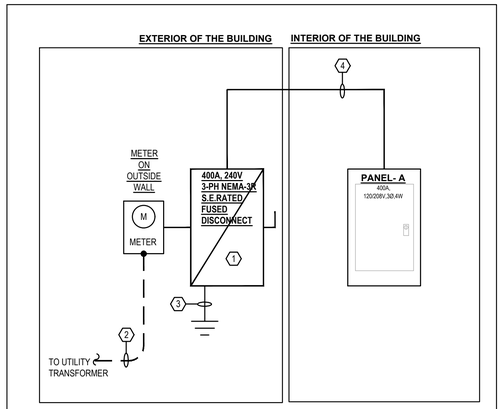
SHEET NO: **E200**

ELECTRICAL POWER PLAN

FOR CONSTRUCTION

COPPER (CU) BRANCH CIRCUIT AND FEEDER SCHEDULE

OVERCURRENT PROTECTIVE DEVICE RATING (AMPS)	CONDUCTOR SIZE PER CONDUIT		CONDUIT SIZE AND QUANTITY			
	PHASE & NEUTRAL	EQUIPMENT GROUND	1P, 1N, 1G 2P, 1G	2P, 1N, 1G 3P, 1G	3P, 1N, 1G	3P, 3N, 1G
15-20	12	12	3/4"	3/4"	3/4"	3/4"
25	12	10	3/4"	3/4"	3/4"	3/4"
30-35	10	10	3/4"	3/4"	3/4"	3/4"
40-50	8	10	3/4"	3/4"	3/4"	1"
60	6	10	3/4"	3/4"	1"	1"
70-80	4	8	3/4"	1"	1-1/4"	1-1/4"
90-100	3	8	1"	1"	1-1/4"	1-1/2"
110	2	6	1"	1-1/4"	1-1/4"	1-1/2"
125	1	6	1-1/4"	1-1/4"	1-1/2"	2"
150	1/0	6	1-1/4"	1-1/2"	1-1/2"	2"
175	2/0	6	1-1/4"	1-1/2"	2"	2-1/2"
200	3/0	6	1-1/2"	2"	2	2-1/2"
225	4/0	4	1-1/2"	2"	2-1/2"	3"
250	250	4	2"	2"	2-1/2"	3"
300	350	4	2"	2-1/2"	3"	3-1/2"



1 ONE-LINE DIAGRAM
SCALE: N.T.S.

ONE-LINE DIAGRAM NOTES

1. VERIFY THE EXACT UTILITY REQUIREMENTS AND LOCATION FOR THE METER AND SERVICE ENTRANCE RATED DISCONNECT IN THE FIELD AND COORDINATE WITH THE ELECTRIC SERVICE PROVIDER.
2. TWO SETS OF THREE (3) #3/0 AWG CU IN 3" CONDUIT. EXTEND THE UNDERGROUND PRIMARY CONDUIT TO THE ELECTRIC SERVICE PROVIDER TRANSFORMER MINIMUM 36 INCHES BELOW GRADE. VERIFY THE EXACT ROUTING OF THE CONDUIT WITH THE ELECTRIC SERVICE PROVIDER.
3. #1/0 COPPER GROUNDING ELECTRODE CONDUCTOR BONDED TO BUILDING STEEL, WATER SERVICE AND DRIVEN GROUND ROD.
4. TWO SETS OF THREE (3) #3/0 AWG AND ONE (1) #3 GROUND IN 3" CONDUIT.

PANEL A

MAIN BUS: 400 AMP MCB AIC: 65,000 AMPS
VOLTAGE: 208 /120 VOLT, 3P, 4W MOUNTING: SURFACE
LOCATION: STORAGE ROOM FED FROM: UTILITY TRANSFORMER
NOTE: VERIFY EXACT LOCATION WITH THE OWNER

DESCRIPTION	CIRCUIT VA	TRIP/ POLE	OPTION	PHASE			OPTION	TRIP/ POLE	CIRCUIT VA	DESCRIPTION
RECEPTACLES SHOP	900	20/1	G	1	A	2		20/1	700	LIGHTING SHOP
RECEPTACLES SHOP	900	20/1	G	3	B	4		20/1	700	LIGHTING SHOP
CONTROL DAMPERS	400	20/1		5	C	6		20/1	700	LIGHTING SHOP
WELDER CONENCTION	4160	50/2		7	A	8		20/1	700	LIGHTING SHOP
-	4160	-		9	B	10		20/1	607	LIGHTING RR BREAKROOM
WELDER CONNECTION	4160	50/2		11	C	12		20/1	204	LIGHTING
-	4160	-		13	A	14		20/1	500	EXTERIOR LIGHTS
WELDER CONNECTION	4160	50/2		15	B	16		20/1	1104	MEZZANINE LIGHTS
-	4160	-		17	C	18		20/1		SPARE
RECEPTACLES SHOP	1080	20/1	G	19	A	20		20/1	500	IT RECEPTACLES
RECEPTACLES SHOP	900	20/1	G	21	B	22		20/1	500	UH-1
RECEPTACLES SHOP	1080	20/1	G	23	C	24		20/2	500	UH-2
RECEPTACLES SECURE ROOM	900	20/1		25	A	26		20/1	500	UH-3
RECEPTACLES RESTROOM	1080	25/2		27	B	28		20/1	500	UH-4
EF-1	400	-		29	C	30		20/1	500	DEDICATED RECEPTACLE SHOP
CU-1	2040	25/2		31	A	32		20/1	500	DEDICATED RECEPTACLE SHOP
-	2040	-		33	B	34		20/1	500	DEDICATED RECEPTACLE SHOP
CU-2	3240	45/2		35	C	36		20/1	500	DEDICATED RECEPTACLE SHOP
-	3240	-		37	A	38		20/1	900	RECEPTACLES BREAKROOM
AHU-1	1260	20/1		39	B	40		20/1	800	DEDICATED RECEPTACLE BREAK
AHU-2	1968	20/1		41	C	42		20/1	1000	REFRIGERATOR BREAK ROOM
RECEPTACLES MEZZANINE	540	20/1		43	A	44		30/2	2400	RANGE BREAK ROOM
RECEPTACLES MEZZANINE	540	20/1		45	B	46		-	2400	-
WH1	200	20/1		47	C	48		20/1	1080	REEPTACLES
WH1 CIRCULATION PUMP	200	20/1		49	A	50		20/1	1200	COMPRESSOR
⊛ SEWAGE EJECTOR PUMP	1440	20/2		51	B	52		20/1		SPARE
-	1440	-		53	C	54		20/1		SPARE
FUTURE EV CHARGING STATION		40/2		55	A	56		20/1		SPARE
-		-		57	B	58		20/1		SPARE
FUTURE EV CHARGING STATION		40/2		59	C	60		20/1		SPARE
-		-		61	A	62		20/1		SPARE
FUTURE EV CHARGING STATION		40/2		63	B	64		20/1		SPARE
-				65	C	66		20/1		SPARE
FUTURE EV CHARGING STATION		40/2		67	A	68		20/1		SPARE
-		-		69	B	70		20/1		SPARE
FUTURE EV CHARGING STATION		40/2		71	C	72		20/1		SPARE
-		-		73	A	74		20/1		SPARE
FUTURE EV CHARGING STATION		40/2		75	B	76		20/1		SPARE
-		-		77	C	78		20/1		SPARE
SPARE		20/1		79	A	80		20/1		SPARE
SPARE		20/1		81	B	82		20/1		SPARE
SPARE		20/1		83	C	84		20/1		SPARE

CONNECTED KVA: 70 KVA
CONNECTED AMPS: 195.0 AMPS

G - INDICATES GROUND FAULT CIRCUIT INTERRUPTER
A - INDICATES ARC FAULT CIRCUIT INTERRUPTER
ST - INDICATES SHUNT TRIP
E - INDICATES EXISTING

⊛ NOTE: VERIFY THE EXACT LOCATION AND CONNECTION REQUIREMENT FOR THE SEWAGE EJECTOR PUMP WITH THE PLUMBING CONTRACTOR.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

STATE OF KENTUCKY
JEJAS PATHAK
27689
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: **E300**

ONE LINE DIAGRAM AND SCHEDULES

FOR CONSTRUCTION

ELECTRICAL SPECIFICATION

ELECTRICAL GENERAL REQUIREMENTS

PART 1 – GENERAL

1.1 WORK INCLUDED

A. FURNISH ALL MATERIALS, LABOR AND EQUIPMENT NECESSARY TO CONSTRUCT A COMPLETE AND FUNCTIONAL ELECTRICAL SYSTEM AS FURTHER DESCRIBED IN THESE SPECIFICATIONS AND ON DESIGN DRAWINGS.

B. WORK UNDER THIS SECTION SHALL INCLUDE FINAL ELECTRICAL CONNECTIONS TO ALL EQUIPMENT FURNISHED UNDER OTHER SECTIONS OF THESE SPECIFICATIONS.

C. CONTRACTOR SHALL FURNISH AND INSTALL ALL MISCELLANEOUS EQUIPMENT, MATERIAL AND LABOR WHICH, THOUGH NOT SPECIFICALLY CALLED FOR IN THIS SPECIFICATION, IS NECESSARY FOR A COMPLETE AND SATISFACTORY OPERATING INSTALLATION. CONTRACTOR SHALL LEAVE HIS WORK IN OPERATING CONDITION.

D. THIS SECTION (ELECTRICAL GENERAL REQUIREMENTS) APPLIES EQUALLY TO ELECTRICAL, HEATING, VENTILATING, AIR CONDITIONING, AND PLUMBING.

1.2 MATERIALS, EQUIPMENT AND WORKMANSHIP

A. MATERIALS AND EQUIPMENT USED THROUGHOUT SHALL BE NEW AND THE BEST OF THEIR RESPECTIVE KINDS. NO SUBSTITUTIONS, OTHER THAN THOSE SPECIFIED, SHALL BE USED UNLESS APPROVED BY THE ARCHITECT AND ENGINEER. ALL WORK SHALL BE EXECUTED WITH SPEED AND CONSISTENT WITH SAFETY AND GOOD WORKMANSHIP. SUBSTITUTIONS OF EQUAL EQUIPMENT WILL BE ACCEPTABLE ONLY IF APPROVED IN WRITING BY ARCHITECT AND ENGINEER 10–DAYS PRIOR TO BID.

B. ALL MATERIALS SHALL BEAR THE UL LABEL WHERE SUCH STANDARDS HAS BEEN ESTABLISHED AND LISTED BY UNDERWRITERS LABORATORIES, INC.

C. COMPETENT WORKMEN SHALL BE EMPLOYED ON ALL PHASES OF THE WORK. POOR WORKMANSHIP WILL BE REJECTED AND WILL CONSTITUTE CAUSE FOR REMOVAL OF THE INDIVIDUAL PERFORMING THE WORK.

D. ALL MATERIAL, EQUIPMENT AND LOCATIONS OF SAME SHALL AT LEAST CONFORM WITH THE STANDARDS OF THE UNDERWRITERS LABORATORIES, INC. WHENEVER APPLICABLE.

E. SHOULD ANY DISPUTE ARISE AS TO THE QUALITY OR FITNESS OF MATERIALS, EQUIPMENT OR WORKMANSHIP, THE DECISION RESTS STRICTLY WITH THE ARCHITECT.

1.3 PERMITS, CODES AND INSPECTIONS

A. ELECTRICAL CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED FOR ELECTRICAL INSTALLATION.

B. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC), NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND LOCAL UTILITY COMPANY REQUIREMENTS.

C. ELECTRICAL CONTRACTOR SHALL FURNISH FINAL INSPECTION CERTIFICATION TO THE OWNER UPON COMPLETION OF WORK. CERTIFICATE SHALL BE FROM LOCAL INSPECTION AUTHORITY.

D. WHERE APPARENT CONTRADICTIONS ARE DISCOVERED BETWEEN LOCAL CODES, NEC, SPECIFICATIONS AND DRAWINGS, MOST STRINGENT OR SAFEST REQUIREMENT WILL PREVAIL. BEYOND THIS, ORDER OF COMPLIANCE SHALL BE:
1. LOCAL CODES/INSPECTOR
2. NATIONAL ELECTRICAL CODE
3. SPECIFICATIONS AND DRAWINGS

1.4 PERMITS, CODES AND INSPECTIONS

A. ELECTRICAL CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED FOR ELECTRICAL INSTALLATION.

B. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC), NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND LOCAL UTILITY COMPANY REQUIREMENTS.

C. ELECTRICAL CONTRACTOR SHALL FURNISH FINAL INSPECTION CERTIFICATION TO THE OWNER UPON COMPLETION OF WORK. CERTIFICATE SHALL BE FROM LOCAL INSPECTION AUTHORITY.

D. WHERE APPARENT CONTRADICTIONS ARE DISCOVERED BETWEEN LOCAL CODES, NEC, SPECIFICATIONS AND DRAWINGS, MOST STRINGENT OR SAFEST REQUIREMENT WILL PREVAIL. BEYOND THIS, ORDER OF COMPLIANCE SHALL BE:
1. LOCAL CODES/INSPECTOR
2. NATIONAL ELECTRICAL CODE
3. SPECIFICATIONS AND DRAWINGS

1.5 DRAWINGS AND SPECIFICATIONS

A. DO NOT SCALE DRAWINGS. SCALE OF DRAWINGS IS APPROXIMATE. EXACT LOCATIONS, DISTANCES, LEVELS AND OTHER CONDITIONS SHALL BE GOVERNED BY FIELD CONDITIONS.

B. FOR PURPOSE OF CLEARNESS AND LEGIBILITY, THE DRAWINGS ARE ESSENTIALLY DIAGRAMMATIC. ALTHOUGH SIZE AND LOCATION OF THE EQUIPMENT IS DRAWN TO SCALE WHEREVER POSSIBLE.

C. THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO COVER ALL WORK ENUMERATED UNDER THE RESPECTIVE HEADINGS. THE SUB–CONTRACTORS SHALL NOT TAKE ADVANTAGE OF CONFLICT OR ERROR BETWEEN DRAWINGS AND SPECIFICATIONS, BUT SHALL REQUEST A CLARIFICATION OF SUCH BEFORE MAKING HIS PROPOSAL SHOULD THIS CONDITION EXIST.

D. CONTRACTORS SHALL OBTAIN A SET OF THE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS, AND CONSULT WITH THE ARCHITECT AND GENERAL CONTRACTOR AS TO THE GENERAL CONSTRUCTION OF THE BUILDING AND THE ORDER AND TIME OF PLACEMENT OF ALL ELECTRICAL WORK.

E. THE DRAWINGS ACCOMPANYING THESE SPECIFICATIONS DETERMINE THE GENERAL DESIGN OF THE EQUIPMENT. EXACT DISPOSITION OF THE EQUIPMENT IS SUBJECT TO THE REQUIREMENTS AND CONSTRUCTION OF THE MANUFACTURER'S STANDARD, BUT THE SPACE OCCUPIED AND GENERAL DESIGN SHALL CORRESPOND TO THAT SHOWN ON THE PLANS.

F. SUBMIT A COMPLETE LIST WITHIN FIFTEEN (15) CALENDAR DAYS AFTER AWARD OF CONTRACT, FOR ALL MATERIALS TO BE USED. NOTE ANY DEVIATIONS FROM SPECIFICATIONS OR PROPOSED "EQUIPMENTS" AND INCLUDE MANUFACTURER'S NAME, CATALOG NUMBER AND DESCRIPTIVE LITERATURE FOR EACH.

1.6 SUBMITTALS

A. ELECTRICAL CONTRACTOR SHALL PROVIDE SUBMITTALS FOR REVIEW AND APPROVAL ON ALL EQUIPMENT AND MATERIAL USED FOR THE PROJECT.

B. SUBMITTALS SHALL CLEARLY INDICATE ELECTRICAL CHARACTERISTICS, PHYSICAL DIMENSIONS AND PERTINENT DATA WHICH INDICATE THAT ITEM MEETS ALL REQUIREMENTS SPECIFIED ON DRAWINGS AND IN TECHNICAL SPECIFICATIONS.

C. EACH SUB–CONTRACTOR SHALL SUBMIT TO THE GENERAL CONTRACTOR FOR REVIEW WITHIN THIRTY (30) DAYS AFTER THE DATE OF THE CONTRACT, SEVEN (7) SETS OF COMPLETE CATALOGUE DATA AND/OR SHOP DRAWINGS FOR EACH ITEM OF MATERIAL OR PIECE OF EQUIPMENT. CATALOG DATA SHALL INCLUDE NAME OF THE MANUFACTURER, CATALOG NUMBERS, TRADE NAMES, PERFORMANCE DATA, DESCRIPTIVE MATERIAL (SUFFICIENT TO IDENTIFY EACH ITEM), AND SPECIFY PERFORMANCE OF THE PRODUCTS. SHOP DRAWINGS SHALL INCLUDE SPECIFIED CATALOGUE DATA AND SHALL SHOW EQUIPMENT IN DETAIL, ARRANGEMENT AND DISPOSITION FOR THIS PARTICULAR PROJECT DESIGN.

D. THE ARCHITECT AND/OR ENGINEER CHECKING AND REVIEWING OF THE CONTRACTOR'S AND SUB–CONTRACTOR'S DRAWINGS AND/OR EQUIPMENT DETAILS DOES NOT RELIEVE THE CONTRACTOR OR SUB–CONTRACTORS FROM RESPONSIBILITY FOR ERRORS, OMISSIONS OR EQUIPMENT FURNISHED IN ACCORDANCE WITH SUCH CHECKED OR REVIEWED DRAWINGS. WHERE SUCH ERRORS OR OMISSIONS ARE LATER DISCOVERED, THEY SHALL BE MADE GOOD BY THE RESPECTIVE SUB–CONTRACTOR IRRESPECTIVE OF ANY REVIEW BY THE ARCHITECT OR ENGINEER.

1.7 SITE EXAMINATION

A. EACH CONTRACTOR SHALL, BEFORE SUBMITTING A PROPOSAL, VISIT AND EXAMINE THE SITE TO SATISFY THEMSELVES AS TO MATERIALS AND SCOPE OF THE CONSTRUCTION, ALTERATIONS AND REMODELING, ANY DIFFICULTY ATTENDING THE PERFORMANCE OF THE WORK, STORAGE OF MATERIAL, ACCESS TO ANY AND ALL AREAS, ETC.

B. THE SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE. CLAIMS MADE SUBSEQUENT TO THE TIME OF SUBMISSION OF THE PROPOSAL FOR LABOR, EQUIPMENT AND MATERIAL REQUIRED FOR DIFFICULTIES ENCOUNTERED, WHICH COULD HAVE BEEN FORESEEN HAD AN EXAMINATION BEEN MADE, WILL NOT BE RECOGNIZED.

1.8 QUALIFICATIONS

A. CONTRACTORS MUST HAVE FIVE (5) YEARS MINIMUM EXPERIENCE, HAS A SATISFACTORY WORK RESUME WITH COMPARABLE PROJECTS LISTED, HAS A SOUND FINANCIAL BASIS, AND IS TECHNICALLY COMPETENT.

B. EQUIPMENT MANUFACTURERS MUST HAVE FIVE (5) YEARS OF SUCCESSFUL EXPERIENCE, BE TECHNICALLY COMPETENT, AND BE INDUSTRIAL FINANCIALLY STABLE.

C. OWNER RESERVES THE RIGHT TO REVIEW AND DETERMINE IF THE CONTRACTORS AND MANUFACTURERS MEET THE ABOVE CATEGORIES TO HIS SATISFACTION. THE OWNER HAS THE AUTHORITY TO REJECT ANY EQUIPMENT AND BIDS IF THE ABOVE STANDARDS ARE NOT MET.

1.9 DEBRIS, CUTTING AND PATCHING

A. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ANY DIRT, BOXES, PAPER OR OTHER DEBRIS PRESENT AS A RESULT OF HIS WORK.

B. WORK AREAS SHALL BE MAINTAINED IN A CLEAN AND ORDERLY CONDITION AT ALL TIMES.

C. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR HIS WORK. ALL WORK SHALL BE BY SKILLED CRAFTSMEN.

D. NO MORE CUTTING SHALL BE DONE THAN IS ABSOLUTELY NECESSARY. CUTTING OF A STRUCTURAL MEMBER OR EXPOSED SURFACE OF CONCRETE WILL NOT BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE ARCHITECT AND STRUCTURAL ENGINEER.

E. CONDUIT OPENINGS IN FLOOR SLABS SHALL BE CUT WITH CORE DRILL. EDGES OF TRENCHES OR OPENINGS IN SLABS SHALL BE SCRIBE CUT WITH MASONRY SAW.

F. EACH SUB–CONTRACTOR WILL BE REQUIRED TO NOTIFY OTHER TRADES IN DUE TIME WHERE HE WILL REQUIRE OPENINGS OR CHASES IN NEW MASONRY. EACH SUB–CONTRACTOR SHALL ALSO SET ALL CONCRETE INSERTS AND SLEEVES FOR HIS WORK IN NEW CONSTRUCTION. FAILING TO DO THIS, HE SHALL CUT OPENINGS FOR HIS WORK AND PATCH AS REQUIRED AT HIS OWN EXPENSE.

G. ALL CUTTING AND PATCHING SHALL BE DONE IN A NEAT AND WORKMANLIKE MANNER BY MEN SKILLED IN THE VARIOUS TRADES AND WITH WRITTEN PERMISSION FROM THE ARCHITECT.

1.10 WARRANTY

A. THE ELECTRICAL CONTRACTOR SHALL WARRANTY ALL MATERIAL AND LABOR FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF OWNER'S ACCEPTANCE EXCEPT WHERE WARRANTIES FOR LONGER TERMS ARE SPECIFIED HEREIN, SUCH LONGER TERM TO APPLY.

B. THE ELECTRICAL CONTRACTOR SHALL REPLACE DEFECTIVE PARTS OR EQUIPMENT PROMPTLY WITHOUT ANY COST TO THE OWNER AND DONE TO THE OWNER'S SATISFACTION.

1.11 DELIVERY, STORAGE, AND HANDLING

A. DELIVER, STORE, PROTECT, AND HANDLE PRODUCTS TO THE PROJECT SITE PROPERLY IDENTIFIED WITH MANUFACTURERS IDENTIFICATION, MODEL NUMBER, TYPES, GRADES, COMPLIANCE LABELS, AND OTHER INFORMATION NEEDED FOR IDENTIFICATION.

B. PROTECT PRODUCTS FROM WEATHER, CONSTRUCTION TRAFFIC, DIRT, WATER CHEMICALS, AND MECHANICAL DAMAGE BY STORING IN ORIGINAL PACKAGING.

1.12 AS–BUILT DRAWINGS

A. MAINTAIN AN ACCURATE SET OF "AS BUILT" DRAWINGS AND RECORD ANY DEVIATIONS FROM CONTRACT DRAWINGS. SUBMIT TWO (2) SETS OF DRAWINGS (MARKED TO SHOW ALL DEVIATIONS) UPON COMPLETION OF WORK TO GENERAL CONTRACTOR.

B. AS–BUILT DRAWINGS SHALL SHOW ALL CHANGES, ADDITIONS, DELETIONS, AND DEVIATIONS FROM CONTRACT DRAWINGS NOTED PLAINLY THEREON. SPECIAL EMPHASIS IS PLACED ON RECORDING THE EXACT LOCATION OF ALL UNDERGROUND UTILITIES BY OFFSET DISTANCES TO BUILDING CORNERS, WALLS, CURBS, ETC.

PART 2 – PRODUCTS

2.1 MATERIALS

A. ALL MATERIALS AND EQUIPMENT INSTALLED SHALL BE NEW AND FREE OF DEFECTS AND SHALL BE THE PRODUCT OF A REPUTABLE MANUFACTURER AND SUBJECT TO APPROVAL.

B. APPLICABLE EQUIPMENT AND MATERIALS SHALL BE LISTED BY UNDERWRITERS LABORATORIES AND MANUFACTURED IN ACCORDANCE WITH ASME, NEMA, ANSI AND IEEE STANDARDS, AND AS APPROVED BY LOCAL AUTHORITIES HAVING JURISDICTION.

C. IF PRODUCTS AND MATERIALS ARE SPECIFIED OR INDICATED ON THE DRAWINGS FOR A SPECIFIC ITEM OR SYSTEM, USE THOSE PRODUCTS OR MATERIALS. IF PRODUCTS AND MATERIALS ARE NOT LISTED IN EITHER OF THE ABOVE, USE FIRST CLASS PRODUCTS AND MATERIALS, SUBJECT TO APPROVAL OF SHOP DRAWINGS WHERE SHOP DRAWINGS ARE REQUIRED OR AS APPROVED IN WRITING WHERE SHOP DRAWINGS ARE NOT REQUIRED.

2.2 MISCELLANEOUS STEEL

A. PROVIDE ALL NECESSARY MISCELLANEOUS STEEL AS REQUIRED FOR MOUNTING, HANGING OR OTHERWISE SUPPORTING PANELBOARDS, WALL–MOUNTED TRANSFORMERS, LIGHT FIXTURES, CONDUIT, ETC. INSTALLED BY ELECTRICAL CONTRACTOR.

B. SUPPORTS SHALL BE SUITABLY FASTENED TO STRUCTURAL MEMBERS AS APPROVED BY ARCHITECT AND STRUCTURAL ENGINEER.

2.3 IDENTIFICATION, NAMEPLATES AND LABELING

A. PROVIDE TYPEWRITTEN CIRCUIT DIRECTORIES IN PANELS WITH CLEAR PLASTIC PROTECTION SHIELDS AND MOUNTED IN CARD HOLDERS. INDICATE CIRCUIT NUMBER, DEVICES OR EQUIPMENT BEING SERVICED. FINAL DIRECTORIES SHALL REFLECT FINAL INSTALLATION, REFLECTING ALL REVISIONS MADE DURING CONSTRUCTION AND SHALL REFLECT FINAL "AS–BUILT" CONDITIONS.

B. LABEL ALL PANELS, STARTERS, AND SWITCHBOARDS WITH PANEL DESIGNATION IN ONE–HALF INCH (1/2") LETTERS AND VOLTAGE IN ONE–QUARTER INCH (1/4") LETTERS. USE ENGRAVED LAMACOID PLATES WITH BLACK BACKGROUND AND WHITE LETTERS. FASTEN PLATE ABOVE DOOR ON PANEL TRIM BY USING ALUMINUM SCREWS.

2.4 EQUIPMENT BOARDS

A. PROVIDE THREE–QUARTER INCH (3/4") THICK FIRE RETARDANT PLYWOOD BOARD OF SIZE REQUIRED TO MOUNT ELECTRICAL EQUIPMENT, TELEPHONE EQUIPMENT, ETC. AS SHOWN ON DRAWINGS.

B. BOARD SHALL BE SUITABLY ATTACHED TO STRUCTURE AS REQUIRED TO SUPPORT EQUIPMENT.

C. BOARD SHALL BE PAINTED WITH BLACK ENAMEL PRIOR TO MOUNTING EQUIPMENT.

PART 3 – EXECUTION

3.1 ROUGH_IN

A. VERIFY FINAL LOCATIONS FOR ROUGH–INS WITH FIELD MEASUREMENTS AND WITH THE SHOP DRAWING REQUIREMENTS OF THE ACTUAL EQUIPMENT TO BE CONNECTED.

3.2 ELECTRICAL INSTALLATION

A. FOLLOW MANUFACTURERS INSTRUCTIONS FOR INSTALLING, CONNECTING, AND ADJUSTING ALL EQUIPMENT. PROVIDE A COPY OF SUCH INSTRUCTIONS AT THE EQUIPMENT DURING ANY WORK ON THE EQUIPMENT. PROVIDE ALL SPECIAL SUPPORTS, CONNECTIONS, WIRING, ACCESSORIES, ETC.

B. GENERAL: UNLESS OTHERWISE INDICATED, HOOK UP ALL EQUIPMENT REQUIRING ELECTRICAL SERVICES, WHETHER SUCH EQUIPMENT IS FURNISHED UNDER THIS SECTION OR FURNISHED BY OTHERS. COMPLY WITH THE FOLLOWING REQUIREMENTS:
1. WORK SPECIFIED UNDER THIS SECTION MAY BE AFFECTED BY WORK AND MATERIALS SPECIFIED UNDER OTHER SECTIONS OF THESE SPECIFICATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF WORK DESCRIBED UNDER THIS SECTION WITH THE OTHER SECTIONS.
2. VERIFY ALL DIMENSIONS BY FIELD MEASUREMENTS.
3. ARRANGE FOR CHASES, SLOTS, AND OPENINGS IN OTHER BUILDING COMPONENTS DURING PROGRESS OF CONSTRUCTION, TO ALLOW FOR ELECTRICAL INSTALLATIONS.
4. COORDINATE THE INSTALLATION OF REQUIRED SUPPORTING DEVICES AND SLEEVES TO BE SET IN POURED–IN–PLACE CONCRETE AND OTHER STRUCTURAL COMPONENTS, AS THEY ARE CONSTRUCTED.
5. SEQUENCE, COORDINATE, AND INTEGRATE INSTALLATIONS OF ELECTRICAL MATERIALS AND EQUIPMENT FOR EFFICIENT FLOW OF THE WORK.
6. COORDINATE CONNECTION OF ELECTRICAL SYSTEMS WITH EXTERIOR UNDERGROUND AND OVERHEAD UTILITIES AND SERVICES. COMPLY WITH REQUIREMENTS OF GOVERNING REGULATIONS, FRANCHISED SERVICE COMPANIES, AND CONTROLLING AGENCIES. PROVIDE REQUIRED CONNECTION FOR EACH SERVICE.
7. INSTALL SYSTEMS, MATERIALS, AND EQUIPMENT TO CONFORM WITH APPROVED SUBMITTAL DATA, INCLUDING COORDINATION DRAWINGS, TO GREATEST EXTENT POSSIBLE. CONFORM TO ARRANGEMENTS INDICATED BY THE CONTRACT DOCUMENTS, RECOGNIZING THAT PORTIONS OF THE WORK ARE SHOWN ONLY IN DIAGRAMMATIC FORM. WHERE COORDINATION REQUIREMENTS CONFLICT WITH INDIVIDUAL SYSTEM REQUIREMENTS, REFER CONFLICT TO THE ENGINEER/OWNER.
8. INSTALL SYSTEMS, MATERIALS, AND EQUIPMENT LEVEL AND PLUMB, PARALLEL AND PERPENDICULAR TO OTHER BUILDING SYSTEMS AND COMPONENTS, WHERE INSTALLED EXPOSED IN FINISHED SPACES.
9. INSTALL ELECTRICAL EQUIPMENT TO FACILITATE SERVICING, MAINTENANCE, AND REPAIR OR REPLACEMENT OF EQUIPMENT COMPONENTS. AS MUCH AS PRACTICAL, CONNECT EQUIPMENT FOR EASE OF DISCONNECTING, WITH MINIMUM OF INTERFERENCE WITH OTHER INSTALLATIONS.

3.3 WORKMANSHIP, COOPERATION AND COORDINATION

A. ALL WORK UNDER THIS SECTION SHALL BE COMPLETED BY WORKMEN SKILLED IN THEIR RESPECTIVE TRADES.

B. WORKMEN SHALL BE THOROUGHLY TRAINED AND FAMILIAR WITH MANUFACTURER'S RECOMMENDED METHODS OF INSTALLATION.

C. ANY INSTALLATION WHICH DOES NOT PRESENT AN APPEARANCE OF THE BEST TRADE PRACTICES SHALL BE REPAIRED, REMOVED OR REPLACED AS DIRECTED BY OWNERS REPRESENTATIVE.

D. ELECTRICAL CONTRACTOR SHALL COOPERATE WITH OTHER TRADES TO OBTAIN MOST PRACTICAL ARRANGEMENT OF WORK.

E. ELECTRICAL CONTRACTOR SHALL COORDINATE INSTALLATION WITH OTHER TRADES TO MINIMIZE INTERFERENCES. "FIRST TO INSTALL" WILL NOT BE JUSTIFICATION FOR INTERFERENCES.

3.4 CLEANING AND TESTING

A. CLEAN ALL EQUIPMENT, PANELS, DISCONNECTS, LIGHT FIXTURES, DEVICE OUTLETS AND PLATES, RACEWAY SYSTEMS AND OTHER ELECTRICAL COMPONENTS AFTER CONSTRUCTION COMPLETION AND PRIOR TO OWNER'S ACCEPTANCE.

B. TEST COMPLETE ELECTRICAL SYSTEM AND ALL COMPONENTS TO ASSURE PROPER OPERATION. FURNISH TO ARCHITECT/ENGINEER ANY TEST RESULTS REQUIRED TO PROVE PROPER SYSTEM OPERATION.

3.5 EQUIPMENT CONNECTIONS

A. ELECTRICAL CONTRACTOR SHALL CONNECT ALL POWER WIRING TO ANY EQUIPMENT FURNISHED BY OTHERS, UNLESS INDICATED OTHERWISE.

B. ELECTRICAL CONTRACTOR SHALL INSTALL ALL RELAYS AND CONTROL INTERLOCKS REQUIRED FOR HIS EQUIPMENT. ELECTRICAL CONTRACTOR SHALL FURNISH ANY MAGNETIC STARTERS REQUIRED FOR HVAC EQUIPMENT.

C. ELECTRICAL CONTRACTOR SHALL FURNISH ALL MATERIALS (I.E. DISCONNECT SWITCHES, JUNCTION BOXES, RECEPTACLES, CORDS, PLUGS, ETC.) AND LABOR NECESSARY TO COMPLETE FINAL CONNECTIONS TO ALL EQUIPMENT.

D. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING FINAL CONNECTION TO ALL OWNER FURNISHED EQUIPMENT INDICATED ON PLANS. CONTRACTOR SHALL CHECK LIST FROM OWNER WITH DRAWINGS AND INFORM OWNER OF ANY DISCREPANCIES.

E. ELECTRICAL CONTRACTOR SHALL OBTAIN SHOP DRAWINGS AND/OR CUT SHEETS FOR ALL EQUIPMENT SUPPLIED BY OTHERS WHICH REQUIRES ELECTRICAL CONNECTIONS PRIOR TO ROUGH–IN. ELECTRICAL CONTRACTOR SHALL CONFIRM THAT ELECTRICAL SERVICES PROVIDED FOR EQUIPMENT ON DRAWINGS ARE CORRECT FOR EQUIPMENT TO BE INSTALLED. INFORM ENGINEER OF ANY DISCREPANCIES. ANY WORK INSTALLED WHICH DOES NOT MATCH THE REQUIREMENTS OF THE EQUIPMENT TO BE INSTALLED SHALL BE REMOVED AT THE EXPENSE OF THE ELECTRICAL CONTRACTOR.

F. BEFORE CONNECTING ANY PIECE OF EQUIPMENT, CHECK THE NAME PLATE DATA AGAINST THE INFORMATION SHOWN ON THE DRAWINGS AND CALL TO THE ATTENTION OF THE ENGINEER ANY DISCREPANCIES THERETO. ANY EQUIPMENT INSTALLED WHICH DOES NOT MEET THE REQUIREMENTS OF THE EQUIPMENT TO BE INSTALLED SHALL BE REMOVED AT THE EXPENSE OF THE CONTRACTOR.

3.7 PAINTING

A. ALL PAINTING OF ELECTRICAL SYSTEM SHALL BE BY G.C./OTHERS.

B. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TOUCH–UP PAINTING. TOUCH–UP PAINTING SHALL BE PER MANUFACTURERS RECOMMENDATION.

END OF SECTION

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.1 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING:
1. BUILDING WIRES AND CABLES RATED 600 V AND LESS.
2. CONNECTORS, SPLICES, AND TERMINATIONS RATED 600 V AND LESS.
3. SLEEVES AND SLEEVE SEALS FOR CABLES.

1.2 SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

B. FIELD QUALITY–CONTROL TEST REPORTS.

1.3 QUALITY ASSURANCE

A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.

B. COMPLY WITH NFPA 70.

PART 2 – PRODUCTS

2.1 CONDUCTORS AND CABLES

A. COPPER CONDUCTORS: COMPLY WITH NEMA WC 70.

B. CONDUCTOR INSULATION: COMPLY WITH NEMA WC 70 FOR TYPES THHN–THWN.

2.2 CONNECTORS AND SPLICES

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. AFC CABLE SYSTEMS, INC.
2. HUBBELL POWER SYSTEMS, INC.
3. O–Z/GEDNEY; EGS ELECTRICAL GROUP LLC.
4. 3M; ELECTRICAL PRODUCTS DIVISION.
5. TYCO ELECTRONICS CORP.

B. DESCRIPTION: FACTORY–FABRICATED CONNECTORS AND SPLICES OF SIZE, AMPACITY RATING, MATERIAL, TYPE, AND CLASS FOR APPLICATION AND SERVICE INDICATED.

PART 3 – EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. FEEDERS: COPPER SOLID FOR NO. 10 AWG AND SMALLER; STRANDED FOR NO. 8 AWG AND LARGER.

B. BRANCH CIRCUITS: COPPER. SOLID FOR NO. 10 AWG AND SMALLER; STRANDED FOR NO. 8 AWG AND LARGER.

3.2 CONDUCTOR INSULATION APPLICATIONS AND WIRING METHODS

A. EXPOSED FEEDERS: TYPE THHN–THWN, SINGLE CONDUCTORS IN RACEWAY.

B. FEEDERS CONCEALED IN CEILINGS, WALLS, PARTITIONS, AND CRAWLSPACES: TYPE THHN–THWN, SINGLE CONDUCTORS IN RACEWAY.

C. EXPOSED BRANCH CIRCUITS: TYPE THHN–THWN, SINGLE CONDUCTORS IN RACEWAY.

D. BRANCH CIRCUITS CONCEALED IN CEILINGS, WALLS, AND PARTITIONS: TYPE THHN–THWN, SINGLE CONDUCTORS IN RACEWAY.

E. CLASS 1 CONTROL CIRCUITS: TYPE THHN–THWN, IN RACEWAY.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. CONCEAL CABLES IN FINISHED WALLS, CEILINGS, AND FLOORS, UNLESS OTHERWISE INDICATED.

B. USE MANUFACTURER–APPROVED PULLING COMPOUND OR LUBRICANT WHERE NECESSARY; COMPOUND USED MUST NOT DETERIORATE CONDUCTOR OR INSULATION. DO NOT EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM PULLING TENSIONS AND SIDEWALL PRESSURE VALUES.

C. USE PULLING MEANS, INCLUDING FISH TAPE, CABLE, ROPE, AND BASKET–WEAVE WIRE/CABLE GRIPS, THAT WILL NOT DAMAGE CABLES OR RACEWAY.

D. IDENTIFY AND COLOR–CODE CONDUCTORS AND CABLES ACCORDING TO DIVISION SECTION "IDENTIFICATION FOR ELECTRICAL SYSTEMS."

E. MAKE SPLICES AND TAPS THAT ARE COMPATIBLE WITH CONDUCTOR MATERIAL AND THAT POSSESS EQUIVALENT OR BETTER MECHANICAL STRENGTH AND INSULATION RATINGS THAN UNSPLICED CONDUCTORS.

F. WIRING AT OUTLETS: INSTALL CONDUCTOR AT EACH OUTLET, WITH AT LEAST 6 INCHES (150 MM) OF SLACK.

END OF SECTION

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. IDENTIFICATION FOR CONDUCTORS.

1.2 SUBMITTALS

A. PRODUCT DATA: FOR EACH ELECTRICAL IDENTIFICATION PRODUCT INDICATED.

1.3 QUALITY ASSURANCE

A. COMPLY WITH ANSI A13.1.

B. COMPLY WITH NFPA 70.

C. COMPLY WITH 29 CFR 1910.144 AND 29 CFR 1910.145.

D. COMPLY WITH ANSI Z535.4 FOR SAFETY SIGNS AND LABELS.

E. ADHESIVE–ATTACHED LABELING MATERIALS, INCLUDING LABEL STOCKS, LAMINATING ADHESIVES, AND INKS USED BY LABEL PRINTERS, SHALL COMPLY WITH UL 969.

PART 2 – PRODUCTS

2.1 CONDUCTOR IDENTIFICATION MATERIALS

A. COLOR–CODING CONDUCTOR TAPE: COLORED, SELF–ADHESIVE VINYL TAPE NOT LESS THAN 3 MILS THICK BY 1 TO 2 INCHES WIDE.

PART 3 – EXECUTION

3.1 INSTALLATION

A. LOCATION: INSTALL IDENTIFICATION MATERIALS AND DEVICES AT LOCATIONS FOR MOST CONVENIENT VIEWING WITHOUT INTERFERENCE WITH OPERATION AND MAINTENANCE OF EQUIPMENT.

B. APPLY IDENTIFICATION DEVICES TO SURFACES THAT REQUIRE FINISH AFTER COMPLETING FINISH WORK.

3.2 IDENTIFICATION SCHEDULE

A. POWER–CIRCUIT CONDUCTOR IDENTIFICATION, 600 V OR LESS: FOR CONDUCTORS IN VAULTS, PULL AND JUNCTION BOXES, MANHOLES, AND HANDHOLES, USE COLOR–CODING CONDUCTOR TAPE TO IDENTIFY THE PHASE.
1. COLOR–CODING FOR PHASE AND VOLTAGE LEVEL IDENTIFICATION, 600 V OR LESS: USE COLORS LISTED BELOW FOR UNGROUNDED SERVICE FEEDER AND BRANCH–CIRCUIT CONDUCTORS.
   a. COLOR SHALL BE FACTORY APPLIED.
   b. COLORS FOR 208/120–V CIRCUITS:
      1) PHASE A: BLACK.
      2) PHASE B: RED.
      3) PHASE C: BLUE.

B. INSTALL INSTRUCTIONAL SIGN INCLUDING THE COLOR–CODE FOR GROUNDED AND UNGROUNDED CONDUCTORS USING ADHESIVE–FILM–TYPE LABELS.

C. AUXILIARY ELECTRICAL SYSTEMS CONDUCTOR IDENTIFICATION: IDENTIFY FIELD–INSTALLED ALARM, CONTROL, AND SIGNAL CONNECTIONS.
1. IDENTIFY CONDUCTORS, CABLES, AND TERMINALS IN ENCLOSURES AND AT JUNCTIONS, TERMINALS, AND PULL POINTS. IDENTIFY BY SYSTEM AND CIRCUIT DESIGNATION.
2. USE SYSTEM OF MARKER TAPE DESIGNATIONS THAT IS UNIFORM AND CONSISTENT WITH SYSTEM USED BY MANUFACTURER FOR FACTORY–INSTALLED CONNECTIONS.
3. COORDINATE IDENTIFICATION WITH PROJECT DRAWINGS, MANUFACTURER'S WIRING DIAGRAMS, AND THE OPERATION AND MAINTENANCE MANUAL.

END OF SECTION

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 01 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING:
1. HANGERS AND SUPPORTS FOR ELECTRICAL EQUIPMENT AND SYSTEMS.
2. CONSTRUCTION REQUIREMENTS FOR CONCRETE BASES.

1.3 DEFINITIONS

A. EMT: ELECTRICAL METALLIC TUBING.

B. IMC: INTERMEDIATE METAL CONDUIT.

RMC: RIGID METAL CONDUIT.

1.4 PERFORMANCE REQUIREMENTS

A. DELEGATED DESIGN: DESIGN SUPPORTS FOR MULTIPLE RACEWAYS, INCLUDING COMPREHENSIVE ENGINEERING ANALYSIS BY A QUALIFIED PROFESSIONAL ENGINEER, USING PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA INDICATED.

B. DESIGN SUPPORTS FOR MULTIPLE RACEWAYS CAPABLE OF SUPPORTING COMBINED WEIGHT OF SUPPORTED SYSTEMS AND ITS CONTENTS.

C. DESIGN EQUIPMENT SUPPORTS CAPABLE OF SUPPORTING COMBINED OPERATING WEIGHT OF SUPPORTED EQUIPMENT AND CONNECTED SYSTEMS AND COMPONENTS.

1.5 ACTION SUBMITTALS

A. PRODUCT DATA: FOR THE FOLLOWING:
1. STEEL SLOTTED SUPPORT SYSTEMS.

B. SHOP DRAWINGS: SHOW FABRICATION AND INSTALLATION DETAILS AND INCLUDE CALCULATIONS FOR THE FOLLOWING:
1. TRAPEZE HANGERS. INCLUDE PRODUCT DATA FOR COMPONENTS.
2. STEEL SLOTTED CHANNEL SYSTEMS. INCLUDE PRODUCT DATA FOR COMPONENTS.
3. NONMETALLIC SLOTTED CHANNEL SYSTEMS. INCLUDE PRODUCT DATA FOR COMPONENTS.
4. EQUIPMENT SUPPORTS.

1.6 INFORMATIONAL SUBMITTALS

A. WELDING CERTIFICATES.

1.7 QUALITY ASSURANCE

A. WELDING: QUALIFY PROCEDURES AND PERSONNEL ACCORDING TO AWS D1.1/D1.1M, "STRUCTURAL WELDING CODE – STEEL."

B. COMPLY WITH NFPA 70.

1.8 COORDINATION

A. COORDINATE SIZE AND LOCATION OF CONCRETE BASES. CAST ANCHOR–BOLT INSERTS INTO BASES. CONCRETE, REINFORCEMENT, AND FORMWORK REQUIREMENTS ARE SPECIFIED IN DIVISION 03.

B. COORDINATE INSTALLATION OF ROOF CURBS, EQUIPMENT SUPPORTS, AND ROOF PENETRATIONS. THESE ITEMS ARE SPECIFIED IN DIVISION 07 SECTION "ROOF ACCESSORIES."

PART 2 – PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. STEEL SLOTTED SUPPORT SYSTEMS: COMPLY WITH MFMA–4, FACTORY–FABRICATED COMPONENTS FOR FIELD ASSEMBLY.
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
   a. ALLIED TUBE & CONDUIT.
   b. COOPER B–LINE, INC.; A DIVISION OF COOPER INDUSTRIES.
   c. ERICO INTERNATIONAL CORPORATION.
   d. GS METALS CORP.
   e. THOMAS & BETTS CORPORATION.
   f. UNISTRUT; TYCO INTERNATIONAL, LTD.
   g. WESANCO, INC.
2. METALLIC COATINGS: HOT–DIP GALVANIZED AFTER FABRICATION AND APPLIED ACCORDING TO MFMA–4.
3. NONMETALLIC COATINGS: MANUFACTURER'S STANDARD PVC, POLYURETHANE, OR POLYESTER COATING APPLIED ACCORDING TO MFMA–4.
4. PAINTED COATINGS: MANUFACTURER'S STANDARD PAINTED COATING APPLIED ACCORDING TO MFMA–4.
5. CHANNEL DIMENSIONS: SELECTED FOR APPLICABLE LOAD CRITERIA.

B. RACEWAY AND CABLE SUPPORTS: AS DESCRIBED IN NECA 1 AND NECA 101.

C. CONDUIT AND CABLE SUPPORT DEVICES: STEEL AND MALLEABLE–IRON HANGERS, CLAMPS, AND ASSOCIATED FITTINGS, DESIGNED FOR TYPES AND SIZES OF RACEWAY OR CABLE TO BE SUPPORTED.

D. SUPPORT FOR CONDUCTORS IN VERTICAL CONDUIT: FACTORY–FABRICATED ASSEMBLY CONSISTING OF THREADED BODY AND INSULATING WEDGING PLUG OR PLUGS FOR NON–ARMORED ELECTRICAL CONDUCTORS OR CABLES IN RISER CONDUITS. PLUGS SHALL HAVE NUMBER, SIZE, AND SHAPE OF CONDUCTOR GRIPPING PIECES AS REQUIRED TO SUIT INDIVIDUAL CONDUCTORS OR CABLES SUPPORTED. BODY SHALL BE MALLEABLE IRON.

E. STRUCTURAL STEEL FOR FABRICATED SUPPORTS AND RESTRAINTS: ASTM A 36/A 36M, STEEL PLATES, SHAPES, AND BARS; BLACK AND GALVANIZED.

F. MOUNTING, ANCHORING, AND ATTACHMENT COMPONENTS: ITEMS FOR FASTENING ELECTRICAL ITEMS OR THEIR SUPPORTS TO BUILDING SURFACES INCLUDE THE FOLLOWING:
1. POWDER–ACTUATED FASTENERS: THREADED–STEEL STUD, FOR USE IN HARDENED PORTLAND CEMENT CONCRETE, STEEL, OR WOOD, WITH TENSION, SHEAR, AND PULLOUT CAPACITIES APPROPRIATE FOR SUPPORTED LOADS AND BUILDING MATERIALS WHERE USED.
   a. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
      1) HILTI INC.
      2) ITW RAMSET/RED HEAD; A DIVISION OF ILLINOIS TOOL WORKS, INC.
      3) MKT FASTENING, LLC.
      4) SIMPSON STRONG–TIE CO., INC.; MASTERSET FASTENING SYSTEMS UNIT.
2. MECHANICAL–EXPANSION ANCHORS: INSERT–WEDGE–TYPE, STAINLESS STEEL, FOR USE IN HARDENED PORTLAND CEMENT CONCRETE WITH TENSION, SHEAR, AND PULLOUT CAPACITIES APPROPRIATE FOR SUPPORTED LOADS AND BUILDING MATERIALS IN WHICH USED.
   a. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
      1) COOPER B–LINE, INC.; A DIVISION OF COOPER INDUSTRIES.
      2) EMPIRE TOOL AND MANUFACTURING CO., INC.
      3) HILTI INC.
      4) ITW RAMSET/RED HEAD; A DIVISION OF ILLINOIS TOOL WORKS, INC.
      5) MKT FASTENING, LLC.
3. CONCRETE INSERTS: STEEL OR MALLEABLE–IRON, SLOTTED SUPPORT SYSTEM UNITS SIMILAR TO MSS TYPE 18; COMPLYING WITH MFMA–4 OR MSS SP–58.
4. THROUGH BOLTS: STRUCTURAL TYPE, HEX HEAD, AND HIGH STRENGTH. COMPLY WITH ASTM A 325.
5. TOGGLE BOLTS: ALL–STEEL SPRINGHEAD TYPE.
6. HANGER RODS: THREADED STEEL.

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004
CABLE BUILDING

STATE OF KENTUCKY
TEJAS PATHAK
27689
LICENSED
PROFESSIONAL ENGINEER

JOB NO.	2021-32
DB:	
CB:	
DATE:	02/03/2022
SHEET NO:	E400

ELECTRICAL SPECIFICATIONS

FOR CONSTRUCTION

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. DESCRIPTION: WELDED OR BOLTED, STRUCTURAL-STEEL SHAPES, SHOP OR FIELD FABRICATED TO FIT DIMENSIONS OF SUPPORTED EQUIPMENT.

B. MATERIALS: COMPLY WITH REQUIREMENTS IN DIVISION 05 SECTION "METAL FABRICATIONS" FOR STEEL SHAPES AND PLATES.

PART 3 – EXECUTION

3.1 APPLICATION

A. COMPLY WITH NECA 1 AND NECA 101 FOR APPLICATION OF HANGERS AND SUPPORTS FOR ELECTRICAL EQUIPMENT AND SYSTEMS EXCEPT IF REQUIREMENTS IN THIS SECTION ARE STRICTER.

B. MAXIMUM SUPPORT SPACING AND MINIMUM HANGER ROD SIZE FOR RACEWAY: SPACE SUPPORTS FOR EMT, IMC, AND RMC SCHEDULED IN NECA 1, WHERE ITS TABLE 1 LISTS MAXIMUM SPACINGS LESS THAN STATED IN NFPA 70. MINIMUM ROD SIZE SHALL BE 1/4 INCH IN DIAMETER.

C. MULTIPLE RACEWAYS OR CABLES: INSTALL TRAPEZE-TYPE SUPPORTS FABRICATED WITH STEEL SLOTTED SUPPORT SYSTEM, SIZED SO CAPACITY CAN BE INCREASED BY AT LEAST 25 PERCENT IN FUTURE WITHOUT EXCEEDING SPECIFIED DESIGN LOAD LIMITS.

1. SECURE RACEWAYS AND CABLES TO THESE SUPPORTS WITH TWO-BOLT CONDUIT CLAMPS.

D. SPRING-STEEL CLAMPS DESIGNED FOR SUPPORTING SINGLE CONDUITS WITHOUT BOLTS MAY BE USED FOR 1-1/2-INCH (38-MM) AND SMALLER RACEWAYS SERVING BRANCH CIRCUITS AND COMMUNICATION SYSTEMS ABOVE SUSPENDED CEILINGS AND FOR FASTENING RACEWAYS TO TRAPEZE SUPPORTS.

3.2 SUPPORT INSTALLATION

A. COMPLY WITH NECA 1 AND NECA 101 FOR INSTALLATION REQUIREMENTS EXCEPT AS SPECIFIED IN THIS ARTICLE.

B. RACEWAY SUPPORT METHODS: IN ADDITION TO METHODS DESCRIBED IN NECA 1, EMT, IMC, AND RMC MAY BE SUPPORTED BY OPENINGS THROUGH STRUCTURE MEMBERS, AS PERMITTED IN NFPA 70.

C. STRENGTH OF SUPPORT ASSEMBLIES: WHERE NOT INDICATED, SELECT SIZES OF COMPONENTS SO STRENGTH WILL BE ADEQUATE TO CARRY PRESENT AND FUTURE STATIC LOADS WITHIN SPECIFIED LOADING LIMITS. MINIMUM STATIC DESIGN LOAD USED FOR STRENGTH DETERMINATION SHALL BE WEIGHT OF SUPPORTED COMPONENTS PLUS 200 LB (90 KG).

D. MOUNTING AND ANCHORAGE OF SURFACE-MOUNTED EQUIPMENT AND COMPONENTS: ANCHOR AND FASTEN ELECTRICAL ITEMS AND THEIR SUPPORTS TO BUILDING STRUCTURAL ELEMENTS BY THE FOLLOWING METHODS UNLESS OTHERWISE INDICATED BY CODE:

1. TO WOOD: FASTEN WITH LAG SCREWS OR THROUGH BOLTS.
2. TO NEW CONCRETE: BOLT TO CONCRETE INSERTS.
3. TO MASONRY: APPROVED TOGGLE-TYPE BOLTS ON HOLLOW MASONRY UNITS AND EXPANSION ANCHOR FASTENERS ON SOLID MASONRY UNITS.
4. TO EXISTING CONCRETE: EXPANSION ANCHOR FASTENERS.
5. INSTEAD OF EXPANSION ANCHORS, POWDER-ACTUATED DRIVEN THREADED STUDS PROVIDED WITH LOCK WASHERS AND NUTS MAY BE USED IN EXISTING STANDARD-WEIGHT CONCRETE 4 INCHES (100 MM) THICK OR GREATER. DO NOT USE FOR ANCHORAGE TO LIGHTWEIGHT-AGGREGATE CONCRETE OR FOR SLABS LESS THAN 4 INCHES (100 MM) THICK.
6. ITEMS MOUNTED ON HOLLOW WALLS AND NONSTRUCTURAL BUILDING SURFACES: MOUNT CABINETS, PANELBOARDS, DISCONNECT SWITCHES, CONTROL ENCLOSURES, PULL AND JUNCTION BOXES, TRANSFORMERS, AND OTHER DEVICES ON SLOTTED-CHANNEL RACKS ATTACHED TO SUBSTRATE.

E. DRILL HOLES FOR EXPANSION ANCHORS IN CONCRETE AT LOCATIONS AND TO DEPTHS THAT AVOID REINFORCING BARS.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. COMPLY WITH INSTALLATION REQUIREMENTS IN DIVISION 05 SECTION "METAL FABRICATIONS" FOR SITE-FABRICATED METAL SUPPORTS.

B. CUT, FIT, AND PLACE MISCELLANEOUS METAL SUPPORTS ACCURATELY IN LOCATION, ALIGNMENT, AND ELEVATION TO SUPPORT AND ANCHOR ELECTRICAL MATERIALS AND EQUIPMENT.

C. FIELD WELDING: COMPLY WITH AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. CONSTRUCT CONCRETE BASES OF DIMENSIONS INDICATED BUT NOT LESS THAN 4 INCHES LARGER IN BOTH DIRECTIONS THAN SUPPORTED UNIT, AND SO ANCHORS WILL BE A MINIMUM OF 10 BOLT DIAMETERS FROM EDGE OF THE BASE.

B. USE 3000-PSI, 28-DAY COMPRESSIVE-STRENGTH CONCRETE. CONCRETE MATERIALS, REINFORCEMENT, AND PLACEMENT REQUIREMENTS ARE SPECIFIED IN DIVISION 03 SECTION "CAST-IN-PLACE CONCRETE."

C. ANCHOR EQUIPMENT TO CONCRETE BASE.

1. PLACE AND SECURE ANCHORAGE DEVICES. USE SUPPORTED EQUIPMENT MANUFACTURER'S SETTING DRAWINGS, TEMPLATES, DIAGRAMS, INSTRUCTIONS, AND DIRECTIONS FURNISHED WITH ITEMS TO BE EMBEDDED.
2. INSTALL ANCHOR BOLTS TO ELEVATIONS REQUIRED FOR PROPER ATTACHMENT TO SUPPORTED EQUIPMENT.
3. INSTALL ANCHOR BOLTS ACCORDING TO ANCHOR-BOLT MANUFACTURER'S WRITTEN INSTRUCTIONS.

3.5 PAINTING

A. TOUCHUP: CLEAN FIELD WELDS AND ABRADED AREAS OF SHOP PAINT. PAINT EXPOSED AREAS IMMEDIATELY AFTER ERECTING HANGERS AND SUPPORTS. USE SAME MATERIALS AS USED FOR SHOP PAINTING. COMPLY WITH SSPC-PA 1 REQUIREMENTS FOR TOUCHING UP FIELD-PAINTED SURFACES.

1. APPLY PAINT BY BRUSH OR SPRAY TO PROVIDE MINIMUM DRY FILM THICKNESS OF 2.0 MILS (0.05 MM).

B. TOUCHUP: COMPLY WITH REQUIREMENTS IN DIVISION 09 PAINTING SECTIONS FOR CLEANING AND TOUCHUP PAINTING OF FIELD WELDS, BOLTED CONNECTIONS, AND ABRADED AREAS OF SHOP PAINT ON MISCELLANEOUS METAL.

C. GALVANIZED SURFACES: CLEAN WELDS, BOLTED CONNECTIONS, AND ABRADED AREAS AND APPLY GALVANIZING-REPAIR PAINT TO COMPLY WITH ASTM A 780.

END OF SECTION

WIRING DEVICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS
A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 01 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY
A. THIS SECTION INCLUDES THE FOLLOWING:
1. RECEPTACLES, RECEPTACLES WITH INTEGRAL GFCI, AND ASSOCIATED DEVICE PLATES.
2. WALL-BOX MOTION SENSORS.
3. SNAP SWITCHES.

1.3 DEFINITIONS
A. GFCI: GROUND-FAULT CIRCUIT INTERRUPTER.

1.4 SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.
B. SHOP DRAWINGS: LIST OF LEGENDS AND DESCRIPTION OF MATERIALS AND PROCESS USED FOR PREMARKING WALL PLATES.
C. OPERATION AND MAINTENANCE DATA: FOR WIRING DEVICES TO INCLUDE IN ALL MANUFACTURERS' PACKING LABEL WARNINGS AND INSTRUCTION MANUALS THAT INCLUDE LABELING CONDITIONS.

1.5 QUALITY ASSURANCE
A. SOURCE LIMITATIONS: OBTAIN EACH TYPE OF WIRING DEVICE AND ASSOCIATED WALL PLATE THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER. INSOFAR AS THEY ARE AVAILABLE, OBTAIN ALL WIRING DEVICES AND ASSOCIATED WALL PLATES FROM A SINGLE MANUFACTURER AND ONE SOURCE.
B. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
C. COMPLY WITH NFPA 70.

1.6 COORDINATION
A. RECEPTACLES FOR OWNER-FURNISHED EQUIPMENT: MATCH PLUG CONFIGURATIONS.

PART 2 – PRODUCTS

2.1 MANUFACTURERS
A. MANUFACTURERS:
1. COOPER WIRING DEVICES; A DIVISION OF COOPER INDUSTRIES, INC. (COOPER).
2. HUBBELL INCORPORATED; WIRING DEVICE-KELLEMS (HUBBELL).
3. PASS & SEYMOUR/LEGRAND; WIRING DEVICES & ACCESSORIES (PASS & SEYMOUR).

2.2 STRAIGHT BLADE RECEPTACLES
A. CONVENIENCE RECEPTACLES, 125 V, 20 A: COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION 5-20R, AND UL 498.
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
a. COOPER; 5351 (SINGLE), 5352 (DUPLEX).
b. HUBBELL; HBL5351 (SINGLE), CR5352 (DUPLEX).
c. PASS & SEYMOUR; 5381 (SINGLE), 5352 (DUPLEX).

2.3 GFCI RECEPTACLES
A. GENERAL DESCRIPTION: STRAIGHT BLADE, FEED-THROUGH TYPE. COMPLY WITH NEMA WD 1, NEMA WD 6, UL 498, AND UL 943, CLASS A, AND INCLUDE INDICATOR LIGHT THAT IS LIGHTED WHEN DEVICE IS TRIPPED.
B. DUPLEX GFCI CONVENIENCE RECEPTACLES, 125 V, 20 A:
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
a. COOPER; GF20.
b. PASS & SEYMOUR; 2084.
c. HUBBELL; GFR8300.

2.4 SNAP SWITCHES
A. COMPLY WITH NEMA WD 1 AND UL 20.
B. SWITCHES, 120/277 V, 20 A:
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
a. COOPER; 2221 (SINGLE POLE), 2222 (TWO POLE), 2223 (THREE WAY), 2224 (FOUR WAY).
b. HUBBELL; CS1221 (SINGLE POLE), CS1222 (TWO POLE), CS1223 (THREE WAY), CS1224 (FOUR WAY).
c. PASS & SEYMOUR; 20AC1 (SINGLE POLE), 20AC2 (TWO POLE), 20AC3 (THREE WAY), 20AC4 (FOUR WAY).

2.5 WALL PLATES
A. SINGLE AND COMBINATION TYPES TO MATCH CORRESPONDING WIRING DEVICES.
1. PLATE-SECURING SCREWS: METAL WITH HEAD COLOR TO MATCH PLATE FINISH.
2. MATERIAL FOR FINISHED SPACES: : SMOOTH, HIGH-IMPACT THERMOPLASTIC.
3. MATERIAL FOR UNFINISHED SPACES: GALVANIZED STEEL.
4. MATERIAL FOR DAMP LOCATIONS: CAST ALUMINUM WITH SPRING-LOADED LIFT COVER, AND LISTED AND LABELED FOR USE IN "WET LOCATIONS."
B. WET-LOCATION, WEATHERPROOF COVER PLATES: NEMA 250, COMPLYING WITH TYPE 3R WEATHER-RESISTANT, DIE-CAST ALUMINUM WITH LOCKABLE COVER AND LISTED AND LABELED FOR "WEATHERPROOF WHILE-IN-USE".

2.6 FINISHES
A. COLOR: WIRING DEVICE CATALOG NUMBERS IN SECTION TEXT DO NOT DESIGNATE DEVICE COLOR.
1. WIRING DEVICES CONNECTED TO NORMAL POWER SYSTEM: AS SELECTED BY OWNER OR ARCHITECT, UNLESS OTHERWISE INDICATED OR REQUIRED BY NFPA 70 OR DEVICE LISTING. DEVICE PLATE COLOR SHALL MATCH DEVICE COLOR.

PART 3 – EXECUTION
3.1 INSTALLATION
A. COMPLY WITH NECA 1, INCLUDING THE MOUNTING HEIGHTS LISTED IN THAT STANDARD, UNLESS OTHERWISE NOTED.
B. COORDINATION WITH OTHER TRADES:
1. INSTALL DEVICE BOXES IN BRICK OR BLOCK WALLS SO THAT THE COVER PLATE DOES NOT CROSS A JOINT UNLESS THE JOINT IS TROWELED FLUSH WITH THE FACE OF THE WALL.
2. INSTALL WIRING DEVICES AFTER ALL WALL PREPARATION, INCLUDING PAINTING, IS COMPLETE.
C. CONDUCTORS:
1. STRIP INSULATION EVENLY AROUND THE CONDUCTOR USING TOOLS DESIGNED FOR THE PURPOSE. AVOID SCORING OR NICKING OF SOLID WIRE OR CUTTING STRANDS FROM STRANDED WIRE.
2. THE LENGTH OF FREE CONDUCTORS AT OUTLETS FOR DEVICES SHALL MEET PROVISIONS OF NFPA 70, ARTICLE 300, WITHOUT PIGTAILS.

D. DEVICE INSTALLATION:
1. REPLACE ALL DEVICES THAT HAVE BEEN IN TEMPORARY USE DURING CONSTRUCTION OR THAT SHOW SIGNS THAT THEY WERE INSTALLED BEFORE BUILDING FINISHING OPERATIONS WERE COMPLETE.
2. KEEP EACH WIRING DEVICE IN ITS PACKAGE OR OTHERWISE PROTECTED UNTIL IT IS TIME TO CONNECT CONDUCTORS.
3. DO NOT REMOVE SURFACE PROTECTION, SUCH AS PLASTIC FILM AND SMUDGE COVERS, UNTIL THE LAST POSSIBLE MOMENT.
4. CONNECT DEVICES TO BRANCH CIRCUITS USING PIGTAILS THAT ARE NOT LESS THAN 6 INCHES (152 MM) IN LENGTH.
5. WHEN CONDUCTORS LARGER THAN NO. 12 AWG ARE INSTALLED ON 15- OR 20-A CIRCUITS, SPLICE NO. 12 AWG PIGTAILS FOR DEVICE CONNECTIONS.
6. WHEN MOUNTING INTO METAL BOXES, REMOVE THE FIBER OR PLASTIC WASHERS USED TO HOLD DEVICE MOUNTING SCREWS IN YOKES, ALLOWING METAL-TO-METAL CONTACT.
E. RECEPTACLE ORIENTATION:
1. INSTALL GROUND PIN OF VERTICALLY MOUNTED RECEPTACLES DOWN, AND ON HORIZONTALLY MOUNTED RECEPTACLES TO THE RIGHT.
F. DEVICE PLATES: DO NOT USE OVERSIZED OR EXTRA-DEEP PLATES. REPAIR WALL FINISHES AND REMOUNT OUTLET BOXES WHEN STANDARD DEVICE PLATES DO NOT FIT FLUSH OR DO NOT COVER ROUGH WALL OPENING.

3.2 FIELD QUALITY CONTROL
A. TESTS FOR CONVENIENCE RECEPTACLES:
1. LINE VOLTAGE: ACCEPTABLE RANGE IS 105 TO 132 V.
2. GROUND IMPEDANCE: VALUES OF UP TO 2 OHMS ARE ACCEPTABLE.
3. GFCI TRIP: TEST FOR TRIPPING VALUES SPECIFIED IN UL 1436 AND UL 943.
4. USING THE TEST PLUG, VERIFY THAT THE DEVICE AND ITS OUTLET BOX ARE SECURELY MOUNTED.
END OF SECTION

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL
1.1 RELATED DOCUMENTS
A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 01 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY
A. THIS SECTION INCLUDES RACEWAYS, FITTINGS, BOXES, ENCLOSURES, AND CABINETS FOR ELECTRICAL WIRING.

1.3 DEFINITIONS
A. EMT: ELECTRICAL METALLIC TUBING.
B. EPDM: ETHYLENE-PROPYLENE-DIENE TERPOLYMER RUBBER.
C. FMC: FLEXIBLE METAL CONDUIT.
D. IMC: INTERMEDIATE METAL CONDUIT.
E. LFMC: LIQUIDTIGHT FLEXIBLE METAL CONDUIT.
F. LFNC: LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT.
G. NBR: ACRYLONITRILE-BUTADIENE RUBBER.
H. RNC: RIGID NONMETALLIC CONDUIT.

1.4 SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF RACEWAY, SURFACE RACEWAYS, WIREWAYS AND FITTINGS, FLOOR BOXES, HINGED-COVER ENCLOSURES, AND CABINETS.

1.5 QUALITY ASSURANCE
A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
B. COMPLY WITH NFPA 70.

PART 2 – PRODUCTS
2.1 METAL CONDUIT AND TUBING
A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
1. AFC CABLE SYSTEMS, INC.
2. ALFLEX INC.
3. ALLIED TUBE & CONDUIT; A TYCO INTERNATIONAL LTD. CO.
4. MAVERICK TUBE CORPORATION.
5. O-Z GEDNEY; A UNIT OF GENERAL SIGNAL.
6. WHEATLAND TUBE COMPANY.
B. RIGID STEEL CONDUIT: ANSI C80.1.
C. IMC: ANSI C80.6.
D. EMT: ANSI C80.3.
E. LFMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.
F. FITTINGS FOR CONDUIT (INCLUDING ALL TYPES AND FLEXIBLE AND LIQUIDTIGHT), EMT, AND CABLE: NEMA FB 1; LISTED FOR TYPE AND SIZE RACEWAY WITH WHICH USED, AND FOR APPLICATION AND ENVIRONMENT IN WHICH INSTALLED.
1. FITTINGS FOR EMT: STEEL SET-SCREW OR COMPRESSION TYPE.
G. JOINT COMPOUND FOR RIGID STEEL CONDUIT OR IMC: LISTED FOR USE IN CABLE CONNECTOR ASSEMBLIES, AND COMPOUNDED FOR USE TO LUBRICATE AND PROTECT THREADED RACEWAY JOINTS FROM CORROSION AND ENHANCE THEIR CONDUCTIVITY.

2.2 SLEEVES FOR RACEWAYS
A. STEEL PIPE SLEEVES: ASTM A 53/A 53M, TYPE E, GRADE B, SCHEDULE 40, GALVANIZED STEEL, PLAIN ENDS.
B. CAST-IRON PIPE SLEEVES: CAST OR FABRICATED "WALL PIPE," EQUIVALENT TO DUCTILE-IRON PRESSURE PIPE, WITH PLAIN ENDS AND INTEGRAL WATERSTOP, UNLESS OTHERWISE INDICATED.
C. SLEEVES FOR RECTANGULAR OPENINGS: GALVANIZED SHEET STEEL WITH MINIMUM 0.052-INCH OR 0.138-INCH THICKNESS AS INDICATED AND OF LENGTH TO SUIT APPLICATION.

PART 3 – EXECUTION
3.1 RACEWAY APPLICATION
A. OUTDOORS: APPLY RACEWAY PRODUCTS AS SPECIFIED BELOW, UNLESS OTHERWISE INDICATED:
1. EXPOSED CONDUIT: RIGID STEEL OR IMC
2. CONCEALED CONDUIT, ABOVEGROUND: EMT.
3. BOXES AND ENCLOSURES, ABOVEGROUND: NEMA 250, TYPE 3R.
B. COMPLY WITH THE FOLLOWING INDOOR APPLICATIONS, UNLESS OTHERWISE INDICATED:
1. EXPOSED, NOT SUBJECT TO PHYSICAL DAMAGE: EMT.
2. EXPOSED AND SUBJECT TO SEVERE PHYSICAL DAMAGE: RIGID STEEL CONDUIT. INCLUDES RACEWAYS IN THE FOLLOWING LOCATIONS:
a. MECHANICAL ROOMS.
3. CONCEALED IN CEILINGS AND INTERIOR WALLS AND PARTITIONS: EMT.
4. CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, ELECTRIC SOLENOID, OR MOTOR-DRIVEN EQUIPMENT): FMC, EXCEPT USE LFMC IN DAMP OR WET LOCATIONS.
5. DAMP OR WET LOCATIONS: IMC.
6. BOXES AND ENCLOSURES: NEMA 250, TYPE 1, EXCEPT USE NEMA 250, TYPE 3R, STAINLESS STEEL IN DAMP OR WET LOCATIONS.
C. MINIMUM RACEWAY SIZE: 3/4-INCH TRADE SIZE.
D. RACEWAY FITTINGS: COMPATIBLE WITH RACEWAYS AND SUITABLE FOR USE AND LOCATION.
1. RIGID AND INTERMEDIATE STEEL CONDUIT: USE THREADED RIGID STEEL CONDUIT FITTINGS, UNLESS OTHERWISE INDICATED.
2. EMT: STEEL SET SCREW TYPE.

3.2 INSTALLATION
A. COMPLY WITH NECA 1 FOR INSTALLATION REQUIREMENTS APPLICABLE TO PRODUCTS SPECIFIED IN PART 2 EXCEPT WHERE REQUIREMENTS ON DRAWINGS OR IN THIS ARTICLE ARE STRICTER.
B. KEEP RACEWAYS AT LEAST 6 INCHES AWAY FROM PARALLEL RUNS OF FLUES AND STEAM OR HOT-WATER PIPES. INSTALL HORIZONTAL RACEWAY RUNS ABOVE WATER AND STEAM PIPING.
C. COMPLETE RACEWAY INSTALLATION BEFORE STARTING CONDUCTOR INSTALLATION.
D. ARRANGE STUB-UPS SO CURVED PORTIONS OF BENDS ARE NOT VISIBLE ABOVE THE FINISHED SLAB.
E. INSTALL NO MORE THAN THE EQUIVALENT OF THREE 90-DEGREE BENDS IN ANY CONDUIT RUN EXCEPT FOR COMMUNICATIONS CONDUITS, FOR WHICH FEWER BENDS ARE ALLOWED.
F. CONCEAL CONDUIT AND EMT WITHIN FINISHED WALLS, CEILINGS, AND FLOORS, UNLESS OTHERWISE INDICATED.
G. THREADED CONDUIT JOINTS, EXPOSED TO WET, DAMP, CORROSIVE, OR OUTDOOR CONDITIONS: APPLY LISTED COMPOUND TO THREADS OF RACEWAY AND FITTINGS BEFORE MAKING UP JOINTS. FOLLOW COMPOUND MANUFACTURER'S WRITTEN INSTRUCTIONS.
H. RACEWAY TERMINATIONS AT LOCATIONS SUBJECT TO MOISTURE OR VIBRATION: USE INSULATING BUSHINGS TO PROTECT CONDUCTORS, INCLUDING CONDUCTORS SMALLER THAN NO. 4 AWG.
I. INSTALL PULL WIRES IN EMPTY RACEWAYS. USE POLYPROPYLENE OR MONOFILAMENT PLASTIC LINE WITH NOT LESS THAN 200-LB TENSILE STRENGTH. LEAVE AT LEAST 12 INCHES OF SLACK AT EACH END OF PULL WIRE.
J. FLEXIBLE CONDUIT CONNECTIONS: USE MAXIMUM OF 72 INCHES OF FLEXIBLE CONDUIT FOR RECESSED AND SEMIRECESSED LIGHTING FIXTURES, EQUIPMENT SUBJECT TO VIBRATION, NOISE TRANSMISSION, OR MOVEMENT; AND FOR TRANSFORMERS AND MOTORS.
1. USE LFMC IN DAMP OR WET LOCATIONS SUBJECT TO SEVERE PHYSICAL DAMAGE.
K. RECESSED BOXES IN MASONRY WALLS: SAW-CUT OPENING FOR BOX IN CENTER OF CELL OF MASONRY BLOCK, AND INSTALL BOX FLUSH WITH SURFACE OF WALL.
L. INSTALL INSULATED THROAT TYPE FITTINGS OR PLASTIC BUSHING ON ALL METAL CONDUITS WHEN THEY ARE TERMINATED AT OUTLET BOXES, WIREWAYS, AND ENCLOSURES.

3.3 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS
A. USE PIPE SLEEVES UNLESS PENETRATION ARRANGEMENT REQUIRES RECTANGULAR SLEEVED OPENING.
B. FIRE-RATED ASSEMBLIES: INSTALL SLEEVES FOR PENETRATIONS OF FIRE-RATED FLOOR AND WALL ASSEMBLIES UNLESS OPENINGS COMPATIBLE WITH FIRESTOP SYSTEM USED ARE FABRICATED DURING CONSTRUCTION OF FLOOR OR WALL.
C. CUT SLEEVES TO LENGTH FOR MOUNTING FLUSH WITH BOTH SURFACES OF WALLS.
D. EXTEND SLEEVES INSTALLED IN FLOORS 2 INCHES ABOVE FINISHED FLOOR LEVEL.
E. SIZE PIPE SLEEVES TO PROVIDE 1/4-INCH ANNULAR CLEAR SPACE BETWEEN SLEEVE AND RACEWAY UNLESS SLEEVE SEAL IS TO BE INSTALLED OR UNLESS SEISMIC CRITERIA REQUIRE DIFFERENT CLEARANCE.
F. SEAL SPACE OUTSIDE OF SLEEVES WITH GROUT FOR PENETRATIONS OF CONCRETE AND MASONRY AND WITH APPROVED JOINT COMPOUND FOR GYPSUM BOARD ASSEMBLIES.
G. INTERIOR PENETRATIONS OF NON-FIRE-RATED WALLS AND FLOORS: SEAL ANNULAR SPACE BETWEEN SLEEVE AND RACEWAY, USING JOINT SEALANT APPROPRIATE FOR SIZE, DEPTH, AND LOCATION OF JOINT. REFER TO DIVISION 07 SECTION "JOINT SEALANTS" FOR MATERIALS AND INSTALLATION.
H. ABOVEGROUND, EXTERIOR-WALL PENETRATIONS: SEAL PENETRATIONS USING SLEEVES AND MECHANICAL SLEEVE SEALS. SELECT SLEEVE SIZE TO ALLOW FOR 1-INCH ANNULAR CLEAR SPACE BETWEEN PIPE AND SLEEVE FOR INSTALLING MECHANICAL SLEEVE SEALS.
I. SILICONE SEALANTS: SINGLE-COMPONENT, SILICONE-BASED, NEUTRAL-CURING ELASTOMERIC SEALANTS OF GRADE INDICATED BELOW.
1. GRADE: POURABLE (SELF-LEVELING) FORMULATION FOR OPENINGS IN FLOORS AND OTHER HORIZONTAL SURFACES THAT ARE NOT FIRE RATED.
2. SEALANT SHALL HAVE VOC CONTENT OF 250 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).

3.4 PROTECTION
A. PROVIDE FINAL PROTECTION AND MAINTAIN CONDITIONS THAT ENSURE COATINGS, FINISHES, AND CABINETS ARE WITHOUT DAMAGE OR DETERIORATION AT TIME OF SUBSTANTIAL COMPLETION.
1. REPAIR DAMAGE TO GALVANIZED FINISHES WITH ZINC-RICH PAINT RECOMMENDED BY MANUFACTURER.
2. REPAIR DAMAGE TO PVC OR PAINT FINISHES WITH MATCHING TOUCHUP COATING RECOMMENDED BY MANUFACTURER.
END OF SECTION

FUSES

PART 1 – GENERAL
1.1 SUMMARY
A. SECTION INCLUDES: CARTRIDGE FUSES RATED 600-V AC AND LESS FOR USE IN ENCLOSED SWITCHES.

1.2 SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.
B. OPERATION AND MAINTENANCE DATA.

1.3 QUALITY ASSURANCE
A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
B. COMPLY WITH NEMA FU 1 FOR CARTRIDGE FUSES.
C. COMPLY WITH NFPA 70.

PART 2 – PRODUCTS
2.1 MANUFACTURERS
A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. COOPER BUSSMANN, INC.
2. EDISON FUSE, INC.
3. FERRAZ SHAWMUT, INC.

2.2 CARTRIDGE FUSES
A. CHARACTERISTICS: NEMA FU 1, NONRENEWABLE CARTRIDGE FUSES WITH VOLTAGE RATINGS CONSISTENT WITH CIRCUIT VOLTAGES.

PART 3 – EXECUTION
3.1 FUSE APPLICATIONS
A. FEEDERS: CLASS RK5, TIME DELAY.
B. MOTOR BRANCH CIRCUITS: CLASS RK5, TIME DELAY.

3.2 INSTALLATION
A. INSTALL FUSES IN FUSIBLE DEVICES. ARRANGE FUSES SO RATING INFORMATION IS READABLE WITHOUT REMOVING FUSE.

3.3 IDENTIFICATION
A. INSTALL LABELS COMPLYING WITH REQUIREMENTS FOR IDENTIFICATION SPECIFIED IN SECTION "IDENTIFICATION FOR ELECTRICAL SYSTEMS" AND INDICATING FUSE REPLACEMENT INFORMATION ON INSIDE DOOR OF EACH FUSED SWITCH AND ADJACENT TO EACH FUSE BLOCK AND HOLDER.
END OF SECTION

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 – GENERAL
1.1 SUMMARY
A. SECTION INCLUDES:
1. FUSIBLE SWITCHES.
2. ENCLOSURES.

1.2 DEFINITIONS
A. NC: NORMALLY CLOSED.
B. NO: NORMALLY OPEN.
C. SPDT: SINGLE POLE, DOUBLE THROW.

1.3 SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF ENCLOSED SWITCH, CIRCUIT BREAKER, ACCESSORY, AND COMPONENT INDICATED.
B. OPERATION AND MAINTENANCE DATA.

1.4 QUALITY ASSURANCE
A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
B. COMPLY WITH NFPA 70.

PART 2 – PRODUCTS
2.1 FUSIBLE SWITCHES
A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. EATON ELECTRICAL INC.; CUTLER-HAMMER BUSINESS UNIT.
2. GENERAL ELECTRIC COMPANY; GE CONSUMER & INDUSTRIAL – ELECTRICAL DISTRIBUTION.
3. SIEMENS ENERGY & AUTOMATION, INC.
4. SQUARE D; A BRAND OF SCHNEIDER ELECTRIC.
B. TYPE HD, HEAVY DUTY, SINGLE THROW, 600-V AC, 200 A AND SMALLER: UL 98 AND NEMA KS 1, HORSEPOWER RATED, WITH CLIPS OR BOLT PADS TO ACCOMMODATE SPECIFIED FUSES, LOCKABLE HANDLE WITH CAPABILITY TO ACCEPT THREE PADLOCKS, AND INTERLOCKED WITH COVER IN CLOSED POSITION.
C. ACCESSORIES:
1. EQUIPMENT GROUND KIT: INTERNALLY MOUNTED AND LABELED FOR COPPER AND ALUMINUM GROUND CONDUCTORS.
2. NEUTRAL KIT: INTERNALLY MOUNTED; INSULATED, CAPABLE OF BEING GROUNDED AND BONDED; LABELED FOR COPPER AND ALUMINUM NEUTRAL CONDUCTORS.
3. CLASS R FUSE KIT: PROVIDES REJECTION OF OTHER FUSE TYPES WHEN CLASS R FUSES ARE SPECIFIED.
4. LUGS: SUITABLE FOR NUMBER, SIZE, AND CONDUCTOR MATERIAL.

2.2 ENCLOSURES
A. ENCLOSED SWITCHES AND CIRCUIT BREAKERS: NEMA AB 1, NEMA KS 1, NEMA 250, AND UL 50, TO COMPLY WITH ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.
1. INDOOR, DRY AND CLEAN LOCATIONS: NEMA 250, TYPE 1.
2. OUTDOOR LOCATIONS: NEMA 250, TYPE 3R.

PART 3 – EXECUTION
3.1 INSTALLATION
A. INSTALL INDIVIDUAL WALL-MOUNTED SWITCHES AND CIRCUIT BREAKERS WITH TOPS AT UNIFORM HEIGHT UNLESS OTHERWISE INDICATED.
B. INSTALL FUSES IN FUSIBLE DEVICES.
C. COMPLY WITH NECA 1.

3.2 IDENTIFICATION
A. COMPLY WITH REQUIREMENTS IN SECTION "IDENTIFICATION FOR ELECTRICAL SYSTEMS."
1. IDENTIFY FIELD-INSTALLED CONDUCTORS, INTERCONNECTING WIRING, AND COMPONENTS; PROVIDE WARNING SIGNS.
2. LABEL EACH ENCLOSURE WITH ENGRAVED METAL OR LAMINATED-PLASTIC NAMEPLATE.

3.3 FIELD QUALITY CONTROL
A. PERFORM TESTS AND INSPECTIONS.
B. ACCEPTANCE TESTING PREPARATION:
1. TEST CONTINUITY OF EACH CIRCUIT.

END OF SECTION

LIGHTING

PART 1 – GENERAL
1.1 SUMMARY
A. THIS SECTION INCLUDES THE FOLLOWING:
1. INTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS.
2. EXIT SIGNS.
3. LIGHTING FIXTURE SUPPORTS.

1.2 SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF LIGHTING FIXTURE, ARRANGED IN ORDER OF FIXTURE DESIGNATION. INCLUDE DATA ON FEATURES, ACCESSORIES, FINISHES.
B. SHOP DRAWINGS: SHOW DETAILS OF NONSTANDARD OR CUSTOM LIGHTING FIXTURES. INDICATE DIMENSIONS, WEIGHTS, METHODS OF FIELD ASSEMBLY, COMPONENTS, FEATURES, AND ACCESSORIES.

1.3 QUALITY ASSURANCE
A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
B. COMPLY WITH NFPA 70.

PART 2 – PRODUCTS
2.1 MANUFACTURERS
A. IN INTERIOR LIGHTING FIXTURE SCHEDULE WHERE TITLES BELOW ARE COLUMN OR ROW HEADINGS THAT INTRODUCE LISTS, THE FOLLOWING REQUIREMENTS APPLY TO PRODUCT SELECTION:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY THE MANUFACTURERS SPECIFIED.

2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS
A. RECESSED FIXTURES: COMPLY WITH NEMA LE 4 FOR CEILING COMPATIBILITY FOR RECESSED FIXTURES.
B. FLUORESCENT FIXTURES: COMPLY WITH UL 1598. WHERE LER IS SPECIFIED, TEST ACCORDING TO NEMA LE 5 AND NEMA LE 5A AS APPLICABLE.
C. HID FIXTURES: COMPLY WITH UL 1598. WHERE LER IS SPECIFIED, TEST ACCORDING TO NEMA LE 5B.
D. SHEET METAL COMPONENTS: STEEL, UNLESS OTHERWISE INDICATED. FORM AND SUPPORT TO PREVENT WARPING AND SAGGING.
E. DOORS, FRAMES, AND OTHER INTERNAL ACCESS: SMOOTH OPERATING, FREE OF LIGHT LEAKAGE UNDER OPERATING CONDITIONS, AND DESIGNED TO PERMIT RELAMPING WITHOUT USE OF TOOLS. DESIGNED TO PREVENT DOORS, FRAMES, LENSES, DIFFUSERS, AND OTHER COMPONENTS FROM FALLING ACCIDENTALLY DURING RELAMPING AND WHEN SECURED IN OPERATING POSITION.
F. REFLECTING SURFACES SHALL HAVE MINIMUM REFLECTANCE AS FOLLOWS, UNLESS OTHERWISE INDICATED:
1. WHITE SURFACES: 85 PERCENT.
2. SPECULAR SURFACES: 83 PERCENT.
3. DIFFUSING SPECULAR SURFACES: 75 PERCENT.
4. LAMINATED SILVER METALLIZED FILM: 90 PERCENT.
G. PLASTIC DIFFUSERS, COVERS, AND GLOBES:
1. ACRYLIC LIGHTING DIFFUSERS: 100 PERCENT VIRGIN ACRYLIC PLASTIC. HIGH RESISTANCE TO YELLOWING AND OTHER CHANGES DUE TO AGING, EXPOSURE TO HEAT, AND UV RADIATION.
a. LENS THICKNESS: AT LEAST 0.125 INCH MINIMUM UNLESS DIFFERENT THICKNESS IS INDICATED.
b. UV STABILIZED.
2. GLASS: ANNEALED CRYSTAL GLASS, UNLESS OTHERWISE INDICATED.

2.3 BALLASTS
A. ELECTRONIC BALLASTS FOR LINEAR FLUORESCENT LAMPS: COMPLY WITH ANSI C82.11; INSTANT-START TYPE, UNLESS OTHERWISE INDICATED, AND DESIGNED FOR TYPE AND QUANTITY OF LAMPS SERVED. BALLASTS SHALL BE DESIGNED FOR FULL LIGHT OUTPUT UNLESS DIMMER OR BI-LEVEL CONTROL IS INDICATED.
1. SOUND RATING: A.
2. TOTAL HARMONIC DISTORTION RATING: LESS THAN 20 PERCENT.
3. TRANSIENT VOLTAGE PROTECTION: IEEE C62.41, CATEGORY A OR BETTER.
4. OPERATING FREQUENCY: 20> KHZ OR HIGHER.
5. LAMP CURRENT CREST FACTOR: 1.7 OR LESS.
6. BF: 0.85 OR HIGHER.
7. POWER FACTOR: 0.98 OR HIGHER.
B. BALLASTS FOR COMPACT FLUORESCENT LAMPS: ELECTRONIC PROGRAMMED RAPID-START TYPE, COMPLYING WITH ANSI C 82.11, DESIGNED FOR TYPE AND QUANTITY OF LAMPS INDICATED. BALLAST SHALL BE DESIGNED FOR FULL LIGHT OUTPUT UNLESS DIMMER OR BI-LEVEL CONTROL IS INDICATED:
1. LAMP END-OF-LIFE DETECTION AND SHUTDOWN CIRCUIT.
2. AUTOMATIC LAMP STARTING AFTER LAMP REPLACEMENT.
3. SOUND RATING: A.
4. TOTAL HARMONIC DISTORTION RATING: LESS THAN 20 PERCENT.
5. TRANSIENT VOLTAGE PROTECTION: IEEE C62.41, CATEGORY A OR BETTER.
6. OPERATING FREQUENCY: 20 KHZ OR HIGHER.
7. LAMP CURRENT CREST FACTOR: 1.7 OR LESS.
8. BF: 0.95 OR HIGHER, UNLESS OTHERWISE INDICATED.
9. POWER FACTOR: 0.98 OR HIGHER.

2.4 EXIT SIGNS
A. INTERNALLY LIGHTED SIGNS: COMPLY WITH UL 924; FOR SIGN COLORS, VISIBILITY, LUMINANCE, AND LETTERING SIZE, COMPLY WITH AUTHORITIES HAVING JURISDICTION.
1. LAMPS FOR AC OPERATION: LEDS, 70,000 HOURS MINIMUM RATED LAMP LIFE.

2.5 EMERGENCY LIGHTING UNITS
A. DESCRIPTION: SELF-CONTAINED UNITS COMPLYING WITH UL 924.
1. BATTERY: SEALED, MAINTENANCE-FREE, LEAD-ACID TYPE.
2. CHARGER: FULLY AUTOMATIC, SOLID-STATE TYPE WITH SEALED TRANSFER RELAY.
3. TEST PUSH BUTTON: PUSH-TO-TEST TYPE, IN UNIT HOUSING, SIMULATES LOSS OF NORMAL POWER AND DEMONSTRATES UNIT OPERABILITY.
4. LED INDICATOR LIGHT: INDICATES NORMAL POWER ON. NORMAL GLOW INDICATES TRICKLE CHARGE; BRIGHT GLOW INDICATES CHARGING AT END OF DISCHARGE CYCLE.

2.6 LAMPS
A. APPROVED MANUFACTURERS:
1. OSRAM SYLVANIA.
2. PHILIPS.
3. GENERAL ELECTRIC.
B. T8 RAPID-START LOW-MERCURY FLUORESCENT LAMPS: RATED 32 W MAXIMUM, NOMINAL LENGTH 48 INCHES, 2800 INITIAL LUMENS (MINIMUM), CRI 82 (MINIMUM), COLOR TEMPERATURE 3500 K, AND AVERAGE RATED LIFE 30,000 HOURS, UNLESS OTHERWISE INDICATED.
C. COMPACT FLUORESCENT LAMPS: 3/4-PIN, LOW MERCURY, CRI 80 (MINIMUM), COLOR TEMPERATURE 3500 K, AVERAGE RATED LIFE OF 10,000 HOURS AT 3 HOURS OPERATION PER START, UNLESS OTHERWISE INDICATED.

2.7 LIGHTING FIXTURE SUPPORT COMPONENTS
A. SINGLE-STEM HANGERS: 1/2-INCH STEEL TUBING WITH SWIVEL BALL FITTINGS AND CEILING CANOPY. FINISH SAME AS FIXTURE.
B. TWIN-STEM HANGERS: TWO, 1/2-INCH STEEL TUBES WITH SINGLE CANOPY DESIGNED TO MOUNT A SINGLE FIXTURE. FINISH SAME AS FIXTURE.
C. WIRES: ASTM A 641/A 641M, CLASS 3, SOFT TEMPER, ZINC-COATED STEEL, 12 GAGE.
D. ROD HANGERS: 3/16-INCH MINIMUM DIAMETER, CADMIUM-PLATED, THREADED STEEL ROD.

PART 3 – EXECUTION
3.1 INSTALLATION
A. ALL EQUIPMENT, WIRING AND INSTALLATION SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, APPLICABLE LOCAL CODES, AND ACCEPTED INDUSTRY STANDARD OF CARE AND PRACTICE, AND SHALL BE THERMALLY PROTECTED WHERE NECESSARY AND SHALL NOT VOID ANY UL LISTINGS OR LABELS. THIS SHALL INCLUDE THE INTEGRATION OF LIGHTING EQUIPMENT AND CONTROLS.
B. INSTALL LIGHT FIXTURES AND EQUIPMENT AT LOCATIONS AND HEIGHTS AS INDICATED, IN ACCORDANCE WITH FIXTURE MANUFACTURER'S WRITTEN INSTRUCTIONS AND RECOMMENDATIONS, APPLICABLE REQUIREMENTS OF NEC, NECA'S " STANDARD OF INSTALLATION", NEMA STANDARDS, AND WITH RECOGNIZED INDUSTRY PRACTICES TO ENSURE THAT LIGHT FIXTURES FULFILL REQUIREMENTS.
C. SET LIGHT FIXTURES LEVEL, PLUMB AND SQUARE WITH CEILING AND WALLS.
D. SECURE ALL FIXTURES TO STRUCTURAL SUPPORT MEMBERS OF BUILDING. PROVIDE ALL STEEL SUPPORTS NECESSARY FOR LIGHTING FIXTURES IN ADDITION TO THOSE SPECIFIED UNDER GENERAL BUILDING CONSTRUCTION.
E. SUPPORT LIGHT FIXTURES INDEPENDENT OF CEILING FRAMING.
F. SUPPORT SURFACE MOUNTED LIGHT FIXTURES GREATER THAN 2 FEET IN LENGTH AT A POINT IN ADDITION TO THE OUTLET BOX FIXTURE STUD.
G. EXPOSED GRID CEILINGS: SUPPORT SURFACE-MOUNTED LIGHT FIXTURES ON GRID CEILING DIRECTLY FROM BUILDING STRUCTURE.
H. PROVIDE PLASTER FRAMES FOR RECESSED LIGHT FIXTURES INSTALLED IN OTHER THAN SUSPENDED GRID TYPE ACOUSTICAL CEILING SYSTEMS. BRACE FRAMES TEMPORARILY TO PREVENT DISTORTION DURING HANDLING.
I. FASTEN LIGHT FIXTURES SECURELY TO INDICATED STRUCTURAL SUPPORTS; AND ENSURE THAT PENDANT FIXTURES ARE PLUMB AND LEVEL. PROVIDE INDIVIDUALLY MOUNTED PENDANT FIXTURES LONGER THAN 2 FEET WITH TWIN STEM HANGERS. PROVIDE STEM HANGER WITH BALL ALIGNERS AND PROVISIONS FOR MINIMUM ONE INCH VERTICAL ADJUSTMENT. MOUNT CONTINUOUS ROWS OF FIXTURES WITH AN ADDITIONAL STEM HANGER GREATER THAN NUMBER OF LIGHT FIXTURES IN THE ROW.
J. FLUORESCENT LIGHT FIXTURES INSTALLED IN LAY-IN CEILINGS SHALL BE SUPPORTED BY ADDITIONAL WIRE SUPPORT AT TWO CORNERS ATTACHED TO CEILING GRID, AND ANCHORED TO STRUCTURAL MEMBER. THIS ADDITIONAL WIRE SUPPORT SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR AND IS NOT CONSIDERED PART OF GENERAL GRID SUPPORT.
K. INSTALL RECESSED LIGHT FIXTURES USING ACCESSORIES AND FIRESTOPPING MATERIALS TO MEET REGULATORY REQUIREMENTS FOR FIRE RATING.
L. INSTALL CLIPS TO SECURE RECESSED GRID-SUPPORTED LIGHT FIXTURES IN PLACE.
M. INSTALL WALL-MOUNTED LIGHT FIXTURES AT HEIGHT AS SCHEDULED.
N. INSTALL ACCESSORIES FURNISHED WITH EACH LIGHT FIXTURE.
O. CONNECT RECESSED FIXTURES WITH FLEXIBLE METALLIC CONDUIT OF APPROXIMATELY 6-FEET IN LENGTH TO AN ACCESSIBLE JUNCTION BOX ABOVE CEILING.
P. MAKE WIRING CONNECTIONS TO BRANCH CIRCUIT USING BUILDING WIRE WITH INSULATION SUITABLE FOR TEMPERATURE CONDITIONS WITHIN LIGHT FIXTURE.
Q. INSTALL SPECIFIED LAMPS IN EACH LIGHT FIXTURE.
R. INSTALL SURFACE-MOUNTED EXIT SIGNS PLUMB AND ADJUST TO ALIGN WITH BUILDING LINES AND WITH EACH OTHER. SECURE TO PREVENT MOVEMENT.
S. LIGHT FIXTURE WHIPS SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE. DO NOT CLIP TO LAY-IN CEILING SUPPORT WIRES.

3.2 FIELD QUALITY CONTROL
A. INSPECT EACH INSTALLED FIXTURE FOR DAMAGE. REPLACE DAMAGED FIXTURES AND COMPONENTS.
B. OPERATE EACH LIGHT FIXTURE AFTER INSTALLATION AND CONNECTION. INSPECT FOR PROPER CONNECTION AND OPERATION.
C. REBALLAST LIGHT FIXTURES HAVING FAILED BALLASTS AT SUBSTANTIAL COMPLETION.
D. RELAMP LIGHT FIXTURES AND EXIT SIGNS HAVING FAILED LAMPS OR WHICH ARE OBSERVED TO BE NOTICEABLY DIMMED, AS JUDGED BY ARCHITECT OR ENGINEER, AT SUBSTANTIAL COMPLETION.
E. TEST FOR EMERGENCY LIGHTING: INTERRUPT POWER SUPPLY TO DEMONSTRATE PROPER OPERATION. VERIFY TRANSFER FROM NORMAL POWER TO BATTERY AND RETRANSFER TO NORMAL.

3.3 CLEANING
A. ALL LIGHT FIXTURES AND ACCESSORIES SHALL BE THOROUGHLY CLEANED AFTER BEING INSTALLED. ALL FINGERPRINTS, DIRT, TAR, SMUDGES, DRYWALL MUD AND DUST, ETC. SHALL BE REMOVED BY THE CONTRACTOR FROM THE LIGHT FIXTURE BODIES AND LENS/LOUVER MATERIAL PRIOR TO FINAL ACCEPTANCE. ALL REFLECTORS SHALL BE FREE OF PAINT OTHER THAN FACTORY – APPLIED, IF ANY. ALL OPTICAL REFLECTORS, CONES AND LENSES SHALL BE CLEANED ONLY ACCORDING TO MANUFACTURERS' INSTRUCTIONS.

END OF SECTION

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004
CABLE BUILDING

STATE OF KENTUCKY
TEJAS PATHAK
27689
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: **E401**

ELECTRICAL SPECIFICATIONS

FOR CONSTRUCTION

PANELBOARDS

PART 1 – GENERAL

1.1 SUMMARY

A. SECTION INCLUDES DISTRIBUTION PANELBOARDS AND LIGHTING AND APPLIANCE BRANCH–CIRCUIT PANELBOARDS.

1.2 SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

B. SHOP DRAWINGS: FOR EACH PANELBOARD AND RELATED EQUIPMENT.

1. INCLUDE DIMENSIONED PLANS, ELEVATIONS, SECTIONS, AND DETAILS. SHOW TABULATIONS OF INSTALLED DEVICES, EQUIPMENT FEATURES, AND RATINGS.
2. DETAIL ENCLOSURE TYPES AND DETAILS FOR TYPES OTHER THAN NEMA 250, TYPE 1.
3. DETAIL BUS CONFIGURATION, CURRENT, AND VOLTAGE RATINGS.
4. SHORT–CIRCUIT CURRENT RATING OF PANELBOARDS AND OVERCURRENT PROTECTIVE DEVICES.
5. INCLUDE EVIDENCE OF NRTL LISTING FOR SERIES RATING OF INSTALLED DEVICES.
6. DETAIL FEATURES, CHARACTERISTICS, RATINGS, AND FACTORY SETTINGS OF INDIVIDUAL OVERCURRENT PROTECTIVE DEVICES AND AUXILIARY COMPONENTS.
7. INCLUDE WIRING DIAGRAMS FOR POWER, SIGNAL, AND CONTROL WIRING.
8. INCLUDE TIME–CURRENT COORDINATION CURVES FOR EACH TYPE AND RATING OF OVERCURRENT PROTECTIVE DEVICE INCLUDED IN PANELBOARDS.

C. SEISMIC QUALIFICATION CERTIFICATES: SUBMIT CERTIFICATION THAT PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, ACCESSORIES, AND COMPONENTS WILL WITHSTAND SEISMIC FORCES DEFINED IN SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS."

D. FIELD QUALITY–CONTROL REPORTS.

E. PANELBOARD SCHEDULES FOR INSTALLATION IN PANELBOARDS.

F. OPERATION AND MAINTENANCE DATA.

1.3 QUALITY ASSURANCE

A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.

B. COMPLY WITH NEMA PB 1.

C. COMPLY WITH NFPA 70.

1.4 WARRANTY

A. SPECIAL WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR OR REPLACE TRANSIENT VOLTAGE SUPPRESSION DEVICES THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD.

1. WARRANTY PERIOD: FIVE YEARS FROM DATE OF SUBSTANTIAL COMPLETION.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. FABRICATE AND TEST PANELBOARDS ACCORDING TO IEEE 344 TO WITHSTAND SEISMIC FORCES DEFINED IN SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS."

B. ENCLOSURES: FLUSH– AND SURFACE–MOUNTED CABINETS.

1. RATED FOR ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.
   a. INDOOR DRY AND CLEAN LOCATIONS: NEMA 250, TYPE 1.
2. FRONT: SECURED TO BOX WITH CONCEALED TRIM CLAMPS. FOR SURFACE–MOUNTED FRONTS, MATCH BOX DIMENSIONS; FOR FLUSH–MOUNTED FRONTS, OVERLAP BOX.
3. HINGED FRONT COVER: ENTIRE FRONT TRIM HINGED TO BOX AND WITH STANDARD DOOR WITHIN HINGED TRIM COVER.
4. DIRECTORY CARD: INSIDE PANELBOARD DOOR, MOUNTED IN TRANSPARENT CARD HOLDER.

C. INCOMING INCOMING MAINS LOCATION: TOP AND BOTTOM.

D. PHASE, NEUTRAL, AND GROUND BUSES: HARD–DRAWN COPPER, 98 PERCENT CONDUCTIVITY.

E. CONDUCTOR CONNECTORS: SUITABLE FOR USE WITH CONDUCTOR MATERIAL AND SIZES.

1. MATERIAL: HARD–DRAWN COPPER, 98 PERCENT CONDUCTIVITY.
2. MAIN AND NEUTRAL LUGS: COMPRESSION TYPE.
3. GROUND LUGS AND BUS CONFIGURED TERMINATORS: COMPRESSION TYPE.
4. FEED–THROUGH LUGS: COMPRESSION TYPE, SUITABLE FOR USE WITH CONDUCTOR MATERIAL. LOCATE AT OPPOSITE END OF BUS FROM INCOMING LUGS OR MAIN DEVICE.
5. SUBFEED (DOUBLE) LUGS: COMPRESSION TYPE SUITABLE FOR USE WITH CONDUCTOR MATERIAL. LOCATE AT SAME END OF BUS AS INCOMING LUGS OR MAIN DEVICE.

F. SERVICE EQUIPMENT LABEL: NRTL LABELED FOR USE AS SERVICE EQUIPMENT FOR PANELBOARDS WITH ONE OR MORE MAIN SERVICE DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES.

G. FUTURE DEVICES: MOUNTING BRACKETS, BUS CONNECTIONS, FILLER PLATES, AND NECESSARY APPURTENANCES REQUIRED FOR FUTURE INSTALLATION OF DEVICES.

H. PANELBOARD SHORT–CIRCUIT CURRENT RATING: RATED FOR SERIES–CONNECTED SYSTEM WITH INTEGRAL OR REMOTE UPSTREAM OVERCURRENT PROTECTIVE DEVICES AND LABELED BY AN NRTL. INCLUDE SIZE AND TYPE OF ALLOWABLE UPSTREAM AND BRANCH DEVICES, AND LISTED AND LABELED FOR SERIES–CONNECTED SHORT–CIRCUIT RATING BY AN NRTL.

I. PANELBOARD SHORT–CIRCUIT CURRENT RATING: FULLY RATED TO INTERRUPT SYMMETRICAL SHORT–CIRCUIT CURRENT AVAILABLE AT TERMINALS.

2.2 DISTRIBUTION PANELBOARDS

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

1. SQUARE D; A BRAND OF SCHNEIDER ELECTRIC.

B. PANELBOARDS: NEMA PB 1, POWER AND FEEDER DISTRIBUTION TYPE.

C. DOORS: SECURED WITH VAULT–TYPE LATCH WITH TUMBLER LOCK; KEYED ALIKE.

D. MAINS: CIRCUIT BREAKER.

E. BRANCH OVERCURRENT PROTECTIVE DEVICES: FOR CIRCUIT–BREAKER FRAME SIZES 125 A AND SMALLER: BOLT–ON CIRCUIT BREAKERS.

F. BRANCH OVERCURRENT PROTECTIVE DEVICES: FOR CIRCUIT–BREAKER FRAME SIZES LARGER THAN 125 A: BOLT–ON CIRCUIT BREAKERS; PLUG–IN CIRCUIT BREAKERS WHERE INDIVIDUAL POSITIVE–LOCKING DEVICE REQUIRES MECHANICAL RELEASE FOR REMOVAL.

2.3 LIGHTING AND APPLIANCE BRANCH–CIRCUIT PANELBOARDS

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

1. SQUARE D; A BRAND OF SCHNEIDER ELECTRIC.

B. PANELBOARDS: NEMA PB 1, LIGHTING AND APPLIANCE BRANCH–CIRCUIT TYPE.

C. MAINS: CIRCUIT BREAKER OR LUGS ONLY.

D. BRANCH OVERCURRENT PROTECTIVE DEVICES: BOLT–ON CIRCUIT BREAKERS, REPLACEABLE WITHOUT DISTURBING ADJACENT UNITS.

E. CONTACTORS IN MAIN BUS: NEMA ICS 2, CLASS A, MECHANICALLY HELD, GENERAL–PURPOSE CONTROLLER, WITH SAME SHORT–CIRCUIT INTERRUPTING RATING AS PANELBOARD.

1. EXTERNAL CONTROL–POWER SOURCE: 120–V BRANCH CIRCUIT.

F. DOORS: CONCEALED HINGES; SECURED WITH FLUSH LATCH WITH TUMBLER LOCK; KEYED ALIKE.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

C. MOLDED–CASE CIRCUIT BREAKER (MCCB): COMPLY WITH UL 489, WITH INTERRUPTING CAPACITY TO MEET AVAILABLE FAULT CURRENTS.

1. THERMAL–MAGNETIC CIRCUIT BREAKERS: INVERSE TIME–CURRENT ELEMENT FOR LOW–LEVEL OVERLOADS, AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS. ADJUSTABLE MAGNETIC TRIP SETTING FOR CIRCUIT–BREAKER FRAME SIZES 250 A AND LARGER.
2. GFCI CIRCUIT BREAKERS: SINGLE– AND TWO–POLE CONFIGURATIONS WITH CLASS A GROUND–FAULT PROTECTION (6–MA TRIP).
3. GROUND–FAULT EQUIPMENT PROTECTION (GFEP) CIRCUIT BREAKERS: CLASS B GROUND–FAULT PROTECTION (30–MA TRIP).
4. ARC–FAULT CIRCUIT INTERRUPTER (AFCI) CIRCUIT BREAKERS: COMPLY WITH UL 1699; 120/240–V, SINGLE–POLE CONFIGURATION.
5. MOLDED–CASE CIRCUIT–BREAKER (MCCB) FEATURES AND ACCESSORIES:
   a. STANDARD FRAME SIZES, TRIP RATINGS, AND NUMBER OF POLES.
   b. LUGS: COMPRESSION STYLE, SUITABLE FOR NUMBER, SIZE, TRIP RATINGS, AND CONDUCTOR MATERIALS.
   c. APPLICATION LISTING: APPROPRIATE FOR APPLICATION; TYPE SWD FOR SWITCHING FLUORESCENT LIGHTING LOADS; TYPE HID FOR FEEDING FLUORESCENT AND HIGH–INTENSITY DISCHARGE (HID) LIGHTING CIRCUITS.
   d. GROUND–FAULT PROTECTION: INTEGRALLY MOUNTED RELAY AND TRIP UNIT WITH ADJUSTABLE PICKUP AND TIME–DELAY SETTINGS, PUSH–TO–TEST FEATURE, AND GROUND–FAULT INDICATOR.
   e. SHUNT TRIP: 120–V TRIP COIL ENERGIZED FROM SEPARATE CIRCUIT, SET TO TRIP AT 75 PERCENT OF RATED VOLTAGE.

PART 3 – EXECUTION

3.1 INSTALLATION

A. RECEIVE, INSPECT, HANDLE, STORE AND INSTALL PANELBOARDS AND ACCESSORIES ACCORDING TO NEMA PB 1.1.

B. COMPLY WITH MOUNTING AND ANCHORING REQUIREMENTS SPECIFIED IN SECTION "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS."

C. MOUNT TOP OF TRIM 90 INCHES (2286 MM) ABOVE FINISHED FLOOR UNLESS OTHERWISE INDICATED.

D. MOUNT PANELBOARD CABINET PLUMB AND RIGID WITHOUT DISTORTION OF BOX. MOUNT RECESSED PANELBOARDS WITH FRONTS UNIFORMLY FLUSH WITH WALL FINISH AND MATING WITH BACK BOX.

E. INSTALL OVERCURRENT PROTECTIVE DEVICES AND CONTROLLERS NOT ALREADY FACTORY INSTALLED.

1. SET FIELD–ADJUSTABLE, CIRCUIT–BREAKER TRIP RANGES.

F. INSTALL FILLER PLATES IN UNUSED SPACES.

G. STUB FOUR 1–INCH (27–GRC) EMPTY CONDUITS FROM PANELBOARD INTO ACCESSIBLE CEILING SPACE OR SPACE DESIGNATED TO BE CEILING SPACE IN THE FUTURE. STUB FOUR 1–INCH (27–GRC) EMPTY CONDUITS INTO RAISED FLOOR SPACE OR BELOW SLAB NOT ON GRADE.

H. ARRANGE CONDUCTORS IN GUTTERS INTO GROUPS AND BUNDLE AND WRAP WITH WIRE TIES.

I. COMPLY WITH NECA 1.

3.2 IDENTIFICATION

A. IDENTIFY FIELD–INSTALLED CONDUCTORS, INTERCONNECTING WIRING, AND COMPONENTS; PROVIDE WARNING SIGNS COMPLYING WITH SECTION "IDENTIFICATION FOR ELECTRICAL SYSTEMS."

B. CREATE A DIRECTORY TO INDICATE INSTALLED CIRCUIT LOADS AND INCORPORATING OWNER'S FINAL ROOM DESIGNATIONS. OBTAIN APPROVAL BEFORE INSTALLING. USE A COMPUTER OR TYPEWRITER TO CREATE DIRECTORY; HANDWRITTEN DIRECTORIES ARE NOT ACCEPTABLE.

C. PANELBOARD NAMEPLATES: LABEL EACH PANELBOARD WITH A NAMEPLATE COMPLYING WITH REQUIREMENTS FOR IDENTIFICATION SPECIFIED IN SECTION "IDENTIFICATION FOR ELECTRICAL SYSTEMS."

D. DEVICE NAMEPLATES: LABEL EACH BRANCH CIRCUIT DEVICE IN DISTRIBUTION PANELBOARDS WITH A NAMEPLATE COMPLYING WITH REQUIREMENTS FOR IDENTIFICATION SPECIFIED IN SECTION "IDENTIFICATION FOR ELECTRICAL SYSTEMS."

3.3 FIELD QUALITY CONTROL

A. PERFORM TESTS AND INSPECTIONS.

B. ACCEPTANCE TESTING PREPARATION:

1. TEST INSULATION RESISTANCE FOR EACH PANELBOARD BUS, COMPONENT, CONNECTING SUPPLY, FEEDER, AND CONTROL CIRCUIT.
2. TEST CONTINUITY OF EACH CIRCUIT.

C. TESTS AND INSPECTIONS:

1. PERFORM EACH VISUAL AND MECHANICAL INSPECTION AND ELECTRICAL TEST STATED IN NETA ACCEPTANCE TESTING SPECIFICATION. CERTIFY COMPLIANCE WITH TEST PARAMETERS.
2. CORRECT MALFUNCTIONING UNITS ON–SITE, WHERE POSSIBLE, AND RETEST TO DEMONSTRATE COMPLIANCE; OTHERWISE, REPLACE WITH NEW UNITS AND RETEST.

D. PANELBOARDS WILL BE CONSIDERED DEFECTIVE IF THEY DO NOT PASS TESTS AND INSPECTIONS.

END OF SECTION

RAMPART ENGINEERING
M: 502-541-5352
E: JEFFREY@RAMPARTENGINEERING.COM

CITY OF BARDSTOWN
999 KELLY DRIVE
BARDSTOWN, KENTUCKY 40004

CABLE BUILDING

STATE OF KENTUCKY
ELIAS PATHAK
27689
LICENSED PROFESSIONAL ENGINEER

JOB NO. 2021-32
DB:
CB:
DATE: 02/03/2022

SHEET NO: **E402**

ELECTRICAL SPECIFICATIONS

FOR CONSTRUCTION