

# DULUTH STEAM

## 4th Avenue West and 1st Street Steam Vault Repair

### Duluth, Minnesota

**STRUCTURAL NOTES:**

- GENERAL**
- Governing Specification is the 2008 Edition of the Minnesota Department of Transportation (MnDOT) Standard Specifications for Construction
  - Designed in accordance with the AASHTO LRFD Bridge Design Specification, 4th Edition
  - Design Loads:
    - HL-93 Design Vehicle
  - Contractor shall ensure high standards of workmanship throughout, with strict adherence to the contract documents.
  - Contractor to provide traffic control as required during construction
  - KOA is responsible only for the design of the steam vault cover as shown in the contract documents. Design of all secondary structure or non-structural elements are by others.
  - Notify the engineer immediately of any discrepancies between these notes, the contract drawings, the specification, or the governing code. The Engineer shall reply in writing. Any related work performed by the Contractor prior to receiving a reply from the Engineer is at the Contractor's sole risk. For purposes of bidding, the most stringent of the conflicting documents shall apply.
  - Verify all existing conditions; verify all dimensions in the field; verify mechanical and electrical openings for size, location and number; notify the engineer of any discrepancies or conditions not included in or contrary to the contract documents prior to shop drawing submittal or construction.
  - Coordinate the structural drawings with drawings from all other disciplines (including but not limited to Civil, Mechanical, and Electrical).
  - The structure shown in these drawings is designed to be stable and to resist the loads specified above only in a fully completed form. Contractor shall ensure that the structure is adequately braced and shored during construction for all temporary loads until all elements are in place, and shall ensure that temporary loadings do not exceed the allowable capacity of any structural elements both before and after these elements are in place.
  - Contractor is solely responsible for site safety, coordination, procedures, construction methodology, shoring, bracing, and sequencing.
  - Contractor is solely responsible for the protection of existing buildings, utilities, streets, equipment, etc. during construction. Provide temporary bracing and protection as required.
  - Do not scale drawings.
  - Any holes or other alterations to the structure which are not specifically detailed on the contract drawings shall be submitted to the engineer for approval.
  - These drawings, and all designs shown within these drawings, are copyrighted by Krech Ojard & Associates. Duplication is not permitted without written permission. The designs shown herein are intended for this project only and may not be used on any other project or for any other purpose.
- SUBMITTALS**
- Provide copies of all submittals to the Engineer, including one copy to be retained by KOA. Allow one week for review. Submittals will be reviewed for general conformance to the contract documents. Responsibility for adherence to the contract documents lies solely with the Contractor, including but not limited to dimensions, sizes, connections, and quantities.
  - Contractor shall review, mark, and stamp all submittals before submittal to the Engineer. Unreviewed or unstamped submittals will be returned to the Contractor without review.
  - Resubmittals shall have all revisions clearly identified with "drawing clouds" and revision dates. KOA shall not be responsible for review of any unmarked revisions.
  - Shop drawings, to include typical and unique conditions and all connections, shall be submitted to the structural engineer of record for the following products prior to fabrication. Shop drawings shall clearly demonstrate the Contractor's understanding of the contract documents. Where indicated below, shop drawings shall be sealed by a Professional Engineer licensed in the State of Minnesota:
    - Concrete/Masonry Reinforcing Steel
    - Concrete/Grout Mix Designs (including copies of previous test reports)
- SPECIAL INSPECTIONS AND TESTING**
- A special inspection agency shall be retained to perform the following special inspection and testing regimen. Special inspection and testing should be performed in accordance with the MnDOT 2008 Materials Control Schedule.
  - SOILS AND FOUNDATIONS:** Conformance of site preparation, fill placement, and in-place density to 95% Standard Proctor Density.
  - CONCRETE:** Reinforcing steel placement and welding, cast-in-place and post-installed anchor installation, verification of design mix use, tests for strength, slump, and air content, and maintenance of proper curing techniques. (Exceptions: not required for isolated column footings and slabs-on-grade)
  - Reference the electrical, and mechanical drawings and/or specifications for addition special inspection and testing requirements.
- STRUCTURAL OBSERVATION**
- Structural Observation will be performed as required. It shall be the Contractor's responsibility to keep the Engineer apprised of the general schedule of construction, such that observations may be made at appropriate stages before significant structural components (such as reinforcing bars, framing members, or wall holdowns) are obscured.

**REINFORCED CONCRETE**

Materials:

Concrete @ 28 days (56 days OK for fly ash or slag concrete):

APPLICATION	fc (psi)	w/c (max)	COARSE AGG. (max)	FLY ASH (%)	SILICA FUME (% substituted, by mass)	CRYSTALLINE WATERPROOFING
ROOF & WALLS	5000	0.42	3/4"	15%	5%	2-3%

- Cement: Type I or II per ASTM C150
- Fly Ash: Class C or Class F per ASTM C618
- Crystalline Waterproofing: Xypex's "C-500" or approved equal
- Corrosion Inhibitor: BASF Rheocrete CNI or approved equal @ 4.0 gallons per cubic yard dosage
- Fiber Reinforcement: Forea-Fero fibers @ 5 lbs per cubic yard dosage
- The use of water reducing agents and plasticizers may be required.
- Concrete exposed to weather shall have air entrainment as follows:

COARSE AGGREGATE	AIR CONTENT (+/-1.5%)
3/8"	7.5%
1/2"	7.0%
3/4" - 1"	6.0%
1 1/2"	5.5%

- Reinforcing Steel: Stainless steel A995, Gr 2205 or approved equal unless noted otherwise
- All reinforcing steel lap splices are to be Class B unless noted otherwise.
- Provide clear cover from outermost reinforcing to surface of concrete in accordance with following schedule:

EXPOSURE	ELEMENTS	BAR SIZE	CLEAR COVER
CAST AGAINST AND PERMANENTLY EXPOSED TO THE EARTH	ALL	ALL	3"
FORMED, EXPOSED TO THE EARTH OR WEATHER	ALL	#6 - #18	2"
		#5 OR SMALLER	1 1/2"
		#14, #18	1 1/2"
NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND	SLABS, WALLS, JOISTS	#11 OR SMALLER	3/4"
	BEAMS, COLUMNS (LONGITUDINAL, HOOPS, TIES, STIRRUPS, SPIRALS)	ALL	1 1/2"

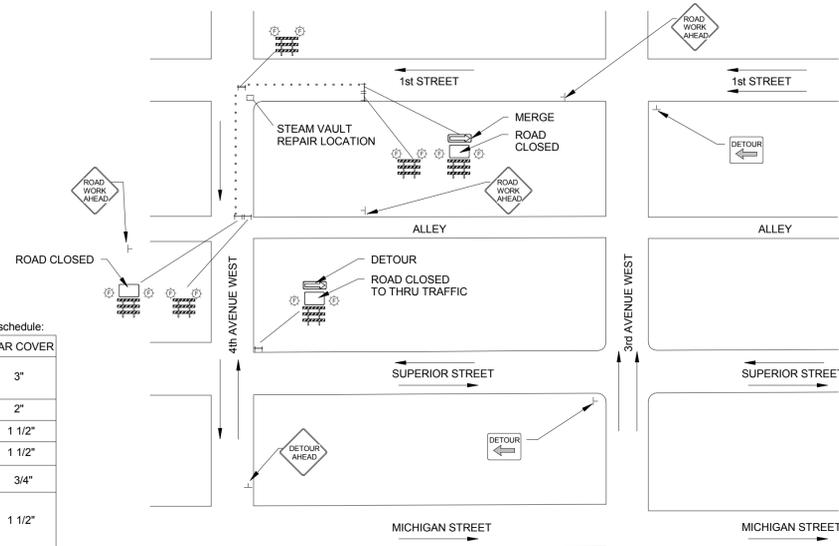
- Provide all accessories, chairs, spacer bars and supports necessary to secure steel in accordance with ACI Code of Standard Practice.
- Do not strip forms until concrete has reached adequate strength.
- Furnish and place all sleeves and openings as shown on the drawings or as specified.
- All reinforcing shall be shop fabricated, except #3 or #4 bars may be field bent. Bend bars only one time in any location, do not rebend.
- All hooked bars shall be a standard ACI shop fabricated hook unless noted otherwise.
- All concrete work shall conform to ACI 301 unless noted otherwise.
- Test cylinders shall be taken once per day or every 150 C.Y. of concrete placed, for each mix used, in accordance with MnDOT 2008 Materials Control Schedule.
- Observe all ACI recommendations for hot or cold weather concreting cure slabs using an approved curing compound or wet cure system per ACI recommendations, with special consideration for slag and fly ash concrete as appropriate.

**CONCRETE/MASONRY ACCESSORIES:**

- "Adhesive" or "Epoxy" anchors in solid base material shall be a stainless steel No. 5 bar set in HiHi HY 150 Max or approved equal. Hole preparation and rod installation shall be per manufacturer recommendation. Minimum embedment shall be 10 x rod diameter unless noted otherwise.
- Cast in place anchors shall be ASTM A316 Stainless Steel threaded rod with nut and washer at embedded end. Minimum embedment shall be 10 x rod diameter, but not less than shown on drawings, nor less than 7 inches. Anchors shall be affixed to form to prevent movement during casting, vibration, or set up and shall not be "Wet-Stubbed" into concrete. Embedment shall be measured from face of washer to surface of concrete.
- All concrete or grouted masonry must cure for a minimum of 7 days before any holes can be drilled, or any post installed anchors placed.
- All post-installed anchors shall be located to avoid drilling into reinforcement, unless specifically approved by the engineer. Reinforcement shall be placed with consideration for location of anchors.

**Exterior Waterproofing System:**

- The following approved waterproofing systems (60 mil minimum thickness) shall be installed on the exterior surfaces that are exposed for construction or repair (walls and roof slab):
  - Polyken No. 660 system (Polyken Industries)
  - Bituthene 4000 (Grace Construction Products)
  - Jiffy Seal 140/60 (Protecto Wrap)
  - Polyguard 650 (Polyguard Products)
  - Or approved equal



TRAFFIC CONTROL PLAN



ESTIMATED QUANTITIES				
TRAFFIC CONTROL				
	SIGN NUMBER	COLOR	SIZE	NO. REQD.
	TYPE III BARRICADE	ORANGE ON WHITE	6'	6
	W20-1	BLACK ON ORANGE	48"X48"	3
	W20-2	BLACK ON ORANGE	48"X48"	1
	M4-9L	BLACK ON ORANGE	30"X24"	2
	R11-2	BLACK ON WHITE	48"X30"	2
	R11-4	BLACK ON WHITE	60"X30"	1
	M6-1	BLACK ON ORANGE ARROW	48"X18"	2

**TRAFFIC CONTROL DEVICES LEGEND**

- SIGN
- BARRICADE
- RETROREFLECTIVE DRUM
- DIRECTION OF TRAFFIC FLOW

**GENERAL NOTES:**

ALL WARNING SIGNS SHALL BE BLACK ON ORANGE, DIAMOND GRADE IN CONFORMANCE WITH PART VI, INCLUDING THE FIELD MANUAL OF THE 2005 MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND THE LATEST REVISIONS AND THE MINNESOTA STANDARD SIGNS MANUAL.

ALL LANE CLOSURE SIGNS SHALL BE REMOVED OR COVERED AS SOON AS IT IS NO LONGER REQUIRED OR APPROPRIATE.

CHANNELIZING DEVICES SHALL BE SPACED NO FURTHER THAN 20 FEET APART.

TRAFFIC CONTROL DEVICES MAY BE ADJUSTED IN THE FIELD AS DIRECTED BY THE ENGINEER.

ALL SIGNS MUST BE CLEARLY VISIBLE TO TRAFFIC.

SHEET INDEX		
SHEET #	DESCRIPTION	REVISION
G100	TITLE SHEET	2
S101	PLANS AND ELEVATIONS	2
TCP	PROPOSED TRAFFIC CONTROL PLAN	

**WARNING**  
BEFORE DIGGING CALL  
1-800-252-1166  
REQUIRED BY LAW



STATE OF MINNESOTA

PROJECT LOCATION  
ST. LOUIS COUNTY  
CITY OF DULUTH

<b>DULUTH STEAM APPROVAL</b>	
RECOMMENDED FOR APPROVAL _____	DATE: _____
<b>CITY OF DULUTH ENGINEERING APPROVAL</b>	
RECOMMENDED FOR APPROVAL _____	DATE: _____

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, AND CONTRACT DOCUMENTS WERE 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.

NAME: PATRICK M. LEON  
SIGNATURE:   
DATE: 8/14/12  
LIC. No. 4702

Revision Schedule	Description	By	Date
ISSUED FOR CONSTRUCTION		PML	8/14/2012
EXTERIOR WATERPROOFING		PML	3/21/13
MISC. OWNER COMMENTS			4/01/13

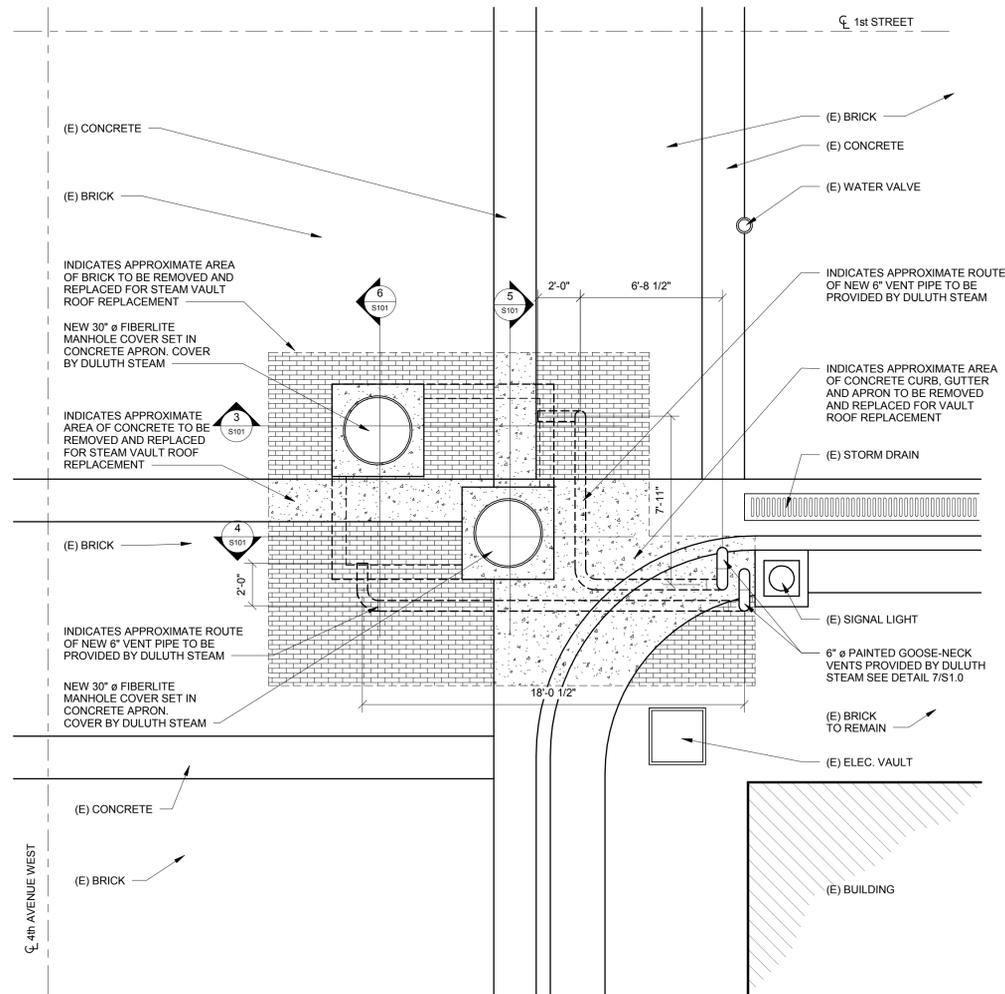
DULUTH STEAM  
4th Ave W. & 1st Street  
STEAM VAULT REPAIR

TITLE SHEET

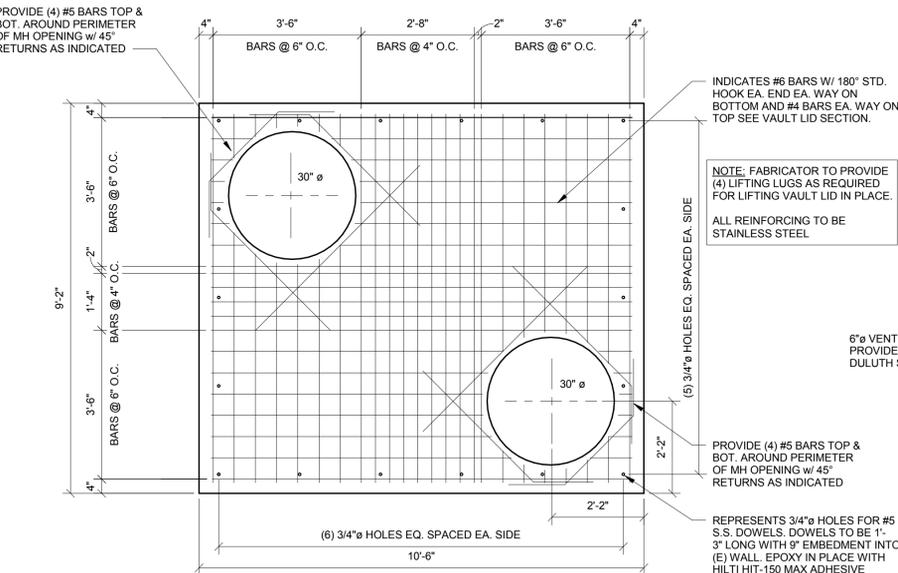
JOB No: 121070.02  
DATE: 8/14/2012  
DRAWN BY: JSW  
CHECKED BY: PML

SHEET:

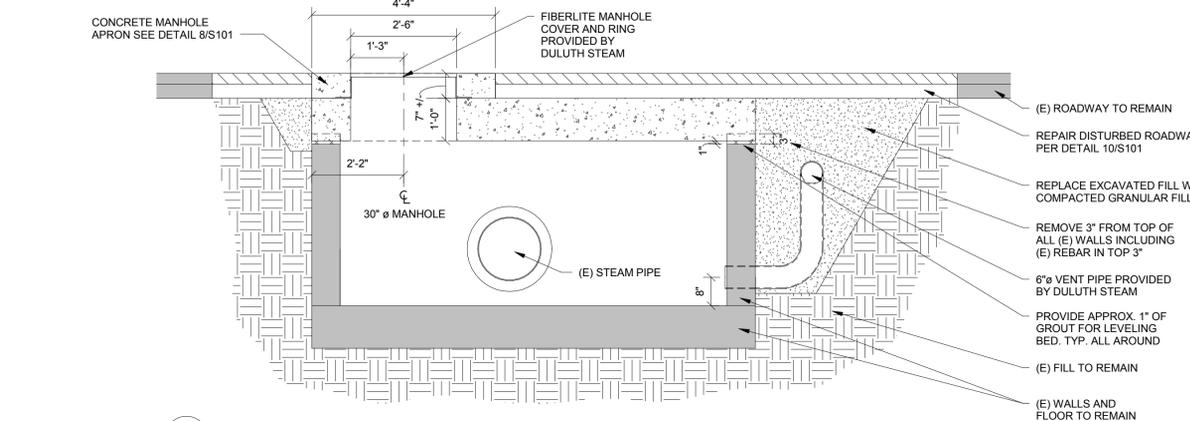
**G100**



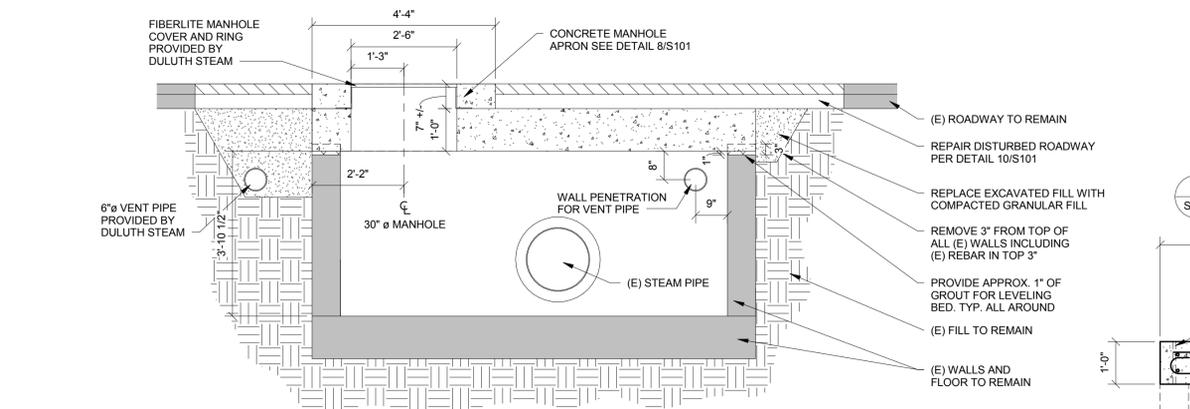
1 ENLARGED STEAM VAULT PLAN  
S101 1/4" = 1'-0"



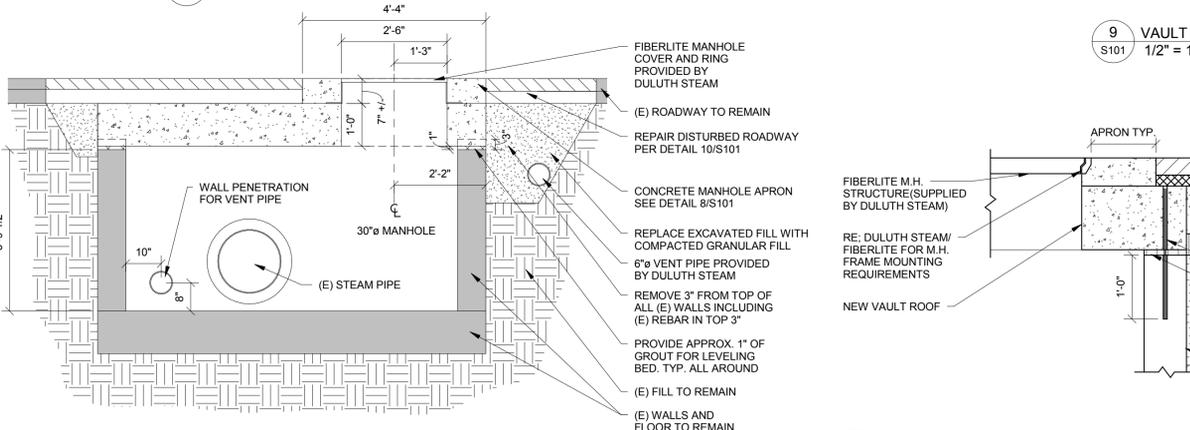
2 VAULT ROOF PLAN  
S101 1/2" = 1'-0"



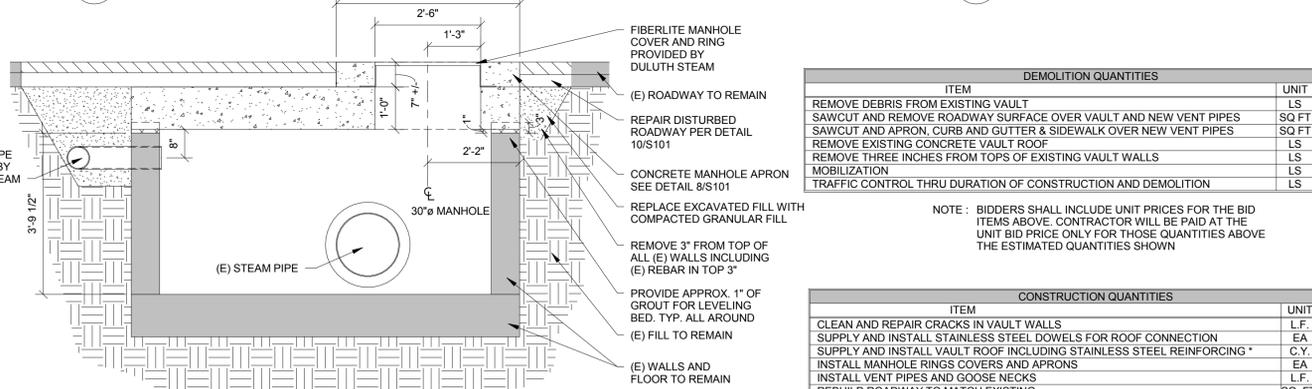
3 NORTH WALL ELEVATION LOOKING NORTH  
S101 1/2" = 1'-0"



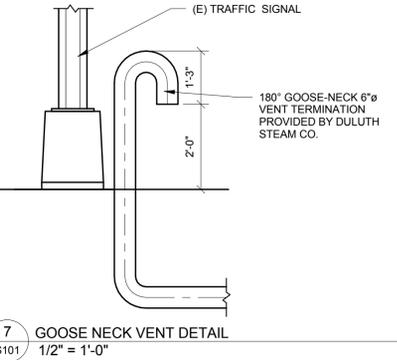
4 SOUTH WALL ELEVATION LOOKING SOUTH  
S101 1/2" = 1'-0"



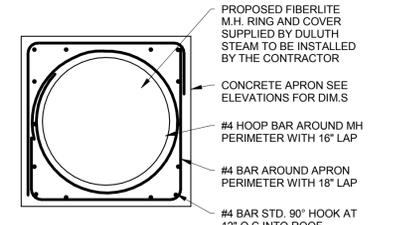
5 EAST WALL ELEVATION LOOKING EAST  
S101 1/2" = 1'-0"



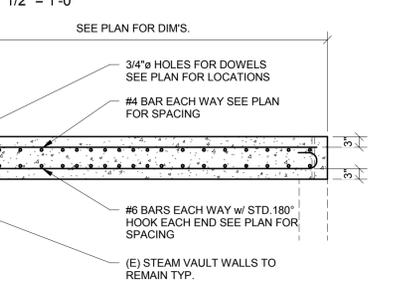
6 WEST WALL LOOKING WEST  
S101 1/2" = 1'-0"



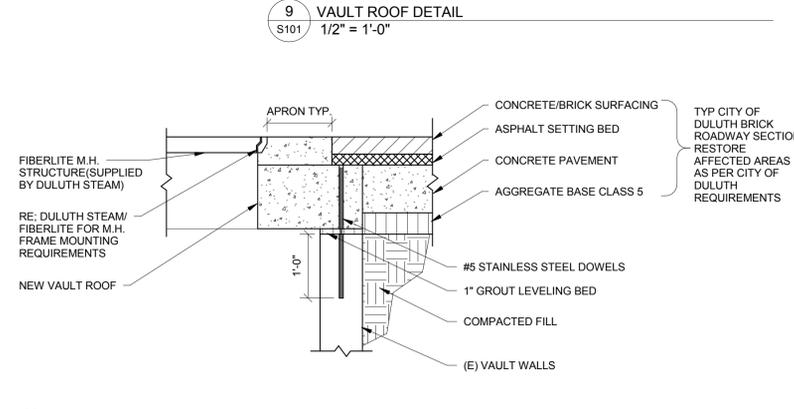
7 GOOSE NECK VENT DETAIL  
S101 1/2" = 1'-0"



8 TYPICAL MANHOLE APRON REINFORCING PLAN  
S101 1/2" = 1'-0"



9 VAULT ROOF DETAIL  
S101 1/2" = 1'-0"



10 MANHOLE APRON AND ROAD WAY REPAIR DETAIL  
S101 3/4" = 1'-0"

DEMOLITION QUANTITIES		
ITEM	UNIT	EST. QTY.
REMOVE DEBRIS FROM EXISTING VAULT	LS	1
SAWCUT AND REMOVE ROADWAY SURFACE OVER VAULT AND NEW VENT PIPES	SQ FT	216
SAWCUT AND APRON CURB AND GUTTER & SIDEWALK OVER NEW VENT PIPES	SQ FT	160
REMOVE EXISTING CONCRETE VAULT ROOF	LS	1
REMOVE THREE INCHES FROM TOPS OF EXISTING VAULT WALLS	LS	1
MOBILIZATION	LS	1
TRAFFIC CONTROL THRU DURATION OF CONSTRUCTION AND DEMOLITION	LS	1

NOTE: BIDDERS SHALL INCLUDE UNIT PRICES FOR THE BID ITEMS ABOVE. CONTRACTOR WILL BE PAID AT THE UNIT BID PRICE ONLY FOR THOSE QUANTITIES ABOVE THE ESTIMATED QUANTITIES SHOWN

CONSTRUCTION QUANTITIES		
ITEM	UNIT	EST. QTY.
CLEAN AND REPAIR CRACKS IN VAULT WALLS	L.F.	40
SUPPLY AND INSTALL STAINLESS STEEL DOWELS FOR ROOF CONNECTION	EA	18
SUPPLY AND INSTALL VAULT ROOF INCLUDING STAINLESS STEEL REINFORCING *	C.Y.	43
INSTALL MANHOLE RINGS COVERS AND APRONS	EA	2
INSTALL VENT PIPES AND GOOSE NECKS	L.F.	41
REBUILD ROADWAY TO MATCH EXISTING	SQ. FT.	216
REBUILD APRON, CURB AND GUTTER AND SIDEWALK TO MATCH EXISTING	SQ. FT.	160

\* USE APPROVED ARROWHEAD CONCRETE MIX FOR HIGH TEMPERATURE APPLICATIONS

- NOTES:
- SEE G100 FOR GENERAL NOTES AND SPECIFICATIONS
  - DO NOT SCALE DRAWINGS. SCALE IS FOR DESIGN REFERENCE ONLY
  - CONTRACTOR IS RESPONSIBLE SHORING AND BRACING
  - NOTIFY ENGINEER OF DISCREPANCIES OR DAMAGE PRIOR TO PROCEEDING WITH WORK
  - SUBSTITUTIONS FOR FASTENERS OR MATERIALS SHALL BE DONE IN WRITING
  - THE WORK COVERED BY THESE PLANS INCLUDES THE REPLACEMENT OF THE VAULT ROOF AND INSTALLATION OF VENT PIPING
  - EPOXY COAT THE ENDS OF ANY EXPOSED (E) RE-BAR IN (E) WALLS AFTER TOP 3" IS REMOVED
  - CONTRACTOR SHALL LOCATE EQUIPMENT ON SITE SO THAT NO EXHAUST FUMES GET PULLED INTO AIR INTAKE VENTS FOR EXISTING BUILDING.
  - BLAST CLEAN AND SEAL ALL NOTICEABLE CRACKS IN VAULT WALLS. USE 'SHAKUR 35 HI-MOD LV' OR EQUIVALENT EPOXY SEALANT ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, DIRECT SUPERVISION AND THAT I AM A DULUTH LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA  
NAME: PATRICK M. LEON  
SIGNATURE: [Signature]  
DATE: 6/10/12  
LIC. NO. 4702

Revision Schedule	Description	By	Check
1	ISSUED FOR CONSTRUCTION	PML	
2	MISC. OWNER COMMENTS		

Date	#	Description
8/14/2012	1	ISSUED FOR CONSTRUCTION
4/01/13	2	MISC. OWNER COMMENTS