Exterior Steam Pipe Specifications:

PIPING SHALL BE MANUFACTURED BY PERMA-PIPE, THERMACOR, INSUL-TEK, OR APPROVED EQUAL. THE SYSTEM SUPPLIER SHALL HAVE AT LEAST FIVE YEARS EXPERIENCE FABRICATING SYSTEMS OF THE COMPOSITION DEFINED HEREIN. SYSTEM SHALL BE DRAINABLE, DRYABLE & TESTABLE, AND SUITABLE FOR HIGH-PRESSURE STEAM AT 150 PSIG SATURATED STEAM PRESSURE.

SUPPLIER SHALL QUOTE DELIVERY TIME WITH THE BID, BASED ON RECEIPT OF APPROVED SUBMITTALS.

GENERAL

ALL STRAIGHT SECTIONS, FITTINGS, ANCHORS AND OTHER ACCESSORIES SHALL BE FACTORY PREFABRICATED TO JOB DIMENSIONS. EACH SYSTEM LAYOUT SHALL BE COMPUTER ANALYZED BY THE PIPING SYSTEM MANUFACTURER, TO DETERMINE STRESSES AND MOVEMENT OF THE SERVICE PIPE. FACTORY TRAINED FIELD TECHNICAL ASSISTANCE SHALL BE PROVIDED FOR THE CRITICAL PERIODS OF THE INSTALLATION; I.E., UNLOADING, FIELD JOINT INSTRUCTION AND TESTING. SHIPPING COSTS SHALL BE INCLUDED – FOB JOBSITE (DULUTH STEAM CO-OP).

SERVICE PIPE

INTERNAL PIPING SHALL BE STANDARD WEIGHT SCH. 40 A53 ERW CARBON STEEL. PIPE SHALL BE BUTT WELDED FOR SIZES 2.5 INCHES AND LARGER. WHERE POSSIBLE, STRAIGHT SECTIONS SHALL BE SUPPLIED IN 40 FOOT RANDOM LENGTHS WITH 6 INCHES OF PIPING EXPOSED AT EACH END FOR FIELD JOINT FABRICATION.

SUBASSEMBLIES

END SEALS, GLAND SEALS AND ANCHORS SHALL BE DESIGNED AND FACTORY PREFABRICATED TO PREVENT THE INGRESS OF MOISTURE INTO THE SYSTEM. ALL SUBASSEMBLIES SHALL BE DESIGNED TO ALLOW FOR COMPLETE DRAINING AND DRYING OF THE CONDUIT SYSTEM.

EXPANSION JOINTS

PRESSURE-EQUALIZED EXPANSION JOINTS SHALL BE FURNISHED INTEGRAL WITH THE PRE-FABRICATED PIPE/CONDUIT SYSTEM. JOINTS SHALL BE MANUFACTURED BY FLEXONICS, METRA-FLEX, HYSPAN, OR APPROVED EQUAL, WITH WELD-ENDS, HAVING 300#/500F DESIGN RATING. OUTSIDE DIAMETER AND DRILLING PER ASME/ANSI B16.5. (300 LB. DRILLING FOR ALL 300 PSIG DESIGNS).

FIXED AND TRAVELING PIPE NIPPLES AND HOUSING SHALL BE MADE FROM ASME A53 GRADE B STANDARD WEIGHT STEEL PIPE. WELD END PREPARATION PER ASME/ANSI B16.9.

GUIDE RINGS SHALL BE STEEL PLATE PER ASME A-36.

DRAIN PORT & PLUG SHALL BE 3000 LB. THREAD-O-LET MADE FROM ASME A105 STEEL FORGING.

BELLOWS SHALL BE THREE OR FOUR PLY LAMINATED, MADE FROM ASTM A240 TYPE 321 STAINLESS STEEL.

SERVICE PIPE INSULATION

SERVICE PIPE INSULATION SHALL BE MINERAL WOOL. SPLIT INSULATION SHALL BE HELD IN PLACE BY STAINLESS STEEL BANDS INSTALLED NOT MORE THAN 18 INCHES APART. THE INSULATION SHALL HAVE PASSED THE BOILING TEST REQUIREMENTS SPECIFIED IN THE FEDERAL AGENCY GUIDELINES. THE INSULATION SHALL BE APPLIED TO A MINIMUM THICKNESS OF 2 INCHES.

OUTER CONDUIT

THE STEEL CONDUIT CASING SHALL BE SMOOTH WALL, 10-GAUGE HOT-DIPPED GALVANIZED WELDED STEEL CONDUIT.

CHANGES IN CASING SIZE, AS REQUIRED AT OVERSIZED CASING TO ALLOW FOR CARRIER PIPE EXPANSION, SHALL BE ACCOMPLISHED BY ECCENTRIC AND/OR CONCENTRIC FITTINGS AND SHALL PROVIDE FOR CONTINUOUS DRAINAGE.

ALL CASING WELDS, INCLUDING ELBOWS, ANCHORS, TEES AND END SEALS SHALL BE AIR TESTED AT 5 PSIG TO ASSURE CONDUIT TIGHTNESS PRIOR TO INSULATING. AIR TEST RECORDS WILL BE VERIFIED BY THE QA DEPARTMENT AND SUBMITTED TO THE ENGINEER FOR APPROVAL.

SUPPORTS

ALL PIPES WITHIN THE OUTER CASING SHALL BE SUPPORTED AT NOT MORE THAN 10 FOOT INTERVALS. THESE SUPPORTS SHALL BE DESIGNED TO ALLOW FOR CONTINUOUS AIRFLOW AND DRAINAGE OF THE CONDUIT IN PLACE. THE STRAIGHT SUPPORTS SHALL BE DESIGNED TO OCCUPY NOT MORE THAN 10% OF THE ANNULAR AIR SPACE. SUPPORTS SHALL BE OF THE TYPE WHERE INSULATION THERMALLY ISOLATES THE CARRIER PIPE FROM THE OUTER CONDUIT. THE SURFACE OF THE INSULATION SHALL BE PROTECTED AT THE SUPPORT BY A SLEEVE NOT LESS THAN 12 INCHES LONG, FITTED WITH TRAVERSE AND, WHERE REQUIRED, ROTATIONAL ARRESTERS.

OUTER CONDUIT INSULATION AND JACKET

CONDUIT INSULATION SHALL BE SPRAY APPLIED POLYURETHANE FOAM, MINIMUM 1" THICK, HAVING A NOMINAL 2 LB/FT3 DENSITY FOR ALL STRAIGHT LENGTHS AND FITTINGS. QUALITY ASSURANCE PROCEDURES FOR THE INSULATION SHALL INCLUDE EITHER A VISUAL CHECK PRIOR TO JACKETING, AN INFRARED INSPECTION OR AN X-RAY INSPECTION OF THE ENTIRE LENGTH TO INSURE THERE ARE NO INSULATION VOIDS. THE URETHANE FOAM SHALL HAVE THE MINIMUM CHARACTERISTICS OF 0.16 K-FACTOR, DENSITY OF 2 LB/FT3, CLOSED CELL CONTENT OF 90 TO 95% AND COMPRESSION STRENGTH OF 40 PSI.

THE POLYURETHANE FOAM INSULATION SHALL BE TESTED BY THE MANUFACTURER FOR MECHANICAL AND THERMAL PROPERTIES TO ASSURE COMPLIANCE WITH THE ABOVE VALUES. ALL TEST SAMPLES WILL BE TAKEN FROM PRODUCTION MATERIAL, IDENTIFIED, TAGGED AND TESTED IN ACCORDANCE WITH THE TABLE BELOW. TEST REPORTS SHOWING RESULTS WILL BE FURNISHED TO THE ENGINEER FOR APPROVAL. DATA SUPPLIED BY THE POLYURETHANE FOAM CHEMICAL SUPPLIER IS NOT ACCEPTABLE.

ATTRIBUTE	ASTM STD	SAMPLE FREQUENCY
INSULATION DENSITY	D 1622	ONCE PER SHIFT
INSULATION COMPRESSION STRENGTH	D 1621	ONCE PER SHIFT
INSULATION CLOSED CELL CONTENT	D 2856	ONCE PER SHIFT
INSULATION THERMAL CONDUCTIVITY	C 518	ONCE PER SHIFT

THE OUTER JACKET SHALL BE FIBERGLASS (FRP) OR POLYETHYLENE (HDPE), AND SHALL BE APPLIED DIRECTLY ONTO THE URETHANE FOAM INSULATION. NO PVC JACKETS SHALL BE ALLOWED. ALL STRAIGHTS AND FITTINGS SHALL BE FACTORY JACKETED.

Revisions		
No.	Date	Description
1	3/1/2011	ISSUED FOR MATERIAL PRICING - BID PACKAGE #1

FOSTER, JACOBS & JOHNSON, INC.
PROFESSIONAL ENGINEERS
345 CANAL PARK DRIVE
SUITE 200
DULUTH, MINNESOTA 55802
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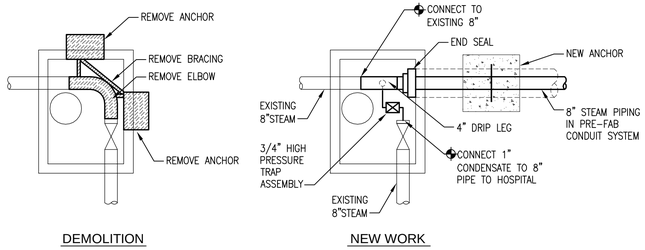
218.722.3931 fax
Email: mail@fjj.com

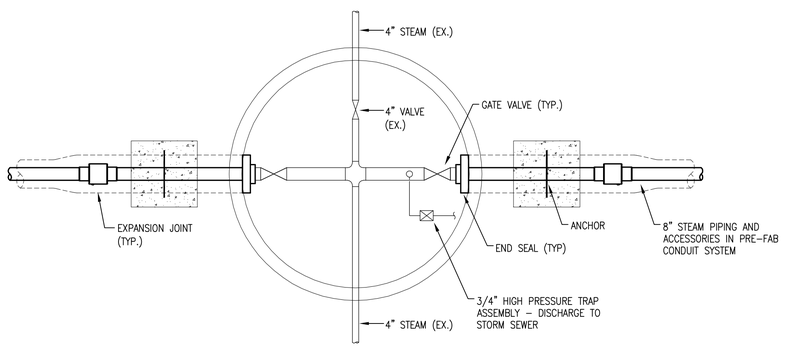


DEMOLITION NEW WORK

3 M1 EXISTING MANHOLE LAYOUT

1/4" = 1'-0"

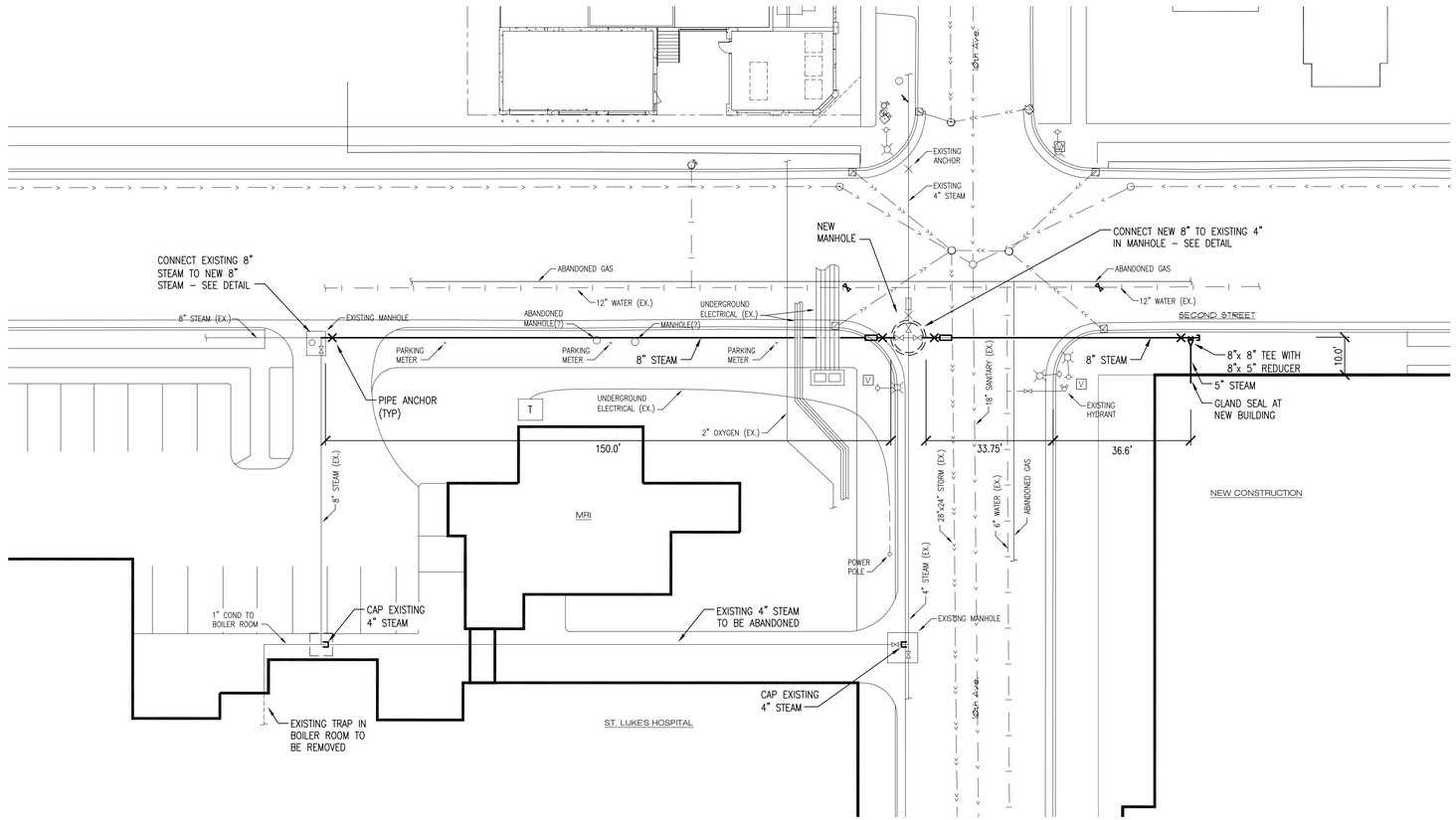
PLAN NORTH / TRUE NORTH



2 M1 NEW MANHOLE LAYOUT

1/4" = 1'-0"

PLAN NORTH / TRUE NORTH



1 M1 SITE PLAN

1" = 20'-0"

PLAN NORTH / TRUE NORTH

GRAPHIC SCALE
0 20 40
FEET

APPROVAL

Recommended for Approval _____ 20____

CITY ENGINEER – DULUTH

DULUTH STEAM EXTENSION
10TH AVENUE EAST & SECOND STREET
DULUTH, MINNESOTA

DRAWN BY: MRA
CHECKED BY: JRJ
PROJECT NO.: 11027
FILENAME: G:\11027\ 5138M1.dwg
REVISIONS:
DATE:

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Engineer under the laws of the State of Minnesota.

James R. Johnson
REG. NO: 15920 DATE:

LINE IS 1 INCH
AT FULL SIZE
(IF NOT 1"-SCALE ACCORDINGLY)

DRAWING NO:

M1

Sheet ___ of ___