

Transmission & Distribution
Material & Installation Specification

Precast Manhole

I. Quantity

The base bid shall include the indicated number of manholes with 50-inch frame and Lid 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.
- C. Design - 5000 PSI concrete mix. Air 6% +/- 2% per Ohio Department of Transportation standards.
- D. Inside dimensions - 14'-0" L x 7'-6" W x 8'-0" H.
- E. Two (2) interlocking wall sections - 10.35 ton (Top), 10.5 ton (Bottom).
- F. Sump Tile - 12" Dia. x 2'-0" L vitrified.
- G. Cast iron frame and covers - 50" manhole lid and frame. EJIW 1985, Neenah R-1741-F, 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 encapsulating the cable. The ends of the pulling iron shall have plastic protective caps. Safe working load varies with application.
- 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 Hooks - Hooks shall be Non-Metallic, 11" minimum length as manufactured by Underground Devices Cat # RA11, .218" deflection @ 400#. or Engineer approved equal. Provide quantity of rack arms that equal 4 arms per stanchions provided.
- L. Lifting Insert - 1-1/2".
- M. Link seal - Link seal shown in detail 12&13 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:

| Property | ASTM Method | Nitrile |
|--------------------|-------------|---------------------|
| 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 |
- N. Precast Joint Sealant - Con Seal CS-102, or approved equal. The sealant shall 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.
- O. Manhole Dewatering System - Provide a complete and operational dewatering system as follows.

| | | |
|--|------------------|-------------------|
| CITY OF COLUMBUS DEPT. OF PUBLIC UTILITIES – DIVISION OF POWER PRECAST MANHOLE | | |
| DRAWN BY: AEC | DATE: 01/01/2018 | TDMIS-1015 |
| APPROVED: <i>[Signature]</i> | | |
| | SHEET 1 of 10 | |

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. 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 drawing TDMIS-1015, sheets 3 thru 10.
- B. To install sealant, clean surface, apply sealant to fill the cavity.

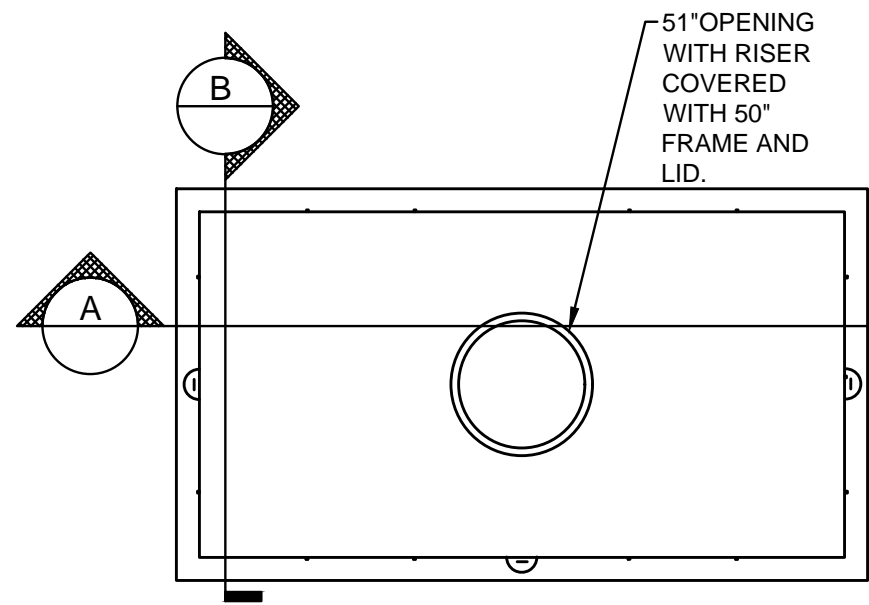
IV. Method of measurement

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

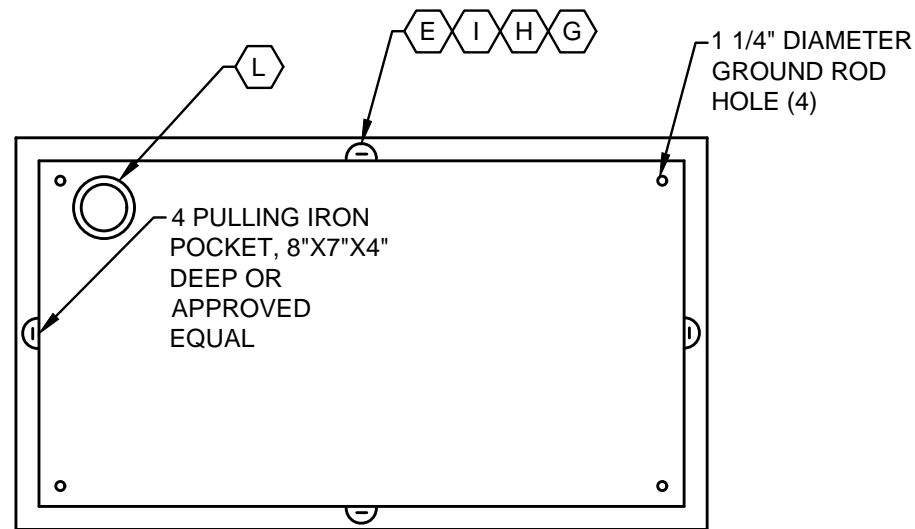
V. Basis of payment

| Items | Unit | Description |
|------------|------|---|
| TDMIS-1015 | Each | Manhole with 50 inch frame and lid module |

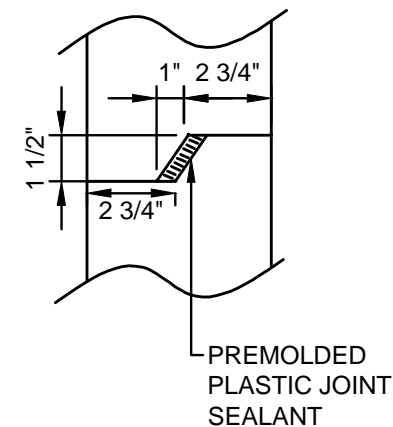
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| CITY OF COLUMBUS DEPT. OF PUBLIC UTILITIES – DIVISION OF POWER PRECAST MANHOLE | | |
| DRAWN BY: AEC | DATE: 01/01/2018 | TDMIS-1015 |
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| | SHEET 2 of 10 | |



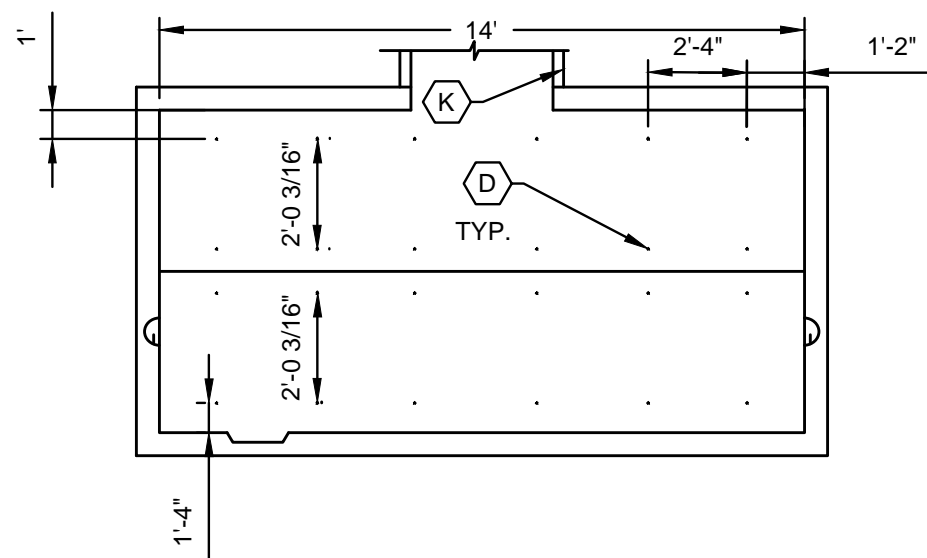
**DETAIL 1
MANHOLE**



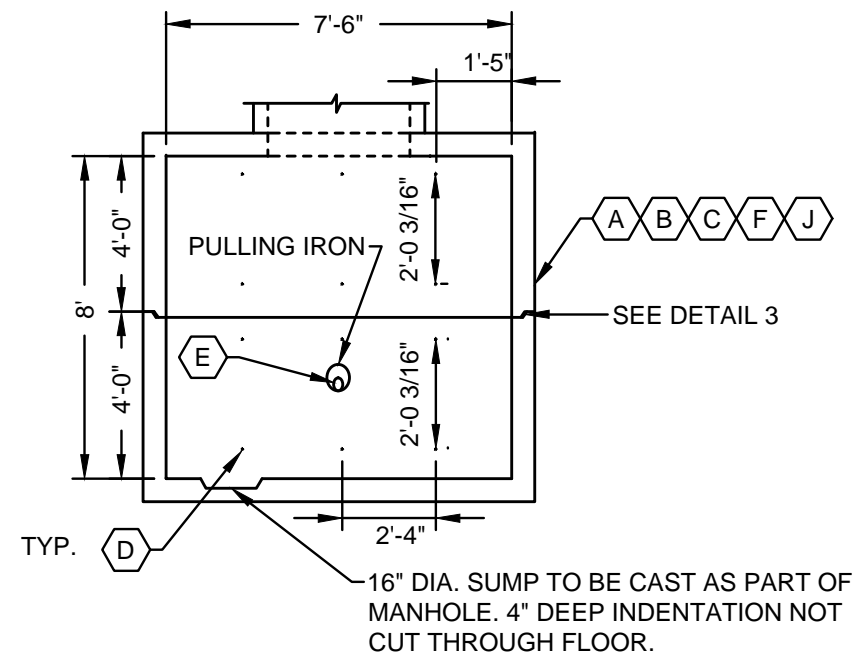
**DETAIL 2
PLAN VIEW**



**DETAIL 3
MANHOLE JOINT**



**SECTION A
SIDE VIEW**

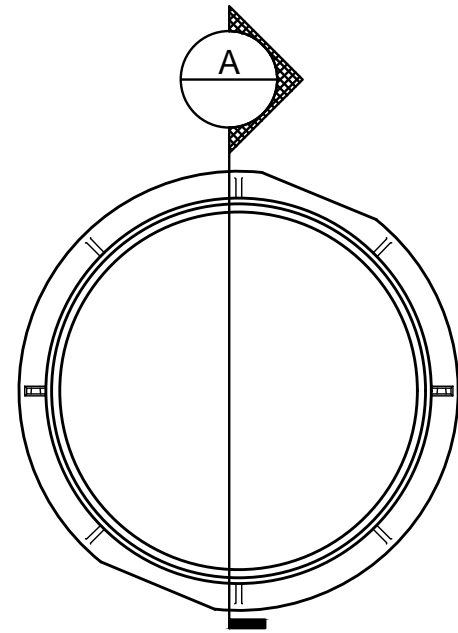


**SECTION B
FRONT VIEW**

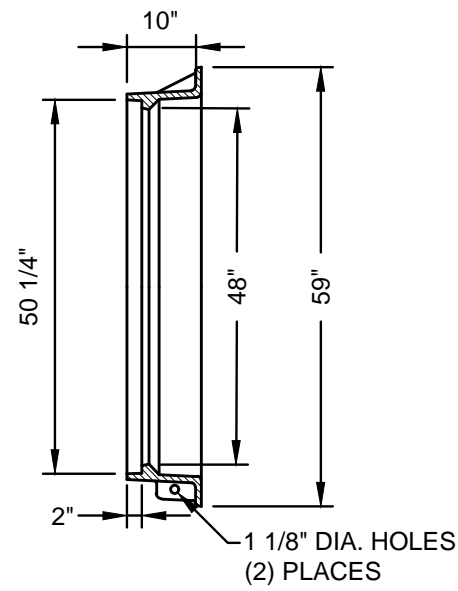
CODED NOTES:

- (A) REINFORCING FOR H-20 BRIDGE LOADING.
- (B) 5,000 PSI CONCRETE AIR 6% PLUS 2% PER OHIO DEPARTMENT OF TRANSPORTATION STANDARDS.
- (C) APPROXIMATE UNIT WEIGHTS. TOP HALF, 20,700 LBS. BOTTOM HALF 21,000 LBS.
- (D) 1/2" ACKERMAN JOHNSON INSERT OR APPROVED EQUAL FOR ATTACHMENT OF CABLE RACK. LENGTH OF STANCHIONS SHALL BE 3' MIN.
- (E) NON STANDARD PULLING IRONS AND KNOCKOUTS SIZES AND LOCATIONS SHALL BE SPECIFIED WHEN ORDERING MANHOLE.
- (F) SUPPLIER, NORWALK CONCRETE INDUSTRIES, NORWALK OHIO OR APPROVED EQUAL.
- (G) WINDOW OR KNOCKOUTS TO BE SIZES USING COMBINATIONS OF 12", 18", 24" OR 32".
- (H) WINDOW OR KNOCKOUT LOCATIONS MAY VARY.
- (I) 4 PULLING IRONS. 1 EACH SIDE ARE TO BE OPPOSITE AND ONE FOOT BELOW EACH WINDOW. IN NO CASE SHALL THE PULLING IRON BE CLOSER THAN SIX INCHES (6") TO A JOINT.
- (J) LIVE LOAD DESIGN -AASHO HS-20-44.
- (K) NUMBER OF RISERS ARE AS REQUIRED TO MEET FINISHED GRADE.
- (L) FLOOR SHALL BE SMOOTH FINISH, SLOPE 0.03" PER FOOT TOWARD THIS SUMP.
- (M) ADJUST LOCATION OF INSERTS AS NEEDED IF WINDOWS OR KNOCKOUTS ARE DESIGNED IN THE AREA.

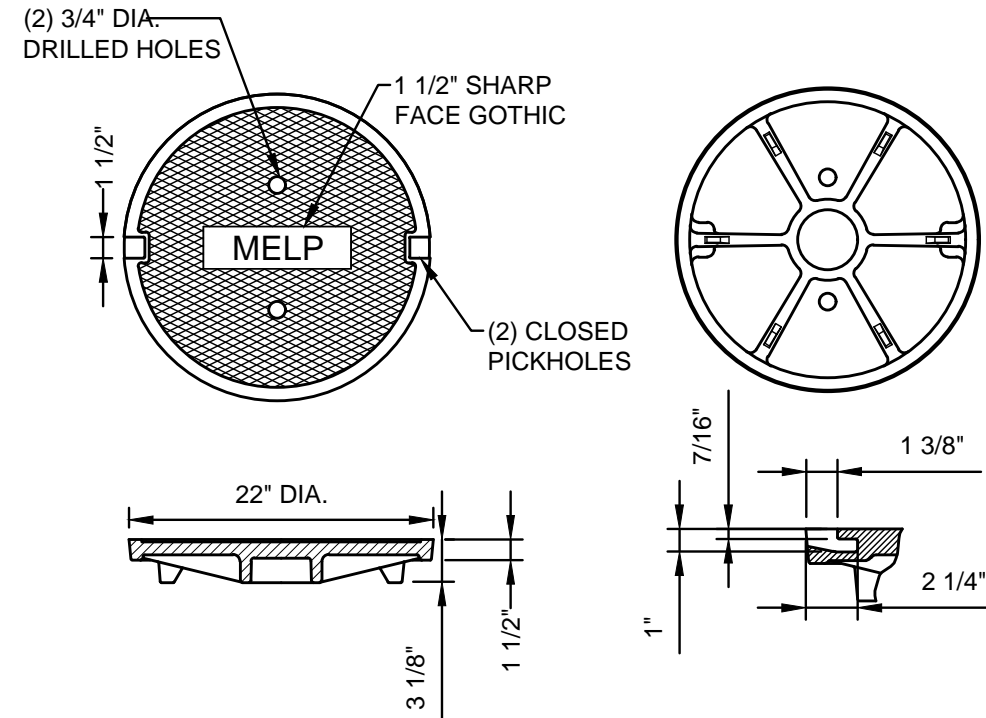
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|---|------------------|-------------------|
| CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER | | |
| PRECAST MANHOLE | | |
| 02E0060 | | |
| DRAWN BY: AEC | DATE: 01/01/2018 | TDMIS-1015 |
| APPROVED: <i>[Signature]</i> | | |
| SCALE: NTS | SHEET: 3 OF 10 | |



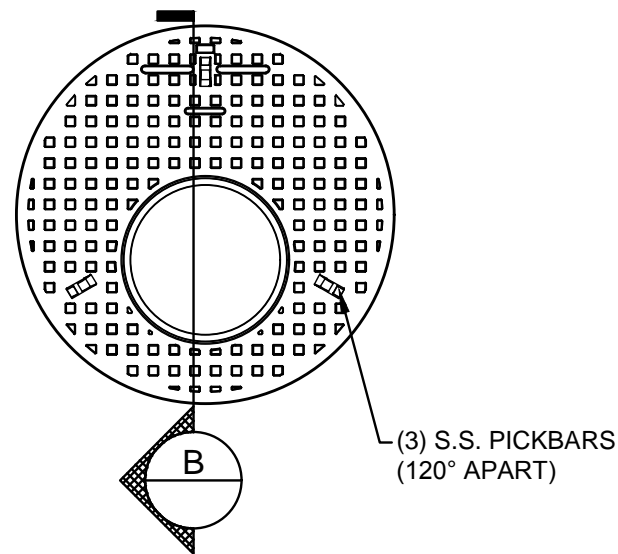
DETAIL 4
MANHOLE FRAME



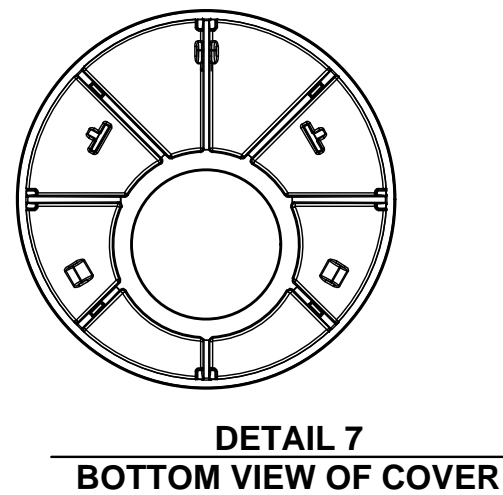
SECTION A
SIDE VIEW



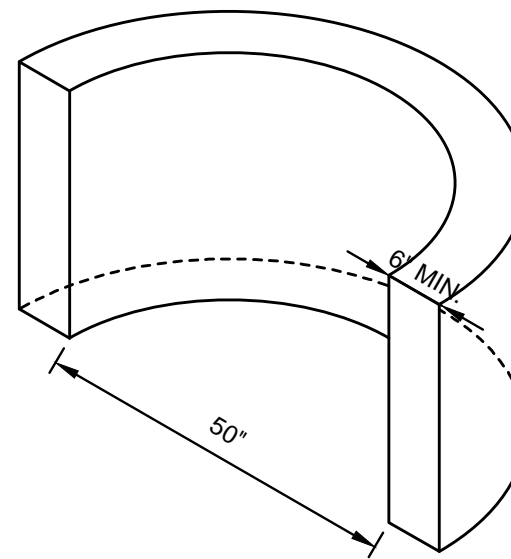
DETAIL 5
MANHOLE COVER



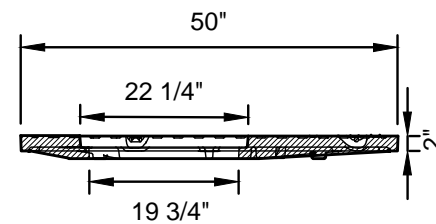
DETAIL 6
MANHOLE COVER AUX. DOOR



DETAIL 7
BOTTOM VIEW OF COVER



DETAIL 8
MANHOLE RISER

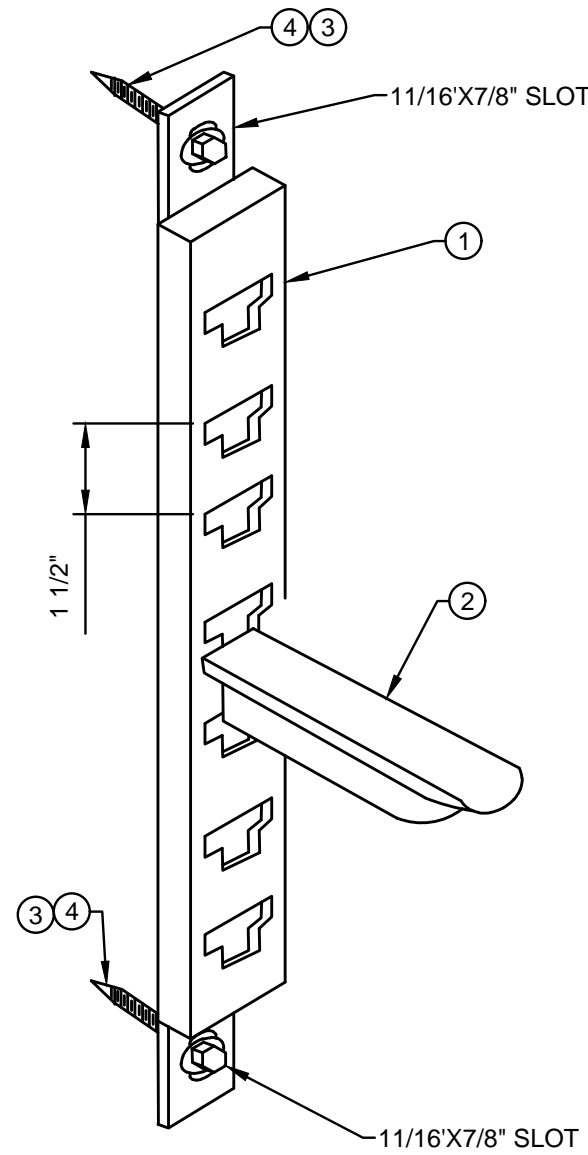


SECTION B
SIDE VIEW

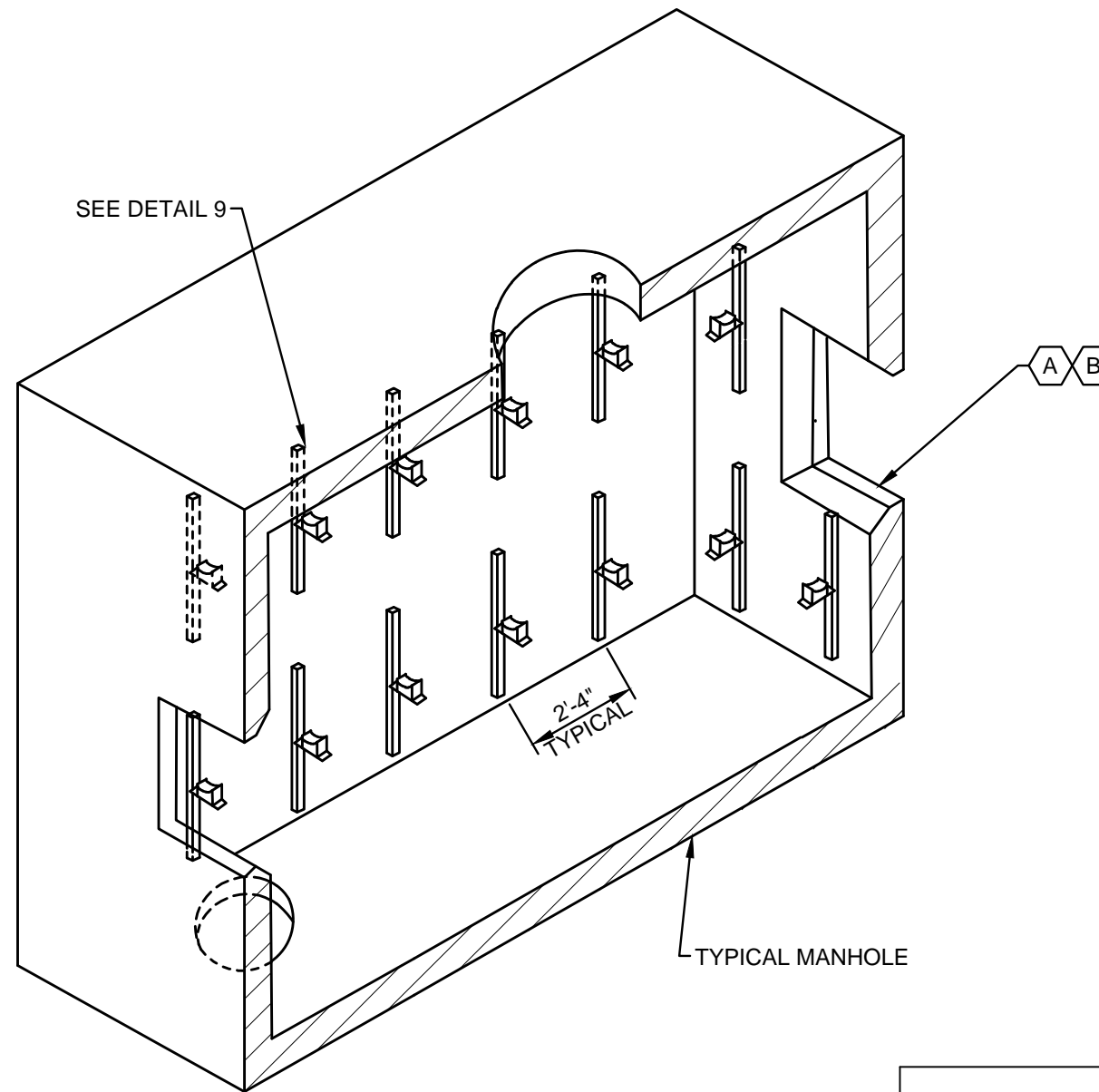
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| CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER | | |
| PRECAST MANHOLE 50 INCH MANHOLE LID, WITH 22" INNER LID 02S0069 | | |
| DRAWN BY: AEC | DATE: 01/01/2018 | TDMIS-1015 |
| APPROVED: <i>[Signature]</i> | | |
| SCALE: NTS | SHEET: 4 OF 10 | |

CODED NOTES:

- (A) WINDOWS OR KNOCK-OUTS MAY BE USED IF PROPER ADVANCED COORDINATION IS POSSIBLE. DUCT BANK PENETRATION IS PREFERRED. REFER TO SHEET 7 OF TDMIS-1015 FOR DUCT BANK PENETRATION DETAILS.
- (B) ADJUST CABLE RACKS AS NEEDED IF WINDOWS OR KNOCKOUTS ARE USED.



**DETAIL 9
CABLE RACK**



**DETAIL 10
TYPICAL MANHOLE**

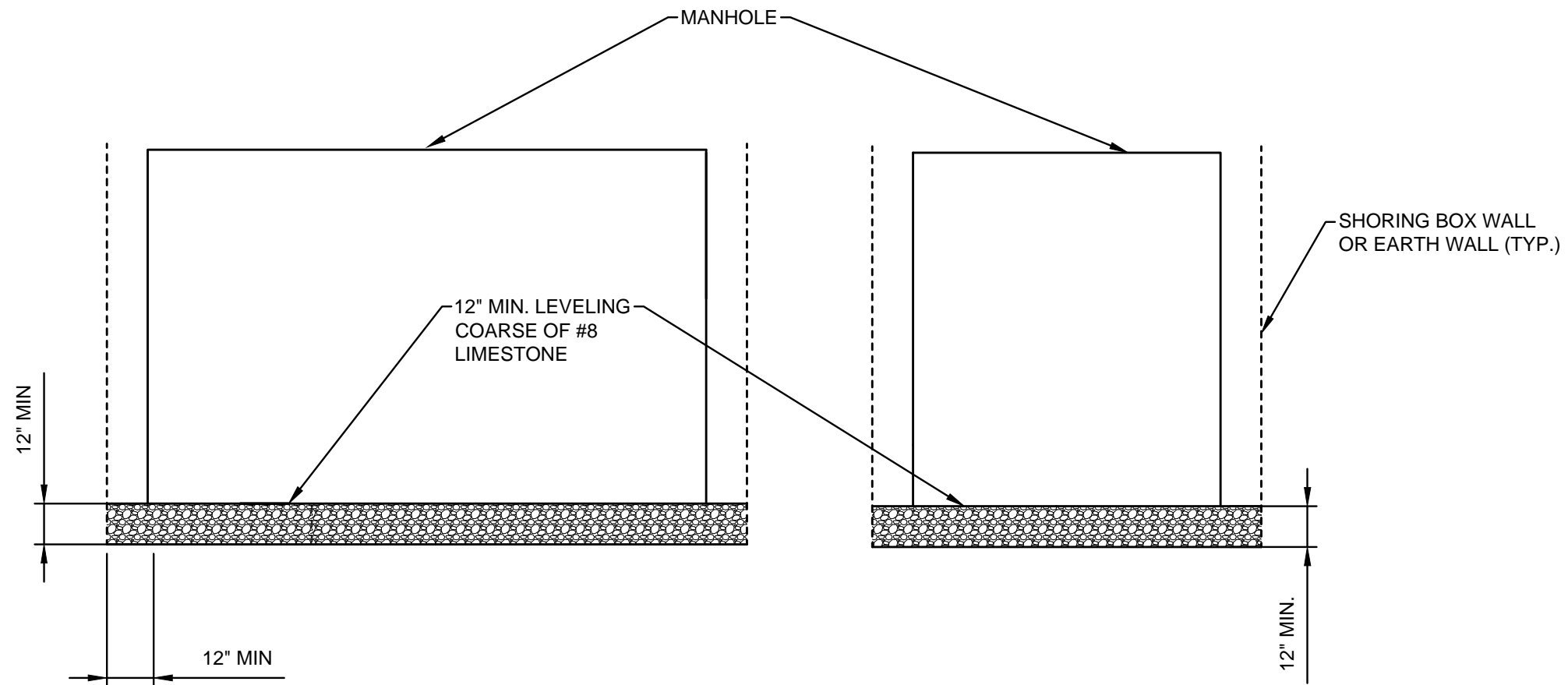
| ITEM LIST | | | |
|------------------|---|--------|---------|
| ITEM # | DESCRIPTION | PART # | QTY. |
| ① | RACK CABLE, NON-METALIC, LENGTH AS REQUIRED | * | AS REQ. |
| ② | CABLE ARM, 11" LENGTH | * | AS REQ. |
| ③ | 1/2"-13 STAINLESS STEEL BOLT | * | AS REQ. |
| ④ | FLAT WASHER, STAINLESS STEEL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

CITY OF COLUMBUS, OHIO
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**PRECAST MANHOLE
CABLE RACK
02S0049**

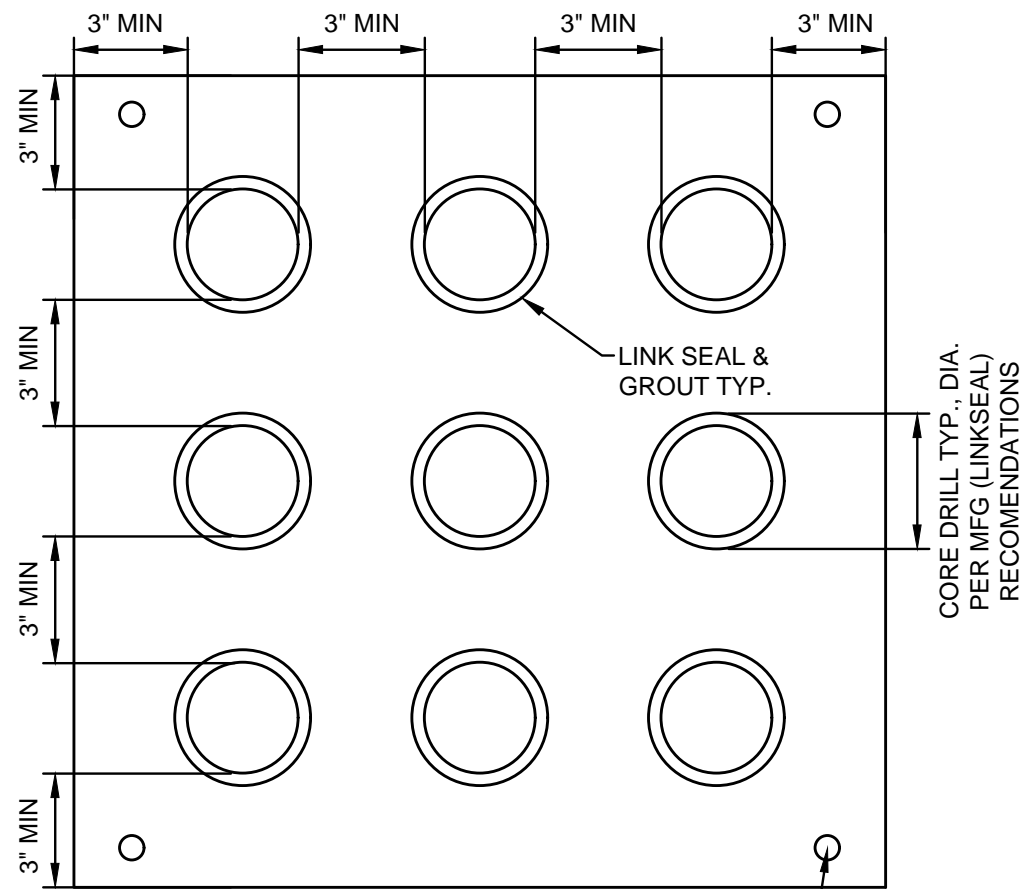
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| APPROVED: <i>[Signature]</i> | |
| SCALE: NTS | SHEET: 5 OF 10 |

TDMIS-1015



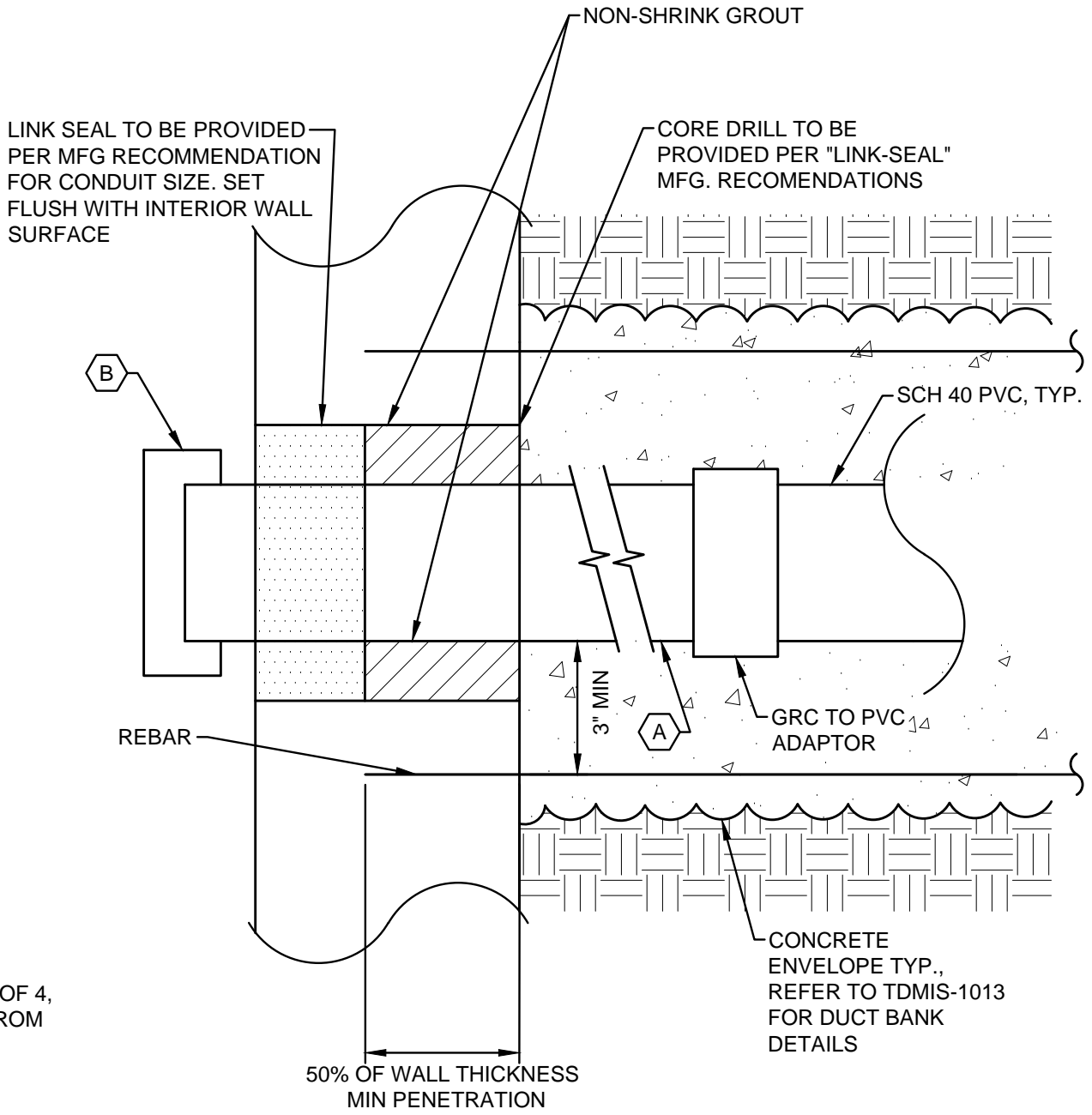
DETAIL 11
LEVELING COARSE

| | | |
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| CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER | | |
| PRECAST MANHOLE LEVELING COARSE | | |
| DRAWN BY: AEC | DATE: 01/01/2018 | TDMIS-1015 |
| APPROVED: <i>[Signature]</i> | | |
| SCALE: NTS | SHEET: 6 OF 10 | |



DETAIL 12
CONDUIT PENETRATION

#4 MIN REBAR, TYP. OF 4,
EXTENDED 20' EA. FROM
MANHOLE WALL



DETAIL 13
CONDUIT PENETRATION - SIDE VIEW

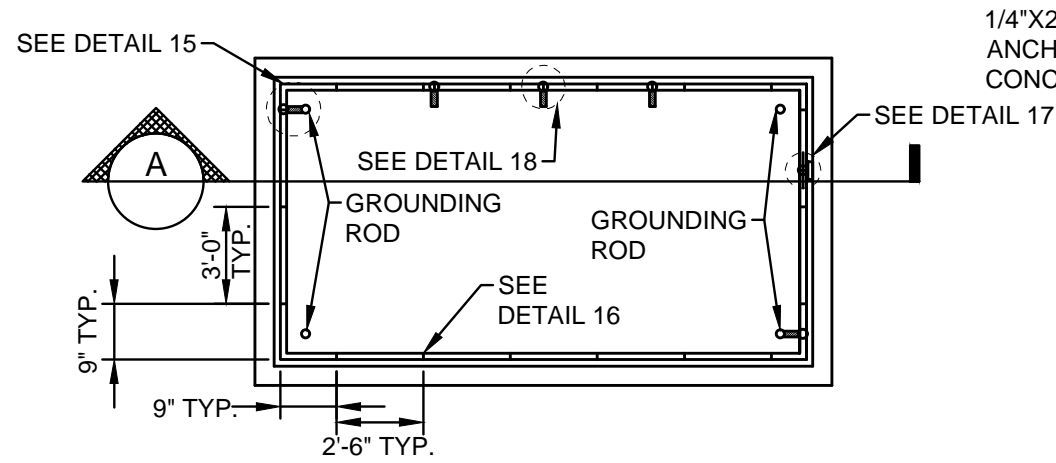
CODED NOTES:

- (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.

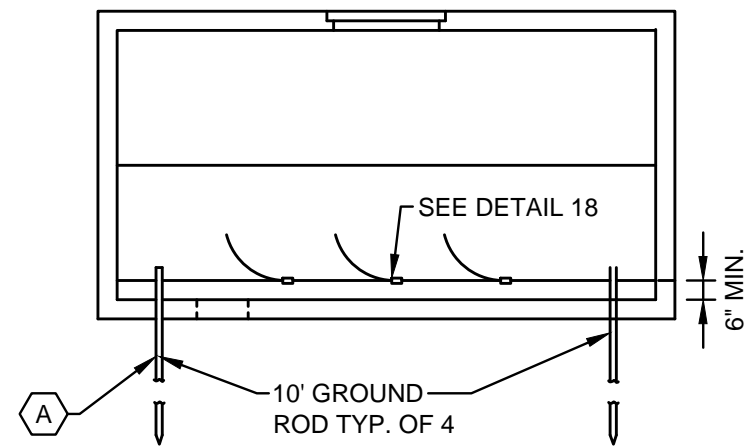
GENERAL NOTES:

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

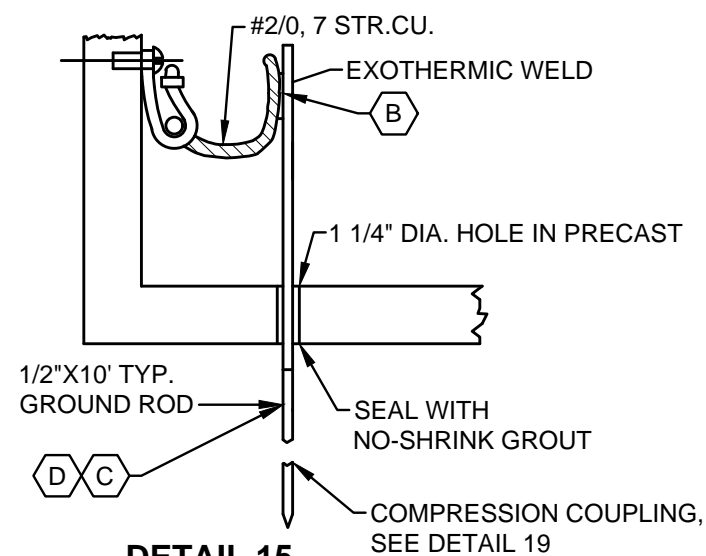
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| CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER | | |
| PRECAST MANHOLE CONDUIT PENETRATION | | |
| DRAWN BY: AEC | DATE: 01/01/2018 | TDMIS-1015 |
| APPROVED: <i>[Signature]</i> | | |
| SCALE: NTS | SHEET: 7 OF 10 | |



**DETAIL 14
PLAN VIEW**

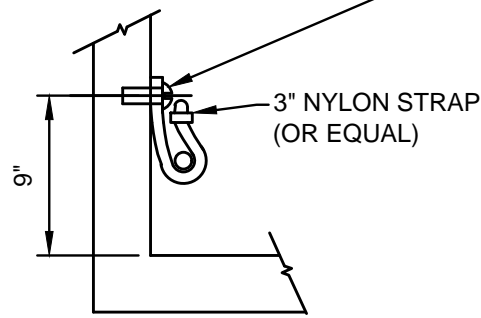


**SECTION A
GROUND ROD**

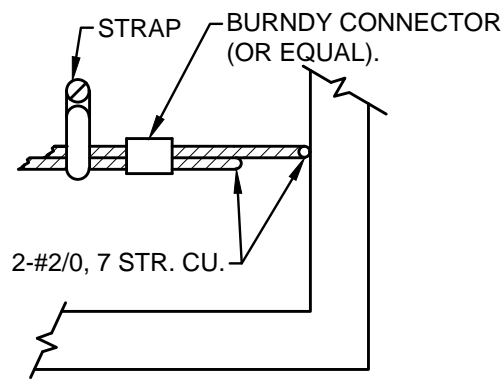


**DETAIL 15
MANHOLE GROUNDING**

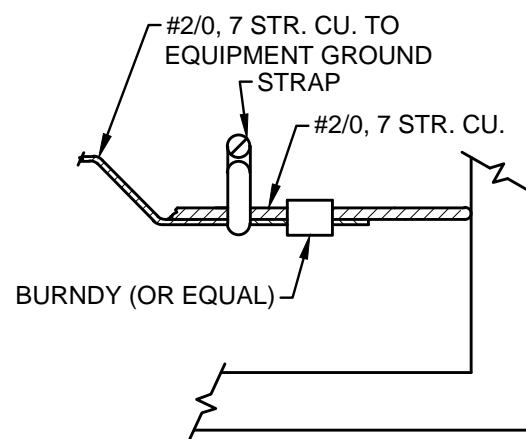
1/4"X20-UNCX1" STAINLESS STEEL ANCHOR BOLT (HILTI OR EQUIVALENT IN CONCRETE WALL AS NEEDED)



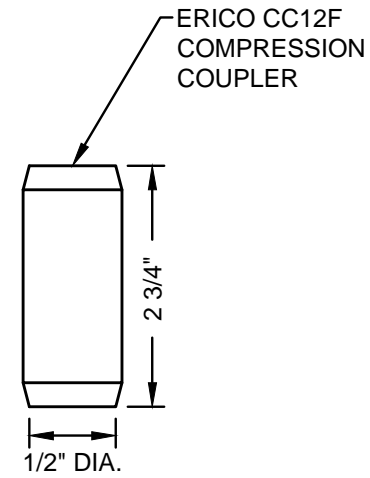
**DETAIL 16
MANHOLE GROUNDING**



**DETAIL 17
MANHOLE GROUNDING**



**DETAIL 18
MANHOLE GROUNDING**



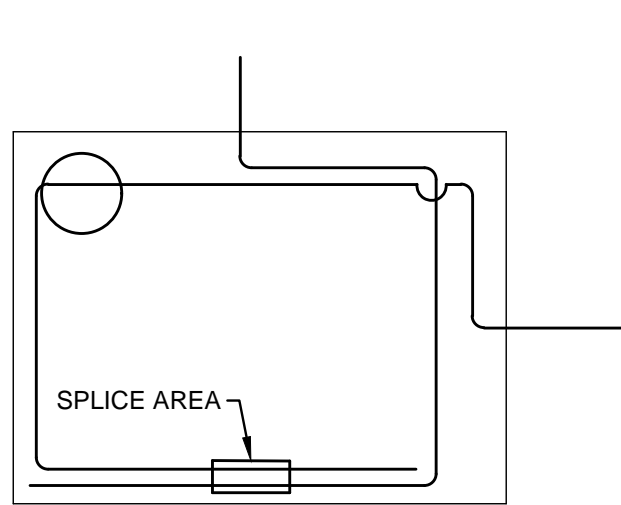
**DETAIL 19
COUPLER**

CODED NOTES:

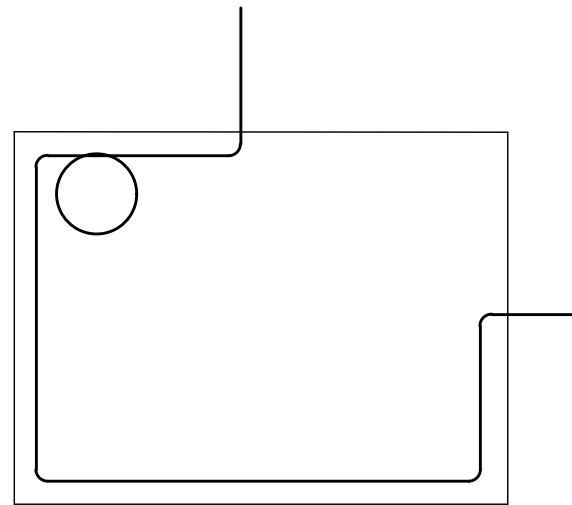
- A** 1/2"X10 GND. ROD FOR NEW INSTALLATION. USE (2) 1/2"X5' 0" SECTIONAL GROUND RODS FOR EXISTING INSTALLATION.
- B** USE APPROPRIATE EXOTHERMIC OR EQUAL FOR #2/0, 7 STR. CU. TO GROUND ROD.
- C** AFTER ROD IS DRIVEN, TEST RESISTANCE WITH A CLAMP ON METER. IF MORE THAN 25Ω RESULT, DRIVE ANOTHER ROD WITH AN ERICO CC12F TREADLESS COUPLING AND RETEST. CONTINUE THIS PROCESS WITH ADDITIONAL RODS UNTIL LESS THAN 25Ω IS ACHIEVED. SEE SPECIFICATIONS TDMIS-1015.
- D** REFER TO TDMIS-1607 FOR ADDITIONAL REQUIREMENTS.

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

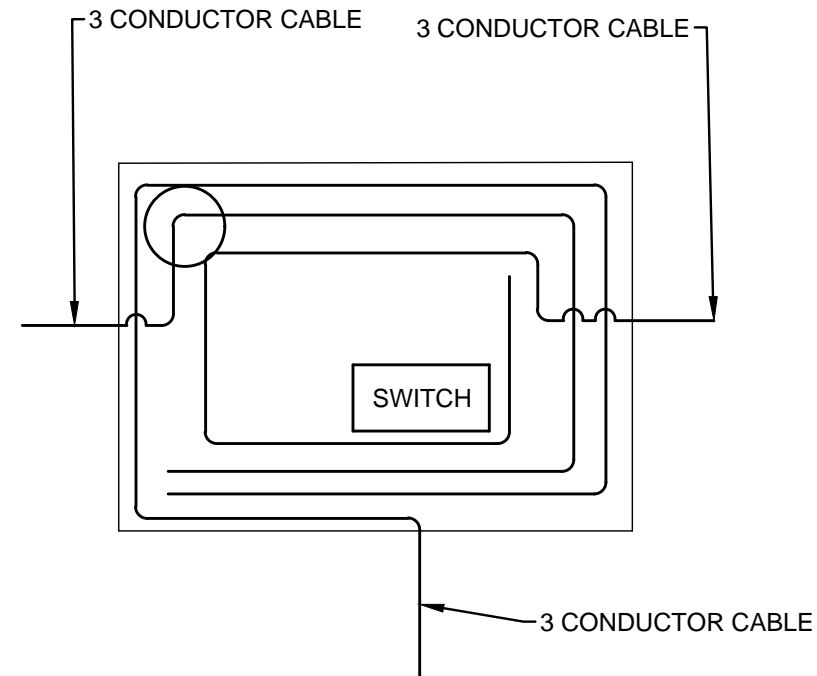
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| CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER | | PRECAST MANHOLE MANHOLE GROUNDING 02S0071 |
| DRAWN BY: AEC | DATE: 01/01/2018 | |
| APPROVED: <i>[Signature]</i> | | TDMIS-1015 |
| SCALE: NTS | SHEET: 8 OF 10 | |



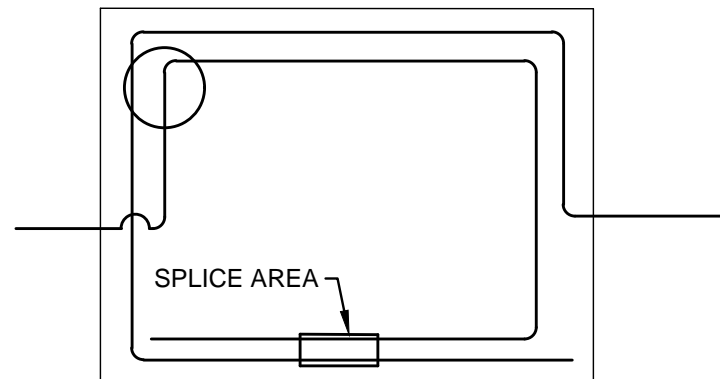
DETAIL 20
WHEN SPLICE IS REQUIRED



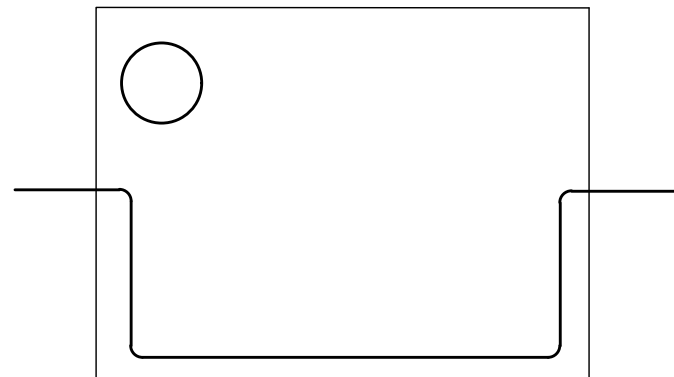
DETAIL 21
IN AND OUT



DETAIL 24
WHEN SWITCH IS TO BE INSTALLED

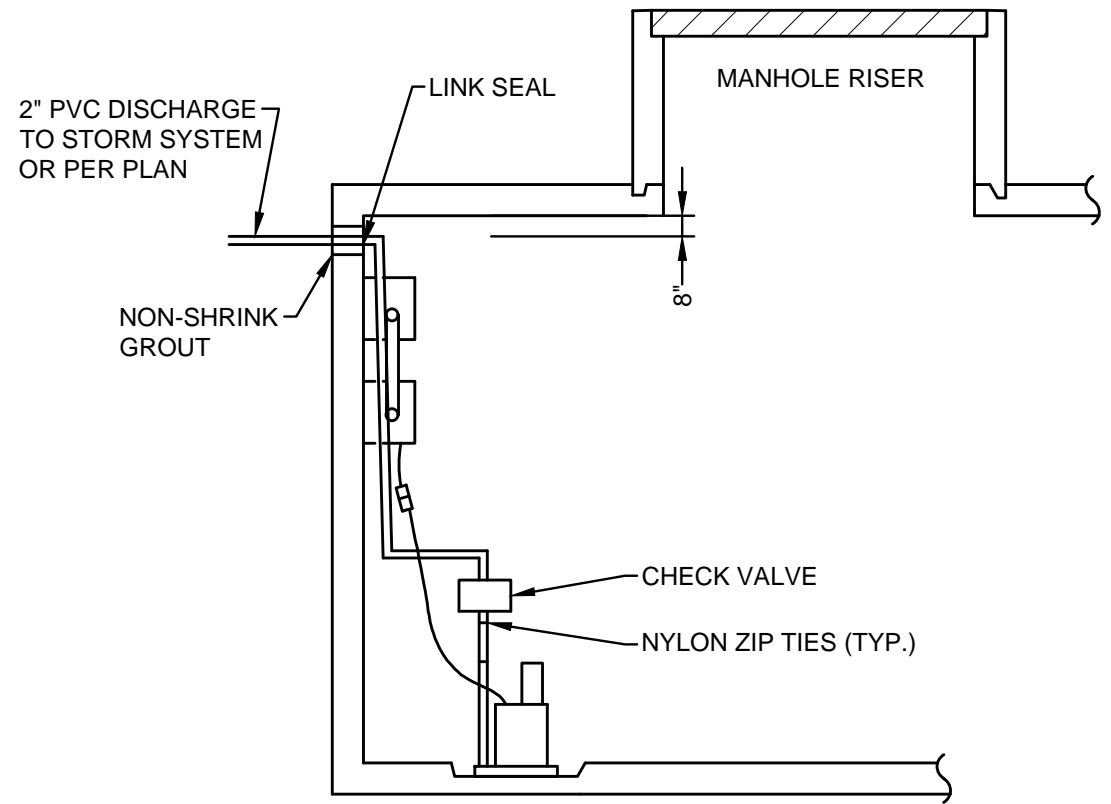


DETAIL 22
WHEN SPLICE IS REQUIRED

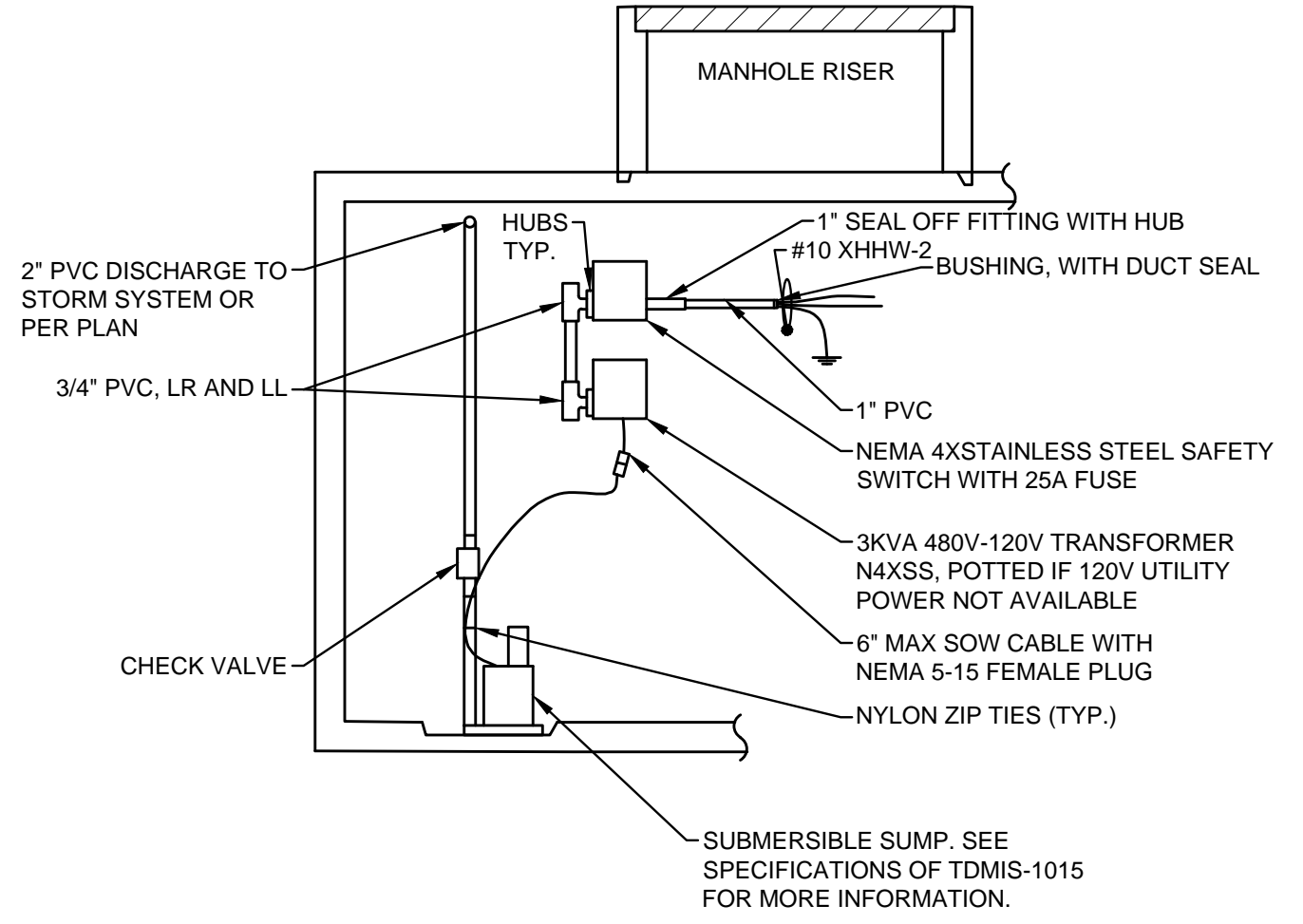


DETAIL 23
IN AND OUT

| | | |
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| CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER | | |
| PRECAST MANHOLE PRIMARY CABLE PLACEMENT 02S0057 | | |
| DRAWN BY: AEC | DATE: 01/01/2018 | TDMIS-1015 |
| APPROVED: <i>[Signature]</i> | | |
| SCALE: NTS | SHEET: 9 OF 10 | |



DETAIL 25
MANHOLE SUMP PUMP-SIDE VIEW



DETAIL 26
MANHOLE SUMP PUMP-FRONT VIEW

| | | |
|---|------------------|-------------------|
| CITY OF COLUMBUS, OHIO DEPT. OF PUBLIC UTILITIES - DIVISION OF POWER | | |
| PRECAST MANHOLE SUMP PUMP 02S0070 | | |
| DRAWN BY: AEC | DATE: 01/01/2018 | TDMIS-1015 |
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| SCALE: NTS | SHEET: 10 OF 10 | |