

DMS - 11030

CONDUIT

EFFECTIVE DATE: APRIL 2014

11030.1. Description. This Specification governs the materials, composition, quality, sampling, and testing of electrical conduit.

11030.2. Units of Measurements. The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

11030.3. Material Producer List. The Traffic Operations Division (TRF) maintains the Material Producer List (MPL) of all materials conforming to the requirements of this specification. Electrical conduits appearing on the MPL, entitled "[Roadway Illumination and Electrical Supplies](#)," need no further sampling or testing unless deemed necessary by the Project Engineer or TRF.

11030.4. Bidders' and Suppliers' Requirements. The Department will purchase or allow on projects only those products listed by manufacturer and product code on the MPL. Use of pre-qualified product does not relieve the Contractor of the responsibility to provide products that meet this Specification. The Department may inspect or test material at any time and reject any material that does not meet the specifications. Testing of failing materials will be at the manufacturer's expense.

Notify the Department in writing of selected materials from the MPL intended for use on each project. Provide evidence of Underwriters Laboratories (UL®) certification to produce electrical conduits. To be accepted on bids, materials must have approved product codes or designations and be from pre-qualified producers.

11030.5. Pre-Qualification Procedure.

- A. Pre-Qualification Request.** Submit a request for evaluation to the Texas Department of Transportation, Traffic Operations Division, Traffic Engineering Section (TRF-TE), 125 East 11th Street, Austin, Texas 78701-2483.
- B. Pre-Qualification Submittals.** Include the following with the pre-qualification request.
 - Submit two legible copies of catalog cut sheets for all components required for each type of electrical conduit, conduit and fitting samples, and box drawings, marked to indicate the specific product submitted for pre-qualification.
 - For each type of conduit, submit a 3-ft. sample and applicable required test results.
 - For each box, submit applicable required test results.
 - For all products, submit Quality Assurance/Quality Control (QA/QC) documentation from Article 11030.6.

Provide additional samples when directed, following Department submittal guidelines. Submit all materials for pre-qualification evaluation at no cost to the Department.

C. Evaluation. TRF-TE reviews submittals, tests samples for specification compliance, and updates the MPL to include materials that meet specification requirements. TRF-TE will notify prospective bidders and suppliers after completion of material evaluation.

1. Qualification. If approved for Department use, TRF-TE will add the conduit to the MPL. Materials listed on the MPL will require no additional submittals for that product.

Report changes in the composition or in the manufacturing process of any material to TRF-TE. Significant changes reported by the manufacturer, as determined by the Director of TRF, may require a re-evaluation of performance. Unapproved changes may result in removal of the manufacturer from the MPL for 1 year.

2. Failure. Producers not qualified under this Specification may not furnish materials for Department projects and must show evidence of correction of all deficiencies before reconsideration for qualification.

The Department normally bears the costs of sampling and testing; however, the Contractor or supplier will bear the costs of sampling and testing materials failing to conform to the requirements of this Specification. The Director of TRF will assess the cost at the time of testing.

The Department will deduct amounts due from monthly or final estimates on Contracts or from partial or final payments on direct purchases by the State. The Department will not retest products until costs for previously failed tests have been paid.

D. Periodic Evaluation. TRF may periodically test products from projects for compliance with this Specification. TRF may remove products from the MPL that inconsistently pass testing or are inconsistent with product guidelines. Testing of failing materials will be at the manufacturer's expense.

E. Disqualification. The following conditions are cause for immediate removal from the MPL.

- Manufacturer makes changes in the composition or in the manufacturing process of any material without prior testing and approval by TRF-TE.
- Pre-qualified material does not meet the requirements of this Specification as a result of periodic evaluation or is inconsistent with product guidelines.
- Pre-qualified material provided on a project does not match the pre-qualified submittals.

F. Re-Qualification. Producers may submit material for re-evaluation after 1 year has elapsed from the date of removal from the MPL or after providing documentation from an independent testing facility stating the materials meet all requirements of this Specification. TRF-TE will reinstate the 1-year time limit if, after retesting, the material again fails any of the specification requirements.

11030.6. QA/QC Requirements. The manufacturer must demonstrate a commitment to quality by submitting QA/QC program documentation with the following minimum requirements:

- Written statement of the company's QA/QC policy,
- Name of employee with special QA/QC training and with QA/QC as a primary job responsibility,
- Written procedure for handling orders for conduit built to Department specifications,
- Written procedure for keeping track of conduit manufactured, certified, and tested for Department orders, and
- Checklist of features for Department conduit with QA/QC employee's signature.

11030.7. Material Requirements.

A. General Requirements. Provide new conduit, conduit fittings, and junction boxes listed for the intended use by UL® and meeting the applicable requirements of the National Electrical Manufacturer's Association (NEMA®) and the National Electrical Code (NEC®). When referencing UL®, consider any current Nationally Recognized Testing Laboratory (NRTL) as shown on the Occupational Safety and Health Administration (OSHA) website. Provide evidence of NRTL certification to produce electrical conduit.

Polymer concrete junction boxes used in traffic barriers and stainless-steel junction boxes larger than 12 × 12 × 6 in. need not be UL® Listed.

Provide documentation of compliance with required standards and specifications. When testing is required, either an independent testing laboratory or licensed professional engineer will certify the test results. Provide a copy of the current applicable testing guidelines upon request.

Faulty fabrication or poor workmanship in materials, equipment, or installation will be justification for rejection. Provide manufacturer's warranties or guarantees when offered as a customary trade practice.

Conduit systems other than listed below, are not governed by these specifications.

B. Rigid Metal Conduit. For rigid metal conduit (RMC) systems, provide hot-dip galvanized steel RMC. Galvanize the conduit after threading is complete. Meet the requirements of Item 445 "Galvanizing." Ensure the zinc coating is a minimum of 1.5 oz. per sq. ft. inside and outside in accordance with ASTM A 90. Galvanize factory threads after cutting. Provide liquid-tight flexible metal conduit (LFMC) for RMC systems.

Submit a test report with results of galvanizing coating and a salt spray test with exposed threads.

1. Fittings and Straps. Provide hot-dip galvanized or stainless steel conduit support hardware, including straps, nuts, bolts, screws, and washers. Provide stainless steel expansion type anchors when mounting to concrete. Unless otherwise shown in the plans, for 1/4-in. conduit, furnish an anchor with an allowable pullout force of 1,300 lb. For 3/8-in. conduit, furnish an anchor with an allowable pullout force of 2,650 lb. Embed anchor to the depth shown on the plans and in accordance with the manufacturer's recommendations. Provide strut-type straps made of malleable iron or

stainless steel material. Do not use stamped cadmium-plated straps. Use rain-tight electro-zinc plated steel, mechanically galvanized malleable iron, or hot dipped galvanized malleable iron couplings, connectors, conduit bodies, grounding bushings, and offset nipples that are compression type or threaded. Ensure the electrical service weatherhead is electro-zinc plated steel, hot dipped galvanized malleable iron, or copper-free sand-cast aluminum. Provide weatherheads that thread on to the galvanized steel RMC conduit riser. Do not use weatherheads made of zinc die-cast material. Do not use set-screw type conduit fittings. When required, provide expansion joints with internal or external bonding jumper.

C. Polyvinyl Chloride Conduit. For polyvinyl chloride (PVC) conduit systems, provide conduit that meets the requirements of NEMA® Standard TC-2 and UL® 651. Provide liquid-tight flexible non-metallic conduit (LFNC) for PVC conduit systems. Provide PVC junction boxes intended for outdoor use in PVC conduit systems.

D. High-Density Polyethylene Conduit. For high-density polyethylene (HDPE) conduit systems, provide weather-resistant HDPE that is black in color (minimum 2% carbon black, maximum 2.5% carbon black). Ensure the HDPE compound type meets or exceeds the cell classification PE334420C as described in ASTM D 3350. The conduit supplier must submit written certification that the resin meets or exceeds cell classification requirements.

Mark conduit with the material designation, schedule of pipe, nominal size shown by IPS (iron pipe standard), the name or trademark of the manufacturer at a maximum of every 10 ft., and the words “TxDOT” or “TxDOT Approved.”

Meet the requirements of UL® 651-A.

Meet the requirements of the latest edition of NEMA® TC-7 for type EPEC-40-HDPE. Ensure the wall type is rated Schedule 40 per ASTM F 2160.

Do not provide factory-installed conductors. Provide approved electrical conduit connector, or thermally fuse using an electrically heated, wound-wire, resistance welding method.

E. Junction Boxes. Provide junction boxes that meet the requirements shown in Table 1.

Equip junction boxes with a threaded hole or lug for grounding. Provide stiffeners or thicker metal and external mounting feet for stainless-steel junction boxes larger than 12 × 12 × 6 in.

Table 1
Junction Box Specifications

Box Size (H × W × D)	Requirements
≤ 12 × 12 × 6 in.	Provide hot-dip galvanized cast iron or sand-cast aluminum junction boxes with external mounting feet.
> 12 × 12 × 6 in. but < 18 × 18 × 6 in.	Provide 14-gauge stainless-steel junction boxes. These need not be UL® listed but must meet the other requirements of the NEC®.
> 18 × 18 × 6 in.	Provide 12-gauge stainless-steel junction boxes. These need not be UL® listed but must meet the other requirements of the NEC®.

F. Traffic Barrier Boxes. For traffic barrier installation, provide polymer concrete junction boxes as described below.

Permanently mark the inside of polymer concrete junction boxes and covers, either by impress or by permanent ink, with manufacturer's model number, Tier rating, and manufacturer's name or logo.

Reinforce polymer concrete junction boxes and covers with two continuous layers of knitted biaxial roving borosilicate fiberglass fabric. The base glass on the fiberglass fabric is alumina-lime-borosilicate type "E" glass. The reinforcing fabric must line the entire inner and outer surfaces. Obtain approval for the fabric prior to production. Do not provide polymer concrete containing chopped fiberglass or fiberglass-reinforced plastic. Construct polymer concrete from catalyzed polyester resin, sand, and aggregate. Ensure a minimum compressive strength of 11,000 psi.

Meet current ANSI/SCTE77 performance and testing requirements for Tier 8 with certification. Supply certification from an independent laboratory or factory-testing documentation witnessed and certified by a professional engineer licensed in Texas.

Ensure polymer concrete junction box withstands 600 lb. per sq. ft. applied over the entire sidewall with less than 1/4 in. deflection per foot length of box. Ensure polymer concrete junction box and cover withstand a test loading of 12,000 lb. over a 10 × 10 in. area centered on the cover with less than 1/2 in. deflection at the design load of 8,000 lb.

Ensure polymer concrete junction box wall thickness is at least 1/2 in. Provide 3/4 in. polymer concrete junction box covers. Ensure covers are interchangeable between manufacturers.

Legibly imprint the polymer concrete junction box cover with the following words: "DANGER — HIGH VOLTAGE ILLUMINATION."

Secure polymer concrete junction box cover using two 3/8 in. stainless-steel captive bolts and retainers. Ensure bolts withstand a minimum of 25 ft.-lb. torque and have a minimum 200-lb. straight-pull-out strength. Provide brass nuts and stainless steel hardware.

Provide drain hole or drain slot in junction box. Prevent the ingress of fingers into box through drain hole or slot. Meet IEC 529 IP20, tested with a 12.5-mm diameter ball.

1. Barrier Box for Cast-In-Place/Jersey Barrier.

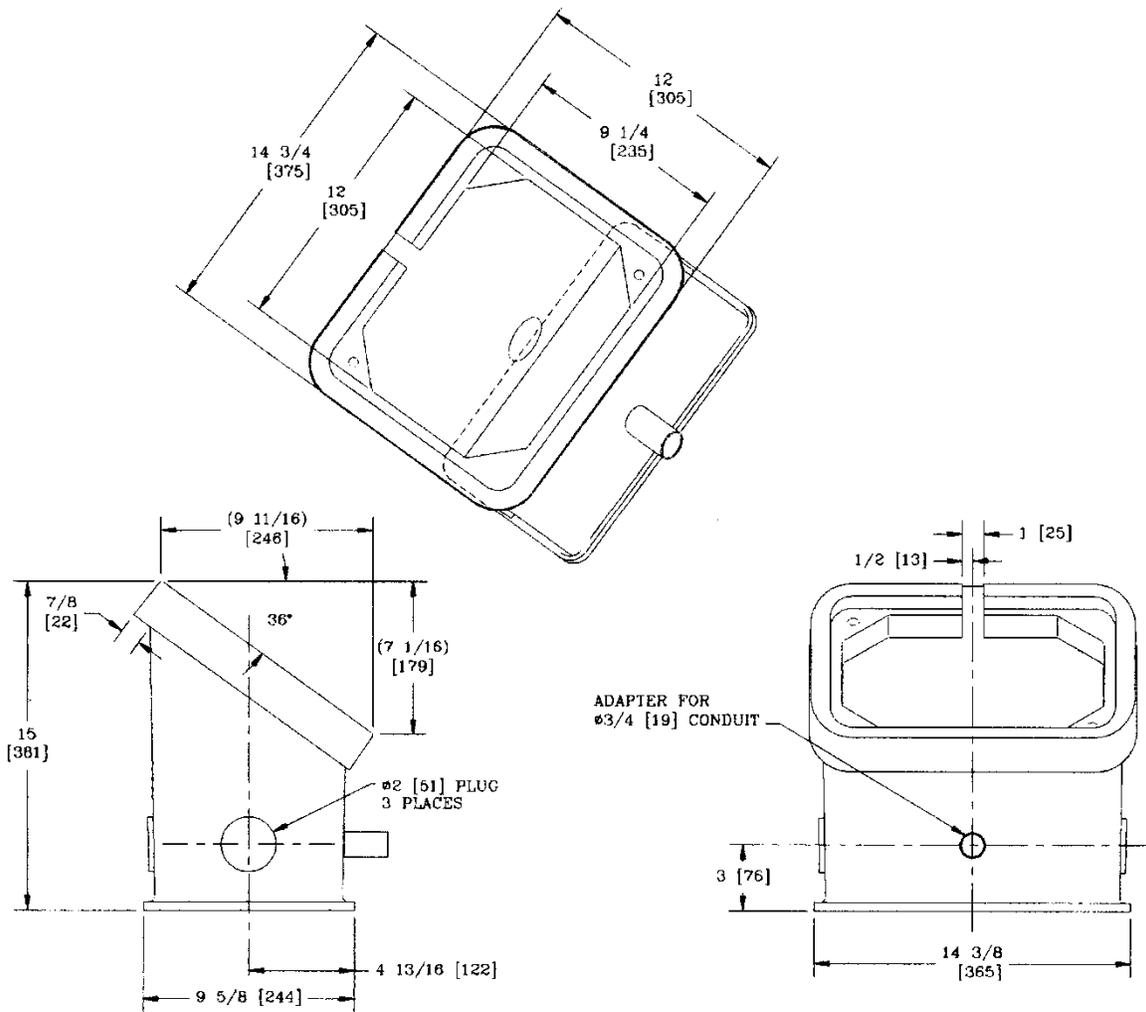


Figure 1
Barrier box.

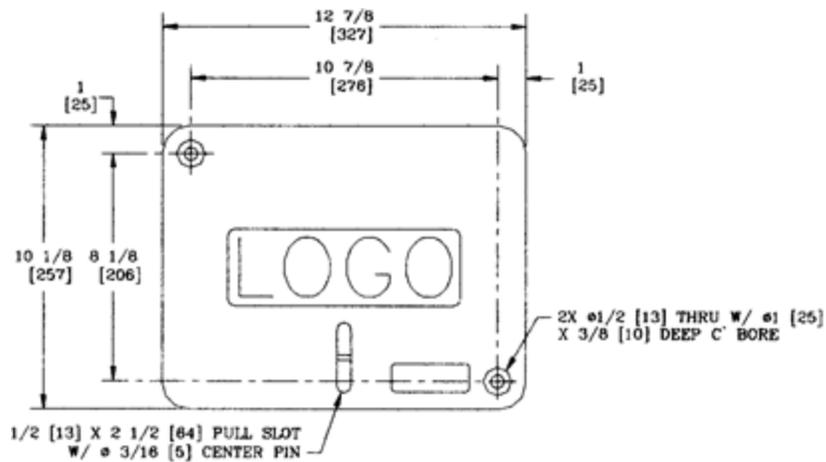


Figure 2
Barrier box lid.

2. Barrier Box for F-Shape Barrier.

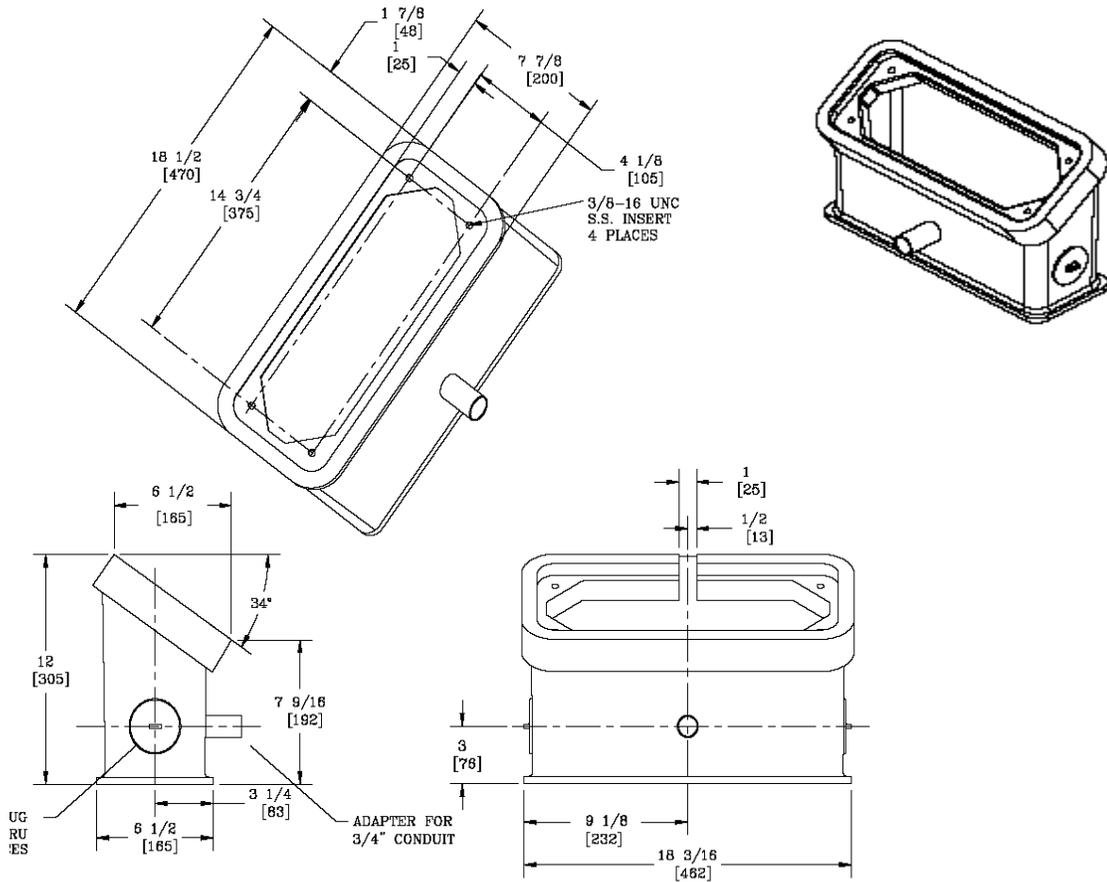


Figure 3
Barrier box for F-shape barrier.

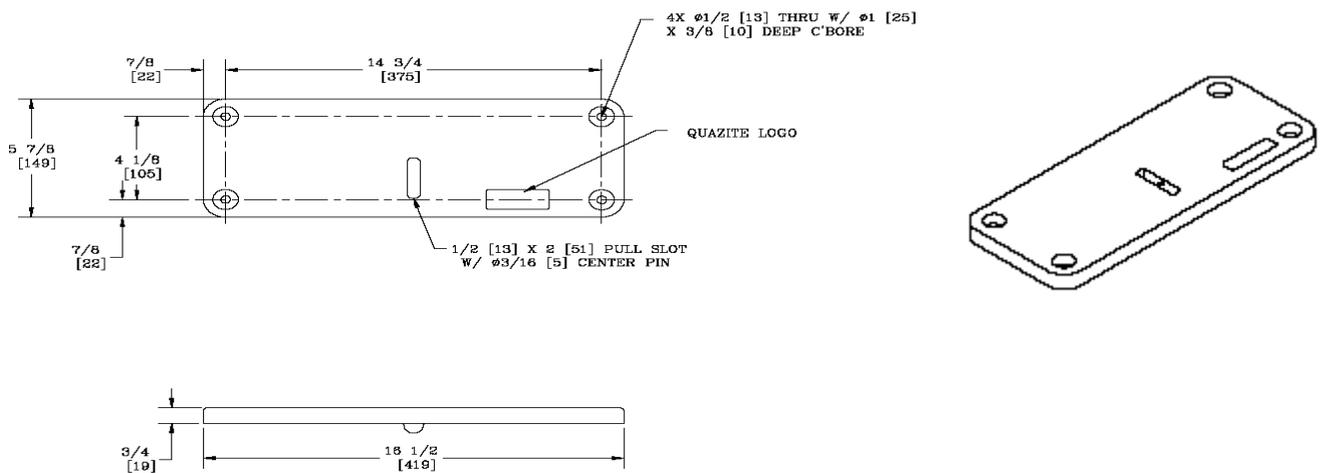


Figure 4
Barrier box lid for F-barrier.

3. Barrier Box for Single Slope or Bridge Rail.

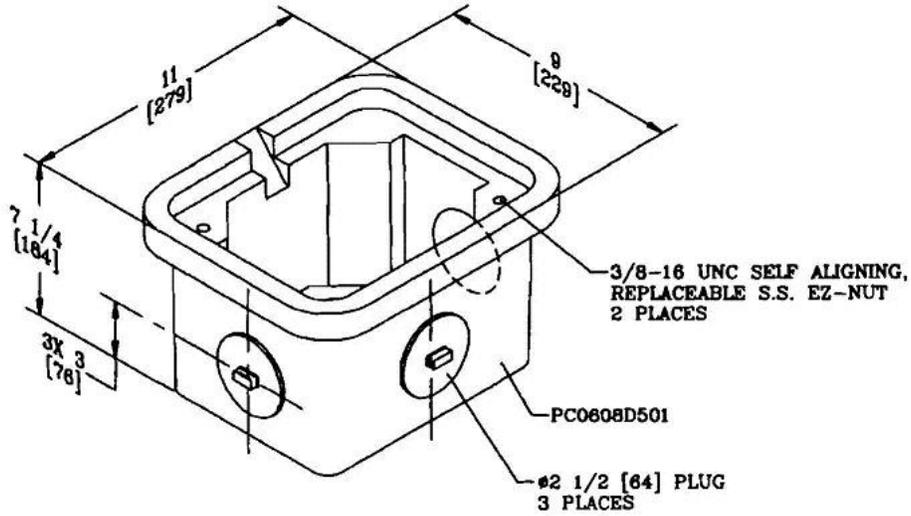


Figure 5
Polymer box for single slope barrier or bridge rail.

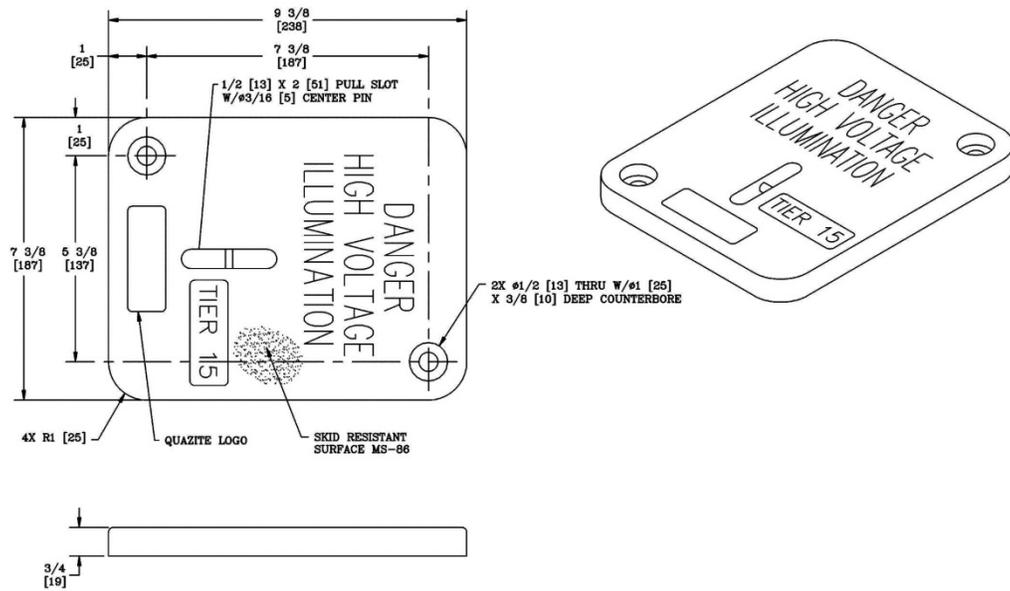


Figure 6
Polymer box cover for single slope barrier or bridge rail.

11030.8. Archived Versions. Archived versions are available.