

DIVISION 22 - PLUMBING

SCOPE
 1. FURNISH ALL LABOR, MATERIAL AND EQUIPMENT NECESSARY TO COMPLETE ALL PLUMBING WORK AS SHOWN ON THE DRAWINGS.
 2. CONTRACTOR SHALL STUDY ALL OTHER DRAWINGS AND ADDENDA WHICH MAY AFFECT THIS WORK.
 3. CONTRACTOR SHALL VISIT SITE AND VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING HIS BID.

WORK INCLUDED

1. THE WORK COVERED UNDER THIS SECTION CONSISTS OF FURNISHING ALL LABOR MATERIALS TOOLS EQUIPMENT APPLIANCES TRANSPORTATION SCAFFOLDING SERVICES SUPERVISION AND PERFORMING ALL OPERATIONS REQUIRED TO PROPERLY COMPLETE ALL PLUMBING WORK IN ACCORDANCE WITH THIS SECTION OF THE SPECIFICATIONS AND AS INDICATED ON THE APPLICABLE DRAWINGS SUBJECT TO TERMS AND CONDITIONS OF THE CONTRACT THE CONTRACTOR FOR THIS PART OF THE WORK SHALL PAY FOR ALL APPLICABLE SERVICE CHARGES FEES PERMITS ROYALTIES TAXES AND INSURANCE OR OTHER SIMILAR COSTS AS REQUIRED BY WORK PERFORMED UNDER THIS SECTION
 2. WORK UNDER THIS SECTION INCLUDES BUT IS NOT NECESSARILY LIMITED TO THE FOLLOWING ITEMS: A. DO ALL EXCAVATING AND BACK FILLING REQUIRED FOR PLUMBING WORK BACKFILL TO BE SAND IN AREAS COVERED BY CONCRETE SLAB OR ASPHALT AND IN ALL EVENTS A COVER OF AT LEAST 8" OF SAND OVER ALL PIPES DRAINS SWEPS, ETC. PRIOR TO COMPLETING BACKFILL WITH BASK ROCK B. COLD WATER SYSTEMS, DRAINS, ETC. COMPLETE WITH ALL WASTE VENT AND WATER CONNECTIONS AS SHOWN ON DRAWINGS.
 3. RELATED ITEMS OF WORK UNDER OTHER SECTIONS OF THE SPECIFICATIONS: A. MECHANICAL CONTRACTOR WILL PROVIDE WORK RELATED TO HEATING AIR CONDITIONING AND VENTILATING INCLUDING CONDENSATE DRAINS AND ALL MINOR DRAINS INCLUDING GAS AND REFRIGERANT LINES FOR HEATING AND AIR CONDITIONING WORK. B. ELECTRICAL CONTRACTOR WILL PROVIDE ALL ELECTRICAL POWER WIRING OUTLETS AND CONNECTIONS REQUIRED FOR PLUMBING EQUIPMENT.

GENERAL

1. ALL PLUMBING WORK SHALL BE DONE IN ACCORDANCE WITH ALL LOCAL CODES HAVING JURISDICTION OVER THIS WORK. WORK IS SUBJECT TO INSPECTION BY AGENCIES HAVING JURISDICTION DISCREPANCIES BETWEEN DRAWINGS AND LOCAL CODES SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER BEFORE SUBMITTING A BID TO THE GENERAL CONTRACTOR. EXTRA COSTS FOR SUCH DISCREPANCIES AFTER ACCEPTANCE OF BID PROPOSAL WILL NOT BE ALLOWED.
 2. THIS CONTRACTOR SHALL DO ALL CUTTING AND PATCHING REQUIRED FOR THE INTRODUCTION AND PLACEMENT OF HIS WORK THE CONTRACTOR SHALL VERIFY ALL PIPE CHASES CALLED FOR ON STRUCTURAL DRAWINGS PIPES THROUGH ROOF AND ELSEWHERE AS REQUIRED SHALL BE THROUGH SLEEVES THIS CONTRACTOR SHALL FURNISH THE GENERAL CONTRACTOR ALL LOCATIONS FOR SLEEVES REQUIRED BUT THIS CONTRACTOR SHALL SET ALL SLEEVES AND/OR BE RESPONSIBLE FOR SAME.
 3. ANY PIECES OF EQUIPMENT SHOWN ON ARCHITECTURAL OR MECHANICAL PLANS OR ANY PLANS REQUIRING PLUMBING TO OR WITHIN WILL BE PLUMBING COMPLETED AND LABOR AND MATERIALS FURNISHED BY THIS CONTRACTOR WHETHER OR NOT IT IS SHOWN ON THE PLANS.
 4. ALL MATERIALS SHALL BE NEW AND OF THE QUALITY SPECIFIED ALL WORK SHALL BE EXECUTED IN A NEAT AND MECHANICAL MANNER WITH PIPING HORIZONTAL OR VERTICAL AND AT RIGHT ANGLES TO EACH OTHER AS REQUIRED.
 5. THE DRAWINGS SHOW THE WORK CONTEMPLATED BUT THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR TAKING HIS OWN MEASUREMENTS AND INSTALLING HIS WORK TO FIT CONDITIONS ENCOUNTERED BEFORE BEGINNING ANY WORK. THE CONTRACTOR SHALL EXAMINE ALL DRAWINGS CAREFULLY AND REPORT TO THE OWNER ANY DISCREPANCIES OR INTERFERENCES THAT MAY BE DISCOVERED. NO EXTRA COST WILL BE ALLOWED FOR DISCREPANCIES UNREPORTED BEFORE SUBMITTAL OF BID. THE OWNER SHALL HAVE THE PRIVILEGE OF MAKING MINOR CHANGES WITHOUT ADDITIONAL COST AS LONG AS SAME ARE MADE PREVIOUS TO ANY PARTICULAR SECTION OF WORK BEING COMPLETED BY THIS CONTRACTOR.

SUBSTITUTION OF MATERIAL

1. WHERE A DEFINITE MANUFACTURER'S PRODUCT IS SPECIFIED AND THE SPECIFICATION STATES THAT PRODUCTS OF SIMILAR DESIGN AND EQUAL CONSTRUCTION FROM SPECIFIED LIST OF MANUFACTURERS MAY BE SUBSTITUTED, IT IS NOT THE INTENTION OF THE ENGINEER THAT PRODUCTS OF MANUFACTURERS THAT ARE SPECIFIED ARE THE ONLY PRODUCTS THAT WILL BE ACCEPTED AND THAT PRODUCTS OF OTHER MANUFACTURERS WILL NOT BE CONSIDERED FOR SUBSTITUTION. HOWEVER, UNDER NO CIRCUMSTANCE SHALL ANY SUBSTITUTION OF THE PRODUCTS FROM THESE SPECIFIED MANUFACTURERS BE MADE WITHOUT WRITTEN APPROVAL OF THE ENGINEER.
 2. IT IS NOT THE INTENTION OF THE ENGINEER TO DISCRIMINATE AGAINST ANY MATERIAL EQUAL TO THE STANDARDS AS DESCRIBED IN THE SPECIFICATIONS; THEREFORE, ANY CONTRACTOR THAT DESIRES TO BASE HIS BID ON ANY MATERIAL THAT CANNOT BE SUBSTITUTED IN ACCORDANCE WITH THE CONDITIONS AS DESCRIBED HEREIN, MAY SUBMIT THIS MATERIAL TO THE ENGINEER NOT LATER THAN FOUR (4) DAYS PRIOR TO THE BID OPENING DATE. IF THE MATERIAL SUBMITTED IS APPROVED, THE SPECIFICATION WILL BE ALTERED BY ADDENDUM TO ALLOW FOR THE SUBSTITUTION.
 3. WHEREVER A DEFINITE MANUFACTURER'S PRODUCT IS SPECIFIED AND THE TERM "OR EQUAL" IS USED, IT IS THE INTENTION OF THE ENGINEER TO SET A DEFINITE STANDARD AS TO THE PRODUCT. PRODUCTS BY OTHER REPUTABLE MANUFACTURERS WILL BE ACCEPTED PROVIDED IT HAS EQUAL CAPACITY CONSTRUCTION AND PERFORMANCE. HOWEVER, UNDER NO CIRCUMSTANCES SHALL ANY SUBSTITUTION BE MADE WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
 4. IF ANY REQUEST FOR A SUBSTITUTION OF MATERIAL IS REJECTED, THE CONTRACTOR SHALL AUTOMATICALLY BE REQUIRED TO FURNISH THE MATERIAL NAMED IN THE SPECIFICATIONS AS REPETITIVE SUBSTITUTIONS FOR THE SAME MATERIAL WILL NOT BE CONSIDERED.

PIPPING

1. ALL PIPING SHALL BE INSTALLED SO AS TO BE FREE FROM STRAINS AND DISTORTIONS BY EXPANSION OR CONTRACTIONS. EXPANSION AND CONTRACTION SHALL BE TAKEN UP BY OFFSETS IN PIPING WITH REQUIRED ANCHORS, EXPANSION JOINTS, ETC., ALL TO MEET WITH GOOD PRACTICE.
 2. EXPANSION JOINTS SHALL BE PROVIDED WHERE SHOWN ON PLANS, OR WHERE NECESSARY TO ABSORB EXPANSION IN COPPER LINES. EXPANSION JOINTS SHALL BE EQUAL TO FLEXONICS MODEL HB EXPANSION COMPENSATOR.
 3. INSULATION:
 A. ALL DOMESTIC COLD AND HOT WATER LINES SHALL BE INSULATED.
 B. INSULATION FOR PIPES SHALL BE AS FOLLOWS:
 (a) MAIN PIPES 1" OR LESS - 3/4" INSULATION
 (b) 1/2" TO 4" MAIN PIPES - 1" INSULATION
 C. INSULATION SHOULD BE EQUAL TO CERTAINTED SNAP-ON SEALED JOINTS WITH AN R² FACTOR OF 4 TO 4.8 HR FT/BTU PER INCH. INSULATION SHALL BE PRE-FORMED, MOLDED, SECTIONAL, BONDED GLASS FIBER WITH FACTORY APPLIED VAPOR BARRIER JACKET. IN AREAS WHERE THE VAPOR BARRIER JACKET FLAP, THE MATERIAL SHALL BE COATED WITH A VAPOR BARRIER ADHESIVE, PASTED DOWN AND SMOOTHED OUT TO GIVE A NEAT AND FINISHED APPEARANCE. THE LONGITUDINAL JOINTS AND THE END-TO-END JOINTS SHALL BE TIGHTLY BUTTED TOGETHER. PROVIDE A 4" WIDE STRIP OF VAPOR BARRIER JACKET MATERIAL SECURELY ADHERED TO THE COVERING AT EACH END JOINT TO OBTAIN A COMPLETE AIR-TIGHT SEAL.
 D. ALL COLD WATER FITTINGS, VALVES, PUMP CONNECTIONS, ETC. IN CONNECTION WITH THE PIPING SHALL BE INSULATED WITH THE SAME MATERIAL AS THE MAIN PIPES. INSULATION SHALL BE SEALED WITH A VAPOR-TIGHT INSTALLATION. VALVES SHALL BE INSULATED UP TO AND INCLUDING VALVE ASSEMBLY LEAVING ONLY VALVE STEM EXPOSED.
 4. ALL PIPING SHALL BE RUN ABOVE BOTTOM OF BAR JOISTS.
 5. PIPES TO BE SEPARATED AT LEAST 4" TO PERMIT ROOM FOR 1" INSULATION.
 6. ELECTRICAL CONNECTIONS SHALL BE USED THROUGHOUT WHERE CHANGING FROM ONE TYPE OF METAL TO A DISSIMILAR METAL.
 7. ALL DOMESTIC WATER LINES SHALL HAVE VALVES INSTALLED AT THE BRANCH POINTS FOR ISOLATION OF AREAS DURING REPAIRS.

CLEANOUTS

1. ALL WASTE LINES WHEREVER POSSIBLE, SHALL HAVE CLEANOUT FACILITIES AT THEIR EXTREMITIES. ALL WAIN WASTE LINES, WHERE POSSIBLE, SHALL HAVE CLEANOUTS LOCATED OUTSIDE OF BUILDING TO PROVIDE CONVENIENT SURFACE ACCESS FOR POWER ROODING. EQUIPMENT AND TO BE LOCATED IN SUCH A MANNER THAT ALL LINES CAN BE POWER ROODED; DISTANCE BETWEEN CLEANOUT NOT TO EXCEED 90 FEET.

PIPE HANGERS

1. PIPE HANGERS SHALL BE STANDARD MALLEABLE IRON OR COPPER TUBING SUPPORTS WITH ADJUSTABLE SWIVELING FLAP FOR ALL GENERAL PIPING. EACH HANGER SHALL BE SUITABLE FOR THE PURPOSES AND CONNECTION ENTERED FOR THE JOB. ALL PIPES SHALL BE SUBSTANTIALLY SUPPORTED IN A NEAT AND WORKMANLIKE MANNER AND SHALL BE FREE FROM SAGGING, WITH LOOPS, ETC. AS REQUIRED FOR EXPANSION AND CONTRACTION.
 2. PIPES RUNNING ABOVE FUJURED CEILING SHALL NOT BE SUPPORTED FROM OR BY THE FUJURED CEILING SLEEVES AND CAPS SHALL BE ARRANGED ON HIS WORK IN SUCH A MANNER THAT NONE OF THE CONNECTIONS ABOVE BOTTOM OF BAR JOISTS.
 3. HANGER SPACING PIPES TO 1 1/2" INCLUSIVE AT 8'-0" CENTERS AND OVER 1 1/2" TO 2" CENTER.

VALVES

1. LESS OTHER SPECIFICATIONS SHOWN AND/OR SPECIFIED, ALL VALVES SHALL BE 125# GATE VALVES 2" AND OVER SHALL BE SOUD WEDGE TYPE GATE VALVES. VALVES SHALL HAVE GONZE BODIES AND DISCS WITH RENEWABLE SEATS AND DISCS. VALVE SHALL BE EQUAL TO NIBCO VALVE.

UNIONS

1. SHALL BE GROUND JOINT BRASS 125# ON ALL PIPING 2" AND SMALLER. UNIONS SHALL BE INSTALLED WITH EQUIPMENT ON VALVE. UNIONS SHALL BE INSTALLED ADJACENT TO SAME FOR THEIR EASY REMOVAL.
 2. ALL CONNECTIONS TO EQUIPMENT SHALL BE PROVIDED WITH ISOLATION SHUT-OFF VALVES PROVIDE SLEEVES OF THE SAME MATERIALS AS PIPE WHERE PIPES PASS THROUGH FLOOR, WALLS AND CEILING CONSTRUCTION. SLEEVES SHALL BE OF SUFFICIENT DIAMETER TO ALLOW FOR MOVEMENT OF PIPE DUE TO EXPANSION AND CONTRACTION. ALL SLEEVES THROUGH SLABS SHALL BE SEALED WITH MASTIC AND MADE WATER TIGHT.
 3. LOCATIONS OBTAINED FROM PREVIOUS PLANS.
 4. CONTRACTOR SHALL VERIFY LOCATIONS OF EXISTING PIPES AND SHALL NOT BE ENTITLED TO EXTRA COMPENSATION FOR EXISTING PIPES DAMAGED DURING CONSTRUCTION OR FOR PIPES BEING AT LOCATIONS NOT SHOWN.

PIPE SLEEVES

1. MAKE ALL SLEEVES THROUGH FLOORS AND WALLS BLACK IRON PIPE, FLUSH WITH WALL, CEILING AND FINISHED FLOOR OR SIZE TO ACCOMMODATE THE PIPE OR PIPE AND INSULATION, IF INSULATED.
 2. CAULK SLEEVES THROUGH OUTSIDE WALLS ABOVE GRADE WITH APPROVED CAULKING; THOSE BELOW GRADE, CAULK WITH LEAD.

TESTING

1. ALL WATER PIPES SHALL BE TESTED WITH 125 PSI WATER PRESSURE. PIPING SHALL HOLD THE TEST PRESSURE 24 HOURS. PIPING WHICH INDICATES A LEAK SHALL NOT BE COVERED UNTIL REPAIRED AND PASSED ON BY A SUBSEQUENT PRESSURE TEST.
 2. IF REQUIRED BY LOCAL CODES AND REGULATIONS, THE TEST SHALL BE MADE IN THE PRESENCE OF A CERTIFIED LOCAL PLUMBING INSPECTOR. THIS CONTRACTOR SHALL DELIVER TO THE OWNER TWO (2) COPIES OF CERTIFICATES OF INSPECTION AND ACCEPTANCE BY THE LOCAL AUTHORITIES WHERE SUCH INSPECTION IS REQUIRED.
 3. DISINFECT ALL DOMESTIC WATER LINES IN ACCORDANCE WITH EITHER AWWA C601, OR AWWA C105.

SHOP DRAWINGS

1. AS SOON AS PRACTICABLE AND WITHIN 10 WORKING DAYS AFTER THE AWARD OF THE CONTRACT AND BEFORE BEGINNING THE FABRICATION OF ANY MATERIAL OR THE INSTALLATION OF ANY EQUIPMENT, SHOP DRAWINGS INCLUDING A COMPLETE SCHEDULE OF THE MATERIALS AND EQUIPMENT PROPOSED FOR INSTALLATION SHALL BE SUBMITTED TO THE ARCHITECT AND/OR ENGINEER FOR APPROVAL.
 2. INCLUDE CATALOGS, CUTS, DIAGRAMS, DRAWINGS, AND OTHER DESCRIPTIVE DATA SUCH AS CAPACITY RATINGS AS MAY BE REQUIRED.
 3. IF ANY ITEM OF MATERIAL OR EQUIPMENT FAILS TO COMPLY WITH SPECIFICATION REQUIREMENTS, SUCH MAY BE REJECTED.
 4. ENGINEER'S APPROVAL OF SHOP DRAWINGS DOES NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY OF CORRECTLY FIGURED DIMENSIONS OR OTHER ERRORS CONTAINED IN THE DRAWINGS.
 5. OMISSION OF MATERIAL SHOWN ON CONTRACT DRAWINGS, EVEN THOUGH APPROVED BY THE ARCHITECT AND/OR ENGINEER, DOES NOT RELIEVE THE CONTRACTOR FROM FURNISHING AND ERRECTING SAME.

GUARANTEE

1. THE CONTRACTOR, BY ACCEPTING THESE PLANS AND SPECIFICATIONS AND SIGNING THE CONTRACT, SHALL GUARANTEE THE FOLLOWING:
 A. ALL EQUIPMENT, ACCESSORIES AND MATERIALS FURNISHED BY HIM FOR A PERIOD OF ONE (1) YEAR FROM FINAL ACCEPTANCE AGAINST ALL DEFECTS IN MATERIAL AND WORKMANSHIP. IF ANY EQUIPMENT FAILS, DOES NOT OPERATE SATISFACTORILY, OR SHOWS UNDUWEAR, THE CONTRACTOR WILL BE NOTIFIED AND WILL BE REQUIRED TO REMEDY THE DEFECT IMMEDIATELY AT HIS OWN EXPENSE.
 B. THAT ALL EQUIPMENT WILL PRODUCE THE RESULTS SPECIFIED OR SHOWN.
 C. ALL PIPING SHALL BE DRIP-TIGHT AND PROPERLY INSTALLED TO BE FREE OF VIBRATION, POUNDING OR OBJECTIONABLE NOISE.
 2. OTHERWISE, HE SHALL, AT HIS OWN EXPENSE, SUPPLY THE PROPER MATERIALS AND LABOR TO MAKE GOOD ANY DAMAGE TO OR DEFECTS IN HIS WORK CAUSED BY SUCH ERROR.
 3. ALL SERVICE WORK FOR THIS PERIOD TO BE PERFORMED WITHOUT CHARGE TO THE OWNER.
 4. THE GENERAL CONTRACTOR WILL BE RESPONSIBLE FOR THE PLUMBING CONTRACTOR.

DIVISION 23 - MECHANICAL

SCOPE

1. FURNISH ALL LABOR, MATERIAL AND EQUIPMENT NECESSARY TO COMPLETE ALL MECHANICAL WORK AS SHOWN ON THE DRAWINGS.
 2. CONTRACTOR SHALL STUDY ALL OTHER DRAWINGS AND ADDENDA WHICH MAY AFFECT THIS WORK.
 3. CONTRACTOR SHALL VISIT AND VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING HIS BID.
 4. ALL WORK TO CONFORM TO 2012 IMC.

WORK INCLUDED

1. THIS SPECIFICATION INCLUDES THE FURNISHING AND ALL LABOR MATERIALS TOOLS, EQUIPMENT STORAGE, RELOADING, FEES, PERMITS, CERTIFICATES OR INSPECTION, ETC. UNLESS SPECIFICALLY FURNISHED BY OTHERS NECESSARY OF REASONABLY REQUIRED FOR THE COMPLETE INSTALLATION OF ALL HEATING AND VENTILATING WORK SHOWN ON THE DRAWINGS AND/OR HEREIN SPECIFIED. THE ENTIRE WORK SHALL BE DELIVERED COMPLETE IN PERFECT WORKING ORDER AND TO THE ENTIRE SATISFACTION OF THE ARCHITECT AND ENGINEER.
 2. THIS CONTRACTOR SHALL VISIT THE SITE BEFORE ENTERING INTO A CONTRACT AND VERIFY TO HIS OWN SATISFACTION ALL OF THE EXISTING CONDITIONS RELATING TO THE INSTALLATION OF THE WORK SHOWN ON THE DRAWINGS AND HEREIN SPECIFIED.

SUBSTITUTION OF MATERIAL

1. WHERE A DEFINITE MANUFACTURER'S PRODUCT IS SPECIFIED AND THE SPECIFICATION STATES THAT PRODUCTS OF SIMILAR DESIGN AND EQUAL CONSTRUCTION FROM SPECIFIED LIST OF MANUFACTURERS MAY BE SUBSTITUTED, IT IS NOT THE INTENTION OF THE ENGINEER THAT PRODUCTS OF MANUFACTURERS THAT ARE SPECIFIED ARE THE ONLY PRODUCTS THAT WILL BE ACCEPTED AND THAT PRODUCTS OF OTHER MANUFACTURERS WILL NOT BE CONSIDERED FOR SUBSTITUTION. HOWEVER, UNDER NO CIRCUMSTANCE SHALL ANY SUBSTITUTION OF THE PRODUCTS FROM THESE SPECIFIED MANUFACTURERS BE MADE WITHOUT WRITTEN APPROVAL OF THE ENGINEER.
 2. IT IS NOT THE INTENTION OF THE ENGINEER TO DISCRIMINATE AGAINST ANY MATERIAL EQUAL TO THE STANDARDS AS DESCRIBED IN THE SPECIFICATIONS; THEREFORE, ANY CONTRACTOR THAT DESIRES TO BASE HIS BID ON ANY MATERIAL THAT CANNOT BE SUBSTITUTED IN ACCORDANCE WITH THE CONDITIONS AS DESCRIBED HEREIN, MAY SUBMIT THIS MATERIAL TO THE ENGINEER NOT LATER THAN FOUR (4) DAYS PRIOR TO THE BID OPENING DATE. IF THE MATERIAL SUBMITTED IS APPROVED, THE SPECIFICATION WILL BE ALTERED BY ADDENDUM TO ALLOW FOR THE SUBSTITUTION.
 3. WHEREVER A DEFINITE MANUFACTURER'S PRODUCT IS SPECIFIED AND THE TERM "OR EQUAL" IS USED, IT IS THE INTENTION OF THE ENGINEER TO SET A DEFINITE STANDARD AS TO THE PRODUCT. PRODUCTS BY OTHER REPUTABLE MANUFACTURERS WILL BE ACCEPTED PROVIDED IT HAS EQUAL CAPACITY CONSTRUCTION, AND PERFORMANCE. HOWEVER, UNDER NO CIRCUMSTANCES SHALL ANY SUBSTITUTION BE MADE WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
 4. IF ANY REQUEST FOR A SUBSTITUTION OF MATERIAL IS REJECTED, THE CONTRACTOR SHALL AUTOMATICALLY BE REQUIRED TO FURNISH THE MATERIAL NAMED IN THE SPECIFICATIONS AS REPETITIVE SUBSTITUTIONS FOR THE SAME MATERIAL WILL NOT BE CONSIDERED.

DRAWINGS

1. THE DRAWINGS INDICATE THE EXTENT AND GENERAL ARRANGEMENT OF THE VARIOUS SYSTEMS. IF ANY DISCREPANCY FROM THESE DRAWINGS ARE DEEMED NECESSARY BY THE CONTRACTOR, THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR APPROVAL AND A STATEMENT OF THE REASONS FOR SUCH DISCREPANCY TO THE ARCHITECT AND/OR ENGINEER FOR APPROVAL. AS SOON AS PRACTICABLE, THE CONTRACTOR SHALL REMOVE FROM THE DRAWING SHOWING ON THE DRAWINGS SHALL BE MADE WITHOUT WRITTEN APPROVAL OF THE ARCHITECT AND/OR ENGINEER.
 2. THE DRAWINGS SHOWING THE EXTENT AND ARRANGEMENT OF THE WORK OF A PARTICULAR TRADE MUST BE SUBMITTED TOGETHER WITH THE DRAWINGS SHOWING THE EXTENT AND ARRANGEMENT OF THE WORK OF THE OTHER TRADES, AND THIS CONTRACTOR SHALL DO HIS WORK IN ACCORDANCE WITH THE WORK OF THE OTHER TRADES AND SHALL BE RESPONSIBLE FOR COORDINATING THE WORK OF THE ARCHITECT AND/OR ENGINEER. ANY INTERFERENCE DETECTED, SUCH AS INTERFERENCES SHOWN ON DRAWINGS, SHALL BE INVESTIGATED AND CALLED TO THE ATTENTION OF THE ARCHITECT AND/OR ENGINEER PRIOR TO THE INSTALLATION OF THE EQUIPMENT. IF INSTALLED AND BEFORE ANY MATERIAL IS PLACED, LOCAL INSULATION SHALL BE MADE AT NO ADDITIONAL COST TO THE OWNER.

STANDARD PRODUCTS

1. EACH ITEM OF EQUIPMENT FURNISHED UNDER THIS SPECIFICATION SHALL BE ESSENTIALLY THE STANDARD PRODUCT OF THE MANUFACTURER WHOSE NAME AND/OR MORE UNITS OF THE SAME KIND OR CLASS OF EQUIPMENT IS REQUIRED; THESE SHALL BE THE PRODUCTS OF A SINGLE MANUFACTURER. HOWEVER, THE COMPONENT PARTS OF THE EQUIPMENT NEED NOT BE THE PRODUCTS OF THE MANUFACTURER.
 2. ALL MATERIALS AND EQUIPMENT SHALL BE OF THE BEST QUALITY NORMALLY USED IN GOOD COMMERCIAL PRACTICE. ALL MATERIALS AND EQUIPMENT SHALL BE IDENTIFIED BY THE NAME AND ADDRESS OF THE MANUFACTURER ON THE CATALOG NUMBERS AND DESIGNATION.
 3. THE CONTRACTOR SHALL COOPERATE WITH THE OTHER CONTRACTORS AND SUBCONTRACTORS ON THE SUBMITTAL AND INSTALLATION OF HIS WORK IN SUCH A MANNER THAT NONE OF THE CONNECTIONS SHALL BE HINDERED OR DELAYED AT ANY TIME WHEN HIS PART OF THE WORK IS SUBMITTED. HE SHALL REMOVE FROM THE PREMISES ALL TOOLS, MACHINERY, DEBRIS, ETC., AND SHALL LEAVE THE PREMISES FREE FROM ALL OBSTRUCTIONS.

FOUNDATIONS AND SUPPORTS

1. THIS CONTRACTOR SHALL PROVIDE FOUNDATIONS AND SUPPORTS FOR ALL APPARATUS FURNISHED AND INSTALLED BY HIM.

CUTTING AND PATCHING

1. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR CUTTING, PATCHING AND PAINTING REQUIRED BY HIS WORK AND SHALL ARRANGE THE PROPER SUBCONTRACTOR FOR THE EXECUTION OF SUCH FITTINGS, PATCHING AND PAINTING IN STRICT ACCORDANCE WITH THE GENERAL SPECIFICATIONS.

GENERAL REQUIREMENTS

1. A MOTOR AND MOTOR CONTROLLER OF SUFFICIENT CAPACITY AND SPEED SHALL BE FURNISHED BY THIS CONTRACTOR FOR INSTALLATION BY THE ELECTRICAL CONTRACTOR FOR ALL APPARATUS REQUIRING SAME. FRAMES AND ENCLOSURES SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE FOR SERVICE CONDITIONS ENCOUNTERED. CONSTRUCTION AND RATINGS SHALL CONFORM WITH THE LATEST STANDARD OF THE NEMA AND AEE.
 2. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR CUTTING, PATCHING AND PAINTING REQUIRED BY HIS WORK AND SHALL ARRANGE THE PROPER SUBCONTRACTOR FOR THE EXECUTION OF SUCH FITTINGS, PATCHING AND PAINTING IN STRICT ACCORDANCE WITH THE GENERAL SPECIFICATIONS.
 3. IF ANY ITEM OF MATERIAL OR EQUIPMENT FAILS TO COMPLY WITH SPECIFICATION REQUIREMENTS, SUCH MAY BE REJECTED.
 4. OWNERS AND/OR ENGINEERS APPROVAL OF SHOP DRAWINGS DOES NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY OF CORRECTLY FIGURED DIMENSIONS OR OTHER ERRORS CONTAINED IN DRAWINGS.
 5. OMISSION OF MATERIAL SHOWN ON CONTRACT DRAWINGS, EVEN THOUGH APPROVED BY THE ARCHITECT AND/OR ENGINEER, DOES NOT RELIEVE THE CONTRACTOR FROM FURNISHING AND ERRECTING SAME.

DUCTWORK

1. DUCTWORK SHOWN ON THE DRAWINGS SPECIFIED OR REQUIRED FOR THE HEATING SYSTEMS SHALL BE CONSTRUCTED AND ERPECTED IN A FIRST-CLASS WORKMANLIKE MANNER. DUCTWORK, UNLESS OTHERWISE APPROVED BY THE ARCHITECT AND/OR ENGINEER, SHALL CONFORM ACCURATELY TO THE SIZES INDICATED ON THE DRAWINGS AND SHALL BE STRAIGHT AND SMOOTH ON THE INSIDE, WITH JOINTS NEATLY FINISHED.
 2. CURVED ELBOWS SHALL HAVE A CENTERLINE RADIUS NOT LESS THAN 1 1/2 TIMES THE WIDTH OF THE DUCT.
 3. AIR TURNS SHALL BE INSTALLED IN ALL ABRUPT ELBOWS.
 4. THE AIR TURNS SHALL CONSIST OF CURVED METAL BLADES OR VANES ARRANGED TO PERMIT THE AIR TO MAKE THE ABRUPT TURNS WITHOUT APPRECIABLE TURBULENCE. SHALL BE THE MANUFACTURERS STANDARD PRODUCTS AND SHALL BE QUIET AND FREE FROM VIBRATION WHEN THE SYSTEM IS IN OPERATION.
 5. SHEET METAL DUCTS SHALL BE PROPERLY BRACED AND REINFORCED WITH GALVANIZED STEEL ANGLES OR OTHER STRUCTURAL MEMBERS APPROVED BY THE ARCHITECT AND/OR ENGINEER.
 6. THE INTERNAL ENDS OF ALL SLIP JOINTS SHALL BE INSTALLED IN THE DIRECTION OF FLOW.
 7. THE SHEET METAL DUCTS AND STIFFENERS SHALL CONFORM TO TABLE 1.
 8. DUCTS SHALL BE SECURELY ANCHORED TO THE BUILDING IN AN APPROVED MANNER AND SHALL BE INSTALLED TO BE COMPLETELY FREE FROM VIBRATION UNDER ALL CONDITIONS OF OPERATION.
 9. ALL SHEET METAL DUCTS ABOVE ROOF SHALL BE PROPERLY WATERPROOFED ON THE EXTERIOR BY THIS CONTRACTOR.
 10. ALL DUCTWORK SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH THE ENTITLED 'LOW VELOCITY DUCT CONSTRUCTION STANDARDS,' LATEST EDITION.
 11. DUCT SIZES SHOWN ARE FREE AREA REQUIRED.
 12. DUCTWORK SHALL BE G90 GALVANIZED STEEL.

TABLE 1

SHEET METAL GAGES FOR RECTANGULAR DUCT CONSTRUCTION

STEEL US STD GAGE	MAXIMUM SIDE INCHES	TYPE OF TRANSVERSE JOINT CONNECTIONS	BRACING
26	UP TO 12	S, DRIVE, POCKET OR BAR SLIPS ON 7-10" CENTERS	NONE
	13 TO 24	S, DRIVE, POCKET OR BAR SLIPS ON 7-10" CENTERS	NONE
24	25 TO 30	S, DRIVE, 1" POCKET OR 1" BAR SLIPS ON 7-10" CENTERS	1X1X1/8" ANGLES 4 FREE JOINT
22	31 TO 40	DRIVE, 1" POCKET OR 1" BAR SLIPS ON 7-0" CENTERS	1X1X1/8" ANGLES 4 FREE JOINT

SHEET METAL GAGES FOR ROUND DUCT CONSTRUCTION

STEEL US STD GAGE	MAXIMUM SIDE INCHES
26	4" Ø & 3"
24	13" Ø & 2 1/2"
22	20" Ø & 3 1/2"

FIRE DAMPERS

1. FIRE DAMPERS SHALL CONFORM TO UL555.
 2. DAMPER SHALL BE 1 1/2" HOUR RATING.
 3. SMACNA TYPE B, BLADES OUT OF AIR STREAM.
 4. REPLACEABLE FUSIBLE LINKS (160°)

TESTING, BALANCING, AND ADJUSTMENT

1. UPON COMPLETION OF THE VARIOUS SYSTEMS, THIS CONTRACTOR SHALL PERFORM A TEST IN THE PRESENCE OF AND TO THE ENTIRE SATISFACTION OF THE ARCHITECT AND/OR ENGINEER. ANY LEAKS OTHER DEFECTS DEVELOPING DURING THESE TEST SHALL BE CORRECTED AND MADE GOOD AS REQUIRED. AND THE TESTS REPEATED UNTIL ALL WORK IN PROVIDED SATISFACTORY.
 2. NO WORK OF ANY NATURE SHALL BE COVERED, ENCLOSED OR OTHERWISE SEALLED UNTIL PROPERLY INSPECTED AND APPROVED.
 3. PREVIOUS TO SUCH PERFORMANCE TEST, THIS CONTRACTOR SHALL HAVE SET UP AND INSTALLED ALL VALVES, MOTORS, CONTROLLERS, THERMOSTATS, ETC. NECESSARY TO PROPERLY BALANCE ALL PARTS OF THE PLANT AND SHALL HAVE THE PLANT OPERATING AND MAINTAINING DESIGN TEMPERATURE THROUGH THE BUILDING. ALL INSTRUMENTS, EQUIPMENT AND PERSONNEL REQUIRED FOR THESE TESTS SHALL BE FURNISHED BY THIS CONTRACTOR.
 4. TESTING, BALANCING AND ADJUSTMENTS SHALL BE PERFORMED IN ACCORDANCE WITH THE SHEET METAL AND AIR CONDITIONING CONTROLS PUBLISHED BY THE NATIONAL ASSOCIATION OF AIR CONDITIONING ENGINEERS. RECORDS SHALL BE MAINTAINED ON EACH OUTLET REGISTER AND/OR GRILLINGS.

WATER HEATER SCHEDULE

MARK	MANUFACTURER	MODEL #	TYPE	GALLON CAPACITY	RECOVERY (GPH @ 90 F RIS)	INPUT (MBH)	OUTPUT (MBH)	KW	EFFICIENCY	VOLTAGE / PHASE	NOTES
WH1	NAVIER	NPE-2405	DRY GAS INST	264	199	193	-	-	97%	120V/1	1,2,3

NOTES AND ACCESSORIES:
 1. PROVIDE TANKLESS WATER HEATER SERVICE VALVE KIT WITH GAS PIPING, PRESSURE/TAMP RELIEF AND SHUT-OFF VALVE.
 2. SET TEMPERATURE 30° OUTLET TEMPERATURE AT REMOTE OUTLET IS 110 DEG. F GAS AS DIRECTED BY OWNER.
 3. PROVIDE STAIRSUPPORT FOR UNIT INSTALLATION ON ROOF APPROVED BY LANDLORD AND ROOF MANUFACTURER. SUBMIT FOR APPROVAL. PROVIDE EQUIVALENT TO BIG FOOT 855 SYSTEM.

MARK	MANUF.	COND. UNIT #	EVAP. COIL MODEL #	ENTERING AIR DRWB	SENSIBLE MBH	TOTAL MBH	SEER	VOLTAGE/ PHASE	MCA	MOCF	NOTES & ACCESSORIES
MSHP1	LENNOX	VP4836H4H-SF	WITH INDOOR UNIT	8067	28.8	36	16.4	240V1	33	50	1,2,3

NOTES AND ACCESSORIES:
 1. PROVIDE REFRIGERANT LINE SIZES SIZED PER MANUFACTURERS RECOMMENDATIONS.
 2. PROVIDE ALL REFRIGERATION SYSTEM ACCESSORIES REQUIRED BY MANUFACTURER FOR GIVEN LINE SET ROUTING.
 3. PROVIDE STAIRSUPPORT FOR UNIT INSTALLATION ON ROOF APPROVED BY LANDLORD AND ROOF MANUFACTURER. SUBMIT FOR APPROVAL. PROVIDE EQUIVALENT TO BIG FOOT 855 SYSTEM.

MARK	MANUFACTURER	MODEL #	TYPE	GALLON CAPACITY	RECOVERY (GPH @ 90 F RIS)	INPUT (MBH)	OUTPUT (MBH)	KW	EFFICIENCY	VOLTAGE / PHASE	NOTES
WH1	NAVIER	NPE-2405	DRY GAS INST	264	199	193	-	-	97%	120V/1	1,2,3

NOTES:
 1. PROVIDE TANKLESS WATER HEATER SERVICE VALVE KIT WITH GAS PIPING, PRESSURE/TAMP RELIEF AND SHUT-OFF VALVE.
 2. SET TEMPERATURE 30° OUTLET TEMPERATURE AT REMOTE OUTLET IS 110 DEG. F GAS AS DIRECTED BY OWNER.
 3. PROVIDE VERY KIT PER MANUFACTURERS RECOMMENDATIONS. VERIFY PLENUM/STAIR LOCATION AND REQUIREMENTS WITH LANDLORD/OWNER.

PIPING MATERIAL SCHEDULE

SYSTEM	PIPPING					FITTINGS			MAXIMUM WORKING		FIELD TEST		NOTES
	SIZE	TYPE	SCHEDULE	GRADE	ASTM	MATERIAL	MATERIAL	TYPE	PRESSURE (PSI)	TEMP (DEG F)	PRESSURE (PSI)	TIME (HOURS)	
CONDENSATE DRAIN ABOVE GRADE	ALL	M	-	-	B88	COPPER	COPPER	DH1	10 FT	40-70	10 FT	1	-
DOMESTIC WATER ABOVE GRADE	ALL	L	-	-	B88	COPPER	COPPER	SI	120	40-180	150	1	-
DOMESTIC WATER BELOW GRADE	ALL	K	-	-	B88	COPPER	COPPER	SI	120	40-180	150	1	-
DOMESTIC WATER SERVICE BELOW GRADE	ALL	PVC	40	1	D-1785	PVC	PVC	SW	250	50-90	500	2	-
SANITARY WASTE BELOW GRADE	ALL	DWV	40	-	2665	PVC	PVC	dRW	10 FT	50-180	10 FT	1	1
SANITARY WASTE AND VENT	ALL	DWV	40	-	2665	PVC	PVC	dWV	10 FT	50-180	10 FT	1	1,2
TEMPERATURE & PRESSURE RELIEF DRAIN	ALL	M	-	-	B88	COPPER	COPPER	DH1	10 FT	40-70	10 FT	1	-

NOTES:
 1. THE USE OF CELLULAR CORE PVC WASTE AND VENT PIPING IS STRICTLY PROHIBITED.
 2. SANITARY WASTE AND VENT PIPING LOCATED WITHIN RETURN AIR PLenums SHALL BE CAST IRON OR SHALL BE ENCLOSED IN A OPSION BOARD SUPPORT.
ABBREVIATIONS:
 BS - BELL AND SPIGOT
 CS - CAST IRON
 CS - CARBON STEEL
 CW - MECHANICAL JOINT
 DR - DUCTILE IRON
 DR - DRAINAGE FITTING
 DWV - DRAINAGE WASTE AND VENT
 HDPE - HIGH DENSITY POLYETHYLENE
 MJ - MECHANICAL JOINT
 SI - STANDARD STRENGTH / SERVICE WEIGHT
 SW - SOLVENT WELD
 NH - NO-HUB
 SI - 95-5 TIN-ANTIMONY SOLDER JOINT
 SS - STANDARD STRENGTH / SERVICE WEIGHT
 SW - SOLVENT WELD

PLUMBING FIXTURE & EQUIPMENT SCHEDULE

MARK	DESCRIPTION	MANUF.	MODEL #	DESCRIPTION / ACCESSORIES	PIPPING CONNECTION SIZES				NOTES & ACCESSORIES	EQUIVALENT MANUFACTURERS
					COLD	HOT	DRAIN	VENT		
F01	FLOOR DRAIN	ZURN	2415-68	PRO SET TRAP GUARD	-	-	SEE PLAN	SEE PLAN	-	JAY R. SMITH, WADE, SIOUX CHEF
F02	TRENCH DRAIN	ACO	3743	LINEAR STRIP DRAIN WITH WAVE LINEAR GRATE PATTERN, SILVER COLOR.	-	-	SEE PLAN	SEE PLAN	-	JAY R. SMITH, WADE, SIOUX CHEF
F03	SHOWER DRAIN	ZURN	2415-28H-28E1		-	-	SEE PLAN	SEE PLAN	-	JAY R. SMITH, WADE, SIOUX CHEF
FFC0	FINISH FLOOR CLEANOUT	ZURN	2N1400	CF CAPNET FLANGE COVER WHERE REQUIRED	-	-	SEE PLAN	-	-	JAY R. SMITH, WADE, SIOUX CHEF
FG00	FINISH GRADE CLEANOUT	ZURN	2N1400-HD		-	-	SEE PLAN	-		