

# Addendum 1

**City of Canton, Ohio**  
Purchasing Department  
218 Cleveland Ave. SW, 4<sup>th</sup> floor  
Canton, Ohio 44702

Crenshaw Park Outdoor Shelter

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**Item/Project**

Park Department

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**Responsible Department**

Tuesday, October 3, 2023 at 2:00 PM local time

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**Bids Due On or Before**

**Bid Proposal Submitted By:**

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**Company Name**

---

**Street Address**

---

**City**

**State**

**Zip**

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**Contact Person**

**Phone No.**

**Email Address**

**Clarification 1:**

Plumbing and HVAC drawings were inadvertently attached as the preliminary files. Final Plumbing and HVAC Drawings are attached to this addendum.

**Question 1:**

Sheet E-1.1 indicates that the EC shall coordinate the entire installation with the utility company. Are the utility company setup & connection fees being paid by the owner/AEP account holder?

**Answer:**

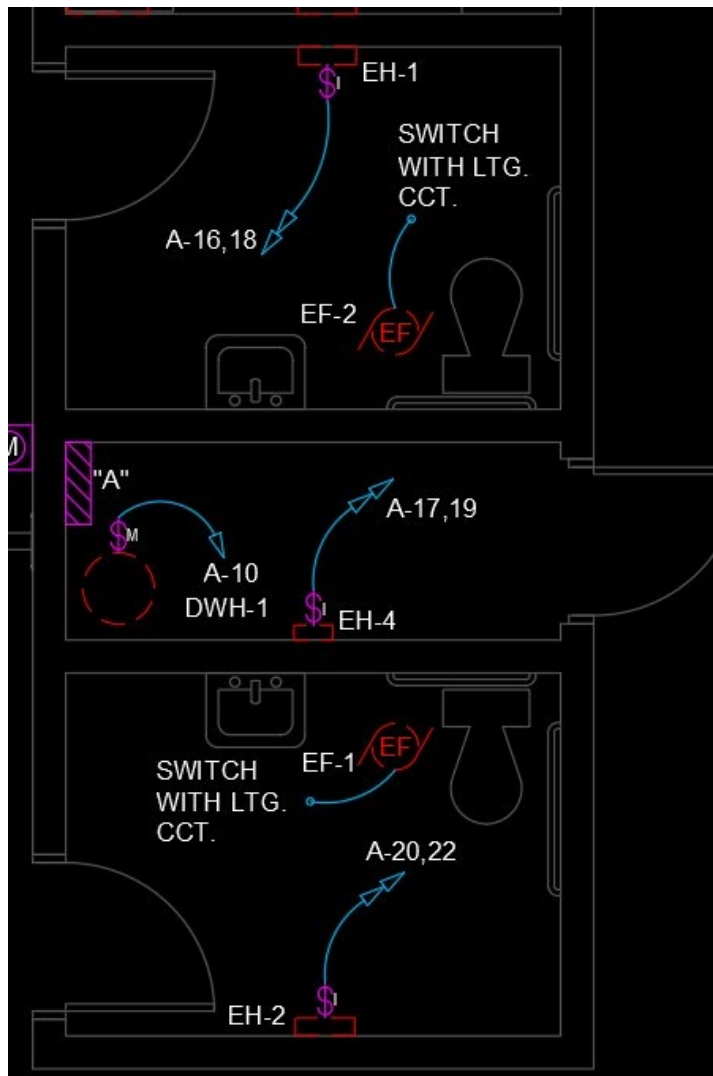
Owner shall be responsible for connection fees.

**Question 2:**

Mechanical drawing H-1.1 appears to mislabel the two ceiling exhaust fans (EF1 & EF2) as EH-1 & EH-2. This typo is carried over to the electrical drawings on sheet E-3.1, and a dedicated circuit is shown for each fan on the floor plan and panel schedule. The mechanical schedules indicate that the fans should only be tied in with the ceiling lighting. Please clarify.

**Answer:**

EF-1 and EF-2 are to be switched with lights and the additional breakers that were shown (A-21,23 & A-25,27) will become spares.



**Question 3:**

Will any of the GFCI receptacles in the open air pavilion seating area need to have in-use "bubble" covers? This includes (2) on the wall and (4) in the ceiling.

**Answer:**

In use covers are not required for these receptacles.

**Question 4:**

Can further detail be given on the (6) spare 1-1/4" PVC conduit stubs that are noted on sheet E-3.1? Please confirm if any sort of support structure is needed (if these are not being strapped to the exterior wall of the shelter), and if there is an approximate distance from a point on the building that can be figured for bidding purposes.

**Answer:**

E.C. stub conduits 6'-0" from building, cap and mark with a painted white rebar stake buried 3" below finished grade.

**Question 5:**

For this 250A single-phase service, a 400A meter socket will have an extremely long lead time. If AEP will allow it, may a CT cabinet be used instead of the standalone metering?

**Answer:**

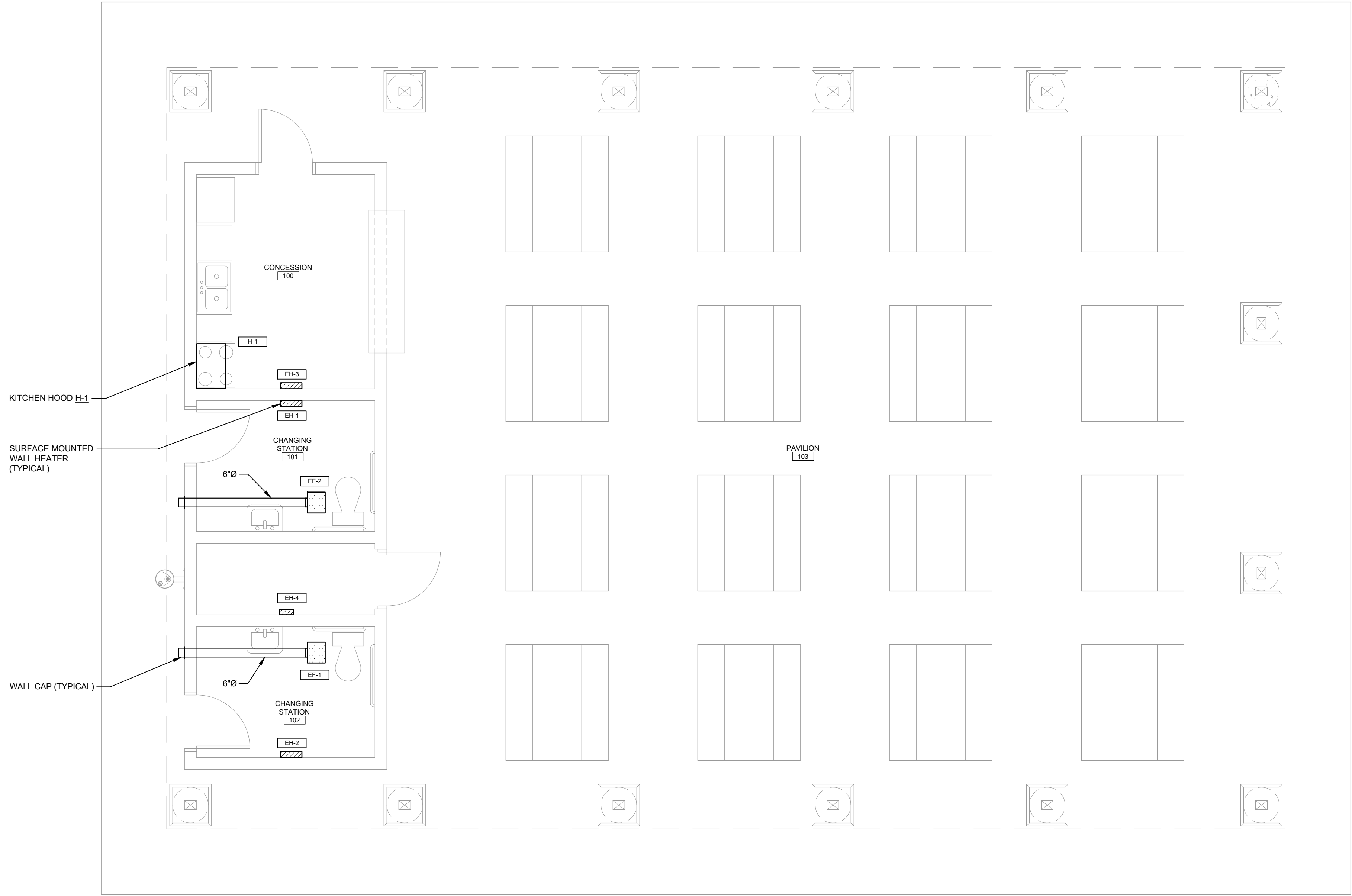
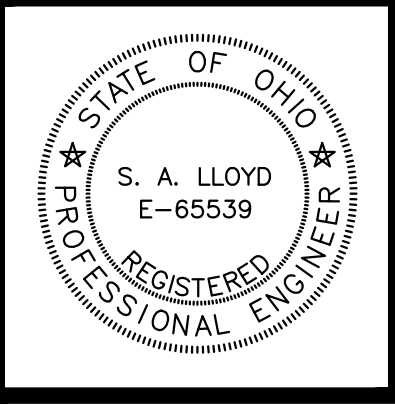
CT cabinet is acceptable if approved by Utility Co.



ENGINEERING GROUP, INC.  
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www.hei-engineering.com

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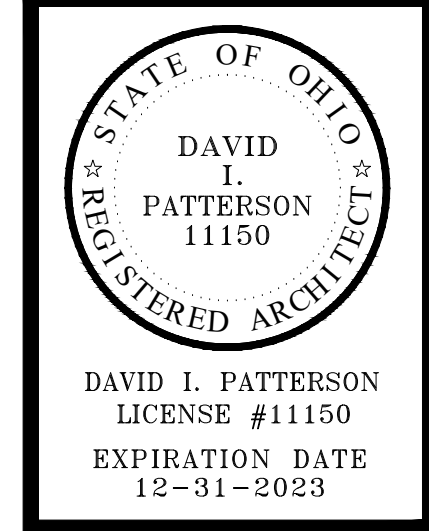
REVISIONS:



FLOOR PLAN - HVAC  
SCALE: 1/4" = 1'-0"

MOTT & MEADOWS  
ARCHITECTS

CRENSHAW PARK - NEW PAVILION  
EDWARD L. "PEEL" COLEMAN COMMUNITY CENTER  
1400 SHERRICK ROAD SE  
CANTON, OHIO



THIS DWG :  
FLOOR PLAN - HVAC

COMM 23105  
DATE 09-28-23

DWG  
H-1.1

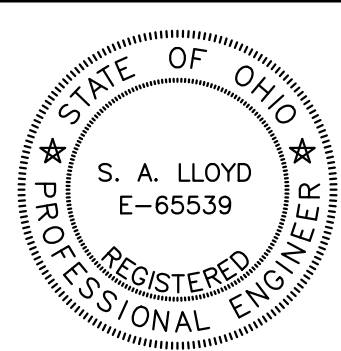
CONSTRUCTION DOCUMENTS

600 MARKET AVENUE NORTH CANTON OHIO 44702



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REVISIONS:

GENERAL HVAC NOTES

1. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF THE MECHANICAL SYSTEMS. ACTUAL FIELD CONDITIONS AND WORK OF OTHER TRADES MAY REQUIRE MINOR DEVIATIONS.

2. ALL MECHANICAL SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE OHIO PLUMBING AND MECHANICAL CODES.

3. ALL MECHANICAL EQUIPMENT AND APPLIANCES SHALL BEAR THE LABEL OF AN APPROVED AGENCY IN ACCORDANCE WITH THE OHIO MECHANICAL CODE. ALL MECHANICAL EQUIPMENT AND APPLIANCES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

4. UNLESS NOTED OTHERWISE, EACH MECHANICAL SYSTEM COMPONENT SHALL BE INDEPENDENTLY SUPPORTED FROM THE BUILDING STRUCTURE.

5. PLUMBING AND HVAC INSTALLATION SHALL BE COORDINATED SO AS TO MAINTAIN AT LEAST TEN FEET OF CLEARANCE FROM ALL OUTDOOR AIR INTAKES AND BUILDING OPENINGS, TO ANY PLUMBING VENTS, EXHAUST AIR OUTLETS OR OTHER NOXIOUS CONDITIONS.

6. ALL MECHANICAL SYSTEM PENETRATIONS THROUGH FIRE / SMOKE RATED ASSEMBLIES SHALL BE SEALED WITH FIRE AND SMOKE STOPPING COMPOUND SO AS TO MAINTAIN THE FIRE RESISTANCE RATING OF THE WALL PENETRATED. FIRESTOPPING COMPOUND, PIPE SLEEVES, AND PIPING INSTALLATION SHALL BE INSTALLED SO AS THE COMPLETE PENETRATION ASSEMBLY IS CLASSIFIED BY UL AS LISTED IN THE UL BUILDING MATERIALS DIRECTORY.

7. UNLESS NOTED OTHERWISE, THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING OF EXISTING WALLS, FLOORS, CEILINGS AND ROOFS AS REQUIRED FOR THE INSTALLATION OF HVAC SYSTEMS. ANY EXISTING ROOF WARRANTIES SHALL BE MAINTAINED. NO STRUCTURAL OR REINFORCING MEMBERS SHALL BE CUT.

8. MECHANICAL CONTRACTOR SHALL VERIFY/COORDINATE EQUIPMENT ELECTRICAL REQUIREMENTS PRIOR TO UNIT PROCUREMENT.

9. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVISION AND INSTALLATION OF ALL CONTROL WIRING, TUBING AND ASSOCIATED CONDUIT AFFILIATED WITH THE HVAC SYSTEMS. CONTROL WIRING AND TUBING SHALL BE CONCEALED WITHIN THE BUILDING WHEREVER POSSIBLE. EXPOSED CONTROL WIRING AND TUBING IS ACCEPTABLE ONLY IN EQUIPMENT ROOMS, STORAGE ROOMS, LOADING DOCKS AND MANUFACTURING AREAS. EXPOSED CONTROL WIRING AND TUBING SHALL BE CONCEALED IN CONDUIT. CONTROL WIRING AND TUBING IN CEILING PLENUMS SHALL BE EITHER UL PLENUM RATED TYPE OR INSTALLED WITHIN CONDUIT. CONTROL TUBING AND CONTROL WIRING 230 VOLT OR LESS MAY BE INSTALLED IN ELECTRICAL METALLIC TUBING (EMT). ALL CONDUCTOR WIRES SHALL BE CODED AND LABELED FOR FUTURE REFERENCE.

10. UNLESS NOTED OTHERWISE, THERMOSTAT SHALL BE INSTALLED @ 48" AFF.

KITCHEN HOOD SCHEDULE											
NO	MAKE	MODEL	DIMENSIONS		EXHAUST AIR		STYLE	ELECTRICAL	MCA AMPS	MOCP AMPS	WEIGHT
			LENGTH X WIDTH X HEIGHT	CFM	SP	CONNECTION					
H-1	DENLAR	D1030-F-NFPA	30"x19.5"x10.5"	500	--	FRONT	RECIRCULATING	120-1-60	3.7	4.0	80 LBS
<p>1. UNIT SHALL BE WALL MOUNTED SO THAT THE BOTTOM OF THE MOUNTING BRACKET SITS 24"-30" ABOVE THE STOVETOP</p> <p>2. UNIT SHALL BE OF STAINLESS STEEL CONSTRUCTION (#18 &amp; #20 GA. POLISHED 304) WITH NO SHARP EDGES AND A BRUSHED FINISH</p> <p>3. UNIT SHALL HAVE FIRE SUPPRESSION SYSTEM PRE-INSTALLED BY FACTORY INTO THE HOOD</p> <p>4. AUTOMATIC SUPPRESSION ACTIVATION SHALL BE BY 212 DEG F RATED FUSIBLE LINK</p> <p>5. EXTINGUISHING AGENT: WET CHEMICAL POTASSIUM CITRATE / POTASSIUM ACETATE SOLUTION IN A PRESSURIZED CYLINDER</p> <p>6. UNIT SHALL HOUSE A CENTRIFUGAL FAN CONTROLLED BY A HOOD MOUNTED MANUAL VARIABLE SPEED SWITCH</p> <p>7. UNIT SHALL BE ETL LISTED TO UL300A STANDARDS</p> <p>8. FAN MOTOR SHALL BE PERMANENTLY LUBRICATED TO MEET UL07 STANDARDS</p> <p>9. UNIT SHALL BE COMPLETE WITH A POWER DISCONNECT AND GAS SOLENOID VALVE TO SHUT-OFF KITCHEN APPLIANCE FUEL SOURCE - ACTIVATED UPON SUPPRESSION SYSTEM DISCHARGE</p> <p>10. UNIT SHALL HAVE MULTIPLE ALARM CONNECTION TERMINALS PRE-INSTALLED (LOCAL AND REMOTE ALARMS) AND AN INTERNAL AUDIBLE BUZZER (90-DBA)</p> <p>11. INTEGRAL LIGHTING SHALL BE COMPLETE SHATTER-PROOF BULB</p> <p>12. NFPA OPTION REQUIREMENTS: MANUAL PULL STATION AND CLOCKBOX</p>											

FAN SCHEDULE														
NO	MAKE	MODEL	DESCRIPTION	DRIVE	CFM	SP	BHP	RPM	MHP	SONES	ELECTRIC	WEIGHT (LBS)	CONTROL	OPTIONS / NOTES
EF-1,2	GREENHECK	SP-A190	CEILING CABINET	DIRECT	140	0.30"	-	1271	33 W	1.1	120-1-60	20	WITH LIGHTS	B,D & G
<p>OPTIONS (SEE SCHEDULE ABOVE FOR APPLICABLE OPTIONS FROM LIST BELOW)</p> <div><div>A. BIRD SCREEN</div><div>B. DISCONNECT SWITCH</div><div>C. MOTOR OPERATED DAMPER</div><div>D. GRAVITY BACKDRAFT DAMPER</div><div>E. 12" HIGH GALVANIZED STEEL ROOF CURB</div><div>F. BRICK VENT</div><div>G. WALL CAP</div><div>H. ROOF CURB WITH CAP</div><div>I. ROOF JACK</div><div>J. FAN SPEED CONTROLLER</div><div>K. ISOLATION KIT</div><div>L. VARIGREEN MOTOR W/ SPEED ADJUSTMENT ON MOTOR</div><div>M. VFD RATED MOTOR WITH CLASS "F" INSULATION</div><div>N. NEMA 3R DISCONNECT SWITCH</div><div>O. HINGED BASE WITH DRIN PIPE AND GREASE TERMINATOR</div><div>P. EXPLOSION PROOF MOTOR</div><div>Q. SPARK RESISTANT CONSTRUCTION: AMCA "___"</div><div>R. OPTIONAL WIRE GUARD</div><div>S. OUTLET SAFETY SCREEN</div><div>T. OSHA APPROVED BELT GUARD</div><div>U. CEILING RADIATION DAMPER</div><div>V. TWO SPEED MOTOR</div><div>W. INLET VANES</div></div>														

ELECTRIC HEATER SCHEDULE											
NO	MAKE	MODEL	TYPE	HEAT CAPACITY		BLOWER		ELECTRICAL		WT LBS	OPTIONS NOTES
				WATTS	BTUH	CFM	HP	VOLT/PH/Hz	AMPS		
EH-1,2	MARKEL	F3422T	WALL HEATER	2000	6826	245	-	208-1-60	9.6	41	A, D, H
EH-3	MARKEL	F3423T	WALL HEATER	3000	10,239	245	-	208-1-60	14.4	41	A, D, H
EH-4	MARKEL	HF4410T2RP	WALL HEATER	1000	3413	70	-	208-1-60	3.6	9	A, D, H
<p>GENERAL NOTES FOR ALL HEATERS</p> <p>1. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS</p> <p>OPTIONS (SEE SCHEDULE ABOVE FOR APPLICABLE OPTIONS FROM LIST BELOW)</p> <div><div>A. INTEGRAL THERMOSTAT (TAMPERPROOF)</div><div>B. INTEGRAL THERMOSTAT (KNOB-OPERATED)</div><div>C. REMOTE WALL MOUNTED LINE VOLTAGE THERMOSTAT</div><div>D. POWER DISCONNECT SWITCH</div><div>E. HANGING BRACKET</div><div>F. AIR FLOW SWITCH</div><div>G. RECESS MOUNTING FRAME</div><div>H. SURFACE MOUNTING FRAME</div><div>I. T-BAR MOUNTING FRAME</div><div>J. 24V THERMOSTAT</div><div>K. LINE VOLTAGE THERMOSTAT</div><div>L. SUMMER FAN SWITCH</div><div>M. DISPOSABLE FILTERS</div></div>											

MOTTED MEADOWS

A R C H I T E C T S

600 MARKET AVENUE NORTH CANTON OHIO 44702

CRENSHAW PARK - NEW PAVILION

EDWARD L. "PEEL" COLEMAN COMMUNITY CENTER

1400 SHERRICK ROAD SE CANTON, OHIO



DAVID I. PATTERSON  
LICENSE #11150  
EXPIRATION DATE  
12-31-2023

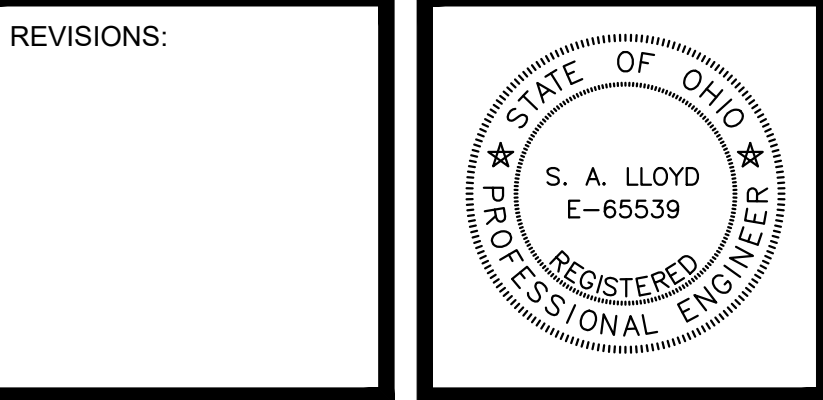
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HVAC SCHEDULES AND  
NOTES

COMM 23105  
DATE 09-28-23

DWG  
H-2.1

CONSTRUCTION DOCUMENTS





# H V A C S P E C I F I C A T I O N S

## BASIC HVAC REQUIREMENTS

- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING A COMPLETE HVAC SYSTEM INSTALLATION AS INDICATED ON THE DRAWINGS AND WITHIN THESE SPECIFICATIONS. THE ENGINEER'S RESPONSIBILITY IS LIMITED TO DESIGN SERVICES ONLY (NO CONSTRUCTION PHASE ADMINISTRATION SERVICES OR INSTALLATION SUPERVISION). THE INSTALLING CONTRACTOR SHALL BE RESPONSIBLE FOR ALL MEANS AND METHODS OF THE MECHANICAL SYSTEM DESIGN IMPLEMENTATION.
- B. DRAWINGS ARE BASICALLY DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS AND COMPONENTS. INSTALLING CONTRACTOR SHALL COORDINATE THE DESIGN INTENT OF THE DRAWINGS WITH THE ACTUAL FIELD CONDITIONS MAKING MINOR DEVIATIONS AND ADJUSTMENTS AS REQUIRED FOR A COMPLETE OPERATIONAL SYSTEM. EXACT LOCATIONS OF MECHANICAL SYSTEM COMPONENTS SHALL BE DETERMINED BY THE CONTRACTOR. SUCH DETERMINATION SHALL GIVE CONSIDERATION TO THE BUILDING STRUCTURAL AND SPATIAL LIMITATIONS, TO COORDINATION WITH WORK OF OTHER TRADES AND DISCIPLINES, AND TO THE NECESSARY CLEARANCE REQUIREMENTS (BOTH OF THE ITEM BEING INSTALLED AND OF ALL ADJACENT ITEMS) TO ACCOMMODATE MANUFACTURERS' INSTALLATION REQUIREMENTS, TO SATISFY CODE CLEARANCE REQUIREMENTS AND TO FACILITATE SYSTEM OPERATION AND MAINTENANCE. UNLESS NOTED OTHERWISE, MECHANICAL SYSTEMS SHALL BE INSTALLED TO PROVIDE MAXIMUM CLEARANCE ABOVE THE FINISHED FLOOR.
- C. THE MECHANICAL SYSTEM INSTALLATION SHALL BE IN FULL COMPLIANCE WITH THE FOLLOWING CODES AND STANDARDS:
- THE OHIO BUILDING CODE  
THE OHIO PLUMBING CODE  
THE OHIO MECHANICAL CODE  
NFPA (APPLICABLE SECTIONS)  
NATIONAL ELECTRIC CODE  
MUNICIPAL AND COUNTY CODES AND ORDINANCES  
STATE, MUNICIPAL, AND COUNTY HEALTH AGENCIES  
OTHERS AS INDICATED WITHIN THESE SPECIFICATIONS
- D. DRAWINGS AND SPECIFICATIONS SHALL BE CONSIDERED COOPERATIVE. ANYTHING APPEARING IN THIS SPECIFICATION BUT NOT ON THE DRAWINGS, OR VICE VERSA, SHALL BE CONSIDERED PART OF THE CONTRACT.
- E. EVERY EFFORT IS MADE ON THE PART OF THE ENGINEER TO COMPLY WITH THE LISTED CODES AND STANDARDS. WHERE THE DESIGN EXCEEDS THE REQUIREMENTS OF THE APPLICABLE CODES AND STANDARDS, THE INSTALLATION SHALL BE PER THE DESIGN REQUIREMENTS. NO WORK SHALL BE INSTALLED CONTRARY TO OR BELOW MINIMUM REQUIREMENTS OF THE CODES AND STANDARDS.
- F. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS AND LICENSES, BOTH TEMPORARY AND PERMANENT, REQUIRED BY LAW AS PART OF THE INSTALLATION WORK INDICATED ON THE DRAWINGS AND WITHIN THIS SPECIFICATION.
- G. THE CONTRACTOR SHALL SUBMIT FOR REVIEW BY THE ARCHITECT-ENGINEER 6 COPIES OF MANUFACTURER'S DRAWINGS, CUT SHEETS, AND APPLICATION SPECIFIC PERFORMANCE DATA.
1. HVAC SYSTEM EQUIPMENT AND SYSTEM COMPONENTS  
2. HVAC DUCTWORK LAYOUTS  
3. HVAC CONTROLS AND SEQUENCES OF OPERATIONS  
4. HVAC TEST AND BALANCE REPORTS
- H. SHOP DRAWING SUBMITTALS SHALL INCLUDE THE PROJECT NAME, THE ARCHITECT-ENGINEER'S PROJECT NUMBER, THE APPLICABLE SPECIFICATION SECTION AND OR DRAWING NUMBER AS WELL, THE CONTRACTOR'S APPROVAL, STAMP, SHOP DRAWINGS SHALL BE SUBMITTED TO ARCHITECT-ENGINEER WITHIN THIRTY WORKING DAYS OF AWARD OF CONTRACT. CONTRACTOR SHALL NOT INSTALL ANY APPLICABLE MATERIALS AND/OR EQUIPMENT WITHOUT PRIOR REVIEW AS INDICATED ON THE ARCHITECT-ENGINEER'S REVIEW STAMP. REVIEW BY THE ENGINEER DOES NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY TO COMPLY WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

- I. THE CONTRACTOR SHALL GUARANTEE THE COMPLETE MECHANICAL SYSTEM INSTALLATION AS INSTALLED BY HIM OR HIS SUB-CONTRACTORS TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE (UNLESS A LONGER PERIOD IS SPECIFIED FOR SPECIFIC ITEMS ELSEWHERE). DEVIATIONS FROM THIS MAY OCCUR ON LARGER ITEMS OF EQUIPMENT USED DURING BENEFICIAL OCCUPANCY BEFORE THE TOTAL SYSTEM IS ACCEPTED. SUCH A MATTER MUST HAVE PRIOR APPROVAL AND BE MADE A MATTER OF WRITTEN RECORD BY THE ARCHITECT-ENGINEER'S REPRESENTATIVE.
- J. THE CONTRACTOR SHALL REPAIR OR REPLACE AT HIS OWN EXPENSE ANY MATERIALS OR EQUIPMENT FOUND TO BE DEFECTIVE WITHIN THE WARRANTY PERIOD AND SHALL BE HELD FINANCIALLY RESPONSIBLE FOR ANY PROPERTY DAMAGES ARISING FROM SUCH DEFECTS OR THE CORRECTION OF SUCH DEFECTS.
- K. THE CONTRACTOR SHALL GUARANTEE THAT ALL MECHANICAL EQUIPMENT SUPPLIED BY HIM OR HIS SUB-CONTRACTORS SHALL DEVELOP CAPACITIES AND HAVE CHARACTERISTICS AS SCHEDULED OR SPECIFIED.
- L. THE CONTRACTOR SHALL SUBMIT WRITTEN WARRANTY CERTIFICATES FOR HIS INSTALLATION WORK AND FROM EACH MANUFACTURER OF EQUIPMENT SUPPLIED ON THE PROJECT TO THE ENGINEER.
- M. CONTRACTOR MAY USE PERMANENT MECHANICAL EQUIPMENT FOR TEMPORARY SERVICES WHEN APPROVED BY THE ARCHITECT-ENGINEER. SUCH APPROVAL IS CONDITIONED BY THE FOLLOWING REQUIREMENTS:
1. THE CONTRACTOR SHALL MAINTAIN THE EQUIPMENT FOR RELEASE TO OWNER AT TIME OF FINAL ACCEPTANCE IN "NEW" CONDITION.  
2. WARRANTY PERIOD FOR THE OWNER SHALL NOT BEGIN UNTIL THE DATE OF FINAL SYSTEM ACCEPTANCE.
- N. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY DAMAGES INCURRED DURING THE INSTALLATION OF HIS WORK TO THE EXISTING GROUNDS, WALKS, ROADS, BUILDING, PLUMBING SYSTEMS, HVAC SYSTEMS, AND ELECTRIC SYSTEMS AS WELL AS ALL NEW CONSTRUCTION WORK BY OTHER TRADES. HE SHALL REPAIR AT HIS EXPENSE ALL SUCH DAMAGES FOR RESTORATION TO THE ORIGINAL CONDITIONS TO THE SATISFACTION OF THE ARCHITECT-ENGINEER AND OWNER.
- O. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING THE MATERIALS, EQUIPMENT AND INSTALLATION OF HIS WORK FROM DAMAGE DUE TO WEATHER AND CONSTRUCTION JOB SITE CONDITIONS.
- P. THE CONTRACTOR SHALL MAINTAIN A SET OF PRINTS AT THE CONSTRUCTION SITE TO RECORD IN RED ANY DEVIATIONS IN THE ACTUAL MECHANICAL SYSTEM INSTALLATION FROM THE DESIGN DRAWINGS AND SHALL BE SUBMITTED TO THE ARCHITECT-ENGINEER UPON COMPLETION OF THE PROJECT.
- Q. THE CONTRACTOR SHALL PROVIDE THREE (3) SETS OF OPERATION AND MAINTENANCE MANUALS FOR THE OWNERS USE UPON COMPLETION OF THE PROJECT. OPERATION AND MAINTENANCE MANUALS SHALL BE SUBMITTED TO THE ARCHITECT-ENGINEER FOR APPROVAL. OPERATION AND MAINTENANCE MANUALS SHALL INCLUDE THE FOLLOWING:
1. NAME AND SERVICE TELEPHONE NUMBER OF THE INSTALLING COMPANY  
2. GENERAL DESCRIPTION OF HOW THE SYSTEM SHOULD OPERATE  
3. MANUFACTURER'S OPERATION AND MAINTENANCE INSTRUCTIONS  
4. COPY OF APPROVED SHOP DRAWINGS  
5. COPY OF FINAL BALANCE REPORT  
6. LUBRICATION SCHEDULE  
7. VALVE CHART  
8. SPARE PARTS LIST  
9. WARRANTY CERTIFICATES
- R. THE CONTRACTOR SHALL INSTRUCT THE OWNERS MAINTENANCE PERSONNEL IN THE PROPER OPERATION AND MAINTENANCE OF THE ENTIRE MECHANICAL SYSTEM INSTALLATION INCLUDING ALL ASSOCIATED CONTROLS AND ACCESSORIES.
- S. THE SCHEDULED MANUFACTURER FOR EACH ITEM SHALL BE CONSIDERED AS BASIS OF DESIGN. PERFORMANCE CHARACTERISTICS, ELECTRICAL CHARACTERISTICS, AND DIMENSIONAL AND SPATIAL REQUIREMENTS FOR THIS ITEM HAVE ALREADY BEEN CONSIDERED IN THE DESIGN. OTHER ACCEPTABLE MANUFACTURERS HAVE NOT BEEN CHECKED FOR SUCH DETAIL AND MUST MEET ALL THE SCHEDULED PERFORMANCE REQUIREMENTS AND POSSIBLE FEATURES SIMILAR TO THOSE WHICH ARE STANDARD ON THE ITEMS WHICH ARE BASIS OF DESIGN.

- UNLESS NOTED OTHERWISE, EACH MECHANICAL SYSTEM COMPONENT SHALL BE INDEPENDENTLY SUPPORTED FROM THE BUILDING STRUCTURE.
- UNLESS NOTED OTHERWISE, CONTRACTOR(S) SHALL COORDINATE PLUMBING AND HVAC INSTALLATION SO AS TO MAINTAIN AT LEAST TEN FEET OF CLEARANCE FROM ALL OUTDOOR AIR INTAKES AND BUILDING OPENINGS TO ANY PLUMBING VENTS (EXISTING AND NEW) EXHAUST AIR OUTLETS OR OTHER NOXIOUS CONDITIONS.
- UNLESS NOTED OTHERWISE, ALL ROOFTOP EQUIPMENT SHALL BE LOCATED SO AS TO MAINTAIN AT LEAST TEN FEET OF CLEARANCE FROM ANY ROOF EDGE WITH A DROP OF 24" OR MORE.

## BASIC HVAC MATERIALS AND METHODS

- A. UNLESS NOTED OTHERWISE, THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL NEW MATERIALS, EQUIPMENT, COMPONENTS, AND FIXTURES AS INDICATED. OTHER MANUFACTURERS OF MECHANICAL EQUIPMENT MAY BE SUBSTITUTED FOR THOSE INDICATED AS LONG AS THE QUALITY OF CONSTRUCTION AND OPERATING CHARACTERISTICS ARE EQUIVALENT.
- B. PIPE SLEEVES SHALL BE PROVIDED AND INSTALLED WHERE PIPES PASS THROUGH WALLS, FLOORS, AND CEILINGS. SLEEVES SHALL BE SUFFICIENTLY LARGE ENOUGH TO ALLOW FOR FIRE AND SOUND STOPPING BETWEEN THE INSIDE SLEEVE WALL AND THE PIPE OR INSULATION SURFACE AS WELL AS ALLOW FOR THERMAL EXPANSION AND CONTRACTION OF PIPING. SLEEVES SHALL BE LARGE ENOUGH TO ALLOW PIPE INSULATION TO BE CONTINUOUS THROUGH THE WALL. LENGTH OF SLEEVES SHALL BE EQUAL TO THE THICKNESS OF THE BUILDING CONSTRUCTION ELEMENT PENETRATED FOR A FLUSH FINISH ON BOTH SIDES EXCEPT FOR FLOOR SLEEVES WHICH SHALL EXTEND 1" ABOVE THE FINISH FLOOR. INSTALL NON-PIPE SLEEVES IN EXTERIOR WALL PENETRATIONS AND STEEL-PIPE SLEEVES ELSEWHERE UNLESS NOTED OTHERWISE.
- C. THE CONTRACTOR SHALL PROVIDE AND INSTALL SEALING MATERIALS FOR MECHANICAL SYSTEM PENETRATIONS THROUGH BUILDING WALLS, FLOORS, CEILINGS, AND ROOFS. EXTERIOR PENETRATIONS SHALL BE WEATHER PROOF AND VERMIN PROOF. INTERIOR PENETRATIONS SHALL HAVE SOUND STOPPING. PENETRATIONS THROUGH FIRE AND SMOKE BARRIERS SHALL HAVE FIRESTOPPING.
1. THE CONTRACTOR SHALL SEAL ALL FIRE-SMOKE RATED WALL AND FLOOR PENETRATIONS FOR MECHANICAL SYSTEM COMPONENTS WITH FIRE AND SMOKE STOPPING COMPOUND SO AS TO MAINTAIN THE FIRE RESISTANCE RATING OF THE WALL OR FLOOR PENETRATION. FIRE-STOPPING COMPOUND, PIPE SLEEVES, AND PIPING AND INSULATION SHALL BE INSTALLED SO AS THE COMPLETE PENETRATION ASSEMBLY IS CLASSIFIED BY UL AS LISTED IN THE UL BUILDING MATERIALS DIRECTORY.
- D. ESCUTCHEON PLATES SHALL BE INSTALLED ON ALL PIPE PENETRATIONS THROUGH WALLS, FLOORS, AND CEILINGS WHERE EXPOSED TO VIEW AND ON THE BUILDING EXTERIOR. ESCUTCHEON PLATE SHALL BE SECURED TO PIPE OR INSULATION AND COMPLETELY COVER THE HOLE PENETRATION.
- E. ACCESS DOORS SHALL BE PROVIDED AND INSTALLED BY THE M.C. IN NON-ACCESSIBLE WALLS, AND CEILINGS WHICH CONCEAL HVAC ITEMS WHICH REQUIRE SERVICE OR INSPECTION SUCH AS VALVES AND DAMPERS. THE DOORS SHALL BE OF ADEQUATE SIZE TO SERVICE THE CONCEALED ITEM. DOOR SHALL BE OF PAINTED STEEL CONSTRUCTION WITH CONCEALED HINGE AND KEYED LOCK. ALL DOORS SHALL BE KEYPED ALIKE WITH A MINIMUM OF TWO KEYS PROVIDED TO OWNER. ACCESS DOORS IN CEILINGS SHALL HAVE A RECESSED FACE FOR FIELD INSTALLATION OF FINISHED CEILING MATERIAL. DOORS INSTALLED IN FIRE RATED WALLS AND CEILINGS SHALL BE UL LISTED AND LABELED WITH APPLICABLE FIRE RESISTANCE RATINGS.
- F. EXISTING BUILDING SURFACES AND AUXILIARY EQUIPMENT AND FINISHES MARKED DURING INSTALLATION OF HVAC WORK SHALL BE REPAINTED BY THE M.C. FACTORY APPLIED PAINT FINISHES ON HVAC EQUIPMENT MARKED DURING INSTALLATION SHALL ALSO BE REPAINTED BY THE M.C.
- G. THE CONTRACTOR SHALL PAINT ALL IRON PIPE FITTINGS AND VALVE BODIES, ALL SUPPORT STEEL INSTALLED AS PART OF HIS SCOPE OF WORK AND ALL EXPOSED PIPING AND DUCTWORK ON THE EXTERIOR OF THE BUILDING. ALL PAINTING SHALL BE DONE IN ACCORDANCE WITH THE PAINT MANUFACTURER'S INSTRUCTIONS INCLUDING SURFACE PREPARATION AND CONDITIONS OF AMBIENT TEMPERATURE AND HUMIDITY. ENVIRONMENTAL CONDITIONS IN THE AREA OF PAINTING WORK SHALL COMPLY WITH THE PAINT MANUFACTURER'S RECOMMENDATIONS AND ALL GOVERNING REGULATIONS.

## HVAC PIPING AND ACCESSORIES

- A. REFER TO THE "PIPE AND INSULATION SCHEDULE" FOR SPECIFIC PIPING APPLICATION AND MATERIAL REQUIREMENTS.
- B. ALL PIPING SHALL BE RUN AS DIRECT AS POSSIBLE WITHIN THE ACTUAL BUILDING CONDITIONS. INSTALLATION SHALL BE PARALLEL WITH OR AT RIGHT ANGLES TO THE BUILDING STRUCTURE. COORDINATE INSTALLATION WITH ALL OTHER TRADES TO BEST UTILIZE AVAILABLE SPACE.
- C. PIPING INSTALLATION SHALL BE SLOPED IN THE DIRECTION OF FLOW AT A PITCH OF AT LEAST 0.2% FOR WATER PIPING, AND 1.0% FOR CONDENSATE PIPING UNLESS NOTED OTHERWISE.
- D. PIPING INSTALLATION SHALL NOT REQUIRE SPRINGING OR FORCING. PIPING OFFSETS, LOOPS AND/OR EXPANSION JOINTS SHALL BE PROVIDED (WHETHER SHOWN OR NOT) TO LIMIT STRESS DUE TO THERMAL EXPANSION.
- E. PIPING MATERIALS SHALL BE CLEAN PRIOR TO AND DURING INSTALLATION. UPON COMPLETION OF PIPING INSTALLATION, BUT PRIOR TO FINAL CONNECTIONS, THE ENTIRE SYSTEM SHALL BE FLUSHED WITH A CLEANING SOLUTION WHICH WILL NOT HARM EITHER THE PIPING EQUIPMENT OR USERS.
- F. THREADED PIPE SHALL BE REAMED AFTER THREADED. PIPE THREAD COMPOUND SHALL BE APPLIED TO MALE THREADS ONLY. SOLDERED JOINTS ON COPPER PIPING SHALL BE MADE WITH 95-5 TIN/ANTIMONY SOLDER. SURFACES SHALL BE CLEANED AND FLUXED IN PREPARATION TO RECEIVE SOLDER.
- G. DRAIN VALVES SHALL BE PROVIDED AT ALL LOW POINTS AND AT ALL COLLEQUIPMENT CONNECTIONS. MANUAL AIR VENTS SHALL BE PROVIDED AT ALL HIGH POINTS.
- H. EQUIPMENT CONNECTIONS SHALL INCLUDE UNIONS PROVIDED BETWEEN A PIPING SERVICE SHUT-OFF VALVE AND EACH EQUIPMENT CONNECTION. PIPING OFFSETS SHALL BE PROVIDED TO PERMIT REMOVAL OF ALL EQUIPMENT.
- I. COPPER PIPING CONNECTIONS TO STEEL OR IRON PIPE SHALL BE MADE WITH DIELECTRIC UNIONS.
- J. INSTALLED PIPING SHALL NOT BE IN DIRECT CONTACT WITH ANY PART OF THE BUILDING STRUCTURE SO AS TO AVOID SOUND TRANSMISSION.
- K. FILLED PIPING INSTALLATION SHALL BE PROTECTED FROM FREEZING UNTIL ACCEPTANCE FROM THE OWNER OF THE ENTIRE CONSTRUCTION PROJECT.
- L. STANDARD PIPE FITTINGS SUCH AS ELBOWS, TEES, COUPLERS, AND INCREASERS OR REDUCERS SHALL BE USED TO JOIN PIPES OF DIFFERENT SIZES. HALF JOINTS SHALL BE PROVIDED FOR THERMOMETERS, GAUGES, AIR VENTS, DRAINS AND TEMPERATURE CONTROL DEVICES.
- M. UPON COMPLETION OF THE PIPING INSTALLATION AND PRIOR TO INSULATING OR CONCEALING, EACH PIPING SYSTEM SHALL BE PRESSURE TESTED WITH WATER AT 125 PSIG MINIMUM PRESSURE FOR SIX HOURS WITHOUT ANY APPRECIABLE PRESSURE LOSS.
- N. HYDRONIC PIPING SYSTEMS SHALL BE CLEANED PRIOR TO START-UP BY FILLING THE ENTIRE SYSTEM WITH WATER AND THEN ADDING A CHEMICAL CLEANING COMPOUND AT A MINIMUM CONCENTRATION OF TWO POUNDS PER 100 GALLON OF WATER. CLEANING SOLUTION SHALL THEN BE CIRCULATED THROUGH THE SYSTEM BY SYSTEM PUMPS FOR SIX HOURS. CLEANING SOLUTION SHALL THEN BE FLUSHED AND DRAINED, AND ALL PIPING STRAINERS SHALL BE REMOVED, CLEANED AND REINSTALLED. UPON CLEANING, PIPING SHALL BE FLUSHED WITH CLEAN WATER. A WATER ANALYSIS MADE, AND CHEMICAL TREATMENT, INCLUDING GLYCOL, AS INDICATED ON THE DRAWINGS, SHALL BE ADDED.

## HVAC HANGERS AND SUPPORTS

- A. ALL PIPING SHALL BE INSTALLED WITH FACTORY FABRICATED PIPING CLAMPS, HANGERS AND SUPPORTS ATTACHED TO THE BUILDING SUBSTRATE WITH SUITABLE EXPANSION SHELLS, INSERTS, OR BEAM CLAMPS. HANGERS SHALL BE SELECTED TO EXACTLY FIT PIPE SIZE FOR BARE PIPING AND TO EXACTLY FIT AROUND PIPING INSULATION WITH SADDLE OR SHED FOR INSULATED PIPING. COPPER PLATED HANGERS AND SUPPORTS SHALL BE UTILIZED FOR ALL COPPER PIPING SYSTEMS. PERFORED STRAP-HANGERS AND "C" CLAMP ATTACHMENTS ARE PROHIBITED.
1. UNLESS NOTED OTHERWISE, ALL HORIZONTAL PIPE 3" AND SMALLER SHALL BE SUPPORTED BY INDIVIDUAL ADJUSTABLE STEEL CLEVIS HANGERS.  
2. UNLESS NOTED OTHERWISE, ALL HORIZONTAL PIPE 4" AND LARGER (AND ALL HORIZONTAL PIPE 2" AND LARGER WHICH CONVEYS A FLUID ABOVE 180° F) SHALL BE SUPPORTED BY ADJUSTABLE ROLLER TYPE HANGERS.  
3. PARALLEL HORIZONTAL PIPING MAY ALSO BE SUPPORTED TOGETHER ON A TRAPEZIE TYPE HANGER AS LONG AS ALL PIPING IS ADEQUATELY SUPPORTED AND INDIVIDUAL THERMAL PIPE MOVEMENT IS ACCOUNTED FOR.  
4. HORIZONTAL PIPE SUPPORT SPACING AND HANGER ROD SIZING SHALL BE AS FOLLOWS EXCEPT FOR CAST IRON PIPE WHICH SHALL BE SUPPORTED AT A MAXIMUM INTERVAL OF 5'-0" ON CENTER AND PVC PIPING WHICH SHALL BE SUPPORTED AT A MAXIMUM INTERVAL OF 4'-0" ON CENTER.
- | PIPE SIZE      | ROD DIA. | MAX SPACING ON CENTER |
|----------------|----------|-----------------------|
| 1/2" TO 1-1/4" | 3/8"     | 6'-0"                 |
| 1-1/2" TO 2"   | 3/8"     | 8'-0"                 |
| 2-1/2" TO 3"   | 1/2"     | 11'-0"                |
| 4" TO 6"       | 3/4"     | 12'-0"                |
- B. HANGERS FOR MECHANICAL EQUIPMENT SHALL CONSIST OF STRUCTURAL STEEL SHAPES OR STEEL RODS ATTACHED TO THE BUILDING SUBSTRATE WITH SUITABLE EXPANSION SHELLS, INSERTS, OR BEAM CLAMPS. HANGERS SHALL BE SELECTED TO ADEQUATELY SUPPORT THE STATIC AND DYNAMIC LOADS OF THE EQUIPMENT AS INDICATED BY THE EQUIPMENT MANUFACTURER. ISOLATION TYPE HANGERS SHALL BE USED TO SUPPORT ALL OVERHEAD MECHANICAL EQUIPMENT WITH ROTATING PARTS. ISOLATORS SHALL BE INSTALLED AS CLOSE TO THE OVERHEAD STRUCTURE AS POSSIBLE.
- C. ROOFTOP EQUIPMENT SUPPORTS AND CURBS SHALL BE AS AVAILABLE FROM THE HVAC EQUIPMENT MANUFACTURER OR AS MANUFACTURED BY ONE OF THE FOLLOWING MANUF. : PAPE, ROFF PRODUCTS AND SYSTEMS OR THYCURB DIVISION OF THYBAR CORPORATION.
- D. SUPPORT FROM STEEL JOIST PANEL POINT IS REQUIRED.
- E. SUPPORTS FROM ROOF DECKING SYSTEMS ARE NOT PERMITTED.

## HVAC IDENTIFICATION

- A. THE CONTRACTOR SHALL PROVIDE AND INSTALL PERMANENT IDENTIFICATION MARKERS FOR THE MECHANICAL SYSTEM COMPONENTS AS INDICATED BELOW.
1. EACH SCHEDULED ITEM OF EQUIPMENT, MECHANICAL (PLUMBING AND HVAC), PIPING, AND VALVES IDENTIFICATION MARKERS SHALL BE AS MANUFACTURED BY BETON, BRADY, ALLEN OR MARKING SYSTEMS INC. OF THE ENTIRE MECHANICAL SYSTEM.
- B. IDENTIFICATION MARKERS SHALL COMPLY WITH ANSI A13.1 REQUIREMENTS FOR LETTERING SIZE, LENGTH OF COLOR FIELD, COLORS AND VIEWING ANGLES.
- C. INSTALL PIPE MARKERS WHEREVER PIPING IS EXPOSED TO VIEW IN ACCESSIBLE SPACES. LOCATE MARKERS APPROXIMATELY 22 FEET ON CENTER AND NEAR EACH WALL, FLOOR AND CEILING PENETRATION. IN ADDITION, LOCATE MARKERS NEAR CONNECTION TO MAJOR EQUIPMENT.

## TESTING, ADJUSTING, AND BALANCING

- A. TESTING ADJUSTING AND BALANCING SHALL BE THE RESPONSIBILITY OF A TEST AND BALANCE CONTRACTOR WHICH IS AABC OR NEBB CERTIFIED.
- B. TESTING ADJUSTING AND BALANCING WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST REVISION OF THE FOLLOWING STANDARDS:
1. "AABC NATIONAL STANDARDS" OR "NEBB PROCEDURAL STANDARDS"  
2. ASHRAE SYSTEMS VOLUME RECOMMENDATIONS FOR TESTING, ADJUSTING AND BALANCING  
3. SMACNA TESTING, ADJUSTING, AND BALANCING MANUAL
- C. A COMPLETE TEST AND BALANCE REPORT ON STANDARD AABC OR NEBB FORMS SHALL BE SUBMITTED TO THE ENGINEER. WHEN THE REPORT INDICATES INADEQUATE SYSTEM PERFORMANCE IN COMPARISON TO THE DESIGN REQUIREMENTS AN EXPLANATION SHALL ACCOMPANY THE REPORT INDICATING THE PROBABLE CAUSE.
- D. THE TEST AND BALANCE CONTRACTOR SHALL CHECK THE MECHANICAL INSTALLATION WORK IN COMPARISON WITH THE DESIGN TO VERIFY CORRECT INSTALLATION AND OPERATING CONDITIONS.
- E. THE TEST AND BALANCE CONTRACTOR SHALL EXAMINE THE AUTOMATIC TEMPERATURE CONTROL SYSTEM TO VERIFY THAT THE CONTROLLED DEVICES AND THEIR RESPECTIVE CONTROLLERS ARE FUNCTIONING PROPERLY IN ACCORDANCE WITH THE SEQUENCE OF OPERATIONS AS INDICATED.
1. VERIFY THAT CONTROL VALVES AND DAMPERS MODULATE/OPERATE FREELY BETWEEN THE SET MINIMUM AND MAXIMUM POSITIONS.  
2. VERIFY THAT ACTUAL POSITION OF CONTROL VALVE AND DAMPER IS AS INDICATED BY THE CONTROLLER.  
3. VERIFY THAT THREE WAY CONTROL VALVES FOR MIXING OR DIVERTING FLUIDS ARE INSTALLED PROPERLY.  
4. VERIFY THAT HVAC EQUIPMENT / SYSTEM INTERLOCKS ARE FUNCTIONING PROPERLY (BOTH HARDWARE AND SOFTWARE INTERLOCKS). VERIFY PROPER HEATING AND COOLING CHANGEOVER OPERATION OF SYSTEM.
- F. THE TEST AND BALANCE CONTRACTOR SHALL PERFORM TESTS AND MAKE ALL ADJUSTMENTS AS REQUIRED TO BALANCE THE HVAC SYSTEMS TO THE FOLLOWING CRITERIA:
1. ALL FANS SHALL PERFORM "EQUAL TO" OR "10% IN EXCESS OF" THE DESIGN VOLUME.  
2. MINIMUM OUTDOOR AIR REQUIREMENTS SHALL BE WITHIN 5% ABOVE OR BELOW THE DESIGN VOLUME.  
3. SUPPLY DIFFUSERS AND REGISTERS SHALL BE WITHIN 10% ABOVE OR 5% BELOW THE DESIGN VOLUME.  
4. RETURN AND EXHAUST GRILLES SHALL BE WITHIN 5% ABOVE OR 10% BELOW THE DESIGN VOLUME.
- G. THE BALANCE CONTRACTOR SHALL NOTIFY THE MECHANICAL CONTRACTOR OF ANY INCOMPLETE WORK, ANY ADDITIONAL WORK, OR ANY REWORK WHICH NEEDS TO BE COMPLETED IN ORDER TO BALANCE THE SYSTEMS TO WITHIN THE ACCEPTABLE CRITERIA. THIS WORK SHALL BE COMPLETED AND ACCOMPANYING TESTS AND ADJUSTMENTS MADE PRIOR TO THE REPORT SUBMISSION.
- H. WHEN EXISTING HVAC SYSTEMS ARE BEING MODIFIED, THE TEST AND BALANCE CONTRACTOR SHALL MEASURE AND RECORD EXISTING FLOWS TO THE REMANINDER OF THE SYSTEM PRIOR TO ANY SYSTEM MODIFICATIONS. UPON COMPLETION OF NEW INSTALLATION MODIFICATIONS, THE TEST AND BALANCE CONTRACTOR SHALL RESTORE THE ORIGINAL BALANCE OF THE UNALTERED SYSTEM PORTIONS AS WELL AS BALANCE THE NEW WORK TO THE NEW SYSTEM REQUIREMENTS.
- I. THE TEST AND BALANCE CONTRACTOR SHALL PATCH ALL HOLES IN DUCTWORK AND INSULATION WHICH WERE MADE FOR THE AFOREMENTIONED TESTING AND BALANCING PROCEDURES.
- J. THE BALANCE CONTRACTOR SHALL PERMANENTLY MARK ALL FINAL BALANCE SETTINGS ON EQUIPMENT AND COMPONENTS FOR FUTURE REFERENCE.

## HVAC INSULATION

- A. THE MATERIALS AND METHODS FOR THE COMPLETE INSULATION SYSTEM INSTALLATION SHALL BE TESTED, RATED, AND INSTALLED IN ACCORDANCE WITH THE FOLLOWING CODES AND STANDARDS:
- NFPA 90A  
ASTM E-84 (NFPA 255)  
ASHRAE 90.1
- B. THE COMPOSITE INSULATION SYSTEM INSTALLATION INCLUDING ALL INSULATION MATERIALS, ADHESIVES, SEALERS, COVERINGS, ETC., SHALL HAVE FLAME-SPREAD AND SMOKE-DEVELOPED INDICES AS INDICATED BELOW:
1. INDOOR INSTALLATIONS SHALL HAVE FLAME-SPREAD INDEX OF 25 OR LESS, AND A SMOKE-DEVELOPED INDEX OF 50 OR LESS.  
2. OUTDOOR INSTALLATIONS SHALL HAVE FLAME-SPREAD INDEX OF 75 OR LESS, AND A SMOKE-DEVELOPED INDEX OF 150 OR LESS. (EXCEPT FOR INSULATION PRODUCTS IN CONTACT WITH THE AIRSTREAM WHICH MUST HAVE THE SAME RATINGS AS THE INDOOR INSTALLATIONS.)
- C. INSULATION WORK SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING TYPES OF SYSTEMS:
- PIPING  
DUCTWORK  
METAL FURNACE FLUES IN UNCONDITIONED ATTIC SPACE
- D. PIPING SHALL BE INSULATED PER THE "PIPE & INSULATION SCHEDULE" ON THE DRAWING AND IN ACCORDANCE WITH THE FOLLOWING MATERIAL STANDARDS:
1. FIBER GLASS PIPE INSULATION WITH AN ALL SERVICE JACKET. INSULATION SHALL BE OF THICKNESS AS INDICATED WITH A THERMAL CONDUCTIVITY "K" FACTOR OF 0.24 AT 75 DEGREE F MEAN TEMPERATURE SUITABLE FOR APPLICATIONS UP TO 350 DEGREES F. INSULATION SHALL BE OWENS-CORNING TYPE ASBESTOS OR EQUIVALENT.  
2. FLEXIBLE UNICELLULAR ELASTOMERIC PIPE AND EQUIPMENT INSULATION. INSULATION SHALL BE OF THICKNESS AS INDICATED WITH A THERMAL CONDUCTIVITY "K" FACTOR OF 0.24 AT 75 DEGREE F MEAN TEMPERATURE SUITABLE FOR APPLICATIONS BETWEEN 40 DEGREE F AND 200 DEGREE F.
- E. HVAC DUCTWORK SHALL BE INSULATED IN ACCORDANCE WITH THE NOTES ON THE DRAWING.

1. FLEXIBLE FIBER GLASS DUCT WRAP INSULATION WITH FOIL FACED KRAFT PAPER VAPOR SEAL FACING. INSULATION SHALL BE OF THICKNESS AS INDICATED IN THIS SPECIFICATION OR ON THE DRAWINGS. 0.75 PCF DENSITY. WITH A THERMAL CONDUCTIVITY "K" FACTOR OF 0.30 AT 75 DEGREE F MEAN TEMPERATURE SUITABLE FOR APPLICATIONS UP TO 250 DEGREES F. INSULATION SHALL BE OWENS-CORNING TYPE 75 OR EQUIVALENT.  
2. RIGID FIBER GLASS DUCT BOARD WITH ALL-SERVICE JACKET FACING INSULATION SHALL BE OF THICKNESS AS INDICATED IN THIS SPECIFICATION OR ON THE DRAWINGS. 0.6 PCF DENSITY. WITH A THERMAL CONDUCTIVITY "K" FACTOR OF 0.24 AT 75 DEGREE F MEAN TEMPERATURE SUITABLE FOR APPLICATIONS UP TO 450 DEGREES F. INSULATION SHALL BE OWENS CORNING TYPE 705 OR EQUIVALENT.  
3. FIBERGLASS DUCT LINER INSULATION FACED WITH BLACK FIRE-RESISTANT COATING AGAINST THE AIRSTREAM. THE COATING SHALL BE MICROBIAL GROWTH RESISTANT IN COMPLIANCE WITH ASTM D1071 AND THE LINER MATERIAL SHALL BE IN ACCORDANCE WITH ASTM C518. INSULATION SHALL HAVE A THERMAL CONDUCTIVITY "K" FACTOR OF 0.25 AT 70°F MEAN TEMPERATURE SUITABLE FOR APPLICATION UP TO 250°F. INSULATION SHALL BE OWENS-CORNING TYPE ASBESTOS OR EQUIVALENT AS LISTED ON MANUFACTURER'S LITERATURE.
- F. ALL INSULATION SYSTEMS SHALL BE CONTINUOUS THROUGH WALL OPENINGS, CEILING OPENINGS, FLOOR OPENINGS, AND PIPE HANGERS.
- G. INSULATION MATERIALS SHALL BE INSTALLED IN COMPLETE ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
- H. INSTALLATION PERSONNEL SHALL TAKE ALL SAFETY PRECAUTIONS TO PROPERLY PROTECT THEMSELVES DURING INSTALLATION OF INSULATION SYSTEMS.
- I. INSULATION CAN BE OMITTED ON FACTORY INSULATED PLENUMS, TERMINAL BOXES, FILTER BOXES, ACCESS PANELS, TESTING LAB LABELS AND STAMPS, FACTORY INSULATED EQUIPMENT, FACTORY INSULATED EQUIPMENT, METAL DUCTS W/ DUCT LINER AND FACTORY INSULATED FLEXIBLE DUCTS.

## REFRIGERANT PIPING SYSTEMS

- A. THE COMPLETE REFRIGERANT PIPING SYSTEM AND ASSOCIATED EQUIPMENT SHALL BE INSTALLED IN COMPLETE ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF THE FOLLOWING CODES AND STANDARDS:
- OHIO MECHANICAL CODE CHAPTER 13 (OAC 4301.241-247) "MECHANICAL REFRIGERATION OHIO PRESSURE PIPING SYSTEMS RULES (OAC 4301.10) ALL PIPE BRAZING SHALL BE DONE IN ACCORDANCE WITH ASME SECTION 9 AND PRESSURE VESSEL CODE, SECTION IX, FOR BRAZING WORK DONE IN A SHOP ENVIRONMENT AND AT THE PROJECT SITE. ASHRAE STANDARD 15 "SAFETY CODE FOR MECHANICAL REFRIGERATION."
- B. PIPING SHALL BE ASTM B280 REFRIGERANT GRADE ACR TYPE HARD DRAWN COPPER TUBE. PRE-CHARGED REFRIGERANT GRADE SOFT ANNEALED COPPER TUBE MAY BE USED WHERE MAXIMUM LENGTH DOES NOT EXCEED 40'-0".
- C. REFRIGERANT PIPING LAYOUT AND ARRANGEMENT SHALL BE PER THE HVAC EQUIPMENT MANUFACTURERS' RECOMMENDATIONS TO ASSURE PROPER OIL AND REFRIGERANT FLOW THROUGH THE SYSTEM. INSTALLER SHALL COORDINATE REQUIREMENTS FOR PIPE SIZES, PIPE SLOPES, LOCATIONS OF TRAPS, INVERTED TRAPS, DOUBLE SUCTION INSERS ETC. WITH THE EQUIPMENT MANUFACTURER.
- ANY PIPE SIZES INDICATED ON THE DRAWINGS ARE NOMINAL. SIZES FOR REFERENCE ONLY. FULL DETEIRMATION OF PIPE SIZES SHALL BE PER THE EQUIPMENT MANUFACTURERS' RECOMMENDATIONS.
- THE REFRIGERANT PIPING SYSTEM AND ASSOCIATED SPECIALTIES SHALL BE SIZED AND SELECTED TO PREVENT EXCESSIVE PRESSURE DROPS SO THAT THE COMPRESSOR AND EVAPORATOR PERFORM WITH BALANCE POINTS AT OR ABOVE THE SPECIFIED CAPACITY.
- D. UNLESS NOTED OTHERWISE, REFRIGERANT LIQUID LINES SHALL BE INSTALLED WITH A FILTER DRIER, A SIGHT GLASS, A SOLENOID VALVE AND A THERMAL EXPANSION VALVE. THE FILTER DRIER SHALL BE INSTALLED WITH A THREE VALVE BY-PASS.
- E. COPPER TO COPPER PIPE JOINTS SHALL BE BRAZED WITHOUT FLUX USING A PHOSPHORUS BEARING ALLOY SUCH AS "SIL-PHOS". COPPER TO BRASS OR STEEL PIPE JOINTS SHALL BE BRAZED WITH FLUX USING A 45% SILVER ALLOY SUCH AS "TASV-FLO". INERT NITROGEN SHALL BE PASSED THROUGH THE PIPING DURING BRAZING TO PREVENT OXIDATION. CARE SHALL BE TAKEN DURING INSTALLATION TO INSURE MAXIMUM CLEANNESS OF ALL REFRIGERANT PIPING AND ACCESSORIES.
- F. UPON COMPLETION OF THE REFRIGERANT PIPING SYSTEM INSTALLATION, THE ENTIRE SYSTEM SHALL BE LEAK TESTED WITH DRY NITROGEN TO THE MAXIMUM OPERATING PRESSURE OF THE SYSTEM. TEST SHALL BE MAINTAINED FOR A PERIOD OF TWELVE HOURS WITHOUT ANY APPRECIABLE LOSS OF PRESSURE. PIPING INSULATION SHALL NOT BE INSTALLED UNTIL THE SYSTEM SATISFACTORILY PASSES THE LEAK TEST.
- G. UPON SATISFACTORY COMPLETION OF THE LEAK TESTING, THE ENTIRE PIPING SYSTEM SHALL BE EVACUATED WITH A TRIPLE EVACUATION METHOD OR OTHER MEANS WHEN SPECIALLY RECOMMENDED BY THE EQUIPMENT MANUFACTURER. VACUUM SHALL BE DRAWN TO 1500 MICRONS, 1500 MICRONS, AND 500 MICRONS SUCCESSIVELY AND BROKEN EACH TIME WITH DRY NITROGEN.
- H. UPON COMPLETION OF THE SYSTEM EVACUATION, THE ENTIRE SYSTEM SHALL BE CHARGED WITH THE PROPER AMOUNT AND TYPE OF REFRIGERANT FOR SYSTEM OPERATION.

## HVAC DUCTWORK

- A. REGULATORY AGENCIES, THE WORK DESCRIBED IN THIS SECTION SHALL BE IN COMPLIANCE WITH ALL CODES AND STANDARDS LISTED BELOW:
- NFPA 90A & 90B  
NFPA 211 (GAS VENTS AND CHIMNEYS)  
SMACNA  
ASHRAE
- B. ALL DUCT SIZES ON DRAWINGS INDICATE FREE INTERNAL DIMENSIONS. ACTUAL SHEETMETAL SIZES SHALL INCLUDE AN ALLOWANCE FOR INTERNAL DUCTLINER.
- C. UNLESS NOTED OTHERWISE, DUCTWORK SHALL BE FABRICATED OF PRIME GRADE MATERIALS FREE FROM ANY IMPERFECTIONS. GALVANIZED SHEET STEEL SHALL BE G-90 ZINC COATED AND WILL PHOSPHORIZED FOR PAINTED APPLICATIONS ON EXPOSED DUCTWORK IN CONDITIONED SPACES.
- D. ALL DUCTWORK AND FITTINGS SHALL BE FABRICATED, ASSEMBLED AND INSTALLED IN ACCORDANCE WITH THE LATEST REVISION OF SMACNA'S STANDARDS FOR THE DESIGN AND INSTALLATION OF MECHANICAL DUCTWORK. CLASSIFICATION, ELBOWS OR TURNS IN THE DUCTWORK SHALL BE FABRICATED WITH A CENTER LINE RADIUS OF NOT LESS THAN 1.5 TIMES THE DUCT WIDTH OR WITH ELBOWS WITH INTEGRAL TURNING VANES. TRANSITIONS AND OFFSETS SHALL BE FABRICATED WITH A MAX. ANGULAR TURN OF 30 DEGREES UNLESS SPECIFIC CONDITIONS PROHIBIT.
- E. GENERAL SUPPLY AIR, RETURN AIR, EXHAUST AIR, RELIEF AIR AND OUTSIDE AIR DUCTWORK WITHIN THE BUILDING SHALL BE 2" SMACNA PRESSURE CLASSIFICATION GALVANIZED STEEL UNLESS NOTED OTHERWISE ON THE DRAWINGS.
- F. REFER TO FLOOR PLANS FOR GAS VENT CONSTRUCTION. TOTAL VENT SYSTEM SHALL INCLUDE ELBOWS, TEES, THIMBLES, ADJUSTABLE ROOF FLASHING, STORM COLLAR, METAL CAP WITH BIRD BARRIER, FIRE STOP SPACERS, SUPPORT ASSEMBLIES AND FASTENERS AS WELL AS STRAIGHT PIPE SECTIONS. GAS VENTS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. INSTALLATIONS SHALL MAINTAIN MINIMUM CLEARANCES FROM COMBUSTIBLE MATERIALS IN ACCORDANCE WITH THE UL LISTING AND THE OBC.
- G. SHEETMETAL ACCESSORIES SHALL INCLUDE DEFLECTORS, TURNING VANES, ELBOWS, V-BRANCH FITTINGS, TEE FITTINGS, TAP FITTINGS, AND TRANSITIONS AND PLENUMS ETC. AS INDICATED ON THE DRAWINGS AND OF THE SAME MATERIAL AS THE DUCTWORK SYSTEM IN WHICH THEY ARE INSTALLED. ALL ACCESSORIES SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH THE LATEST REVISION OF SMACNA "HVAC DUCT CONSTRUCTION STANDARDS".
- H. FIRE DAMPERS SHALL BE INSTALLED FOR DUCTWORK PENETRATIONS AND AIR OPENINGS THROUGH ALL FIRE RATED BUILDING ASSEMBLIES. FIRE DAMPERS SHALL COMPLY WITH THE REQUIREMENTS OF UL555. DAMPERS SHALL BE UL LABELED FRAME STYLE "B" FOR RECTANGULAR DUCTWORK AND OPENINGS AND FRAME STYLE "C" FOR ROUND AND FLAT Oval DUCTWORK. DAMPERS SHALL BE CURTAIN TYPE WITH INTERLOCKING BLADES OUTSIDE OF THE AIRSTREAM AND A 160°F FUSIBLE LINK. DAMPER RATINGS SHALL BE 1-1/2 HOUR FOR 1 OR 2 HOUR RATED ASSEMBLIES. DAMPERS SHALL BE AS MANUFACTURED BY RUSKIN, GREENHECK, AIR BALANCE INC. OR PREFCO.
- I. ACCESS DOORS SHALL BE INSTALLED FOR FUSIBLE LINK REPAIR FOR EACH FIRE DAMPER AND AS INDICATED ON THE DRAWINGS. ACCESS DOORS SHALL HAVE EXTENDED FRAMES FOR EXTERNALLY INSULATED DUCTWORK. ACCESS DOORS SHALL BE FACTORY INSULATED FOR ALL INSULATED DUCTWORK APPLICATIONS. ACCESS DOORS SHALL BE OF THE CAM LOCK TYPE FITTED OR AIR TIGHT CLOSURE AND SHALL BE RATED FOR THE SMACNA PRESSURE CLASSIFICATION IN WHICH IT WILL BE APPLIED. ACCESS DOORS SHALL BE PERMANENTLY IDENTIFIED ON THE EXTERIOR BY A LABEL WITH LETTERS NOT LESS THAN 1/2" HIGH TITLED "FIRE DAMPER" OR "SMOKE DAMPER". ACCESS DOORS SHALL BE AS MANUFACTURED BY RUSKIN, CESCO, SEMCO OR UNITED MCGILL.

CANTON OHIO 44702

600 MARKET AVENUE NORTH

MOTT & MEADOWS  
ARCHITECTS

CRENSHAW PARK - NEW PAVILION  
EDWARD L. "PEEL" COLEMAN COMMUNITY CENTER  
1400 SHERRICK ROAD SE  
CANTON, OHIO



DAVID I. PATTERSON  
LICENSE #11150  
EXPIRATION DATE  
12-31-2023

THIS DWG :  
HVAC SPECIFICATIONS

COMM 23105  
DATE 09-28-23

DWG  
H-3.1

CONSTRUCTION DOCUMENTS

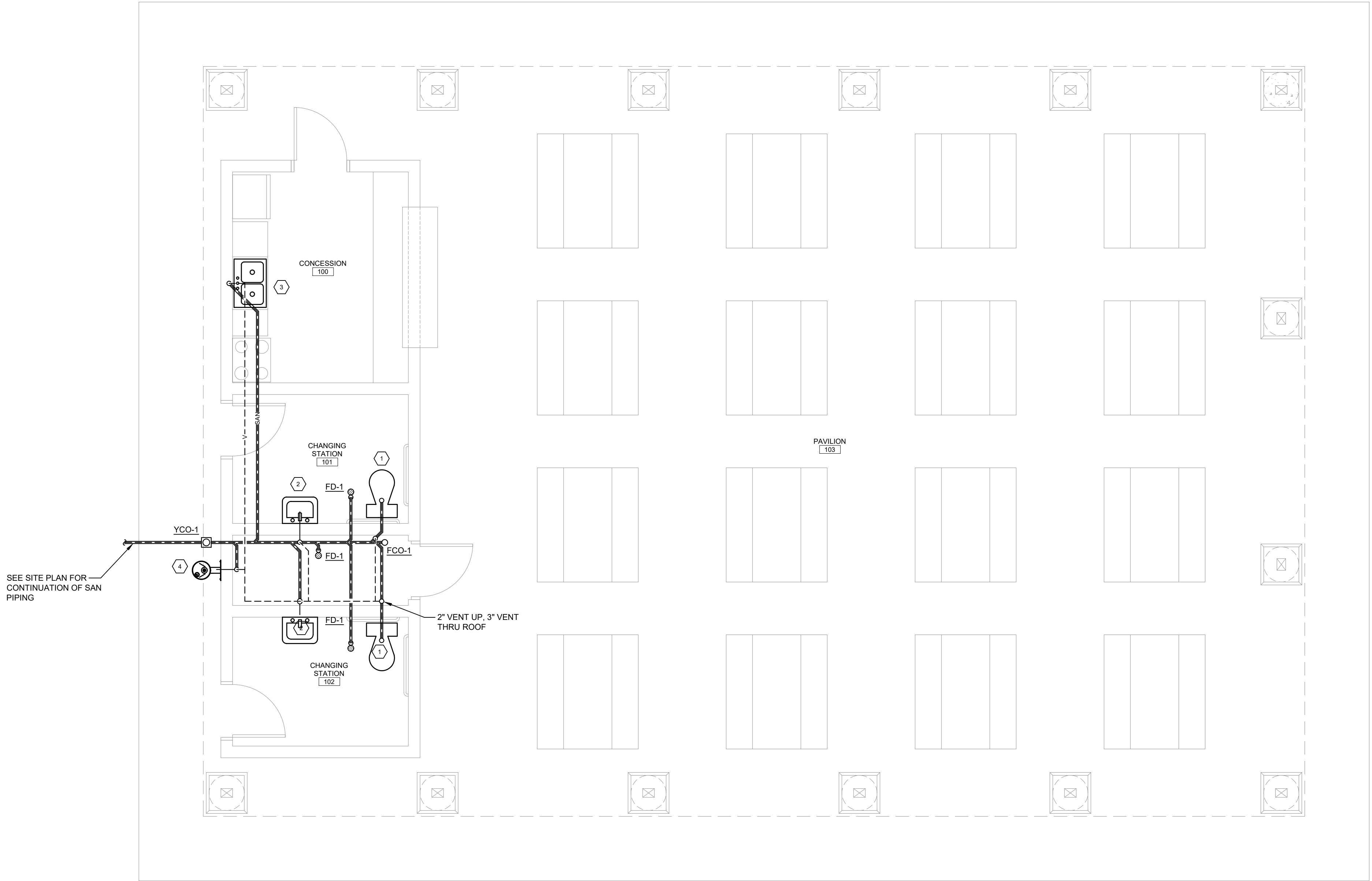
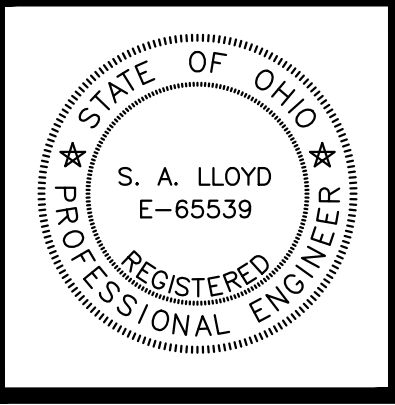




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SANITARY  
FLOOR PLAN - PLUMBING  
SCALE: 1/4" = 1'-0"

MOTT & MEADOWS  
ARCHITECTS

600 MARKET AVENUE NORTH CANTON OHIO 44702  
CRENSHAW PARK - NEW PAVILION  
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CONSTRUCTION DOCUMENTS



DAVID I. PATTERSON  
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12-31-2023

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FLOOR PLAN -  
PLUMBING SANITARY

COMM 23105  
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DWG  
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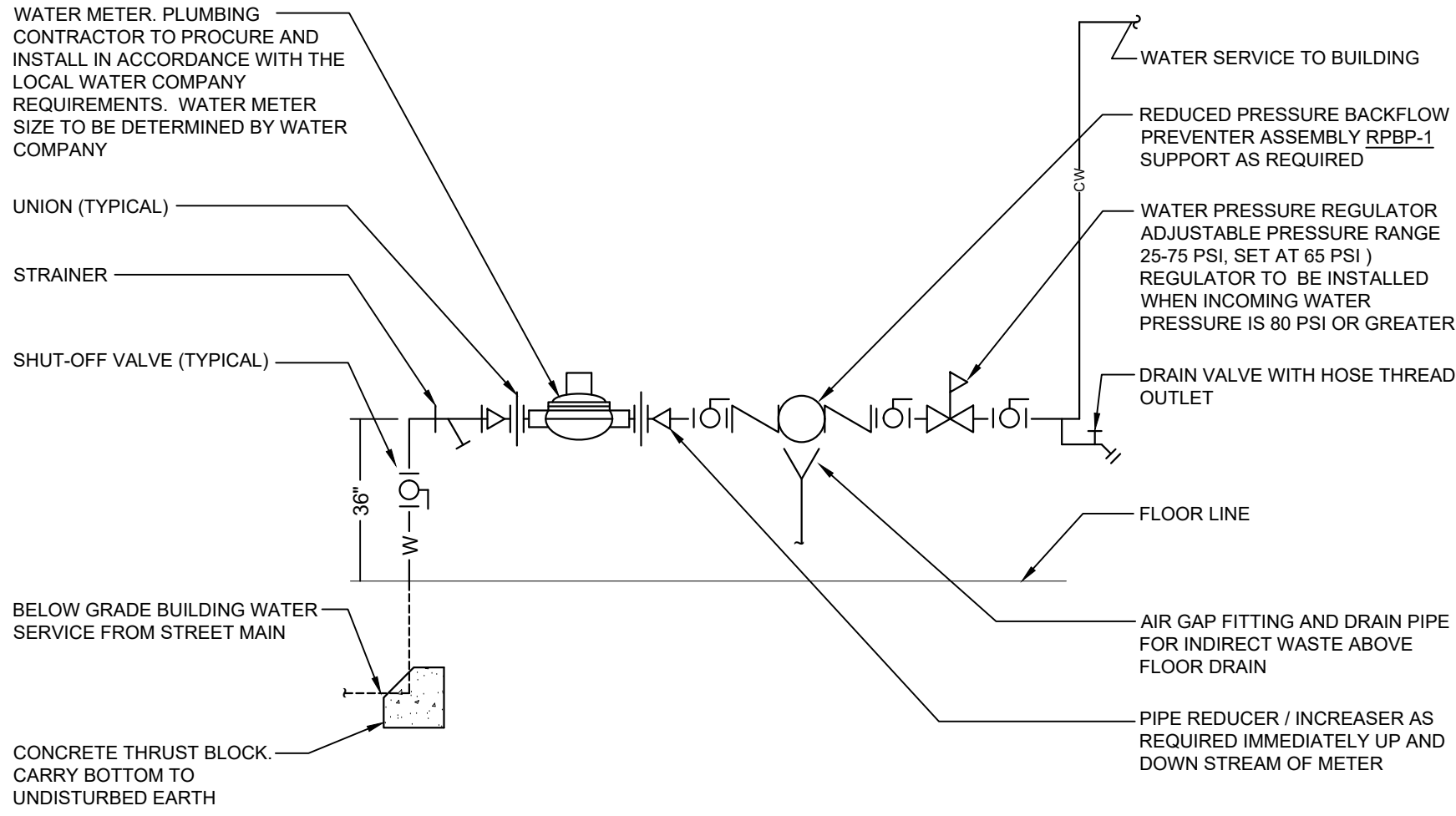
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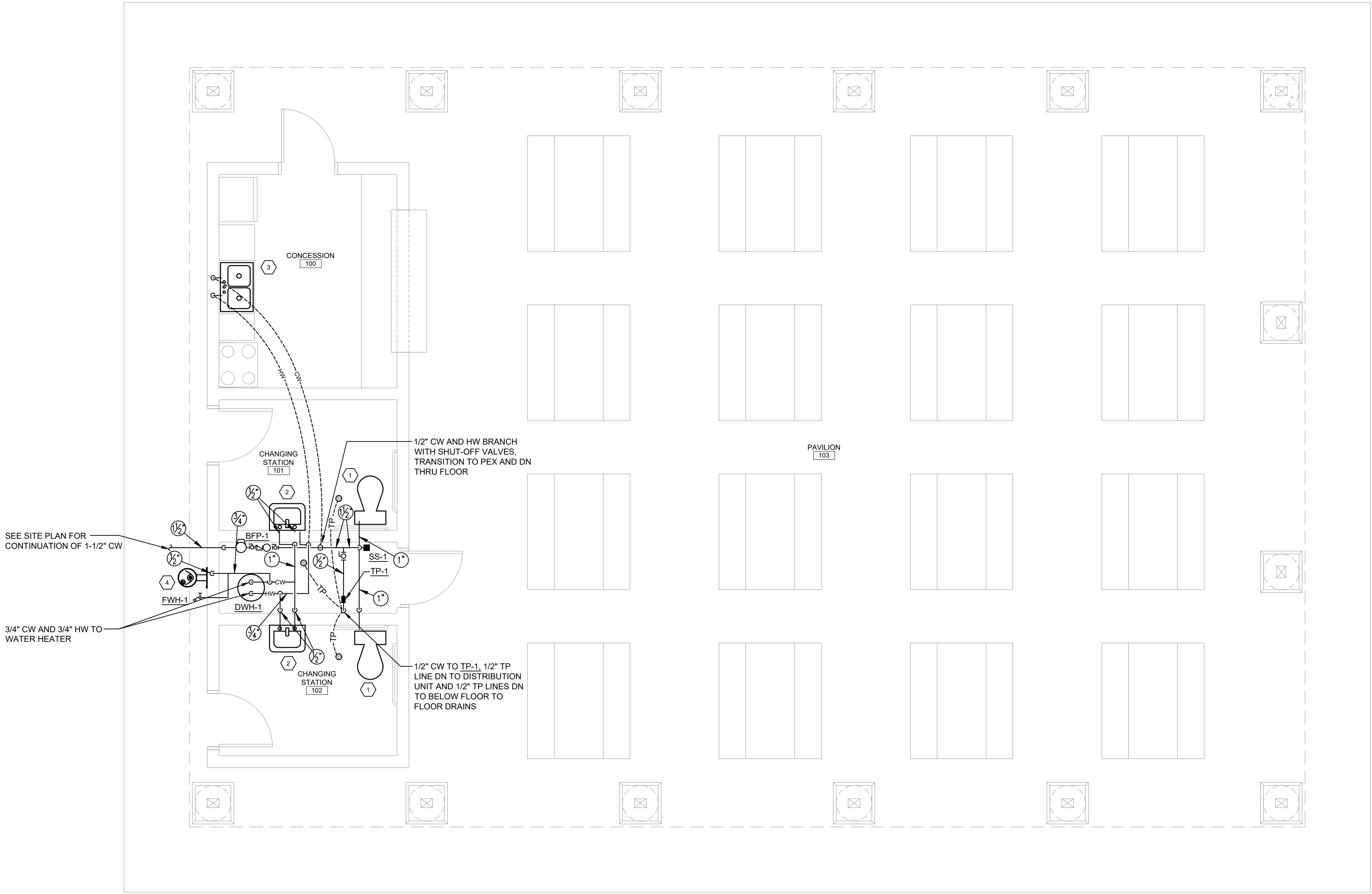
STATE OF OHIO

S. A. LLOYD  
E-65539

REGISTERED PROFESSIONAL ENGINEER



DOMESTIC WATER SERVICE ENTRANCE DETAIL  
NOT TO SCALE



WATER PIPING  
FLOOR PLAN - PLUMBING  
SCALE: 1/4" = 1'-0"

MOTTED MEADOWS

ARCHITECT &

CRENSHAW PARK - NEW PAVILION

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CANTON OHIO

44702

CONSTRUCTION DOCUMENTS

DAVID I. PATTERSON  
REGISTERED ARCHITECT  
LICENSE #11150  
EXPIRATION DATE 12-31-2023

THIS DWG :  
FLOOR PLAN -  
PLUMBING WATER  
PIPING

COMM 23105  
DATE 09-28-23

DWG  
P-1.2



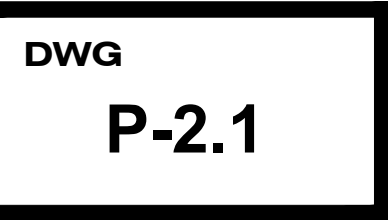
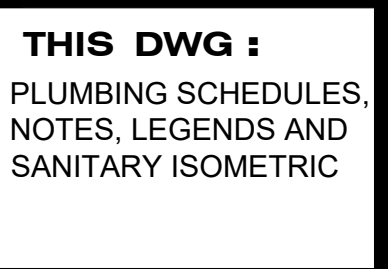
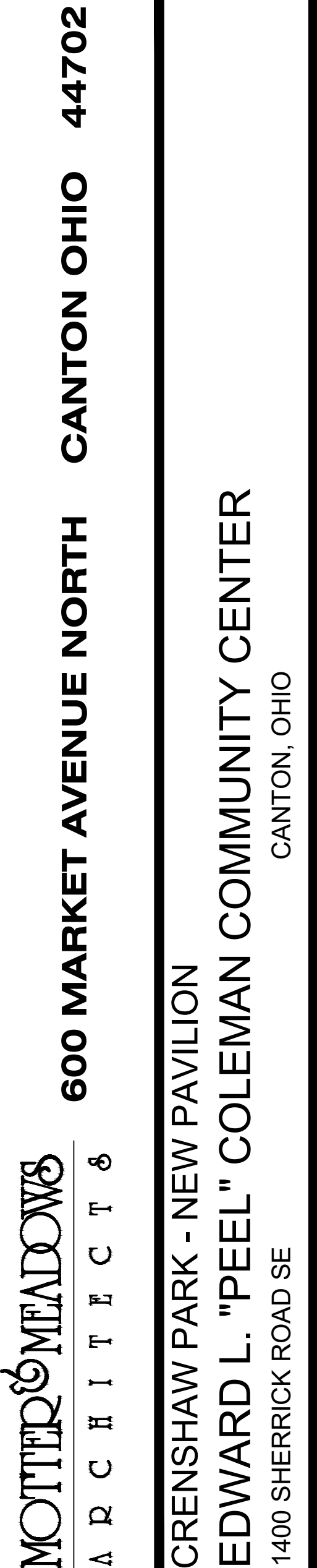
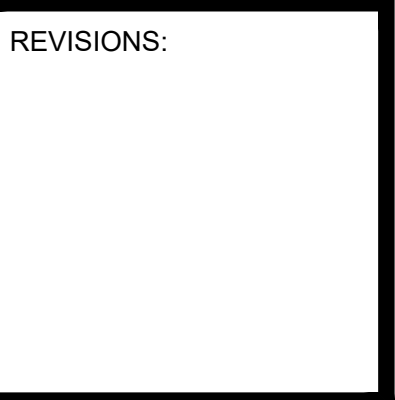


Diagram illustrating the installation of a water heater, showing the following components and connections:

- VACUUM RELIEF VALVE**: Located at the top of the water heater.
- CHECK VALVE**: Located on the cold water supply line.
- EXPANSION TANK EXT-1 (SEE SCHEDULE)**: Connected to the cold water supply line.
- DRAIN VALVE WITH HOSE THREAD OUTLET**: Located on the side of the water heater.
- ELECTRIC DOMESTIC WATER HEATER DWH-1 (SEE SCHEDULE)**: The main water heater unit.
- STEEL GRATED SHELF AND POLYSTYRENE DRAIN PAN. RUN FULL SIZE DRAIN LINE DN. ALONG WALL TO 2' ABOVE FLOOR DRAIN OR MOP BASIN**: Located at the base of the water heater.
- FINISHED FLOOR LINE**: Indicated by a horizontal line at the bottom.
- ASME TEMPERATURE AND PRESSURE RELIEF VALVE**: Located on the side of the water heater.
- DIELECTRIC UNION (TYPICAL)**: Located on the cold water supply line.
- BALL VALVE (TYPICAL)**: Located on the cold water supply line.
- COLD WATER SUPPLY (CW)**: Indicated by a line with an arrow pointing down.
- HEAT WATER SUPPLY (HW)**: Indicated by a line with an arrow pointing down.

Diagram illustrating the components and connections of a trap primer system:

- NEAREST COLD WATER SOURCE
- SHUT-OFF VALVE
- TRAP PRIMER VALVE
- DISTRIBUTION UNIT (AS REQUIRED)
- TRAP PRIMER LINES TO OTHER FLOOR DRAINS (AS REQUIRED)
- 1/2" CONTINUOUS SOFT COPPER TUBING WITH NO JOINTS BELOW FLOOR (TYPICAL)
- FLOOR DRAIN
- FINISHED FLOOR LINE
- TO SANITARY SYSTEM

[illegible]

PLUMBING EQUIPMENT AND DRAIN SCHEDULE			
SYM	TYPE	MAKE, MODEL	DESCRIPTION
BFP-1	REDUCED PRESSURE BACKFLOW PREVENTER	WATTS REGULATOR #LF909	TWO INDEPENDENT CHECK VALVES WITH AN INTERMEDIATE RELIEF VALVE AND ISOLATING SHUT-OFF VALVES. ASSEMBLY TO BE FURNISHED COMPLETE WITH AN INTEGRAL STRAINER AND AN AIR GAP DRAINAGE FITTING. ASSEMBLY TO BE TESTED AND CERTIFIED IN ACCORDANCE WITH ASSE STD. 1013 AND AWWA STD. C511-92.
FWH-1	FROSTPROOF WALL HYDRANT	WOODFORD #65	EXPPOSED NON-FREEZE CHROME PLATED WALL HYDRANT WITH ANTI-SIPHON VACUUM BREAKER, LOOSE KEY TEE HANDLE, 3/4" INLET AND A 3/4" HOSE THREAD OUTLET. HYDRANT SHALL BE SUPPLIED WITH AN ADJUSTABLE WALL CLAMP.
DWH-1	DOMESTIC WATER HEATER	A.O. SMITH DURA-POWER #DEL-6	ELECTRIC TANK TYPE WATER HEATER WITH 2.5 KW INPUT RATING FOR 10.0 GPH RECOVERY RATE AT 100 DEG F. TEMPERATURE RISE. WATER HEATER SHALL HAVE A STORAGE CAPACITY OF 6 GALLONS AND A SINGLE ELEMENT REQUIRING 120V-1PH ELECTRIC. HEATER SHALL INCLUDE A WALL MOUNT INSTALLATION KIT AND AN ASME TEMPERATURE AND PRESSURE RELIEF VALVE SELECTED FOR CAPACITY BASED ON THE ASME TEMPERATURE STEAM RATING. WATER HEATER SHALL BE IN COMPLIANCE WITH CURRENT EDITION OF ASHRAE STD. 90.1.
EXT-1	EXPANSION TANK	AMTROL THERM-X-TROL #ST-5	NON-ASME STEEL TANK WITH A RIGID POLYPROPYLENE LINER AND A HEAVY-DUTY BUTYL DIAPHRAGM TO SEPARATE THE WATER FROM THE PRE-CHARGED (40 PSIG) AIR CHAMBER. TOTAL TANK VOLUME EQUALS 2.0 GALLONS, MAXIMUM ACCEPTANCE FACTOR OF 0.45 AND MAXIMUM ACCEPTANCE VOLUME EQUALS 0.9 GALLONS. SYSTEM CONNECTION OF 3/4".
FD-1	FLOOR DRAIN	J.R. SMITH #200S-A-P	NO HUB OUTLET CAST IRON FLOOR DRAIN WITH FLANGE, INTEGRAL REVERSIBLE CLAMPING COLLAR, SEEPAGE OPENINGS, ROUND NICKEL BRONZE STRAINER TOP WITH VANDAL PROOF SCREWS AND 1/2" TRAP PRIMER CONNECTION. GRAD APPLICATIONS TO UTILIZE A SPEEDI-SET GASKET. ALL FLOOR DRAINS TO HAVE A 4" DEEP SEAL TRAP.
TP-1	TRAP PRIMER	PRECISION PLUMBING PRODUCTS PRIME-RITE #PR-500	AUTOMATIC TRAP PRIMER VALVE WITH CORROSION RESISTANT BRASS BODY AND 1/2" PIPE THREAD CONNECTIONS. PROVIDE DISTRIBUTION LINES SERIES DU WHEN TRAP PRIMER VALVE IS SERVING MORE THAN ONE FLOOR DRAIN.
SS-1	SHOCKSTOP	J.R. SMITH #5010	PRE-CHARGED PERMANENTLY SEALED WATER HAMMER ARRESTER WITH 1" PIPE SIZE. PDI SYMBOL "B" FOR 12-32 WATER SUPPLY FIXTURE UNITS.
FCO-1	FLOOR CLEANOUT	J.R. SMITH #4023	LIGHT TO MEDIUM DUTY CAST IRON FLOOR CLEANOUT WITH FLASHING FLANGE AND ROUND ADJUSTABLE SCORIATED SECURED NICKEL BRONZE TOP. PROVIDE RECESSED TOP FOR TILE, LINOLEUM, CARPET, TERRAZZO, ETC. AS REQUIRED BY ARCHITECT. GRAD APPLICATIONS TO UTILIZE A SPEEDI-SET GASKET.
<p>NOTE: ITEMS SCHEDULED ARE BASIS OF DESIGN. OTHER MANUFACTURERS MAY BE SUBSTITUTED IN ACCORDANCE WITH THE FOLLOWING LIST:</p> <p>BACKFLOW PREVENTORS - AMES, CONBRACO, FEBCO, HERSEY, WATTS, WILKENS          DRAINS, CLEANOUTS AND CARRIERS - JAY R. SMITH, JOSAM, MIFAB, WADZ, WATTS, ZURN          EXPANSION TANKS - AMTROL, TACO, WATTS, WILKENS          HOSE BIBS AND WALL HYDRANTS - JOSAM, MIFAB, WATTS, WOODFORD, ZURN          LAUNDRY WALL BOXES - ACORN, GUY GRAY, OATEY, WHITEHALL, WILLOUGHBY          MIXING VALVES - ARMSTRONGS, LAWLER, LEONARD, POWER, SYMONS, WATTS, ZURN          SHOCK STOPS - JAY R. SMITH, JOSAM, MIFAB, PPP, SIOUX CHIEF, WADZ, WATTS, ZURN          TRAP PRIMER VALVES - JAY R. SMITH, JOSAM, MIFAB, PPP, SIOUX CHIEF, WATTS          WATER HEATERS AND STORAGE TANKS - A.O. SMITH, BRADFORD WHITE, LOCHINVAR, RHEEM, STATE</p>			



PLUMBING SPECIFICATIONS

BASIC PLUMBING REQUIREMENTS

- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING A COMPLETE PLUMBING SYSTEM INSTALLATION AS INDICATED ON THE DRAWINGS AND WITHIN THESE SPECIFICATIONS. THE INSTALLING CONTRACTOR SHALL BE RESPONSIBLE FOR ALL MEANS AND METHODS OF THE PLUMBING SYSTEM DESIGN IMPLEMENTATION.
- B. DRAWINGS ARE BASICALLY DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS AND COMPONENTS. INSTALLING CONTRACTOR SHALL COORDINATE THE DESIGN INTENT OF THE DRAWINGS WITH THE ACTUAL FIELD CONDITIONS MAKING MINOR DEVIATIONS AND ADJUSTMENTS AS REQUIRED FOR A COMPLETE OPERATIONAL SYSTEM. EXACT LOCATIONS OF PLUMBING SYSTEM COMPONENTS SHALL BE DETERMINED BY THE CONTRACTOR. SUCH DETERMINATION SHALL GIVE CONSIDERATION TO THE BUILDING STRUCTURAL AND SPATIAL LIMITATIONS, TO COORDINATION WITH WORK OF OTHER TRADES AND DISCIPLINES, AND TO THE NECESSARY CLEARANCE REQUIREMENTS (BOTH OF THE ITEM BEING INSTALLED AND OF ALL ADJACENT ITEMS) TO ACCOMMODATE MANUFACTURER'S INSTALLATION REQUIREMENTS, TO SATISFY CODE CLEARANCE REQUIREMENTS AND TO FACILITATE SYSTEM OPERATION AND MAINTENANCE. UNLESS NOTED OTHERWISE, PLUMBING SYSTEMS SHALL BE INSTALLED TO PROVIDE MAXIMUM CLEARANCE ABOVE THE FINISHED FLOOR.
- C. THE PLUMBING SYSTEM INSTALLATION SHALL BE IN FULL COMPLIANCE WITH THE FOLLOWING CODES AND STANDARDS:
1. THE OHIO BUILDING CODE
  2. THE OHIO PLUMBING CODE
  3. THE OHIO MECHANICAL CODE
  4. NFPA (APPLICABLE SECTIONS)
  5. NATIONAL ELECTRIC CODE
  6. MUNICIPAL AND COUNTY CODES AND ORDINANCES
  7. STATE, MUNICIPAL AND COUNTY HEALTH AGENCIES
  8. OTHERS AS INDICATED WITHIN THESE SPECIFICATIONS

- D. EVERY EFFORT IS MADE ON THE PART OF THE ENGINEER TO COMPLY WITH THE LISTED CODES AND STANDARDS. WHERE THE DESIGN EXCEEDS THE REQUIREMENTS OF THE APPLICABLE CODES AND STANDARDS, THE INSTALLATION SHALL BE PER THE DESIGN REQUIREMENTS. NO WORK SHALL BE INSTALLED CONTRARY TO OR BELOW MINIMUM REQUIREMENTS OF THE CODES AND STANDARDS.

- E. THE SCHEDULED MANUFACTURER FOR EACH ITEM SHALL BE CONSIDERED AS BASIS OF DESIGN. PERFORMANCE CHARACTERISTICS, ELECTRICAL CHARACTERISTICS, AND DIMENSIONAL AND SPATIAL REQUIREMENTS FOR THIS ITEM HAVE ALREADY BEEN CONSIDERED IN THE DESIGN. OTHER ACCEPTABLE MANUFACTURERS HAVE NOT BEEN CHECKED FOR SUCH DETAIL AND MUST MEET ALL THE SCHEDULED PERFORMANCE REQUIREMENTS AND POSSESS FEATURES SIMILAR TO THOSE WHICH ARE STANDARD ON THE ITEMS WHICH ARE BASIS OF DESIGN.

- F. UNLESS NOTED OTHERWISE, EACH PLUMBING SYSTEM COMPONENT SHALL BE INDEPENDENTLY SUPPORTED FROM THE BUILDING STRUCTURE.

- G. UNLESS NOTED OTHERWISE, CONTRACTOR(S) SHALL COORDINATE PLUMBING AND HVAC INSTALLATION SO AS TO MAINTAIN AT LEAST TEN FEET OF CLEARANCE FROM ALL OUTDOOR AIR INTAKES AND BUILDING OPENINGS TO ANY PLUMBING VENTS (EXISTING AND NEW) EXHAUST AIR OUTLETS OR OTHER NOXIOUS CONDITIONS.

- H. THIS CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS AND LICENSES, BOTH TEMPORARY AND PERMANENT, REQUIRED BY LAW AS PART OF THE INSTALLATION WORK INDICATED ON THE DRAWINGS AND WITHIN THE SPECIFICATION.

- I. THE CONTRACTOR SHALL SUBMIT FOR REVIEW BY THE ARCHITECT-ENGINEER, 6 COPIES OF MANUFACTURER'S DRAWINGS, CUT SHEETS, AND APPLICATION SPECIFIC PERFORMANCE DATA FOR ALL PLUMBING FIXTURES AND EQUIPMENT.

- J. SHOP DRAWING SUBMITTALS SHALL INCLUDE THE PROJECT NAME, THE ARCHITECT-ENGINEER'S PROJECT NUMBER, THE APPLICABLE SPECIFICATION SECTION AND OR DRAWING NUMBER AS WELL AS THE CONTRACTOR'S APPROVAL. STAMP. SHOP DRAWINGS SHALL BE SUBMITTED TO ARCHITECT-ENGINEER WITHIN THIRTY WORKING DAYS OF AWARD OF CONTRACT. CONTRACTOR SHALL NOT INSTALL ANY APPLICABLE MATERIALS AND/OR EQUIPMENT WITHOUT PRIOR REVIEW AS INDICATED ON THE ARCHITECT-ENGINEER'S REVIEW STAMP. REVIEW BY THE ENGINEER DOES NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY TO COMPLY WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

- K. THE CONTRACTOR SHALL GUARANTEE THE COMPLETE PLUMBING SYSTEM INSTALLATION AS INSTALLED BY HIM OR HIS SUB-CONTRACTORS TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE (UNLESS A LONGER PERIOD IS SPECIFIED FOR SPECIFIC ITEMS ELSEWHERE). DEVIATIONS FROM THIS MAY OCCUR ON LARGER ITEMS OF EQUIPMENT USED DURING BENEFICIAL OCCUPANCY BEFORE THE TOTAL SYSTEM IS ACCEPTED. SUCH A MATTER MUST HAVE PRIOR APPROVAL AND BE MADE A MATTER OF WRITTEN RECORD BY THE ARCHITECT-ENGINEER'S REPRESENTATIVE.

- L. THE CONTRACTOR SHALL REPAIR OR REPLACE AT HIS OWN EXPENSE ANY MATERIALS OR EQUIPMENT FOUND TO BE DEFECTIVE WITHIN THE WARRANTY PERIOD AND SHALL BE HELD FINANCIALLY RESPONSIBLE FOR ANY PROPERTY DAMAGES ARISING FROM SUCH DEFECTS OR THE CORRECTION OF SUCH DEFECTS.

- M. THE CONTRACTOR SHALL GUARANTEE THAT ALL PLUMBING EQUIPMENT SUPPLIED BY HIM OR HIS SUB-CONTRACTORS SHALL DEVELOP CAPACITIES AND HAVE CHARACTERISTICS AS SCHEDULED OR SPECIFIED.

- N. THE CONTRACTOR SHALL SUBMIT WRITTEN WARRANTY CERTIFICATES FOR HIS INSTALLATION WORK AND FROM EACH MANUFACTURER OF EQUIPMENT SUPPLIED ON THE PROJECT TO THE ENGINEER.

- O. THE CONTRACTOR MAY USE PERMANENT PLUMBING EQUIPMENT FOR TEMPORARY SERVICES WHEN APPROVED BY THE ARCHITECT-ENGINEER. SUCH APPROVAL IS CONDITIONED BY THE FOLLOWING REQUIREMENTS:
1. THE CONTRACTOR SHALL MAINTAIN THE EQUIPMENT FOR RELEASE TO OWNER AT TIME OF FINAL ACCEPTANCE IN "NEW" CONDITION.
  2. WARRANTY PERIOD FOR THE OWNER SHALL NOT BEGIN UNTIL THE DATE OF FINAL SYSTEM ACCEPTANCE.

- P. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY DAMAGES INCURRED DURING THE INSTALLATION OF HIS WORK TO THE EXISTING GROUNDS, WALKS, ROADS, BUILDING, PLUMBING SYSTEMS, HVAC SYSTEMS, AND ELECTRIC SYSTEMS AS WELL AS ALL NEW CONSTRUCTION WORK BY OTHER TRADES. HE SHALL REPAIR AT HIS EXPENSE ALL SUCH DAMAGES FOR RESTORATION TO THE ORIGINAL CONDITIONS TO THE SATISFACTION OF THE ARCHITECT-ENGINEER AND OWNER.

- Q. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING THE MATERIALS, EQUIPMENT AND INSTALLATION OF HIS WORK FROM DAMAGE DUE TO WEATHER AND CONSTRUCTION JOB SITE CONDITIONS.

- R. THE CONTRACTOR SHALL MAINTAIN A SET OF PRINTS AT THE CONSTRUCTION SITE TO RECORD IN RED ANY DEVIATIONS IN THE ACTUAL MECHANICAL SYSTEM INSTALLATION FROM THE DESIGN DRAWINGS. IN ADDITION, ACTUAL INSTALLED INVERTS SHALL BE RECORDED FOR EACH UNDERGROUND SANITARY, STORM, WATER, AND GAS SYSTEM. THESE RECORD DRAWINGS SHALL BE SUBMITTED TO THE ARCHITECT-ENGINEER UPON COMPLETION OF THE PROJECT.

- S. THE CONTRACTOR SHALL PROVIDE PERSONAL INSTRUCTION TO THE OWNER'S OPERATING STAFF ON THE PROPER OPERATION AND MAINTENANCE OF THE PLUMBING SYSTEMS.

- T. THE CONTRACTOR SHALL PROVIDE THREE (3) SETS OF OPERATION AND MAINTENANCE MANUALS FOR THE OWNER'S USE UPON COMPLETION OF THE PROJECT. OPERATION AND MAINTENANCE MANUALS SHALL BE SUBMITTED TO THE ARCHITECT-ENGINEER FOR APPROVAL. OPERATION AND MAINTENANCE MANUALS SHALL INCLUDE THE FOLLOWING:

1. NAME AND SERVICE TELEPHONE NUMBER OF THE INSTALLING COMPANY.
2. GENERAL DESCRIPTION OF HOW THE SYSTEM SHOULD OPERATE.
3. MANUFACTURER'S OPERATION AND MAINTENANCE INSTRUCTIONS
4. COPY OF APPROVED SHOP DRAWINGS
5. LUBRICATION SCHEDULE
6. VALVE CHART
7. SPARE PARTS LIST
8. WARRANTY CERTIFICATES

PLUMBING MATERIALS AND METHODS

- A. UNLESS NOTED OTHERWISE, THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL NEW MATERIALS, EQUIPMENT, COMPONENTS, AND FIXTURES AS INDICATED. OTHER MANUFACTURERS OF PLUMBING EQUIPMENT MAY BE SUBSTITUTED FOR THOSE INDICATED AS LONG AS THE QUALITY OF CONSTRUCTION AND OPERATING CHARACTERISTICS ARE EQUIVALENT.

- B. PIPE SLEEVES SHALL BE PROVIDED AND INSTALLED WHERE PIPES PASS THROUGH WALLS, FLOORS, AND CEILINGS. SLEEVES SHALL BE SUFFICIENTLY LARGE ENOUGH TO ALLOW FOR FIRE AND SOUND STOPPING BETWEEN THE INSIDE SLEEVE WALL AND THE PIPE OR INSULATION SURFACE AS WELL AS ALLOW FOR THERMAL EXPANSION AND CONTRACTION OF PIPING. (SLEEVES SHALL BE LARGE ENOUGH TO ALLOW PIPE INSULATION TO BE CONTINUOUS THROUGH THE WALL.) LENGTH OF SLEEVES SHALL BE EQUAL TO THE THICKNESS OF THE BUILDING CONSTRUCTION ELEMENT PENETRATED FOR A FLUSH FINISH ON BOTH SIDES EXCEPT FOR FLOOR SLEEVES WHICH SHALL EXTEND 2" ABOVE THE FINISH FLOOR. INSTALL IRON PIPE SLEEVES IN EXTERIOR WALL PENETRATIONS AND STEEL PIPE SLEEVES ELSEWHERE UNLESS NOTED OTHERWISE.

- C. THE CONTRACTOR SHALL PROVIDE AND INSTALL SEALING MATERIALS FOR PLUMBING SYSTEM PENETRATIONS THROUGH BUILDING WALLS, FLOORS, CEILINGS, AND ROOFS. EXTERIOR PENETRATIONS SHALL BE WEATHER PROOF AND VERMIN PROOF, INTERIOR PENETRATIONS SHALL HAVE SOUND STOPPING, PENETRATIONS THROUGH FIRE AND SMOKE BARRIERS SHALL HAVE FIRESTOPPING. THE CONTRACTOR SHALL SEAL ALL FIRE-SMOKE RATED WALL AND FLOOR PENETRATIONS FOR MECHANICAL SYSTEM COMPONENTS WITH FIRE AND SMOKE STOPPING COMPOUND SO AS TO MAINTAIN THE FIRE RESISTANCE RATING OF THE WALL OR FLOOR PENETRATED. FIRESTOPPING COMPOUND, PIPE SLEEVES, AND PIPING AND INSULATION SHALL BE INSTALLED SO AS THE COMPLETE PENETRATION ASSEMBLY IS CLASSIFIED BY UL AS LISTED IN THE UL BUILDING MATERIALS DIRECTORY.

- D. ESCUTCHEON PLATES SHALL BE INSTALLED ON ALL PIPE PENETRATIONS THROUGH WALLS, FLOORS, AND CEILINGS WHERE EXPOSED TO VIEW AND ON THE BUILDING EXTERIOR. ESCUTCHEON PLATE SHALL BE SECURED TO PIPE OR INSULATION AND COMPLETELY COVER THE HOLE PENETRATION.

- E. ACCESS DOORS SHALL BE PROVIDED AND INSTALLED BY THIS CONTRACTOR IN NON-ACCESSIBLE WALLS AND CEILINGS WHICH CONCEAL PLUMBING ITEMS WHICH REQUIRE SERVICE OR INSPECTION SUCH AS VALVES. THE DOORS SHALL BE OF ADEQUATE SIZE TO SERVICE THE CONCEALED ITEM. DOOR SHALL BE OF PAINTED STEEL CONSTRUCTION WITH CONCEALED HINGE AND KEYS LOCK. ALL DOORS SHALL BE KEYS ALIKE WITH A MINIMUM OF TWO KEYS PROVIDED TO OWNER. ACCESS DOORS IN CEILINGS SHALL HAVE A RECESSED FACE FOR FIELD INSTALLATION OF FINISHED CEILING MATERIAL. DOORS INSTALLED IN FIRE RATED WALLS AND CEILINGS SHALL BE UL LISTED AND LABELED WITH APPLICABLE FIRE RESISTANCE RATING.

- F. EXISTING BUILDING SURFACES AND AUXILIARY EQUIPMENT AND FINISHES MARRED DURING INSTALLATION OF PLUMBING WORK SHALL BE REPAINTED BY THIS CONTRACTOR.

- G. THE CONTRACTOR SHALL PAINT ALL IRON PIPE FITTINGS AND VALVE BODIES, ALL SUPPORT STEEL INSTALLED AS PART OF HIS SCOPE OF WORK AND ALL EXPOSED PIPING AND DUCTWORK ON THE EXTERIOR OF THE BUILDING. ALL PAINTING SHALL BE DONE IN ACCORDANCE WITH THE PAINT MANUFACTURER'S INSTRUCTIONS INCLUDING SURFACE PREPARATION AND CONDITIONS OF AMBIENT TEMPERATURE AND HUMIDITY. ENVIRONMENTAL CONDITIONS IN THE AREA OF PAINTING WORK SHALL COMPLY WITH THE PAINT MANUFACTURER'S RECOMMENDATIONS AND ALL GOVERNING REGULATIONS.

- H. THE APPROXIMATE LOCATION OF ALL KNOWN UNDERGROUND UTILITIES WITHIN THE PROJECT AREA SHALL BE DETERMINED AND MARKED PRIOR TO PERFORMING ANY EXCAVATION. THE PROPER AUTHORITIES SHALL BE CONTACTED TO AID IN LOCATING ALL UNDERGROUND UTILITIES AND TO NOTIFY THEM OF INTENTION TO EXCAVATE.

- I. EXISTING UNDERGROUND UTILITIES SHALL BE PROPERLY SUPPORTED AND PROTECTED DURING EXCAVATION. CLEARANCE REQUIREMENTS (BOTH OF THE ITEM BEING INSTALLED AND OF ALL ADJACENT ITEMS) TO ACCOMMODATE MANUFACTURER'S INSTALLATION REQUIREMENTS, TO SATISFY CODE CLEARANCE REQUIREMENTS AND TO FACILITATE SYSTEM OPERATION AND MAINTENANCE. UNLESS NOTED OTHERWISE, PLUMBING SYSTEMS SHALL BE INSTALLED TO PROVIDE MAXIMUM CLEARANCE ABOVE THE FINISHED FLOOR.

- J. EXISTING UTILITIES SHALL NOT BE INTERRUPTED WITHOUT PRIOR APPROVAL OF THE ARCHITECT-ENGINEER OR THE OWNER. INTERRUPTIONS SHALL BE COORDINATED SO AS TO MINIMIZE THE FREQUENCY OF OCCURRENCE AND THE LENGTH OF DOWNTIME.

- K. ALL NEW UTILITIES AND PIPING CONTAINING WATER SHALL HAVE A 42" MINIMUM DEPTH OF BURIAL.

- L. ALL TRENCH EXCAVATION AND BACKFILL FOR LAYOUT AND INSTALLATION OF INTERIOR UNDERGROUND SANITARY, STORM, VENT, GAS, AND WATER PIPING; AS WELL AS EXTERIOR WATER SERVICE, FIRE SERVICE, GAS SERVICE, SANITARY AND STORM SEWERS SHOWN OR INDICATED ON THE DRAWINGS SHALL BE THE RESPONSIBILITY OF THE THIS CONTRACTOR.

- M. EXCAVATIONS SHALL HAVE SIDES SLOPED, SHORED, AND BRACED IN ACCORDANCE WITH LOCAL CODES AND ORDINANCES AND AS REQUIRED FOR SAFETY OF WORKERS.

- N. CONTRACTOR SHALL PROTECT EXCAVATIONS FROM RAIN, SURFACE AND GROUND WATER AS MUCH AS POSSIBLE. ALL WATER SHALL BE REMOVED FROM THE EXCAVATIONS PRIOR TO LAYING OF THE UNDERGROUND PIPING.

- O. UNLESS NOTED OTHERWISE, ALL TRENCHES FOR UNDERGROUND PIPING SHALL BE BACKFILLED SO THAT THE RUN OF PIPE SHALL BE LAID ON 4" OF SAND AND BACKFILLED TO 6" ABOVE CROWN OF PIPE WITH SAND. THEREAFTER, BACKFILL SHALL BE COMPACTED WITH MECHANICAL TAMPERS IN NO GREATER THAN 6" LAYERS OF SUITABLE EXCAVATED MATERIAL FREE OF LARGE STONES UNTIL PROPER GRADE IS ATTAINED.

- P. TRENCHES PARALLEL TO FOOTERS OR OUTSIDE BEARING WALLS SHALL MAINTAIN THREE FEET OF CLEARANCE FROM THE FOOTERS OR WALLS. EXCAVATION FOR SUCH TRENCHES BELOW THE ELEVATION OF THE BOTTOM OF A FOOTER SHALL MAINTAIN A HORIZONTAL SEPARATION DISTANCE SO AS NOT TO DISTURB SOIL WITHIN A ZONE 45 DEGREES OFF OF THE BOTTOM EDGE OF THE FOOTER.

- Q. ALL EXCAVATION FOR TRENCHES WITHIN PAVED AREAS, SIDEWALKS, ETC., SHALL BE BACKFILLED THE WIDTH OF THE TRENCH PLUS FIVE FEET BEYOND EACH SIDE WITH GOOD FILL SAND TO THE UNDERSIDE OF THE BASE COURSE OF THE PAVING MATERIAL.

- R. ANY AND ALL EXCAVATED MATERIALS WHICH ARE NOT USED FOR BACKFILL SHALL BECOME THE PROPERTY OF THIS CONTRACTOR AND SHALL BE REMOVED FROM THE SITE AT HIS EXPENSE. (IF EXCESS EXCAVATION MATERIALS ARE SUITABLE, ARCHITECT-ENGINEER MAY ALLOW FOR THE MATERIALS TO BE DISTRIBUTED ON SITE.)

- S. TRENCHES SHALL NOT BE BACKFILLED UNTIL ALL PIPING WITHIN THE TRENCH HAS BEEN TESTED AND/OR INSPECTED AND APPROVED BY THE LOCAL AUTHORITIES HAVING JURISDICTION.

- T. WHERE TRENCHES CROSS STREETS, WALKS, OR PUBLIC THROUGHFARES, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ERECTING BARRICADES AND BRIDGES, ADEQUATELY PROTECTED BY SIGNS OR RED FLAGS DURING THE DAY AND BY LIGHTS AT NIGHT.

- U. ALL STREETS, PARKING LOTS, SIDEWALKS, SDO, ETC., WHICH ARE DISTURBED BY THE EXCAVATION PROCESS SHALL BE RESTORED BY THE CONTRACTOR AT HIS EXPENSE TO THE ORIGINAL SITE CONDITION TO THE SATISFACTION OF THE ARCHITECT-ENGINEER, THE OWNER AND THE AUTHORITIES HAVING JURISDICTION.

- V. IF OBSERVABLE SUBSIDENCE IS NOTED IN THE AREAS OF EXCAVATION FOR PLUMBING WORK DURING THE PROJECT WARRANTY PERIOD, THE CONTRACTOR SHALL REMOVE THE SURFACE FINISH, FILL IN THE SUBSIDENCE AND RESTORE THE SURFACE FINISH TO THE INTENDED CONDITION.

PLUMBING PIPING AND ACCESSORIES

- A. REFER TO THE "PIPE AND INSULATION SCHEDULE" FOR SPECIFIC PIPING APPLICATION AND MATERIAL REQUIREMENTS.

- B. PIPING INSTALLATION SHALL NOT REQUIRE SPRINGING OR FORCING. PIPING OFFSETS, LOOPS AND/OR EXPANSION JOINTS SHALL BE PROVIDED (WHETHER SHOWN OR NOT) TO LIMIT STRESS DUE TO THERMAL EXPANSION.

- C. PIPING MATERIALS SHALL BE CLEAN PRIOR TO AND DURING INSTALLATION. UPON COMPLETION OF PIPING INSTALLATION, BUT PRIOR TO FINAL CONNECTIONS, THE ENTIRE SYSTEM SHALL BE FLUSHED WITH A CLEANING SOLUTION WHICH WILL NOT HARM EITHER THE PIPING, EQUIPMENT OR USERS.

- D. DRAIN VALVES SHALL NOT BE PROVIDED AT ALL LOW POINTS AND MANUAL AIR VENTS AT ALL HIGH POINTS.

- E. EQUIPMENT CONNECTIONS SHALL INCLUDE UNIONS PROVIDED BETWEEN A PIPING SERVICE SHUT-OFF VALVE AND EACH EQUIPMENT CONNECTION. PIPING OFFSETS SHALL BE PROVIDED TO PERMIT REMOVAL OF ALL EQUIPMENT.

- F. COPPER PIPING CONNECTIONS TO STEEL OR IRON PIPE SHALL BE MADE WITH DIELECTRIC UNIONS.

- G. STANDARD INCREASER AND REDUCER PIPE FITTINGS SHALL BE USED TO JOIN PIPES OF DIFFERENT SIZES.

- H. DOMESTIC WATER PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS:

1. SOLDER JOINTS SHALL BE LEAD-FREE USING 95-5 TIN-ANTIMONY SOLDER AND APPROPRIATE FLUX.
2. PIPE NIPPLES BETWEEN COPPER PIPING AND FIXTURE FITTINGS SHALL BE BRASS.
3. UPON COMPLETION OF THE DOMESTIC WATER PIPING INSTALLATION, THE ENTIRE SYSTEM SHALL BE FLUSHED, DISINFECTED, AND FLUSHED AGAIN IN ACCORDANCE WITH THE LATEST AWWA STANDARDS. UPON COMPLETION OF THE DISINFECTION PROCESS, BACTERIOLOGICAL TESTS SHALL BE PERFORMED IN ACCORDANCE WITH AWWA STANDARDS AND THE LOCAL HEALTH DEPARTMENT TO VERIFY SATISFACTORY WATER QUALITY.

- I. NATURAL GAS PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS:

1. ALL GAS PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE INTERNATIONAL FLUE GAS CODE.
2. ANY GAS PIPING IN A NON-ACCESSIBLE SPACE SHALL BE OF ALL WELDED CONSTRUCTION.
3. THE ENTIRE EXISTING GAS PIPING SYSTEM SHALL BE PURGED PRIOR TO EXTENSION OR CONNECTION TO NEW WORK. UPON COMPLETION OF INSTALLATION, INSPECTIONS, AND TESTS ALL EXISTING AND NEW PILOT LIGHTS SHALL BE LIT BY THIS CONTRACTOR.
4. COMPLY WITH THE LOCAL UTILITY COMPANY FOR ANY ADDITIONAL REQUIREMENTS.
5. CONTRACTOR IS TO MAKE FINAL GAS CONNECTIONS TO ALL PLUMBING, HVAC, AND OWNER SUPPLIED EQUIPMENT NOTED ON THE DRAWINGS. GAS CONNECTION PIPING SHALL INCLUDE AN ACCEPTABLE AGA APPROVED SHUT-OFF WITH A 90° RIGHT TURN AND A UNION. THE UNION SHALL BE BETWEEN THE SHUT-OFF VALVE AND THE EQUIPMENT. PIPE REDUCER/INCREASER FITTINGS SHALL BE INSTALLED AT POINT OF EQUIPMENT CONNECTION AS REQUIRED.
6. ALL EXPOSED GAS PIPING ON THE EXTERIOR OF THE BUILDING SHALL BE PAINTED BY THE INSTALLING CONTRACTOR WITH A PRIME COAT AND TWO FINISH COATS OF WEATHER RESISTANT PAINT.

PLUMBING VALVES

- A. ALL VALVES OF THE SAME TYPE SHALL BE OF THE SAME MANUFACTURER WITH VALVE BODIES CLEARLY MARKED WITH THE MANUFACTURER'S NAME OR TRADEMARK AND THE PRESSURE RATING. VALVES SHALL COMPLY WITH ANSI B16.10 "FACE-TO-FACE AND END TO END DIMENSIONS OF FERROUS VALVES.

- B. VALVES SHALL BE SUPPLIED AS MANUFACTURED BY ONE OF THE FOLLOWING: APOLLO, CRANE, JAMESBURY, JENKINS, NIBCO, AND WATTS.

- C. ISOLATION, SHUT-OFF, OR SERVICE VALVES SHALL BE BALL VALVES FOR PIPE SIZES 2" AND SMALLER AND BE GATE OR BUTTERFLY VALVES FOR PIPE SIZES 2-1/2" AND LARGER UNLESS NOTED OTHERWISE.

- D. BALANCE VALVES SHALL BE OF THE FLOW MEASURING AND BALANCE TYPE FOR PIPE SIZES 2" AND SMALLER AND SHALL BE OF THE PLUG TYPE FOR PIPE SIZES 2-1/2" AND LARGER. WHERE MORE THAN ONE TYPE OF VALVE IS INDICATED THE INSTALLING CONTRACTOR SHALL SELECT FROM THE INDICATED OPTIONS ACCORDING TO HIS PREFERENCE. (UNLESS NOTED OTHERWISE ON THE CONTRACT DRAWINGS).

- E. MANUAL AIR VENTS AND DRAIN VALVES FOR WATER PIPING MAINS AND ELSEWHERE AS INDICATED ON THE CONTRACT DRAWINGS SHALL BE 3/4" BALL VALVES WITH MALE HOSE THREAD ADAPTER AND CAP UNLESS NOTED OTHERWISE.

- F. VALVE SIZE SHALL BE SAME SIZE AS THE PIPE IN WHICH IT IS INSTALLED UNLESS NOTED OTHERWISE.

- G. STANDARD VALVES 2" AND SMALLER:

1. GATE VALVE: 125 WSP: BRONZE BODY WITH RISING STEM, UNION BONNET, SINGLE WEDGE DISC FOR SOLDER JOINT PIPE CONNECTIONS. VALVES SHALL CONFORM TO ASTM SPECIFICATION WW-V-540, CLASS A, TYPE II. (NIBCO #5-134)
2. GLOBE VALVE: 125 WSP: BRONZE BODY WITH RISING STEM, UNION BONNET, AND ANSI 420-S STAINLESS STEEL TAPERED PLUG AND SEAT FOR SOLDER JOINT PIPE CONNECTIONS. VALVES SHALL CONFORM TO ASTM SPECIFICATION B-602 AND FEDERAL SPECIFICATION WW-V-51, CLASS A, TYPE I AND II. (NIBCO #5-211-Y)
3. CHECK VALVE: 125 WSP: BRONZE, SWING CHECK FOR SOLDER JOINT PIPE CONNECTIONS. VALVES SHALL CONFORM TO ASTM SPECIFICATION B-442 AND FEDERAL SPECIFICATION WW-V-510, TYPE IV, CLASS C. (NIBCO #5-413-Y)
4. BALL VALVE: 150 PSI SWP AND 600 PSI NON SHOCK WSP: TWO PIECE BRONZE BODY WITH CHROME PLATED BALL, TFE SEATS, FULL PORT, STEM PACKING, ANTI-BLOW-OUT STEMS FOR SOLDER JOINT PIPE CONNECTIONS. (NIBCO #5-885-70)

- H. STEEL WATER PIPING 2-1/2" AND GREATER:

1. GATE VALVE: 125 WSP: CAST IRON BODY WITH BRONZE TRIM, OUTSIDE SCREW AND YOKE, RISING STEM, BOLTED BONNET FOR FLANGED JOINT PIPE CONNECTIONS. VALVES SHALL CONFORM TO ASTM SPECIFICATION A-126 CLASS B. (NIBCO #6-617-0)
2. GLOBE VALVE: 125 WSP: CAST IRON BODY WITH BRONZE TRIM, OUTSIDE SCREW AND YOKE, RISING STEM, BOLTED BONNET FOR FLANGED JOINT PIPE CONNECTIONS. VALVES SHALL CONFORM TO ASTM SPECIFICATION A-126 CLASS B. (NIBCO #6-718-B)
3. CHECK VALVE: 125 WSP: CAST IRON BODY WITH BRONZE TRIM FOR FLANGED JOINT PIPE CONNECTIONS. VALVES SHALL CONFORM TO ASTM SPECIFICATION A-126. (NIBCO #6-918-B)
4. BUTTERFLY VALVE: 200 PSI NON SHOCK COLD WATER WORKING PRESSURE; LUG TYPE DUCTILE OR CAST IRON BODY WITH EXTENDED NECK FOR INSULATING, ALUMINUM BRONZE ALLOY DISC, EPDM RUBBER SEATS AND SEALS, A 400 SERIES STAINLESS STEEL STEM AND A TEN POSITION LEVER LOCK HANDLE. (NIBCO #LD-2000 SERIES)

I. GAS VALVES:

1. 2" AND SMALLER: 175# WOG CAST IRON BODY FOR SCREWED JOINT PIPE CONNECTIONS. VALVES SHALL BE UL LISTED FOR GAS SERVICE. (DEZURICK SERIES 425 WITH RS-49 PLUG SEALS AND LEVER HANDLE)
2. 2-1/2" TO 4": 175# WOG CAST IRON BODY FOR FLANGED JOINT PIPE CONNECTIONS. VALVES SHALL BE UL LISTED FOR GAS SERVICE. (DEZURICK SERIES 425 WITH RS-49 PLUG SEALS AND LEVER HANDLE)
3. 6" AND GREATER: 175# WOG CAST IRON BODY FOR FLANGED JOINT PIPE CONNECTIONS. VALVES SHALL BE UL LISTED FOR GAS SERVICE. (DEZURICK SERIES 100 WITH RS-49 PLUG SEALS AND LEVER HANDLE)

PLUMBING HANGERS AND SUPPORTS

- A. ALL PIPING SHALL BE INSTALLED WITH FACTORY FABRICATED PIPING CLAMPS, HANGERS AND SUPPORTS ATTACHED TO THE BUILDING SUBSTRATE WITH SUITABLE EXPANSION SHELLS, INSERTS, OR BEAM CLAMPS. HANGERS SHALL BE SELECTED TO EXACTLY FIT PIPE SIZE FOR HANGING AND TO EXACTLY FIT AROUND PIPING INSULATION WITH SADDLE OR SHIELD FOR INSULATED PIPING. COPPER PLATED HANGERS AND SUPPORTS SHALL BE UTILIZED FOR ALL COPPER PIPING SYSTEMS. PERFORATED STRAP HANGERS AND "C" CLAMP ATTACHMENTS ARE PROHIBITED.
1. UNLESS NOTED OTHERWISE, ALL HORIZONTAL PIPE 3" AND SMALLER SHALL BE SUPPORTED BY INDIVIDUAL ADJUSTABLE STEEL CLEVIS HANGERS.
  2. UNLESS NOTED OTHERWISE, ALL HORIZONTAL PIPE 4" AND LARGER (AND ALL HORIZONTAL PIPE 2" AND LARGER WHICH CONVEYS A FLUID ABOVE 150° F) SHALL BE SUPPORTED BY ADJUSTABLE ROLLER TYPE HANGERS.
  3. PARALLEL HORIZONTAL PIPING MAY ALSO BE SUPPORTED TOGETHER ON A TRAPEZIE TYPE HANGER AS LONG AS ALL PIPING IS ADEQUATELY SUPPORTED AND INDIVIDUAL THERMAL PIPE MOVEMENT IS ACCOMMODATED FOR.
  4. HORIZONTAL PIPE SUPPORT SPACING AND HANGER ROD SIZING SHALL BE AS FOLLOWS EXCEPT FOR CAST IRON PIPE WHICH SHALL BE SUPPORTED AT A MAXIMUM INTERVAL OF 5'-0" ON CENTER AND PVC PIPING WHICH SHALL BE SUPPORTED AT A MAXIMUM INTERVAL OF 4'-0" ON CENTER:

PIPE SIZE	ROD DIA	MAX SPACING ON CENTER
1/2" TO 1-1/4"	3/8"	6'-0"
1-1/2" TO 2"	3/8"	9'-0"
2-1/2" TO 3"	1/2"	11'-0"
4" TO 6"	3/4"	12'-0"

- B. HANGERS FOR PLUMBING EQUIPMENT SHALL CONSIST OF STRUCTURAL STEEL SHAPES OR STEEL RODS ATTACHED TO THE BUILDING SUBSTRATE WITH SUITABLE EXPANSION SHELLS, INSERTS, OR BEAM CLAMPS. HANGERS SHALL BE SELECTED TO ADEQUATELY SUPPORT THE STATIC AND DYNAMIC LOADS OF THE EQUIPMENT AS INDICATED BY THE EQUIPMENT MANUFACTURER. HANGERS SHALL BE PROVIDED TO SUPPORT ALL OVERHEAD PLUMBING EQUIPMENT WITH ROTATING PARTS. ISOLATORS SHALL BE INSTALLED AS CLOSE TO THE OVERHEAD STRUCTURE AS POSSIBLE.

- C. PREFABRICATED ROOF PIPE SUPPORTS SHALL BE UTILIZED TO SUPPORT ALL ROOFTOP PIPING 12" ABOVE ROOF AND BE AS MANUFACTURED BY ONE OF THE FOLLOWING: COOPER-BLIE, ERICO INTERNATIONAL, MIRO INDUSTRIES, PATE COMPANY, AND ROOF PRODUCTS AND SYSTEMS.

PLUMBING IDENTIFICATION

- A. THE CONTRACTOR SHALL PROVIDE AND INSTALL PERMANENT IDENTIFICATION MARKERS FOR THE PLUMBING SYSTEM COMPONENTS, EQUIPMENT, PIPING, AND VALVES.

- B. IDENTIFICATION MARKERS SHALL COMPLY WITH ANSI A13.1 REQUIREMENTS FOR LETTERING SIZE, LENGTH OF COLOR FIELD, COLORS AND VIEWING ANGLES.

- C. INSTALL PIPE MARKERS WHEREVER PIPING IS EXPOSED TO VIEW IN ACCESSIBLE SPACES. LOCATE MARKERS APPROXIMATELY 25 FEET IN CENTER AND NEAR EACH WALL, FLOOR, AND CEILING PENETRATION. IN ADDITION, LOCATE MARKERS NEAR POINTS OF PIPING ORIGIN, POINTS OF PIPING TERMINATION AND POINTS OF PIPING CONNECTION TO MAJOR EQUIPMENT.

- D. UNDERGROUND PIPING SHALL BE IDENTIFIED WITH BRIGHT COLORED CONTINUOUSLY PRINTED PLASTIC RIBBON TAPE MANUFACTURED FOR DIRECT BURIAL SERVICE AND LOCATED 6" TO 8" BELOW GRADE, DIRECTLY ABOVE BURIED PIPE.

- E. A TYPE WRITTEN VALVE CHART SHALL BE INSTALLED IN AN EQUIPMENT ROOM IN A WOOD OR ALUMINUM FRAME WITH A PLEXIGLASS COVER.

PLUMBING INSULATION

- A. THE MATERIALS AND METHODS FOR THE COMPLETE INSULATION SYSTEM INSTALLATION SHALL BE TESTED, RATED, AND INSTALLED IN ACCORDANCE WITH THE FOLLOWING CODES AND STANDARDS:

1. OBC
2. NFPA 90A
3. ASTM E-84 (NFPA 255)

- B. THE COMPOSITE INSULATION SYSTEM INSTALLATION INCLUDING ALL INSULATION MATERIALS, ADHESIVES, SEALERS, COVERINGS, ETC. SHALL HAVE FLAME-SPREAD AND SMOKE-DEVELOPED INDEXES AS INDICATED BELOW.

1. INDOOR INSTALLATIONS SHALL HAVE FLAME-SPREAD INDEX OF 25 OR LESS, AND A SMOKE-DEVELOPED INDEX OF 50 OR LESS.
2. OUTDOOR INSTALLATIONS SHALL HAVE FLAME-SPREAD INDEX OF 75 OR LESS, AND A SMOKE-DEVELOPED INDEX OF 150 OR LESS.

- C. INSULATION WORK SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING TYPES OF SYSTEMS: PIPING AND EQUIPMENT.

- D. PIPING SHALL BE INSULATED PER THE "PIPE AND INSULATION SCHEDULE" ON THE DRAWING AND IN ACCORDANCE WITH THE FOLLOWING MATERIAL STANDARDS:

1. FIBER GLASS PIPE INSULATION WITH AN ALL SERVICE JACKET. INSULATION SHALL BE OF THICKNESS IDENTIFIABLE WITH A THERMAL CONDUCTIVITY "K" FACTOR OF 0.24 AT 75 DEGREE F. MEAN TEMPERATURE SUITABLE FOR APPLICATIONS UP TO 350 DEGREES F. INSULATION SHALL BE OWENS-CORNING TYPE ASUS48H OR EQUIVALENT.
2. FLEXIBLE UNICELLULAR ELASTOMERIC PIPE AND EQUIPMENT INSULATION. INSULATION SHALL BE OF THICKNESS AS INDICATED WITH A THERMAL CONDUCTIVITY "K" FACTOR OF 0.24 AT 75 DEGREE F. MEAN TEMPERATURE SUITABLE FOR APPLICATIONS UP TO 40 DEGREE F. AND 200 DEGREE F. INSULATION SHALL BE ARMSTRONG ARMAFLEX SS5A OR EQUIVALENT.
3. SEMI-RIGID FIBERGLASS BATTS OR ROLLS WITH A FIELD APPLIED GLASS CLOTH LAGGING. INSULATION SHALL BE THICKNESS AS INDICATED WITH A THERMAL CONDUCTIVITY "K" FACTOR OF 0.27 AT 75 DEGREE F. MEAN TEMPERATURE SUITABLE FOR APPLICATIONS UP TO 1000 DEGREES F. INSULATION SHALL BE OWENS-CORNING TYPE TIW (THERMAL INSULATING WOOL) OR EQUIVALENT.

- E. ALL INSULATION SYSTEMS SHALL BE CONTINUOUS THROUGH WALL OPENINGS, CEILING OPENINGS, FLOOR OPENINGS, AND PIPE HANGERS.

- F. INSULATION MATERIALS SHALL BE INSTALLED IN COMPLETE ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

- G. INSTALLATION PERSONNEL SHALL TAKE ALL SAFETY PRECAUTIONS TO PROPERLY PROTECT THEMSELVES DURING INSTALLATION OF INSULATION SYSTEMS.

DOMESTIC WATER HEATING

- A. TYPE, QUANTITY, PERFORMANCE AND OPERATING CHARACTERISTICS OF WATER HEATERS AND ASSOCIATED EQUIPMENT SHALL BE AS INDICATED ON THE CONTRACT DRAWINGS.

- B. ALL SIMILAR TYPES OF WATER HEATERS SHALL BE SUPPLIED BY THE SAME MANUFACTURER.

- C. WATER HEATERS SHALL BE IN COMPLIANCE WITH THE FOLLOWING APPLICABLE CODES AND STANDARDS:

1. ELECTRIC WATER HEATERS SHALL BE UL LISTED AND LABELED
  2. GAS FIRED WATER HEATERS SHALL BE AGA APPROVED
  3. WATER HEATERS WITH A HEAT INPUT IN EXCESS 200 MBH OR A STORAGE CAPACITY GREATER THAN 120 GALLONS SHALL BE IN COMPLIANCE WITH THE ASME BOILER AND PRESSURE VESSEL CODE
  4. WATER HEATERS SHALL MEET OR EXCEED THE MINIMUM EFFICIENCY REQUIREMENTS OF ASHRAE 90.1 B-1992
  5. TEMPERATURE AND PRESSURE RELIEF VALVES SHALL BE IN COMPLIANCE WITH THE ASME BOILER AND PRESSURE VESSEL CODE AND SELECTED FOR CAPACITY BASED ON THE GAS TEMPERATURE STEAM RATING
- D. ELECTRIC WATER HEATERS
1. WATER HEATER SHALL CONSIST OF AN ELECTRIC IMMERSION TYPE HEATER AND AN INTEGRAL HEAVY GAUGE STEEL GLASS LINED STORAGE TANK WITH FIBER GLASS OR POLYURETHANE FOAM INSULATION AND A OUTER STEEL JACKET WITH A BAKED ENAMEL FINISH
  2. THE WATER HEATER ELEMENTS SHALL BE OF THE LOW WATT DENSITY (75 WATT PER SQUARE INCH) COPPER SHEATH, TIN COATED PROTECTION TYPE. THE ELEMENTS SHALL BE FUSED IN ACCORDANCE WITH UL
  3. THE STORAGE TANK SHALL BE RATED FOR A WORKING PRESSURE OF 150 PSIG AND BE COMPLETE WITH MAGNESIUM ANODES FOR PROTECTION AGAINST ELECTROLYTIC CORROSION.
  4. THE CONTROL CIRCUIT SHALL BE POWERED BY A FUSED INTEGRAL CONTROL TRANSFORMER. THE CONTROL CIRCUIT SHALL INCLUDE A MAGNETIC CONTACTOR AND EACH 18 KW INCREMENT OF HEATER CAPACITY, AN ADJUSTABLE IMMERSION THERMOSTAT, AND A FACTORY SET HIGH LIMIT TEMPERATURE CUTOFF SWITCH.
  5. THE FOLLOWING ACCESSORIES SHALL BE INCLUDED WITH THE WATER HEATER: TEMPERATURE & PRESSURE RELIEF VALVE AND MANUAL DRAIN VALVE.

- E. DOMESTIC HOT WATER EXPANSION TANKS
1. DOMESTIC HOT WATER EXPANSION TANKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASME AND BE RATED FOR A WORKING PRESSURE OF 125 PSI. THE TANK SHALL BE OF STEEL CONSTRUCTION WITH A PRE-CHARGED AIR CHAMBER. THE EXTERIOR OF THE TANK SHALL HAVE A BAKED ENAMEL FINISH.
  2. THE TANK SHALL BE CONSTRUCTED TO ACCEPT AND STORE EXPANDED WATER SEPARATE FROM AIR WITH EITHER A HEAVY DUTY BUTYL DIAPHRAGM AND A RIGID POLYPROPYLENE TANK LINER OR WITH A HEAVY DUTY BUTYL WATER HOLDING BLADDER.
  3. THE EXPANSION TANK SHALL BE SIZED TO ACCOMMODATE FOR THERMAL EXPANSION OF THE STORED WATER AND THUS MAINTAIN HEATED WATER PRESSURE BELOW THE RELIEF VALVE SETTING.

- F. DOMESTIC HOT WATER CIRCULATING PUMPS SHALL BE OF THE IN-LINE TYPE WITH FLANGED PIPING CONNECTIONS OF ALL BRONZE CONSTRUCTION.

- G. CONTRACTOR SHALL INSTALL THE DOMESTIC WATER HEATERS AND ACCESSORY COMPONENTS PLUMB AND LEVEL IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. MANUFACTURER'S RECOMMENDED OPERATING AND SERVICE CLEARANCES SHALL BE MAINTAINED.

- H. CONTRACTOR SHALL INSTALL WATER PIPING FOR THE DOMESTIC WATER HEATER CONNECTIONS TO INCLUDE THE FOLLOWING DEVICES AS WELL AS ANY ADDITIONAL REQUIREMENTS AS INDICATED ON THE CONTRACT DRAWINGS.

1. INLET AND OUTLET ISOLATION VALVES
2. DIELECTRIC PIPE UNIONS AT POINT OF HEATER CONNECTION
3. THERMOMETERS IN THE INLET AND OUTLET PIPING CONNECTIONS

- I. DOMESTIC HOT WATER CIRCULATING PUMPS SHALL BE INSTALLED WITH ISOLATION VALVES UP AND DOWNSTREAM AND WITH A SWING CHECK VALVE AT THE PUMP DISCHARGE.

PLUMBING FIXTURES, DRAINS AND CLEANOUTS

- A. CONTRACTOR SHALL PROVIDE AND INSTALL ALL PLUMBING FIXTURES AND EQUIPMENT AS SHOWN ON THE CONTRACT DRAWINGS AND LISTED IN THE FIXTURE SCHEDULE.

- B. CONTRACTOR SHALL PROVIDE AND INSTALL FLOOR DRAINS, SHOWER DRAINS, FIXTURE CARRIERS, CLEANOUTS AND ROOF DRAINS AS INDICATED ON THE CONTRACT DRAWINGS AND IN THESE SPEC