

Transmission & Distribution
Material & Installation Specification

Switchgear Manhole

I. Quantity

The base bid shall include the indicated number of Switchgear Manholes with precast Collar, units furnished and installed as hereinafter specified.

II. Material

- A. Certification - National Precast Concrete Association, latest edition.
- B. Load rating - AASHTO H-20 including precast collar.
- C. Design - 5000 PSI concrete mix air 6% +/- 2% per Ohio Department of Transportation Standards.
- D. Outside dimensions - 14'-0" L x 7'-0" W x 7'-8" H, plus risers and collar.
- E. Inside dimensions - 13'-0" L x 6'-0" W x 6'-8" H minimum.
- F. Sump depression shall be centered under manhole cast iron frame and cover and shall be 16" Dia. x 4" deep. 1 inch chamfer at 45 degrees around sump.
- G. Cast iron frame and covers - 36" manhole lid and frame. Neenah R-1752, with "MELP" cast into cover, or approved equal.
- H. Steel reinforcing bars shall be Grade 60 and conform to the latest revision of ASTM-A-615, minimum of 2" concrete cover.
- I. Anchor bolts shall be 5/8" diameter X 8" long, galvanized, grade 36 and conform to latest revision of ASTM-F-1554.
- J. Epoxy adhesive shall be a 2 part component structural epoxy system conforming to the latest revision of ASTM-E-488 and ASTM-E-1512 for its capability to resist static, dynamic, seismic, and wind loads.

- K. 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 encapsulation on the cable. 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.
- L. 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.
- M. Cable racking - 1/2" Ackerman- Johnson inserts 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 and installed at each vertical row of Ackerman-Johnson Inserts.
- N. Cable arms - 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 equals 4 arms per stanchion provided.
- O. Lifting insert - lifting inserts that will accept a 1" minimum shackle bolt shall be provided per the precast manufacturers recommendation, minimum of four, for each segments weight and balance involved that will provide for level lifting and maximum safety of personnel.
- P. Precast joint sealant - shall be ConSeal 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 as required by ASTM C-990 section 10.1.
- Q. Grounding - provide four (4) 1 1/4" holes in manhole floor at opposing corners as shown on drawing to allow for ground rod installation. Contractor shall provide 5/8"

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dia. x 10' long copper clad steel ground rods, with a minimum 10 mil copper clad, in each corner of manhole as required to achieve less than 25 ohms resistance.

R. Link seal - Link seal shown in detail 7 and 8 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

III. Installation

- A. The installation shall be as shown on drawing TDMIS-1016.
- B. Anchor bolts shall be field installed. Field drill a 7/8" diameter hole in concrete and remove all dust from bottom of hole. The anchor hole must be clean and free of standing water. Inject a 2 part epoxy in the hold per manufacturers' recommendations. Place anchor in the hold using a twisting motion as it is pushed downward to help distribute the adhesive around the anchor bolt and eliminate trapped air. Note epoxy manufacturers recommendation for curing time.

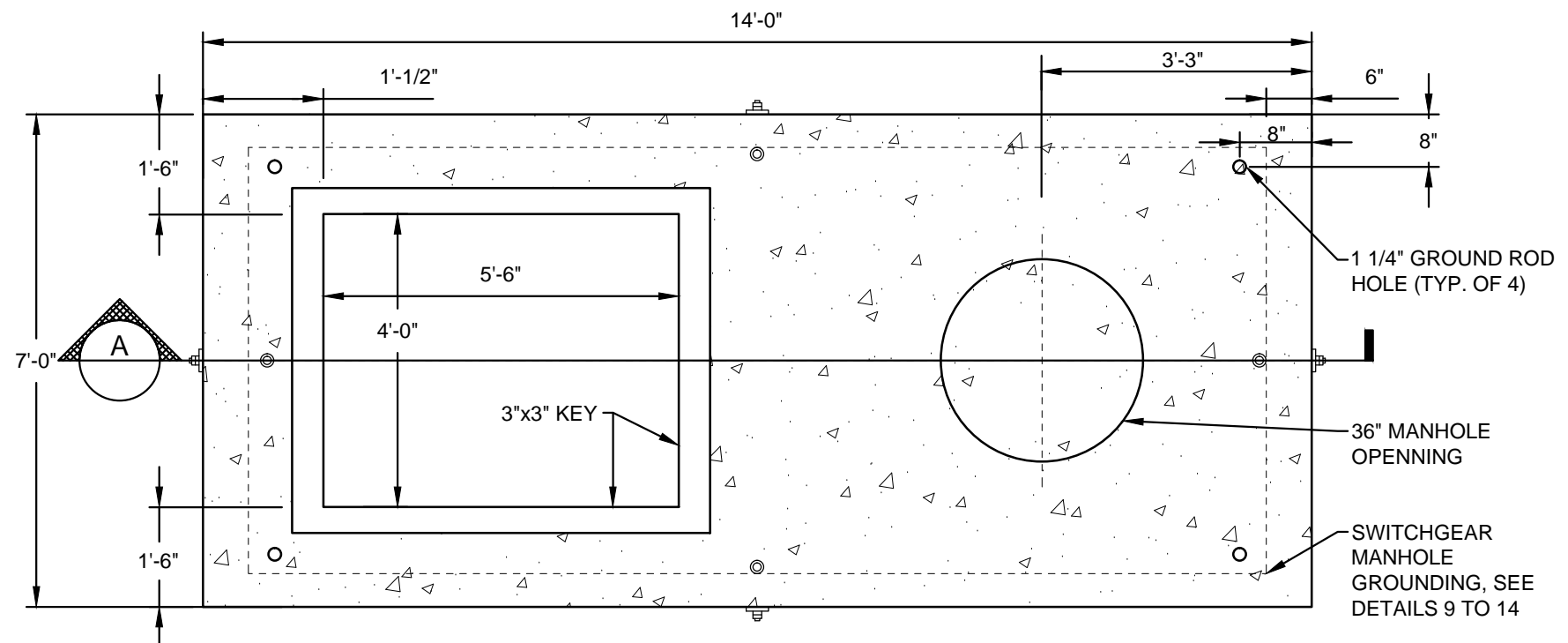
IV. Method of measurement

Shall be per each complete and operational Switchgear Manhole with precast collar, rebar, and anchor bolts including but not limited to excavation, transportation, rigging, placement, leveling, granular base, grounding, inserts, racks and slings, cast iron frame and cover, tools, equipment, duct bank coordination and window placement, site restoration, labor and supervision required for a complete and operational assembly.

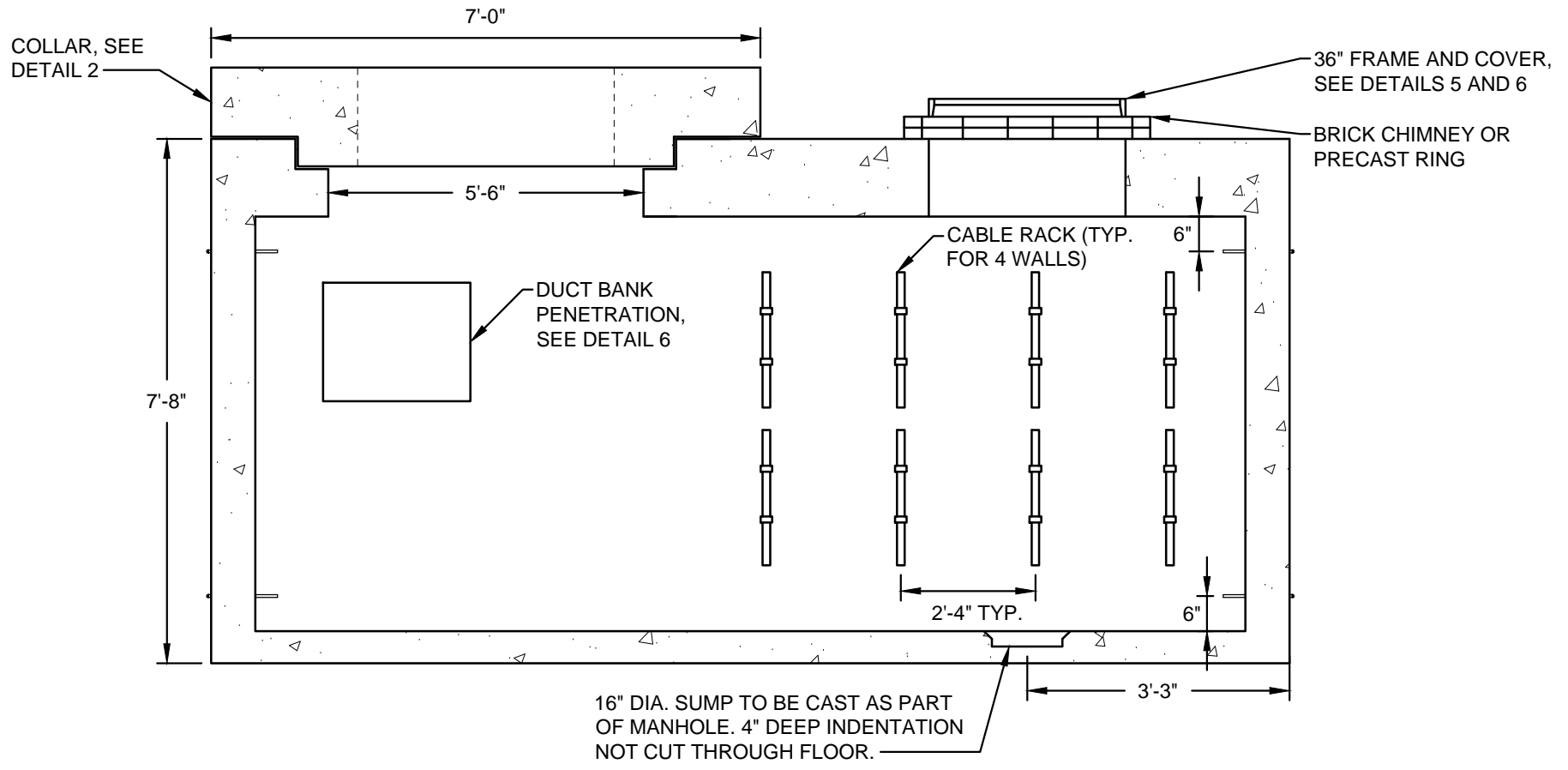
V. Basis of payment

Items	Unit	Description
TDMIS-1016	Each	Switchgear manhole

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**DETAIL 1
PLAN VIEW**

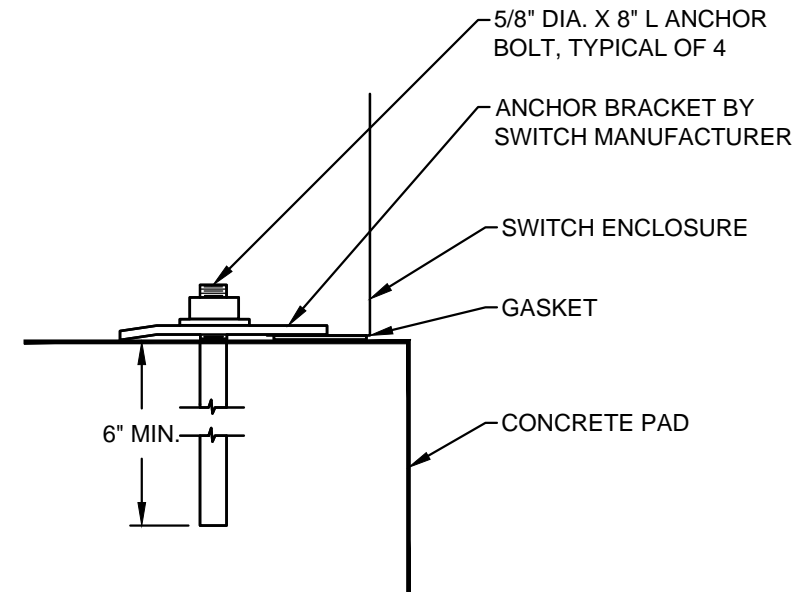
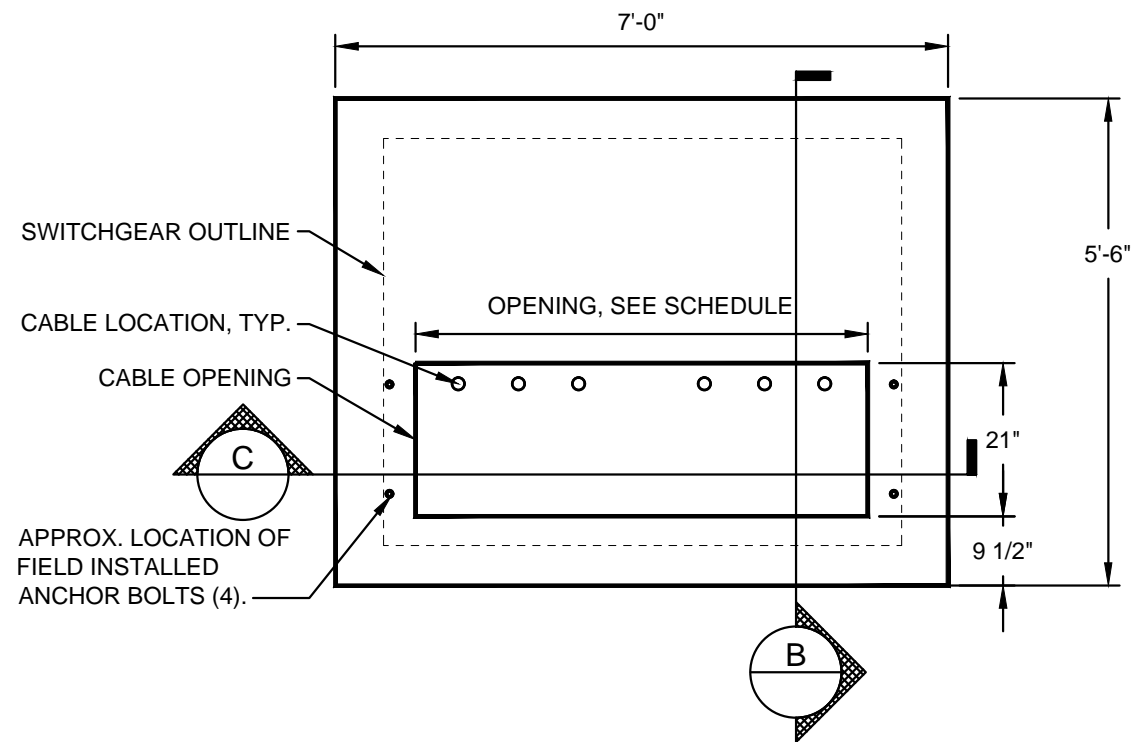


**SECTION A
ELEVATION VIEW**

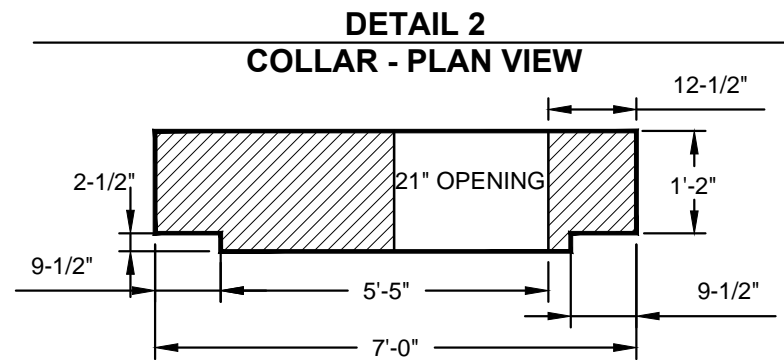
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SWITCHGEAR MANHOLE	
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GENERAL NOTES:

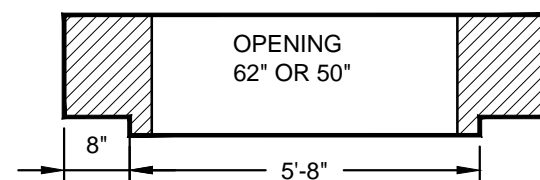
1. PROVIDE TIE WIRES FOR COMPLETE AND OPERATIONAL INSTALLATION.



**DETAIL 3
 ANCHOR BOLT**



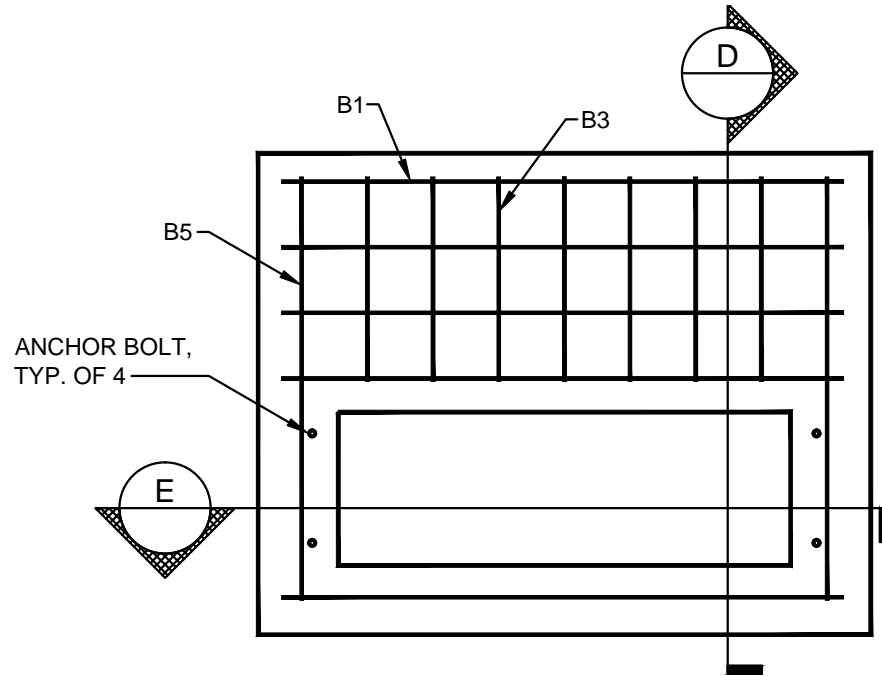
**SECTION B
 COLLAR**



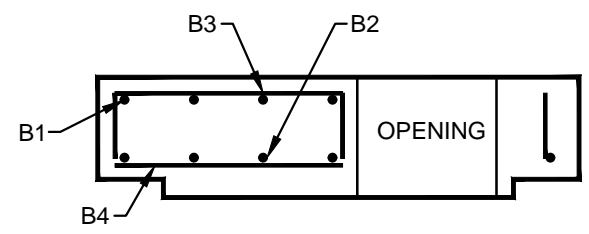
**SECTION C
 COLLAR**

SCHEDULE - CABLE OPENING WIDTH	
NUMBER OF WAYS	WIDTH
4	50"
5	62"

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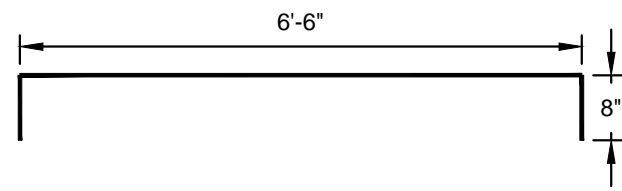
DETAIL 4
COLLAR - REBAR INSTALLATION



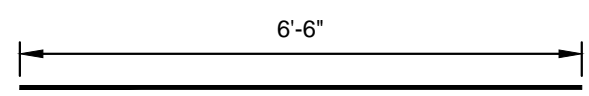
SECTION D
COLLAR - REBAR INSTALLATION



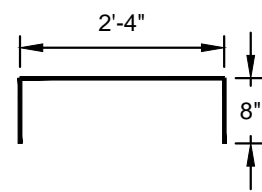
SECTION E
COLLAR - REBAR INSTALLATION



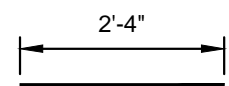
B1 REBAR (5 REQ'D)



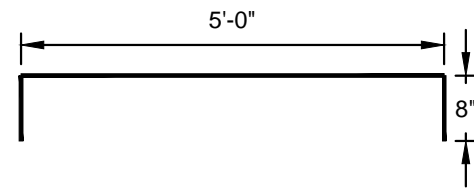
B2 REBAR (5 REQ'D)



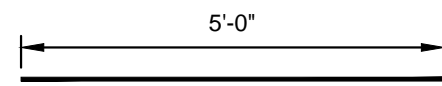
B3 REBAR (7 REQ'D)



B4 REBAR (7 REQ'D)

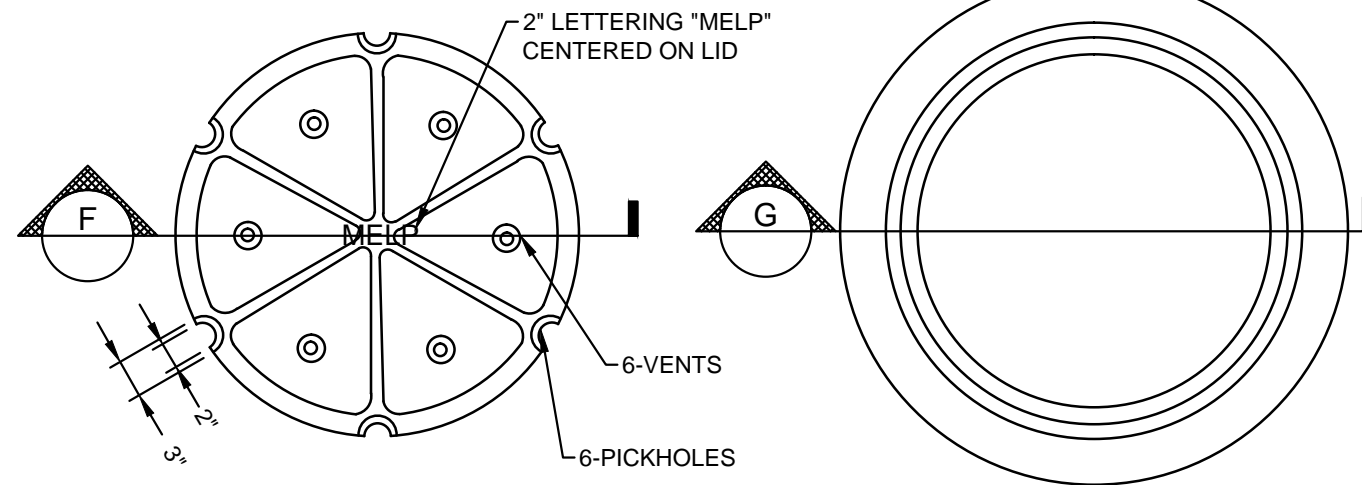


B5 REBAR (2 REQ'D)



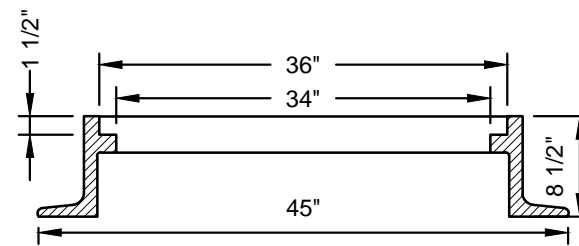
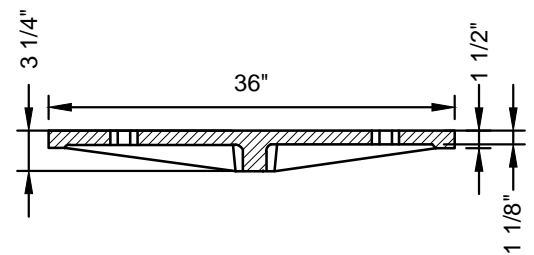
B6 REBAR (2 REQ'D)

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DETAIL 5
SWITCHGEAR MANHOLE COVER

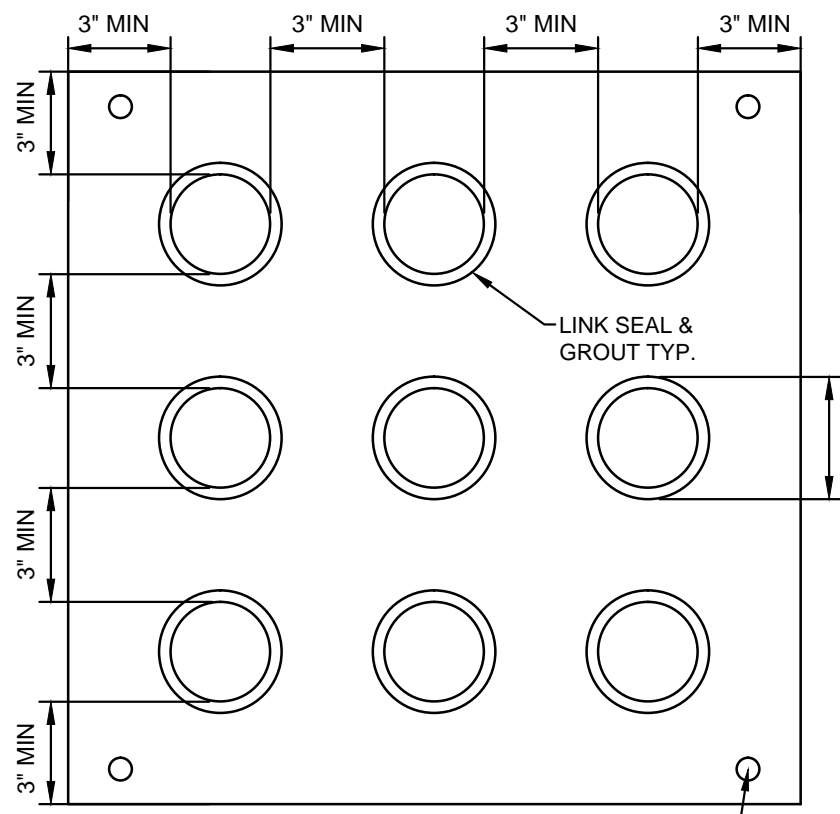
DETAIL 6
SWITCHGEAR MANHOLE COVER FRAME



SECTION F
SWITCHGEAR MANHOLE COVER

SECTION G
SWITCHGEAR MANHOLE COVER FRAME

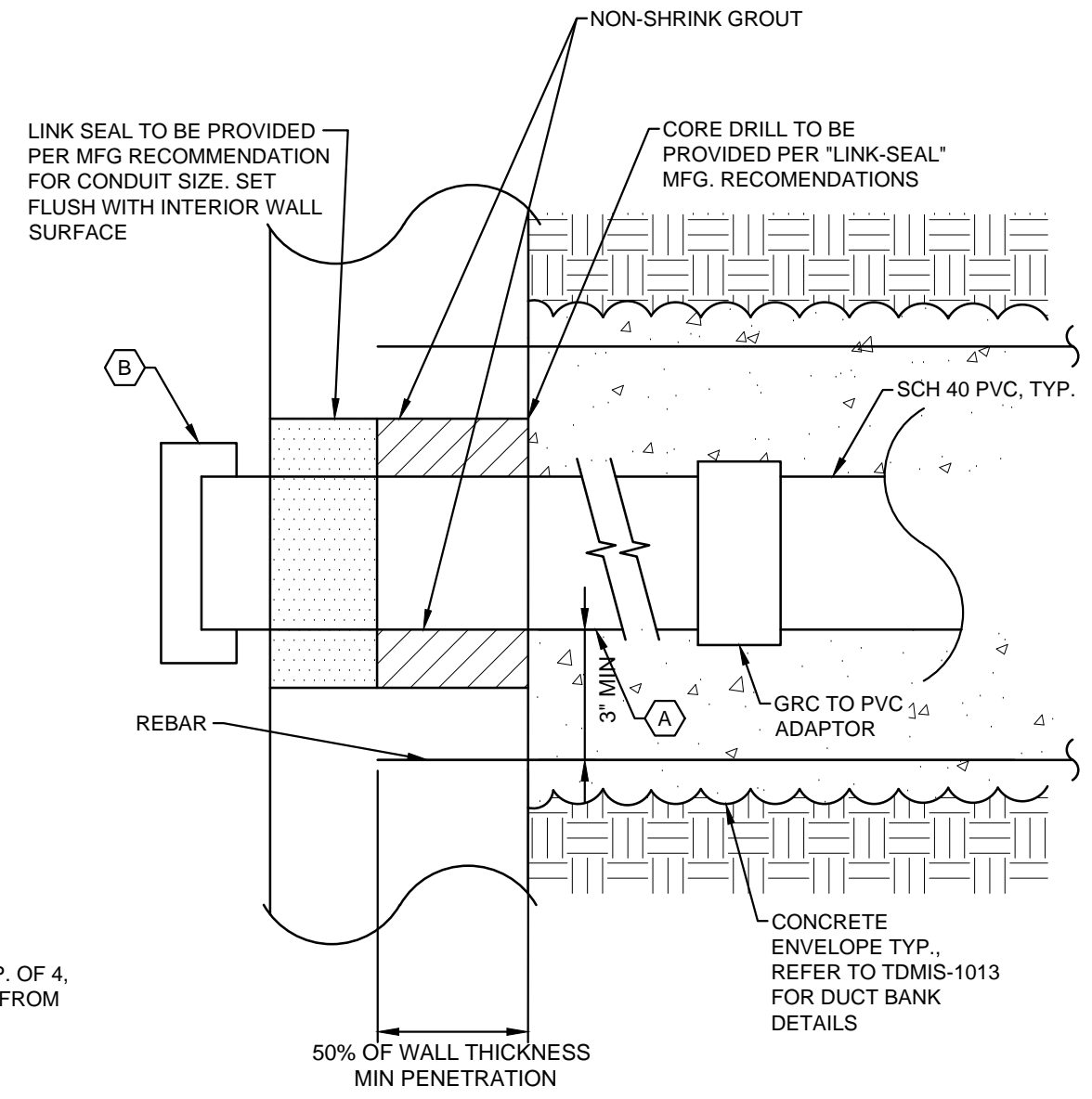
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#4 MIN REBAR, TYP. OF 4,
EXTENDED 20' EA. FROM
MANHOLE WALL

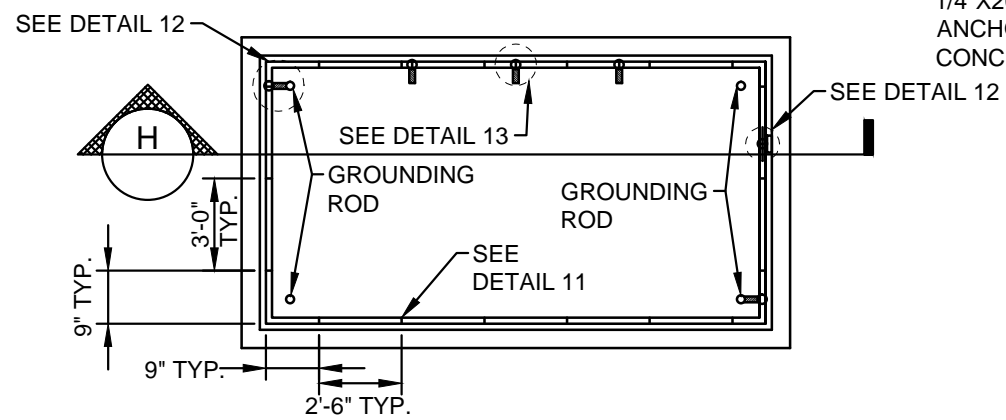
CORE DRILL TYP., DIA. PER MFG (LINKSEAL) RECOMMENDATIONS

DETAIL 7
CONDUIT PENETRATION

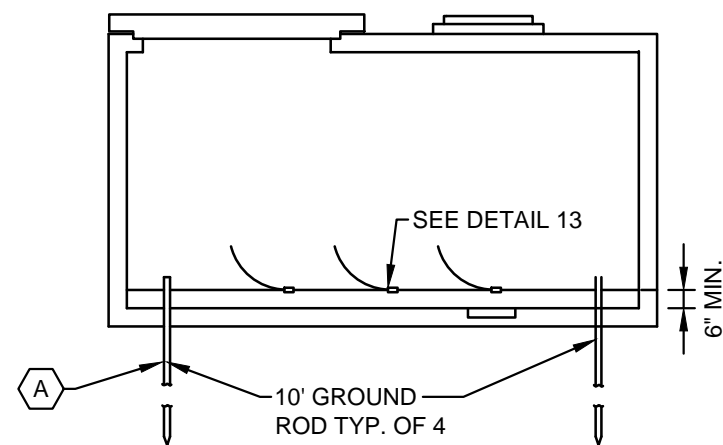


DETAIL 8
CONDUIT PENETRATION - SIDE VIEW

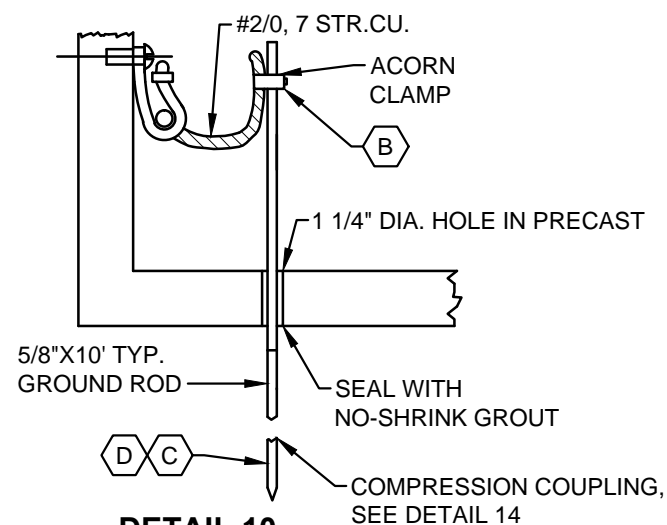
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DETAIL 9
GROUNDING - PLAN VIEW

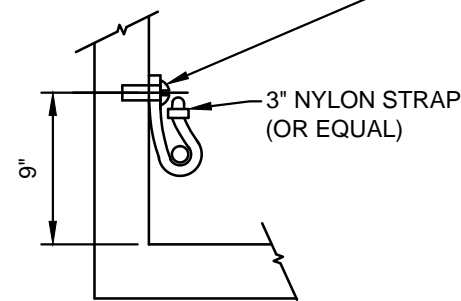


SECTION H
GROUND ROD

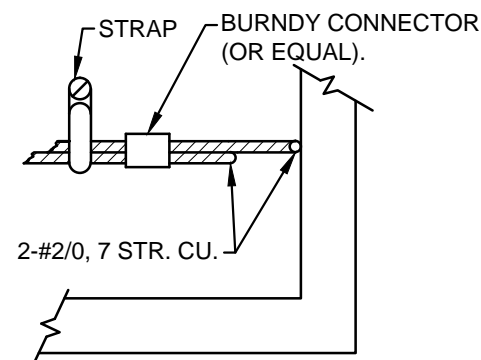


DETAIL 10
SWITCHGEAR MANHOLE GROUNDING

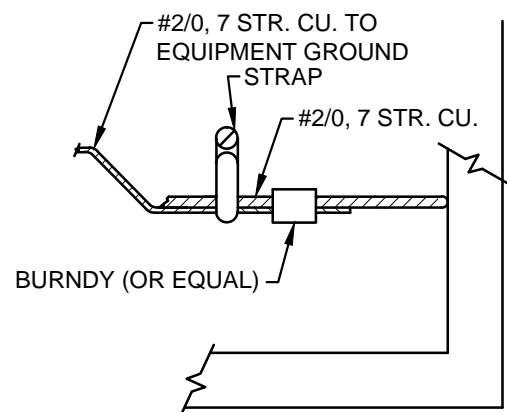
1/4"X20-UNCX1" STAINLESS STEEL ANCHOR BOLT (HILTI OR EQUIVALENT IN CONCRETE WALL AS NEEDED)



DETAIL 11
SWITCHGEAR MANHOLE GROUNDING

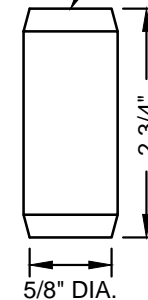


DETAIL 12
SWITCHGEAR MANHOLE GROUNDING



DETAIL 13
SWITCHGEAR MANHOLE GROUNDING

ERICO CC58F COMPRESSION COUPLER

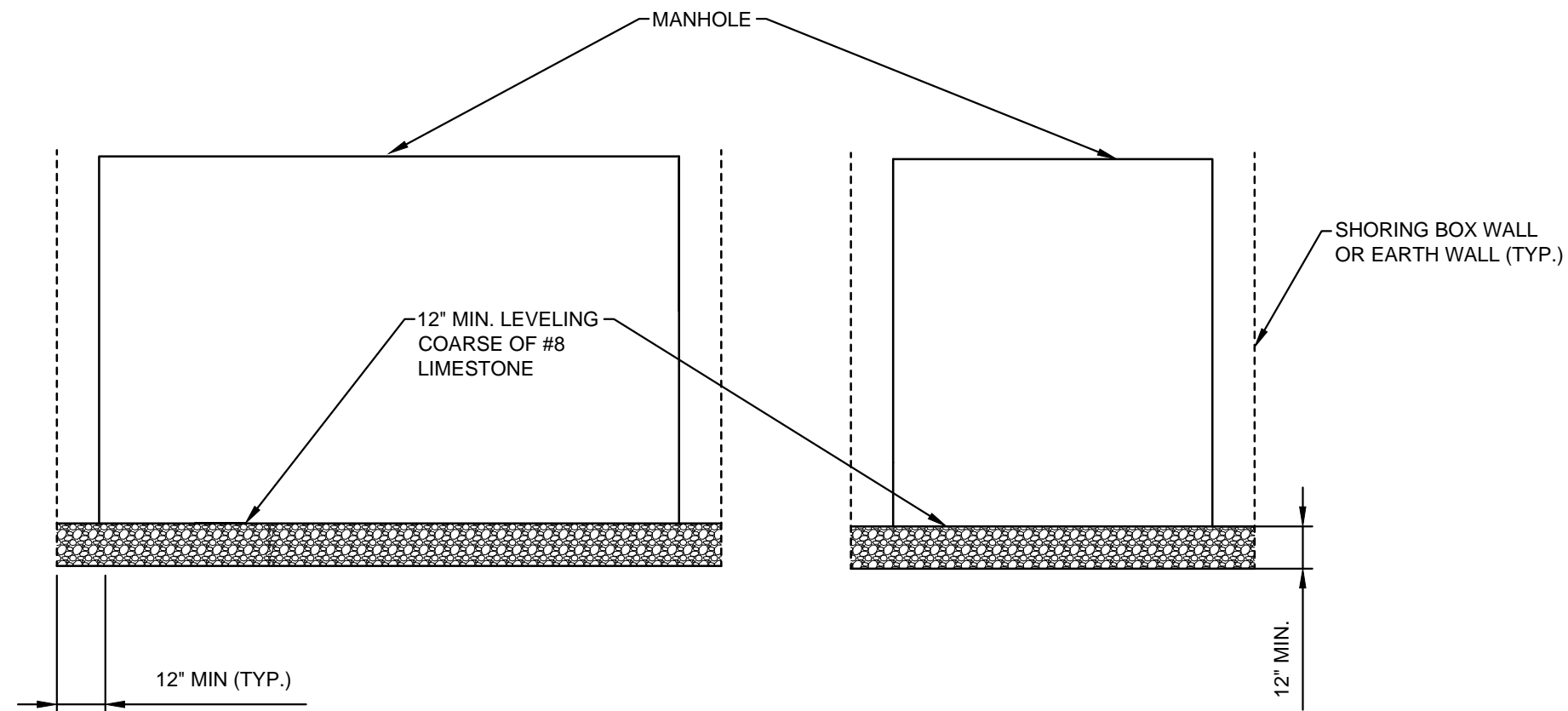


DETAIL 14
COUPLER

CODED NOTES:

- (A) 5/8"X10 GND. ROD FOR NEW INSTALLATION. USE (2) 5/8"X5' 0" SECTIONAL GROUND RODS FOR EXISTING INSTALLATION.
- (B) USE APPROPRIATE ACORN CLAMP 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 CC58F TREADLESS COUPLING AND RETEST. CONTINUE THIS PROCESS WITH ADDITIONAL RODS UNTIL LESS THAN 25Ω IS ACHIEVED. SEE SPECIFICATIONS TDMIS-1016.
- (D) REFER TO TDMIS-1607 FOR ADDITIONAL REQUIREMENTS.

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**DETAIL 15
LEVELING COARSE**

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