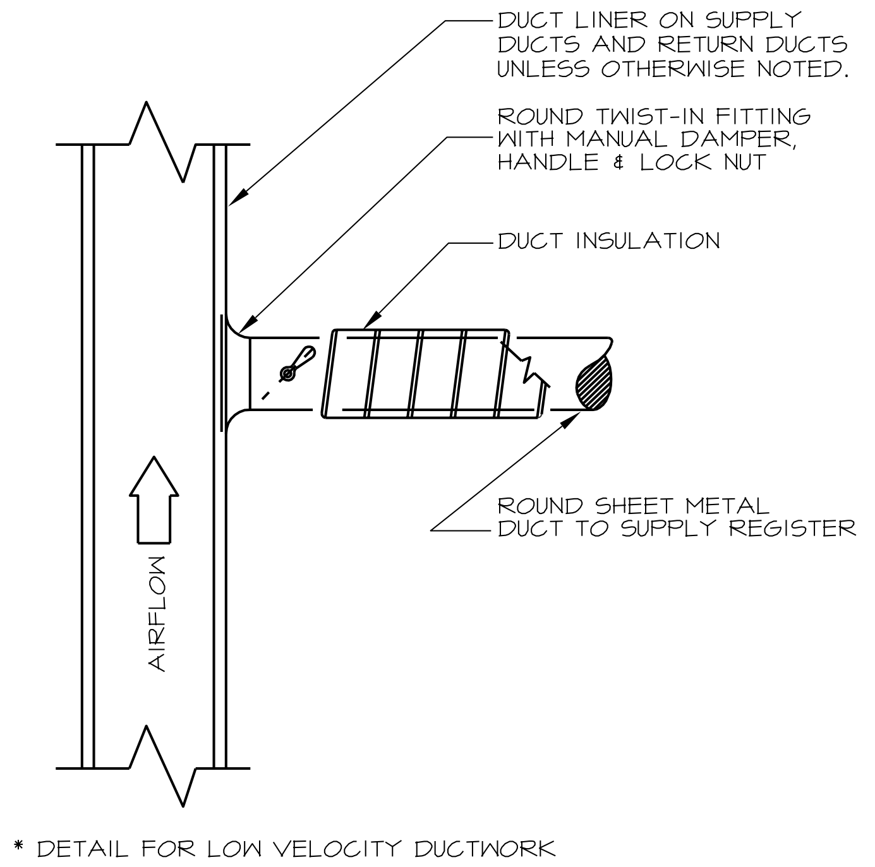
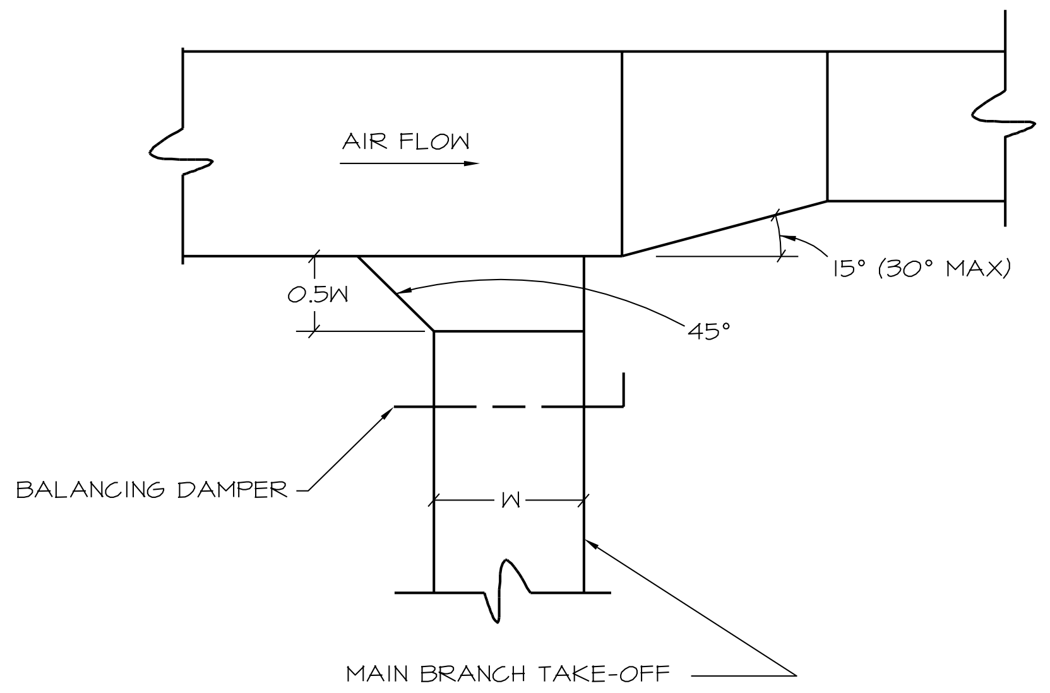


* DETAIL FOR LOW VELOCITY DUCTWORK

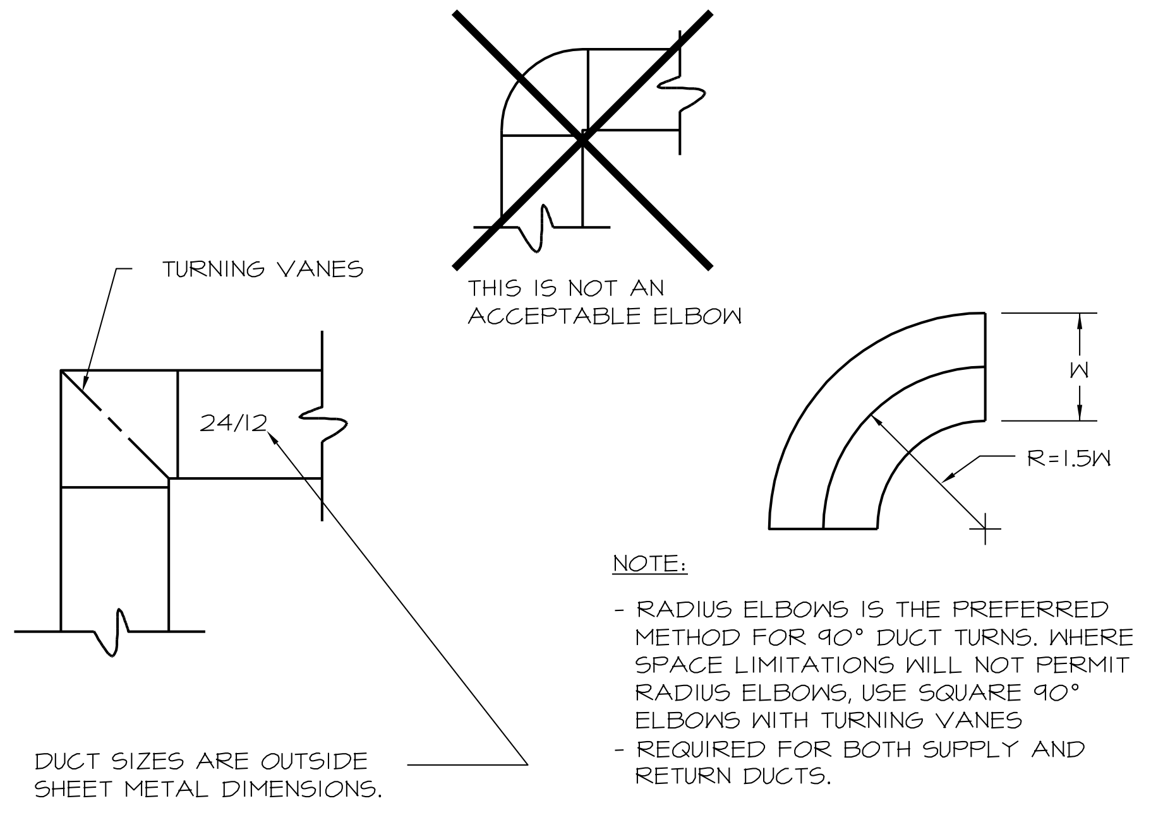
ROUND DUCT TAKE-OFF

NO SCALE



DUCT FITTING DETAIL

NO SCALE



NOTE:

- RADIUS ELBOWS IS THE PREFERRED METHOD FOR 90° DUCT TURNS. WHERE SPACE LIMITATIONS WILL NOT PERMIT RADIUS ELBOWS, USE SQUARE 90° ELBOWS WITH TURNING VANES
- REQUIRED FOR BOTH SUPPLY AND RETURN DUCTS.

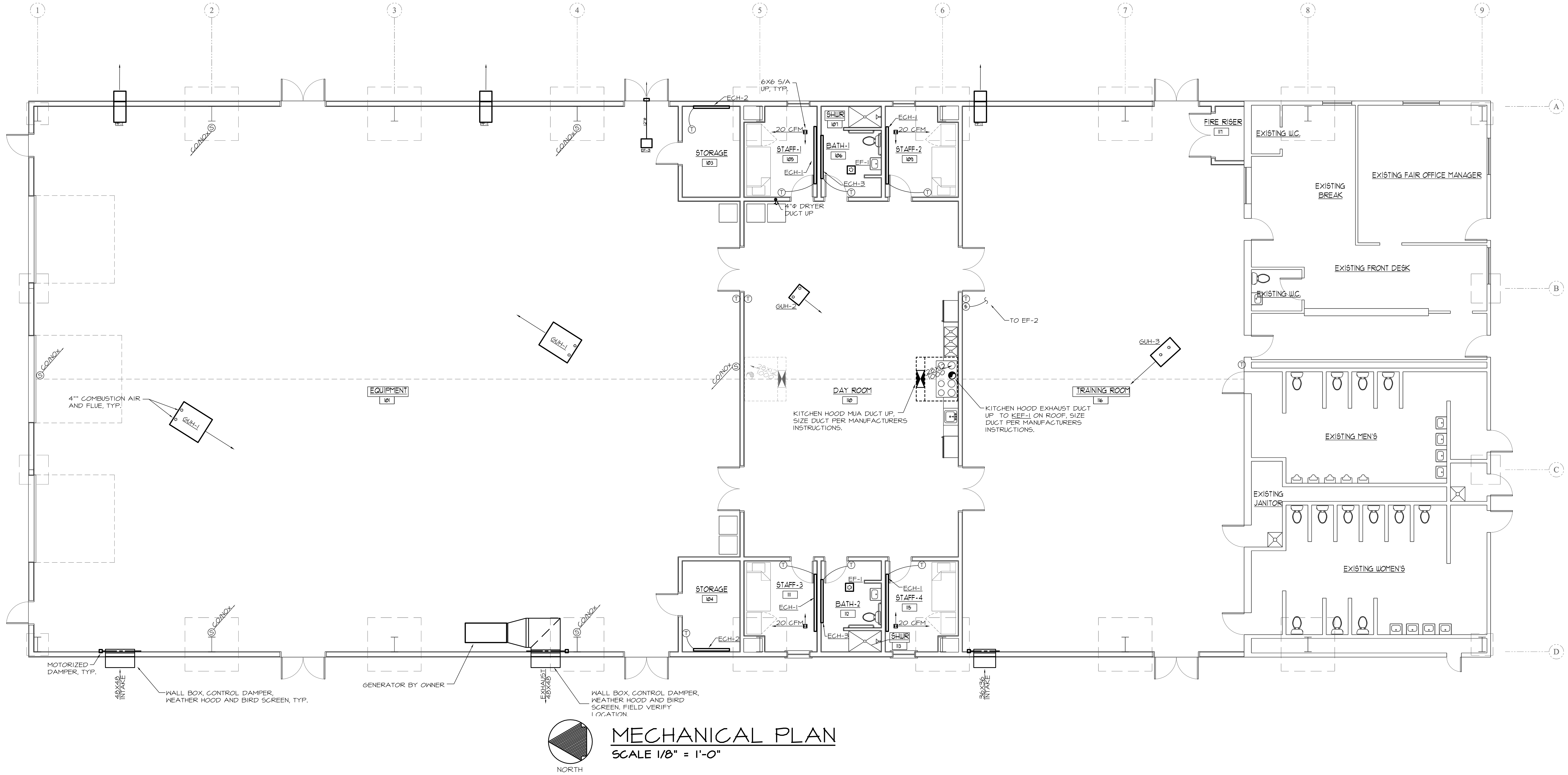
DUCT ELBOW DETAIL

NO SCALE

MECHANICAL LEGEND

NOTE: ALL SYMBOLS SHOWN ON LEGEND ARE NOT NECESSARILY USED.

S/A	SUPPLY AIR
R/A	RETURN AIR
E/A	EXHAUST AIR
O/A	OUTSIDE AIR
— HWS —	HEATING WATER SUPPLY
— HWR —	HEATING WATER RETURN
— RL —	REFRIGERANT LINE (LIQUID)
— RS —	REFRIGERANT LINE (SUCTION)
	GATE VALVE
	GLOBE VALVE
	CHECK VALVE
	WEIGHTED CHECK VALVE
	BALL VALVE
	PLUG OR BALANCING VALVE
	CIRCUIT SETTER
	DRAIN VALVE WITH HOSE END
	STRAINER W/ BLOW-OFF VALVE
	TEMPERATURE CONTROL VALVE
	PRESSURE REDUCING VALVE
	SAFETY RELIEF VALVE
	AIR VENT
	PRESSURE-TEMPERATURE TAP
	PRESSURE GAUGE
	THERMOMETER
Ⓢ	SENSOR
Ⓗ	HUMIDISTAT
Ⓣ	THERMOSTAT
HB-1	HOSE BIBB
	PIPE UNION
	DOMESTIC COLD WATER
	DOMESTIC HOT WATER
	HOT WATER CIRCULATING
— G —	GAS
— V —	PLUMBING VENT
— W —	WASTE PIPE
— RD —	ROOF DRAIN PIPE
— ORD —	OVERFLOW ROOF DRAIN PIPE
	HORIZONTAL CLEANOUT
	VERTICAL CLEANOUT
	FLOOR DRAIN
▲	FIRE DAMPER
	TURNING VANES IN ELBOW
	OPPOSED BLADE DAMPER (O.B.D.)
	AIR EXTRACTOR
24/12	DUCT SIZES ARE OUTSIDE SHEET METAL DIMENSIONS, 1 ST NO. IS SIZE OF SURFACE SHOWN, 2 ND NO. IS DUCT DEPTH.
SIZE CFM	SUPPLY REGISTER
SIZE CFM	RETURN AIR OR EXHAUST AIR REGISTER
SIZE CFM	SUPPLY DIFFUSER, ARROWS INDICATE DIRECTION OF THROW
	SECTION THRU SUPPLY AIR DUCT
	SECTION THRU OUTSIDE AIR INTAKE, RETURN AIR OR EXHAUST DUCT



MECHANICAL PLAN

SCALE 1/8" = 1'-0"

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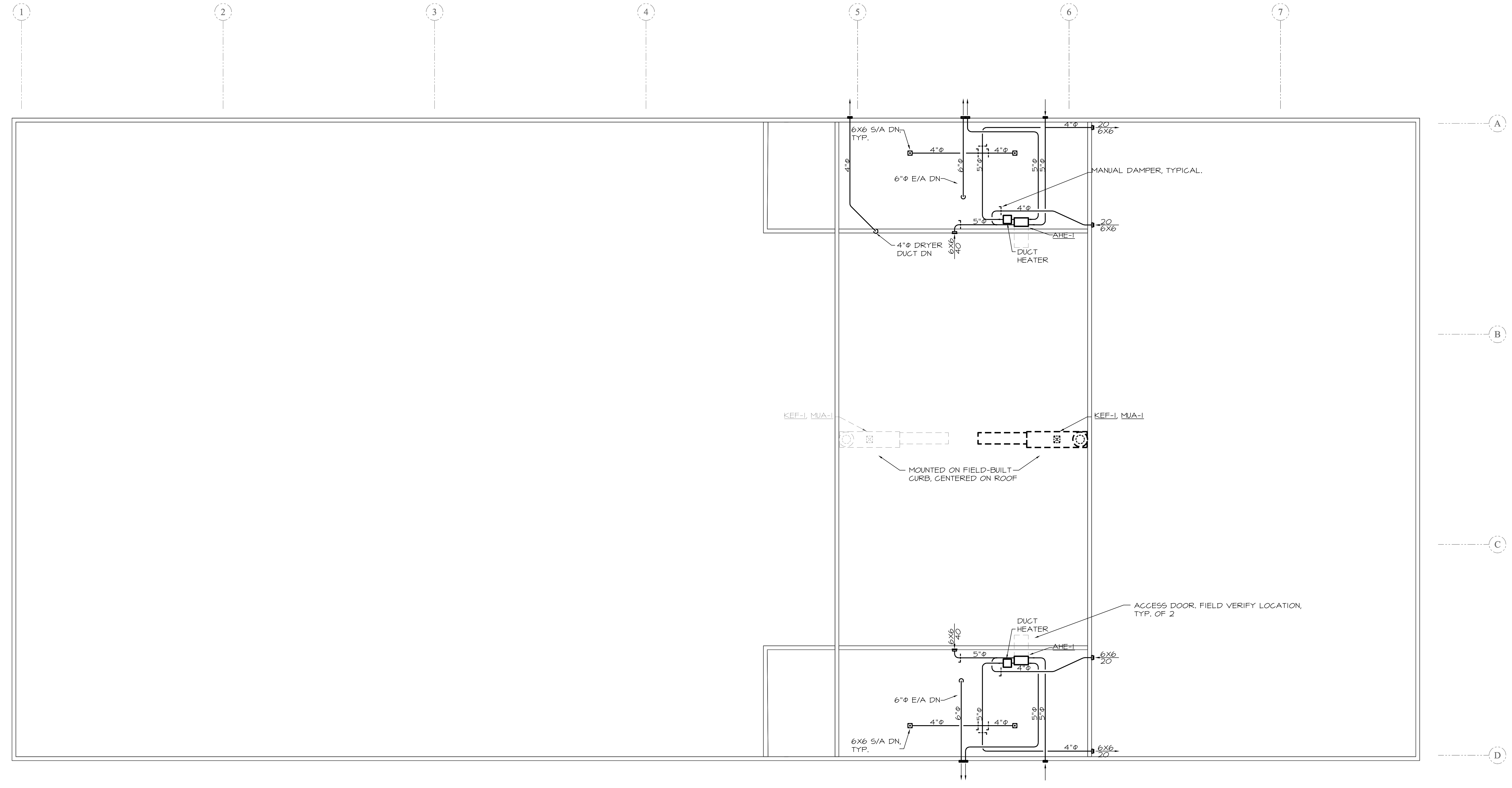
Date:
8/31/17
Revisions:

M-100



UPPER LEVEL MECHANICAL PLAN

SCALE 1/8" = 1'-0"

NORTH

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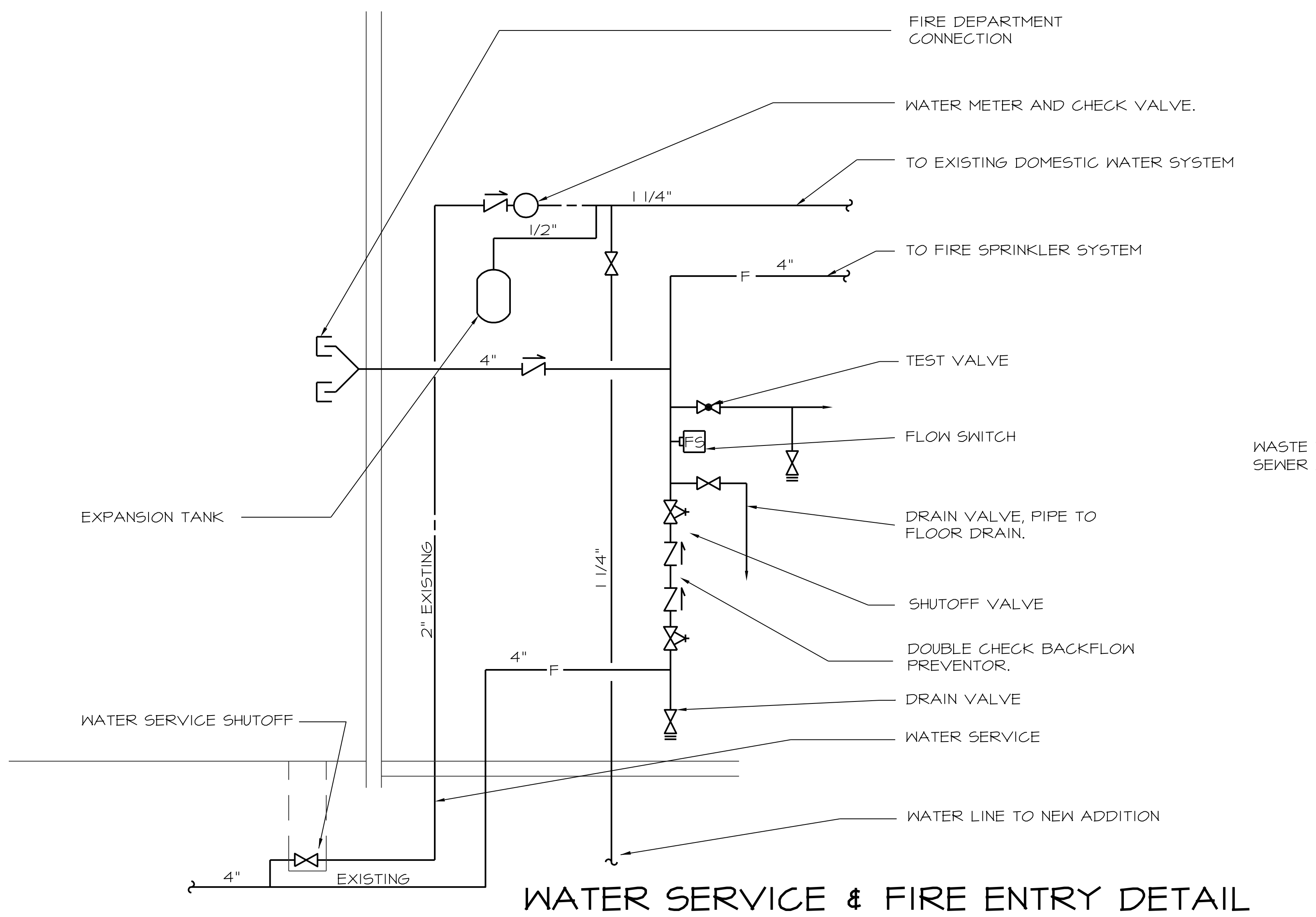
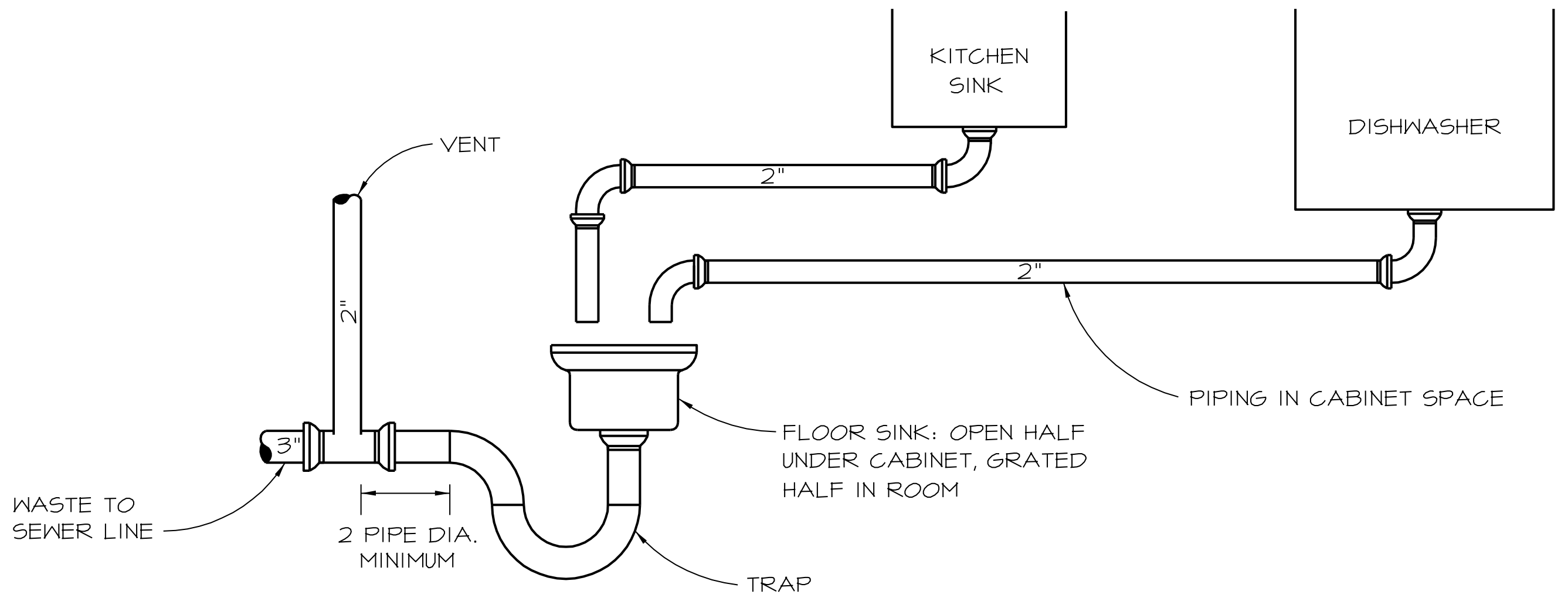
Date:
8/31/17
Revisions:

M-101



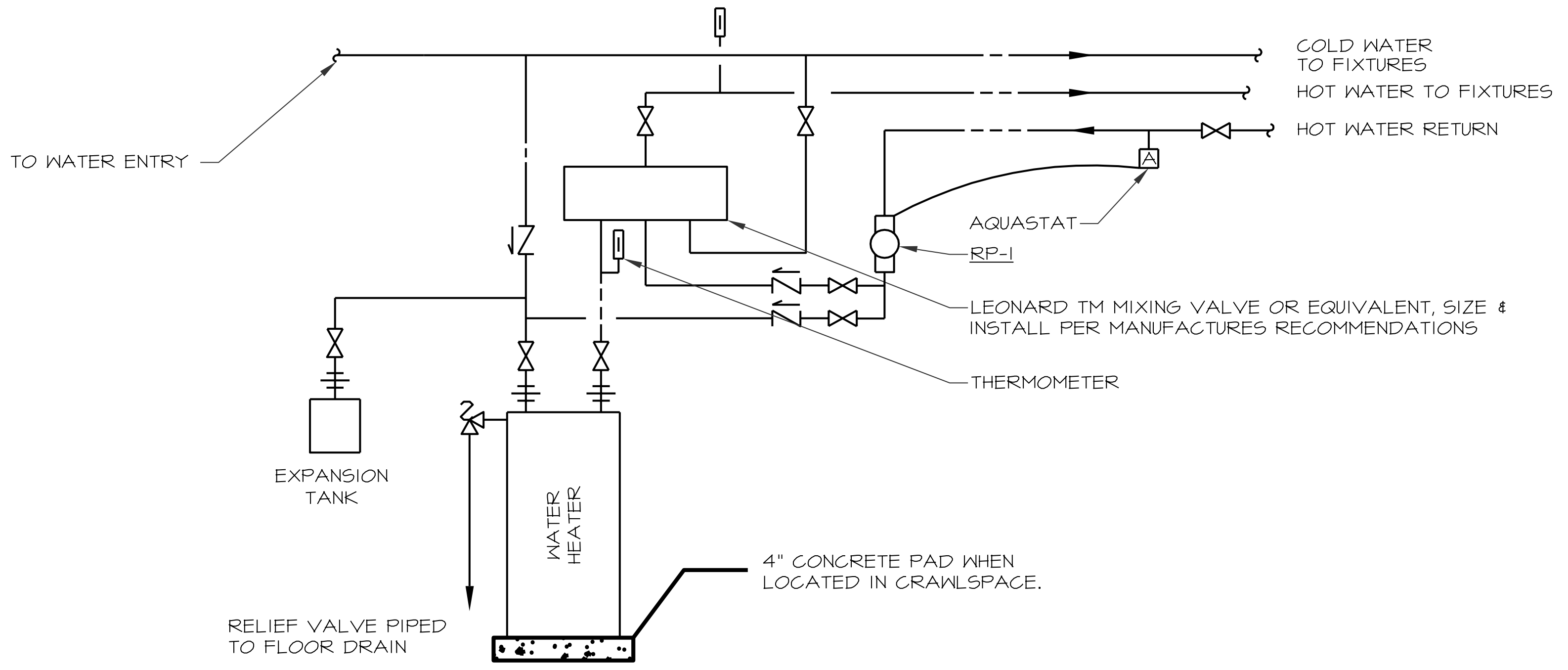
WATER SERVICE & FIRE ENTRY DETAIL

NO SCALE



FLOOR SINK DETAIL

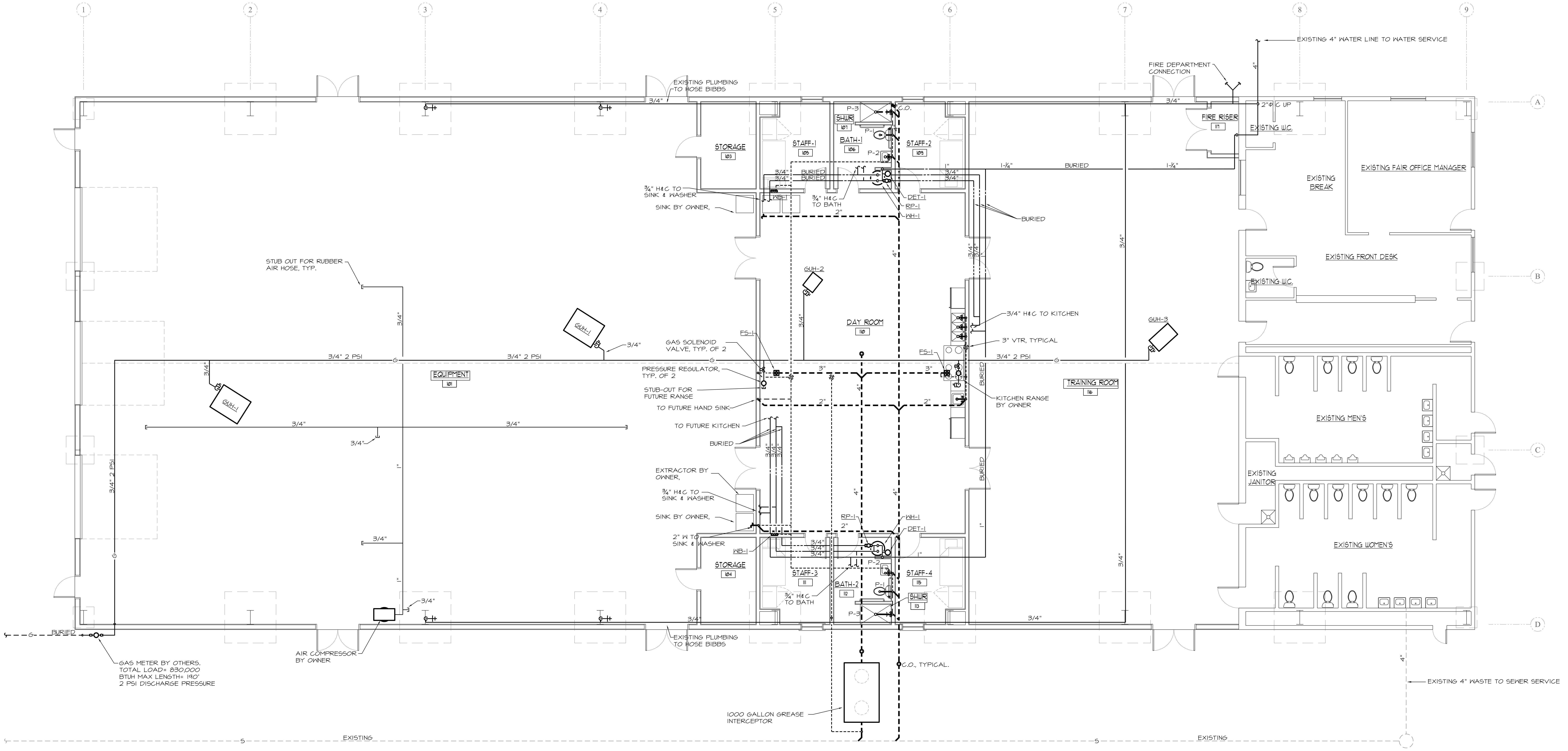
NO SCALE



WATER HEATER DETAIL

NO SCALE

TEMPORARY FIRE HOUSE NATURAL GAS LOADS			
EQUIPMENT	QUANTITY	BTUH RATING, INPUT	SUBTOTAL BTUH RATING
UH-1	2	250,000	500,000
UH-2	1	25,000	25,000
UH-3	1	105,000	105,000
RANGE	2	100,000	100,000
MAX DIST FROM REGULATOR = 190 FT.		TOTAL	830,000 BTUH



NORTH

PLUMBING PLAN

SCALE 1/8" = 1'-0"

Professional Engineer (Mechanical)
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5378
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Date:
8/31/17
Revisions:

M-200

SECTION 15010
BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY OF WORK:

A. WORK INCLUDED: THE WORK UNDER THIS DIVISION OF THE SPECIFICATIONS CONSISTS OF FURNISHING ALL LABOR, EQUIPMENT AND MATERIALS NECESSARY FOR AND REASONABLY INCIDENTAL TO THE COMPLETE INSTALLATION OF THE MECHANICAL SYSTEMS AS HEREIN DESCRIBED AND INDICATED ON THE DRAWINGS, INCLUDING SUCH MINOR DETAILS NOT SPECIFICALLY MENTIONED OR SHOWN AS MAY BE NECESSARY TO COMPLETE THE SYSTEM READY FOR SUCCESSFUL OPERATION, AND SUBJECT TO THE TERMS AND CONDITIONS OF THE CONTRACT. ALL WORK UNDER THIS SECTION SHALL BE DONE IN ACCORDANCE WITH THE BEST MODERN PRACTICE USING FIRST GRADE EQUIPMENT AND MATERIAL NEW AND PREVIOUSLY UNUSED.

B. WORK NOT INCLUDED (SPECIFIED ELSEWHERE): CERTAIN LABOR AND MATERIALS MAY BE FURNISHED AND/OR INSTALLED UNDER OTHER DIVISIONS OF THESE SPECIFICATIONS. COORDINATE WITH OTHER TRADES AND ARRANGE THE WORK TO MAKE THE PARTS FIT TOGETHER.

C. EXISTING UTILITIES:

1. PRIOR TO THE START OF EXCAVATION, UTILITY COMPANIES SHALL BE CONTACTED AND ADVISED OF PROPOSED WORK WHERE SEWER, TELEPHONE, WATER, FUEL, ELECTRIC LINES, ETC. MAY BE ENCOUNTERED; AND BE ADVISED OF WHERE SUCH UNDERGROUND INSTALLATIONS ARE LOCATED. WHEN THE EXCAVATION APPROACHES THE ESTIMATED LOCATION OF SUCH AN INSTALLATION, THE EXACT LOCATION SHALL BE DETERMINED AND WHEN IT IS UNCOVERED, PROPER SUPPORTS SHALL BE PROVIDED FOR THE EXISTING INSTALLATION.

2. IF ACTIVE UTILITIES ARE ENCOUNTERED THAT ARE NOT INDICATED ON THE DRAWINGS, ASK FOR INSTRUCTIONS FROM THE ARCHITECT. ANY RELOCATION OR REMODELING REQUIRED WILL THEN BE DIRECTED BY THE OWNER.

3. ASSUME ALL RESPONSIBILITY FOR PROTECTION OF ALL UTILITIES, SHOWN OR NOT, AND REPAIR ANY DAMAGE CAUSED BY THIS CONSTRUCTION AT NO EXTRA CHARGE TO THE OWNER.

4. INVESTIGATE WITH PROPER AUTHORITIES FOR ALL EXISTING WATER TAPS, ETC. AND MAKE ARRANGEMENTS TO PAY FOR ALL REMOVAL CHARGES IN ORIGINAL BID.

D. DEFINITIONS:

1. PROVIDE: CONTRACTOR SHALL FURNISH AND INSTALL ITEM OR ITEMS SPECIFIED. CONTRACTOR SHALL PERFORM ALL LABOR AND FURNISH ALL MATERIALS AND EQUIPMENT NECESSARY SO THAT SPECIFIED ITEM OR SYSTEM WILL BE COMPLETE AND OPERATIONAL.

2. FURNISH: CONTRACTOR SHALL DELIVER TO THE SITE ITEM(S) SPECIFIED, AS WELL AS ADDITIONAL SPECIALIZED MATERIALS AND/OR ACCESSORIES NECESSARY FOR THE USE AND OPERATION OF ITEM OR ITEMS SPECIFIED.

3. INSTALL: CONTRACTOR SHALL SET IN PLACE, CONNECT AND ADJUST FOR USE. CONTRACTOR SHALL FURNISH MISCELLANEOUS SPECIALTY ITEMS SUCH AS HANGERS, VALVES, UNIONS, PIPING, SHEET METAL, ETC. AS NECESSARY FOR A COMPLETE AND OPERATING INSTALLATION.

4. EXPOSED: ACCESSIBLE IN MECHANICAL ROOMS, UNFINISHED AREAS, ABOVE T-GRID CEILINGS, ACCESSIBLE TUNNELS, ETC.

5. CONCEALED: IN SUCH SPACES AS CHASES, TRENCHES, ABOVE DRYWALL CEILINGS, IN WALLS AND BURIED WHERE MATERIALS ARE INACCESSIBLE WHEN BUILDING IS COMPLETED

1.02 COORDINATION:

A. GENERAL: COORDINATE AND ORDER THE PROGRESS OF MECHANICAL WORK TO CONFORM TO THE SCHEDULE AND THE PROGRESS OF THE WORK OF THE OTHER TRADES.

B. DRAWINGS AND SPECIFICATIONS:

1. CONTRACT DRAWINGS FOR MECHANICAL WORK ARE IN PART DIAGRAMMATIC, INTENDED TO CONVEY THE SCOPE OF WORK AND INDICATE GENERAL ARRANGEMENT OF EQUIPMENT, DUCTS, PIPING, APPROXIMATE SIZES AND LOCATION OF EQUIPMENT AND OUTLETS. DRAWINGS DO NOT NECESSARILY INDICATE EVERY REQUIRED OFFSET, FITTING, ETC. TAKE ALL DIMENSIONS FROM THE STRUCTURE ITSELF BEFORE FABRICATING ANY WORK. VERIFY ALL SPACE REQUIREMENTS, COORDINATING WITH OTHER TRADES AND INSTALL THE SYSTEMS IN THE SPACE PROVIDED.

2. THE DRAWINGS ARE NOT INTENDED TO BE SCALED FOR ROUGHING IN MEASUREMENTS NOR TO SERVE AS SHOP DRAWINGS.

3. SHOULD THERE BE A CONFLICT WITHIN THE SPECIFICATIONS OR WITHIN DRAWINGS OF THE SAME SCALE, THE MORE STRINGENT OR HIGHER QUALITY REQUIREMENTS SHALL APPLY.

4. IN THE DRAWINGS, THE PRECEDENCE SHALL BE DRAWINGS OF LARGER SCALE OVER THOSE OF SMALLER SCALE.

5. SHOULD A CONFLICT ARISE BETWEEN THE DRAWINGS AND THE SPECIFICATIONS FOR PRODUCTS INDICATED ON THE DRAWINGS, THE SPECIFICATIONS SHALL HAVE PRECEDENCE.

6. SHOULD THERE BE A CONFLICT IN DIMENSIONS OR LOCATIONS BETWEEN MECHANICAL DRAWINGS AND ARCHITECTURAL DRAWINGS, THE ARCHITECTURAL DRAWINGS SHALL HAVE PRECEDENCE.

1.03 QUALITY ASSURANCE:

A. WORKMANSHIP: PERFORM WORK IN ACCORDANCE WITH GOOD TRADE PRACTICE. THE GOOD APPEARANCE OF THE FINISHED WORK SHALL BE OF EQUAL IMPORTANCE WITH ITS MECHANICAL EFFICIENCY. THE ARCHITECT AND/OR ENGINEER MAY REJECT WORK IF WORKMANSHIP AND APPEARANCE ARE NOT SATISFACTORY.

B. SUPERVISION: BE RESPONSIBLE FOR AND COORDINATE THE WORK OF ALL SUBCONTRACTORS WORKING UNDER DIVISION 15.

C. INSTALLATION PROCEDURES:

1. CONFER AND COOPERATE WITH OTHER TRADES AND COORDINATE THE WORK IN PROPER RELATION WITH THEIRS.

2. INSTALL ALL WORK TO PERMIT REMOVAL (WITHOUT DAMAGE TO OTHER PARTS) OF COILS, FAN SHAFTS AND WHEELS, FILTERS, AND ALL OTHER PARTS WHICH MIGHT REQUIRE PERIODIC REPLACEMENT OR MAINTENANCE. ARRANGE PIPES, DUCTS AND EQUIPMENT TO PERMIT READY ACCESS TO VALVES, TRAPS, MOTORS AND CONTROL COMPONENTS.

3. OFFSETS, TRANSITIONS AND CHANGES IN DIRECTION IN PIPES AND DUCTS SHALL BE MADE AS REQUIRED. MAINTAIN PROPER HEADROOM AND PITCH OF SLOPING PIPES WHETHER OR NOT INDICATED ON THE DRAWINGS. FURNISH AND INSTALL ALL DUCTWORK FITTINGS, TRAPS, AIR VENTS, SANITARY VENTS, ETC. AS REQUIRED TO AFFECT THESE OFFSETS, TRANSITIONS AND CHANGES IN DIRECTION.

4. UNDER FLOOR SPACES AND ATTIC SPACES CONTAINING EQUIPMENT REQUIRING ACCESS FOR SERVICE SHALL BE PROVIDED WITH AN UNOBSTRUCTED PASSAGEWAY LARGE ENOUGH TO REMOVE THE EQUIPMENT, BUT NOT LESS THAN 30 INCHES HIGH AND 22 INCHES WIDE. THE PASSAGE WAY SHALL NOT BE LONGER THAN 20 FEET IN LENGTH WHEN MEASURED ALONG THE CENTERLINE OF THE PASSAGEWAY FROM THE OPENING TO THE EQUIPMENT.

5. INSTALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS UNLESS SPECIFICALLY INDICATED OTHERWISE, OR WHERE LOCAL CODES OR REGULATIONS TAKE PRECEDENCE.

6. CONCEAL ALL PIPING IN FINISHED AREAS OF THE BUILDING.

D. PROTECTION: CLOSE ENDS OF PIPE AND DUCTWORK DURING CONSTRUCTION WITH CAPS OR PLUGS TO PREVENT ENTRY OF FOREIGN MATERIAL. PROTECT INSULATION AGAINST DAMAGE BEFORE, DURING AND AFTER INSTALLATION. PROTECT FIXTURES AND EQUIPMENT AGAINST DAMAGE DURING MECHANICAL WORK.

1.04 REGULATORY AND CODE REQUIREMENTS:

A. OBTAIN ALL PERMITS AND LICENSES REQUIRED FOR WORK PERFORMED UNDER DIVISION 15 AND PAY FOR ALL FEES AND INSPECTIONS IN CONNECTION WITH SAME.

B. ALL WORK SHALL BE EXECUTED IN ACCORDANCE WITH THE LOCAL, STATE AND OTHER ATTENDING RULES AND REGULATIONS APPLICABLE TO THE TRADE AFFECTED AND BE SUBJECT TO THE INSPECTION OF THESE DEPARTMENTS.

C. WHERE WORK REQUIRED BY THE DRAWINGS AND SPECIFICATIONS IS ABOVE THE STANDARD REQUIRED BY LOCAL REGULATIONS, IT SHALL BE DONE AS SHOWN AND/OR SPECIFIED.

1.05 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS:

A. USE OF THE PERMANENT HEATING SYSTEM WILL NOT BE ALLOWED WITHOUT APPROVAL FROM THE OWNER/ARCHITECT/ENGINEER. IN CASE WHERE THE PERMANENT HEATING SYSTEM IS APPROVED FOR USE AS TEMPORARY HEAT, THE GENERAL CONTRACTOR SHALL PAY ALL COSTS UNTIL ACCEPTANCE BY THE OWNER.

B. IF THE PERMANENT HEATING SYSTEM IS AUTHORIZED FOR USE, THE BUILDING MUST BE TOTALLY ENCLOSED WITH FINAL BUILDING MATERIALS IN PLACE WITHOUT TEMPORARY BARRIERS. ALL DUST PRODUCING FINISH WORK MUST BE COMPLETE AND THE SOURCE OF HEAT SUPPLY IS PERMANENTLY INSTALLED. SYSTEM MUST BE SUFFICIENTLY COMPLETE, INCLUDING CONTROLS, TO PERMIT ITS SAFE OPERATION AS ACCEPTABLE TO THE MECHANICAL CONTRACTOR. MECHANICAL CONTRACTOR IS SOLELY RESPONSIBLE FOR THE SAFE OPERATION OF THE SYSTEM.

C. SYSTEMS USED FOR TEMPORARY HEAT ARE THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN AND SHOULD BE PUT INTO FIRST CLASS WORKING ORDER BEFORE ACCEPTANCE BY THE OWNER.

D. EQUIPMENT WARRANTIES THAT START WITH THE USE OF EQUIPMENT FOR TEMPORARY HEAT SHALL BE EXTENDED BY THE CONTRACTOR SO THAT THE OWNER WILL HAVE THE FULL ONE YEAR WARRANTY FROM THE DATE OF ACCEPTANCE OF THE BUILDING.

1.06 DELIVERY, STORAGE AND HANDLING:
PROVIDE FOR PROPER STORAGE OF ALL MATERIALS AND EQUIPMENT AND ASSUME RESPONSIBILITY FOR LOSSES DUE TO ANY CAUSE. COVER AND STORE ALL EQUIPMENT AND MATERIALS OUT OF THE ELEMENTS AND OFF OF THE GROUND; ANY RUSTED OR WEATHER DAMAGED ITEM WILL NOT BE PERMITTED TO BE USED.

1.07 PRODUCT OPTIONS AND SUBSTITUTIONS:

A. PRIOR TO BIDDING:

1. MATERIALS OR PRODUCTS SPECIFIED BY NAME OR MANUFACTURER, BRAND OR TRADE NAME SHALL BE FURNISHED UNDER THE CONTRACT UNLESS CHANGED BY AN ADDENDUM OR A CONTRACT MODIFICATION. WHERE TWO OR MORE MATERIALS ARE NAMED, THE CHOICE OF THESE SHALL BE OPTIONAL WITH THE CONTRACTOR.

2. ACTION FOR SUBSTITUTIONS SPECIFIED HEREIN WILL BE GIVEN ONLY AFTER THE RECEIPT OF COMPLETE DATA SHOWING PERFORMANCE, PHYSICAL DIMENSIONS AND MATERIAL CONSTRUCTION. ONE COPY OF ALL DESCRIPTIVE DATA SHALL BE SUBMITTED TO THE MECHANICAL ENGINEER'S OFFICE.

3. MATERIAL AND EQUIPMENT SPECIFIED IS USED AS A BASIS OF STANDARD, AND WHILE NOT SPECIFICALLY MENTIONED, MATERIAL GAUGES, WEIGHTS, APPEARANCE AND SPACE REQUIREMENTS MUST BE MET BY ANY SUBSTITUTIONS.

1.08 CLEANING:

A. CLEAR AWAY ALL DEBRIS, SURPLUS MATERIALS, ETC. RESULTING FROM MECHANICAL CONTRACTOR'S WORK OR OPERATIONS, LEAVING THE JOB AND EQUIPMENT IN A CLEAN CONDITION.

B. ALL SURFACES OF ALL FANS, AIR UNITS, AIR FILTERS, ETC. SHALL BE WIPED CLEAN OR WASHED IF REQUIRED. ALL PLUMBING FIXTURES SHALL BE THOROUGHLY CLEANED OF ALL FOREIGN MATTER INCLUDING STICKERS. CLEAN ALL ITEMS FURNISHED SUCH AS FLOOR DRAINS, PUMPS, MOTORS, TRAPS, ETC. LEAVING THE ENTIRE INSTALLATION IN A FIRST-CLASS CONDITION.

1.09 PROJECT RECORD DRAWING:

A. FILE AT THE JOB SITE ONE COPY OF DRAWINGS, SPECIFICATIONS, ADDENDA, CHANGE ORDERS, FIELD ORDERS AND OTHER MODIFICATIONS TO CONTRACT DOCUMENTS.

B. DO NOT USE PROJECT RECORD DOCUMENTS FOR CONSTRUCTION PURPOSES.

C. LEGIBLY MARK WITH RED PENCIL FIELD CHANGES, REFERENCED TO PERMANENT AND ACCESSIBLE FEATURES OF THE SITE OR BUILDING AS APPLICABLE. DO NOT CONCEAL ANY WORK UNTIL REQUIRED INFORMATION IS RECORDED.

1.10 OPERATION AND MAINTENANCE DATA:

A. PREPARE 1 TYPED AND HARD BOUND COPY OF OPERATING AND MAINTENANCE MANUAL TO ARCHITECT FOR APPROVAL PRIOR TO SCHEDULING ANY SYSTEM DEMONSTRATION FOR THE OWNER. BOOK SHALL BE ARRANGED IN SEQUENCE TO MATCH THE EQUIPMENT SCHEDULES INCLUDED IN THE SPECIFICATIONS.

B. THE BOOKS SHALL CONTAIN, BUT NOT BE LIMITED TO, THE FOLLOWING GENERAL ITEMS; EACH ITEM SHALL BE PROVIDED WITH A SEPARATE INDEX TAB:

1. PRODUCT DATA ON EACH PIECE OF EQUIPMENT INSTALLED IDENTIFIED BY DRAWING CODE NUMBERS AS THEY APPEAR ON THE DRAWING AND IN THE SPECIFICATIONS. DATA SHALL INCLUDE THE FOLLOWING: INSTALLATION INSTRUCTION SHEETS, SPARE PARTS LISTS, OPERATING MANUALS AND COMPLETE WIRING DIAGRAMS.

2. ALL WARRANTIES PROVIDED BY THE MANUFACTURER ON THEIR EQUIPMENT THAT RUN LONGER THAN THE ONE YEAR WARRANTY BY THE CONTRACTOR.

1.11 FINAL OBSERVATION:

A. WHEN THE CONTRACTOR NOTIFIES THE ARCHITECT THAT THE PROJECT IS READY FOR A FINAL OBSERVATION, THE ARCHITECT WILL VISIT THE JOB SITE AND WILL PREPARE A FINAL PUNCH LIST OF ALL THE ITEMS ON THE PROJECT THAT SHALL BE FINISHED OR CORRECTED BEFORE THE PROJECT CAN BE ACCEPTED.

B. WHEN THE CONTRACTOR NOTIFIES THE ARCHITECT THAT ALL ITEMS ON THE ABOVE PUNCH LIST HAVE BEEN COMPLETED AND CORRECTED, THE ARCHITECT WILL VISIT THE PROJECT TO ASCERTAIN THAT ALL THE ITEMS ON THE PUNCH LIST HAVE BEEN CORRECTED AND CAN BE ACCEPTED.

1.12 WARRANTIES:

A. ALL MATERIALS AND EQUIPMENT SHALL BE NEW UNLESS OTHERWISE SPECIFIED.

B. PROVIDE WARRANTY TO THE OWNER COVERING THE ENTIRE MECHANICAL WORK TO BE FREE FROM DEFECTIVE MATERIALS, EQUIPMENT AND WORKMANSHIP FOR A PERIOD OF ONE YEAR AFTER DATE OF ACCEPTANCE. DURING THIS PERIOD, PROVIDE LABOR AND MATERIALS AS REQUIRED TO REPAIR OR REPLACE DEFECTS AT NO ADDITIONAL COST TO THE OWNER. PROVIDE CERTIFICATES IN O & M MANUALS FOR SUCH MATERIALS OR EQUIPMENT WHICH HAVE WARRANTIES IN EXCESS OF ONE YEAR.

C. THIS WARRANTY WILL BE SUPERSEDED BY WARRANTY MODIFICATIONS RESULTING FROM USE OF EQUIPMENT FOR CONSTRUCTION HEAT OR VENTILATION.

1.13 OPERATING INSTRUCTIONS:

A. THE MECHANICAL CONTRACTOR SHALL PROVIDE PERSONNEL FOR INITIAL STARTUP AND OPERATION OF THE MECHANICAL EQUIPMENT AND FOR A TRIAL RUN OF THE EQUIPMENT TO DEMONSTRATE THAT THE EQUIPMENT AND ASSOCIATED SYSTEMS ARE PROPERLY INSTALLED AND OPERATING AS INTENDED.

B. THE MECHANICAL CONTRACTOR SHALL INSTRUCT THE OWNER IN THE PROPER STARTUP, OPERATION, OBSERVATION AND MAINTENANCE OF ALL MECHANICAL EQUIPMENT INSTALLED UNDER THIS CONTRACT.

1.14 BALANCING

A. AT THE COMPLETION OF THE INSTALLATION, THE FORCED AIR SYSTEM SHALL BE ADJUSTED AND BALANCED BY THE CONTRACTOR. ALL AIR BALANCING SHALL BE DONE AT DAMPERS IN BRANCH DUCTS AND SPIN FITTINGS FIRST, THEN AT THE SUPPLY REGISTERS. PROVIDE AIR QUANTITIES AS SHOWN ON THE DRAWINGS.

B. AIR TESTING AND BALANCING SHALL NOT BEGIN UNTIL THE SYSTEM HAS BEEN COMPLETED AND IS IN FULL WORKING ORDER.

C. ADJUST ALL AIR AND WATER SYSTEMS WITHIN +5% TO -5% OF DESIGN FLOW RATES.

D. MARK FINAL SETTINGS OF VOLUME DAMPERS WITH PERMANENT MARKING WHEN BALANCING IS COMPLETE.

PART 2 - PRODUCTS
NOT APPLICABLE

PART 3 - EXECUTION
NOT APPLICABLE

END OF SECTION 15010

SECTION 15050
BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 WORK INCLUDED:
PIPE SUPPORTS
VALVES
PIPE INSTALLATION

PART 2 - PRODUCTS

2.01 EQUIPMENT MANUFACTURERS:
EQUIPMENT SUCH AS MOTORS, PUMPS, GAUGES, VALVES, ETC. SHALL BE OF ONE MANUFACTURER OR AVAILABLE THROUGH ONE MANUFACTURER TO FACILITATE EASE OF MAINTENANCE FOR THE OWNER.

2.2. ACCESS DOORS:
FURNISH ACCESS DOORS AT LOCATIONS WHERE REQUIRED FOR ACCESS TO CONCEALED VALVES, DAMPERS, CLEANOUTS, CONTROL DEVICES AND EQUIPMENT.

2.03 PIPE SUPPORTS AND HANGERS:

A. GENERAL: USE ADJUSTABLE PIPE HANGERS ON SUSPENDED PIPE. PROVIDE HANGERS TO SUPPORT THE SYSTEMS WITHOUT SAGGING, INCLUDING HANGERS AT EACH OFFSET OR CHANGE IN DIRECTION, AT ENDS OF BRANCHES OVER FIVE FEET IN LENGTH AND AT THE FOLLOWING MAXIMUM SPACING:

B.

PIPE TYPE	PIPE SIZE	SPACING
STEEL PIPE	1/2" THROUGH 1-1/4"	8'-0"
	1-1/2" AND 2"	10'-0"
COPPER PIPE	1/2" THROUGH 1-1/2"	6'-0"
PLASTIC PIPE	1/2" THROUGH 1"	3'-0"
	1-1/4"AND ABOVE	4'-0"

C. INDIVIDUAL HANGERS:

1. INDIVIDUAL HANGERS FOR COPPER PIPING, 1-1/4" AND LARGER SHALL BE COPPER PLATED OR PLASTIC COATED STEEL.

2. INDIVIDUAL HANGERS FOR STEEL PIPING 1-1/4" AND LARGER SHALL BE ZINC PLATED, ADJUSTABLE SWIVEL RING HANGERS.

3. INDIVIDUAL HANGERS FOR PIPING UP TO 1" SHALL BE SAME AS ABOVE OR MAY BE SIOUX STRAP PLASTIC TUBE HANGERS OR APPROVED EQUIVALENT.

D. TRAPEZE HANGERS:

1. PARALLEL RUNS OF PIPING MAY BE SUPPORTED ON TRAPEZE HANGERS. HANGERS SHALL BE SPACED FOR SMALLEST PIPE IN GROUP.

2. ALL STEEL PIPE SHALL HAVE STANDARD PIPE STRAPS AT EACH SUPPORT.

3. ALL COPPER PIPE SHALL REST ON NEOPRENE SLEEVES AND HAVE STANDARD PIPE STRAPS AT EACH SUPPORT.

2.04 VALVES:

A. PRESSURE RATINGS: UNLESS OTHERWISE INDICATED, USE VALVES SUITABLE FOR MINIMUM 125 PSIG AT 450 DEG. F AND 200 PSIG AT 250 DEG. F.

B. VALVE CONNECTIONS: PROVIDE VALVES SUITABLE TO CONNECT TO ADJOINING PIPING AS SPECIFIED FOR PIPE JOINTS. SOLDER OR SCREW TO SOLDER ADAPTERS FOR COPPER TUBING.

PART 3 - EXECUTION

3.01 PREPARATION:
BASE FINAL INSTALLATION OF MATERIALS AND EQUIPMENT ON JOB SITE DIMENSIONS AND CONDITIONS. JOB SITE DIMENSIONS SHALL TAKE PRECEDENCE OVER DRAWING DIMENSIONS. FIELD MEASURE CRITICAL DIMENSIONS AND DO NOT FABRICATE OR CUT MATERIALS TO LENGTH UNTIL SUCH MEASUREMENTS ARE MADE. BE RESPONSIBLE FOR ACCURATE LOCATION OF ROUGH-INS AS REQUIRED FOR EQUIPMENT BEING SERVICED.

3.02 EXCAVATION AND BACKFILL:

A. THE CONTRACTOR SHALL DO ALL TRENCH AND PIT EXCAVATIONS AND BACKFILLING REQUIRED FOR WORK UNDER THIS SECTION OF THE SPECIFICATIONS, INSIDE AND OUTSIDE THE BUILDING INCLUDING REPAIRING OF FINISHED SURFACES, ALL REQUIRED SHORING, BRACING, PUMPING AND ALL PROTECTION FOR SAFETY OF PERSONS AND PROPERTY. LOCAL OR STATE SAFETY CODES SHALL BE STRICTLY OBSERVED.

B. EXTREME CAUTION SHALL BE EXERCISED TO PREVENT DAMAGE TO INSTALLATION; WHEN SOFT MATERIALS SUCH AS COPPER TUBING ARE BEING BURIED.

3.03 VIBRATION ISOLATION:
PROVIDE VIBRATION ISOLATION FOR EACH AIR HANDLING UNIT BY MASON INDUSTRIES OR EQUIVALENT NEOPRENE VIBRATION ISOLATORS.

3.04 CUTTING AND PATCHING:
BE RESPONSIBLE FOR THE COST OF CUTTING AND PATCHING FOR WORK UNDER DIVISION 15.

3.05 PIPE AND DUCTWORK PENETRATIONS:

A. WHERE HORIZONTAL DUCTS AND PIPE PASS THROUGH WALLS, AND VERTICAL DUCTS AND PIPES PASS THROUGH FLOORS OR ROOFS, SEAL OFF VOID BETWEEN OPENING AND DUCT OR PIPE AND SLEEVE.

B. WHEREVER ANY PIPE OR OTHER MATERIAL PENETRATES THROUGH FIRE-RESISTANT WALL, CEILING OR FLOOR, COMPLETELY SEAL VOIDS IN CONSTRUCTION WITH CEMENT GROUT, PLASTER OR OTHER FIRE RESISTANT MATERIAL AS APPROVED BY AUTHORITY HAVING JURISDICTION. EMBED SEALING MATERIAL FULL THICKNESS OF MATERIAL BEING PENETRATED. SEALANTS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND SHALL HAVE BEEN TESTED AND CLASSIFIED BY UNDERWRITERS LABORATORIES.

3.06 FLASHINGS:
ALL FLASHINGS WILL BE DONE UNDER ROOFING DIVISION EXCEPT AS NOTED OR DETAILED ELSEWHERE IN THESE SPECIFICATIONS.

3.07 PIPE INSTALLATION:

A. INSTALL PIPING WITHOUT SPRINGING OR FORCING, AND TO CLEAR WINDOWS, DOORS AND OTHER OPENINGS. CUTTING OR OTHER WEAKENING OF THE BUILDING STRUCTURE TO FACILITATE PIPING INSTALLATION IS NOT PERMITTED. INSTALL VERTICAL RISERS PLUMB AND STRAIGHT, HORIZONTAL LINES PARALLEL WITH WALLS AND PARTITIONS. CONCEAL PIPING ABOVE CEILINGS AND WITHIN FURRING AND WALLS UNLESS OTHERWISE INDICATED.

B. ROUTE PIPING IN GENERAL LOCATIONS INDICATED IN AN ORDERLY MANNER AND TO MAINTAIN REQUIRED GRADES. COORDINATE WITH OTHER PIPING, DUCTS AND EQUIPMENT MAKING NECESSARY OFFSETS TO ACCOMMODATE THE SAME. INSTALL PIPING TO CONSERVE HEADROOM AND INTERFERE AS LITTLE AS POSSIBLE WITH USE OF AVAILABLE SPACE. GROUP PIPING WHEREVER POSSIBLE AT COMMON ELEVATIONS. INSTALL CONCEALED PIPES CLOSE TO THE BUILDING STRUCTURE TO KEEP FURRING TO A MINIMUM.

3.08 INSTALLATION OF PIPE HANGERS:
ADEQUATELY SUPPORT PIPING FROM THE BUILDING STRUCTURE WITH ADJUSTABLE HANGERS TO MAINTAIN UNIFORM GRADING WHERE REQUIRED AND TO PREVENT SAGGING AND POCKETING. PROVIDE SUPPORTS BETWEEN PIPING AND BUILDING STRUCTURE WHERE NECESSARY TO PREVENT SWAYING.

3.09 VALVES:

A. INSTALL VALVES WITH STEMS UPRIGHT OR HORIZONTAL, NOT INVERTED.

B. PROVIDE DRAIN VALVES AT MAIN SHUT OFF VALVES, LOW POINTS OF PIPING AND EQUIPMENT.

3.10 PIPE TESTING:

A. TEST PIPING SYSTEMS PRIOR TO CONCEALMENT. ENSURE THAT THE TEST PRESSURE WHICH MIGHT DAMAGE FIXTURES OR EQUIPMENT DOES NOT REACH SUCH UNITS BY VALVING THEM OFF OR OTHERWISE ISOLATING THEM DURING THE TEST. ALL TESTS MUST BE DONE TO THE SATISFACTION OF THE LOCAL AUTHORITIES HAVING JURISDICTION, BEFORE COVERING. FURNISH ALL INSTRUMENTS REQUIRED FOR TESTING. ALL HYDROSTATIC TESTS TO BE HELD FOR A MINIMUM OF SIX HOURS WITHOUT LOSS OF PRESSURE. AIR TESTS TO BE HELD FOR A MINIMUM OF TWO HOURS WITHOUT LOSS OF PRESSURE. CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING ALL PLUGS, PIPING, VALVES, HOSES AND PUMPS NECESSARY FOR THE REQUIRED TESTS AND FOR PROPER DISPOSAL OF THE WATER UPON COMPLETION OF THE TESTS.

B. TEST ALL DRAIN LINES WITH STANDING WATER TEST OF TWELVE FEET OF HEAD, HELD LONG ENOUGH TO VISUALLY INSPECT EACH JOINT.

C. TEST ALL DOMESTIC WATER PIPING BEFORE CONNECTING TO UNITS AT 150 PSIG HYDROSTATIC PRESSURE.

D. TEST ALL GAS AND COMPRESSED AIR PIPING UNDER 60 PSIG AIR PRESSURE.

E. INSURE THAT ALL PIPING IS PROTECTED FROM FREEZING CONDITIONS WHERE HYDROSTATIC TESTS ARE REQUIRED. COORDINATE WITH THE ENGINEER IF HYDROSTATIC TESTS CANNOT BE CONDUCTED.

3.12 FLUSHING, CLEANING AND STERILIZING:

A. BEFORE FINAL CONNECTIONS ARE MADE IN THE PIPING SYSTEMS, ALL PIPING EXCEPT AS INDIVIDUALLY NOTED BELOW, SHALL BE BLOWN OUT WITH AIR AND THEN COMPLETELY WASHED OUT WITH CLEANING COMPOUNDS COMPATIBLE WITH FINAL FLUID TO AVOID CONTAMINATION. THE SYSTEMS SHALL THEN BE FLUSHED FOR THE COMPLETE REMOVAL OF ALL FOREIGN MATERIALS. FURNISH ALL TEMPORARY CONNECTIONS, VALVES, ETC. REQUIRED FOR THIS PURPOSE.

B. AFTER FLUSHING, STERILIZE THE DOMESTIC WATER SYSTEM WITH APPROVED CHLORINATING AGENT TO PROVIDE A DOSAGE OF NOT LESS THAN 50 PPM FOR 24 HOURS OR 200PPM FOR 3 HOURS. AFTER MINIMUM CONTACT PERIOD, FLUSH THE SYSTEM WITH CLEAN WATER.

END OF SECTION 15050

SECTION 15250
PIPE AND DUCT INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

A. THIS SECTION OF THE SPECIFICATION CONTAINS ITEMS APPLICABLE ONLY TO PIPE AND DUCT INSULATION WORK. ALL INSULATION WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH APPLICABLE CODES AND ORDINANCES.

B. THE WORK COVERED BY THIS SPECIFICATION CONSISTS OF FURNISHING ALL LABOR, EQUIPMENT, MATERIALS AND ACCESSORIES, AND OF PERFORMING ALL OPERATIONS NECESSARY FOR THE INSTALLATION OF THIS INSULATION FOR THE PLUMBING AND HEATING PIPING AND DUCTWORK. ALL INSULATION SHALL BE INSTALLED IN A WORKMANLIKE MANNER BY SKILLED WORKMEN REGULARLY ENGAGED IN THIS TYPE OF WORK.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND PRODUCTS:
IMCOA OR APPROVED EQUIVALENT FOR PIPING.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS:

A. DO NOT APPLY INSULATION BEFORE TESTING AND CLEANING OF SURFACES TO BE COVERED IS COMPLETED.

B. APPLY INSULATION TIGHTLY OVER CLEAN DRY SURFACES WITH SECTIONS OR EDGES FIRMLY BUTTED TOGETHER.

C. DUCTWORK INSULATION SHALL MEET THE REQUIREMENTS OF NFPA 90A I A TEST EDITION.

3.02 PIPING AND EQUIPMENT

A. DOMESTIC HOT AND COLD WATER PIPING: INSULATE ALL DOMESTIC HOT AND COLD WATER SUPPLY LINES AND CIRCULATING WATER LINES THROUGHOUT THE BUILDING WITH 1\2" THICK CLOSED CELL POLYOLEFIN FOAM INSULATION SUCH AS IMCOA IMCOLOCK OR EQUIVALENT. INSULATION SHALL HAVE UPPER TEMPERATURE LIMIT OF AT LEAST 210 DEG. F, FLAME SPREAD BY E84 OF 25, AND SMOKE DENSITY BY E84 OF 50. SEAL OFF ENDS OF PIPE INSULATION AT ALL VALVES, FITTINGS, ETC.

3.03 DUCT INSULATION:
INSULATE THE OUTSIDE OF ALL DUCTS WHEN CALLED FOR IN SECTION 15800 WITH 1-1/2" THICK ONE LB./CUBIC FOOT, UL RATED, GLASS FIBER INSULATION WITH FOIL-SCRIM-KRAFT FACING. APPLY TO PROVIDE A CONTINUOUS VAPOR BARRIER. SEAL ALL JOINTS WITH 3" WIDE PRESSURE SENSITIVE ALUMINUM FOIL TAPE. ALL CUTS AND TEARS SHALL BE SEALED WITH STRIPS OF ALUMINUM FOIL TAPE.

END OF SECTION 15250

SECTION 15300
FIRE PROTECTION SPRINKLER AND STANDPIPE SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS:
THE GENERAL CONDITIONS, SPECIAL CONDITIONS AND CONTRACT DOCUMENTS ARE A PART OF THESE SPECIFICATIONS. CONSULT THEM FOR FURTHER INSTRUCTIONS AND BE GOVERNED BY THE REQUIREMENTS THEREUNDER.

1.02 DESCRIPTION:

A. WORK INCLUDED:

1. FURNISH ALL LABOR AND MATERIAL AND PERFORM ALL OPERATIONS NECESSARY FOR THE INSTALLATION OF COMPLETE AND OPERATING SYSTEMS SUBJECT TO THE CONDITIONS OF THE CONTRACT. ALL WORK MUST BE DONE IN ACCORDANCE WITH THE APPLICABLE NFPA RECOMMENDATIONS AND COMPLYING WITH THE RECOMMENDATIONS OF LOCAL BUILDING AND FIRE DEPARTMENTS. THESE JURISDICTIONAL AUTHORITIES AND CODES SHALL TAKE PRECEDENCE OVER THE DRAWINGS AND SPECIFICATIONS IN THE EVENT OF DISPUTE OR DISCREPANCY BETWEEN REQUIREMENTS OF CONTRACT DOCUMENTS AND INSURANCE RATING AUTHORITY OR CODE.

2. SPRINKLER EQUIPMENT INCLUDING INSIDE AND OUTSIDE PIPING, SPRINKLER HEADS, VALVES, FIRE DEPARTMENT CONNECTIONS, FIRE PUMPS AND ACCESSORIES NECESSARY TO PROVIDE A COMPLETE AND APPROVED FIRE SPRINKLER SYSTEM(S).

B. WORK NOT INCLUDED:

1. ALL WIRING WILL BE DONE UNDER ELECTRICAL DIVISION, PROVIDE SUPERVISION FOR PROPER OPERATION. ALL WIRING SHALL COMPLY WITH THE NATIONAL ELECTRICAL CODE, LOCAL CODES AND ELECTRICAL DIVISION OF THESE SPECIFICATIONS. ALL WIRING SHALL BE RUN IN METALLIC CONDUIT, TUBING OR RACEWAYS.

2. PAINTING OF SPRINKLER PIPING SYSTEM, HANGERS OR ACCESSORIES.

C. FEES AND PERMITS:
ALL FEES AND PERMITS SPECIFICALLY REQUIRED FOR FIRE PROTECTION WORK, OTHER THAN PERMITS NORMALLY REQUIRED BY THE MECHANICAL SUBCONTRACTOR, SHALL BE APPLIED FOR AND PAID FOR BY THE FIRE PROTECTION SUBCONTRACTOR.

D. DEFICIENCIES:
THE POSITION IS TAKEN THAT THE OWNER IS ENTITLED TO A NO PENALTY PROJECT. ALL EFFORTS AND INSTALLATIONS SHALL BE DIRECTED TOWARD THIS END. ALL DEFICIENCIES AS NOTED BY LOCAL JURISDICTIONAL AUTHORITIES SHALL BE CORRECTED. NO EXTRA CHARGES WILL BE ALLOWED ON THIS ACCOUNT.

E. CONTRACTOR QUALIFICATIONS:
WORK SHALL BE PERFORMED BY A CONTRACTOR REGULARLY ENGAGED IN THE DESIGN AND INSTALLATION OF FIRE PROTECTION SYSTEMS IN ACCORDANCE WITH NFPA REQUIREMENTS HAVING AT LEAST FIVE YEARS CONTINUOUS EXPERIENCE IN THE TYPE OF WORK SPECIFIED.

1.03 SUBMITTALS:

A. SAMPLES: SUBMIT FOR THE FOLLOWING IN ACCORDANCE WITH SECTION 15010 AND DIVISION 1.

1. SPRINKLER HEADS: ONE OF EACH TYPE AND TEMPERATURE RATING.

2. ESCUTCHEONS: ONE OF EACH TYPE AND FINISH.

B. SHOP DRAWINGS: SUBMIT FOR THE FOLLOWING IN ACCORDANCE WITH SECTION 15010 AND DIVISION 1.

1. SHOP DRAWINGS OF ENTIRE SYSTEM LAYOUT. DRAWINGS SHALL BEAR REVIEW STAMP OF LOCAL JURISDICTIONAL CODE AUTHORITIES AND FACTORY MUTUAL. INCLUDE HYDRAULIC CALCULATIONS. NO WORK SHALL BE STARTED UNTIL ALL APPROVALS ARE OBTAINED.

2. ALL VALVES, SPRINKLER DEVICES AND HEADS, PIPE AND FITTINGS, HANGERS, FLOW SWITCHES, PUMPS, TANKS, AND HOSE CABINETS, RACK AND HOSES, SPECIALTIES AND ACCESSORIES USED IN THE SYSTEM.

C. TEST REPORTS: SUBMIT CERTIFIED TEST REPORTS IN ACCORDANCE WITH SECTION 15050.

D. OPERATION AND MAINTENANCE DATA: SUBMIT IN ACCORDANCE WITH SECTION 15010 AND DIVISION 1.

1.04 PROJECT CONDITIONS:
EXAMINE EXISTING CONDITIONS AT THE JOB SITE PRIOR TO ANY PREFABRICATION OF PIPING. MODIFY SYSTEM AS REQUIRED TO COMPLY WITH ACTUAL JOB CONDITIONS AND WORK OF ADJACENT TRADES.
SCHEDULING: COORDINATE MATERIAL DELIVERY AND INSTALLATION WITH WORK OF OTHER TRADES.

1.05 WARRANTY:
COMPLY WITH SECTION 15010

1.06 PROJECT RECORD DRAWINGS:
COMPLY WITH SECTION 15010.

1.07 WATER DAMAGE:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE WORK OF OTHERS, TO THE BUILDING AND PROPERTIES/MATERIALS OF OTHERS CAUSED BY LEAKS IN THE SPRINKLER SYSTEM AND SHALL PAY FOR NECESSARY REPLACEMENT OR REPAIR OF WORK OR ITEMS SO DAMAGED DURING THE INSTALLATION AND TESTING PERIOD OF THIS WORK.

PART 2 PRODUCTS

2.01 GENERAL:
ALL MATERIAL SHALL BE UL LISTED APPROVED.

2.02 PIPING AND FITTINGS INSIDE THE BUILDING:

A. SCHEDULE 40, 175 PSI WORKING PRESSURE BLACK STEEL PIPE, ASTM A135 AND A53 JOINED BY SCREWED JOINTS (ANSI/ASME B2.1), WELDED JOINTS (ANSI/ASME B31.1) OR BY MECHANICAL GROOVED COUPLINGS OR PUSH ON (LOCKING) COUPLINGS, JOINED BY UL APPROVED COMBINATION OF COUPLINGS, GASKETS AND GROOVES WHERE APPROVED BY LOCAL JURISDICTIONAL CODE AUTHORITY. GROOVES SHALL BE ROLLED (CUT GROOVES ARE NOT ACCEPTABLE) AND SHALL BE DIMENSIONALLY COMPATIBLE WITH THE COUPLING. SCHEDULE 10, BLACK STEEL PIPE, IN ACCORDANCE WITH ASTM A135, WHERE APPROVED BY LOCAL JURISDICTIONAL CODE AUTHORITY, JOINED BY WELDED JOINTS (ANSI/ASME B31.1) OR BY MECHANICAL GROOVED COUPLING OR PUSH ON (LOCKING) COUPLINGS, JOINED BY UL APPROVED COMBINATION OF COUPLINGS, GASKETS AND GROOVES WHERE APPROVED BY LOCAL JURISDICTIONAL CODE AUTHORITY. GROOVES SHALL BE ROLLED (CUT GROOVES ARE NOT ACCEPTABLE) AND SHALL BE DIMENSIONALLY COMPATIBLE WITH THE COUPLING. PIPE END PREPARATION FOR THE MECHANICAL PUSH ON (LOCKING) COUPLINGS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

B. SCHEDULE 10, 175 PSI WORKING PRESSURE, BLACK STEEL PIPE, IN ACCORDANCE WITH ASTM A135 WHERE APPROVED BY LOCAL JURISDICTIONAL CODE AUTHORITY, JOINED BY WELDED JOINTS (ANSI/ASME B31.1) OR BY MECHANICAL GROOVED COUPLING OR PUSH ON (LOCKING) COUPLINGS, JOINED BY UL APPROVED COMBINATION OF COUPLINGS, GASKETS AND GROOVES WHERE APPROVED BY LOCAL JURISDICTIONAL CODE AUTHORITY. GROOVES SHALL BE ROLLED (CUT GROOVES ARE NOT ACCEPTABLE) AND SHALL BE DIMENSIONALLY COMPATIBLE WITH THE COUPLING. PIPE AND PREPARATION FOR THE MECHANICAL PUSH ON (LOCKING) COUPLINGS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

C. TUBING SHALL BE COPPER, TYPE "K" OR "L", SUITABLE TO WITHSTAND WATER WORKING PRESSURE NOT LESS THAN 175 PSI, IN ACCORDANCE WITH ASTM B75 OR ASTM B88, JOINED BY BRAZED JOINTS EXCEPT SOLDER JOINTS MAY BE PERMITTED FOR WET PIPE SYSTEMS IN LIGHT HAZARD OCCUPANCIES WHERE TEMPERATURE CLASSIFICATION OF THE INSTALLED SPRINKLERS IS ORDINARY OR INTERMEDIATE. SOLDER JOINTS MAY ALSO BE PERMITTED FOR WET PIPE SYSTEMS IN ORDINARY HAZARD GROUP 1 OCCUPANCIES WHERE PIPING IS CONCEALED. BRAZING FILLER METAL SHALL BE CLASSIFICATION BCUP 3 OR BCUP 5 IN ACCORDANCE WITH AWS A5.8. SOLDER METAL SHALL BE 95 5 (TIN/ANTIMONY GRADE 95 TA) IN ACCORDANCE WITH ASTM B32.

D. LIGHTWEIGHT, UL LISTED APPROVED EXTERIOR GALVANIZED STEEL PIPE IN ACCORDANCE WITH ASTM A135, WHERE APPROVED BY LOCAL JURISDICTIONAL CODE AUTHORITY, JOINED BY SCREWED JOINTS (ANSI/ASME B2.1), WELDED JOINTS (ANSI/ASME B31.1) OR BY UL APPROVED MECHANICAL FITTINGS. COUPLINGS SHALL BE OF THE ROLLED GROOVED TYPE OR PUSH ON (LOCKING) TYPE. ROLLED GROOVES SHALL BE DIMENSIONALLY COMPATIBLE WITH THE COUPLING. PIPE END PREPARATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

E. ALL ASTM A135 SPRINKLER PIPE MUST BE TESTED WITH A NON DESTRUCTIVE ELECTRIC TEST FOR CONTINUOUS AND UNINTERRUPTED INSPECTION OF THE WELDED SEAM AND TESTED TO A CRITICAL WELD, BOTH CONE AND FLATTEN TEST.

F. ALL ASTM A53 SPRINKLER PIPE SHALL BE HYDROSTATICALLY TESTED AT THE MILL PER ASTM STANDARD.

G. ALL STEEL PIPE FOR USE WITH PUSH ON (LOCKING) COUPLINGS SHALL CONFORM TO ASTM A135 TOLERANCES.

H. SCREWED FITTINGS; BLACK CAST IRON, 175 PSI WORKING PRESSURE, 150 LB. CLASS IN ACCORDANCE WITH ANSI B16.4 OR BLACK MALLEABLE IRON, 150 LB. CLASS IN ACCORDANCE WITH ANSI B16.3.

I. FLANGED FITTINGS; BLACK CAST IRON, 175 PSI WORKING PRESSURE, SHORT BODY, 125 LB. CLASS IN ACCORDANCE WITH ANSI B16.1. GASKETS SHALL BE FULL FACE OF 1/8" MINIMUM THICKNESS, RED SHEET RUBBER. FLANGE BOLTS SHALL BE HEXAGON HEAD MACHINE BOLTS WITH HEAVY SEMIFINISHED HEXAGON HEAD NUTS, CADIUM PLATED WITH DIMENSIONS IN ACCORDANCE WITH ANSI B18.2.

J. WELD FITTINGS; STANDARD WEIGHT, BLACK STEEL IN ACCORDANCE WITH APPLICABLE ANSI AND ASTM SPECIFICATIONS.

K. GROOVED COUPLINGS AND MECHANICAL FITTINGS; MALLEABLE IRON, 500 PSI WORKING PRESSURE IN ACCORDANCE WITH ASTM A47. COUPLING GASKET MATERIAL SHALL BE BUTYL RUBBER. COUPLINGS AND MECHANICAL FITTINGS SHALL BE TESTED AND LISTED BY UL AND NFPA#13 APPROVED.

L. FITTINGS FOR COPPER PIPING SHALL BE WROUGHT COPPER.

M. STANDARD WEIGHT CAST IRON FITTINGS 2" AND SMALLER MAY BE USED WHERE PRESSURE DOES NOT EXCEED 300 PSI.

N. STANDARD WEIGHT MALLEABLE IRON FITTINGS 6" AND SMALLER MAY BE USED WHERE PRESSURE DOES NOT EXCEED 300 PSI.

2.03 VALVES:

A. GENERAL: ALL VALVES SHALL BE UL LISTED APPROVED.

B. GATE VALVES:

1. FOR SYSTEM OPERATING PRESSURE LESS THAN 175 PSI: 2" AND SMALLER; O.S. & Y., BRONZE, 200 LB., SCREWED. 2 1/2" AND LARGER; O.S. & Y., IBBM, 250 LB., FLANGED.

2. FOR SYSTEM OPERATING PRESSURE GREATER THAN 175 PSI: 2" AND SMALLER: O.S. & Y., BRONZE, 200 LB. SCREWED; 2 1/2" AND LARGER: O.S. & Y., IBBM, 250 LB., FLANGED.

C. GATE VALVES FOR POST INDICATOR:
NON RISING STEM IRON BODY, BRONZE MOUNTED, 175 PSI PRESSURE RATING WITH POST INDICATOR FLANGE AND 2" SQUARE WRENCH NUT TURNING COUNTER CLOCKWISE TO OPEN, FLANGED. TESTED AND APPROVED BY AWWA AND UL.

G. GLOBE AND ANGLE VALVES DRAINS AND FLOW REGULATION:

1. FOR SYSTEM OPERATING PRESSURES LESS THAN 175 PSI: 2" AND SMALLER: 200 LB., SCREWED; 2 1/2 AND LARGER: IBBM, 125 LB. FLANGED.

2.04 SPRINKLER HEADS:
UL LISTED APPROVED STANDARD SPRAY SPRINKLER HEADS, ORDINARY TEMPERATURE RATINGS(165□F) EXCEPT WHERE HIGH TEMPERATURE HEADS ARE REQUIRED.

A. HEADS IN FINISHED AREAS: CHROME HEADS WITH CHROME ESCUTCHEONS.

B. HEADS IN UNFINISHED AREAS: PLAIN BRASS PENDENT OR UPRIGHT AS REQUIRED.

C. ESCUTCHEONS:

D. EXTRA HEADS: PROVIDE EXTRA HEADS OF EACH DEGREE LINK INSTALLED, ENCLOSED IN STEEL CABINET. LOCATE CABINET ON WALL NEXT TO SPRINKLER ENTRY STATION. NUMBER OF HEADS TO BE IN ACCORDANCE WITH NFPA NO. 13RECOMMENDATIONS.

2.05 EXTERIOR LIGHT AND HORN:
FURNISH AND INSTALL A UL LISTED APPROVED OUTSIDE WEATHERPROOF ELECTRIC ALARM AT EACH FIRE ENTRY ASSEMBLY, CONSISTING OF AUDIBLE HORN AND VISUAL LIGHT DEVICES.

PART 3 EXECUTION:

3.01 GENERAL:

A. INSPECT PRECEDING WORK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH WORK. COORDINATE ALL WORK AND PLACEMENT OF COMPONENTS WITH OTHER TRADES.

B. BE RESPONSIBLE FOR ALL MEASUREMENTS, FITTING AND ASSEMBLY OF ALL WORK. PREFABRICATION IS DONE AT THIS CONTRACTOR'S RISK.

3.02 INSTALLATION:

A. PROVIDE SLEEVES FOR PIPE PASSING THROUGH BUILDING WALLS AND FLOORS ABOVE GRADE, SLEEVES OF STANDARD WEIGHT STEEL PIPE. THE ANNULAR SPACES BETWEEN PIPE AND SLEEVES SHALL BE PACKED TIGHT WITH CAULKING. PIPES PASSING THROUGH FIRE WALLS SHALL HAVE ANNULAR SPACE PACKED WITH APPROVED FIRE BARRIER MATERIAL. PROVIDE CHROME PLATED ESCUTCHEON PLATES LARGE ENOUGH TO COVER THE PIPE SLEEVE.

B. PIPING SHALL BE INSTALLED IN THE MOST DIRECT, STRAIGHT AND MECHANICAL MANNER AS POSSIBLE AND AS CLOSE TO WALLS AND CEILINGS AS IS CONSISTENT WITH GOOD WORKMANSHIP. ALL LINES SHALL BE RUN HIGH ENOUGH TO PERMIT RELOCATION OF LIGHTS WITHOUT MOVING CEILING GRID.

C. COORDINATE EXACT PIPE LOCATIONS WITH DRAWINGS AND OTHER TRADES BEFORE DESIGN APPROVAL AND FABRICATION OF PIPING. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ANY REDESIGN AND FABRICATION REQUIRED TO FIT SYSTEM INTO ALLOWABLE SPACE.

D. ALL PIPING IN FINISHED AREAS SHALL BE CONCEALED UNLESS SHOWN OTHERWISE, ALL OTHER PIPING CAN BE EXPOSED.

E. ALL VERTICAL LINES SHALL BE PLUMB, AND HORIZONTAL LINES SHALL RUN PARALLEL TO BUILDING LINES.

F. INSTALL HORIZONTAL PIPING GRADED TO LOW POINTS AND IN MANNER TO MAKE IT POSSIBLE TO TEST AND EMPTY ENTIRE SYSTEM. PROVIDE VALVES AT LOW POINTS TO FACILITATE SYSTEM DRAINAGE.

G. PIPE AND FITTINGS SHALL BE INSPECTED FOR SOUNDNESS AND CLEANED OF ALL DIRT AND OTHER FOREIGN MATTER PRIOR TO BEING INSTALLED. ALL DAMAGED PIPE AND FITTINGS WILL BE REJECTED.

H. PROTECT OPEN PIPE ENDS WHENEVER WORK IS SUSPENDED DURING CONSTRUCTION TO PREVENT FOREIGN BODIES ENTERING AND LODGING THEREIN.

I. CHROME PLATED OR OTHER POLISHED FINISHED COMPONENTS SHALL BE INSTALLED WITH CARE SO THAT MARRING DOES NOT OCCUR TO THE FINISH.

3.03 PIPE SUPPORTS:
SIZING, SPACING AND INSTALLATION SHALL BE IN ACCORDANCE WITH NATIONAL FIRE PROTECTION ASSOCIATION STANDARD NO. 13, "SPRINKLER SYSTEMS".

3.04 SPRINKLER HEADS:

A. ALL HEADS SHALL BE CENTERED IN CEILING TILE WHERE CEILINGS OCCUR. SHOW ACTUAL LOCATION ON SHOP DRAWINGS.

B. WHEN SPRINKLER HEADS ARE INSTALLED WHERE THEY MAY BE EXPOSED OR SUBJECT TO DAMAGE, HEAD GUARDS SHALL BE FURNISHED.

3.05 WET SPRINKLER SYSTEM:

A. FIRE SPRINKLERS SHALL BE PROVIDED FOR THE ENTIRE ADDITION.

B. THE SPRINKLER SYSTEM SHALL BE BASED ON THE FOLLOWING (HYDRAULIC) DESIGN CRITERIA:

C. PROVIDE WET SPRINKLER SYSTEM(S) OF PRESSURE, FLOW AND DENSITIES REQUIRED BY LOCAL JURISDICTIONAL AUTHORITY. SYSTEMS SHALL BE CALCULATED AND OF A CONFIGURATION ACCEPTABLE TO THE LOCAL JURISDICTIONAL AUTHORITY.

3.06 HYDRAULIC CALCULATIONS:

A. GENERAL:

1. THE FIRE PROTECTION CONTRACTOR SHALL PREPARE HYDRAULIC CALCULATIONS FOR THE DESIGN OF THE SYSTEM AND SUBMIT TO LOCAL JURISDICTIONAL CODE AUTHORITY AND FACTORY MUTUAL FOR APPROVAL BEFORE ANY FABRICATION OR INSTALLATION IS STARTED. SUBMITTALS SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:

a. COMPUTER PRINTOUT SHEETS OR HAND CALCULATION SHEETS WITH ALL CALCULATIONS.

b. CROSS REFERENCE POINTS OF CALCULATIONS BOTH ON THE DRAWINGS AND IN THE CALCULATIONS BY SYMBOL OR NUMBER.

c. FLOW TEST DATA: FLOW TESTS SHALL BE PERFORMED BY THIS CONTRACTOR AND VERIFIED BY LOCAL FIRE DEPARTMENT. PRIOR FLOW TESTS ON FILE WITH LOCAL JURISDICTIONAL AUTHORITY MAY BE USED ONLY WHEN THIS TEST DATA IS ONLY THREE MONTHS OLD AT THE START OF THE PROJECT.

d. CONTRACTOR SHALL USE 85% OF THE FLOW TEST PRESSURE DATA IN HIS HYDRAULIC CALCULATIONS.

3.07 INSTRUCTION:
WHEN REQUIRED APPROVALS OF THIS WORK HAVE BEEN OBTAINED, AND AT A TIME DESIGNATED BY THE OWNER, DEMONSTRATE TO THE OWNER'S PERSONNEL THE OPERATION AND MAINTENANCE AND DEMONSTRATE THE CONTENTS OF THE APPROVED MANUAL.

3.08 IDENTIFICATION:
THE DRAIN, ALARM TEST VALVES, ETC. SHALL HAVE STANDARD IDENTIFICATION SIGNS, PAINTED FIRE RED WITH WHITE LETTERING. THE SIGNS SHALL BE ATTACHED TO THE VALVES IN A CONSPICUOUS POSITION.

3.09 TESTING:
COMPLY WITH SECTION 15050
RETEST PIPING FAILING INITIAL TESTS FOLLOWING CORRECTION OF DEFECTIVE WORK. REQUIREMENTS OF INITIAL TESTS SHALL APPLY.

3.16 COMPLETION:

A. THIS SUBCONTRACTOR SHALL CALL FOR INSPECTION AND OBTAIN CERTIFICATE OF COMPLETION AND TEST FROM THE FIRE INSPECTION BUREAU UNDER WHOSE JURISDICTION THIS INSTALLATION OCCURS. AFTER THE SYSTEM HAS BEEN INSPECTED AND TESTED, PROVIDE AND SIGN A CERTIFICATE "CONTRACTOR'S MATERIAL AND TEST CERTIFICATE SPRINKLER SYSTEM WATER SPRAY SYSTEMS". CERTIFICATE SHALL ALSO BE SIGNED BY A REPRESENTATIVE OF THE FIRE INSPECTION BUREAU. SUFFICIENT COPIES SHALL BE PREPARED TO INSURE THAT INSPECTING AUTHORITIES AND THE CONTRACTOR WILL HAVE A COPY FOR THEIR FILES. ALSO INCLUDE A COPY IN THE O & M MANUALS.

B. THIS SUBCONTRACTOR SHALL REMOVE FROM THE BUILDING ALL RUBBISH AND UNUSED MATERIALS DUE TO OR CONNECTED WITH THIS INSTALLATION.

C. THE SURFACE OF ALL EXPOSED PIPING SHALL BE CLEANED AND LEFT READY FOR PAINTING DONE BY PAINTING SUBCONTRACTOR.

END OF SECTION 15300

SECTION 15400
PLUMBING

PART 1 GENERAL

1.01 WORK INCLUDED:

A. FURNISH, INSTALL AND TEST ALL EQUIPMENT, PIPING AND PIPING SPECIALTIES AS SPECIFIED IN THIS SECTION AND/OR AS INDICATED ON THE DRAWINGS PERTAINING TO THIS DIVISION.

B. THE WORK COVERED IN THIS SECTION SHALL INCLUDE, BUT NOT BE LIMITED TO, FURNISHING AND INSTALLING THE FOLLOWING MATERIALS AND EQUIPMENT:

SANITARY SEWER SYSTEM
WATER DISTRIBUTION SYSTEM
PLUMBING FIXTURES, ROUGH-IN, SETTING AND CONNECTION
FLOOR DRAINS, HYDRANTS, ETC.

PART 2 PRODUCTS

2.01 WATER PIPING MATERIALS:

A. PIPING INSIDE BUILDING: ALL DOMESTIC COLD WATER AND HOT WATER PIPING WITHIN THE BUILDING ABOVE GRADE SHALL BE TYPE "L" HARD DRAWN COPPER PIPE WITH WROUGHT COPPER FITTINGS WITH 95-5 (TIN/ANTIMONY) OR CANFIELD 100% WATERSAFE SOLDER. ALL DOMESTIC COLD WATER AND HOT WATER PIPING BURIED BELOW SLAB ON GRADE SHALL BE TYPE "K" COPPER WITH NO JOINTS OR AQUAPEX AND BE WRAPPED WITH FOAMED PLASTIC INSULATION.

C. VALVES AND SPECIALTY SCHEDULE:

1. GATE VALVES: BRONZE, CLASS 125, 200 PSI W.O.G. SCREWED OR SOLDER.

2. BALL VALVES: BRONZE, CLASS 125, CHROMIUM PLATED, BRASS BALL WITH REINFORCED TEFLON SEATS AND ADJUSTABLE STEM PACKING AND STAINLESS STEEL HANDLE.

3. DIELECTRIC UNIONS AND FLANGES: UNIONS RATED FOR 250 PSI WITH GALVANIZED OR PLATED STEEL THREADED END, COPPER SOLDER END AND IMPERVIOUS ISOLATION GASKET APPROVED FOR USE ON GAS, OIL, AIR AND WATER LINES. FLANGES TO BE COMPLETE WITH INSULATED BOLT SHEAVES, WASHERS AND GASKETS.

2.02 SOIL WASTE AND VENT MATERIALS INSIDE BUILDING:

A. SCHEDULE 40 ABS DWV PLASTIC PIPE AND FITTINGS (ASTM D2661) OR SCHEDULE 40 PVC DWV PLASTIC PIPE AND FITTINGS (ASTM D2665). ALL PIPE AND FITTINGS SHALL BEAR NFS-DWV MARK AND SHALL BE JOINED WITH SOLVENT WELD JOINTS AS RECOMMENDED BY THE MANUFACTURER.

B. CLEANOUTS: BRONZE PLUG CLEANOUT WITH NICKEL BRONZE FRAME IN FLOORS. PROVIDE CARPET CLEANOUT MARKER IN AREAS WITH CARPET. WALL CLEANOUTS SHALL HAVE STAINLESS STEEL COVER IN FINISHED AREAS. JOSAM OR APPROVED EQUIVALENT.

2.03 BUILDING SANITARY SEWER MATERIALS OUTSIDE THE BUILDING:
PVC GRAVITY SEWER PIPE COMPLYING WITH ASTM D-3034.

2.04 GAS PIPING MATERIALS:

A. ABOVE GRADE PIPING: SCHEDULE 40 BLACK STEEL WITH BLACK STEEL MALLEABLE FITTINGS FOR PIPE 2" AND SMALLER. PIPING LARGER THAN 2" IN SIZE SHALL BE JOINED WITH BUTT WELDED FITTINGS. USE WELDED FITTINGS ON ALL PIPE IN INACCESSIBLE LOCATIONS.

B. GAS COCKS: CLASS 125, 175 LB. W.O.G. WORKING PRESSURE, BRONZE BODY, SQUARE HEAD STRAIGHT WAY COCK OR BRONZE BODIED BALL VALVE WITH REMOVABLE TAPERED CARTRIDGE ARRANGED FOR GAS SERVICE.

2.05 COMPRESSED AIR PIPING MATERIALS:

A. ABOVE GRADE PIPING: SCHEDULE 40 BLACK STEEL WITH BLACK STEEL MALLEABLE FITTINGS FOR PIPE 2" AND SMALLER.

B. GAS COCKS: CLASS 125, 175 LB. W.O.G. WORKING PRESSURE, BRONZE BODY, SQUARE HEAD STRAIGHT WAY COCK OR BRONZE BODIED BALL VALVE WITH REMOVABLE TAPERED CARTRIDGE ARRANGED FOR GAS SERVICE.

2.06 FIXTURES AND EQUIPMENT:
SEE SCHEDULE ON DRAWINGS.

PART 3 EXECUTION

3.01 WATER PIPING:

A. INSIDE BUILDING:

1. ALL PIPING SHALL BE PITCHED 1" IN 40 FEET INSOFAR AS POSSIBLE AND SHALL BE PROVIDED WITH DRAINS AT ALL LOW POINTS FOR COMPLETE DRAIN DOWN. DRAINS SHALL BE LOCATED IN ACCESSIBLE LOCATIONS. RUN PIPING AS DIRECT AS POSSIBLE TO REQUIRED CONNECTIONS.

2. PROVIDE PLASTIC PIPE ISOLATORS AT FRAMING PENETRATIONS IN WALLS AND FLOORS.

B. VALVES AND FITTINGS:

1. GATE VALVES, PLUG VALVES OR BALL VALVES MAY BE USED FOR SHUT-OFF SERVICE. VALVES UTILIZING LEVER HANDLES SHALL BE INSTALLED TO ALLOW COMPLETE OPEN TO CLOSE VALVE OPERATION WITHOUT INTERFERENCE OF STRUCTURE, INSULATION, ETC.

2. BALL VALVES SHALL BE USED FOR BALANCING SERVICE.

3. INSTALL UNIONS AT ALL EQUIPMENT CONNECTIONS WHEN UNION TRIM IS NOT FURNISHED AS A STANDARD PART OF THE EQUIPMENT TRIM OR WHERE ITEMS CANNOT BE REMOVED FROM LINE WITHOUT UNIONS.

4. ISOLATE CONNECTIONS BETWEEN FERROUS PIPING AND NONFERROUS PIPING WITH DIELECTRIC UNIONS OR FITTINGS.

5. PROVIDE UNIONS AT CONNECTIONS TO FIXTURES AND EQUIPMENT INCLUDING VALVES WHEN UNION TRIM IS NOT FURNISHED AS A STANDARD PART OF THE EQUIPMENT TRIM OR WHERE ITEMS CANNOT BE REMOVED FROM LINE WITHOUT UNIONS.

6. DIELECTRIC UNIONS SHALL BE USED AT ALL CONNECTIONS OF FERROUS MATERIAL TO NON-FERROUS MATERIAL.

7. COUPLINGS CAN BE USED WHEREVER UNIONS ARE NOT REQUIRED.

3.02 SOIL, WASTE & VENT PIPING INSIDE BUILDING:

A. SLOPE: MAIN LINES WITHIN THE BUILDING: PROVIDE A UNIFORM FALL OF NOT LESS THAN 1" IN 8 FEET. BRANCHES: PROVIDE A UNIFORM FALL OF NOT LESS THAN 1" IN 4 FEET FOR 3" AND SMALLER AND 1" IN 8 FEET FOR SIZES 4" AND LARGER.

B. FIXTURES: VENT IN ACCORDANCE WITH SOUND PLUMBING PRACTICE AND APPLICABLE CODES. DO NOT INSTALL VENTS WITHIN TWO FEET OF ROOF EDGE. COORDINATE EXACT LOCATION WITH ARCHITECT.

C. CLEANOUTS: PROVIDE CLEANOUTS IN SANITARY AND STORM SYSTEMS WHERE REQUIRED BY CODE OR AS INDICATED AT ALL BENDS, ANGLES AND NOT OVER 50 FEET APART FOR 4" AND SMALLER PIPING AND NOT OVER100 FEET APART FOR LARGER PIPING. CLEANOUTS TO HAVE CHROME PLATED COVER PLATES FOR WALLS, SCORIATED BRASS COVER FOR FLOOR.

3.03 BUILDING SANITARY SEWER PIPING OUTSIDE BUILDING:

A. CLEANOUTS: PROVIDE CLEANOUTS AT 100 FOOT INTERVALS.

B. FLUSHING AND CLEANING: FLUSH AND CLEAN SEWER LINES AND REMOVE DEBRIS BEFORE FINAL CONNECTION INTO THE EXISTING SEWER OR SEPTIC SYSTEM IS MADE.

3.04 GAS PIPING:

A. GENERAL:

C. PROVIDE LUBRICATED PLUG VALVES, 6" LONG CONDENSATE DIRT POCKETS AND UNIONS AT EQUIPMENT CONNECTIONS.

D. TAKE BRANCHES FROM TOP OR SIDES OF HORIZONTAL PIPES, NOT FROM BOTTOM.

E. INSTALLATION, MATERIALS AND/OR EQUIPMENT NOT INDICATED ON THE DRAWINGS, SPECIFIED OR COVERED BY THE REQUIREMENTS OF UTILITY OF AGENCY HAVING JURISDICTION SHALL BE IN ACCORDANCE WITH NFPA MANUAL 54 "STANDARDS FOR INSTALLATION OF GAS PIPING AND GAS APPLIANCES IN BUILDINGS".

F. PRESSURE TESTING: SEE SECTION 15050.

3.05 COMPRESSED AIR:

A. PIPING:
PITCH ALL MAINS BACK TO THE CENTRAL TANK AND PROVIDE MANUAL DRAINS AT ALL LOW POINTS AND TRAPPED SECTIONS. CONNECT ALL BRANCHES TO THE TOP OF MAINS. VALVE ALL RISERS AND BRANCHES.

B. VALVES AND SPECIALTIES:

1. PROVIDE UNIONS OR FLANGES WHEREVER NECESSARY AND IN PIPING AT ALL EQUIPMENT SO THAT PIPING MAY BE CONVENIENTLY BROKEN AND MOVED TO FACILITATE EQUIPMENT MAINTENANCE.

C. PRESSURE TESTING: SEE SECTION 15050.

3.06 FIXTURES AND EQUIPMENT:

A. FIXTURES:

1. INSTALL ALL FIXTURES AND/OR ROUGH IN ACCORDING TO THE FIXTURE SCHEDULE. SOME PLUMBING FIXTURES MAY REQUIRE LARGER PIPE SIZES THAN SHOWN ON THE FIXTURE CONNECTION SCHEDULE ON THE DRAWINGS. COORDINATE WITH THE FIXTURE MANUFACTURER.

2. ALL FIXTURES SHALL BE SECURED TO WALLS AND FLOOR OR COUNTER TOPS IN ACCORDANCE WITH MANUFACTURER'S ROUGHING IN AND SETTING REQUIREMENTS TO FORM A RIGID INSTALLATION.

3. ALL PIPE AT THE FIXTURES WHICH MAY BE EXPOSED TO VIEW SHALL BE BRASS CHROME FINISH, FINISHED WITH CHROME ESCUTCHEONS WHERE THEY PROJECT FROM WALLS AND FLOORS.

4. STOP VALVES SHALL BE FURNISHED AND INSTALLED AT ALL FIXTURES, FOR ALL EQUIPMENT AND AT ROUGH IN LOCATIONS.

5. INTEGRAL VACUUM BREAKERS SHALL BE PROVIDED AT ALL OUTLETS WITH HOSE CONNECTIONS.

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Revisions:

M-300

SYSTEM WITH DIELECTRIC UNIONS. FURNISH AND INSTALL COPPER DRAIN PIPING FROM TEMPERATURE AND PRESSURE RELIEF VALVE FOR WATER HEATER. DRAIN PIPING TO BE SAME SIZE AS RELIEF VALVE OUTLET.

3.06 FLASHINGS:
A. PROVIDE FLASHING AS RECOMMENDED BY ROOFING MANUFACTURER FOR EACH VENT OR STACK.

3.07 ADJUSTING AND CLEANING:
A. CLEAN STRAINERS, TRAPS, AERATORS AND VALVES OF DEBRIS, SAND AND DIRT.

B. AT COMPLETION, THOROUGHLY CLEAN PLUMBING FIXTURES AND EQUIPMENT.

C. ADJUST FAUCETS, SHOWERS AND TOILETS FOR PROPER FLOW AFTER CLEANING AND FLUSHING OPERATIONS ARE ACCOMPLISHED.

D. UPON COMPLETION OF WATER HEATER INSTALLATION, VERIFY SATISFACTORY CONTROL OPERATION UNDER MAXIMUM DEMAND OPERATION AS RECOMMENDED BY MANUFACTURER. ADJUST DISCHARGE WATER TEMPERATURE.

E. ADJUST BALANCING VALVES IN DOMESTIC HOT WATER RECIRCULATION LINES TO INSURE QUICK DELIVERY OF HOT WATER TO FIXTURES. SET MEMORY STOPS.

3.08 PROTECTION:
PROTECT FIXTURES AND RELATED COMPONENTS FROM DAMAGE BEFORE, DURING AND AFTER INSTALLATION TO DATE OF FINAL ACCEPTANCE OR OWNER MOVE-IN. PROVIDE PROTECTIVE COVERINGS OR OTHER PROTECTION AS REQUIRED.

END OF SECTION 15400

SECTION 15800
AIR DISTRIBUTION, HEATING VENTILATING AND AIR CONDITIONING

PART 1 GENERAL

1.01 WORK INCLUDED:
PROVIDE ALL LABOR, MATERIAL, EQUIPMENT, ACCESSORIES AND TESTS NECESSARY TO COMPLETELY EXECUTE ALL WORK WHICH SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:

AIR HANDLING UNIT
EXHAUST FANS
LOUVERS
AIR FILTERS
REGISTERS, GRILLES AND DIFFUSERS
DUCTWORK AND ACCESSORIES

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT:
A. GENERAL:
1. STEEL DUCTWORK SHALL BE CONSTRUCTED OF GALVANIZED SHEET STEEL. DUCT SYSTEMS GAUGES SHALL BE IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS MANUAL.

2. ALUMINUM DUCT SHALL BE CONSTRUCTED OF COMMERCIAL DESIGNATION 3003 TEMPER H14, SHEET ALUMINUM.

B. DUCT PRESSURE CLASSES (SMACNA):
1. SUPPLY SYSTEMS: FROM THE SUPPLY DIFFUSER OR REGISTER TO THE SUPPLY FAN INLET, DUCTWORK PRESSURE CLASS SHALL BE NOT LESS THAN 1/2" TOTAL STATIC PRESSURE.

2. RETURN AIR DUCTWORK: -1/2" W.G. PRESSURE CLASS.

3. SPIRAL SEAM DUCTS: ROUND AND OVAL SPIRAL SEAM DUCTS AND FITTINGS. UNITED SHEET METAL COMPANY, SHEET METAL PRODUCTS COMPANY, OR SEMCO.

4. SPIN-IN FITTINGS: FACTORY FABRICATED CONICAL GALV. FOR INSULATED DUCTS. INTEGRAL BUTTERFLY DAMPER WITH QUADRANT OPERATOR AND LOCK NUT ON ALL APPLICATIONS .

5. FLEXIBLE CONNECTIONS: CONNECTORS SHALL BE UL APPROVED 32 OZ. PER YARD, FIRE-RETARDANT, NEOPRENE COATED FIBERGLASS.

6. TURNING VANES: FORMED DOUBLE WALL BLADES CONSTRUCTED OF MINIMUM 20-GAUGE GALVANIZED STEEL. FOR METAL DUCTWORK OTHER THAN STEEL, USE SAME TYPE OF MATERIAL AS DUCT. VANES ON 3-1/4" CENTERS.

7. DUCT LINER: LINER SHALL BE 1" THICK, RESIN BONDED GLASS FIBER, BLACK COATING ON AIR STREAM SURFACE, RATED BY MANUFACTURER FOR AT LEAST 4000 FPM. FIRE RESISTANCE SHALL MEET REQUIREMENTS OF NFPA 90A. MINIMUM FLAME SPREAD RATING OF 25. FUEL CONTRIBUTION AND SMOKE DEVELOPMENT NOT TO EXCEED 50. NOISE REDUCTION COEFFICIENT (NRC) OF NOT LESS THAN .70 WHEN TESTED IN ACCORDANCE WITH ASTM TYPE F-25 MOUNTING. K VALUE NOT MORE THAN 0.26 BTUH PER SQUARE FOOT PER DEG. F AT 75 DEG. F, MAXIMUM ABSOLUTE ROUGHNESS FACTOR PER FOOT OF .004 FT.

8. DUCT SEALANT: NON-HARDENING, WATER RESISTANT, NON-COMBUSTIBLE, LIQUID OR MASTIC OR WITH TAPE AS RECOMMENDED BY MANUFACTURER. ALL SEALANTS SHALL HAVE APPROVED FIRE RATING FOR PLENUM APPLICATION AS REQUIRED BY CODE AUTHORITY.

9. LOUVER: 0.081" THICK EXTRUDED ALUMINUM, 4" BLADES SET IN ALUMINUM FRAME. 1/2" ALUMINUM MESH INTERIOR OF LOUVER. COLOR TO BE SELECTED BY ARCHITECT.

AMERICAN WARMING LE-49 OR EQUIVALENT.

C. EQUIPMENT SCHEDULE:
SEE SCHEDULES ON DRAWINGS.

PART 3 EXECUTION

3.01 DUCTWORK:
A. GENERAL: DUCT SIZES SHOWN ON THE DRAWINGS ARE OUTSIDE (SHEET METAL) DUCT DIMENSIONS. AS A MINIMUM, DUCTWORK SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS MANUAL, ALSO COMPLY WITH MORE RIGID REQUIREMENTS SPECIFIED HEREIN.

B. DUCT SEALING: ALL DUCTS SHALL BE SEALED BY USING DUCT SEALANT AS RECOMMENDED BY MANUFACTURER. THIS INCLUDES THE SEALING OF ALL TRANSVERSE JOINT AND FITTING CONNECTIONS AND SNAPLOCK SEAMS.

C. DUCTWORK APPLICATION:
1. ALL SUPPLY AND RETURN DUCTWORK TO BE GALVANIZED STEEL.

2. ALL DRYER EXHAUST DUCTS TO OUTSIDE OF BUILDING TO BE ALUMINUM. FLEXIBLE DUCTS WILL NOT BE ALLOWED.

3. ALL ROUND AND OVAL DUCTS EXPOSED TO VIEW SHALL BE SPIRAL SEAM. CONCEALED ROUND AND OVAL DUCTS MAY BE FABRICATED WITH LOCK TYPE LONGITUDINAL SEAMS. ALL ELBOWS TO BE PRESSED STEEL ELBOWS OR FIVE PIECE WELDED ELBOWS.

D. TAKEOFFS: DO NOT INSTALL TAKEOFFS ON ELBOWS OR OTHER POINTS OF THE SYSTEM WHERE AIR VELOCITY IS NOT UNIFORM.

E. DUCTWORK HANGERS, CONNECTIONS AND CONSTRUCTION:
1. SUSPEND DUCTS FROM STRUCTURE WITH PROPER HANGERS AT INTERVALS RECOMMENDED BY SMACNA.

2. MAKE ALL DUCT CONNECTIONS TO MOTOR DRIVEN EQUIPMENT WITH FLEXIBLE CONNECTIONS, UNLESS SPECIFICALLY INDICATED OTHERWISE.

3. MAKE ALL RADIUS ELBOWS WITH RADIUS OF 1-1/2 TIMES THE DIAMETER OR WIDTH OF DUCT AND AN INSIDE THROAT RADIUS OF ONE TIMES THE DIAMETER OR WIDTH. ALL 90 DEG. SQUARE ELBOWS ARE TO HAVE TURNING VANES, THIS INCLUDES SUPPLY AND RETURN DUCTS.

4. ALL DIFFUSERS AND REGISTERS TO BE EQUIPPED WITH OPPOSED BLADE DAMPERS. WHERE NOTED AS GRILLE ON PLANS, OPPOSED BLADE DAMPERS NOT REQUIRED. DAMPER TO BE ADJUSTABLE THRU FACE OF DIFFUSER OR REGISTER.

5. PROVIDE 45 DEG. TAKEOFFS AT ALL RECTANGULAR DUCT TAKEOFFS EXCEPT AS INDICATED ON DRAWINGS.

6. MAKE ALL DUCT OFFSETS WITH 15 DEG. TRANSITIONS. SHARPER TRANSITIONS CAN BE MADE ONLY WHEN SPACE DOES NOT ALLOW 15 DEG. OFFSETS, 30 DEG. OFFSETS MAXIMUM.

F. INSIDE DUCT LINER:
1. RECTANGULAR DUCTS ARE INSULATED ON THE INSIDE OF THE DUCT TO PROVIDE AN INSULATION BARRIER AND TO HELP ATTENUATE FAN NOISE. DUCT MAINS WITH DUCT WRAP ARE NOT AN APPROVED SUBSTITUTE. INSULATE AS DESCRIBED BELOW.
a. INSULATE ALL RECTANGULAR SUPPLY AND RETURN DUCTS UNLESS OTHERWISE NOTED ON DRAWINGS.

b. THE LINER SHALL BE APPLIED TO THE INSIDE OF THE DUCT, WITH THE SPRAY FACE TO THE AIR STREAM, WITH NON-FLAMMABLE, SPRAYABLE, DUCT LINER ADHESIVE COMPLETELY COATING THE CLEAN SHEETMETAL. THE LINER SHALL FURTHER BE FASTENED WITH STUD WELD OR GLUE ON TYPE PINS AND CLIPS STARTING WITHIN 3" OF UPSTREAM TRANSVERSE EDGES OF THE LINER AND SPACED AT A MAXIMUM OF 15" ON CENTER AND 15" FROM LONGITUDINAL JOINTS. THE UPSTREAM TRANSVERSE EDGES AND CLIPS SHALL BE SEALED WITH VAPOR BARRIER ADHESIVE.

d. ALL JOINTS IN THE LINER SHALL BE TIGHTLY BUTTED AND SEALED WITH ADHESIVE.

e. LEADING EDGES OF INSULATION AT FAN DISCHARGE SHALL BE PROVIDED WITH SHEET METAL EDGE COVER.

G. DUCT WRAP:
1. ROUND SUPPLY AND RETURN DUCTS, EXHAUST DUCTS AND OUTSIDE AIR DUCTS SHALL BE INSULATED ON THE OUTSIDE. SEE SECTION 15250, INSULATION.

2. INSULATE THE OUTSIDE OF ALL EXHAUST FAN DUCTS.

3. INSULATE THE OUTSIDE OF ALL SUPPLY DUCTS FOR SWIMMING POOL AND HOT TUB ROOMS.

END OF SECTION 15800

AIR-TO-AIR HEAT EXCHANGER (AHE)

NO.	CAPACITY CFM	CAPACITY " W.G.	MANUFACTURER AND MODEL	ELECTRICAL REQUIREMENTS AHE	ELECTRICAL REQUIREMENTS HEATER
AHE-1	56	0.4"	FANTECH SH704 *THERMO-AIR TER-6-2-240	120V, 0.4A, 40W	240V, 8.3A, 2KW

NOTES
- CONTINUOUSLY RUNNING HEAT RECOVERY VENTILATOR WITH AUTOMATIC DEFROST CYCLE.
- *HEATER SHALL BE UL LISTED AND MEET ALL NEC REQUIREMENTS
- SYSTEM SHALL HAVE A DUCT HEATER WITH SCR CONTROLS FOR FULL MODULATION OF THE HEATING ELEMENT, DUCT TEMPERATURE SENSOR (SET TO 70 DEGREES F) & MOTORIZED DAMPER.

GRILLES AND REGISTERS

TYPE	MANUFACTURER AND MODEL
WALL RETURN AIR GRILLE & REGISTER	HART AND COOLEY 94A

NOTES
- ALL SUPPLY REGISTERS SHALL HAVE OPPOSED BLADE DAMPERS.
- SIZE AND CFM AS SHOWN ON DRAWINGS.
- CLEAN ANODIZED FINISH ON ALUMINUM GRILLES AND REGISTERS.
- PRIME FINISH ON STEEL REGISTERS.
- IF REGISTER MANUFACTURER & MODEL IS CHANGED, BOOT SIZE MAY CHANGE. VERIFY REGISTER TYPE WITH OWNER
- PAINT THE INSIDE OF DUCTS FLAT BLACK BEHIND SUPPLY REGISTERS AND RETURN AIR GRILLES

KITCHEN EXHAUST FANS (KEF)

NO.	SERVING	CFM	SP"	ELECTRICAL DATA	MANUFACTURER AND MODEL NO.	COMMENTS
KEF-1	KITCHEN HOOD	1000	1.0	240V, 1PH, 1/2HP	ECON-AIR EADU50H	

NOTES:

-ROOF MOUNTED UPBLAST CENTRIFUGAL FAN DESIGNED TO OPERATE CONTINUOUSLY AT 300 DEG. F WHILE EXHAUSTING GREASE LADEN VAPORS AND FUMES.

-UL AND AMCA LISTED AND RATED, MEETING NFPA 96 REQUIREMENTS.

-WEATHER PROOF CONSTRUCTION; MOTOR BEARING AND DRIVE OUT OF AIR STREAM IN POSITIVELY VENTILATED COMPARTMENT. MOTOR TO BE FACTORY WIRED TO EXTERIOR MOUNTED JUNCTION BOX. OIL RESISTENT, NON-SPARKING, NON-STATIC BELTS WITH 24,000 HOUR EXPECTANCY. ADJUSTABLE V-BELT DRIVE, MOTOR AND DRIVE ASSEMBLY MOUNTED ON RUBBER ISOLATORS. MOTORS SHALL BE HEAVY DUTY TYPE, PERMANENTLY LUBRICATED SEALED BALL BEARINGS. FAN DRIVE BEARINGS SHALL BE PERMANENTLY LUBRICATED SEALED BALL TYPE RATED FOR 200,000 HOURS MIN. LIFE. DRIVE ASSEMBLY TO BE REMOVABLE AS A UNIT FOR EASY ACCESS TO SERVICE AND FOR CLEANING FAN HOUSING AND DUCTS. B.I. NON-OVERLOADING, ALUMINUM WHEEL STATICALLY AND DYNAMICALLY BALANCED. ROOF CURB SHALL BE FIELD FABRICATED BY OTHERS.

EXHAUST FANS (EF)

NO.	SERVING	CFM	ELECTRICAL DATA	SONES	MANUFACTURER AND MODEL NO.	COMMENTS
EF-1	REST ROOMS	110	120V, 0.2, 21W	0.3	PANASONIC FV-11VQ5	2 UNITS
EF-2	APPARATUS BAY	450	120V, 1.6A, 155W	4.0	PENNBARRY Z1015	CONTINUOUSLY EXHAUSTING

NOTES:

-CENTRIFUGAL FORWARD CURVE FAN IN SOUND INSULATED CABINET WITH AMCA LABEL FOR AIR PERFORMANCE AND U.L. LISTED.

-MOTOR MOUNTED IN RUBBER MOUNTINGS OR OTHER SUITABLE METHOD OF VIBRATION ISOLATION.

-FACE GRILLE SHALL BE PROVIDED WITH UNIT.

-PROVIDE IN-LINE CONFIGURATION FOR DUCTED INLET AND OUTLET WHERE SHOWN.

-FAN WITH INTEGRAL BACKDRAFT DAMPER.

-PROVIDE WALL OR SOFFIT CAP AS SHOWN ON DRAWINGS.

-EF-1 SHALL BE CONTROLLED BY A DEHUMIDISTAT WITH A LOW TEMPERATURE OVERRIDE. ANYTIME THE FAN IS ON, THE CONTROL DAMPERS SHALL OPEN.

DEHUMIDISTAT: HONEYWELL H46C
THERMOSTAT: HONEYWELL T6051
CONTROL DAMPER: HONEYWELL ML 4115/8115 ACTUATOR

PLUMBING FIXTURE FITTING SCHEDULE

FIT. NO.	FIX. TYPE	MANUFACTURER AND MODEL NO.	FINISH	COMMENTS
1	TOILET SEAT ANGLE SUPPLY	KOHLER K-4650-0 KOHLER K-7637-CP	WHITE CHROME PLATED	
2	FAUCET P-TRAP ANGLE SUPPLY	KOHLER K-97283-4-CP KOHLER K-8998-CP KOHLER K-7605-P-CP	CHROME PLATED	INSULATED P-TRAP AND WATER LINES
3	SHOWER HEAD & VALVE	KOHLER K-T56910-4A-CP	POLISHED CHROME	

PLUMBING FIXTURE SCHEDULE

FIX. NO.	FIX. TYPE	MANUFACTURER AND MODEL NO.	COLOR	FIT. NO.	COMMENTS
P-1	W.C.	KOHLER WELLWORTH K3519-0	WHITE	1	LEVER & SUPPLY PIPE
P-2	LAVATORY	KOHLER GREENWICH K-2031-0	WHITE	2	ANGLE SUPPLIE, GRID DRAIN, STOPS & P-TRAP. SINGLE HOLE
P-3	SHOWER	KOHLER WALL PANELS AND BASE		3	

ELECTRIC COVE HEATER (ECH)

NO.	LOCATION	MANUFACTURER AND MODEL NO.	ELECTRICAL DATA	COMMENTS
ECH-1	BEDROOMS	KING KCV2412	240V, 1200W, 5A	4 UNITS
ECH-2	OFFICE, MED. ROOM	KING KCV2407	240V, 750W, 3.2A	2 UNITS
ECH-3	RESTROOMS	KING KCV2409	240V, 900W, 3.75A	2 UNITS

THERMOSTAT: WALL MOUNTED M602

* PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR

GAS UNIT HEATER (GUH)

NO.	SERVING	MANUFACTURER AND MODEL NO.	CFM	HEATING CAPACITY (OUTPUT)	ELECTRICAL DATA
GUH-1	APPARATUS ROOM	STERLING SF300	5000	249,000 BTUH	120V, 14MCA
GUH-2	COMMON ROOM	STERLING GG30	370	24,900 BTUH	120V, 3.7MCA
GUH-3	EAST WING	STERLING SF125	2200	104,000 BTUH	120V, 8.1MCA

NOTES
- PROVIDE PRESSURE REGULATOR TO REDUCE FROM 2 PSI SUPPLY PRESSURE.
- FURNACE DESIGNED AND CERTIFIED BY AGA WITH STEEL CABINET WITH BAKED ENAMEL FINISH AND ACCESS PANEL. FAN ASSEMBLY TO BE STATICALLY AND DYNAMICALLY BALANCED WITH DIRECT DRIVE MOTOR.
- COMPLETELY ASSEMBLED AND WIRED; FACTORY-INSTALLED POWER VENTER; METERED COMBUSTION AIR; FAN AND LIMIT SAFETY CONTROLS; DIFFERENTIAL AIR PRESSURE SWITCH TO VERIFY VENT FLOW; REDUNDANT SINGLE-STAGE COMBINATION GAS VALVE; SPARK-IGNITED INTERMITTENT SAFETY PILOT WITH ELECTRONIC FLAME SUPERVISION FOR NATURAL GAS; FULL SAFETY FAN GUARD
- 2 POINT THREADED HANGER CONNECTIONS
- 24-VOLT CONTROL VOLTAGE TRANSFORMER; TERMINAL STRIP CONNECTOR FOR FIELD CONNECTION TO REMOTE 24-VOLT THERMOSTAT
- THERMOSTATS SHALL BE HONEYWELL T834N

MAKE-UP AIR UNIT (MUA)

NO.	SERVING	CFM	EXT. SP @ S.L. DATA	ELEC. DATA	BTU INPUT	MANUFACTURER MODEL	COMMENTS
MUA-1	KITCHEN	800	.5	240V, 1PH, 1/2HP	52,000	ECON AIR E76	

NOTES:

-UNIT SHALL CONSIST OF SUPPLY AIR BLOWER WITH DIRECT FIRED NATURAL GAS HEATING SECTION, 45 TURN DOWN AND FILTER SECTION. PROVIDE OUTSIDE AIR DAMPER AND TWO POSTION DAMPER MOTOR.

-CABINET WILL BE INSULATED AND CONSTRUCTED OF 18 GAUGE GALVANIZED STEEL WITH BAKED ENAMEL FINISH OR ALUMINIZED STEEL. PROVIDE ACCESS PANELS TO BURNERS AND CONTROLS.

-BLOWER TO HAVE SELF ALIGNING BALL BEARINGS, PERMANENTLY LUBRICATED AND SEALED. BLOWER TO BE FORWARD CURVED CENTRIFUGAL TYPE CONSTRUCTION OF GALVANIZED STEEL. UNIT TO BE BELT DRIVE USING VARIABLE PITCH TYPE PULLEY.

-DIRECT GAS FIRED, 409 STAINLESS STEEL HEAT EXCHANGER WITH STAINLESS STEEL BURNERS. BURNER SHALL BE AGA APPROVED AND SHALL PROVIDE MODULATING HEATING. EQUIPMENT SHALL INCLUDE GAS SHUTOFF VALVE, AUTOMATIC GAS VALVE, PRESSURE REGULATOR, PILOT SAFETY SYSTEM WITH SPARK IGNITION, HIGH LIMIT CONTROL AND REVERSE AIR FLOW SAFETY CONTROL AND AUTOMATIC FAN SWITCH.

-PROVIDE REMOTE CONTROL CONSOLE WITH DISCHARGE AIR TEMPERATURE SENSOR AND REMOTE SET POINT, SUMMER-OFF-WINTER CONTROL SWITCH. PROVIDE OUTSIDE AIR DAMPER AND TWO POSITION DAMPER MOTOR. WHEN SYSTEM IS ON, THE OUTSIDE AIR DAMPER SHALL OPEN. IN THE WINTER POSITION, A DISCHARGE AIR THERMOSTAT SHALL MODULATE THE GAS VALVE TO MAINTAIN ITS SETTING. IN THE SUMMER POSITION, THE BURNERS SHALL BE OFF. THE KITCHEN EXHAUST FAN SHALL BE INTERLOCKED TO OPERATE ANYTIME THE SWITCH IS ON. PROVIDE ALL NECESSARY RELAYS, CONTACTORS AND TRANSFORMERS. PROVIDE MOTOR STARTER, AUXILLIARY CONTACTS FOR CONTROL INTERLOCKS AND CONTROL TRANSFORMERS.

PLUMBING FIXTURE CONNECTION SCHEDULE

	WASTE	VENT	CW	HW
WATER CLOSET (TANK TYPE)	3"	2"	½"	-
LAVATORY	1 ½"	1 ½"	½"	½"
MOP SINK	3"	1 ½"	½"	½"
KITCHEN SINK	2"	1 ½"	½"	½"
SHOWER	2"	1 ½"	**¾"	**¾"
CLOTHES WASHER	2"	1 ½"	¾"	¾"
DISHWASHER	1 ½"	1 ½"	-	½"
WALL HYDRANTS AND HOSE BIBBS	-	-	¾"	-
3 COMPARTMENT SINK	3"	2"	¾"	¾"
LAVATORY	1 ½"	1 ½"	½"	½"

NOTES:

-SIZES SHOWN ARE MINIMUM PIPE SIZES TO INDIVIDUAL FIXTURES.

-REDUCE PIPE SIZE AT FIXTURE AS REQUIRED.

-USE LARGER PIPE SIZE WHEN RECOMMENDED BY THE EQUIPMENT MANUFACTURER.

-LONG PIPING RUNS TO INDIVIDUAL FIXTURES MAY BE SHOWN LARGER THAN WHAT IS SHOWN ON SCHEDULE.

* AS RECOMMENDED BY MANUFACTURER

** SOME LARGE BATH AND SHOWER FIXTURES REQUIRE 3/4" HOT AND COLD WATER CONNECTIONS. COORDINATE WITH THE FAUCET MANUFACTURER.

ELECTRIC WATER HEATER (WH)

NO.	LOCATION	MANUFACTURER AND MODEL NO.	SIZE	ELECTRICAL DATA	COMMENTS
WH-1	SEE PLANS	A.O. SMITH ENT-50	50 GAL	240V, 4.5KW, 18.75A	2 UNITS

NOTES:

-HEATER SHALL BE LISTED BY UNDERWRITERS LABATORIES.

-HEATER SHALL HAVE A MAXIMUM WORKING PRESSURE OF 150 PSI WITH A SEPARATE 3/4" TAPPING FOR RELIEF VALVE INSTALLATION AND AN ANODE ROD FOR CATHODIC PROTECTION.

-ALL INTERNAL SURFACES OF THE HEATER EXPOSED TO WATER SHALL BE GLASS-LINED. ELECTRICAL HEATING ELEMENT SHALL BE LOW WATT DENSITY INCOLOY SHEATH, SCREW-IN DESIGN.

-ELEMENT OPERATION SHALL BE DOUBLE ELEMENT, NON-SIMULTANEOUS. THE CONTROLS SHALL INCLUDE A THERMOSTAT WITH EACH ELEMENT AND A HIGH TEMPERATURE CUT-OFF.

-THE JACKET SHALL PROVIDE CONTROL COMPARTMENTS FOR MAINTENANCE THROUGH FRONT PANEL OPENINGS AND ENCLOSE THE TANK WITH FOAM INSULATION. OUTER JACKET SHALL BE BAKED ENAMEL FINISH.

-SEE PIPING DETAILS ON DRAWINGS.

DOMESTIC WATER EXPANSION TANK (DET)

NO.	MANUFACTURER AND MODEL NO.	TOTAL VOLUME	ACCEPTANCE VOLUME	SIZE DIA/HEIGHT
DET-1	EXTROL ST-12	4.4 GAL.	3.2 GAL.	9"/15"

NOTES:
- WELDED STEEL CONSTRUCTION WITH HEAVY-DUTY BUTYL DIAPHRAGM MECHANICALLY BONDED WITH POLYPROPYLENE LINER TO SHELL.
- MAXIMUM WORKING PRESSURE OF 125 PSI AND MAXIMUM WORKING TEMPERATURE OF 200 DEGREES F.

WASHING MACHINE BOX (WB)

NO.	MANUFACTURER & MODEL	COMMENTS
WB-1	GUY GRAY MODEL NO. FB-200	2 UNITS

NOTES:

-PROVIDE CLOTHES WASHER ROUGH-IN BOX FOR HOT AND COLD WATER LINES AND WASTE LINE.

-ROUGH-IN BOX SHALL HAVE HOT AND COLD WATER SHUT-OFF AND SHALL BE EQUIPPED WITH AN OVERFLOW GUARD.

-FABRICATED OF 16 GAUGE STEEL WITH EPOXY FINISH.

-2" WASTE CONNECTION, 1/2" COLD AND HOT WITH BRASS SWEAT CONNECTION.

RECIRCULATING PUMP (RP)

NO.	GPM/FEET HEAD	HP	VOLTS	PHASE	MANUFACTURER & MODEL	COMMENTS
RP-1	2/2	1/25	120	1	GRUNDFOS UP 10-16 PM A	2 UNITS

NOTES:

-HORIZONTAL SHAFT, PUMP FOR IN-LINE MOUNTING AND RATED FOR A MINIMUM OF 145 PSI WORKING PRESSURE.

-ALUMINUM ALLOY MOTOR HOUSING WITH STAINLESS STEEL IMPELLER, SHAFT, SEAL RING AND BEARING PLATE.

-ROTATING PARTS TO BE STATICALLY AND DYNAMICALLY BALANCED.

-WITH BUILT IN AQUASTAT AND AUTOADAPT.

WALL-MOUNTED PROPELLER FAN (PF)

NO.	SERVING	CFM	ELECTRICAL DATA	SONES	MANUFACTURER AND MODEL NO.	COMMENTS
PF-1	APPARATUS BAY SOUTH WING	3000	120V, 1/2 HP	20	TWIN CITIES WPDE16E428	3 UNITS

NOTES:

-MOTOR MOUNTED IN RUBBER MOUNTINGS OR OTHER SUITABLE METHOD OF VIBRATION ISOLATION.

-BACKDRAFT DAMPER AND DAMPER GUARD SHALL BE PROVIDED WITH UNIT.

-INCLUDE OSHA MOTOR SIDE GUARD WITH REMOVABLE SCREEN

-MOUNT UNIT IN 16-GAUGE GALVANIZED STEEL WALL COLLAR

DEHUMIDISTAT: HONEYWELL H46C
THERMOSTAT: HONEYWELL T6051
CONTROL DAMPER: HONEYWELL ML 4115/8115 ACTUATOR

FLOOR SINK (FS)

NO.	MANUFACTURER & MODEL
FS-1	WADE W-9110

NOTES:
-1/2 GRATE
-DRAIN SAME SIZE AS PIPE.
-DOME STRAINER

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8/31/17

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