

Transmission & Distribution
Material & Installation Specification

Precast Vault

I. Quantity

The base bid shall include the indicated number of Vault with Frame and Grate units furnished and installed as hereinafter specified.

II. Material

- A. Certification - National Precast Concrete Association 2011 or latest edition.
- B. Load Rating - AASHTO H-20 including grate.
- C. Design - 5000 PSI concrete mix. Air 6% +/- 2% per Ohio Department Transportation standards.
- D. Inside Dimensions - 17'- 0" L x 10' 0" W x 10'-6" H. minimum.
- E. Four (4) Interlocking Wall Sections - 10.6 ton +- (Bottom), 9.0 ton +-(Bottom Riser), 9.0 ton +- (Top Riser), and 10.8 ton +- (Top).
- F. Sump Tile - 18" dia. minimum x 2'-0" L vitrified.
- G. Cast Iron Frame and Covers - 36" manhole lid and frame. Neenah R-1752, with "MELP" cast into cover, or approved equal.
- H. Pulling Iron - Pulling irons shall be model PI-1, as manufactured by Pennsylvania Insert Corp. or approved equal and shall be 7-strand, 1/2" stress relieved carbon steel cable designed for concrete applications the ultimate strength of the cable shall be 270 kips. The exposed portion of the pulling iron shall have a molded Hytrel polyester elastomer encapsulated.

The ends of the pulling iron shall have plastic protective caps. Safe working load varies with application. Location of pulling irons shall be determined in submittal review to coordinate with duct bank exits.

- I. Pockets - Pulling iron pockets and pocket lids shall be manufactured by Pennsylvania Insert Corp. or approved equal and shall be injected molded from high strength polystyrene. Pocket shall be designed to cast Pulling Irons recessed in walls. Pocket shall feature grooves molded into its surface to facilitate mounting of part with wire. Pocket Lid shall fit into Pocket and shall be reusable. Opening in bottom of pocket shall be sized to prevent concrete leakage when used with Pennsylvania Insert Pulling Irons.
- J. Cable Racking - 1/2" Ackerman-Johnson insert or approved equal as shown on the drawings. Rack stanchions shall be non-metallic. Length as required but 3' minimum, as manufactured by Underground Devices Cat #CR36-B, or equal, and be butted together to achieve a minimum total length each of 72". Quantity of racks shall be provided for installation at each vertical row.
- K. Cable Arms - Hooks shall be Non-Metallic, 11" maximum length as manufactured by Underground Devices Cat # RA11, .218" deflection @ 400 lbs. or engineer approved equal. Provide quantity of rack arms that equal 4 arms per station provided.
- L. Cable sling - cable sling shall be manufactured by Underground Devices or approved equal and shall be UL listed, non-corrosive, non-flammable polymer, capable of holding up to a 3" diameter cable, or several smaller cables.
- M. Lifting Insert - Provide lifting inserts that will accept a 1" minimum shackle bolt shall be installed per the pre-cast manufacturers recommendation, minimum of four, for each segments weight and balance involved that will provide for level lifting and maximum safety of personnel.
- N. Link seal – Link seal shown in detail 4 and 5 shall comply with the following:
 - 1. Pressure resistant to 20 psig (40ft of head)
 - 2. Oil resistant – Nitrile rubber (green)
 - 3. Hardware – S316 stainless steel

Per ASTM F593-95 tensile strength = 85,000 psi, average.

Material properties of Link-Seal modular seal elements:

<u>Property</u>	<u>ASTM Method</u>	<u>Nitrile</u>
Hardness (shore A)	D2240	50+/-5
Tensile	D-412	1300 psi
Elongation	D-412	300%
Compression set	S-395	45%, 22hrs. @ 212°F
Specific gravity	D297	1.15

CITY OF COLUMBUS DEPT. OF PUBLIC UTILITIES – DIVISION OF POWER PRECAST VAULT		
DRAWN BY: AEC	DATE: 01/01/2018	TDMIS-1014
APPROVED: <i>[Signature]</i>		
	SHEET 1 of 16	

- O. Precast Joint Sealant - Con Seal CS-102, or approved equal. The Sealant is to meet or exceed the requirements of the Federal Specification SS-S-210 (210-A), AASHTO M-198B, and ASTM C-990-91. The Sealant is to provide permanently flexible watertight joints and low to high temperature workability of 30 deg. F to 120 deg. F. The hydrostatic strength shall be required by ASTM C-990 section 10.1.
- P. Grate Opening - 9'-8" x 5'-6". This grating, having a 1/2" max. opening conforms with the Americans with disabilities act accessibility guidelines (ADAAG) issued in June, 2002. The ADAAG notice of proposed rulemaking issued November 16, 1999 for grating. Amended September, 2002. The elongated grate openings shall be perpendicular to the dominate direction of travel.
 Grating - Wheels N' Heels 23-WH-4 series heavy duty grating by Ohio Gratings, Inc., or approved equal.
 Bearing bars -To be 1/4" x 4 1/2" ASTM A-36 bar spaced 1- 7/16" CC, and 2" x 3/16" filler bars spaced 1- 7/16" CC, 1/2" open space between bars.
 Cross Bars - To be 1" x 1/4" bar spaced 4" CC and welded at right angles with one fillet at each bearing bar/filler bar/cross bar intersection.
 Surface - Shall be a slip resistant surface using plasma stream disposition of steel on steel or CNC laser disposition process.
 Loading - AASHTD H20.
 Finish - Hot dipped galvanized.
 Fabrication and tolerances - In accordance with the NAAMM heavy duty metal bar grating manual.
 Grating shall be provided with a minimum of four stainless steel threaded bosses per section, welded into the grate fabric at joints that will accept 1/2" threaded eyebolts for lifting grates with cable Beckys and shackles. 1/2" thread shall be at least 2" long and shall be recessed below the top of grate. Provide eyebolt for each of the for lifting bosses. Provide temporary threaded plug, semi-flush with top of grate to protect boss and threads when not in use. See detail drawings TDMIS-1014.
- Q. Grounding - Provide four (4) 1 1/4" holes in vault floor at opposing corners as show on drawings to allow for ground rod installation.
 Contractor shall provide 1/2" dia. x 10' long Copper clad steel ground rods, with a minimum 10 mil copper clad, in each corner of vault as require to achieve less than 25 Ω resistance.
- R. Vault Dewatering system - Provide a complete and operational dewatering system as follows.

1. Fusible disconnect switch shall be 30A, 600V, 2 pole, solid neutral with bonding screw, NEMA 4X stainless steel with fuses (plus 2 spares) as required for transformer and pump load.
2. Transformer shall be single phase, 3KVA minimum, 480V primary and 120V secondary. Core and coils shall be epoxy encapsulated "potted" and enclosed within a 302 stainless steel enclosure. Mixture of silica, sand and resin forming a solid mass completely enclosing and protecting the core and coil, and should also significantly reduces audible noise.
 - Windings, utilize class 220°C Insulating rated for 150°C Rise, but designed to operate at 115°C maximum.
 - The transformer's core shall be solidly grounded.
 - Enclosure constructed from heavy gauge steel, coated with ASA#61 grey powder paint
 - Suitable for NEMA/CSA Type 4X enclosure applications for both indoor and outdoor
 - Wiring compartment (bottom or front access may depend on size)
 - Standard Primary Taps
 - CSA Certified
 - UL Listed
 - ISO9001 Quality Certification
 Entire assembly shall be rated NEMA 4X.
3. Hydrocarbon discriminating pump and control package shall be See Water Inc., or engineered approved equal by Myers "Pentek" series. System shall include:
 - NEMA 4X Outdoor/indoor rated enclosures.
 - Visible indicators – Yellow Oil Light, White Water Light, Green Pump Run Light, HOA switch, High Red Beacon Alarm Light, 85 Decibel Alarm.
 - Oil Smart On & Off Pump Controller
 - Liquid Smart Alarm Sensor
 - Dry contacts for SCADA/building management systems for 24/7 monitoring
 - No float switches or other moving parts shall be accepted
 - Completely UL / CSA Certified

CITY OF COLUMBUS DEPT. OF PUBLIC UTILITIES – DIVISION OF POWER PRECAST VAULT		
DRAWN BY: AEC	DATE: 01/01/2018	TDMIS-1014
APPROVED: <i>[Signature]</i>		
	SHEET 2 of 16	

4. Submersible Pump shall have the following characteristics:
- Cast Iron Construction
 - ½ HP, 60 Hz, 1 ½" NPT Discharge
 - Integrated with a float operated mechanical switch, no external control required.
 - Non-clogging engineered thermoplastic vortex impeller design.
 - Completed UL/CSA Certified.
 - Basis of design: Zoeller "Flow-Mate" Model 98

III. Installation

A. The installation shall be as shown on all applicable sheets of TDMIS-1014.

IV. Method of measurement

Shall be per each based on a complete and operational vault including all miscellaneous precast items, grates, frames, covers, sumps, pumps, inserts, racks, arms, slings, grounding system, excavation and backfill, surface restoration, as shown and/or as required.

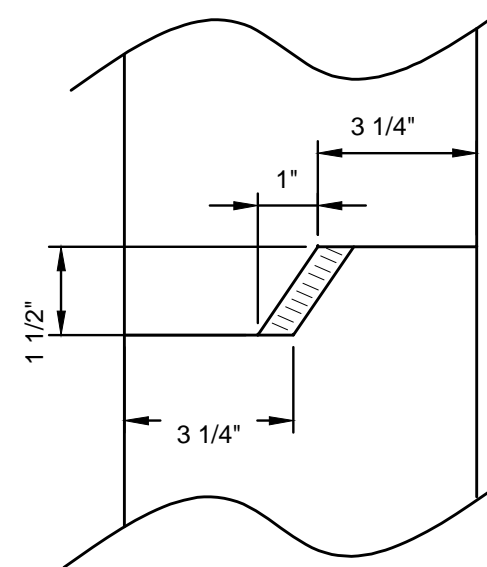
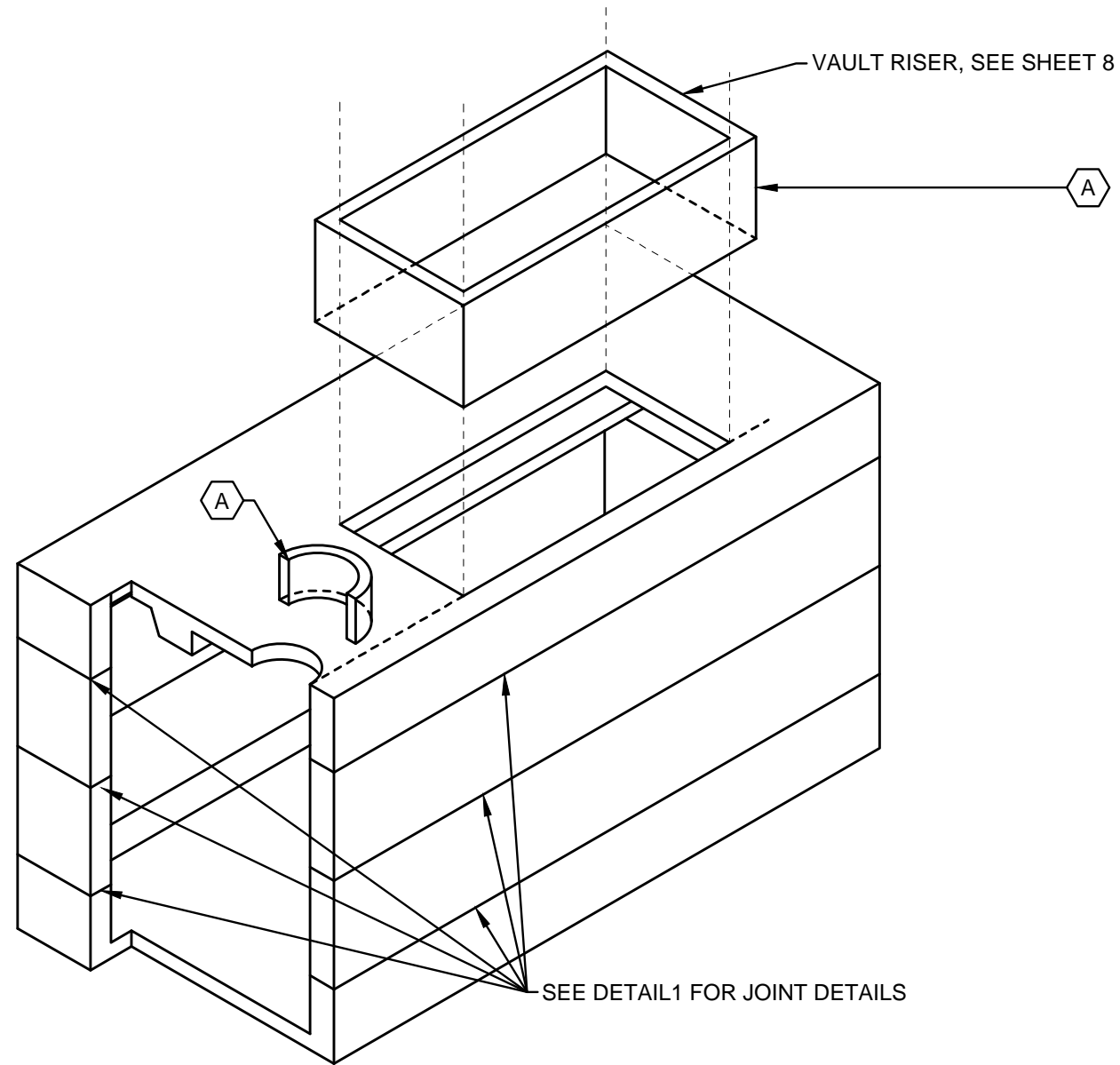
V. Basis of payment

Items	Unit	Description
TDMIS-1014	Each	Vault with frame and grate module

CITY OF COLUMBUS DEPT. OF PUBLIC UTILITIES – DIVISION OF POWER PRECAST VAULT		
DRAWN BY: AEC	DATE: 01/01/2018	TDMIS-1014
APPROVED: <i>[Signature]</i>		
	SHEET 3 of 16	

CODED NOTES:

A 9'-8" X 5'-6" OPENING AND 36" DIAMETER
M.H. OPENING LOCATION SHALL BE GIVEN
AT TIME OF ORDERING.



DETAIL 1
JOINT

CITY OF COLUMBUS, OHIO
DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER

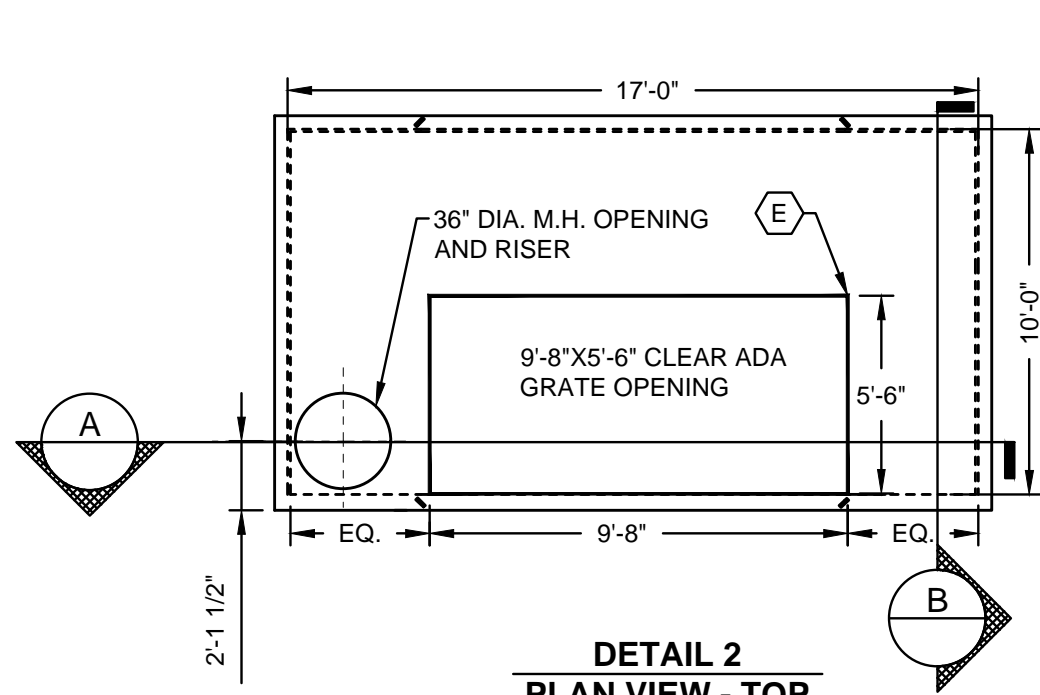
**PRECAST VAULT
ENGINEERING STANDARD
02E0020**

DRAWN BY: AEC DATE: 01/01/2018

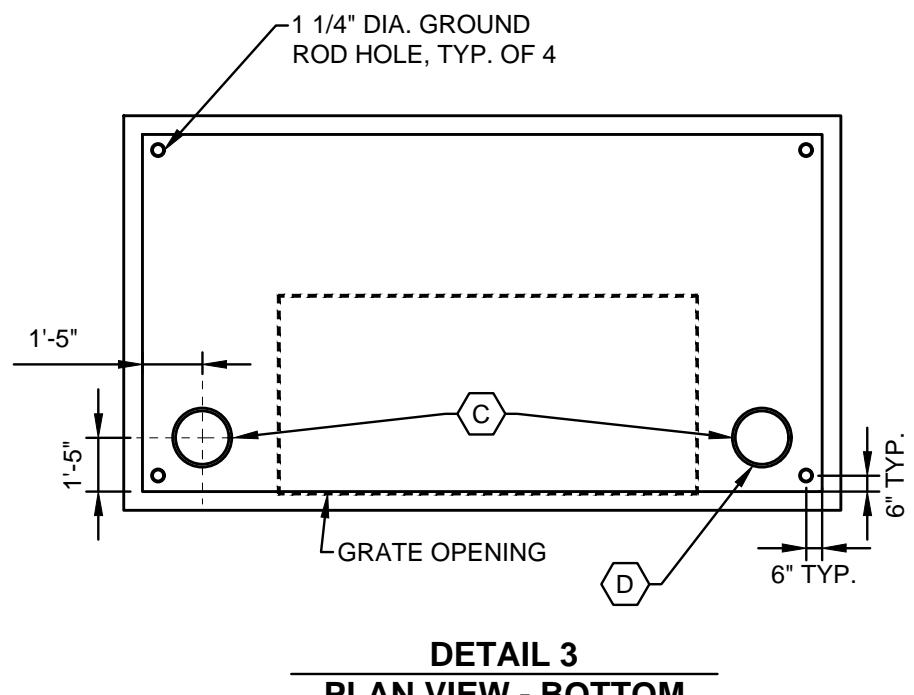
APPROVED: *[Signature]*

SCALE: NTS SHEET: 4 OF 16

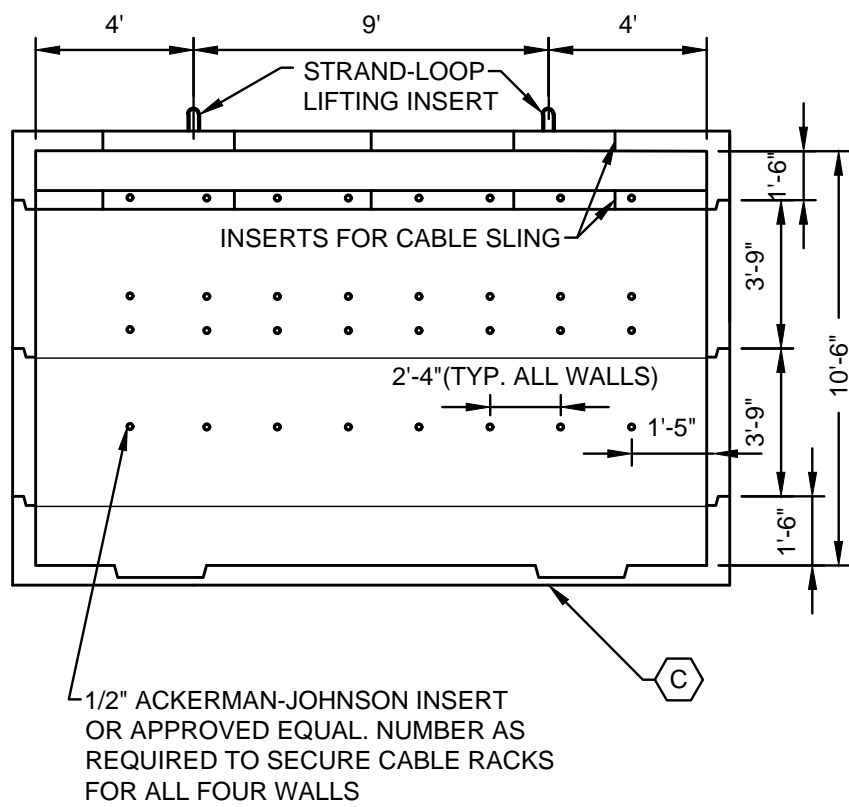
TDMIS-1014



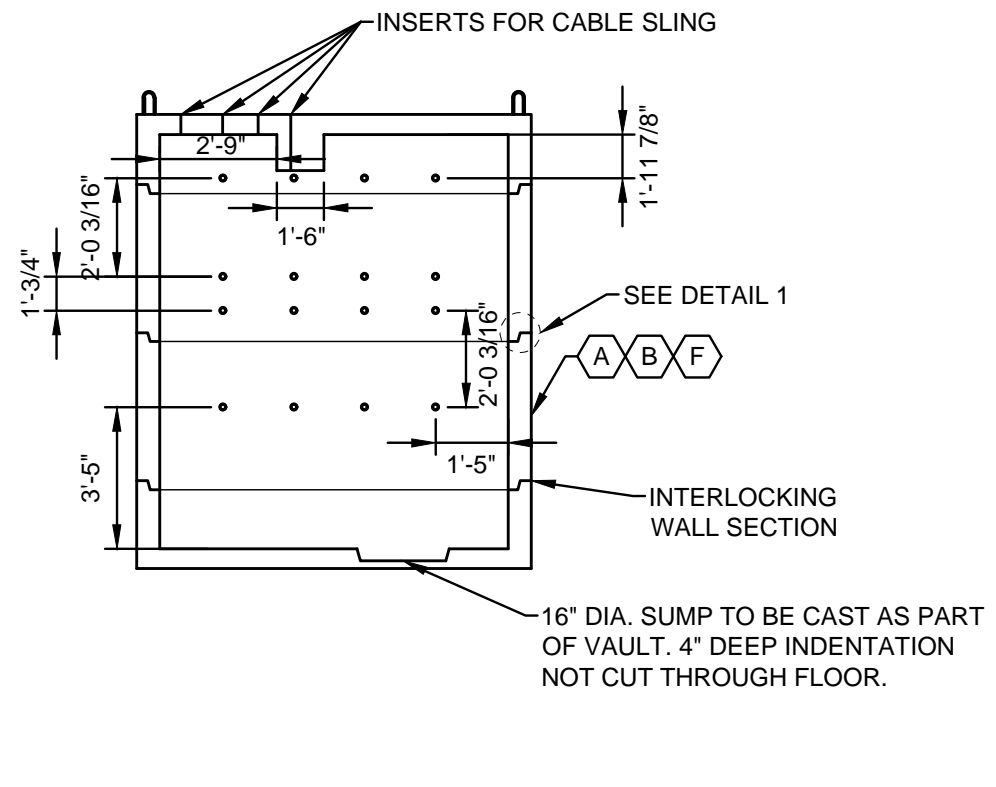
DETAIL 2
PLAN VIEW - TOP



DETAIL 3
PLAN VIEW - BOTTOM



SECTION A
INSERTS

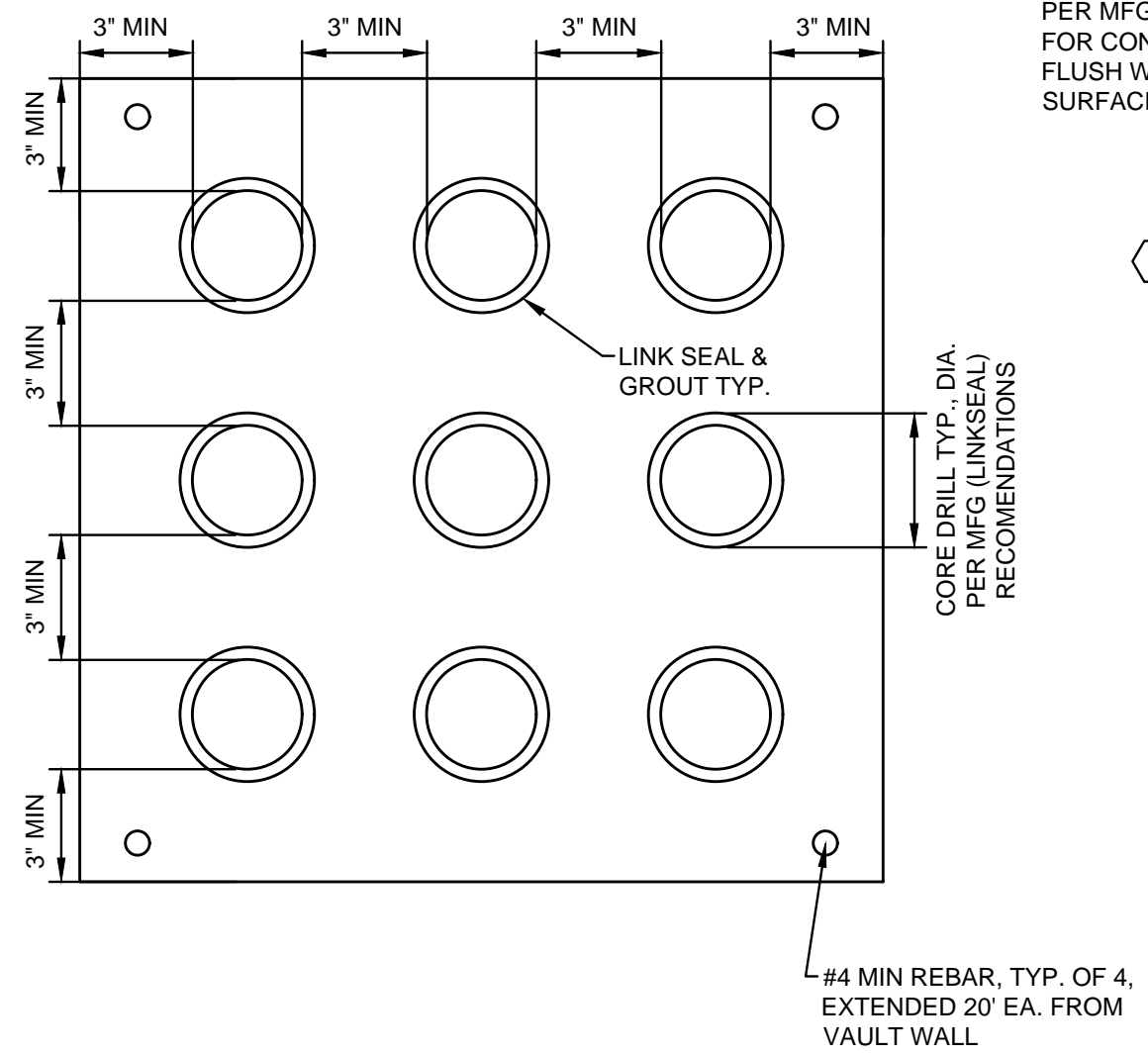


SECTION B
INSERTS & SUMP

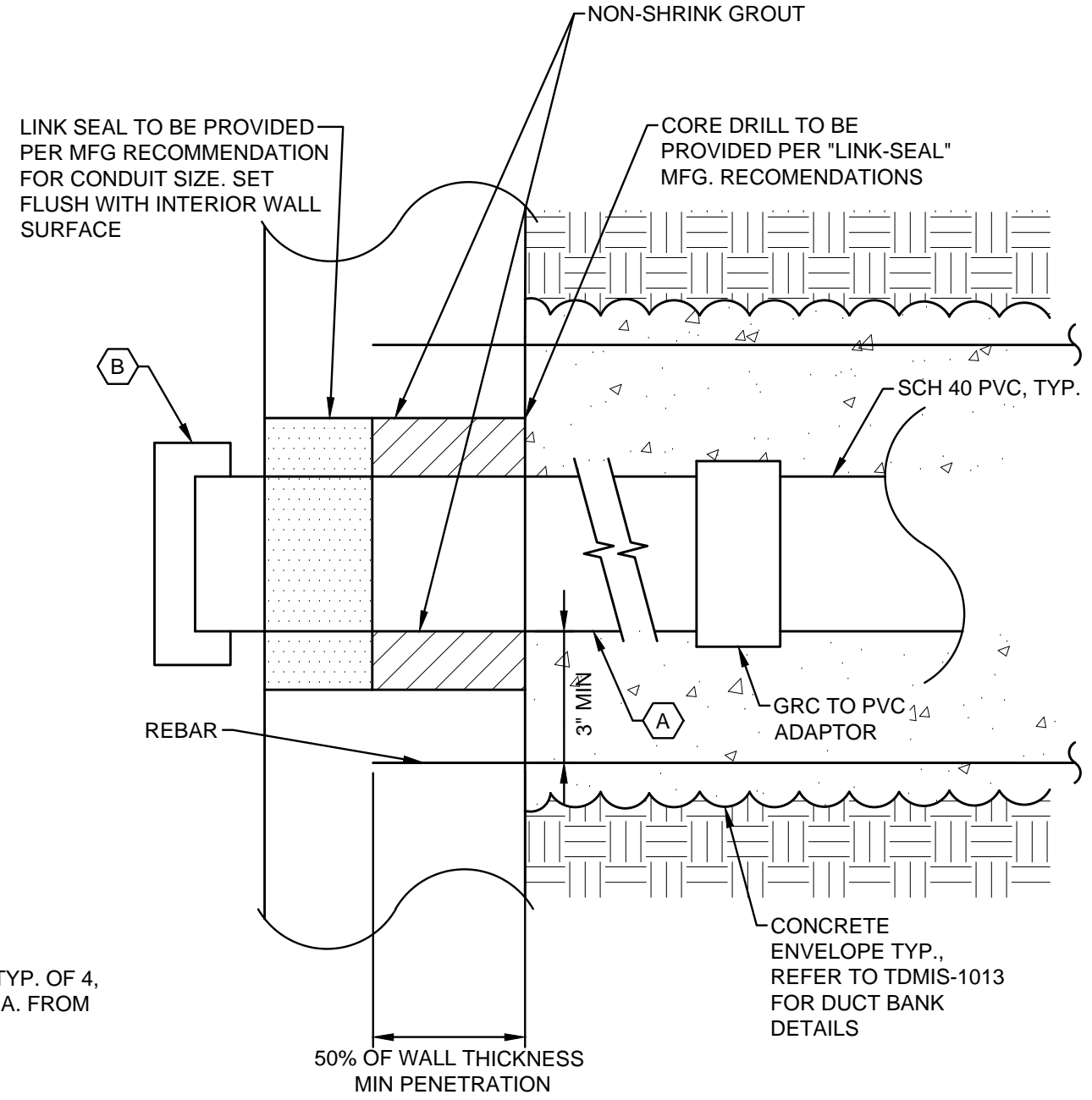
CODED NOTES:

- (A)** PULLING EYES SHALL BE LINE MATERIAL CO. STYLE NO. DU2T3 OR APPROVED EQUAL. (ALL SIDES). PULLING EYES SHALL BE LOCATED ON SHOP DRAWINGS PER PROJECT REQUIREMENTS. SEE SPECIFICATIONS.
- (B)** KNOCK OUTS OR WINDOW LOCATION AND SIZES MAY BE GIVEN AT TIME OF ORDERING.
- (C)** TWO SUMP PITS REQUIRED. 16" DIA. SUMP TO BE CAST AS PART OF VAULT. 4" DEEP INDENTATION NOT CUT THROUGH FLOOR. INSTALL PLUMBING TO PIT NOT UNDER MANHOLE OPENING.
- (D)** FLOOR SHALL BE SMOOTH FINISH, SLOPE 0.03" PER FOOT TOWARD THIS SUMP.
- (E)** GRATING OPENING SHALL NOT BE ABOVE EITHER SUMP PIT.
- (F)** ADJUST LOCATION OF INSERTS AS NEEDED IF WINDOWS OR KNOCKOUTS ARE DESIGNED IN THE AREA.

CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER		
PRECAST VAULT ENGINEERING STANDARD 02E0020		
DRAWN BY: AEC	DATE: 01/01/2018	TDMIS-1014
APPROVED: <i>[Signature]</i>		
SCALE: NTS	SHEET: 5 OF 16	



DETAIL 4
CONDUIT PENETRATION



DETAIL 5
CONDUIT PENETRATION - SIDE VIEW

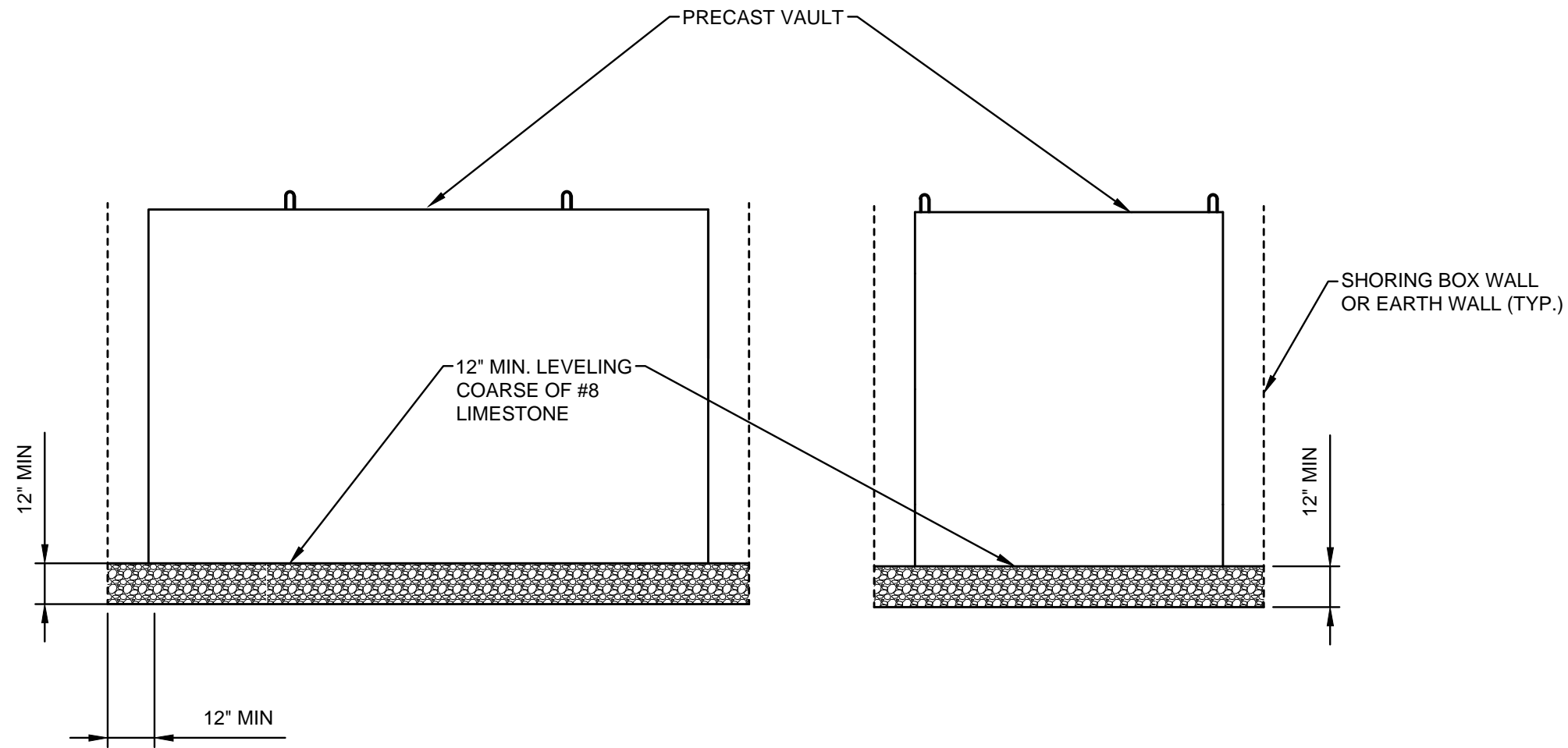
CODED NOTES:

- (A) FIRST 10' OF CONDUIT SHALL BE RIGID GALVANIZED STEEL FOR EACH CONDUIT
- (B) GROUNDING BUSHING. EXTEND #6 SOLID SOFT DRAWN BARE COPPER TO GROUND GRID FOR EACH CONDUIT.

GENERAL NOTES:

1. THE PENETRATION IS 5"C MIN. FOR PRIMARY, 4"C MIN. FOR SECONDARY.

CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER		
PRECAST VAULT CONDUIT PENETRATION		
DRAWN BY: AEC	DATE: 01/01/2018	TDMIS-1014
APPROVED: <i>[Signature]</i>		
SCALE: NTS	SHEET: 6 OF 16	

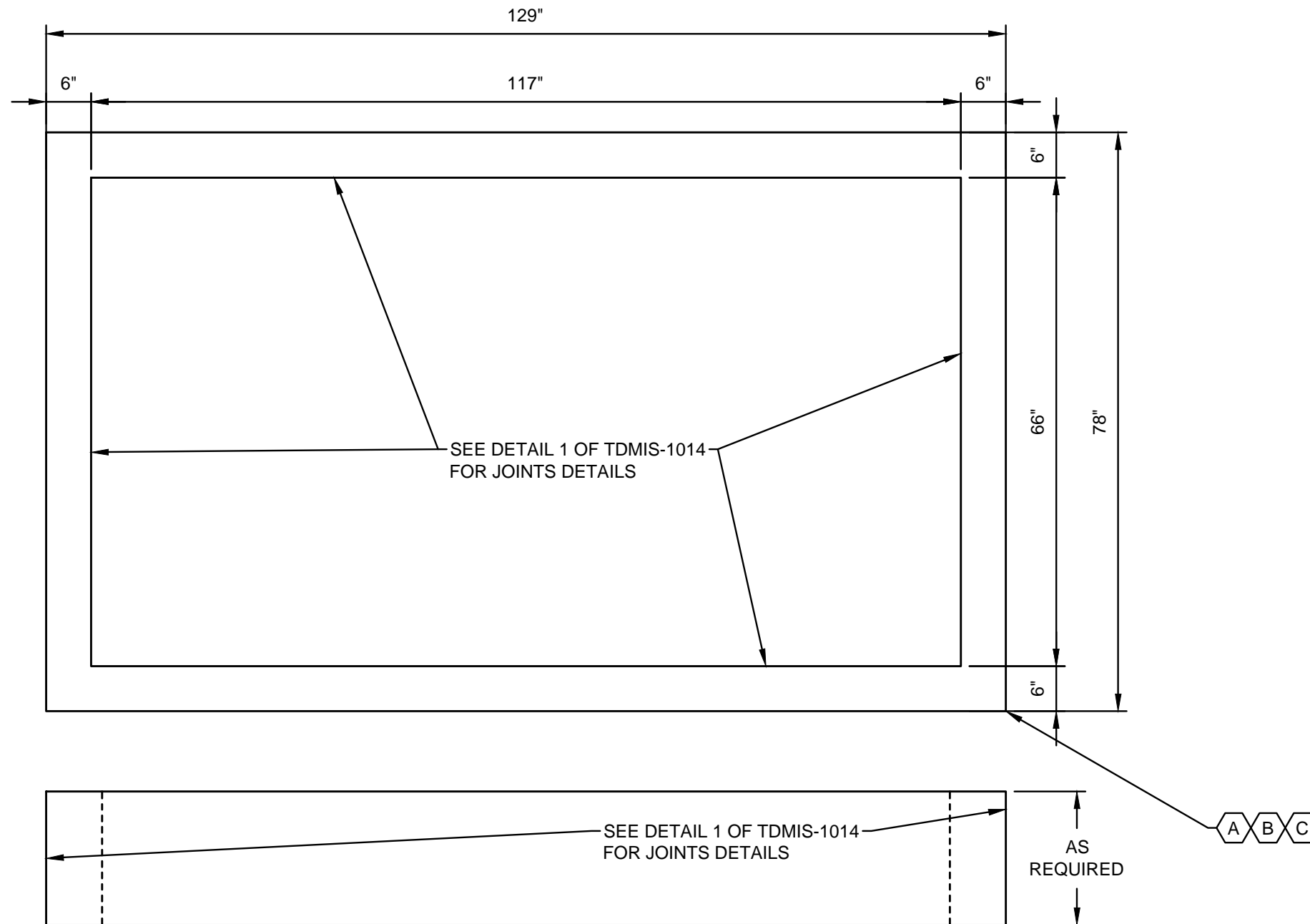


DETAIL 6
LEVELING COARSE

CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER		
PRECAST VAULT LEVELING COARSE		
DRAWN BY: AEC	DATE: 01/01/2018	TDMIS-1014
APPROVED: <i>[Signature]</i>		
SCALE: NTS	SHEET: 7 OF 16	

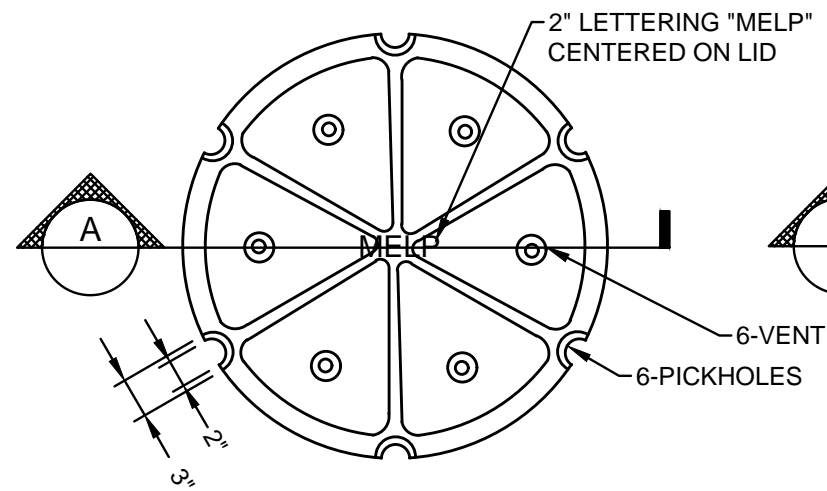
CODED NOTES:

- (A)** REINFORCING FOR H-20 BRIDGE LOADING
- (B)** CONCRETE: 5000 PSI-28 DAY STRENGTH, AIR 6% +/- 2%
- (C)** LIFTING EYES SHALL BE PROVIDED

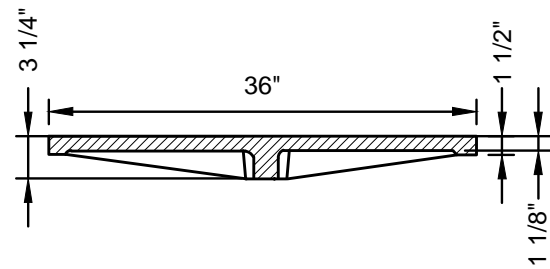


**DETAIL 7
VAULT RISER**

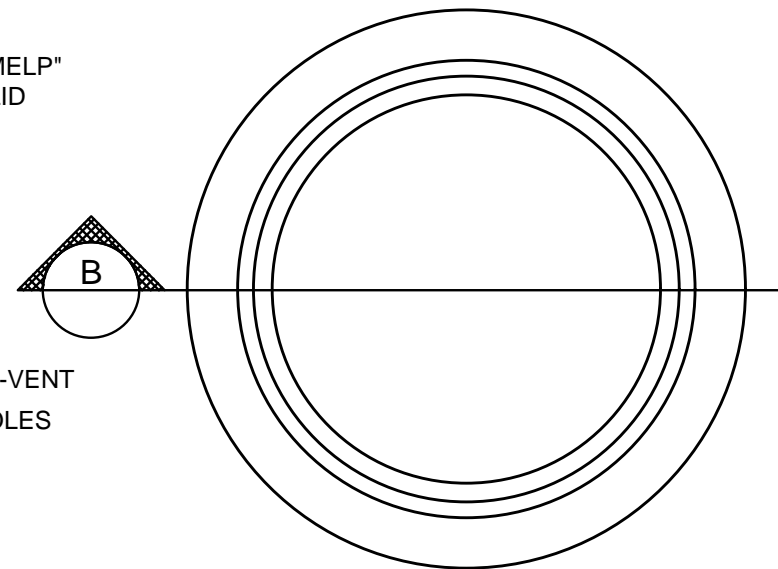
CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER		
PRECAST VAULT 5'-6" X 9'-8" I.D. GRATING RISER 02G0064		
DRAWN BY: AEC	DATE: 01/01/2018	TDMIS-1014
APPROVED: <i>[Signature]</i>		
SCALE: NTS	SHEET: 8 OF 16	



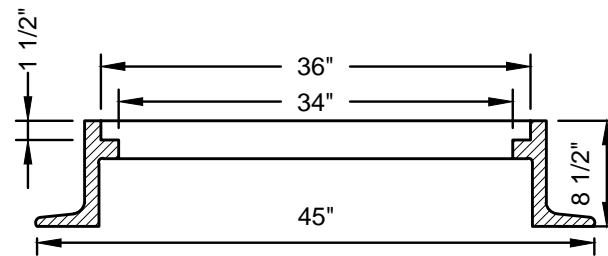
DETAIL 8
VAULT COVER



SECTION A
VAULT COVER

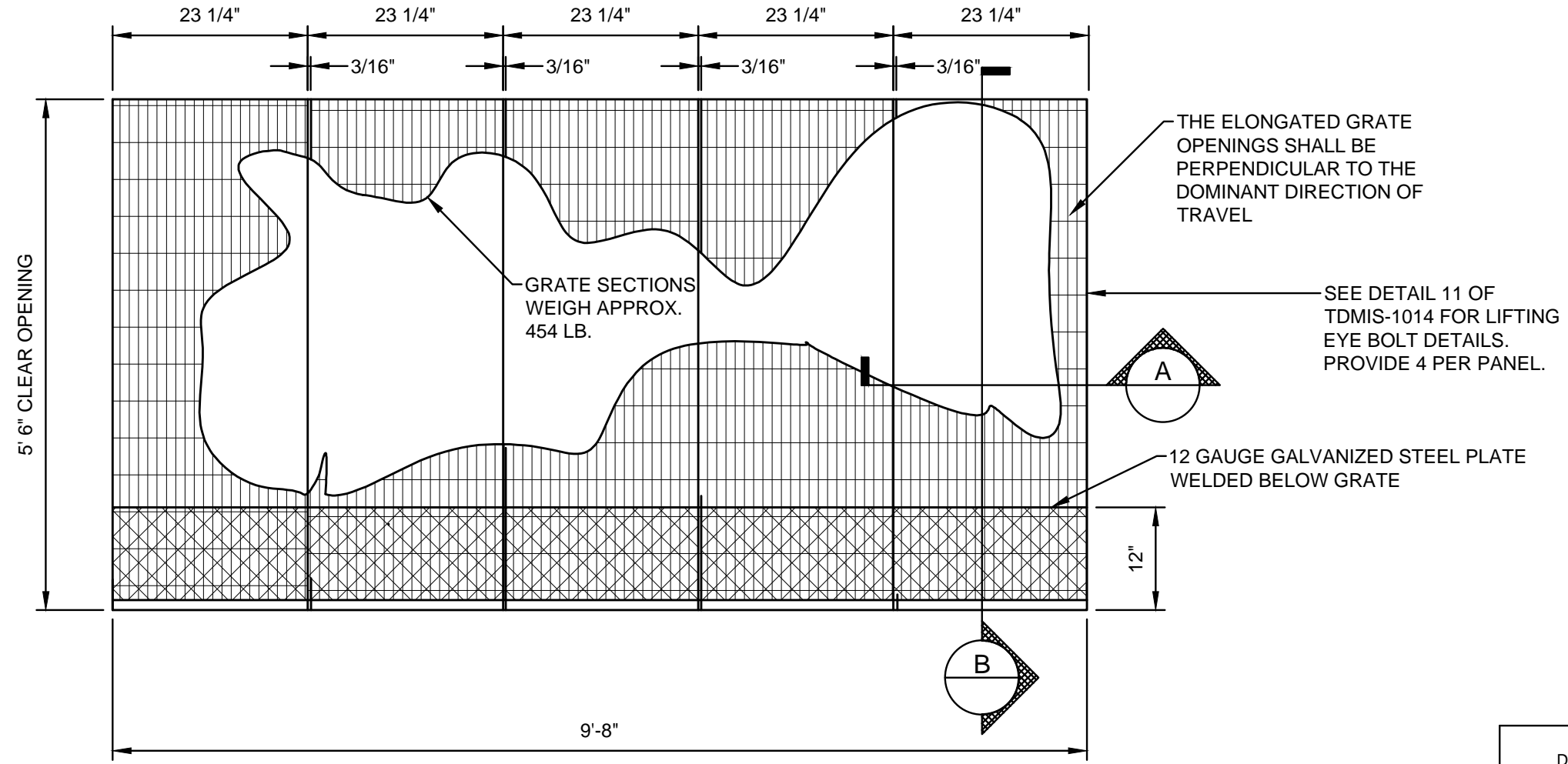
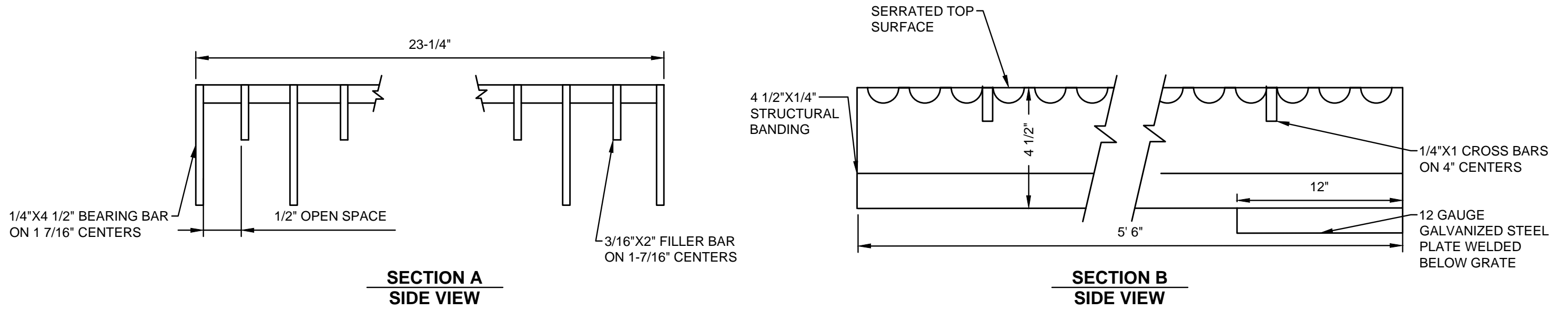


DETAIL 9
VAULT COVER FRAME



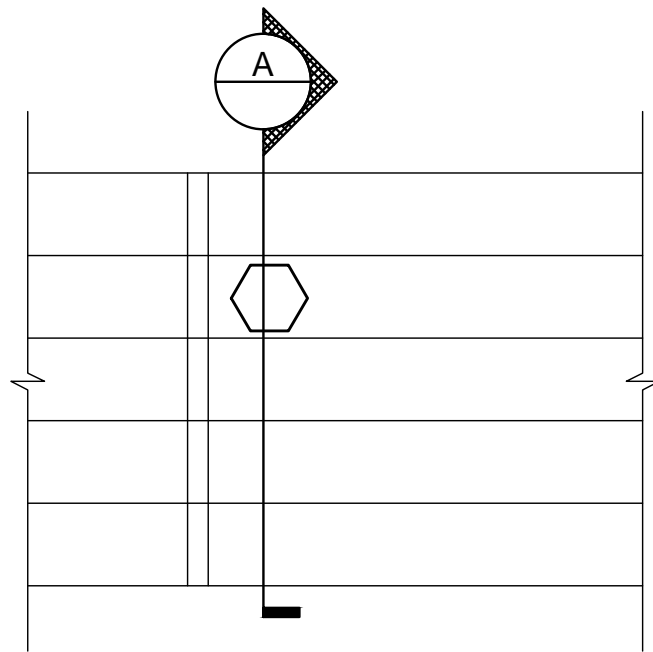
SECTION B
VAULT COVER FRAME

CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER		
PRECAST VAULT 36" LID AND FRAME 02S0055		
DRAWN BY: AEC	DATE: 01/01/2018	TDMIS-1014
APPROVED: <i>[Signature]</i>		
SCALE: NTS	SHEET: 9 OF 16	

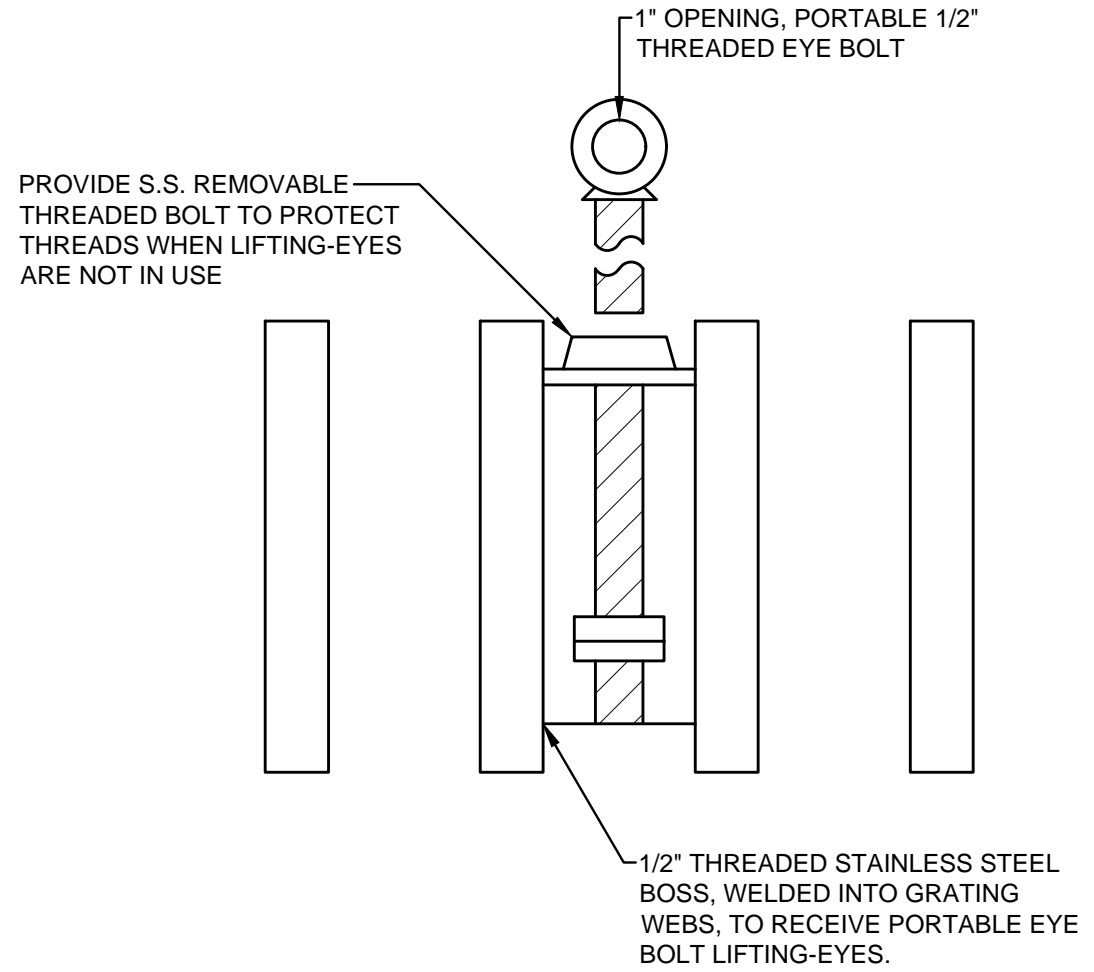


**DETAIL 10
VAULT GRATE**

CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER		
PRECAST VAULT ADA VAULT GRATING 02S0072		
DRAWN BY: AEC	DATE: 01/01/2018	TDMIS-1014
APPROVED: <i>[Signature]</i>		
SCALE: NTS	SHEET: 10 OF 16	



DETAIL 11
LIFTING EYE - PLAN VIEW

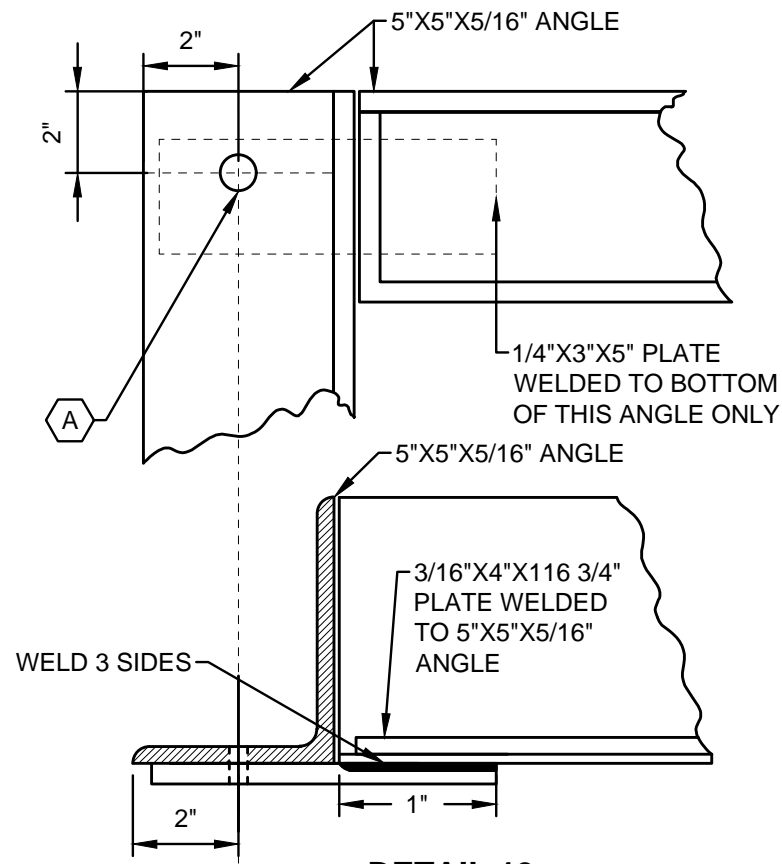


SECTION A
LIFTING EYE

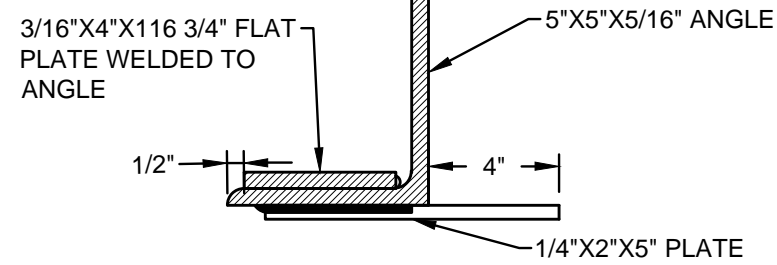
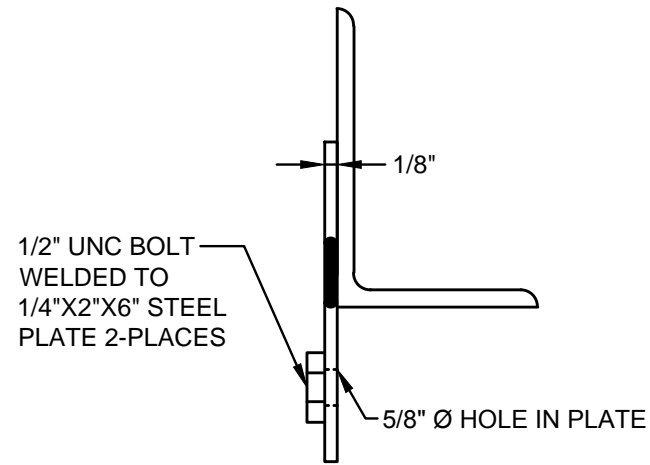
CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER		
PRECAST VAULT GRATE LIFTING EYE DETAIL		
DRAWN BY: AEC	DATE: 01/01/2018	TDMIS-1014
APPROVED: <i>[Signature]</i>		
SCALE: NTS	SHEET: 11 OF 16	

CODED NOTES:

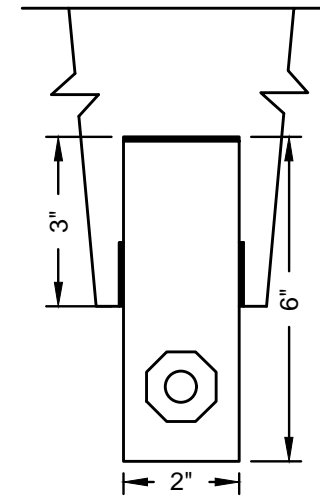
(A) DRILL 5/8" HOLE. PROVIDE 5/16" X 1" BOLT AND NUT (4 PLACES)



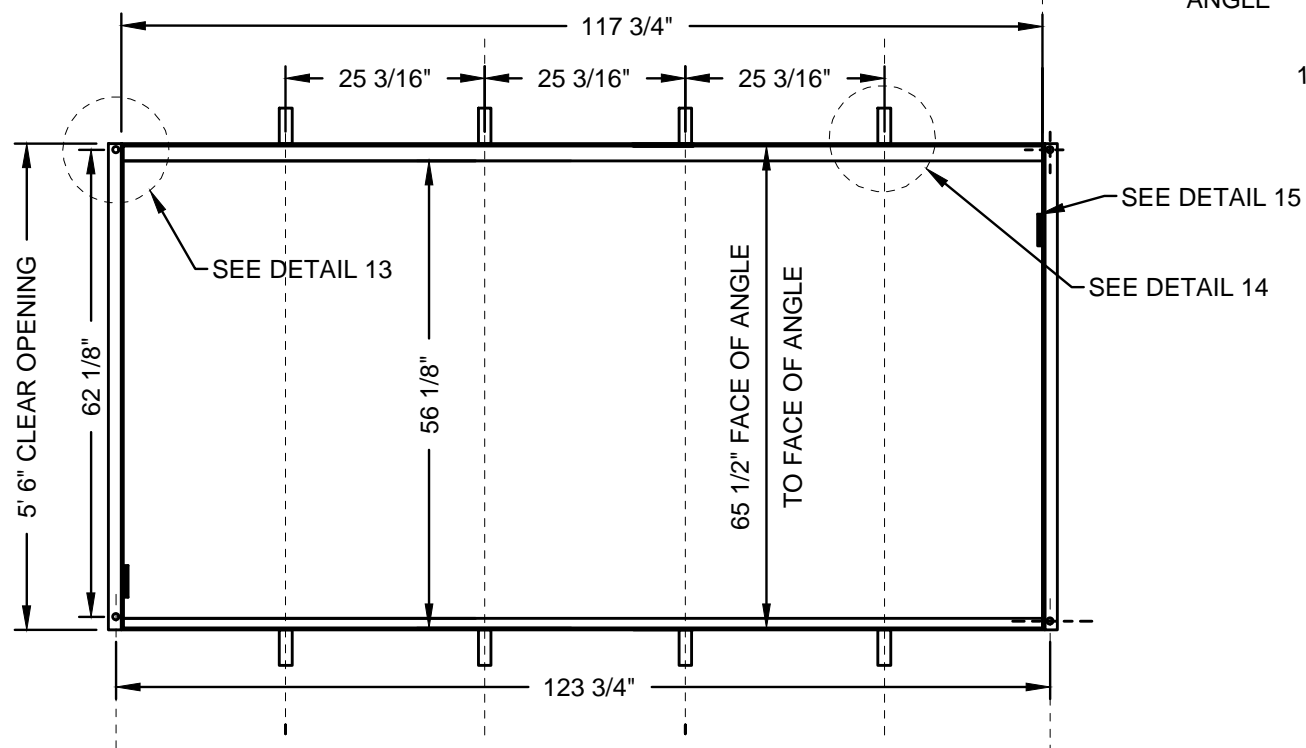
**DETAIL 13
VAULT FRAME**



**DETAIL 14
VAULT FRAME**

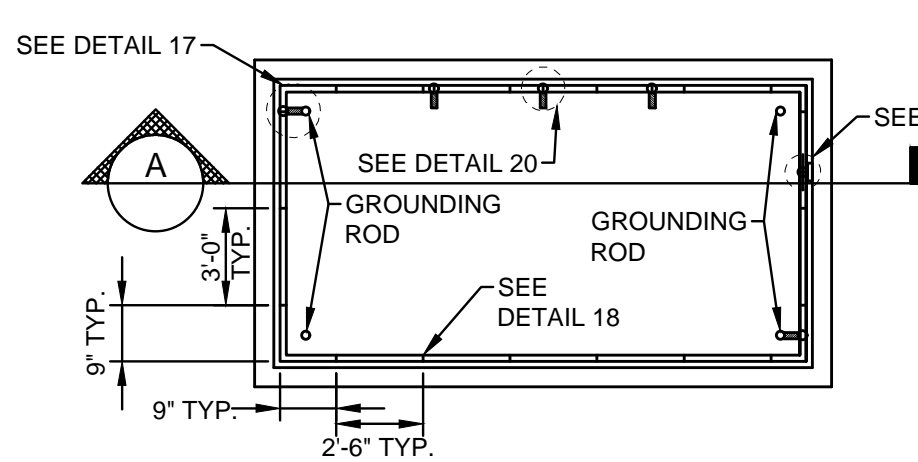


**DETAIL 15
VAULT FRAME**

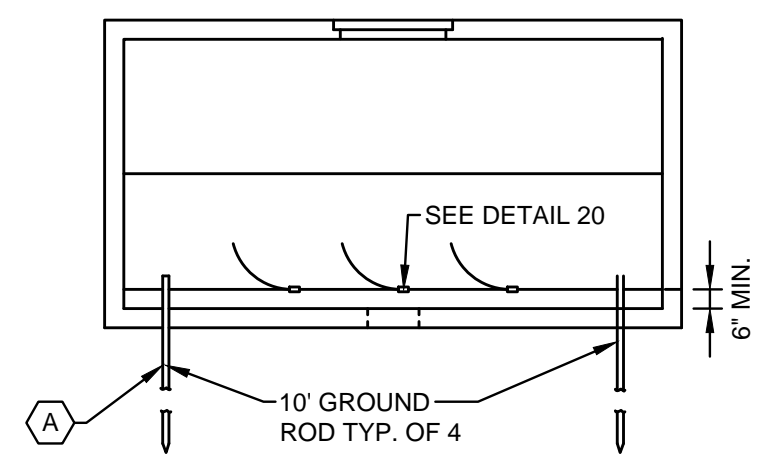


**DETAIL 12
GRATING FRAME - PLAN VIEW**

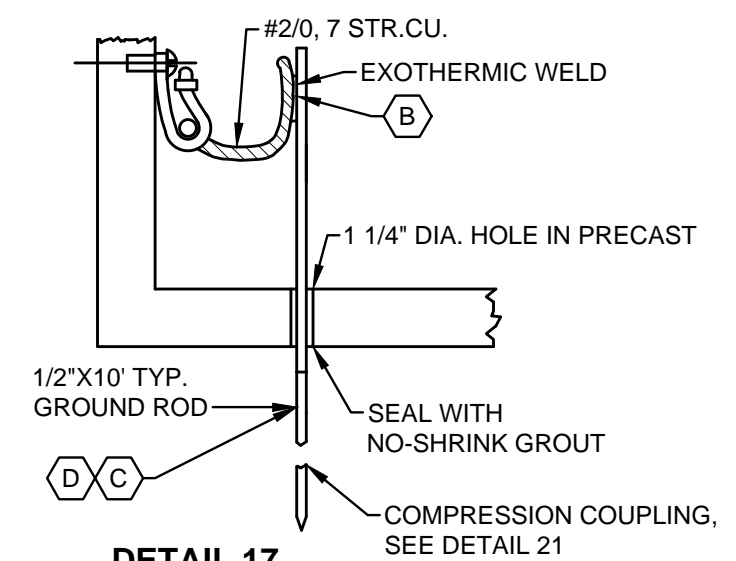
CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER	
PRECAST VAULT VAULT GRATE FRAME 02S0073	
DRAWN BY: AEC	DATE: 01/01/2018
APPROVED: <i>[Signature]</i>	TDMIS-1014
SCALE: NTS	



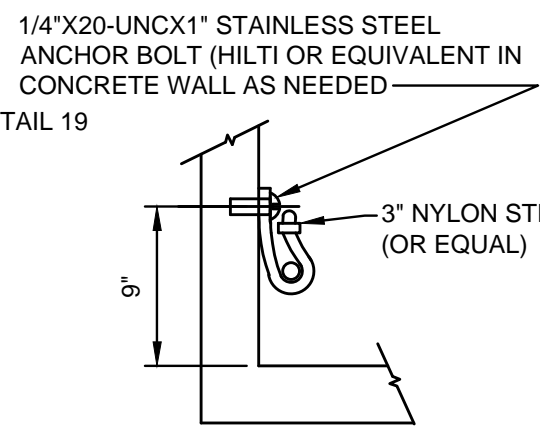
**DETAIL 16
PLAN VIEW**



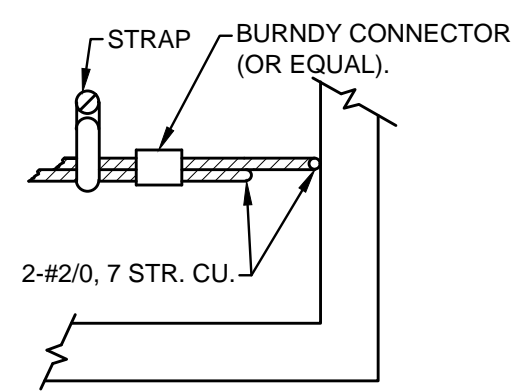
**SECTION A
GROUND ROD**



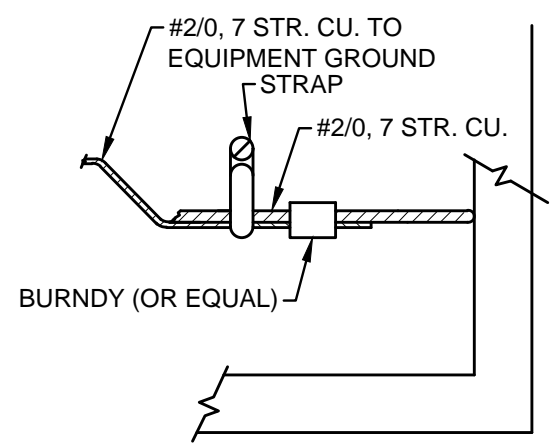
**DETAIL 17
VAULT GROUNDING**



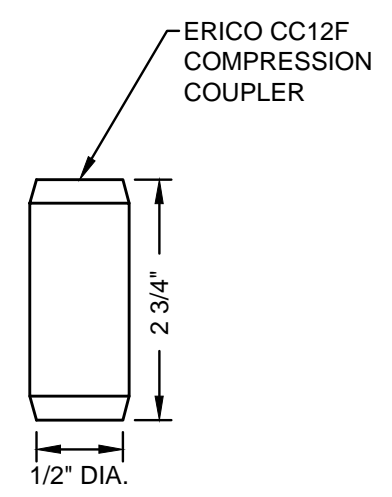
**DETAIL 18
VAULT GROUNDING**



**DETAIL 19
VAULT GROUNDING**



**DETAIL 20
VAULT GROUNDING**



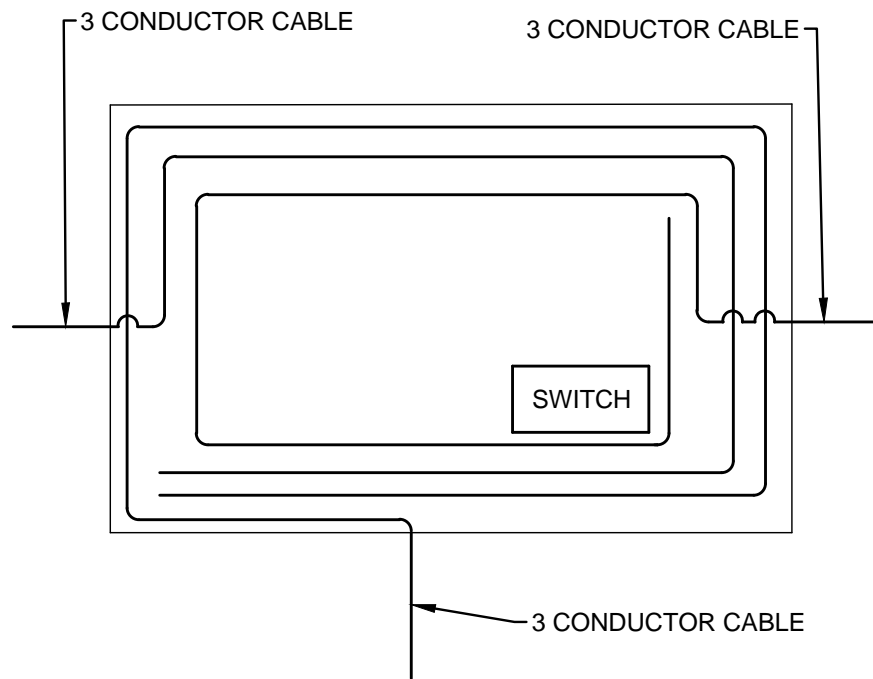
**DETAIL 21
COUPLER**

CODED NOTES:

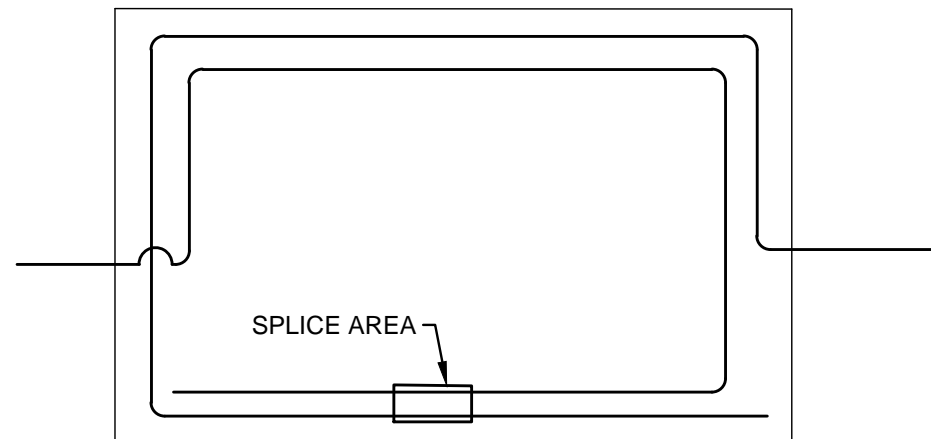
- A** 1/2"X10 GND. ROD FOR NEW INSTALLATION. USE (2) 1/2"X5' 0" SECTIONAL GROUND RODS FOR EXISTING INSTALLATION.
- B** USE APPROPRIATE EXOTHERMIC OR EQUAL FOR #2/0, 7 STR. CU. TO GROUND ROD.
- C** AFTER ROD IS DRIVEN, TEST RESISTANCE WITH A CLAMP ON METER. IF MORE THAN 25Ω RESULT, DRIVE ANOTHER ROD WITH AN ERICO CC12F TREADLESS COUPLING AND RETEST. CONTINUE THIS PROCESS WITH ADDITIONAL RODS UNTIL LESS THAN 25Ω IS ACHIEVED. SEE SPECIFICATIONS TDMIS-1014.
- D** REFER TO TDMIS-1607 FOR ADDITIONAL REQUIREMENTS.

REFERENCE: EXOTHERMIC WELD IS REQUIRED TO BOND THE ROD WITH THE GROUNDING GRID

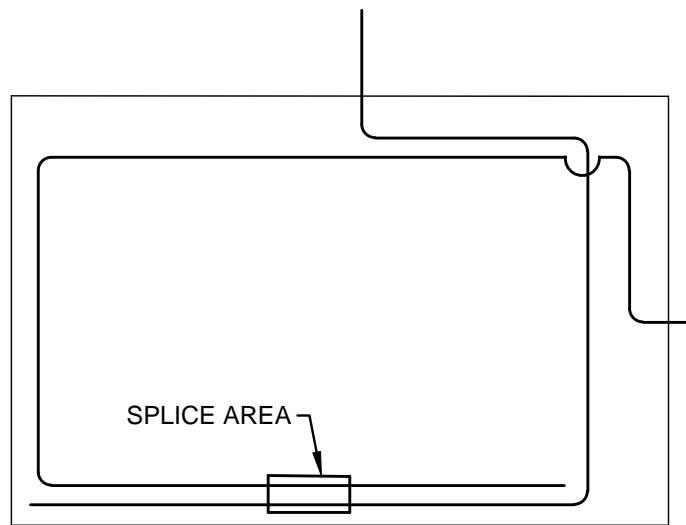
CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER		PRECAST VAULT VAULT GROUNDING 02S0071
DRAWN BY: AEC DATE: 01/01/2018		
APPROVED: <i>[Signature]</i>		TDMIS-1014
SCALE: NTS	SHEET: 13 OF 16	



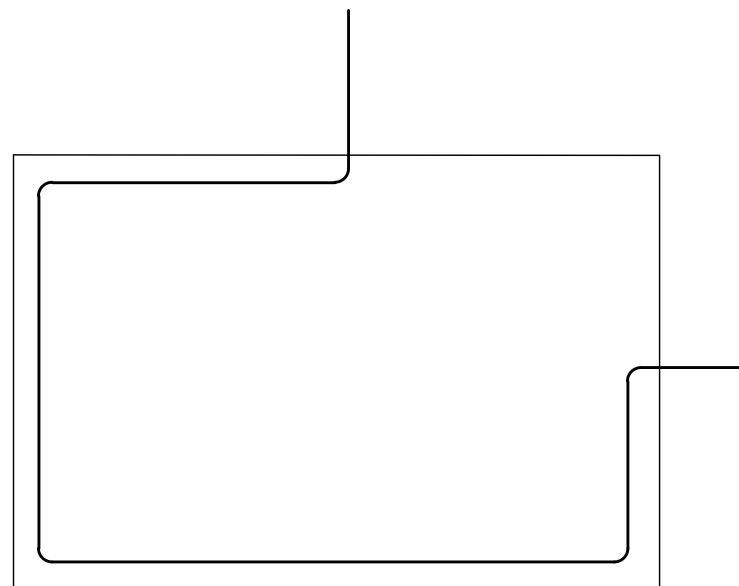
DETAIL 22
WHEN SWITCH IS TO BE INSTALLED



DETAIL 23
WHEN SPLICE IS REQUIRED



DETAIL 24
WHEN SPLICE IS REQUIRED

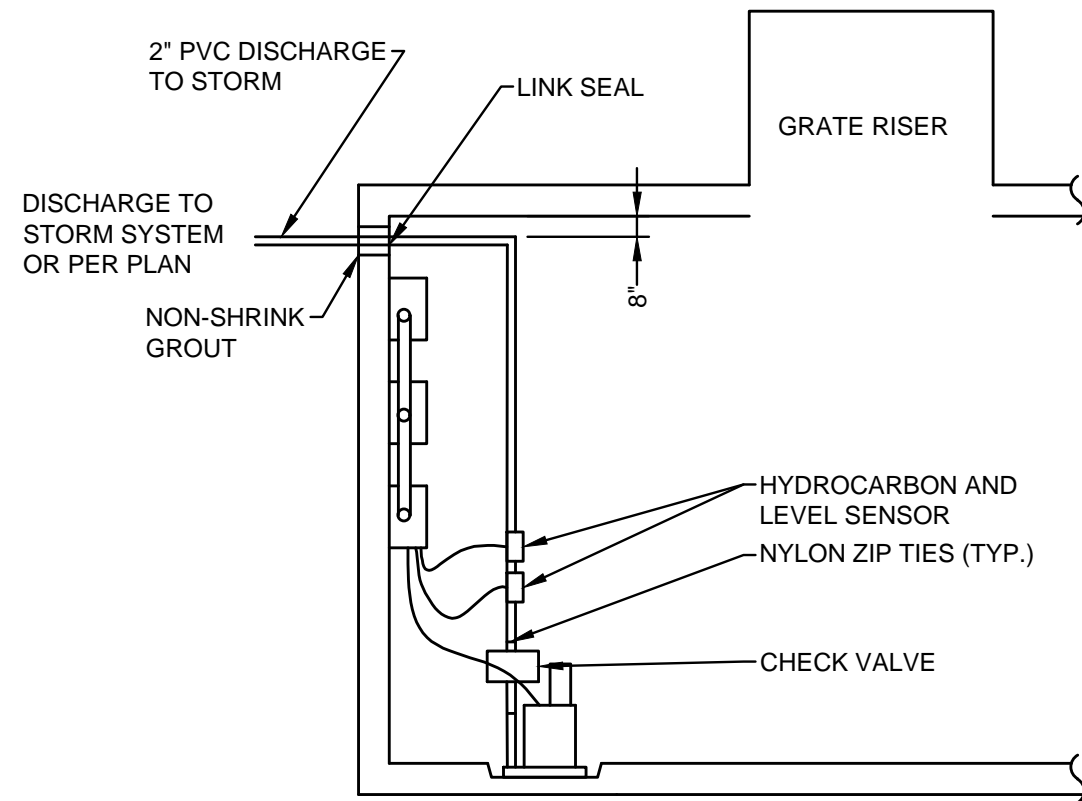


DETAIL 25
IN AND OUT

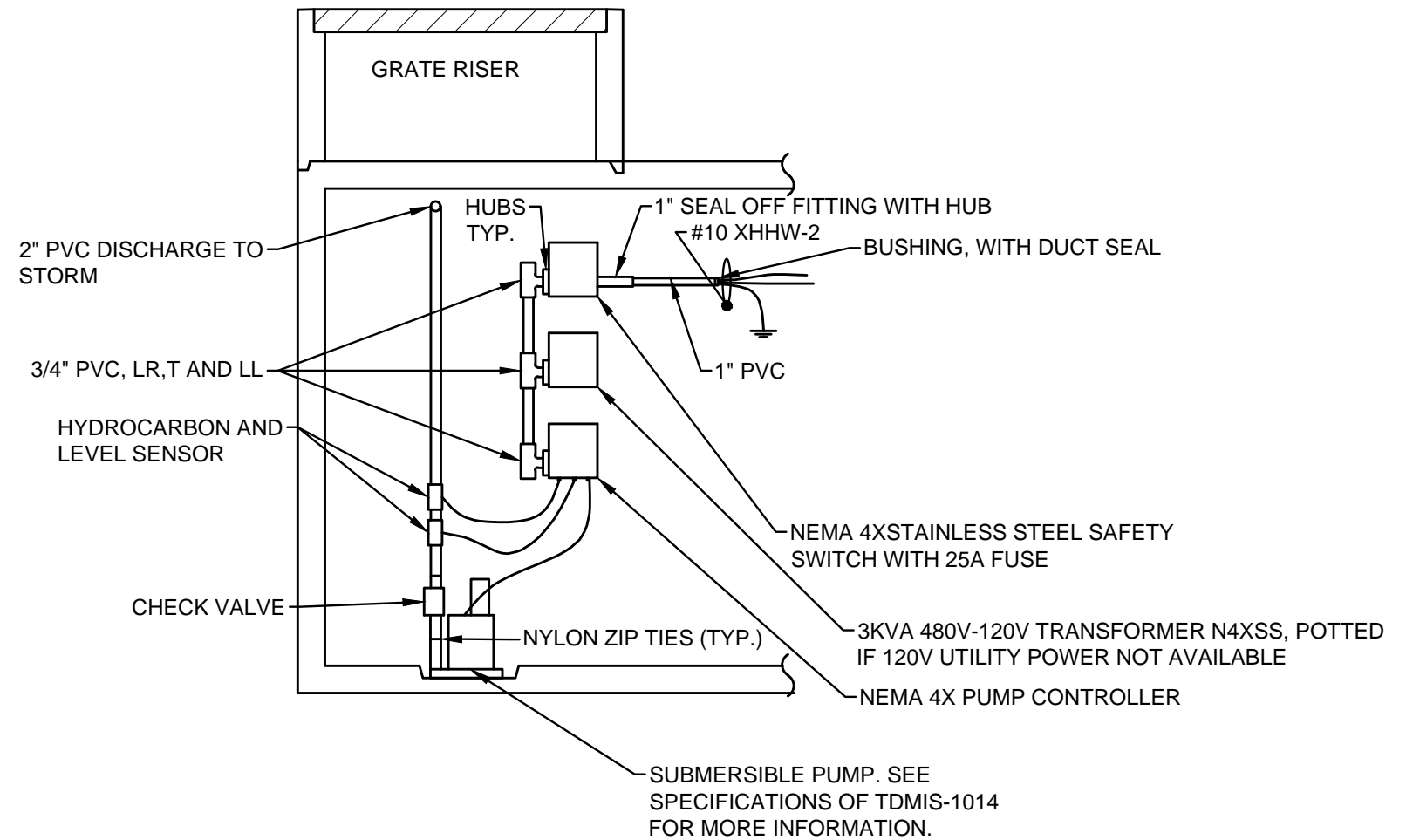


DETAIL 26
IN AND OUT

CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER		
PRECAST VAULT PRIMARY CABLE PLACEMENT 02S0057		
DRAWN BY: AEC	DATE: 01/01/2018	TDMIS-1014
APPROVED: <i>[Signature]</i>		
SCALE: NTS	SHEET: 14 OF 16	



DETAIL 27
VAULT SUMP PUMP-SIDE VIEW

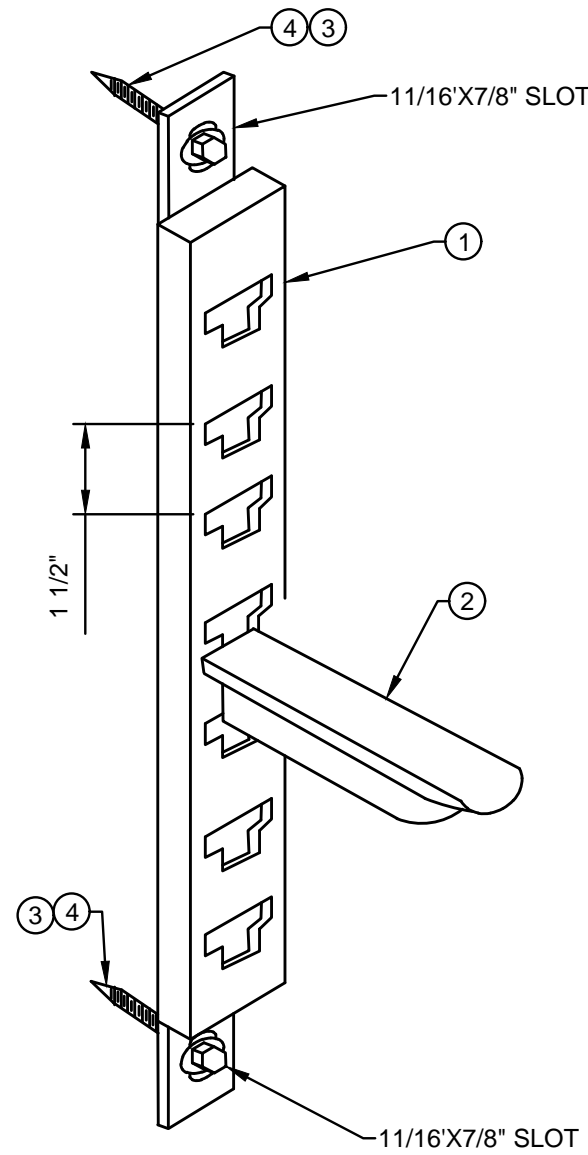


DETAIL 28
VAULT SUMP PUMP-FRONT VIEW

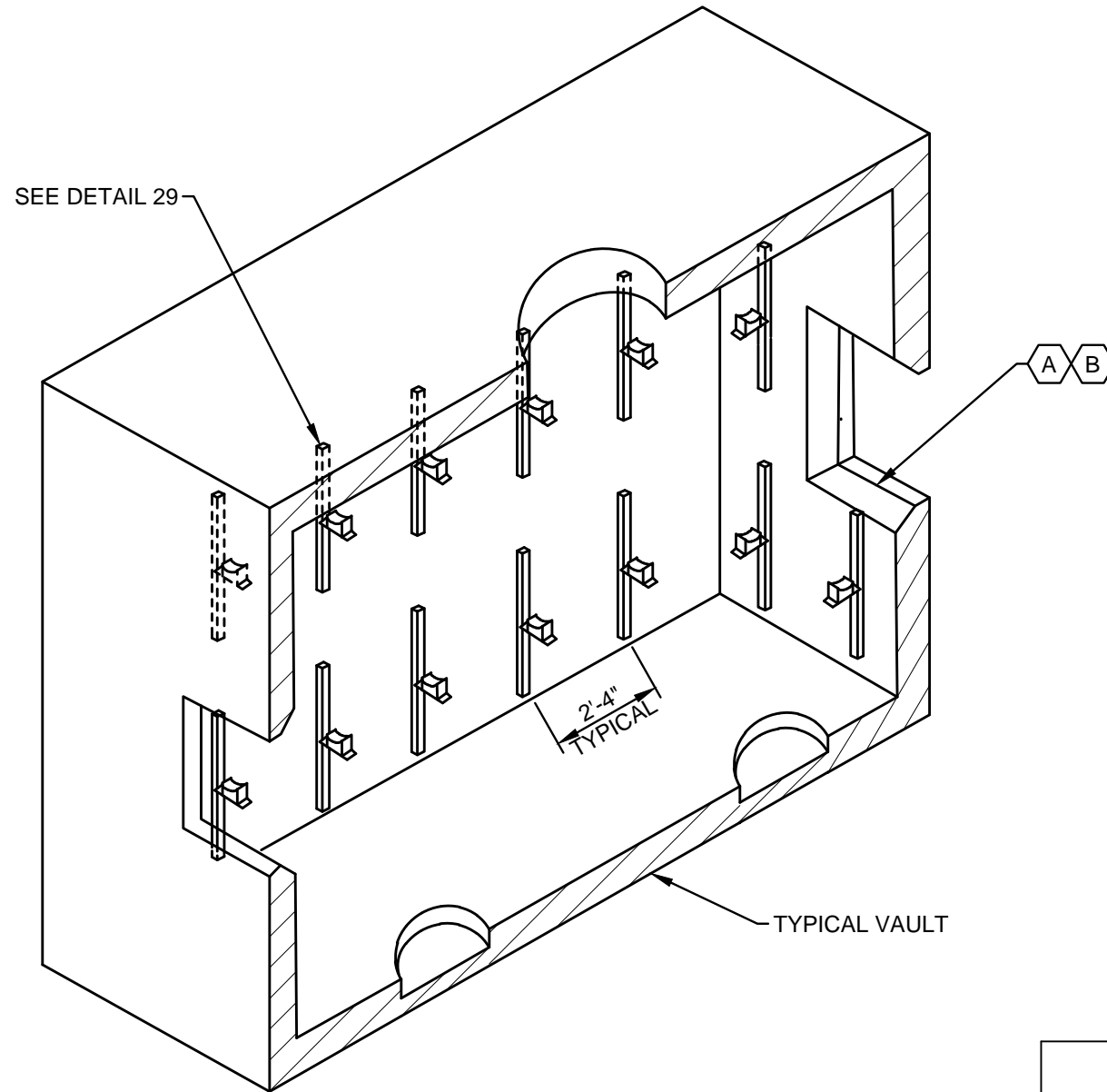
CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER		
PRECAST VAULT SUMP PUMP 02S0070		
DRAWN BY: AEC	DATE: 01/01/2018	TDMIS-1014
APPROVED: <i>[Signature]</i>		
SCALE: NTS	SHEET: 15 OF 16	

CODED NOTES:

- (A) WINDOWS OR KNOCK-OUTS MAY BE USED IF PROPER ADVANCED COORDINATION IS POSSIBLE. DUCT BANK PENETRATION IS PREFERRED.
- (B) ADJUST CABLE RACKS AS NEEDED IF WINDOWS OR KNOCKOUTS ARE USED.



**DETAIL 29
CABLE RACK**



**DETAIL 30
TYPICAL VAULT**

ITEM LIST			
ITEM #	DESCRIPTION	PART #	QTY.
(1)	RACK CABLE, NON-METALIC, LENGTH AS REQUIRED	*	AS REQ.
(2)	CABLE ARM, 11" LENGTH	*	AS REQ.
(3)	1/2"-13 STAINLESS STEEL BOLT	*	AS REQ.
(4)	FLAT WASHER, STAINLESS STEEL	*	AS REQ.

CITY OF COLUMBUS, OHIO
DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER

**PRECAST VAULT
CABLE RACK
02S0049**

DRAWN BY: AEC	DATE: 01/01/2018
APPROVED: <i>[Signature]</i>	
SCALE: NTS	SHEET: 16 OF 16

TDMIS-1014