

REINFORCED CONCRETE

-Materials:
Concrete @ 28 days:

APPLICATION	f _c (psi)	w/c (max)	COARSE AGG. (max)	FLY ASH (% substituted, by mass)	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: Fofex-Fibro 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%)
3/4" - 1"	7.5%
1/2"	7.0%
3/8"	6.0%
1 1/2"	5.5%

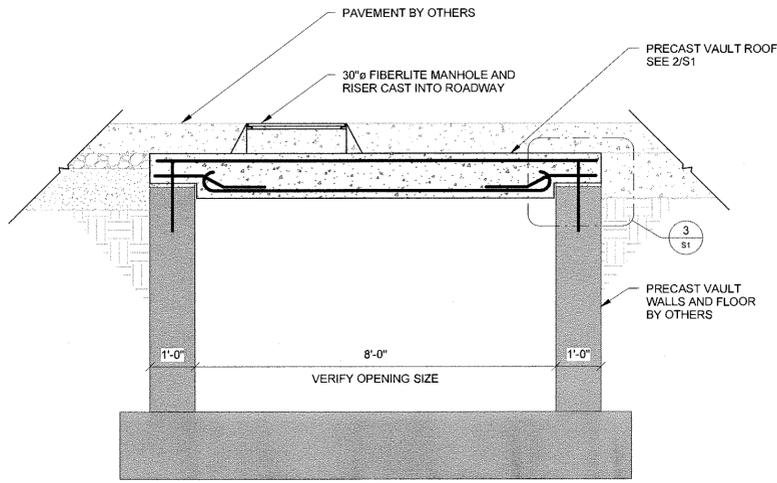
- Reinforcing Steel: Stainless steel A995, or 2205 or approved equal.
- All reinforcing steel lap splices are to be Class B per typical schedule unless noted otherwise.
- Provide clear cover from outermost reinforcing to surface of concrete in accordance with following schedule:

EXPOSURE	ELEMENTS	BAR SIZE	CLEAR COVER
CAST AGAINST AND PERMANENTLY EXPOSED TO THE EARTH	ALL	ALL	3"
		#6 - #18	2"
FORMED, EXPOSED TO THE EARTH OR WEATHER	ALL	#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"

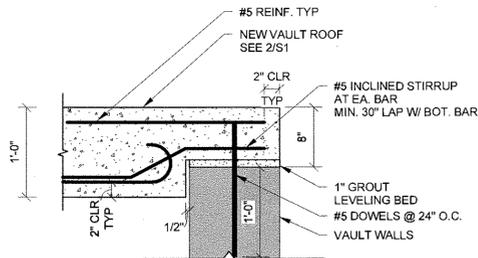
- Provide all accessories, chairs, spacer bars and supports necessary to secure steel in accordance with ACI Code of Standard Practice.
- Do not strip forms until concrete has reached adequate strength.
- Furnish and place all sleeves and openings as shown on the drawings or as specified.
- All reinforcing 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 2009 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:

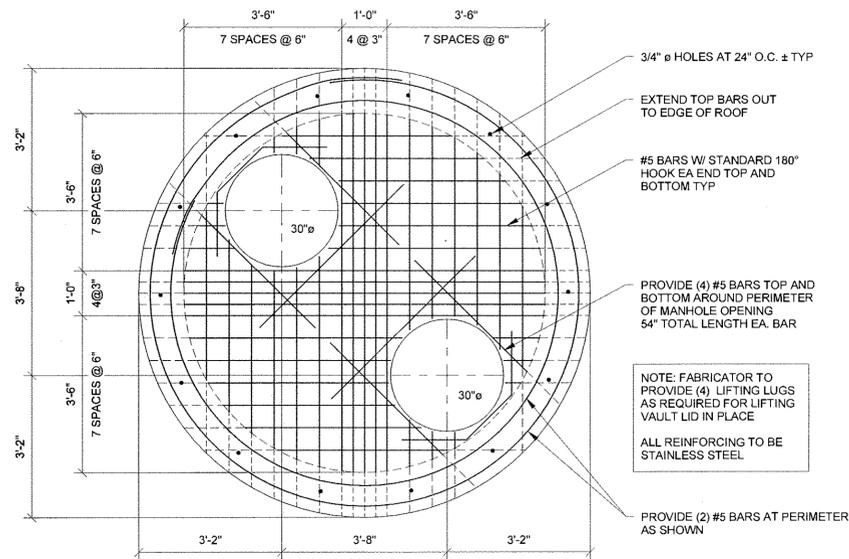
- "Adhesive" or "Epoxy" anchors in solid base material shall be a stainless steel No. 5 bar set in Hilti HY 150 Max or approved equal. Hole preparation and rod installation shall be per manufacturer recommendation. Minimum embedment shall be 10 x rod diameter unless noted otherwise.
- Cast in place anchors 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.



1 NEW MANHOLE SECTION
1/2" = 1'-0"



3 ROOF DOWEL DETAIL
1" = 1'-0"



2 VAULT ROOF REINFORCEMENT DETAIL
1/2" = 1'-0"



ISSUED FOR CONSTRUCTION

KRECH OIARD & ASSOCIATES P.A.
Engineers & Architects

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I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY CLOSE PERSONAL SUPERVISION AND THAT I AM A LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

NAME: PATRICK M. LEWIS
SIGNATURE: *P.M. Lewis*
DATE: 6/20/11
LIC. NO. 47102

#	Date	Revision Schedule	
		Description	By

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

PRECAST VAULT ROOF

JOB No: 111072
DATE: 6/20/11
DRAWN BY: JSG
CHECKED BY: PFB

SHEET:
S1