

Voodchuck Road dows Subdivision Sounty, Wyoming 0 ich

NOTE: ALL SYMBOLS SHOWN ON LEGEND

— G — GAS

HORIZONTAL CLEANOUT

FLOOR DRAIN

FIRE DAMPER

AIR EXTRACTOR

SIZE SUPPLY REGISTER

TURNING VANES IN ELBOW

OPPOSED BLADE DAMPER (O.B.D.)

SIZE RETURN AIR OR EXHAUST AIR REGISTER

SUPPLY DIFFUSER, ARROWS INDICATE DIRECTION OF THROW

SECTION THRU SUPPLY AIR DUCT

SECTION THRU OUTSIDE AIR INTAKE, RETURN AIR OR EXHAUST DUCT

DUCT SIZES ARE OUTSIDE SHEET METAL DIMENSIONS, I ST NO. IS SIZE OF SURFACE SHOWN, 2 ND NO. IS DUCT DEPTH.

VERTICAL CLEANOUT

---- W ---- WASTE PIPE

MECHANICAL LEGEND

R/A

O/A

RETURN AIR

EXHAUST AIR

OUTSIDE AIR

TRANSFER AIR

- RL - REFRIGERANT LINE (LIQUID)

MEIGHTED CHECK VALVE

PLUG OR BALANCING VALVE

DRAIN VALVE WITH HOSE END

STRAINER W/ BLOW-OFF VALVE

TEMPERATURE CONTROL VALVE

PRESSURE REDUCING VALVE

SAFETY RELIEF VALVE

PRESSURE-TEMPERATURE TAP

─── GATE VALVE

GLOBE VALVE
CHECK VALVE

──O BALL VALVE

AIR VENT

PRESSURE GAUGE

SENSOR

HUMIDISTAT

THERMOSTAT

- DOMESTIC COLD WATER

--- DOMESTIC HOT WATER ---- HOT WATER CIRCULATING

THERMOMETER

+ HB-I HOSE BIBB

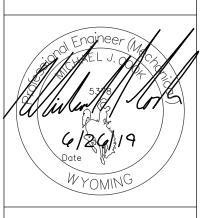
PIPE UNION

- RS - REFRIGERANT LINE (SUCTION)

—½" LINE TO DOM. CW

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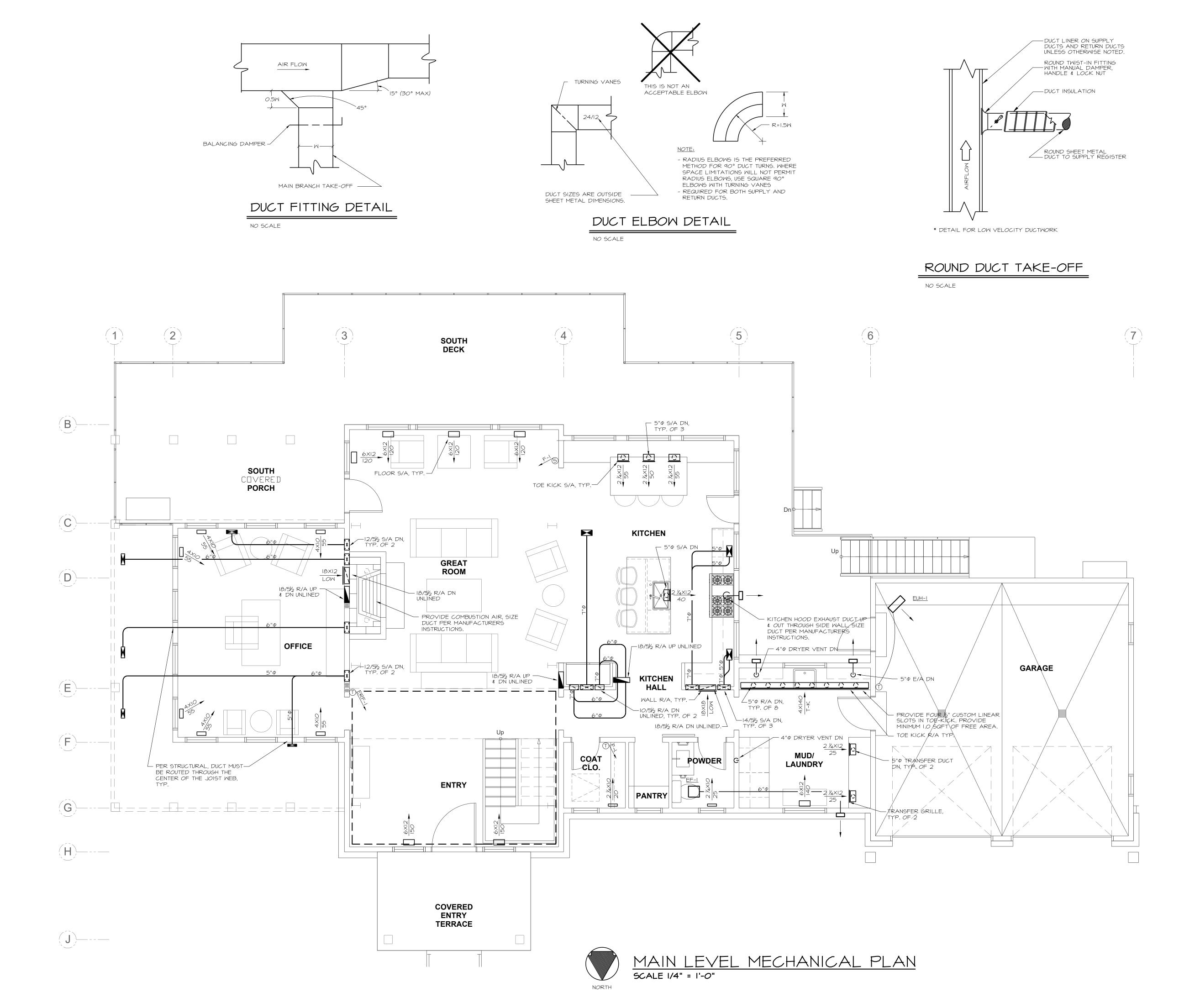
Date/Revision:

11.16.18 SD Set 5.10.19 Permit Set

6.28.19 Construction

Sheet:

Crawlspace Mechanical Plan



SON RESIGENCE 5370 West Woodchuck Road, River Meadows Subdivision

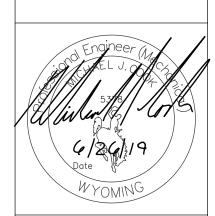
Unit

10

Richard

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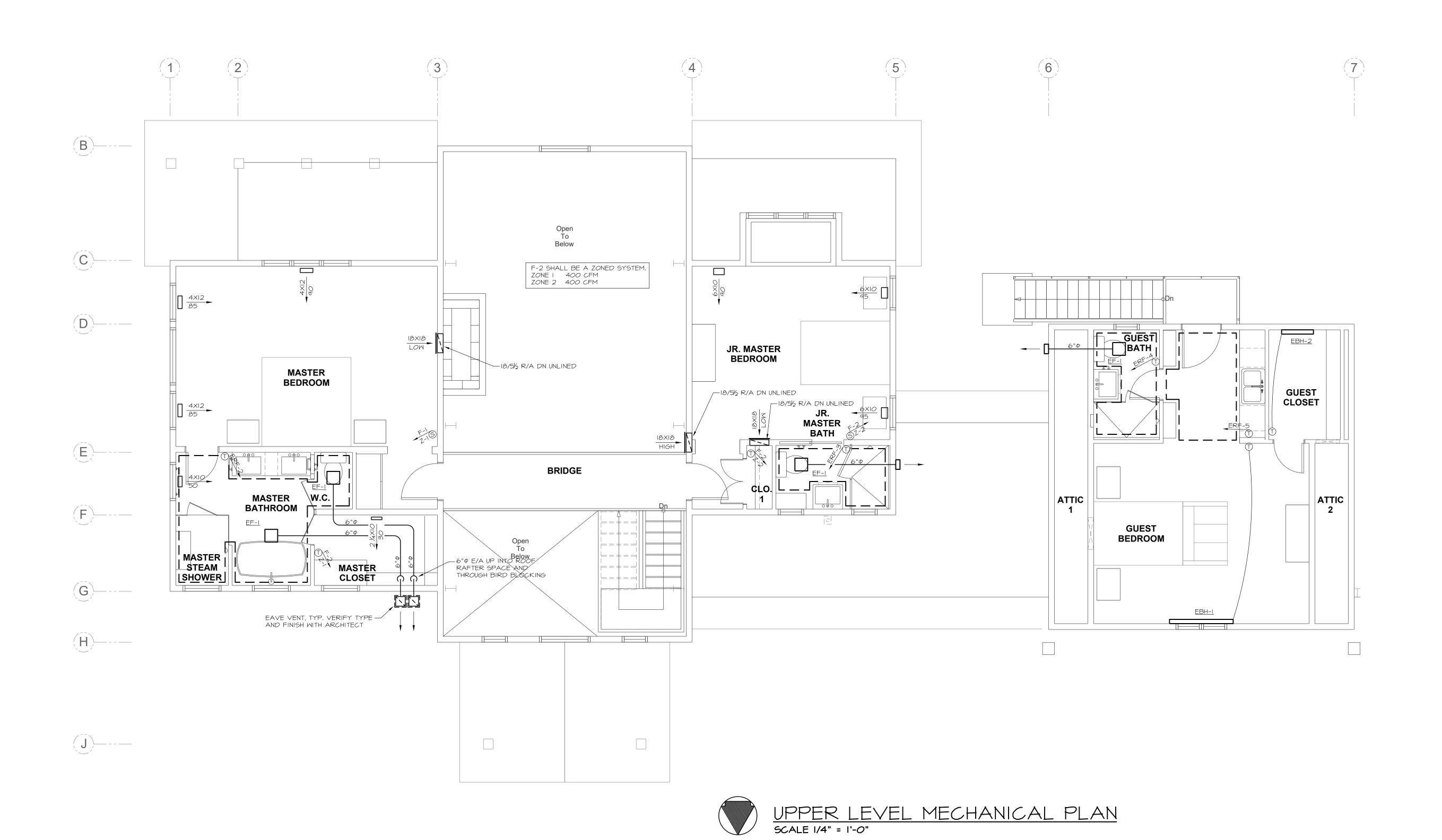
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Sheet:

M1.2

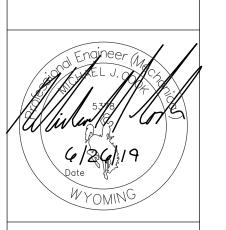
Main Level Mechanical Plan



Richardson Residence 5370 West Woodchuck Road Lot 10 Unit 1, River Meadows Subdivision Teton County, Wyoming

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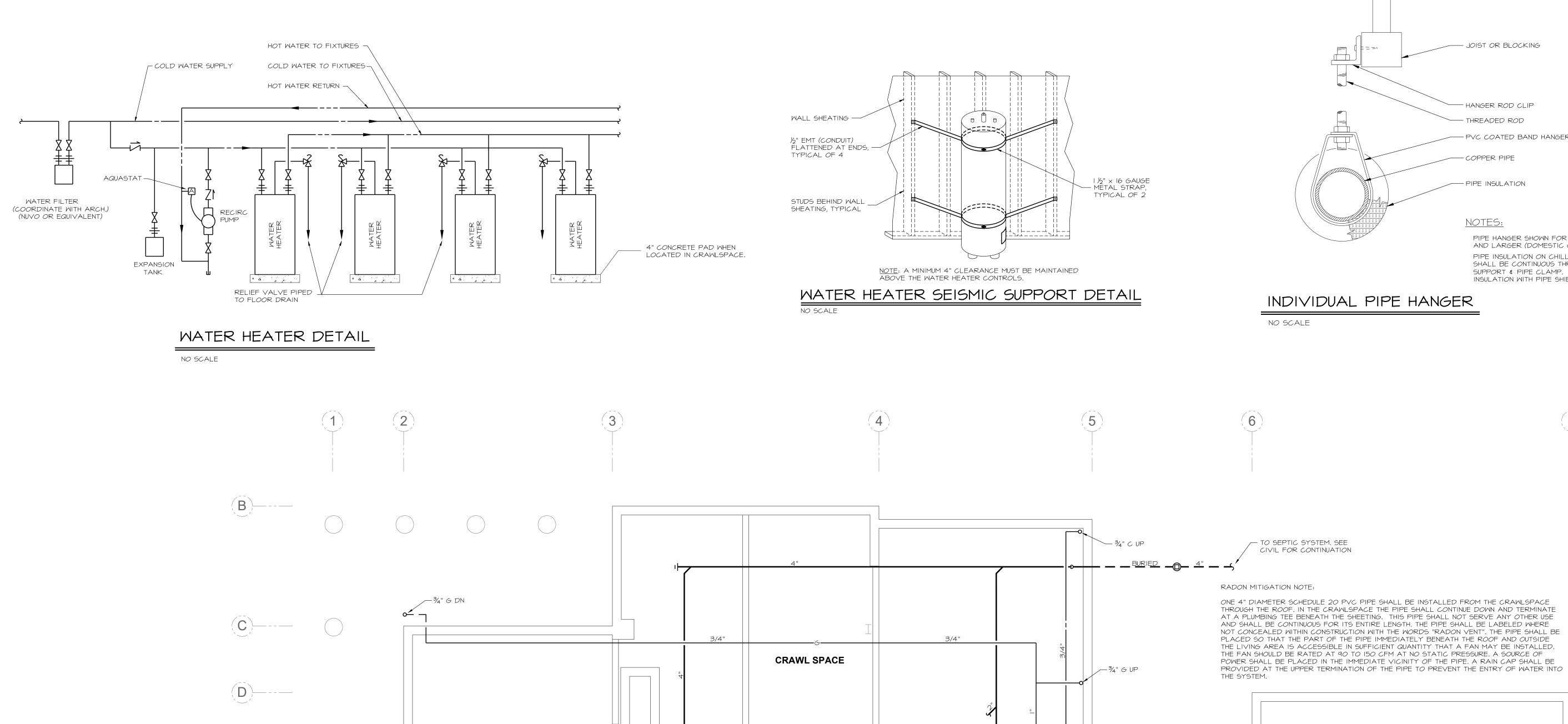
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M1.3

Upper Level Mechanical Plan



1/2" STEAM UP -

3" W UP -

|" C, |" H & ¾" R UP—

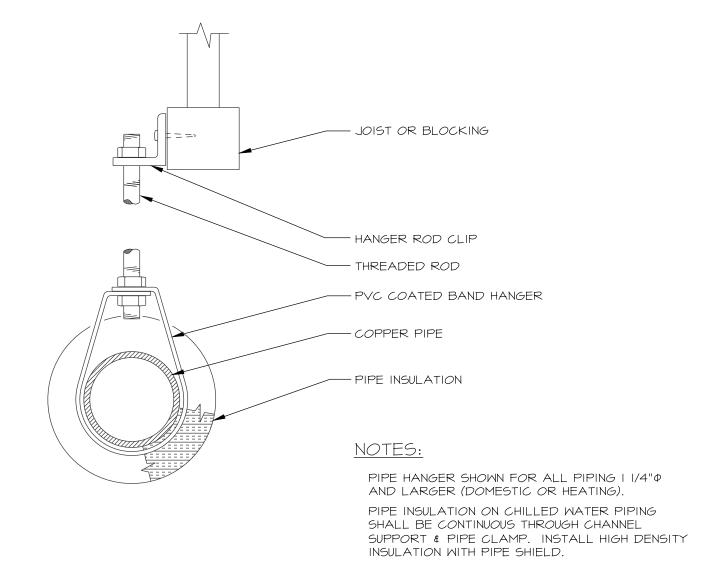
CRAWLSPACE PLUMBING PLAN
SCALE 1/4" = 1'-0"

TO DOMESTIC WATER SYSTEM. A

MECHANICAL

WATER ENTRY SEE -DETAIL ON SHEET M2.2.

l" C, l" H & ¾" R UP ─



INDIVIDUAL PIPE HANGER

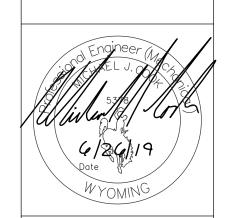
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1" G UP —

BURIED I" GAS LINE TO REGULATOR ON— PROPANE TANK, SEE SITE PLAN FOR CONTINUATION.

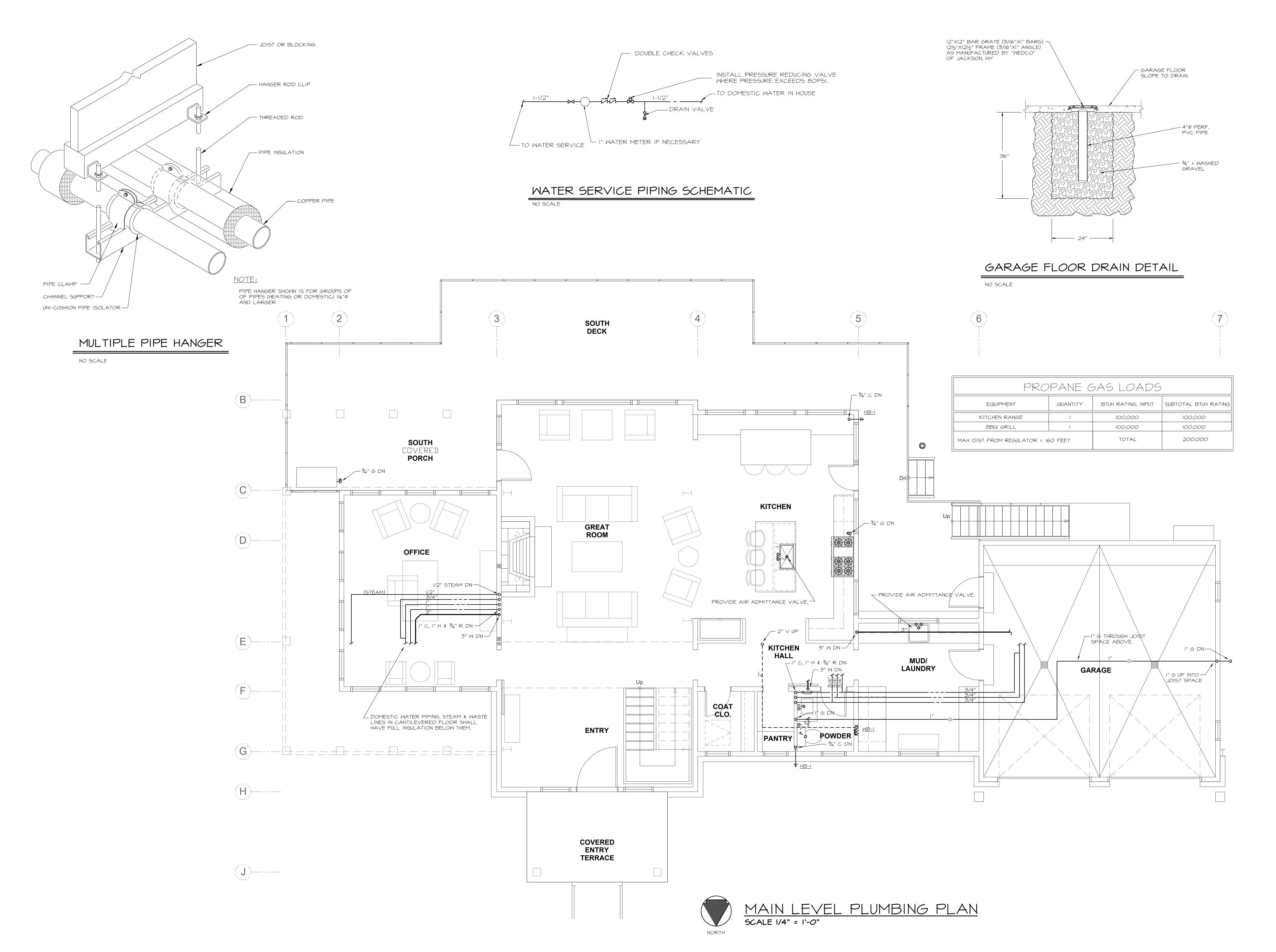
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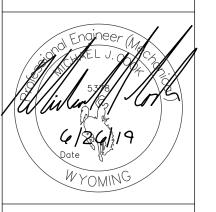
Crawlspace Plumbing Plan



Richard Unit 10

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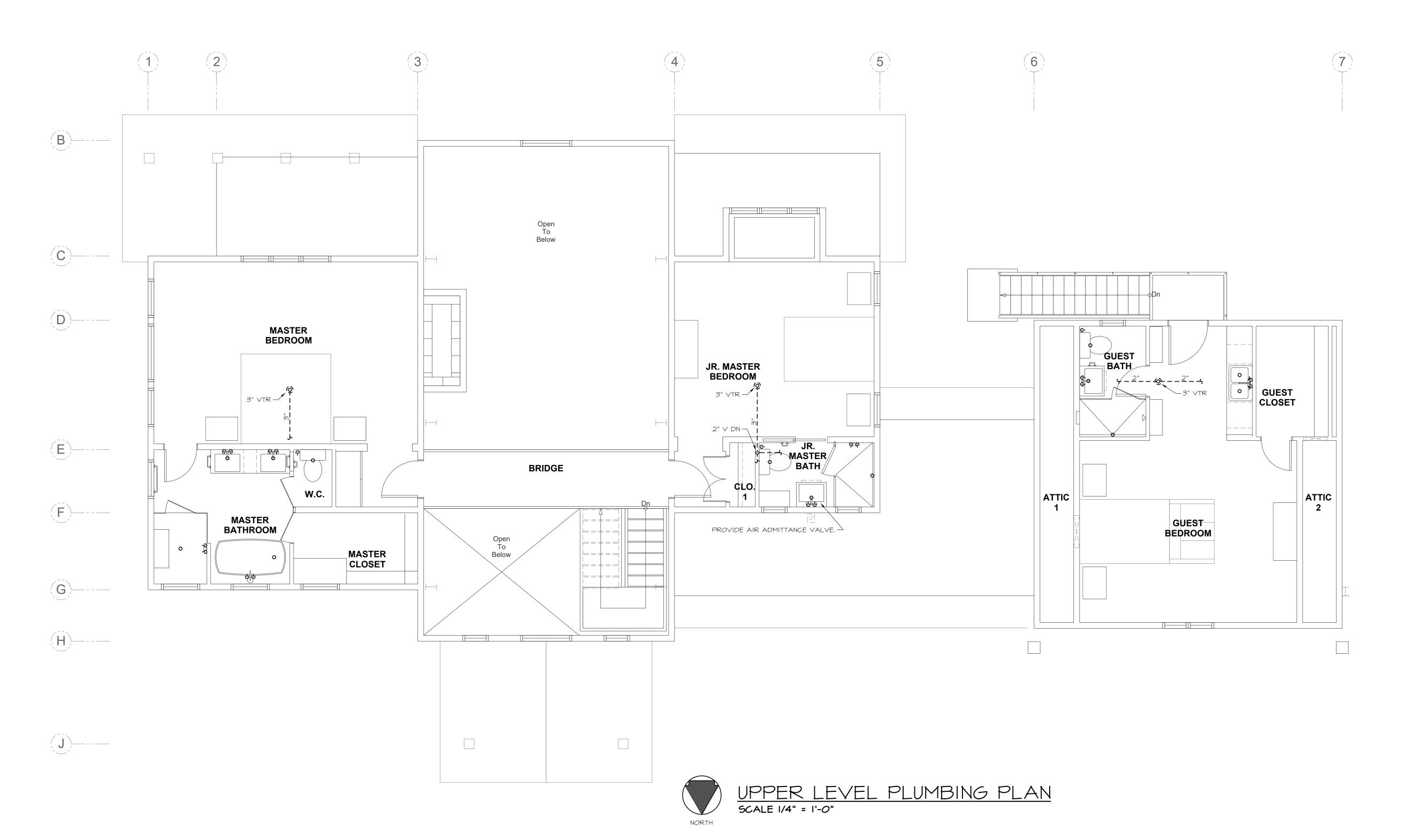
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M2.2

Main Level Plumbing Plan



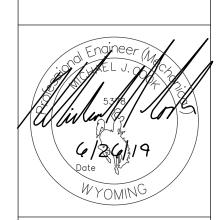


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Sheet:

M2.3

Upper Level Plumbing Plan

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 NECESSAR' 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
- 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 ARCHITECT.
- 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.
- I. 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
- 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

SUBCONTRACTORS WORKING UNDER DIVISION 15.

PROPER RELATION WITH THEIRS.

- B. SUPERVISION: BE RESPONSIBLE FOR AND COORDINATE THE WORK OF ALL
- C. INSTALLATION PROCEDURES: 1. CONFER AND COOPERATE WITH OTHER TRADES AND COORDINATE THE WORK IN
- 2. INSTALL ALL WORK TO PERMIT REMOVAL (WITHOUT DAMAGE TO OTHER PARTS) OF COILS, FURNACES, BOILERS, 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
- 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
- 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
- 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.
- 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

1.05 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS:

WORKING ORDER BEFORE 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 SYSTEM MUST BE SUFFICIENTLY COMPLETE, INCLUDING INSTALLED. CONTROLS, TO PERMIT ITS SAFE OPERATION AS ACCEPTABLE TO MECHANICAL CONTRACTOR. MECHANICAL CONTRACTOR IS SOLELY RESPONSIBLE
- C. WHEN ANY AIR HANDLING EQUIPMENT IS USED FOR TEMPORARY HEAT, INSTALL AND MAINTAIN TEMPORARY FILTERS. BEFORE BUILDING ACCEPTANCE BY OWNER, INSTALL NEW FILTERS. CLEAN FURNACE AND DUCT LINER, IF NECESSARY, AS DETERMINED BY THE ENGINEER/ ARCHITECT.
- D. SYSTEMS USED FOR TEMPORARY HEAT ARE THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN AND SHOULD BE PUT INTO FIRST CLASS
- E. 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.

NO. LOCATION MANUFACTURER SIZE ELECTRICAL DATA COMMEN	ELECTRIC WATER HEATER (WH)								
	NO.								
MH-I ROOM	MH-I								

-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

-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.

OF 200 DEGREES F.

DOMESTIC WATER EXPANSION TANK (DET) MANUFACTURER AND MODEL NO. OTAL VOLUME ACCEPTANCE VOLUME DET-I EXTROL ST-12 4.4 GAL. 3.2 GAL.

- 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

	STEAM BATH (SB)							
NO.	LOCATION	MANUFACTURER AND MODEL NO.	ELECTRICAL DATA	COMMENTS				
SB-I	MASTER BATHROOM	MR. STEAM MS 400E	240V, 38A, 9KM					

-INCLUDE AUTOFLUSH AUTOMATIC DRAIN -INCLUDE TEMPO/PLUS ELECTRONIC CONTROL

	HOSE BIBB (HB)						
NO.	MANUFACTURER & MODEL						
HB-I	WOODFORD MODEL 25						

-FREEZELESS WALL FAUCET WITH 3/4" HOSE THREAD AND VACUUM BREAKER, WHEEL HANDLE AND BRASS BODY.

	WASHING MACHINE BOX (WB)	
NO.	MANUFACTURER & MODEL	
MB-I	GUY GRAY MODEL NO. FB-200	

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, I/2" COLD AND HOT WITH BRASS SWEAT CONNECTION.

PLUMBING FIXTURE CONNECTION SCHEDULE					
	WASTE	VENT	CM	HM	
WATER CLOSET (TANK TYPE)	3"	2"	1/2"	-	
LAVATORY	1 ½"	1 ½"	1/2"	1/2"	
LAUNDRY SINK	2"	1 ½"	1/2"	1/2"	
KITCHEN SINK	2"	1 ½"	1/2"	1/2"	
BATH TUB	2"	1 ½"	**3/4"	**3/4"	
SHOWER	2"	1 ½"	**3/4"	**3/4"	
CLOTHES WASHER	2"	1 ½"	34"	3/4"	
DISHWASHER	1 ½"	1 ½"	1	1/2"	
BAR SINK	1 ½"	1 ½"	1/2"	1/2"	
ICE MACHINE	1 ½"	1½"	*	-	
WALL HYDRANTS AND HOSE BIBBS	-	-	34"	-	
HUMIDIFIERS	-	-	*	-	

NOTES: -SIZES SHOWN ARE MINIMUM PIPE SIZES TO INDIVIDUAL FIXTURES.

-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

-REDUCE PIPE SIZE AT FIXTURE AS REQUIRED.

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

SUMP PUMP (SP)						
NO.	GPM	FT. HEAD	ELECTRICAL DATA	MANUFACTURER & MODEL		
SP-I	20	15	1/3HP, 120V, IPH	LIBERTY SPAC 237		

- SUBMERSIBLE PUMP WITH BRONZE FITTED CONSTRUCTION

- 1 1/2" DISCHARGE WITH CHECK VALVE AND GATE VALVE. PROVIDE MERCURY FLOAT SWITCH AND ALARM PANEL.

	AIR-TO-AIR HEAT EXCHANGER (AHE)							
NO.	CAP, CFM	ACITY " W.G.	MANUFACTURER AND MODEL	ELECTRICAL F	REQUIREMENTS			
	60	60 0.4"	FANTECH SH704 *THERMO-AIR TER-5-1-240	AHE	HEATER			
AHE-I				120V, 0.4A, 40W	240V, 4.2A, IKV			

MOTORIZED DAMPER.

- CONTINUOUSLY RUNNING HEAT RECOVERY VENTILATOR WITH AUTOMATIC DEFROST

- *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) &

	E	XHAUST FA	ANS (E	F)	
				MANUEAC.TURER	

NO. | SERVING | CFM | ELECTRICAL DATA | SONES | AND MODEL NO. | COMMENTS 120V, 0.2, 2IW 0.3

- -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-I SHALL BE CONTROLLED BY A WALL SWITCH LOCATED IN THE ROOM IT SERVES

BOOSTER FAN (BF)						
NO.	SERVING	CFM	ELECTRICAL DATA	SONES	MANUFACTURER AND MODEL NO.	COMMENTS
BF-I	CLOTHES DRYER EXHAUST	100 @¼"	120V, 72W	1.5	FANTECH DEDPV-705	CONTROLLED BY PRESSURE SWITCH

-BACKWARD INCLINED FAN BLADES SUITABLE FOR HIGH PRESSURE, DUST OPERATION. -TOTALLY ENCLOSED, U.L, LISTED MOTOR WITH CLASS B INSULATION, PERMANENTLY SEALED BALL BEARINGS, THERMAL OVERLOAD PROTECTION WITH AUTOMATIC RESET, AND SUITABLE FOR HIGH MOISTURE, DUST AND LINT LOADING CONDITIONS.

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

-WALL OR SOFFIT CAP SHALL HAVE INTEGRAL BACKDRAFT DAMPER -PROVIDE WALL OR SOFFIT CAP AS SHOWN ON DRAWINGS

-FAN SHALL BE CONTROLLED BY FANTECH DB-10 PRESSURE SENSOR SWITCH.

ELECTRIC RADIANT FLOOR (ERF) *

	HINSET)			
NO.	LOCATION	MANUFACTURER AND MODEL	FLOOR AREA	ELECTRICAL DATA
ERF-I	ENTRY	NUHEAT N2C	275 SQ.FT. (APPROX.)	240V, I4A, 3300V
ERF-2	MASTER BATH	NUHEAT N2C	IIO SQ.FT. (APPROX.)	240V, 6A, 1300M
ERF-3	JR. MASTER BATH	NUHEAT N2C	35 SQ.FT. (APPROX.)	240V, 2A, 400W
ERF-4	GUEST BATH	NUHEAT N2C	40 SQ.FT. (APPROX.)	240V, 2A, 500W
	_			

GUEST ENTRY

INSTALL CABLES IN TILE THINSET. COORDINATE WITH THE TILE INSTALLER AND THE -THERMOSTAT SHALL BE NUHEAT TEMPO WITH FLOOR SENSOR

(APPROX.)

-COORDINATE THERMOSTAT LOCATION WITH THE GENERAL CONTRACTOR AND/OR THE ARCHITECT. -PROVIDE GROUND FAULT PROTECTION (GFI CIRCUIT).

RADIANT FLOOR SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.

* PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR

ELECTRIC UNIT HEATER (EUH) *						
NO	LOCATION	MANUFACTURER AND MODEL NO.	ELECTRICAL DATA	COMMENTS		
EUH-I	GARAGE	QMARK MUH07-2	240V, IPH., 7.5KW, 31.1A	SEE NOTES		

PROVIDE HONEYWELL T822DI032 POSITIVE OFF THERMOSTAT PROVIDE 24 VOLT CONTROL CONTACTOR AND TRANSFORMER. B) PROVIDE MOUNTING BRACKETS AS REQUIRED

4) PROVIDE DISCONNECTING MEANS AS REQUIRED BY THE 1999 N.E.C.

* PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR

ELECTRIC BASEBOARD HEATER (EBH) *

NO.	LOCATION	MANUFACTURER AND MODEL NO.	ELECTRICAL DATA	COMMENTS
EBH-I	GUEST BEDROOM	QMARK QMKC2575W	240V, 4.7A, 940W	LOW DENSITY 277V @ 240V
EBH-2	GUEST CLOSET	QMARK QMKC25726W	240V, I.6A, 380W	LOW DENSITY 277V @ 240V

THERMOSTAT: QMARK MS26

* PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR

	RECIRCULATING PUMP (RP)						
NO.	GPM/FEET HEAD	HP	VOLTS	PHASE	MANUFACTURER & MODEL	COMMENTS	
RP-I	2/2	1/25	120	I	GRUNDFOS UP 10-16 PM A	_	

- -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

ELECTRIC FURNACE (F) CFM EXT. S.P./ ELEC. HEATING CAPACITY MANUFACTURER AND MODEL NO. SERVING ELECTRICAL DATA MAIN LIVING EV4CNB003 **VARIABLE** 20 KW 20KW, 58.5/50MC ECFH330IC MASTER SUITE/ FV4CNB002 JR. M. SUITE 8KW, 48.5MCA KECEH330IC

- FURNACE SHALL BE INSTALLED WITH CIRCUIT BREAKERS OR DISCONNECTING MEANS PER CURRENT NEC CODE. MECHANICAL CONTRACTOR SHALL COORDINATE WITH ELECTRICAL CONTRACTOR IF DISCONNECTING MEANS ARE FIELD INSTALLED. FIELD
- INSULATED STEEL CABINET WITH BAKED ENAMEL FINISH AND ACCESS PANELS. CABINET SHALL BE INTERNALLY INSULATED WITH I" FIBERGLASS INSULATION. BLOWER ASSEMBLY TO BE STATICALLY AND DYNAMICALLY BALANCED, CENTRIFUGAL TYPE FAN WITH RESILIENTLY MOUNTED MULTI-SPEED DIRECT DRIVE MOTOR.
- EVAPORATOR COIL SHALL BE CONSTRUCTED OF ALUMINUM FINS MACHINE FITTED TO SEAMLESS COPPER TUBES AND PRESSURE LEAK TESTED TO 450 PSI. THE COIL SHAL BE PRECHARGED AND HAVE CORROSION RESISTANT CONDENSATE PAN WITH DRAIN WITH DRAIN CONNECTION AND MECHANICAL OR SWEAT REFRIGERANT LINE CONNECTIONS. PIPE THE DRAIN PAN CONNECTION FULL SIZE TO FLOOR DRAIN. FACTORY OR FIELD
- DRAIN PAN SHALL BE FABRICATED OF CONTINUOUS GALVANIZED STEEL, INSULATED WITH CLOSED CELL INSULATION AND SEALED WITH MASTIC.
- THERMOSTAT/HUMIDISTAT SHALL BE TEKMAR 563 & THERMOSTAT SHALL BE TEKMAR 561 WITH SYSTEM HEAT-COOL AND FAN ON-AUTO SETTINGS. FURNACE FAN AND HUMIDIFIER SHALL BE ON ANYTIME THE HUMIDISTAT CALLS FOR HUMIDITY. ROOM T/H SENSOR SHALL BE TEKMAR 086. TEMPERATURE ONLY SENSOR SHALL BE TEKMAR 084 - F-2 WILL BE A ZONED SYSTEMS AND SHALL USE AN EWC ZONING SYSTEMS WITH NCM
- CONTROLLER AND 8" PEBD MOTORIZED BYPASS DAMPER. PROVIDE CONTROLS TO LOCK OUT THE HUMIDIFIERS ON SYSTEMS WITH AIR CONDITIONING WHEN THE THERMOSTAT IS SET ON COOLING.
- AND RETURN DUCTS. - HORIZONTAL FURNACES SHALL SET ON NEOPRENE ISOLATORS.

- FURNACE SHALL BE INSTALLED WITH FLEXIBLE CONNECTION ON BOTH SUPPLY

- DRAIN PAN PIPING SHALL BE A MINIMUM OF 3/4" COPPER OR PVC. FLEXIBLE TUBING IS NOT ALLOWED.
- A SECONDARY DRAIN OR AUXILIARY DRAIN PAN SHALL BE INSTALLED WHERE DAMAGE MAY OCCUR TO THE BUILDING. THIS WOULD INCLUDE ALL UNITS WITH AIR CONDITIONING ABOVE THE CRAWLSPACE LEVEL EXCEPT UNITS WITHIN THE GARAGE. ONE OF THE FOLLOWING METHODS SHALL BE USED: I. AN AUXILIARY DRAIN PAN WITH SEPARATE DRAIN SHALL BE PROVIDED UNDER THE COIL. THE AUXILIARY DRAIN SHALL DISCHARGE TO A CONSPICUOUS, VISIBLE
- LOCATION. AUXILIARY DRAIN PAN SHALL BE 1.5" DEEP AND 3" LARGER THAN THE UNIT IN EACH DIRECTION. 2. A SEPARATE OVERFLOW DRAIN SHALL BE CONNECTED TO THE DRAIN PAN PROVIDED

WITH THE EQUIPMENT. THE AUXILIARY DRAIN SHALL DISCHARGE TO AN CONSPICUOUS,

0.1" @ 600 CFM

16X20

3. AN AUXILIARY DRAIN PAN WITHOUT A SEPARATE DRAIN SHALL BE EQUIPPED WITH A WATER LEVEL DETECTION DEVICE THAT WILL SHUT OFF THE EQUIPMENT PRIOR TO OVERFLOW OF THE PAN.

AIR FILTER (AF) SERVING SIZE S.P. DROP/MAX. AIR AND MODEL NO MAIN LIVING 0.2" @ 1500 CFM HONEYWELL F200F2025

HONEYWELL F200F1620

AF-2

VISIBLE LOCATION.

MASTER SUITE,

JR. M. SUITE/

- HIGH EFFICIENCY AIR FILTER MOUNTED IN RETURN DUCT.
- GALVANIZED STEEL FRAME WITH ACCESS DOOR. PROVIDE DUCT TRANSITION - EFFICIENCY TEST USING ASHRAE STANDARD TEST PROCEDURE NO. 52-76 OF 97% WITH PARTICLES RANGING FROM .OI MICRON TO 2500 MICRON IN SIZE.

GRILLES AND REGISTERS					
TYPE	MANUFACTURER AND MODEL				
WALL RETURN AIR GRILLE	REGGIO (SQUARE GRID PATTERN) FLUSH MOUNT, WITHOUT SCREW HOLES & PAINTED TO MATCH WALL COLOR				
FLOOR SUPPLY REGISTER	REGGIO (SQUARE GRID PATTERN) CARPET-SURFACE MOUNTED WITH SCREW HOLES TILE-FLUSH MOUNTED WITH NO SCREW HOLES				
FLOOR SUPPLY REGISTER (WOOD FLOORS)	REGGIO WOOD FLUSH MOUNTED VERIFY WOOD SPECIES WITH ARCHITECT				

240V, 2A, 500W

- VERIFY ALL REGISTER & GRILLE TYPES AND FINISHES WITH ARCHITECT PRIOR TO ORDERING. - ALL SUPPLY REGISTERS SHALL HAVE OPPOSED BLADE DAMPERS.
- · SIZE AND CFM AS SHOWN ON DRAWINGS - IF REGISTER MANUFACTURER & MODEL IS CHANGED, BOOT SIZE MAY CHANGE. VERIFY
- REGISTER TYPE WITH ARCHITECT. - PAINT THE INSIDE OF DUCTS FLAT BLACK BEHIND SUPPLY REGISTERS AND RETURN

STEAM HUMIDIFIER (SH) MANUFACTURER AND MODEL CAPACITY ELECTRICAL DATA 240V, 3.8KW. I PH NORTEG RH DUGT 3 - 10 LB/HR

FOR HUMIDITY

- PROVIDE WALL MOUNTED REMOTE HUMIDISTAT TO CONTROL HUMIDIFIER AND FURNACE FAN ON A CALL FOR HUMIDITY. SEE FURNACE FOR HUMIDISTAT MODEL. · PROVIDE VALVES, TUBING AND NECESSARY FITTINGS AND MOUNTING BRACKET.
- PIPE AS SHOWN ON FURNACE DETAIL. PROVIDE AIR PROVING SWITCH (COLUMBUS ELECTRIC RH3) WHICH ALLOWS HUMIDIFIER TO OPERATE ONLY WHEN AIR FLOW IS DETECTED.

PROVIDE DRAINLINE FROM HUMIDIFIER TO SEWER SYSTEM WITH P-TRAP AND AIR GAP OR

- PROVIDE HIGH LIMIT HUMIDISTAT LOCATED 5' DOWNSTREAM OF HUMIDIFIER SET AT 80%. HUMIDIFIER SHALL TURN OFF WHEN SETTING IS REACHED.
- HUMIDIFIER NOZZLE SHALL BE INSTALLED WITH A MINIMUM OF FOUR FEET OF STRAIGHT DUCTWORK DOWNSTREAM OF NOZZLE. PROVIDE CONTROLS TO LOCK OUT THE HUMIDIFIERS ON SYSTEMS WITH AIR CONDITIONING WHEN THE THERMOSTAT IS SET ON COOLING.
- HUMIDIFIER SHALL PRODUCE STEAM USING AN ELECTRODE STEAM GENERATING DISPOSABLE CYLINDER AND INCLUDE A FIELD INSTALLED DISTRIBUTOR IN THE SUPPLY

- UNIT SHALL BE PROVIDED WITH FILL VALVE, DRAIN VALVE AND HIGH WATER SENSOR.

- THE UNIT SHALL HAVE A BUILT-IN CONTACTOR RELAY TO INTERRUPT POWER TO THE ELECTRODES WHEN THE HUMIDITY SENSORS SETPOINT HAS BEEN SATISFIED. THE HUMIDIFIER SHALL BE UL RATED AND HAVE A TWO YEAR LIMITED PARTS WARRANTY FROM THE MANUFACTURER.
- PLUMBER SHALL PIPE CW TO HUMIDIFIER. - ON ANY ZONED FORCED AIR SYSTEMS ALL ZONE DAMPERS SHALL OPEN ON A CALL

Date/Revision:

11.16.18 SD Set 5.10.19 Permit Set

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(1)

6.28.19 Construction

Sheet:

Mechanical Schedules

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. THIS INCLUDES ATTIC AND CRAWLSPACE.

B. ALL SURFACES OF ALL COILS, 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

1.10 OPERATION AND MAINTENANCE DATA:

A. PREPARE I 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 & 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 AND HYDRONIC 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 AND WATER 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

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

PART 2 - PRODUCTS NOT APPLICABLE

NOT APPLICABLE

PART 3 - EXECUTION

END OF SECTION 15010

SECTION 15050

BASIC MATERIALS AND METHODS

PART I - GENERAL

1.01 WORK INCLUDED: PIPE SUPPORTS VALVES PIPE INSTALLATION

PART 2 - PRODUCTS

2.04 VALVES:

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:

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

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

E. VERTICAL SUPPORTS:

PROVIDE FRICTION RISER CLAMPS, SUPPORTED AND BRACED. CLAMPS FOR
COPPER PIPING SHALL BE PLASTIC COATED STEEL. SUPPORT CAST IRON
SOIL PIPE AT NOT LESS THAN EVERY STORY HEIGHT AND AT ITS BASE.
SUPPORT COPPER TUBING AT SIX FOOT ON CENTER.

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

DIVISION 15.

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

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. ALL PENETRATIONS OF EXTERIOR WALL BELOW GRADE SHALL BE SEALED WATERTIGHT. ALL PENETRATIONS OF EXTERIOR WALLS ABOVE GRADE SHALL BE SEALED WEATHER TIGHT.

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.

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.

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.

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.

3.08 INSTALLATION OF PIPE HANGERS:

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

3.10 ACCESS DOORS:
FURNISH ACCESS DOORS IN ALL NON-REMOVABLE CEILINGS AND IN PARTITIONS
AND WALLS WHERE NECESSARY TO MAINTAIN ACCESS TO PLUMBING CLEANOUTS,
FIRE DAMPERS, MANUAL DAMPERS, VALVES AND OTHER MECHANICAL DEVICES
REQUIRING ACCESS. SIZE THESE AS REQUIRED TO PROVIDE ADEQUATE ACCESS
FOR SERVICE OR REPLACEMENT OF COMPONENTS.

3.11 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 OTHERNISE 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 SIX 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, WASTE AND ROOF DRAIN LINES WITH STANDING WATER TEST OF TWELVE FEET OF HEAD, HELD LONG ENOUGH TO VISUALLY INSPECT EACH JOINT.

C. TEST ALL GAS PIPING UNDER 60 PSIG AIR PRESSURE.

D. 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.

SECTION 15250 PIPE AND DUCT INSULATION

PART 1 GENERAL

END OF SECTION 15050

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 NEPA 90A I A

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.

B. PIPING WITH HEAT TRACING: INSULATE ALL PIPES AND FITTINGS THE SAME AS HEATING WATER PIPING. INSULATION SHALL BE ONE SIZE LARGER THAN PIPE SIZE TO ALLOW FOR ADDITION OF HEAT TRACING.

C. PIPE EXPOSED TO WEATHER: INSULATE ALL PIPE "OUTDOORS" OR EXPOSED TO WEATHER THAT THIS SPECIFICATION REQUIRES TO BE INSULATED TO THE SAME THICKNESS AS CALLED FOR USING METAL JACKETED PIPE INSULATION TO PROVIDE A WEATHER PROOF SYSTEM. METAL JACKET SHALL BE .010 THICK ALUMINUM OR STAINLESS STEEL. INSULATION SHALL BE INSTALLED ACCORDING TO MANUFACTURERS RECOMMENDATIONS.

.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.

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 REPORT OF THE PROPERTY OF THE PROPERTY

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:

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

PART 2 PRODUCTS

SANITARY SEWER SYSTEM

2.01 WATER PIPING MATERIALS:

A. PIPING OUTSIDE BUILDING: ALL PIPE OUTSIDE THE BUILDING SHALL BE TYPE "K", SOFT DRAWN COPPER USING SILVER SOLDER (15% SILVER COMPOSITION AND BC-5 CLASSIFICATION), ASTM B260-62T. AN ACCEPTABLE ALTERNATE IS POLYETHYLENE SERVICE PIPE CONFORMING TO THE REQUIREMENTS OF AWWA SPECIFICATION C-901, "POLYETHYLENE (PE) PRESSURE PIPE, TUBING AND FITTINGS, 1/2 INCH THROUGH 3 INCH FOR WATER." TUBING SHALL BE CLASS 200 WITH SDR OF 7.3.

B. 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 AND BE WRAPPED WITH FOAMED PLASTIC INSULATION.

C. VALVES AND SPECIALTY SCHEDULE:

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

 BALL VALVES: BRONZE, CLASS 125, CHROMIUM PLATED, BRASS BALL WITH REINFORCED TEFLON SEATS AND ADJUSTABLE STEM PACKING AND STAINLESS STEEL HANDLE.
 CHECK VALVES: BRONZE, CLASS 125, 200 PSI W.O.G. SCREWED OR

SOLDER, HORIZONTAL SWING RENEWABLE DISC.

4. PRESSURE GAUGES: DIAL GAUGES SHALL BE 4-1/2" DIAL SIZE WITH GAUGE LINE VALVES AND PIGTAIL. DANTON 101 OR APPROVED EQUIVALENT.

5. THERMOMETERS: ADJUSTABLE ANGLE INDUSTRIAL THERMOMETER WITH BRASS CASE, RED-READING MERCURY AND SEPARABLE SOCKET. THERMOMETERS SHALL BE GRADUATED FROM PLUS 20 DEG. F TO 200 DEG. F. U.S. GAUGE MN-9 OR APPROVED EQUIVALENT.

6. 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.

7. STRAINERS: 250 LB. BRONZE OR CAST IRON "Y" TYPE SCREWED WITH STAINLESS STEEL SCREEN.

2.02 SOIL WASTE AND VENT AND STORM DRAIN 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. SERVICE WEIGHT HUBLESS CAST IRON WITH GASKET AND CLAMP FITTINGS.

C. 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 AND STORM 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. BELOW GRADE PIPING: SCHEDULE 40 BLACK STEEL WITH BLACK STEEL MALLEABLE FITTINGS. PROVIDE CATHODIC PROTECTION AS REQUIRED. PIPING SHALL BE PROVIDED WITH A FACTORY APPLIED COATING OF EITHER FUSION BONDED EPOXY OR TAPE WRAP. FACTORY COATING MUST BE

C. 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.

D. PROPANE TANK: PROVIDE BURIED 250 GALLON PROPANE TANK EQUIPPED WITH

ALL VALVES, REGULATORS AND FITTINGS MEETING ALL CODE REQUIREMENTS.

2.05 FIXTURES AND EQUIPMENT SEE SCHEDULE ON DRAWINGS.

PART 3 EXECUTION

3.01 WATER PIPING: A. WATER SERVICE:

. MATER SERVICE:

1. PROVIDE NEW WATER SERVICE AS INDICATED ON THE PLANS. PROVIDE SHUTOFF VALVES AND VALVE BOX WHERE SHOWN.

2. PROVIDE PIPING OUTSIDE THE BUILDING WITH NOT LESS THAN SEVEN FEET OF COVER FROM FINISHED GRADE. SURROUND PIPE WITH 4" OF CLEAN SAND. PROVIDE 2" THICK BY 2' WIDE INSULATING BLUE BOARD OVER FULL

LENGTH OF WATER SERVICE OUTSIDE OF BUILDING.

B. INSIDE BUILDING:

1. ALL PIPING SHALL BE PITCHED I" 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.

C. 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.8. PRESSURE GAUGES AND THERMOMETERS ARE TO BE USED WHEREVER SHOWN ON DRAWINGS AND SHALL BE LOCATED IN AN ACCESSIBLE POSITION.

3.02 SOIL, WASTE, VENT & STORM DRAIN 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.

D. ALL HORIZONTAL AND VERTICAL WASTE MAINS AND STORM DRAIN MAINS FROM UPPER FLOORS TO LOWER LEVEL SLAB OR CRAWLSPACE SHALL BE HUBLESS

CAST IRON. HORIZONTAL MAINS SHALL INCLUDE ALL PIPING SERVING MORE

THAN ONE PLUMBING FIXTURE, ALL TOILETS AND ALL STORM DRAIN LINES.

3.03 BUILDING SANITARY AND STORM 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: I. ALL UNDERGROUND PIPE SHALL BE BURIED 24" MINIMUM AND SURROUNDED WITH 4" CLEAN SAND BEFORE BACKFILLING. ALL BURIED JOINTS SHALL BE LEFT EXPOSED UNTIL TESTING HAS BEEN COMPLETED.

2. FURNISH AND INSTALL ALL GAS PIPING FROM THE METER OR PROPANE TANK THROUGHOUT THE BUILDING AND CONNECT TO ALL EQUIPMENT REQUIRED.

B. BURIED PIPE COATING: BURIED PIPE TAPE WRAP SHALL BE MACHINE WRAPPED USING A 50% OVERLAP WRAP MINIMUM. PIPE SHALL BE COATED WITH PRIMER BEFORE WRAPPING. FITTINGS AND JOINTS SHALL BE DOUBLE WRAPPED. EXTEND FITTING AND JOINT WRAPPING NOT LESS THAN 6" PAST THE END OF THE FITTING OR JOINT ONTO THE PIPE SECTION. TEST PIPE, JOINTS AND FITTING PRIOR TO WRAPPING JOINTS AND FITTINGS.

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

F. PRESSURE TESTING: SEE SECTION 15050.

3.05 FIXTURES AND EQUIPMENT:

BUILDINGS"

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.6. INSTALL WATER, WASTE AND VENT LINES TO REFRIGERATOR AND ICE MACHINES AS REQUIRED BY THE MANUFACTURER.

B. WATER HEATER: MAKE CONNECTIONS BETWEEN WATER HEATER AND DOMESTIC

WATER PIPING SYSTEM WITH DIFLECTRIC UNIONS. FURNISH AND INSTALL

COPPER DRAIN PIPING FROM TEMPERATURE AND PRESSURE RELIEF VALVE FOR

VENT OR STACK AND FOR EACH ROOF DRAIN. CLAMP FLASHING INTO ROOF

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

B. FLASH ALL DRAINS (I.E. ROOF, FLOOR, ETC.) NOT INSTALLED IN SLAB ON GRADE WITH 36" SQUARE, 4 LB/SQ.FT. SHEET LEAD, OR CHLORINATED POLYETHYLENE FACTORY LAMINATED TO 15 LB. FELT. CLAMP FLASHING INTO DRAIN.

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.

SECTION 15800
AIR DISTRIBUTION, HEATING VENTILATING AND AIR CONDITIONING

PART 1 GENERAL

END OF SECTION 15400

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

SCRATCHED SURFACES AFTER INSTALLATION.

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.

3. POLY-VINYL COATED DUCTS SHALL BE THE SAME AS GALVANIZED STEEL
WITH A 4 MIL THICKNESS OF PVC ON THE EXTERIOR SURFACE AND I MIL
THICKNESS ON THE INTERIOR SURFACE. ALL JOINTS SHALL BE TAPED WITH

TAPE. APPLY PVS COATING ON ALL INTERIOR AND EXTERIOR

4. FIBERGLASS REINFORCED PLASTIC DUCTS SHALL BE ICBO APPROVED AND APPROVED BY THE LOCAL AUTHORITY FOR THE APPLICATION. PEABODY SPUNSTRAND OR APPROVED EQUIVALENT.

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.

RETURN AIR DUCTWORK: -1/2" W.G. PRESSURE CLASS.
 SPIRAL SEAM DUCTS: ROUND AND OVAL SPIRAL SEAM DUCTS AND FITTINGS.
UNITED SHEET METAL COMPANY, SHEET METAL PRODUCTS COMPANY, OR

4. LOW VELOCITY FLEXIBLE DUCTS: DUCT SHALL CONFORM TO REQUIREMENTS FOR CLASS I CONNECTORS TESTED IN ACCORDANCE WITH UL 181-1974 AND NFPA 90A. MATERIALS INSTALLED SHALL HAVE MAXIMUM FLAME SPREAD RATING OF 25 AND MAXIMUM SMOKE DEVELOPED RATING OF 50. DUCTS SHALL HAVE A GALVANIZED SPRING STEEL WIRE HELIX BONDED TO A LINER OF CONTINUOUS AIR-TIGHT MATERIAL. INSULATION SHALL BE 1" THICK FIBERGLASS, MAXIMUM "K" FACTOR OF 0.25, MAXIMUM VAPOR TRANSMISSION RATE OF 0.20 PERMS. DUCT MUST BE APPROVED BY CODE AUTHORITY FOR

THE SPECIFIC APPLICATION.

5. SPIN-IN FITTINGS: FACTORY FABRICATED CONICAL GALV. FOR INSULATED DUCTS. INTEGRAL BUTTERFLY DAMPER WITH QUADRANT OPERATOR AND LOCK

6. FLEXIBLE CONNECTIONS: CONNECTORS SHALL BE UL APPROVED 32 OZ. PER

7. 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.

8. OPPOSED BLADE DAMPERS: OPPOSED BLADE TYPE, STEEL OR ALUMINUM

CONSTRUCTION WITH WORM DRIVE OPERATOR. SCREWDRIVER SLOTTED SHAFT,

YARD, FIRE-RETARDANT, NEOPRENE COATED FIBERGLASS

FACTORY ASSEMBLED. EXTERNAL HANDLE AND QUADRANT TYPE LOOKING DEVICE ON SIZES ABOVE 36X12.

9. VOLUME EXTRACTORS: STEEL OR ALUMINUM CONSTRUCTION WITH VANES ON 2" CENTERS, GANG OPERATED. MANUAL OPERATOR ATTACHED TO BRANCH DUCT OR IN THE CASE OF SIDEWALL REGISTERS OPERATION THROUGH FACE OF REGISTER.

10. DUCT LINER: LINER SHALL BE I" 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

II.DUCT SEALANT: NON-HARDENING, WATER RESISTANT, NON-COMBUSTIBLE,

SEALANTS SHALL HAVE APPROVED FIRE RATING FOR PLENUM APPLICATION AS REQUIRED BY CODE AUTHORITY.

12.LOUVER: 0.081" THICK EXTRUDED ALUMINUM, 4" BLADES SET IN

LIQUID OR MASTIC OR WITH TAPE AS RECOMMENDED BY MANUFACTURER.

ALUMINUM FRAME. 1/2" ALUMINUM MESH INTERIOR OF LOUVER. COLOR TO BE SELECTED BY ARCHITECT.

AMERICAN WARMING LE-49 & LE-23 OR EQUIVALENT.

AMERICAN WARMING LE-49 & LE-23 OR EQUIVALENT.

C. EQUIPMENT SCHEDULE:

SEE SCHEDULES ON DRAWINGS.

PRIOR TO INSTALLATION.

PART 3 EXECUTI

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.

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

4. PANNED SUPPLY AND RETURN DUCTS USING FLOOR JOISTS OR WALL CAVITY SPACE IS NOT ALLOWED UNLESS REVIEWED WITH THE ENGINEER

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

2. MAKE ALL DUCT CONNECTIONS TO MOTOR DRIVEN EQUIPMENT WITH FLEXIBLE

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

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. INSTALL MANUAL SPLITTER DAMPERS AND/OR OPPOSED BLADE DAMPERS IN ALL LOW VELOCITY DUCT DIVISIONS AND SPLITS WHERE SHOWN. SPLITTER DAMPERS SHALL HAVE PUSH ROD AND EXTERNAL LOCKING DEVICE.

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.
 PROVIDE 45 DEG. TAKEOFFS AT ALL RECTANGULAR DUCT TAKEOFFS EXCEPT

7. 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.

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. SUPPLY AND RETURN DUCTS FOR SWIMMING POOL AND HOT TUB ROOMS

SHALL NOT BE INSULATED ON THE INSIDE.

C. 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

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

SHALL BE SEALED WITH VAPOR BARRIER ADHESIVE.

2. INSULATE THE OUTSIDE OF ALL EXHAUST FAN DUCTS

WITH SHEET METAL EDGE COVER.

HOT TUB ROOMS.

END OF SECTION 15800

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

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

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Date/Revision:

11.16.18 SD Set 5.10.19 Permit Set

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Mechanical Specifications

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Sheet:

6.28.19 Construction