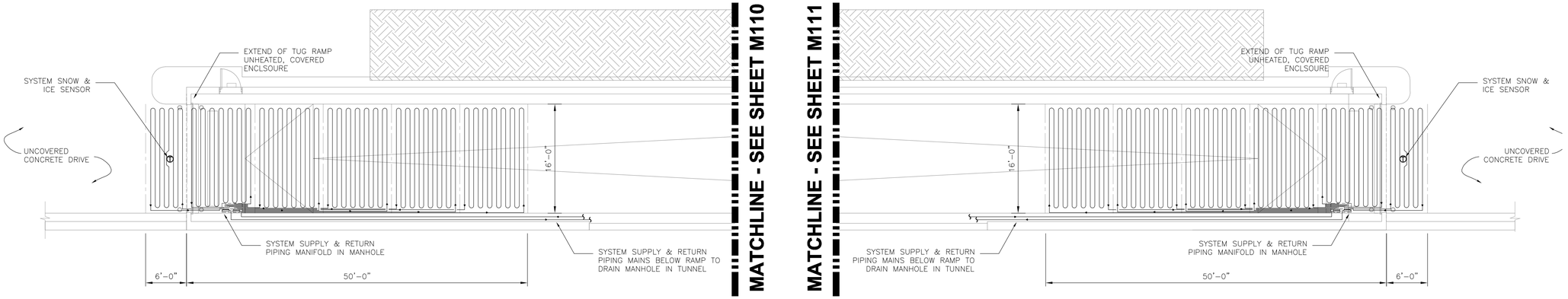
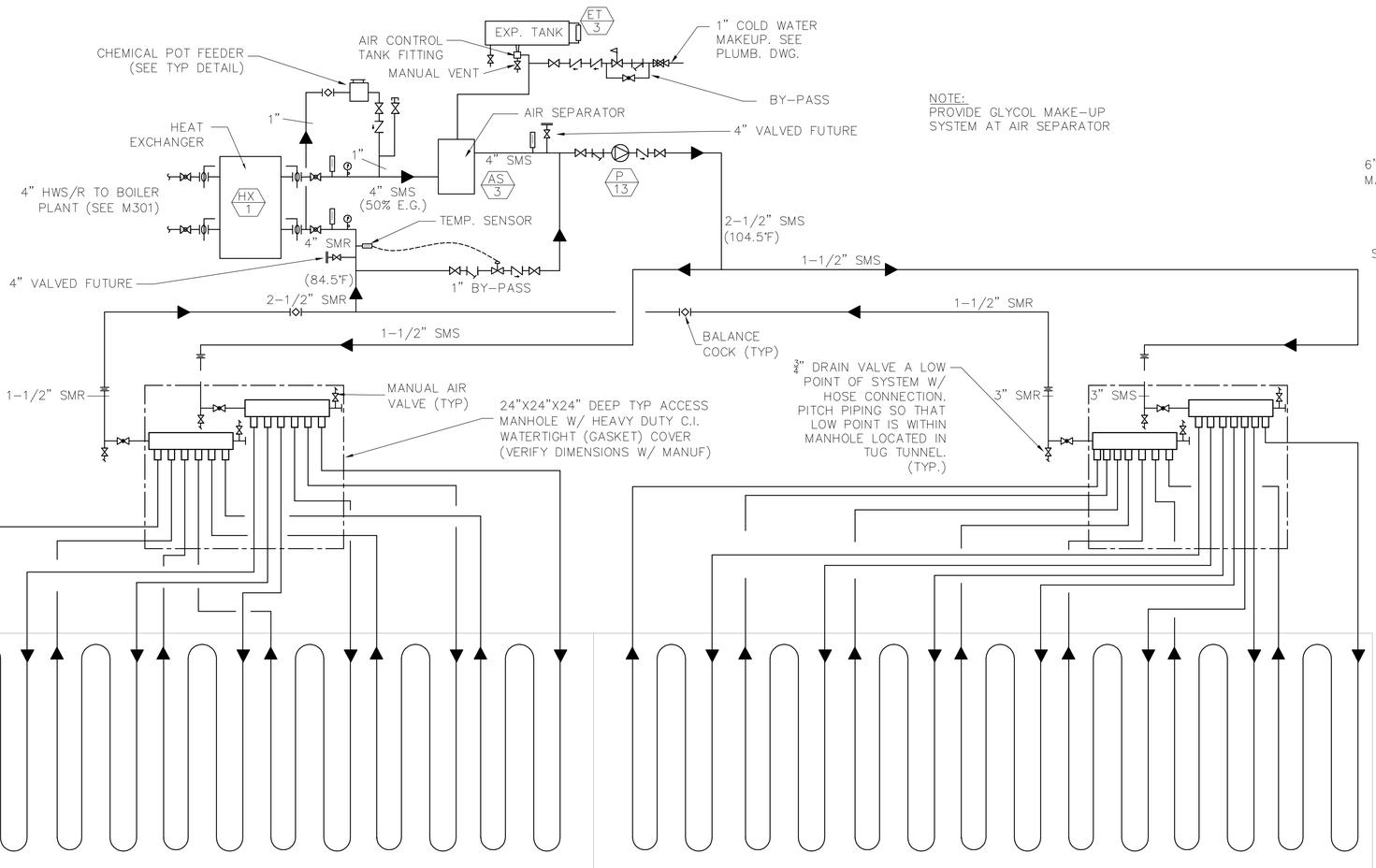


N 1 **ENLARGED FIRST LEVEL TUG TUNNEL WEST**
1/8" = 1'-0"

N 2 **ENLARGED FIRST LEVEL TUG TUNNEL EAST**
1/8" = 1'-0"



NOTE:
PROVIDE GLYCOL MAKE-UP SYSTEM AT AIR SEPARATOR

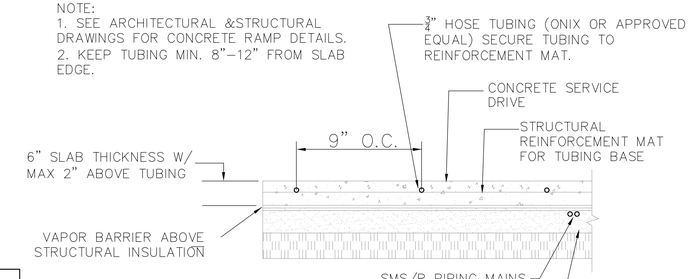
SNOW MELTING FLOW DIAGRAM
NOT TO SCALE

3 **SNOW MELT SYSTEM DIAGRAM, NOTES & DETAILS**
NO SCALE

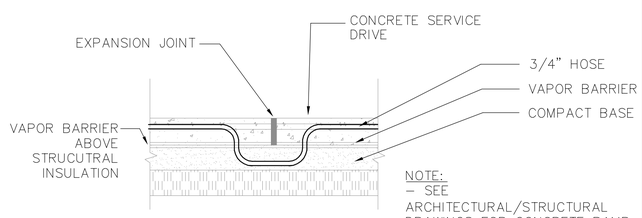
NOTES:

1. PROVIDE COMPLETE SNOW MELTING SYSTEM INCLUDING THREE ZONES, EIGHT CIRCUITS MAXIMUM PER ZONE (SEE PLANS), 9" O.C. SPACING PER CIRCUIT. PROVIDE 3/4" ONIX TUBING FOR CIRCUITS EMBEDDED IN CONCRETE SERVICE DRIVE RAMP.
2. TUBING WILL BE AS MANUFACTURED BY WATTS RADIANT, OR APPROVED EQUAL.
3. DISTRIBUTING MANIFOLDS SHALL BE REVERSE RETURN CONFIGURATION AND SHALL INCLUDE BRANCHES AND FITTINGS, MINI-BALL VALVES AT SUPPLY AND RETURN SIDE OF EACH TUBE, VENT/PURGE VALVES & TENSION CLAMPS.

NOTE:
1. SEE ARCHITECTURAL &STRUCTURAL DRAWINGS FOR CONCRETE RAMP DETAILS.
2. KEEP TUBING MIN. 8"-12" FROM SLAB EDGE.



TYP. SNOW MELTING HOSE DETAIL
NOT TO SCALE



TYP. HOSE DETAIL AT EXPANSION JOINT
NOT TO SCALE

NOTE:
- SEE ARCHITECTURAL/STRUCTURAL DRAWINGS FOR CONCRETE RAMP DETAILS.
- 12" LONG SLEEVE THROUGH EXPANSION JOINT IS ACCEPTABLE UPON REVIEW AND APPROVAL BY STRUCTURAL ENGINEER.

4. PROVIDE 40% ETHYLENE GLYCOL BY VOLUME IN SNOW MELTING HEATING WATER SYSTEM.
5. PROVIDE VENT/PURGE ASSEMBLY W/ HOSE CONNECTIONS ON RETURN SIDE MANIFOLDS. RETURN MANIFOLDS SHALL BE MOUNTED HIGHER THAN SUPPLY MANIFOLD FOR SAME ZONE.
6. THE SYSTEM SHALL BE DESIGNED AND TESTED FOR LEAKS, AT 100 PSIG MINIMUM PRESSURE.
7. SECURE & SUPPORT PIPING, 6'-0" ON CENTERS, & PITCH FOR DRAINAGE.
8. SLAB TEMPERATURE SENSORS SHALL BE PROVIDED FOR EACH ZONE. SENSOR & CONTROLLER TO BE PROVIDED BY TEKMAR OR APPROVED EQUAL. CONTROLS SHAL INTEGRATE BOILER & PUMP PACKAGES. ROUTE 3/4" PVC CONDUIT IN TOPPING SLAB FOR EACH SENSOR TO CONTROL PANEL IN BOILER ROOM. CONDUIT SHALL BE ROUTED FROM SENORS TO MANIFOLD MANHOLE FOR EACH ZONE. ROUTE CONDUIT TRUNK IN TOPPING SLAB AT SIDE OF RAMP TO MAIN CONTROLLER. LOCATE SENSOR APPROXIMATELY 2 FT. OFF WEST CURB OR PER MANUFACTURERS RECOMMENDATION.
9. BURIED SMS/R MAIN PIPING BELOW RAMP SHALL BE PRE-INSULATED, FLEXIBLE PEX PIPING (WATTS RADIANT R-FLEX OR APPROVED EQUAL). INSULATION SHALL BE CELLULAR FOAM MINIMUM 1" THICK, U=0.025 BTU/HR SQ.FT °F. JACKET SHALL BE CORRUGATED, DOUBLEWALL HDPE. PIPING SHALL HAVE OXYGEN BARRIER COATING. PROVIDE ALL FITTINGS BY SAME MANUFACTURER.

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DULUTH, MN

NEW PASSENGER TERMINAL

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ENGINEER CERTIFICATION
I hereby certify that the engineerinh plans, specifications or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.
Print Name: Douglas C. Mass
Signature:
Date: 08/16/10
Reg. No.: 21067

REVISIONS

NO.	DESCRIPTION	DATE
1	BP2A ADDENDUM 2	2.25.11

DATE ISSUED: 02-25-11
REVIEWED BY: MXB
DRAWN BY: JEH
DESIGNED BY: MXB

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213-1882-091

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SHEET TITLE
TUG TUNNEL RAMP SNOW MELT PLAN, FLOW DIAGRAM & DETAILS

SHEET NUMBER
1 M303

BID PACKAGE 2A
ADDENDUM 2

Drawing: I:\2038.00 Duluth Airport\5.0 CADD\(5.4) HVAC\Dwgs\M303_M303.dwg Plotted on: 2/25/2011 11:02 AM Plotted by: Brandt, Mark