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, ½” 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 - ½” 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:

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

City of Columbus
DEPT. of Public Utilities - DIVISION OF POWER
PRECAST VAULT

DRAWN BY: AEC DATE: 01/01/2015
APPROVED: R. SPORTE SHEET: 1 of 15
TDMIS-1014
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-1988, 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 ½" 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 ⅝" x 4 ⅞" ASTM A-36 bar spaced 1- 7/16" CC, and 2" x 3/16" filler bars spaced 1- 7/16" CC, ½" open space between bars.

Cross Bars - To be 1" x ⅜" 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 ½" threaded eyebolts for lifting grates with cable Beckys and shackles. ½" 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 ¼" holes in vault floor at opposing corners as show on drawings to allow for ground rod installation.

Contractor shall provide ½" 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
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

<table>
<thead>
<tr>
<th>Items</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDMIS-1014</td>
<td>Each</td>
<td>Vault with frame and grate module</td>
</tr>
</tbody>
</table>
9'-8" X 5'-6" OPENING AND 36" DIAMETER
M.H. OPENING LOCATION SHALL BE GIVEN AT TIME OF ORDERING.
**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.

---

**SECTION A**

INSETS

- 1/2" ACKERMAN-JOHNSON INSERT OR APPROVED EQUAL. NUMBER AS REQUIRED TO SECURE CABLE RACKS FOR ALL FOUR WALLS

---

**SECTION B**

INSETS & SUMP

- 16" DIA. SUMP TO BE CAST AS PART OF VAULT. 4" DEEP INDENTATION NOT CUT THROUGH FLOOR.
3' MIN

LINK SEAL &
GROUT TYP.

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

50% OF WALL THICKNESS
MIN PENETRATION

A

B

3' MIN

3' MIN

3' MIN

SCH 40 PVC, TYP.

GRC TO PVC ADAPTOR

CORE DRILL TO BE
PROVIDED PER "LINK-SEAL"
MFG. RECOMMENDATIONS

NON-SHRINK GROUT

CONCRETE ENVELOPE TYP.,
REFER TO TDMIS-1013
FOR DUCT BANK
DETAILS

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

50% OF WALL THICKNESS
MIN PENETRATION

A

B

NON-SHRINK GROUT

CORE DRILL TO BE
PROVIDED PER "LINK-SEAL"
MFG. RECOMMENDATIONS

50% OF WALL THICKNESS
MIN PENETRATION

A

B

CODED NOTES:

A. FIRST 10' OF CONDUIT SHALL BE RIGID
GALVANIZED STEEL FOR EACH CONDUIT

B. GROUNDING BUSHING. EXTEND #6 SOILD
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.
DETAIL 6
LEVELING COARSE

PRECAST VAULT

12" MIN.
LEVELING COARSE OF #8 LIMESTONE

12" MIN.

SHORING BOX WALL OR EARTH WALL (TYP.)

12" MIN.

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

PRECAST VAULT
LEVELING COARSE

DRAWN BY: AEC
APPROVED: R. SPRITE
DATE: 01/01/2018
SCALE: NTS
SHEET: 7 OF 16

TDMIS-1014
REINFORCING FOR H-20 BRIDGE LOADING
CONCRETE: 5000 PSI-28 DAY STRENGTH,
AIR 6% +/- 2%
LIFTING EYES SHALL BE PROVIDED

DETAIL 7
VAULT RISER

SEE DETAIL 1 OF TDMIS-1014
FOR JOINTS DETAILS

SEE DETAIL 1 OF TDMIS-1014
FOR JOINTS DETAILS

AS REQUIRED

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
APPROVED: R. SPRITE
SCALE: NTS
SHEET: 8 OF 16
1/4"X4 1/2" BEARING BAR ON 1 7/16" CENTERS
1/2" OPEN SPACE

SECTION A
SIDE VIEW

SECTION B
SIDE VIEW

1/4"X1 CROSS BARS ON 4" CENTERS

THE ELONGATED GRATE OPENINGS SHALL BE PERPENDICULAR TO THE DOMINANT DIRECTION OF TRAVEL

GRATE SECTIONS WEIGH APPROX. 454 LB.

SEE DETAIL 11 OF TDMIS-1014 FOR LIFTING EYE BOLT DETAILS. PROVIDE 4 PER PANEL.

12 GAUGE GALVANIZED STEEL PLATE WELDED BELOW GRATE

1/4"X1 CROSS BARS ON 4" CENTERS

12 GAUGE GALVANIZED STEEL PLATE WELDED BELOW GRATE

THE ELONGATED GRATE OPENINGS SHALL BE PERPENDICULAR TO THE DOMINANT DIRECTION OF TRAVEL

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GRATE SECTIONS WEIGH APPROX. 454 LB.

SEE DETAIL 11 OF TDMIS-1014 FOR LIFTING EYE BOLT DETAILS. PROVIDE 4 PER PANEL.
PROVIDE S.S. REMOVABLE THREADED BOLT TO PROTECT THREADS WHEN LIFTING-EYES ARE NOT IN USE.

1/2" THREADED STAINLESS STEEL BOSS, WELDED INTO GRATING WEBs, TO RECEIVE PORTABLE EYE BOLT LIFTING-EYES.

SECTION A
LIFTING EYE

DRAWN BY: R. SPRITE
APPROVED: R. SPRITE
DATE: 01/01/2018
SHEET: 11 OF 16

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

PRECAST VAULT
GRATE LIFTING EYE DETAIL

TDMIS-1014
CORDED NOTES:
A DRILL 5/8" HOLE. PROVIDE 5/16" X 1" BOLT AND NUT (4 PLACES)
1/4"X20-UNCX1" STAINLESS STEEL ANCHOR BOLT (HILTI OR EQUIVALENT IN CONCRETE WALL AS NEEDED)

3" NYLON STRAP (OR EQUAL)

9" TYP.

2'-6" TYP.

3'-0" TYP.

GROUNDING ROD

GROUNDING ROD

GROUNDING ROD

1/2"X10 GND. ROD FOR NEW INSTALLATION. USE (2) 1/2"X5' 0" SECTIONAL GROUND RODS FOR EXISTING INSTALLATION.

USE APPROPRIATE EXOTHERMIC OR EQUAL FOR #2/0, 7 STR. CU. TO GROUND ROD.

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.

REFER TO TDMIS-1807 FOR ADDITIONAL REQUIREMENTS.

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

SEAL WITH NO-SHRINK GROUT

COMPRESSION COUPLING, SEE DETAIL 21

1/2"X10" TYP. GROUND ROD

1 1/4" DIA. HOLE IN PRECAST

EXOTHERMIC WELD

#2/0, 7 STR. CU.

#2/0, 7 STR. CU. TO EQUIPMENT GROUND STRAP

BURNFY (OR EQUAL)

#2/0, 7 STR. CU.

DETAIL 17

VAULT GROUNDING

SECTION A

GROUND ROD

DETAIL 16

PLAN VIEW

DETAIL 18

VAULT GROUNDING

DETAIL 19

VAULT GROUNDING

DETAIL 20

VAULT GROUNDING

#2/0, 7 STR. CU.

BURNDY CONNECTOR (OR EQUAL)

2-#2/0, 7 STR. CU.

REFERENCE: EXOTHERMIC WELD IS REQUIRED TO BOND THE ROD WITH THE GROUNDING GRID
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
**Detail 27**

VAULT SUMP PUMP - SIDE VIEW

- 2" PVC DISCHARGE TO STORM
- LINK SEAL
- DISCHARGE TO STORM SYSTEM OR PER PLAN
- NON-SHRINK GROUT
- CHECK VALVE
- HYDROCARBON AND LEVEL SENSOR
- NYLON ZIP TIES (TYP.)

**Detail 28**

VAULT SUMP PUMP - FRONT VIEW

- 2" PVC DISCHARGE TO STORM
- 1" PVC SEAL OFF FITTING WITH HUB
- #10 XHHW-2 BUSHING, WITH DUCT SEAL
- 1" PVC
- HUBS TYP.
- HYDROCARBON AND LEVEL SENSOR
- NYLON ZIP TIES (TYP.)

- CHECK VALVE
- 3/4" PVC, LR, T AND LL
- NEMA 4X STAINLESS STEEL SAFETY SWITCH WITH 25A FUSE
- 3KVA 480V-120V TRANSFORMER NAXSS, POTTED IF 120V UTILITY POWER NOT AVAILABLE
- NYLON 4X PUMP CONTROLLER

- NON-SHRINK GROUT
- SUBMERSIBLE PUMP. SEE SPECIFICATIONS OF TDMIS-1014 FOR MORE INFORMATION.
SEE DETAIL 29

**CABLE RACK**

**TYPICAL VAULT**

**ITEM LIST**

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>DESCRIPTION</th>
<th>PART #</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RACK CABLE, NON-METALIC, LENGTH AS REQUIRED</td>
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<td>AS REQ.</td>
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<tr>
<td>2</td>
<td>CABLE ARM, 11&quot; LENGTH</td>
<td>*</td>
<td>AS REQ.</td>
</tr>
<tr>
<td>3</td>
<td>1/2&quot;-13 STAINLESS STEEL BOLT</td>
<td>*</td>
<td>AS REQ.</td>
</tr>
<tr>
<td>4</td>
<td>FLAT WASHER, STAINLESS STEEL</td>
<td>*</td>
<td>AS REQ.</td>
</tr>
</tbody>
</table>

**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.