THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY

October 10, 2014

DESIGN BULLETIN No. 14-13

SUBJECT: Overhead Sign Structure Ramp Monotube Types

Tollway Standard Drawing F-15 and Tollway Base Sheet Drawings M47 and M48 have been developed for overhead sign structure monotube (steel) at AET ramp toll plazas.

Tollway Standard Drawing F-16 and Tollway Base Sheet Drawing M49 have been developed for overhead sign structure monotube (steel) at Cash-IPO ramp toll plazas.

These drawings are to support electronic toll collection and lane direction equipment.

Tollway Supplemental Specifications Section 733 Overhead Sign Structures and Section 734 Concrete Foundations for Sign Structures have been modified.

Design Section Engineers (DSE) are hereby directed to immediately utilize these details for all contracts currently under design. In the meantime, designers should request the Microstation files so they can include these as plan details.

Paul D. Kovacs, P.E.
Chief Engineer

10/14/14
Date

Illinois State Toll Highway Authority

SUPPLEMENTAL SPECIFICATION
FOR
SECTION 733. OVERHEAD SIGN STRUCTURES

Issued February 7, 2012
Revised October 10, 2014

This Supplemental Specification amends and supersedes the provisions of the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, adopted January 1, 2012 and shall be construed to be a part thereof, superseding any conflicting provisions thereof applicable to the work under the contract.

Replace this section of the IDOT Standard Specifications for Road and Bridge Construction adopted January 1, 2012 in its entirety with the following.

733.01 Description. This work shall consist of fabricating, furnishing, and erecting span, cantilever butterfly, monotube or bridge mounted type overhead sign structures, including supports, on previously prepared foundations conforming to the details and locations shown in the Plans.

733.02 Materials. Materials used in the fabrication of the overhead sign structures shall conform to the requirements shown in the Plans and to the following:

(a) Structural Steel Pipe: All structural steel pipe shall conform to the ASTM A53, Type E or S, Grade B, API 5L Grade B or Grade X42 or Grade X52; ASTM A106, Grade B.

(b) Steel Plates: Steel plates shall conform to the requirements of ASTM A36 (AASHTO M183) or ASTM A572 Grade 50, as specified in the drawings

(c) Structural Steel Tube: All structural steel tube shall conform to ASTM A500, Grade B.

(d) High-Strength Steel Bolts: High-strength bolts shall conform to ASTM A325 Type 1 (AASHTO M164).

(e) Washers: Washers shall conform to ASTM F436 (AASHTO M293).

(f) Stainless Steel Bolts: All stainless steel bolts shall conform to the ASTM A193, Class I, Grade B8 (AISI Type 304).

(g) Stainless Steel Nuts: Stainless steel nuts shall conform to ASTM A194 (AASHTO M292), Grade 8F (AISI Type 303), unless noted otherwise. Stainless steel nuts for high-strength steel bolts and high-strength anchor bolts shall conform to the requirements of ASTM A194, Grade 2H. The nuts shall be "locknuts" and shall be equivalent to the finished hex series of the American Heavy Standard Series.

(h) Nuts: Nuts for high-strength steel bolts and high-strength anchor bolts shall conform to the requirements of ASTM A563 (AASHTO M291), Grade DH.

(i) Stainless Steel Washer: Unless noted otherwise, stainless steel washers shall conform to ASTM A240, Type 302.

(j) Aluminum Tubes for chords and diagonals shall conform to ASTM B221, Alloy 6061-T6.

(k) Aluminum Flange Plates for splices shall conform to ASTM B209, Alloy 6061-T651 or ASTM B221, Alloy 6061-T6.

(l) Aluminum Alloy castings shall conform to ASTM B26, Alloy 356 and forgings shall conform to ASTM B247, Alloy 6061-T6.

(m) Aluminum plates shall conform to ASTM B209, Alloy 6061-T651 or Alloy 6061-T6.

(n) High-Strength Anchor Bolts shall conform to ASTM F1554 Grade 55 or Grade 105 as noted on the drawings.

(o) Neoprene Pads: Neoprene pads shall be of the size shown in the Plans and shall have a Shore Durometer surface hardness of 65.

733.03 Drawings. Article 505.03 shall govern.

733.04 Fabrication.

(a) Structural Steel: Article 505.04 shall govern.

(b) Structural Aluminum: Article 733.04 shall govern, except as modified by the following:

(1) General: Aluminum materials shall be sawed or milled. Flame cutting will not be permitted. Holes in extruded material shall be drilled. Holes in forgings shall be drilled, or formed and reamed for final fit. In handling aluminum materials in the shop and in the field, every precaution shall be taken to avoid scoring or marring of the surfaces, sufficient in the opinion of the Engineer, to cause an objectionable appearance. Such scoring or marring shall be cause for rejection of the material. Cast or forged parts shall have all fins or other irregularities removed. Tubing shall be seamless and uniform in quality and temper. Exterior and interior surfaces shall be clean, smooth and free from seams, slivers, laminations, grooves, cracks, or other defects.

(2) Welding: Welding shall be done by the inert gas shielded arc method and no flux shall be used. Welders shall qualify by passing the requirements of Procedure and Performance Test of Qualification Standard for Welding Procedure for Welders and Welding Operators, current edition, formulated by the Boiler and Pressure Vessel Committee of ASME.

Qualifications shall be based on welding of aluminum alloy 6061-T6 with consumable electrode type welding, using the same aluminum alloy filler material specified herein. Welding shall comply with the Specifications mentioned in Section I, Fabrication, of ASCE Paper 970, Specifications for Structures of Aluminum Alloy 6061-T6. Welding shall be carefully checked by the fabricator by visual inspection of all welds, by proof testing of welds, and by the destructive testing of weld samples fabricated during the production welding. Poor welding workmanship as noted by visual inspection shall be sufficient cause for rejection.

All welds shall be made in accordance with current AWS Specifications. Aluminum alloy filler metal for welding aluminum shall conform to Specification for Aluminum and Aluminum Alloy Welding Rods and Electrodes, AWS A5.10-88 or latest edition.

Fillet sizes for welding on aluminum members shall be at least as thick as the thinnest member being welded.

733.05 Erection

(a) General: Erection of all structural steel and structural aluminum sign trusses and monotubes shall conform to the applicable provisions of Article 505.08 and the following requirements:

(1) Prior to the erection of the truss, the end supports with their welded base plates shall be mounted over the anchor bolts on the concrete foundations, partially plumbed, and temporarily secured. After the erection of the truss and while the truss is supported by the crane, the uprights shall be fully plumbed and brought to final alignment by means of leveling nuts on the anchor bolts. The top nuts shall then be tightened.

(2) All bolts used for assembling truss sections shall be tightened to the tension specified in the Plan erection details and/or indicated in the approved shop drawings. Bolt tension shall be measured in foot-pounds of applied torque.

(3) When air-driven impact wrenches are used to provide the specified bolt tension, they shall be set to provide tension in excess of that specified by not more than 5%. Such wrenches shall be calibrated for each size of bolt to be installed. Calibration shall be accomplished by use of a device providing a direct read-out in foot-pounds of torque on three typical bolts of each size from the bolts to be installed.

The average of the three calibration torque readings shall be used to adjust the impact wrenches for tightening all the bolts of each size.

Wrenches to be used for inspection shall be likewise calibrated. Typical bolts used for testing the calibrations shall be of the same grade, size and condition as those under inspection. Bolts which have been tightened in the truss shall be inspected by applying a calibrated and approved inspection torque wrench to 15% of the bolts, but not less than one bolt selected at random in each connection. If any nut or bolt head is turned by the application of the inspection wrench, all bolts in that connection shall be inspected for proper tightening.

(4) After erection is completed the truss shall be in a true horizontal position, and normal to the pavement centerline.

(b) Lane Closure. Lane closures shall be in accordance with the Contract Maintenance of Traffic Special Provision.

(c) Full Span Trusses. The erection and maintenance of traffic procedure for overhead sign trusses shall be as follows, and shall be in accordance with the Special Provisions and applicable provisions of Section 701, unless otherwise authorized by the Tollway.

(1) The Contractor shall erect the trusses only between the hours of 12:01 A.M. and 5:00 A.M., Monday through Sunday. Forty-eight (48) hours advance written notice to the Tollway, together with the Engineer's written approval, will be required prior to erection of any truss.

(2) All signs, lighting conduit, and other appurtenances shall be attached to each truss prior to erection.

(3) The appropriate lane closure shall be in place, restricting traffic to a single lane of travel, prior to any erection activity.

(4) Closed lanes and shoulders may be used by the Contractor to attach the truss to the lines of the erecting crane.

(5) When the truss is properly balanced for erection, a complete closure to traffic will be required. Traffic shall not be stopped more than ten (10) minutes at any one time.

(6) The lifting crane shall then swing the truss to the end supports. The end supports shall be plumbed and the nuts on the anchor bolts tightened.

(7) One U-Bolt on each end of the truss shall be installed to attach the truss to the end supports.

(8) The erecting lines shall then be detached from the truss and traffic allowed to travel in the single lane until the crane is removed from the pavement.

(9) Traffic may be allowed to drive under the truss in the open lane while the remaining U-Bolts are installed.

(10)The lane closure signs and barricades shall be removed prior to expiration of the allowable lane closure period.

(d) Cantilever Trusses. The provisions of Article 733.05 (c) shall apply, except as modified by the following:

(1) The Contractor may erect cantilever trusses during those hours that one lane traffic closures are permitted under the Special Provisions and/or Section 701.

(2) Item 2 of Article 733.05 (c) shall apply.

(3) Lane closures for the erection of cantilever trusses shall be in accordance with the Contract Maintenance of Traffic Special Provision.

(4) Item 4 of Article 733.05 (c) shall apply.

(5) Traffic shall not be stopped for the erection of cantilever trusses in any lanes other than the lanes authorized for closure.

(6) Item 6 of Article 733.05 (b) shall apply.

(7) Items 7, 8, 9 of Article 733.05 (c) shall not apply. The installation of bolts and other attachment devices shall be as required in the Plan details for each particular design and type of cantilever to be erected.

(8) Item 10 of Article 733.05 (c) shall apply.

(e) Bridge Mounted Sign Support

(1) The applicable provisions of Article 733.05 (b) shall govern.

(f) Butterfly Trusses. The applicable provisions of Article 733.05 (d) shall apply.

(g) Monotube Frames. The erection and maintenance of traffic procedure for overhead monotube frames shall be as follows, and shall be in accordance with the Special Provisions and applicable provisions of Section 701, unless otherwise authorized by the Tollway.

(1) The Contractor shall erect the monotube frames only between the hours of 12:01 A.M. and 5:00 A.M., Monday through Sunday. Forty-eight (48) hours advance written notice to the Tollway, together with the Engineer's written approval, will be required prior to erection of any frames.

(2) The contractor may install signs, support pipes, antennas, cameras and other appurtenances after erecting the monotube frame.

(9) Lane closures for the erection of monotube frames shall be in accordance with the Contract Maintenance of Traffic Special Provision.

(3) Closed lanes and shoulders may be used by the Contractor to erect the monotube frames.

(4) The installation of bolts and other attachment devices shall be as required in the Plan details for each particular design and type of frame to be erected.

(5) Item 10 of Article 733.05 (c) shall apply.

733.06 Mounting of Bridge Mounted Sign Support

(a) Concrete Girder Structure. Holes to be drilled in structural concrete for mounting sign supports shall be made in a manner which will not damage the concrete and which meets the approval of the Engineer. The positions of the brackets as shown in the Plans are based on the positions of the prestressing strands and the reinforcing steel in the girders as shown in record Plans. Copies of the as-built Plans and shop drawings are available to the Contractor from the Tollway upon request. Care shall be taken in drilling to avoid drilling through reinforcing steel or prestressing strands. At the first sign of steel cuttings in any drill hole, the drilling shall be stopped and an evaluation made of the conditions relative to the record Plans. Adjustments to the location of the drill holes shall be made to allow drilling to miss the steel. Any such adjustments in hole locations must be approved by the Engineer.

(b) Steel Structure. Holes to be drilled in the steel fascia beam shall be as shown on the Plans and in accordance with the applicable portions of Article 505.04 (d).

733.07 Galvanizing Steel Structures. After fabrication and drilling of all holes in the horizontal steel truss units, vertical end supports, and bridge mount supports they shall be hot dipped galvanized in accordance with ASTM A123 (AASHTO M111) and ASTM A 385.

The fabricator shall provide relief holes for galvanizing as required by the galvanizer. The location of the holes shall have the approval of the Engineer.

Poor appearance or damage to the galvanized surfaces shall be sufficient cause for rejection.

If, in the judgment of the Engineer, damage or defacement is minor, it shall be repaired with zinc in accordance with American Welding Society "Recommended Practice for Metalizing", para. C2.2-52T, Part IB.

Hot dip galvanize fasteners, anchor bolts, nuts and washers according to ASTM A123 (AASHTO M111) or ASTM A153 (AASHTO M232) as appropriate to the product; except stainless steel fasteners, nuts and washers.

The cost of galvanizing shall be considered as included in the Contract unit price per foot for OVERHEAD SIGN STRUCTURE - SPAN TYPE (STEEL), OVERHEAD SIGN STRUCTURE - CANTILEVER TYPE (STEEL), OVERHEAD SIGN STRUCTURE, BUTTERFLY TYPE (STEEL); OVERHEAD SIGN STRUCTURE, MONOTUBE TYPE (STEEL) or BRIDGE MOUNTED SIGN SUPPORT.

733.08 Method of Measurement

(a) OVERHEAD SIGN STRUCTURE for each of the various types will be measured for payment in feet from center to center of the end supports or from the end of the unsupported end to center of the support as shown in the Plans.

(b) BRIDGE MOUNTED SIGN SUPPORT of each type will be measured in feet, complete, in place and accepted. Such measurement shall be the overall length end to end of the sign panels.

(c) SIGN STRUCTURE WALKWAY. The sign structure walkway will be measured for payment in feet of the overall length of the walkway, end to end.

733.09 Basis of Payment. Payment for OVERHEAD SIGN STRUCTURE, SPAN TYPE (STEEL); OVERHEAD SIGN STRUCTURE, CANTILEVER TYPE (STEEL); OVERHEAD SIGN STRUCTURE, BUTTERFLY TYPE (STEEL); OVERHEAD SIGN STRUCTURE, MAINLINE ENTRANCE MONOTUBE TYPE (STEEL); OVERHEAD SIGN STRUCTURE, MAINLINE EXIT MONOTUBE TYPE (STEEL); OVERHEAD SIGN STRUCTURE, AET RAMP ENTRANCE MONOTUBE TYPE (STEEL); OVERHEAD SIGN STRUCTURE, AET RAMP EXIT MONOTUBE TYPE (STEEL); OVERHEAD SIGN STRUCTURE, CASH-IPO RAMP MONOTUBE TYPE (STEEL) and OVERHEAD SIGN STRUCTURE, SPAN TYPE (ALUMINUM), of the depth and width shown in the Plans, will be made at the Contract unit price per foot, complete and accepted, and measured as specified, which payment shall constitute full compensation for furnishing all materials; fabricating and erecting the structures; including the end supports; galvanizing; and for all labor, equipment, tools and incidentals necessary to complete the work as specified, exclusive of foundations and anchor bolts.

Payment for BRIDGE (CONCRETE) MOUNTED SIGN SUPPORT, BRIDGE (STEEL) MOUNTED SIGN SUPPORT will be made at the Contract unit price per foot, measured as specified, which payment shall constitute full compensation for furnishing all materials; fabricating, erecting and mounting sign supports, including all brackets and hardware; drilling as required; maintenance of traffic; and for furnishing all labor, equipment, tools and incidentals necessary to complete the work as specified.

Payment for SIGN STRUCTURE WALKWAY will be made at the Contract unit price per foot, measured as specified, which payment shall constitute full compensation for furnishing all materials; fabricating, galvanizing and installing the walkway, including all brackets and hardware; drilling as required; and for furnishing all labor, equipment, tools and incidentals necessary to complete the work as specified.

Illinois State Toll Highway Authority

SUPPLEMENTAL SPECIFICATION
FOR
SECTION 734. CONCRETE FOUNDATIONS FOR SIGN STRUCTURES

Issued February 7, 2012
Revised October 10, 2014

This Supplemental Specification amends and supersedes the provisions of the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, adopted January 1, 2012 and shall be construed to be a part thereof, superseding any conflicting provisions thereof applicable to the work under the contract.

Section 734 of the IDOT Standard Specifications for Road and Bridge Construction, adopted January 1, 2012 shall be modified as follows:

Add the following to Article 734.03:

(d) Contractor's Responsibility for Underground Facilities. It shall be the Contractor's responsibility to ascertain in advance of any work, by any and all possible means, the presence of underground electrical or telecommunications cables in or near the vicinity of the work. It shall be the Contractor's further responsibility to notify the Tollway at least ten days in advance of setting new posts when working near underground electrical or telecommunications cables. Tollway technicians will then locate any such cables which may be in jeopardy. It shall be the Contractor's responsibility to preserve cable location markings and all information given to him relating thereto, and to effectively communicate such information to his workers. If the Contractor cuts or damages any such cables, either through carelessness or failure to follow the foregoing procedures, he will then be held responsible for repairing all damages or replacing the cable without splicing, at the Tollway's option, all at no cost to the Tollway and without cause for the Contractor claiming delay.

Such repair or replacement shall include the immediate installation by the Contractor, without further notice to him, of temporary cables satisfactory to the Tollway, the temporary cables to remain in service until the directed repairs or replacements are made. Stringing temporary cables on the ground will not be allowed in any circumstances. Temporary cables shall be:

(1) Suitable for direct burial installation, acceptable to the Tollway, and shall be buried to a depth not less than 12 inches;

(2) Weather-proof cable, acceptable to the Tollway, and shall be suspended not less than 8 feet above the highest point of terrain between supports. Suspended temporary cables may be attached to existing poles, or, in their absence, shall be attached to supports acceptable to the Engineer, furnished and installed by the Contractor.

All efforts on the Tollway's part to advise the Contractor as to the locations of underground cables notwithstanding, it shall be understood that such locations are at best approximate, may be in error, and that such efforts by the Tollway shall not relieve the Contractor of any responsibility for restoring damage resulting from the activities of any employee, sub-contractor, agent, or representative of the Contractor.

It shall be the further responsibility of the Contractor to determine the location of any underground drainage structures, or other utility lines in the vicinity before beginning any work, and to conduct the work so as to avoid damage to any such installation. The Contractor shall contact the Engineer for assistance in locating utilities, drainage structures, and other underground facilities. Any damage caused by the Contractor's operations shall be immediately repaired by the Contractor, at no additional cost to the Tollway, and to the satisfaction of the Tollway.

(e) When any sign structure foundation is to be constructed in a closed roadway median or pavement gore, any existing median barrier wall and base, gutter, or pavement shall be removed and, upon completion of the foundation, made contiguous with the foundation as shown in the Plan details. Any existing underlying subbase and base shall be duplicated in kind in the foundation backfill to preserve the contiguity of such strata. Also, any existing subsurface drainage conduits, sewers, water pipes, utilities, etc. shall be preserved and made continuous through or around the foundation. All such work shall be carried out in accordance with the Plan details and/or as directed by the Engineer. The cost for all such removals, replacements, preservation and backfilling, including the cost of furnishing and placing any and all required materials, shall be considered as included in the Contract unit price(s) for Foundation For Overhead Sign Structure.

If the Contractor is unable for any reason to complete any foundation before the onset of the winter season, any open excavation shall be backfilled as directed by the Engineer. The cost thereof shall be considered as included in the Contract unit price(s) for Foundation For Overhead Sign Structure.

Coated Steel Conduit shall be installed in the foundation of each overhead sign structure as shown in the Plans. The conduit shall be anchored securely in place, cleaned and plugged immediately after installation (prior to placement of any concrete).

A ground rod shall be installed adjacent to one foundation for each overhead sign structure as shown in the Plans.

(f) Foundations for overhead sign structures include:

(1) Span type shoulder and median foundation consists of shoulder or median barrier, any barrier slab as needed, and concrete grade beam supported by drilled shafts. Concrete shall be Class DS for all elements from the top of the grade beam and below and Class SI for all elements above the top of the grade beam.

(2) Monotube type single face and median foundation consists of shoulder or median barrier, and barrier slab, supported by a drilled shaft. Concrete shall be the Class indicated in the Plans.

(3) Cantilever type foundation consists of concrete column, grade beam supported by a drilled shaft, and crashwall as shown on the plans. Concrete shall be the Class indicated in the Plans.

(4) Butterfly type foundation consists of concrete column and crashwall supported by a drilled shaft. Concrete shall be the Class indicated in the Plans.

(g) The butterfly type and cantilever type concrete column shall conform to Section 503.15(b) "Rubbed Finish" of the Standard Specifications.

(h) Site Grounding

All sign structures shall be provided with a site grounding electrode system to provide a single ground reference. This grounding electrode system shall consist of ground rods oriented around the concrete foundation of the sign structure as shown on the plans (grounding halo). The grounds rods within the grounding halo shall be connected to each other by a solid continuous 1/C No. 2/0 AWG bare tinned-copper conductor.

Where a span type sign structure is specified including concrete foundations, a second grounding halo shall be provided oriented around this second concrete foundation as shown on the plans. Where the distance between the two grounding halos is less than 200 feet, the grounding halos shall be bonded together at no less than two separate points on each by a solid continuous 1/C No. 2/0 AWG bare tinned-copper conductor installed a minimum of 30

inches below grade or at the frost line, whichever is deeper.

All ground rods located below the roadway shoulder shall be installed such that the top of the ground rod is a minimum of 30 inches below grade or at the frost line, whichever is deeper and be accessible from within the access well (if applicable). Ground rods located in unpaved (grassy) areas shall be installed such that the top of the ground rod is a minimum 12 inches below grade and be accessible from within an access well.

Whenever possible, ground rods shall be installed a nominal distance of 1.1 times the length of a rod and a minimum of 36 inches from all foundations or other underground structures. In no case shall a ground rod be installed through a foundation or beneath travelled roadway pavement.
Whenever possible, the spacing between adjacent ground rods shall be 2 times the length of the ground rod and a minimum of 6 feet in any direction.

If the measured resistance to ground exceeds 5 ohms, the Contractor shall install additional ground rods and solid continuous 1/C No. 2/0 AWG bare tinned-copper conductors in an expanding star-burst pattern until the resistance is brought down to acceptable levels. Any additional ground rods and conductors required to reduce resistance to ground to 5 ohms or less shall be incidental to this work.

No more than three grounding electrode conductors shall be connected to a single ground rod.

Material Requirements:

All materials and work shall be in accordance with Article 250 of the latest revision of the National Electrical Code (NEC).

All grounding materials shall be listed for the intended application.

Ground rods and access wells shall be per Tollway supplemental specification 806.

Aluminum or copper-clad aluminum grounding conductors **SHALL NOT** be used.

All grounding electrode conductors shall be a 1/C, solid, soft drawn, tinned-copper unless otherwise specified herein.

All conductors for the bonding of metallic members either attached to the structure and/or those which comprise the sign structure shall be a braided tinned-copper bonding jumper.

All bare copper conductors must be tinned. All copper used for lightning protection or equipment bonding must have 95% conductivity when annealed. See IDOT Standard Specification 1066.03(b) for additional requirements.

All grounding hardware must be stainless steel or galvanized rigid steel. (See installation requirements pertaining to dissimilar metals.)

Unless otherwise noted bus bars (if specified) must be solid copper and be equipped with insulating mounting supports. Bus bars must be pre-drilled with holes suitably sized for terminating up to No. 2/0 AWG grounding conductors with two-hole lugs.

General Installation Requirements:

All metallic members either attached to the sign structure and those which comprise the structure shall be bonded together by means of a copper bonding jumper as specified herein to create a continuous low impedance path to the site grounding electrode system.

If so equipped, all metallic housings containing electrically energized components or metallic

structures which may become energized under fault conditions shall be bonded to the site grounding electrode system.

All grounded metal objects within 25 feet of a component of the sign structure site must be tied into the site grounding electrode system.

All connections to structural steel shall be made above grade and external to the structural foundation. In no case shall a conductor connected to the site grounding system pass through a structural foundation. The conductor shall be routed through FRE conduit from a point below grade up to an elevation of ten feet above grade or to the top of foundation, whichever is less, for foundations located beyond the edge of pavement. It is permitted to route these conductors through the median barrier wall in conduit for span type structures provided the conduit is located outside the limits of the structural foundation.

All equipment bonds must be made to bare metal surfaces as specified herein.

All ground rods shall include a ground test well (access well) to allow inspection of connections to the ground rod.

Exothermic welded joints on galvanized material shall be coated as specified herein to prevent corrosion.

Copper/Aluminum joints shall be avoided wherever possible. In cases where this cannot be avoided, the connections shall be as specified herein.

Bare copper shall not come in contact with galvanized steel. However, a connection of copper and stainless steel, and a connection of tinned copper and galvanized steel are acceptable.

There shall be no coils of power cables internal to any enclosure containing electronic equipment.

Contractor shall provide any necessary materials and labor even if not shown specifically on the plans or specified herein to provide a sign structure site grounding system in accordance with NEC requirements.

If electrically energized equipment is mounted to the sign structure, the equipment ground conductor which originates at the electrical service entrance shall be bonded to the grounding electrode system by means of a direct copper conductor connection to a grounding bus bar provided as part of the equipment installed.

The equipment ground conductor shall be bonded to the neutral bus bar at the electrical service entrance panel or enclosure ONLY unless a separately derived system is identified as defined by the National Electric Code (NEC). For example, if a transformer is utilized (unless it is an autotransformer) there exists no direct electrical connection between the primary and secondary sides. In this case, a bonding jumper between the neutral and grounding bus bars on the secondary side would be required.

The Contractor shall perform a soil analysis to determine the acidity (pH) and the porosity (aeration) of the soil. The analysis shall also test for the presence of organic acids in the soil commonly associated with poorly drained or poorly aerated soils. Test reports for each site shall be provided. In acidic soils with a pH of 5 or lower and in soils where organic acids are found to be present, the ground rod shall be encased as specified elsewhere herein. The cost of the soil analysis and the possible use of ground rod encasement shall be included in the cost of FOUNDATION FOR OVERHEAD SIGN STRUCTURE, SPAN TYPE; FOUNDATION FOR OVERHEAD SIGN STRUCTURE, MONOTUBE TYPE; FOUNDATION FOR OVERHEAD SIGN STRUCTURE, CANTILEVER TYPE or FOUNDATION FOR OVERHEAD SIGN STRUCTURE, BUTTERFLY TYPE.

The Contractor shall perform testing of the resistance to ground for the site grounding electrode system. This testing shall be according to Article 801.13(a)(5).

All testing shall be conducted in the presence of the Engineer after a 48 hour notification period. All test results, including those where the design criteria was not achieved, shall be documented. All retests shall be witnessed and documented.

Grounding/Bonding Conductors:

To prevent arcing, all grounding/bonding conductors shall be as short, straight, and with as few kinks as possible. A minimum bending radius of 8 inches shall be maintained. "U" shaped bonding jumpers may be utilized for the bonding of doors and gates only.

Note: A UL listed, lightning protection listed T-splice is an acceptable means of installing grounding/bonding conductors with 90 degree angles provided it can withstand a 200 pound pull test. The T-splice must be listed for use with 1/C No.2/0 AWG conductor.

Care shall be exercised during the installation of tinned conductors to ensure surfaces are not damaged. Any tinned conductors damaged during installation shall be replaced at no cost to the Tollway.

Any above grade grounding/bonding conductor which is not in conduit shall be supported by a listed connector a minimum of every 3 feet.

A. Grounding Electrode Conductors

1. All grounding electrode conductors terminating on a ground rod shall be a 1/C, solid, soft drawn, tinned-copper, minimum No. 2/0 AWG in size.

2. Grounding electrode conductors shall be installed without any splices.

3. All grounding electrode conductors must be individually run to a ground bus bar or ground rod. The only exception to this "no-daisy chaining" rule is when joining two ground rods together in order to obtain 5 ohms or less.

B. Bonding Jumpers

1. All bonding jumpers shall be 1/C No. 2/0 AWG copper minimum or as required by the National Electric Code Article 250 and as specified herein.

2. At the electrical service entrance, a bonding jumper shall be provided between the neutral and grounding bus bar. This shall be included with the service entrance panel (if specified).

3. At any separately derived system as defined by the NEC, a bonding jumper shall be provided between the neutral and grounding bus bars of the separately derived system. The grounding bus bar of the separately derived system shall also be connected to the overall system ground by direct copper conductor connection.

4. A bonding jumper shall be provided for all metallic enclosures containing electrical conductors or components including but not limited to service entrance panels, disconnect switches, and junction boxes. Any metallic lids and/or doors of said enclosures shall also be bonded by means of a bonding jumper between the main enclosure

and the lid and/or door. This bonding jumper shall be as required by the NEC and shall not impede the function of opening the door or removing the lid for service.

C. Equipment Grounding Conductors (If specified)

1. In all cases, equipment grounding conductors originating at the electrical service entrance shall be provided. This equipment grounding conductor shall be bonded to the service reference ground system. The equipment grounding conductor shall be a 1/C copper sized as shown on the plans but at a minimum shall meet the requirements of the NEC Table 250.122.D.

2. In all cases, power conductors routed between structures include an equipment grounding conductor as shown on the plans. This equipment grounding conductor shall be bonded to the site ground by means of direct copper connection to either a grounding bus bar or to the grounding electrode conductor.

3. If conductors are routed in a continuous run of metallic conduit, an equipment grounding conductor shall be provided and the conduit system shall be provided with properly installed grounding bushings. Both ends of a metallic conduit containing a grounding conductor must be bonded with a listed grounding bushing.

Grounding/Bonding Connections:

All connectors must be rated for both the intended use and the surface upon which it will be installed.

Grounding clamps and bushings, were specified, must be galvanized steel or a high copper content alloy.

Insulation piercing connections shall not be used in the installation of conductor lugs. Only connection devices which require the complete removal of the conductor jacket and which provide a complete connection between the inside of the lug and the outer circumference of the grounding wire shall be permissible.

A listed, irreversible, pressure-typed crimp connection shall be used to connect a ground rod connected grounding conductor to a grounding bus bar (if specified). All other internal connections to a bus bar by conductors larger than No. 6 AWG must be made by two-hole lugs. No more than one connection shall be made at each bus bar position unless the connector is listed for multiple conductors.

All external and underground connections shall be by exothermic welding.

Exothermic welded connections to metal surfaces must be completed with a weld area roughly twice the diameter of the conductor. The area of the connection must first be sanded or filled to expose the bare metal prior to the exothermic weld being performed.

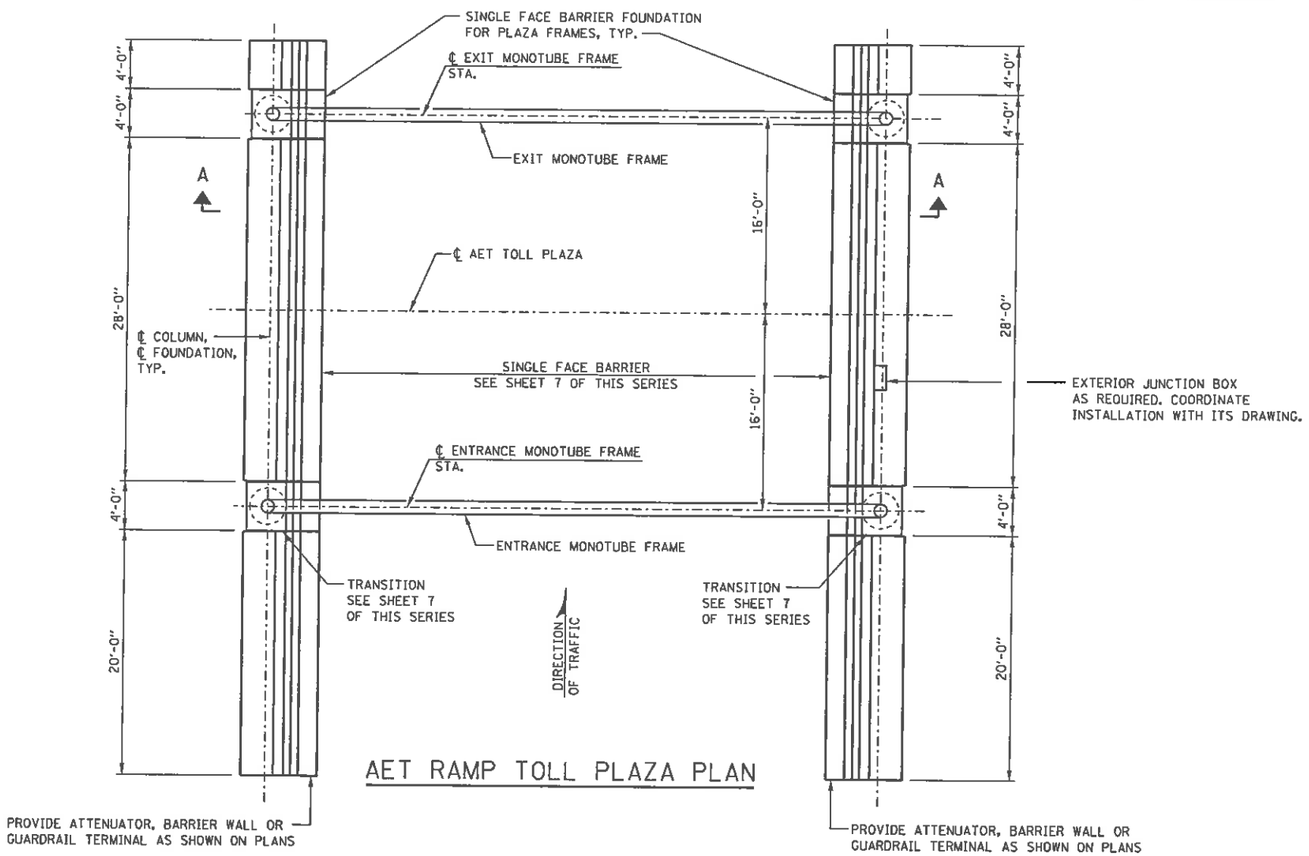
Exothermic welded connections to galvanized material shall be coated with a zinc-enriched paint to prevent corrosion.

Where Copper/Aluminum connections cannot be avoided, the connections shall be exothermically welded using and aluminum/copper listed bimetallic transition connector and a listed conductive anti-oxidant compound on all metallic connections.

For all mechanical connections, a listed conductive anti-oxidant compound shall be applied between the two metals.

Delete the first sentence of Article 734.05 after Basis of Payment and replace with the following:

This work will be paid for at the contract unit price per cubic yard for FOUNDATION FOR OVERHEAD SIGN STRUCTURE, SPAN TYPE; FOUNDATION FOR OVERHEAD SIGN STRUCTURE, CANTILEVER TYPE; FOUNDATION FOR OVERHEAD SIGN STRUCTURE, BUTTERFLY TYPE; FOUNDATION FOR OVERHEAD SIGN STRUCTURE, MAINLINE MONOTUBE TYPE or FOUNDATION FOR OVERHEAD SIGN STRUCTURE, RAMP MONOTUBE TYPE RAMP.



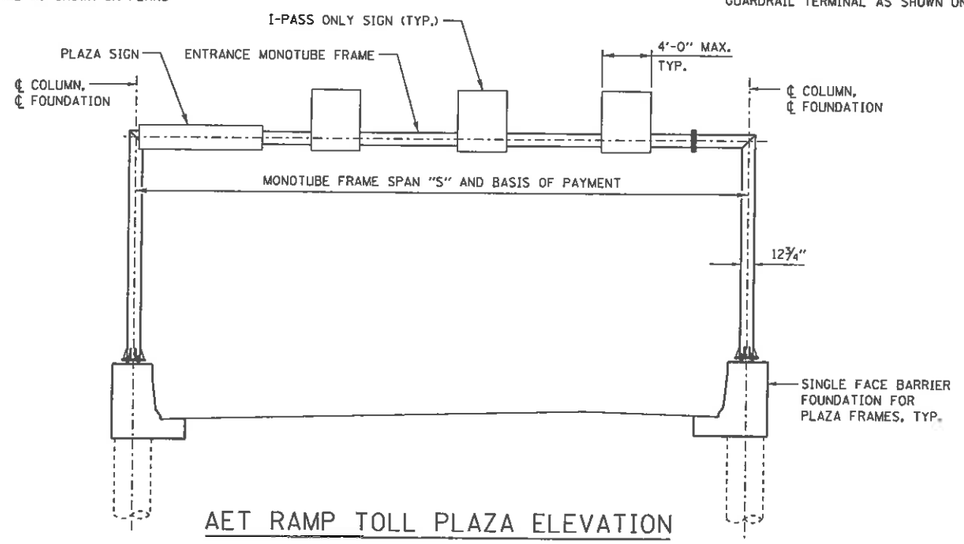
AET RAMP TOLL PLAZA PLAN

SIGN TABLE

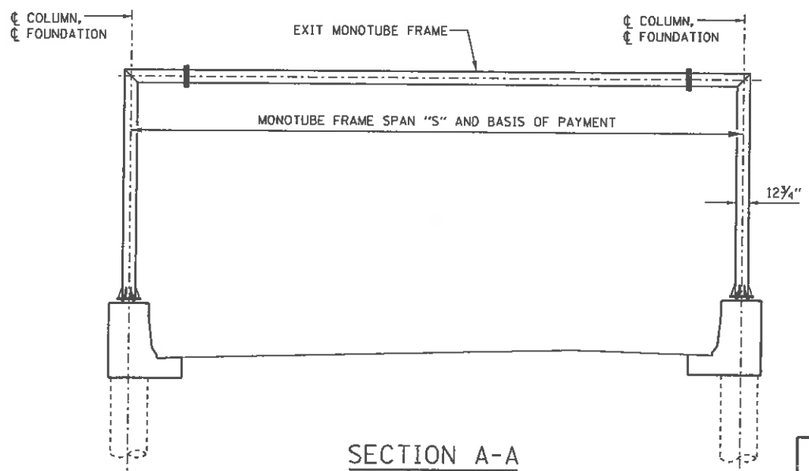
SIGN	MAXIMUM AREA	MAXIMUM LENGTH
PLAZA SIGN	24 S.F.	8'-0"
I-PASS ONLY SIGN	20 S.F.	4'-0"

NOTE:

1. SEE CONTRACT PLANS FOR SIGN SIZE AND LOCATION.
2. PROVIDE ENTRANCE AND EXIT MONOTUBE FRAME STATIONS IN BASE SHEETS.



AET RAMP TOLL PLAZA ELEVATION



SECTION A-A

APPROVED ..... CHIEF ENGINEER DATE .....

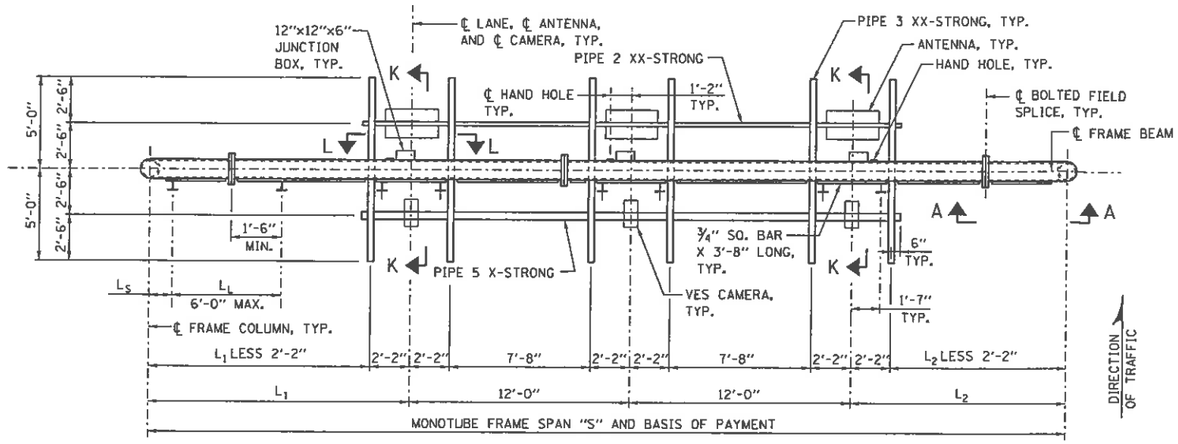
DATE	REVISIONS

SHEET 1 OF 7

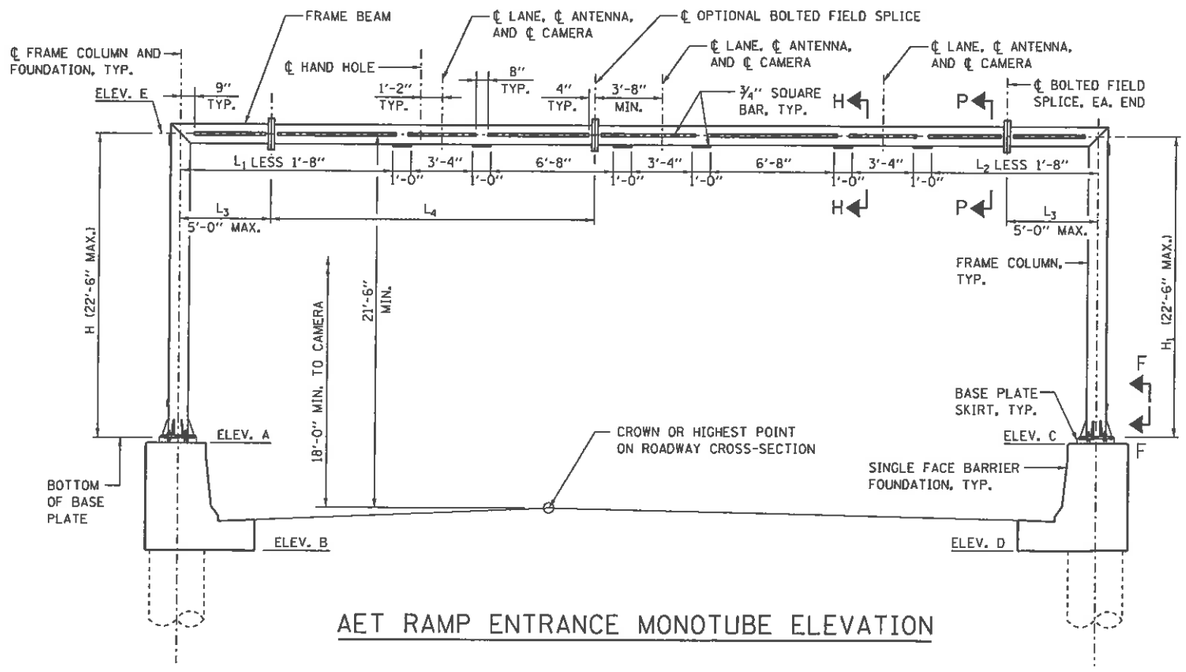
Illinois Tollway

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL)
STRUCTURE DETAILS
FOR AET RAMP

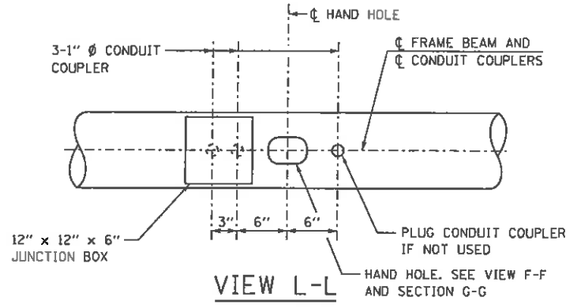
STANDARD F15-00



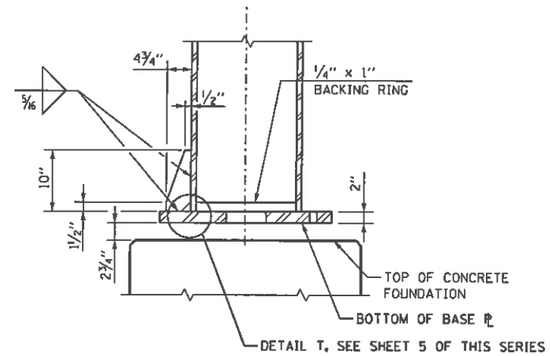
AET RAMP ENTRANCE MONOTUBE PLAN



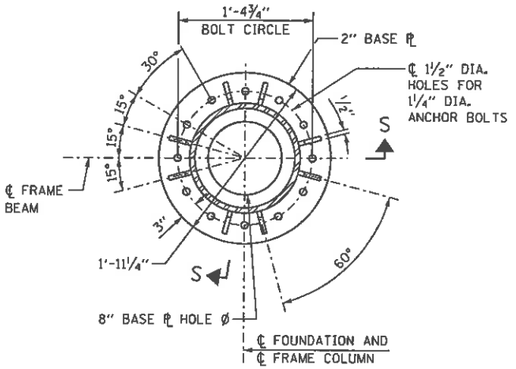
AET RAMP ENTRANCE MONOTUBE ELEVATION



VIEW L-L



SECTION S-S



BASE PLATE PLAN ENTRANCE MONOTUBE

NOTES:

1. FOUNDATIONS FOR MONOTUBE FRAMES ARE SHOWN ON SHEET 6 OF THIS SERIES.
2. SEE SHEET 5 OF THIS SERIES FOR SECTIONS A-A, G-G, H-H, K-K, VIEW F-F AND BASE PLATE SKIRT.
3. SEE SHEET 4 OF THIS SERIES FOR SECTION P-P.
4. PROVIDE CAMBER AT MIDSPAN OF STRUCTURE.
5. LOCATE OPTIONAL BOLTED FIELD SPLICE NEAR MIDSPAN.

ENTRANCE MONOTUBE FRAME TABLE

SPAN "S"	FRAME COLUMN	FRAME BEAM	CAMBER
60' MAX.	HSS 12.75x0.500	HSS 12.75x0.500	2¾"

SEE STANDARD F13 FOR SPANS GREATER THAN 60'

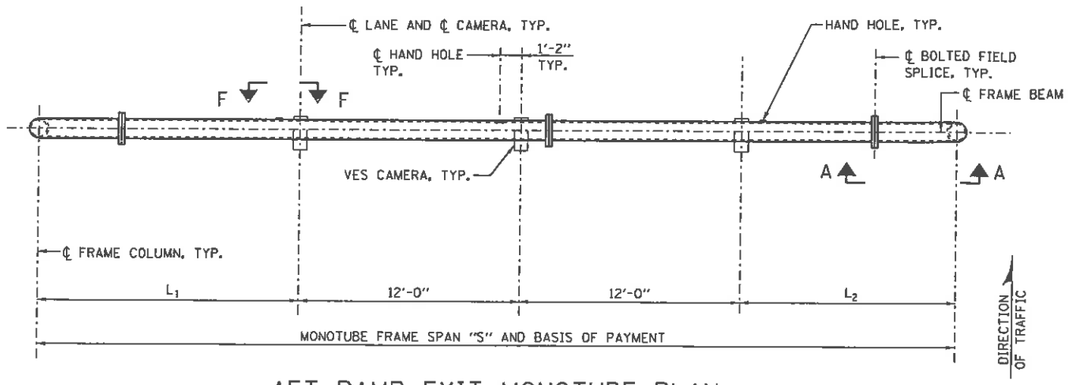
APPROVED..... CHIEF ENGINEER DATE .....

WORK THIS SHEET WITH BASE SHEET M47

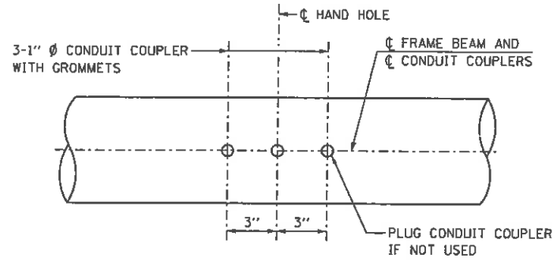
Illinois Tollway

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL)
STRUCTURE DETAILS
FOR AET RAMP

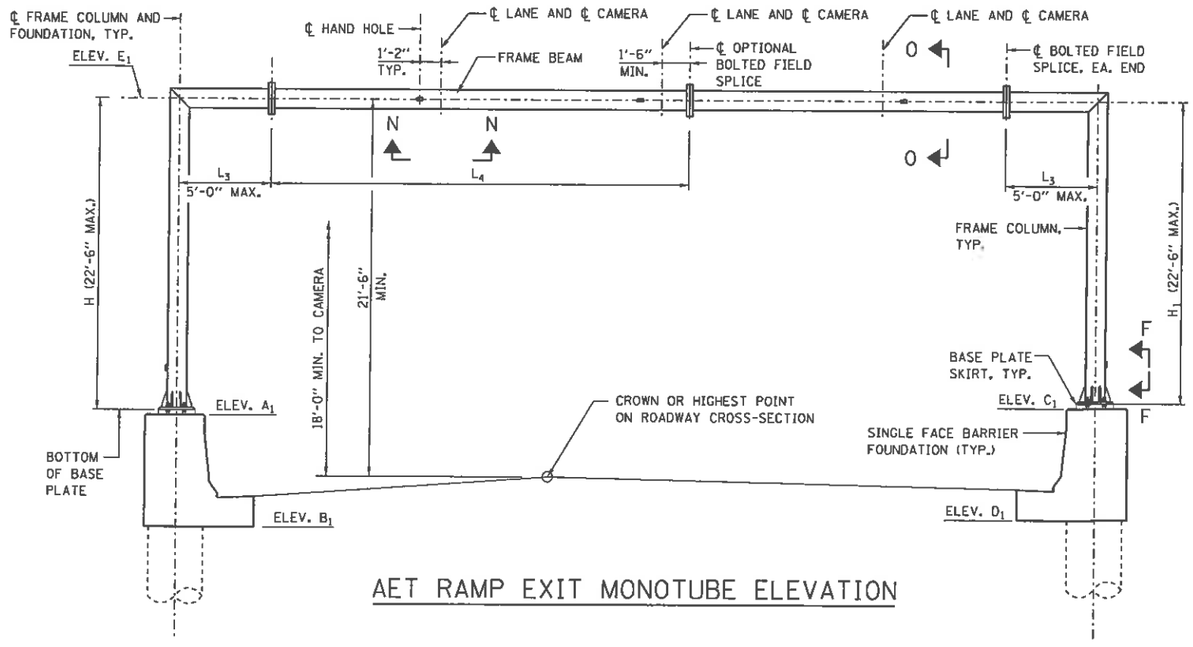
STANDARD F15-00



AET RAMP EXIT MONOTUBE PLAN



VIEW N-N (CONDUIT COUPLER DETAIL)



AET RAMP EXIT MONOTUBE ELEVATION

NOTES:

1. SEE SHEET 2 OF THIS SERIES FOR SECTION S-S, BASE ℄ PLAN AND ADDITIONAL NOTES.
2. SEE SHEET 4 OF THIS SERIES FOR SECTION O-O.
3. SEE SHEET 5 OF THIS SERIES FOR SECTIONS A-A AND G-G, AND BASE PLATE SKIRT.

EXIT MONOTUBE FRAME TABLE

SPAN "S"	FRAME COLUMN	FRAME BEAM	CAMBER
60' MAX.	HSS 12.75x0.500	HSS 12.75x0.500	1¾"

SEE STANDARD F13 FOR SPANS GREATER THAN 60'

APPROVED..... CHIEF ENGINEER DATE .....

WORK THIS SHEET WITH BASE SHEET M48

Illinois Tollway

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL)
STRUCTURE DETAILS
FOR AET RAMP

STANDARD F15-00

GENERAL NOTES:

1. AFTER ADJUSTMENTS TO LEVEL FRAME BEAM AND ENSURE ADEQUATE VERTICAL CLEARANCE, TIGHTEN ALL TOP AND LEVELING NUTS AGAINST THE BASE PLATE WITH A MINIMUM TORQUE OF 200 LB.-FT. THEN PLACE STAINLESS STEEL MESH AROUND THE PERIMETER OF THE BASE PLATE. SECURE TO BASE PLATE WITH STAINLESS STEEL BANDING.
2. REINFORCEMENT BARS DESIGNATED "(E)" SHALL BE EPOXY COATED.
3. FINAL LOCATION OF I-PASS ANTENNAS SHALL BE DIRECTED BY THE TOLLWAY.

STRUCTURAL STEEL:

1. MATERIAL FOR THE MONOTUBE FRAME SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B. BASE PLATE AND STIFFENER PLATE SHALL CONFORM TO ASTM A709 GRADE 50. OTHER STRUCTURAL STEEL SHAPES AND PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A36, UNLESS NOTED OTHERWISE.
2. PIPES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A53 GRADE B.
3. U-BOLTS SHALL BE STAINLESS STEEL. PROVIDE STAINLESS STEEL WASHERS AND NUTS FOR U-BOLTS.
4. BOLTS (EXCLUDING ANCHOR BOLTS AND U-BOLTS) SHALL BE HIGH STRENGTH STEEL BOLTS.
5. TUBES FOR MONOTUBE FRAME, PIPES, STRUCTURAL STEEL SHAPES AND PLATES SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123 AFTER FABRICATION.
6. THE MONOTUBE FRAME BEAM, COLUMNS, BASE PLATE MATERIAL, AND SPLICES ARE CONSIDERED TENSION MEMBERS AND SHALL CONFORM TO THE IMPACT TESTING REQUIREMENT, ZONE 2.

DESIGN LOADING:

WIND LOAD CRITERIA

SIGN PANEL	35 P.S.F.
COLUMN/BEAM	35 P.S.F.

EQUIPMENT LOADS:

CAMERA ASSEMBLY	8 LB.
ANTENNA	28 LB.

DESIGN STRESSES FOR REINFORCED CONCRETE:

f'c = COMPRESSIVE STRENGTH OF CONCRETE (CLASS SI)	= 3,500 P.S.I.
f'c = COMPRESSIVE STRENGTH OF CONCRETE (CLASS DS)	= 4,000 P.S.I.
fy = YIELD STRENGTH OF REINFORCEMENT BARS (GRADE 60)	= 60,000 P.S.I.

FOUNDATION:

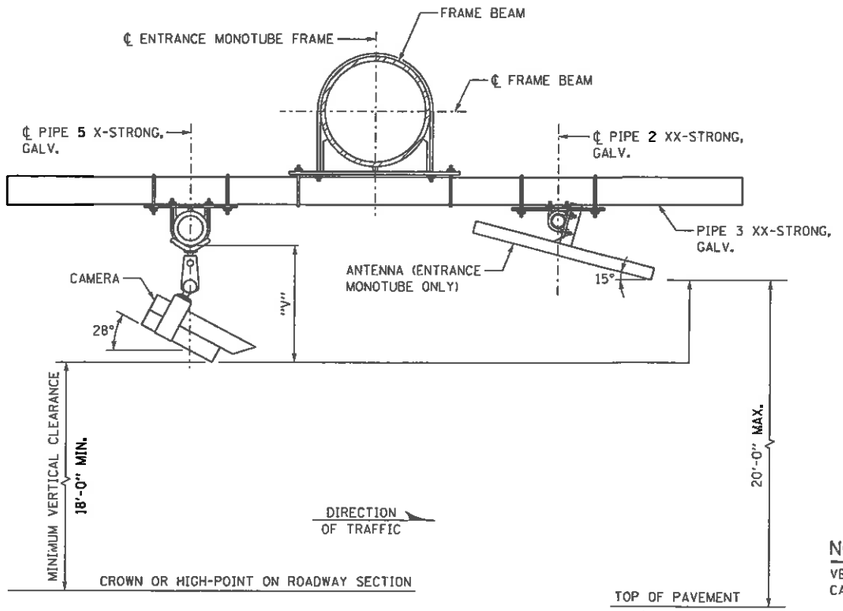
MINIMUM UNCONFINED COMPRESSIVE STRENGTH, Qu FOR ALL LAYERS OF COHESIVE SOILS (CLAYS) SHALL BE 1.25 TON/SQ.FT. AT MONOTUBE FRAMES.

DESIGN SPECIFICATIONS:

1. STRUCTURE DESIGN MANUAL, DATED MARCH, 2014, WITH LATEST DESIGN BULLETINS.
2. AASHTO STANDARD SPECIFICATION FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES AND TRAFFIC SIGNALS, 6TH EDITION.
3. AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 6TH EDITION DATED FEBRUARY 2012.
4. ILLINOIS DEPARTMENT OF TRANSPORTATION BRIDGE MANUAL, JANUARY 2012

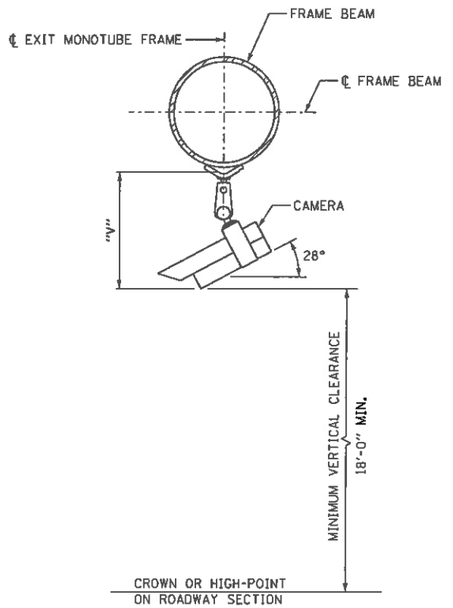
CONSTRUCTION SPECIFICATIONS:

1. TOLLWAY SUPPLEMENTAL SPECIFICATIONS TO THE ILLINOIS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION.
2. ILLINOIS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION.



SECTION P-P

NOTE:
VERIFY DIMENSION "V" WITH CAMERA MANUFACTURER.



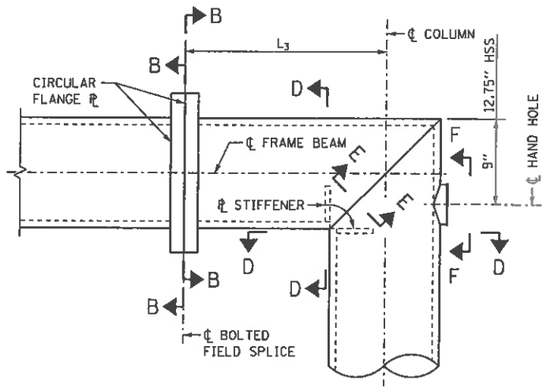
SECTION O-O

APPROVED..... CHIEF ENGINEER DATE .....

Illinois Tollway

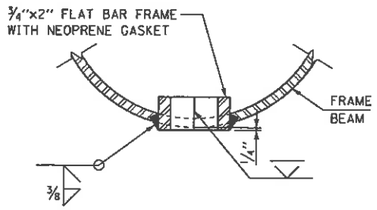
OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL)
STRUCTURE DETAILS
FOR AET RAMP

STANDARD F15-00

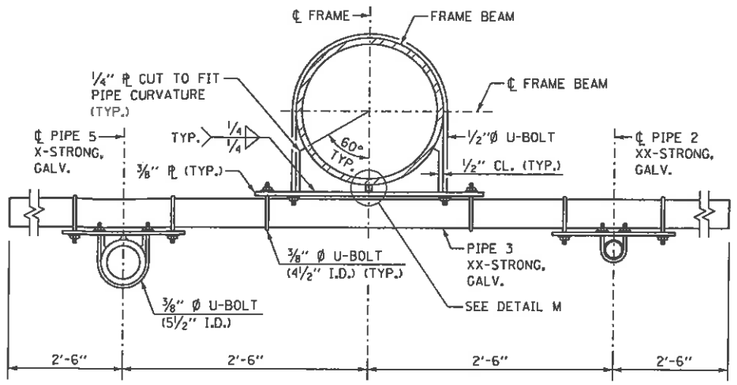


SECTION A-A

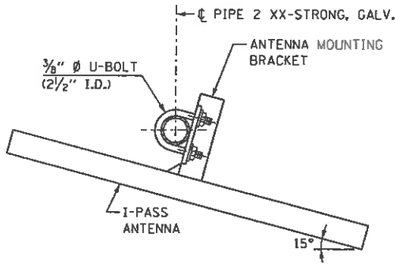
(SEE SHEETS 2 AND 3 OF THIS SERIES FOR LOCATION)



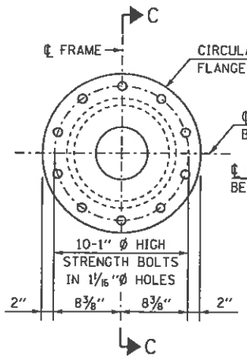
SECTION G-G



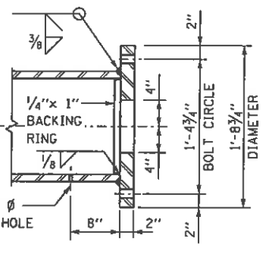
SECTION K-K



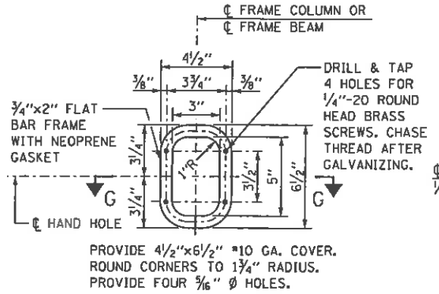
ANTENNA HANGER



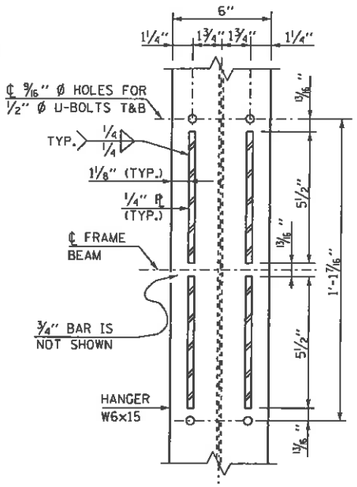
SECTION B-B



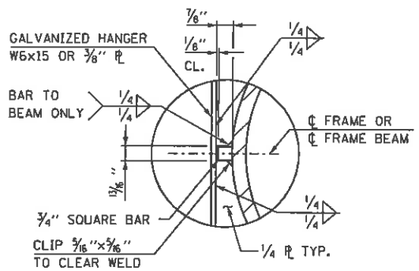
SECTION C-C



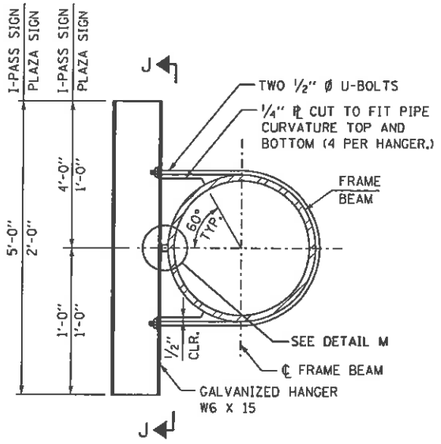
VIEW F-F



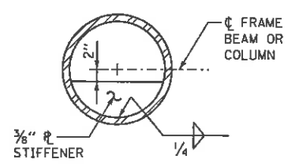
SECTION J-J



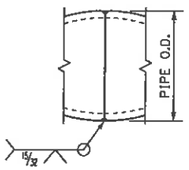
DETAIL M



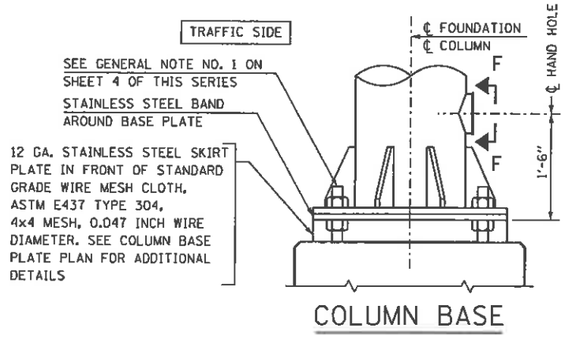
SECTION H-H (SIGN HANGER)



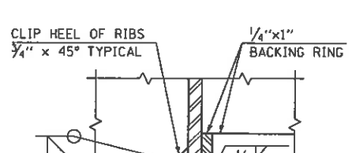
SECTION D-D



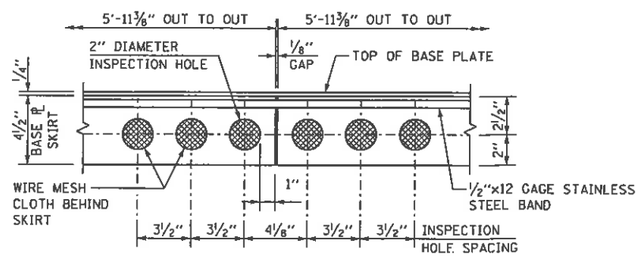
SECTION E-E



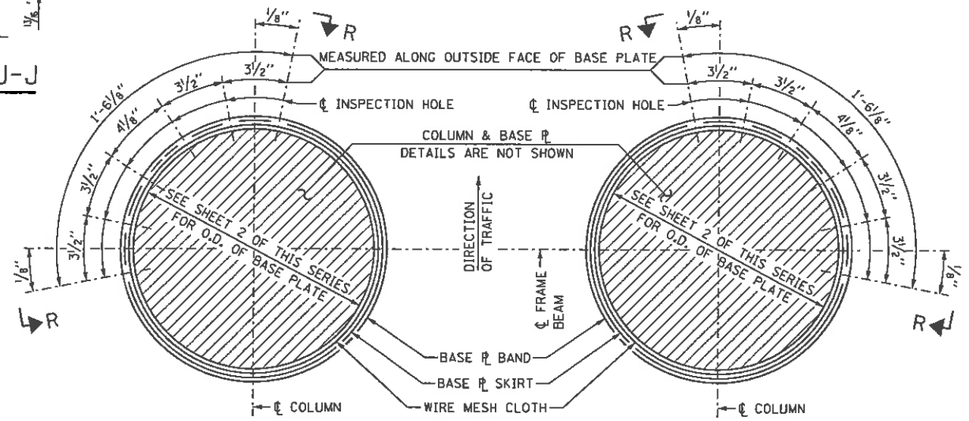
COLUMN BASE



DETAIL T



VIEW R-R (BASE PLATE SKIRT)



LEFT BASE PLATE

RIGHT BASE PLATE

COLUMN BASE PLATE PLAN

NOTE:

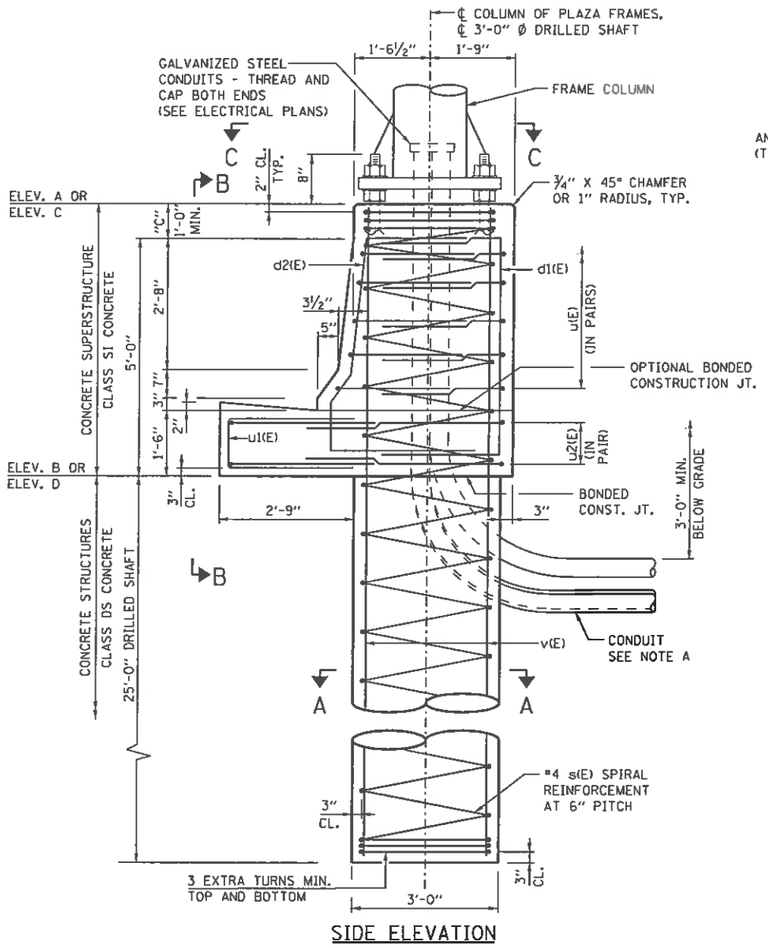
1. SIGN AND SIGN HANGER ARE OMITTED FROM SECTION A-A FOR CLARITY.
2. FOR DETAILS OF ATTACHMENT BETWEEN HANGER AND SIGN PANELS, SEE STANDARD F10.
3. T&B DENOTE TOP AND BOTTOM.
4. PROVIDE ANTENNA MOUNTING BRACKET ACCORDING TO ANTENNA MANUFACTURER'S RECOMMENDATION.

APPROVED ..... CHIEF ENGINEER ..... DATE .....

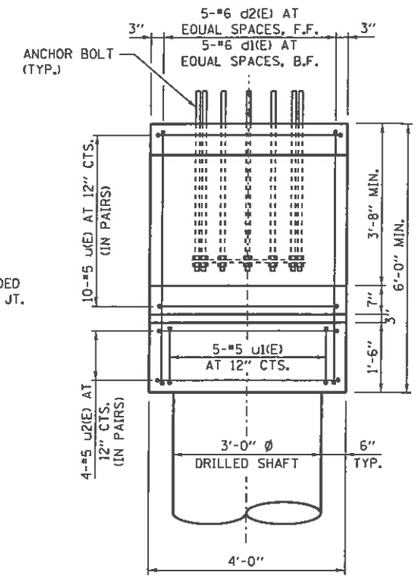
Illinois Tollway

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL)
STRUCTURE DETAILS
FOR AET RAMP

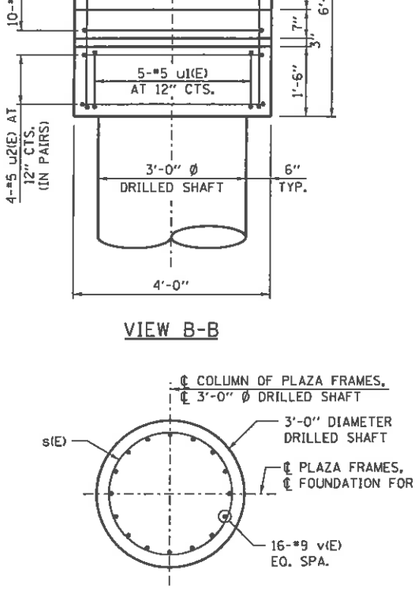
STANDARD F15-00



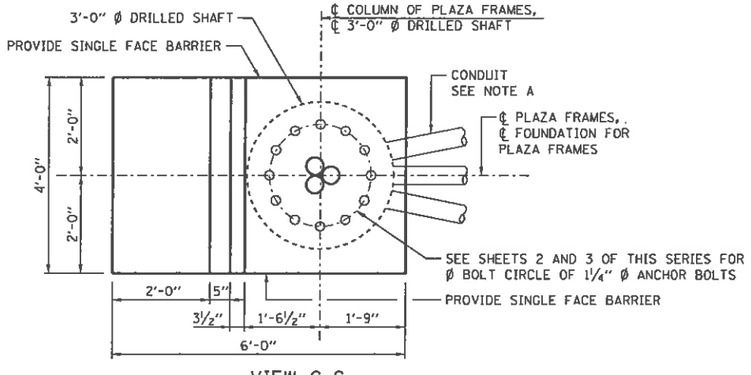
SIDE ELEVATION



VIEW B-B



SECTION A-A



VIEW C-C

SINGLE FACE BARRIER FOUNDATION FOR PLAZA FRAMES

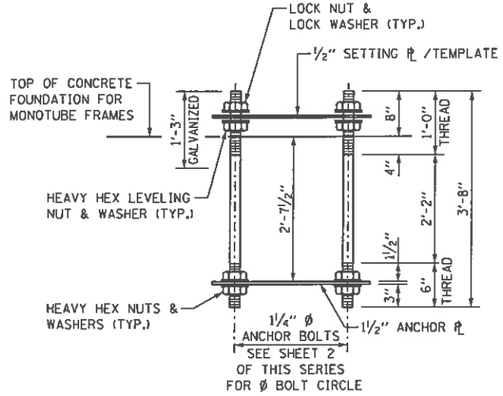
NOTE:
SITE GROUNDING ELECTRODE SYSTEM SHALL BE PROVIDED AS INDICATED ON THE CONTRACT PLANS.

NOTE A:

1. COORDINATE CONDUIT SIZE, LOCATION AND QUANTITY WITH ELECTRICAL PLANS. PROVIDE CONDUIT COUPLERS AS REQUIRED.
2. CONDUITS SHALL BE PLACED TO MISS REINFORCEMENT. CUTTING OF REINFORCEMENT SHALL NOT BE ALLOWED.
3. COST INCLUDED IN FOUNDATION FOR OVERHEAD SIGN STRUCTURE, MONOTUBE TYPE.

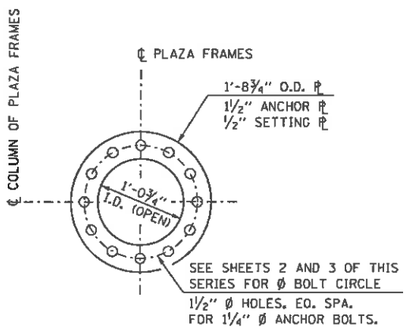
FOUNDATIONS:
THE FOUNDATION DIMENSIONS SHOWN ARE BASED ON THE PRESENCE OF MOSTLY COHESIVE SOILS WITH AN AVERAGE UNCONFINED COMPRESSIVE STRENGTH (Qu) OF AT LEAST 1.25 TON/SQ. FT., WHICH MUST BE DETERMINED BY PREVIOUS SOIL INVESTIGATIONS AT THE JOBSITE. WHEN OTHER CONDITIONS ARE INDICATED, THE BORING DATA WILL BE INCLUDED IN THE PLANS AND THE FOUNDATION DIMENSIONS SHOWN WILL BE THE RESULT OF THE SITE SPECIFIC DESIGNS. IF THE CONDITIONS ENCOUNTERED ARE DIFFERENT THAN THOSE INDICATED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO DETERMINE IF THE FOUNDATION DIMENSIONS NEED TO BE MODIFIED.

LEGEND:
F.F. - FRONT FACE
B.F. - BACK FACE
CTS. - CENTERS

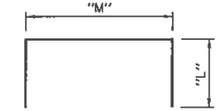


ANCHOR BOLT ASSEMBLY

FRAME COLUMN	ANCHOR BOLT
HSS 12.75x0.500	12

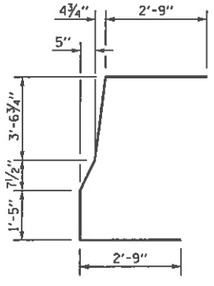


ANCHOR ℄ / SETTING ℄



BAR	"L"	"M"	
d1(E)	2'-9"	5'-7"	**
u(E)	2'-9"	3'-8"	
u1(E)	3'-3"	1'-1"	
u2(E)	3'-10"	3'-8"	

BARS d1(E), u(E), u1(E) AND u2(E)



BAR d2(E)

REINFORCEMENT BAR SCHEDULE
FOR ONE FOUNDATION

	BAR	NO.	SIZE	LENGTH	SHAPE
**	d1(E)	5	#6	11'-1"	
**	d2(E)	5	#6	11'-3"	
*	s(E)	1	#4	30'-7"	
**	v(E)	16	#9	30'-7"	
	u(E)	10	#5	9'-2"	
	u1(E)	5	#5	7'-7"	
	u2(E)	4	#5	11'-4"	

* THE LENGTH OF SPIRAL SHOWN IS THE HEIGHT OF SPIRAL, COMPUTED USING "C" = 1'-0". ADJUST LENGTH ACCORDINGLY IF "C" IS GREATER THAN 1'-0".

** BAR LENGTH IS COMPUTED USING "C" = 1'-0". ADJUST BAR LENGTH ACCORDINGLY IF "C" IS GREATER THAN 1'-0".

ESTIMATED QUANTITY

ITEM	UNIT	SINGLE FACE BARRIER FDN.
CONCRETE SUPERSTRUCTURE	CY	3.7
CONCRETE STRUCTURES	CY	6.6
REINFORCEMENT BARS, EPOXY COATED	POUNDS	2,360
PROTECTIVE COAT	SY	4.5

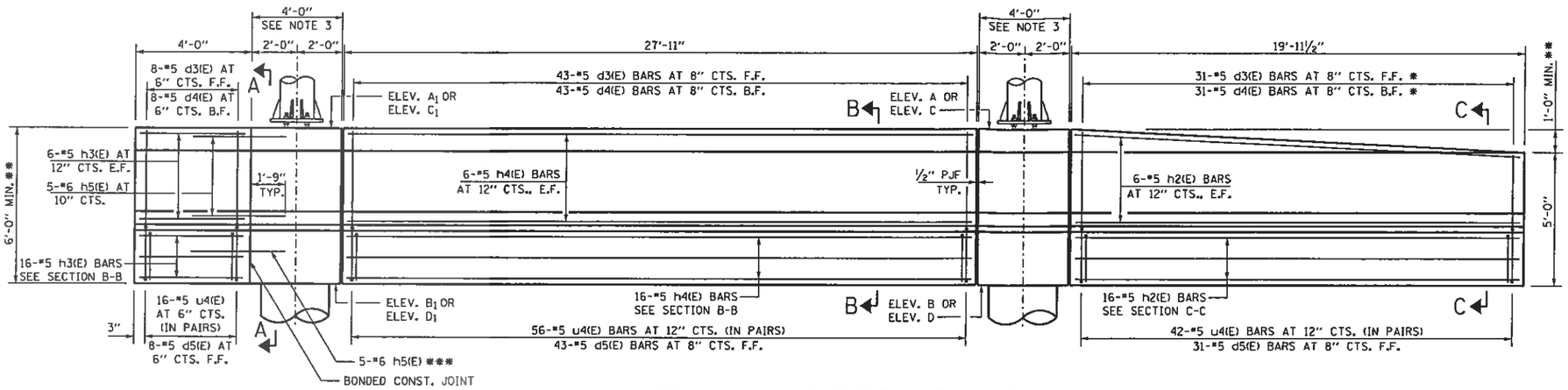
NOTE:
QUANTITIES FOR SINGLE FACE BARRIER FOUNDATION ARE DETERMINED USING "C" = 1'-0". IF DIMENSION "C" IS GREATER THAN 1'-0", ADJUST QUANTITIES ACCORDINGLY.

APPROVED ..... CHIEF ENGINEER ..... DATE .....

Illinois Tollway

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL)
STRUCTURE DETAILS
FOR AET RAMP

STANDARD F15-00



SINGLE FACE BARRIER ELEVATION

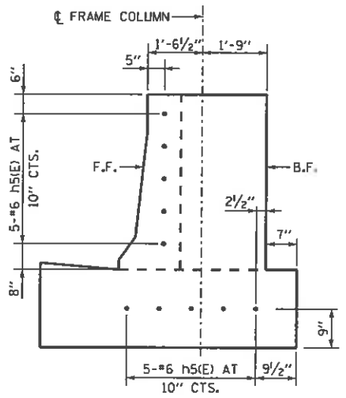
INSIDE FACE OF RIGHT BARRIER IS SHOWN
(MIRROR ELEVATION OF LEFT BARRIER)

* CUT IN FIELD AS REQUIRED TO FIT TAPER
** BASED ON DIMENSION "C" = 1'-0"
*** REINFORCEMENT INCLUDED IN SINGLE FACE BARRIER QUANTITY

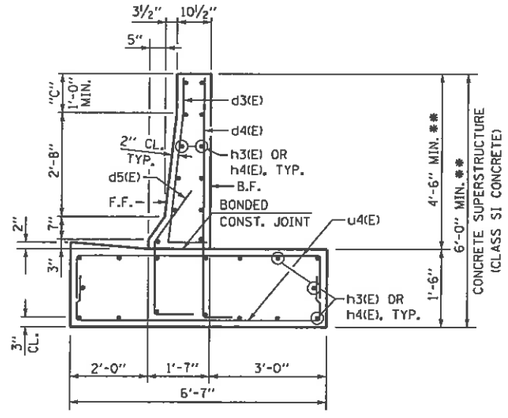
REINFORCEMENT BAR SCHEDULE

(FOR ONE BARRIER)

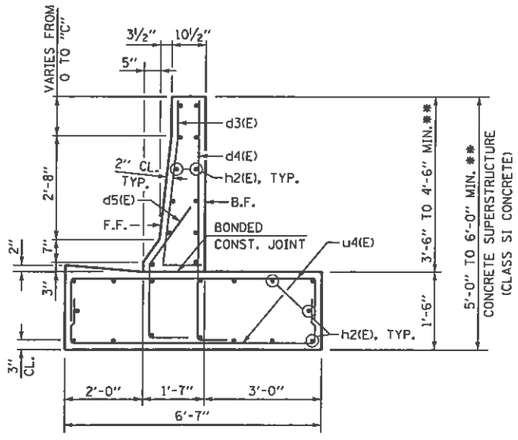
	BAR	NO.	SIZE	LENGTH	SHAPE
	d3(E)	82	#5	5'-0"	
	d4(E)	82	#5	6'-7"	
	d5(E)	82	#5	4'-7"	
	h2(E)	28	#5	19'-7"	
	h3(E)	28	#5	3'-8"	
	h4(E)	28	#5	27'-7"	
***	h5(E)	10	#6	3'-9"	
	u4(E)	114	#5	8'-3"	



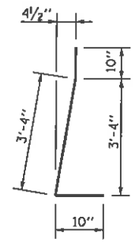
SECTION A-A



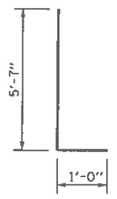
SECTION B-B



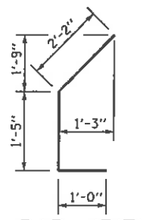
SECTION C-C



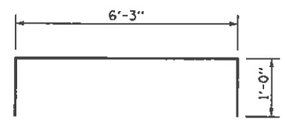
BAR d3(E)



BAR d4(E)



BAR d5(E)



BAR u4(E)

ESTIMATED QUANTITY

(FOR ONE BARRIER)

ITEM	UNIT	SINGLE FACE BARRIER
CONCRETE SUPERSTRUCTURE	CY	28.2
REINFORCEMENT BARS, EPOXY COATED	POUNDS	3,910
PROTECTIVE COAT	SY	42.4

NOTES:

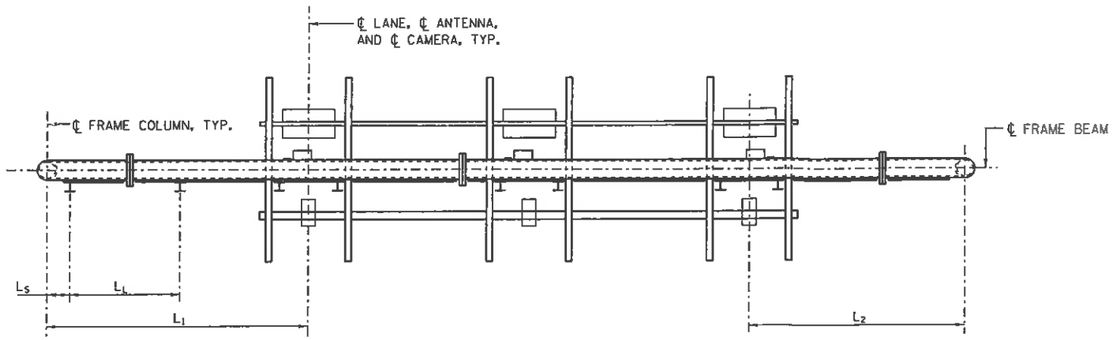
1. PROTECTIVE COAT SHALL BE APPLIED TO THE TRAFFIC AND TOP FACES OF THE BARRIER, GUTTER AND TO THE ENTRANCE SIDE FACE (AT THE BEGINNING OF THE RAMP PLAZA PAVEMENT) FOR THE FULL HEIGHT OF THE BARRIER.
2. ELECTRICAL JUNCTION BOXES SHALL BE EXTERIOR MOUNTED ON THE BACK FACE OF BARRIER.
3. FOR SINGLE FACE BARRIER FOUNDATION DETAILS FOR MONOTUBE FRAMES, SEE SHEET 6 OF THIS SERIES.
4. QUANTITIES FOR SINGLE FACE BARRIER ARE DETERMINED USING "C" = 1'-0". IF DIMENSION "C" IS GREATER THAN 1'-0", ADJUST QUANTITIES ACCORDINGLY.
5. SEE BASE SHEET M47 FOR BILL OF MATERIAL.

APPROVED..... DATE .....
CHIEF ENGINEER

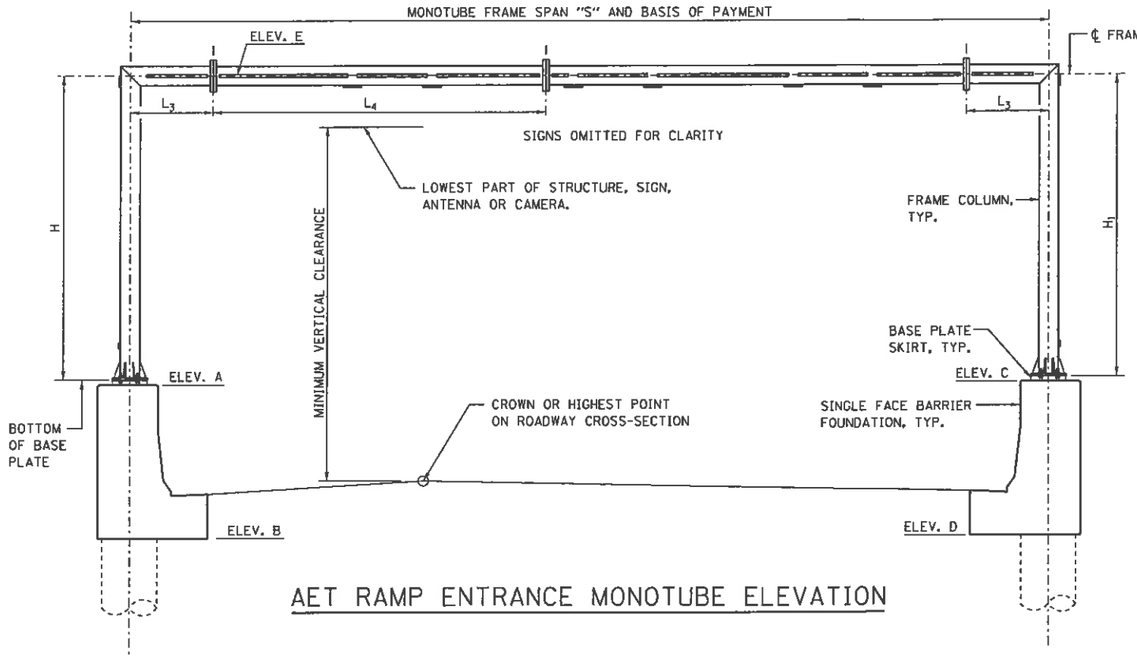
Illinois Tollway

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL)
STRUCTURE DETAILS
FOR AET RAMP

STANDARD F15-00



AET RAMP ENTRANCE MONOTUBE PLAN



AET RAMP ENTRANCE MONOTUBE ELEVATION

NOTE TO DESIGNER

THIS BASE SHEET SHOWS TYPICAL NEW CONSTRUCTION BUT IT IS NOT A STANDARD DRAWING. IT REQUIRES COMPLETION BY THE DSE PRIOR TO INSERTION INTO A CONTRACT. MICROSTATION FILES ARE CONTAINED W/IN THE CADD STANDARDS MANUAL RESOURCE CD OR AVAILABLE FROM THE TOLLWAY. THE DSE SHALL ACCEPT THE RESPONSIBILITY OF THE DESIGN OF THIS SHEET UPON ITS COMPLETION & INSERTION INTO A CONTRACT.

THIS "NOTE TO DSE" SHALL BE REMOVED BY THE DSE PRIOR TO INSERTION OF THE SHEET INTO THE PLAN SET.

PROVIDE SITE GROUNDING ELECTRODE SYSTEM DETAIL ACCORDING TO THE TOLLWAY SUPPLEMENTAL SPECIFICATIONS SECTION 734.

SEE THE TOLLWAY STRUCTURE DESIGN MANUAL FOR MINIMUM VERTICAL CLEARANCE.

TOTAL BILL OF MATERIAL

ITEM	UNIT	TOTAL
OVERHEAD SIGN STRUCTURE, AET RAMP ENTRANCE MONOTUBE TYPE (STEEL) (60 FT)	FOOT	
FOUNDATION FOR OVERHEAD SIGN STRUCTURE, MONOTUBE TYPE	CU. YD.	
CONCRETE SUPERSTRUCTURE	CU. YD.	
REINFORCEMENT BARS, EPOXY COATED	POUNDS	
PROTECTIVE COAT	SQ. YD.	

SUMMARY

STRUCTURE NUMBER	STATION	SPAN "S" (FT.)	ELEV. A	ELEV. B	ELEV. C	ELEV. D	ELEV. E	MINIMUM VERTICAL CLEARANCE	SHEET 2								SHEET 6	CONCRETE SUPERSTRUCTURE (CU. YD.)	CONCRETE STRUCTURES (CU. YD.)	REINFORCEMENT BARS, EPOXY COATED (POUNDS)	PROTECTIVE COAT (SQ. YD.)
									L_S	L_L	L_1	L_2	L_3	L_4	H	H_1	"C"				

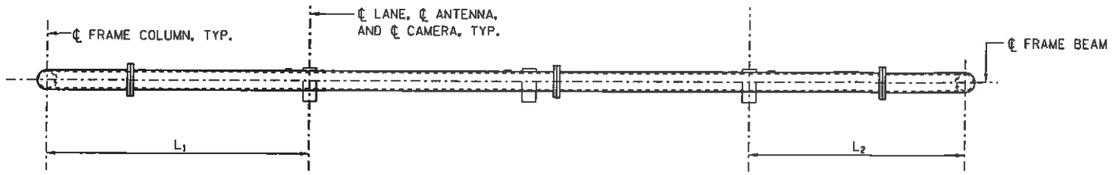
NOTE:
WORK THIS SHEET WITH STANDARD F15

BASE DRAWING M47

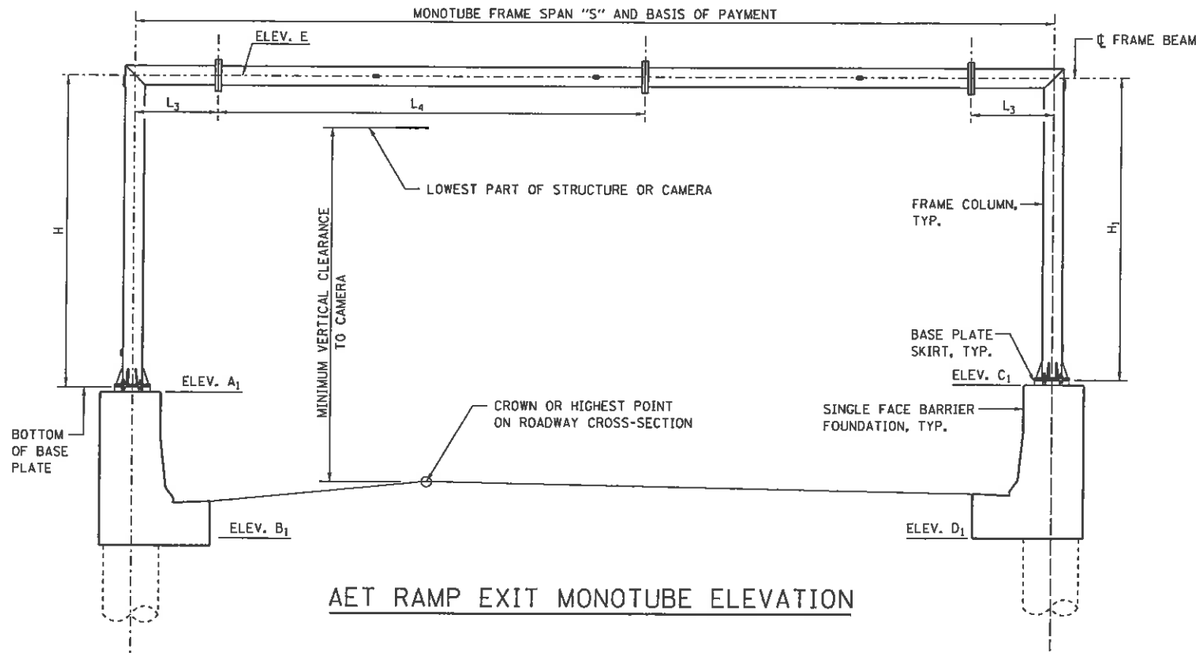
Illinois Tollway

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL) AET RAMP ENTRANCE MONOTUBE SUMMARY AND TOTAL BILL OF MATERIAL

DATE
- -2014



AET RAMP EXIT MONOTUBE PLAN



AET RAMP EXIT MONOTUBE ELEVATION

NOTE TO DESIGNER

THIS BASE SHEET SHOWS TYPICAL NEW CONSTRUCTION BUT IT IS NOT A STANDARD DRAWING. IT REQUIRES COMPLETION BY THE DSE PRIOR TO INSERTION INTO A CONTRACT. MICROSTATION FILES ARE CONTAINED W/IN THE CADD STANDARDS MANUAL RESOURCE CD OR AVAILABLE FROM THE TOLLWAY. THE DSE SHALL ACCEPT THE RESPONSIBILITY OF THE DESIGN OF THIS SHEET UPON ITS COMPLETION & INSERTION INTO A CONTRACT.

THIS "NOTE TO DSE" SHALL BE REMOVED BY THE DSE PRIOR TO INSERTION OF THE SHEET INTO THE PLAN SET.

PROVIDE SITE GROUNDING ELECTRODE SYSTEM DETAIL ACCORDING TO THE TOLLWAY SUPPLEMENTAL SPECIFICATIONS SECTION 734.

SEE THE TOLLWAY STRUCTURE DESIGN MANUAL FOR MINIMUM VERTICAL CLEARANCE.

TOTAL BILL OF MATERIAL

ITEM	UNIT	TOTAL
OVERHEAD SIGN STRUCTURE, AET RAMP EXIT MONOTUBE TYPE (STEEL) (60 FT)	FOOT	
FOUNDATION FOR OVERHEAD SIGN STRUCTURE, MONOTUBE TYPE	CU. YD.	

SUMMARY

STRUCTURE NUMBER	STATION	SPAN "S" (FT.)	ELEV. A_1	ELEV. B_1	ELEV. C_1	ELEV. D_1	ELEV. E_1	MINIMUM VERTICAL CLEARANCE	SHEET 3						SHEET 6	CONCRETE SUPERSTRUCTURE (CU. YD.)	CONCRETE STRUCTURES (CU. YD.)	REINFORCEMENT BARS, EPOXY COATED (POUNDS)	PROTECTIVE COAT (SQ. YD.)
									L_1	L_2	L_3	L_4	H	H_1	"C"				

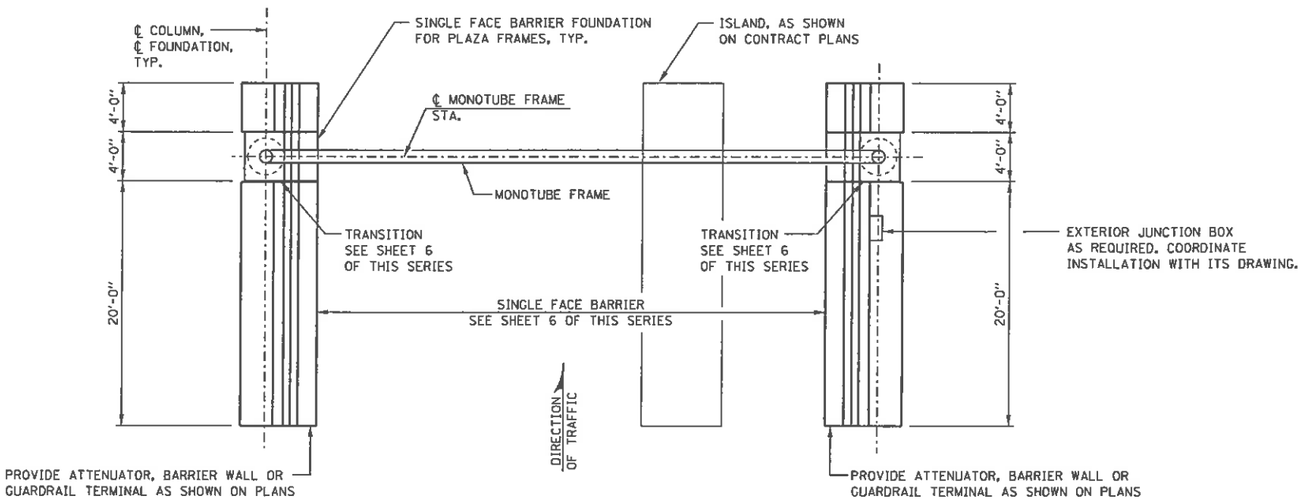
NOTE:
WORK THIS SHEET WITH STANDARD F15

BASE DRAWING M48

Illinois Tollway

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL) AET RAMP
EXIT MONOTUBE SUMMARY
AND TOTAL BILL OF MATERIAL

DATE
- -2014



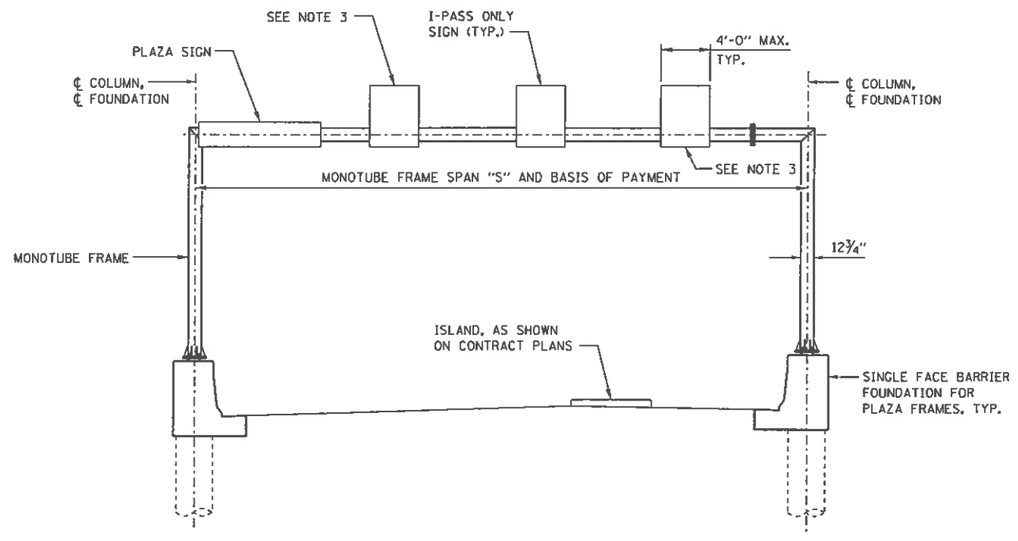
CASH-IPO RAMP TOLL PLAZA PLAN

SIGN TABLE

SIGN	MAXIMUM AREA	MAXIMUM LENGTH
PLAZA SIGN	24 S.F.	8'-0"
I-PASS ONLY SIGN	20 S.F.	4'-0"
CASH ONLY SIGN	20 S.F.	4'-0"

NOTE:

1. SEE CONTRACT PLANS FOR SIGN SIZE AND LOCATION.
2. PROVIDE MONOTUBE FRAME STATION IN BASE SHEET.
3. CASH ONLY SIGN OR I-PASS ONLY SIGN. SEE CONTRACT PLANS FOR SIGN PLACEMENT.



CASH-IPO RAMP TOLL PLAZA ELEVATION

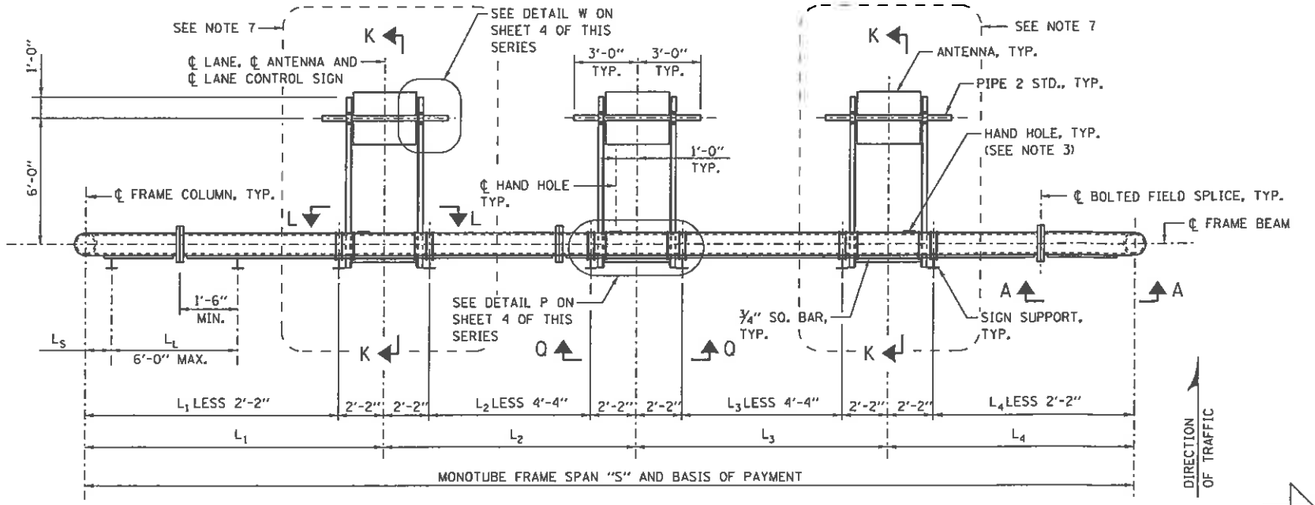
APPROVED ..... DATE .....
CHIEF ENGINEER

Illinois Tollway

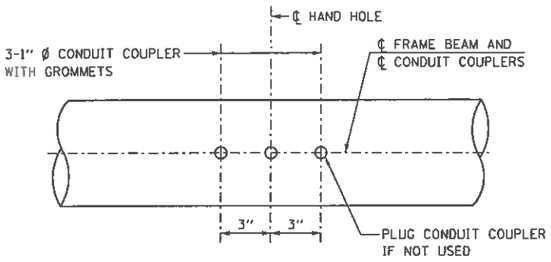
DATE	REVISIONS

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL)
STRUCTURE DETAILS
FOR CASH-IPO RAMP

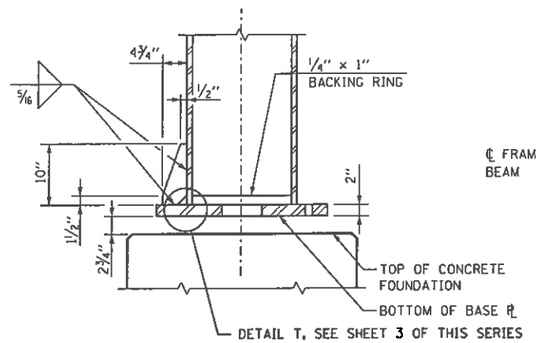
STANDARD F16-00



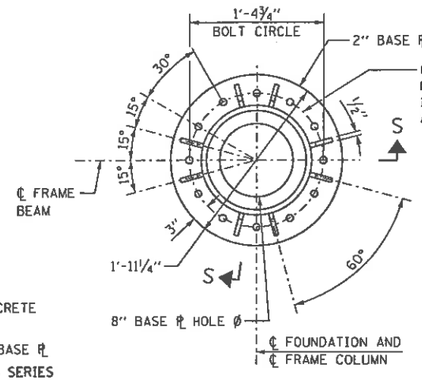
CASH-IPO RAMP MONOTUBE PLAN



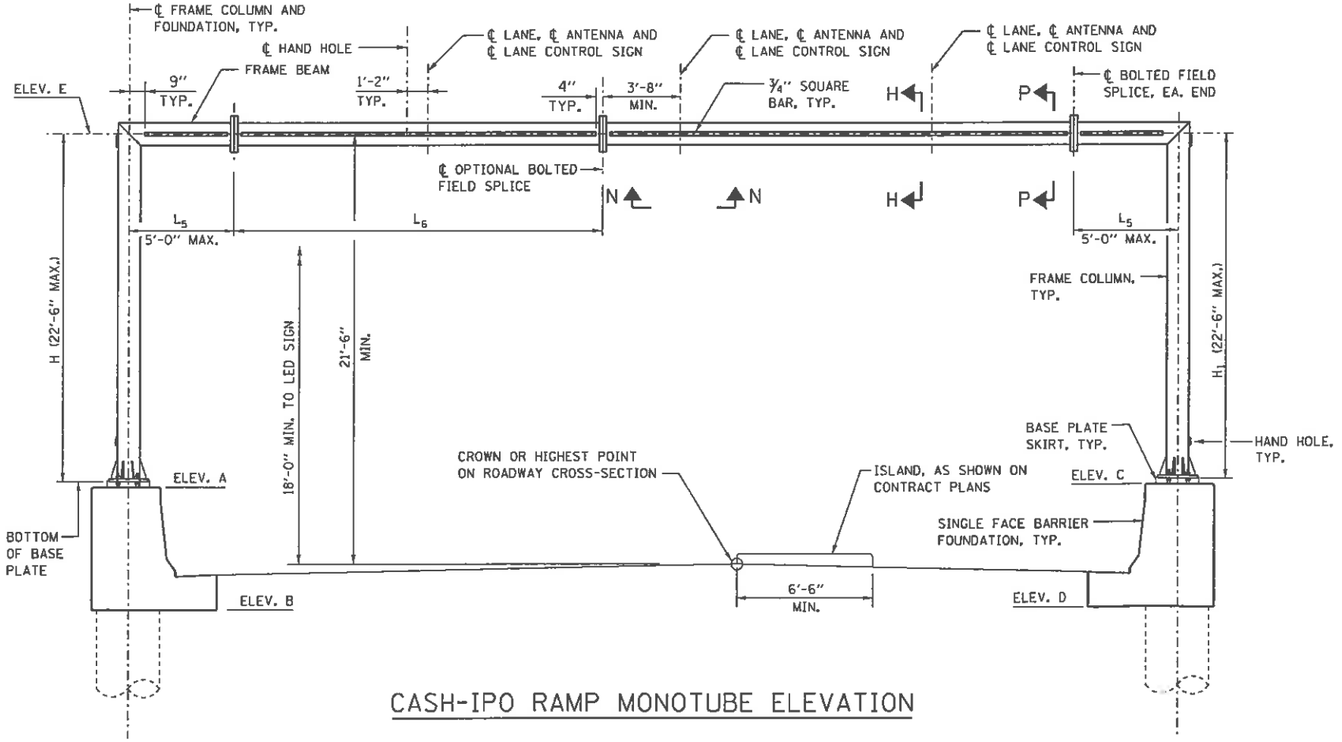
VIEW N-N (CONDUIT COUPLER DETAIL)



SECTION S-S



BASE PLATE PLAN MONOTUBE FRAME



CASH-IPO RAMP MONOTUBE ELEVATION

MONOTUBE FRAME TABLE

SPAN "S"	FRAME COLUMN	FRAME BEAM	CAMBER
60' MAX.	HSS 12.75x0.500	HSS 12.75x0.500	2½"

SEE STANDARD F13 FOR SPANS GREATER THAN 60'

NOTES:

1. WORK THIS SHEET WITH BASE SHEET M49.
2. FOUNDATION FOR MONOTUBE FRAME IS SHOWN ON SHEET 5 OF THIS SERIES.
3. SEE SHEET 4 OF THIS SERIES FOR SECTIONS G-G, H-H AND K-K, VIEWS A-A AND Q-Q, AND HAND HOLE DETAILS.
4. SEE SHEET 3 OF THIS SERIES FOR SECTION P-P AND BASE PLATE SKIRT.
5. PROVIDE CAMBER AT MIDSPAN OF STRUCTURE.
6. LOCATE OPTIONAL BOLTED FIELD SPLICE NEAR MIDSPAN.
7. OMIT ANTENNA AND ANTENNA MOUNTING ASSEMBLY ABOVE CASH ONLY LANE.

APPROVED ..... DATE .....
CHIEF ENGINEER

Illinois Tollway

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL)
STRUCTURE DETAILS
FOR CASH-IPO RAMP

STANDARD F16-00

GENERAL NOTES:

1. AFTER ADJUSTMENTS TO LEVEL FRAME BEAM AND ENSURE ADEQUATE VERTICAL CLEARANCE, TIGHTEN ALL TOP AND LEVELING NUTS AGAINST THE BASE PLATE WITH A MINIMUM TORQUE OF 200 LB.-FT. THEN PLACE STAINLESS STEEL MESH AROUND THE PERIMETER OF THE BASE PLATE. SECURE TO BASE PLATE WITH STAINLESS STEEL BANDING.
2. REINFORCEMENT BARS DESIGNATED "(E)" SHALL BE EPOXY COATED.
3. FINAL LOCATION OF I-PASS ANTENNAE SHALL BE AS DIRECTED BY THE TOLLWAY.

STRUCTURAL STEEL:

1. MATERIAL FOR THE MONOTUBE FRAME AND RECTANGULAR HSS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B. BASE PLATE AND STIFFENER PLATE SHALL CONFORM TO ASTM A709 GRADE 50. OTHER STRUCTURAL STEEL SHAPES AND PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A36, UNLESS NOTED OTHERWISE.
2. PIPES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A53 GRADE B.
3. U-BOLTS SHALL BE STAINLESS STEEL. PROVIDE STAINLESS STEEL WASHERS AND NUTS FOR U-BOLTS.
4. BOLTS (EXCLUDING ANCHOR BOLTS AND U-BOLTS) SHALL BE HIGH STRENGTH STEEL BOLTS.
5. TUBES FOR MONOTUBE FRAME, PIPES, STRUCTURAL STEEL SHAPES AND PLATES SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123 AFTER FABRICATION.
6. THE MONOTUBE FRAME BEAM, COLUMNS, BASE PLATE MATERIAL, AND SPLICES ARE CONSIDERED TENSION MEMBERS AND SHALL CONFORM TO THE IMPACT TESTING REQUIREMENT, ZONE 2.

DESIGN LOADING:

WIND LOAD CRITERIA
SIGN PANEL 35 P.S.F.
COLUMN/BEAM 35 P.S.F.

EQUIPMENT LOADS:

LED LANE CONTROL SIGN 50 LB.
ANTENNA 28 LB.

DESIGN STRESSES FOR REINFORCED CONCRETE:

f'c = COMPRESSIVE STRENGTH OF CONCRETE (CLASS SI) = 3,500 P.S.I.
f'c = COMPRESSIVE STRENGTH OF CONCRETE (CLASS DS) = 4,000 P.S.I.
fy = YIELD STRENGTH OF REINFORCEMENT BARS (GRADE 60) = 60,000 P.S.I.

FOUNDATION:

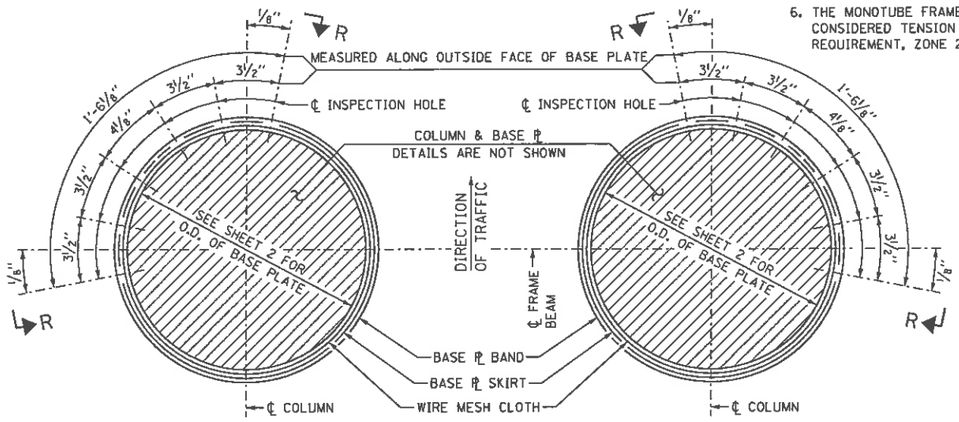
MINIMUM UNCONFINED COMPRESSIVE STRENGTH, Qu FOR ALL LAYERS OF COHESIVE SOILS (CLAYS) SHALL BE 1.25 TON/SQ.FT. AT RAMP FRAMES.

DESIGN SPECIFICATIONS:

1. STRUCTURE DESIGN MANUAL, DATED MARCH, 2014, WITH LATEST DESIGN BULLETINS.
2. AASHTO STANDARD SPECIFICATION FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES AND TRAFFIC SIGNALS, 6TH EDITION.
3. AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 6TH EDITION DATED FEBRUARY 2012.
4. ILLINOIS DEPARTMENT OF TRANSPORTATION BRIDGE MANUAL, JANUARY 2012

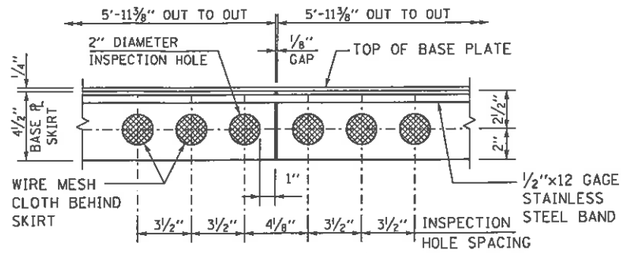
CONSTRUCTION SPECIFICATIONS:

1. TOLLWAY SUPPLEMENTAL SPECIFICATIONS TO THE ILLINOIS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION.
2. ILLINOIS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION.



LEFT BASE PLATE RIGHT BASE PLATE

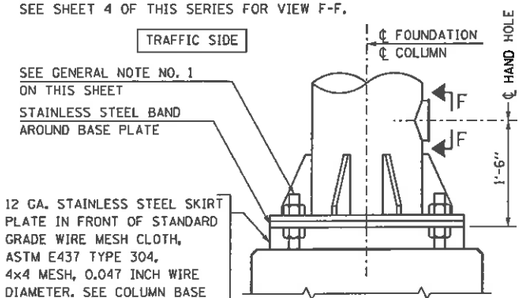
COLUMN BASE PLATE PLAN



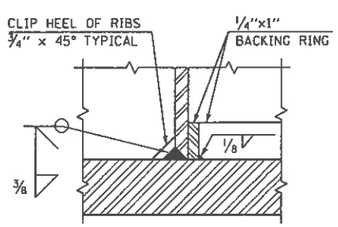
VIEW R-R (BASE PLATE SKIRT)

NOTE:

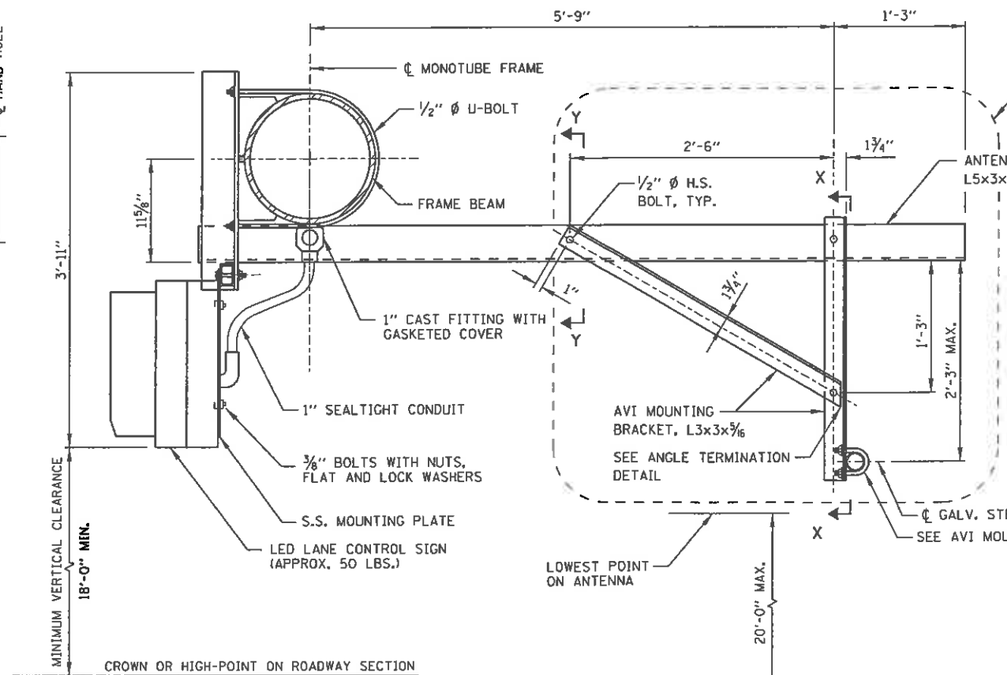
SEE SHEET 4 OF THIS SERIES FOR VIEW F-F.



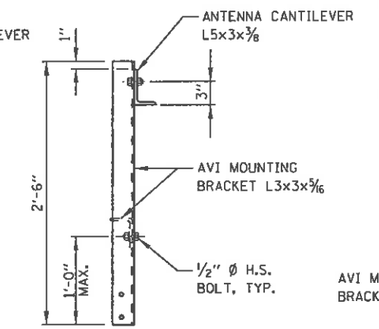
COLUMN BASE



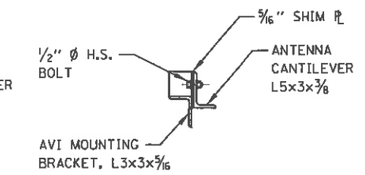
DETAIL T



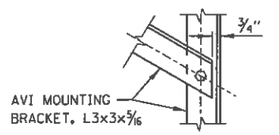
SECTION P-P
(LED LANE CONTROL SIGNAL MOUNTING DETAIL)



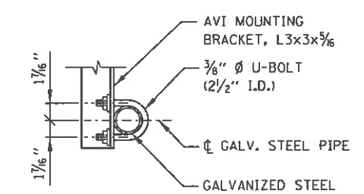
SECTION X-X



SECTION Y-Y



ANGLE TERMINATION



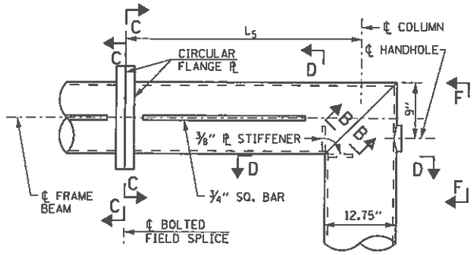
AVI MOUNTING DETAIL

APPROVED ..... CHIEF ENGINEER DATE .....

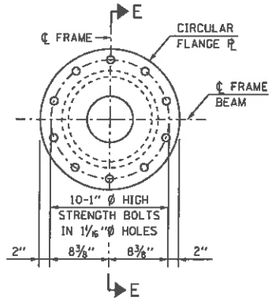
Illinois Tollway

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL)
STRUCTURE DETAILS
FOR CASH-IPO RAMP

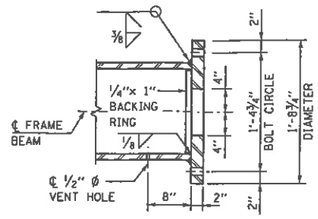
STANDARD F16-00



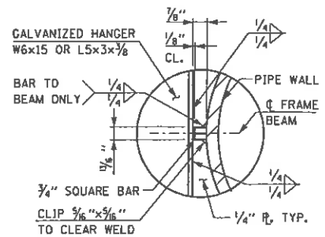
VIEW A-A



SECTION C-C

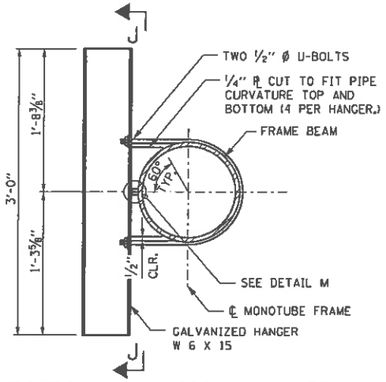


SECTION E-E

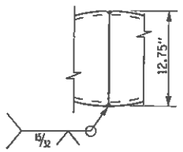


DETAIL M

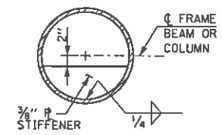
(AT SIGN HANGER AND ANTENNA HANGER)



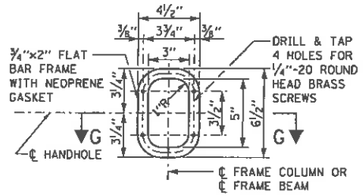
SECTION H-H (SIGN HANGER)



SECTION B-B



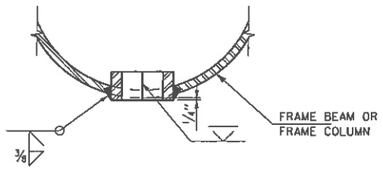
SECTION D-D



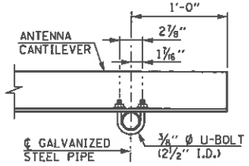
PROVIDE 6½"x4½" #10 GA. COVER. ROUND CORNERS TO 1¾" RADIUS. PROVIDE FOUR 5/16" ø HOLES.

VIEW F-F

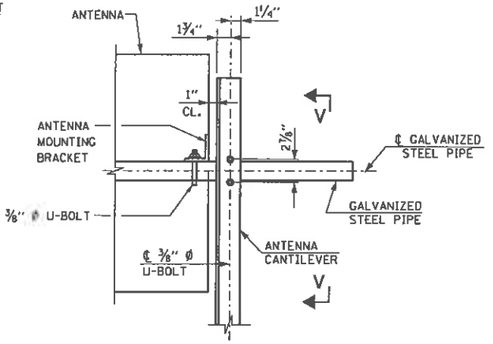
(HAND HOLE DETAIL)



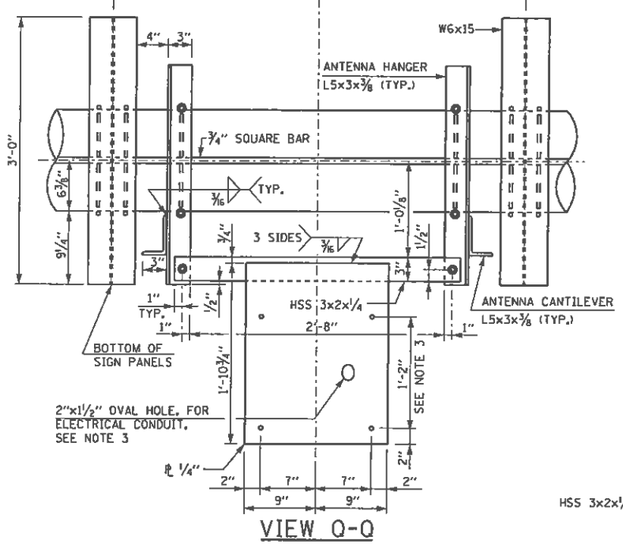
SECTION G-G



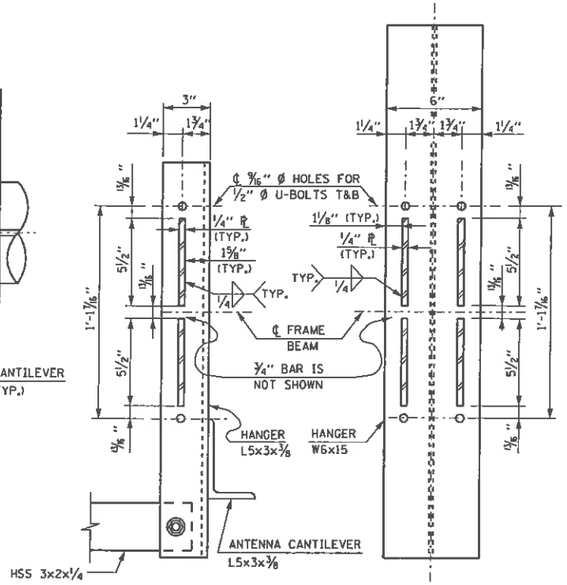
VIEW V-V



DETAIL W

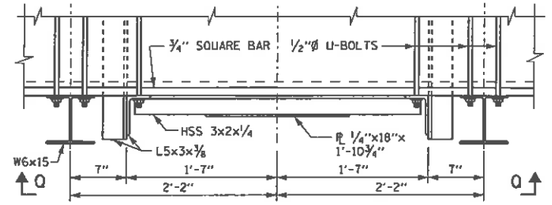


VIEW Q-Q

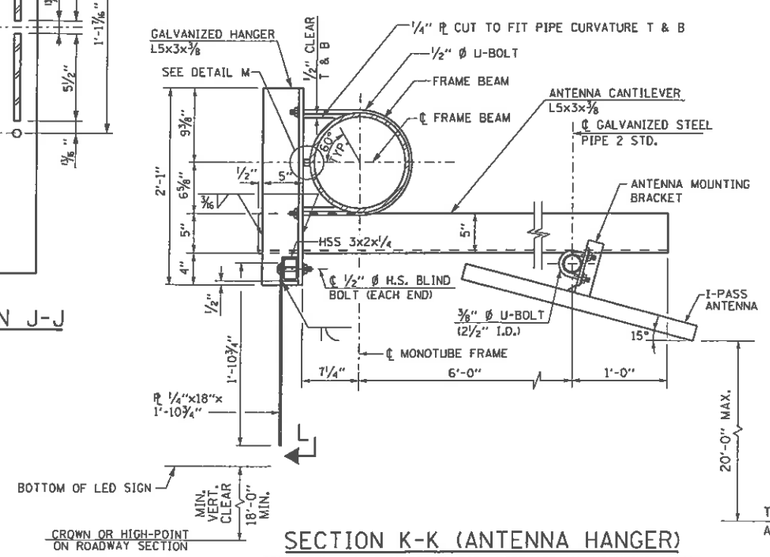


SECTION L-L

SECTION J-J



DETAIL P



SECTION K-K (ANTENNA HANGER)

(SEE SHEET 3 OF THIS SERIES FOR ALTERNATE AVI MOUNTING DETAIL)

NOTES:

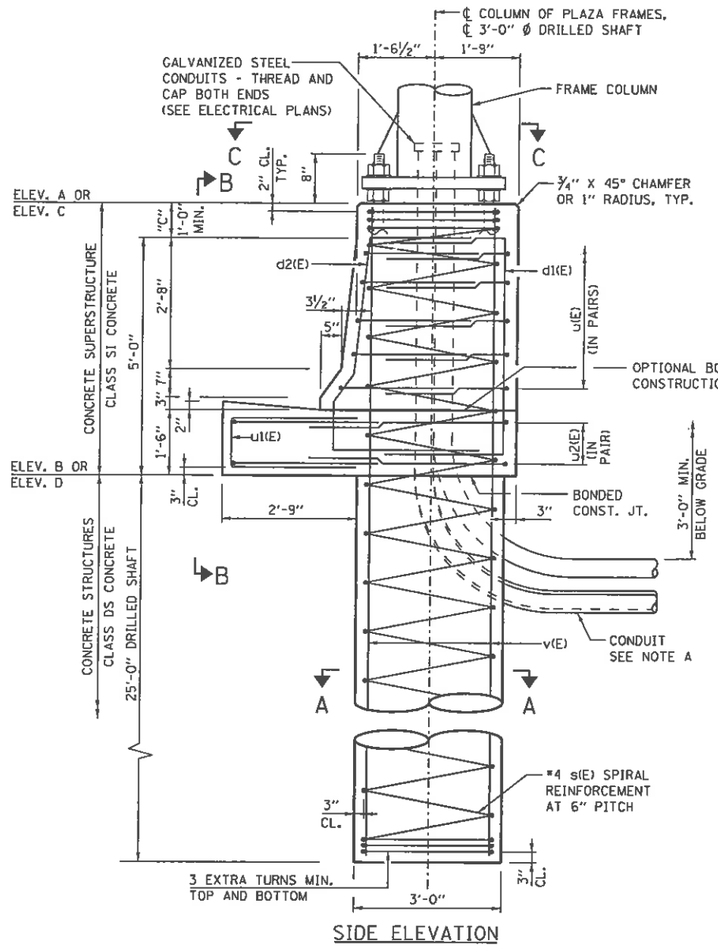
1. SIGN AND SIGN HANGER ARE OMITTED FROM VIEW A-A FOR CLARITY.
2. FOR DETAILS OF ATTACHMENT BETWEEN HANGER AND SIGN PANELS. SEE STANDARD F10.
3. CONTRACTOR SHALL VERIFY LOCATION AND SIZE OF HOLES WITH LANE CONTROL SIGNAL PRIOR TO FABRICATION OF ¼" PLATE.
4. T&B DENOTE TOP AND BOTTOM.
5. PROVIDE ANTENNA MOUNTING BRACKET ACCORDING TO ANTENNA MANUFACTURER'S RECOMMENDATION.
6. SEE SHEET 2 OF THIS SERIES FOR HANDHOLE LOCATIONS.

APPROVED..... CHIEF ENGINEER DATE .....

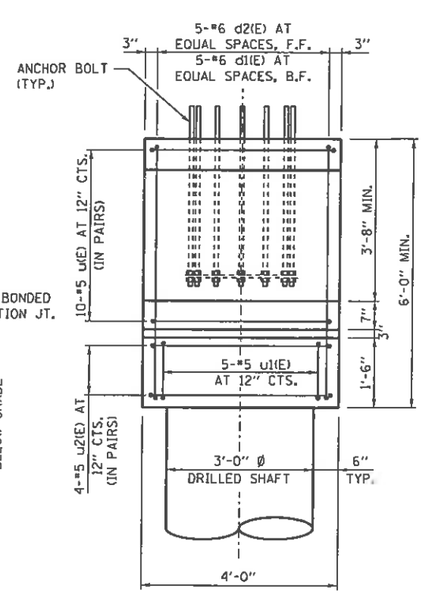
Illinois Tollway

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL)
STRUCTURE DETAILS
FOR CASH-IPO RAMP

STANDARD F16-00

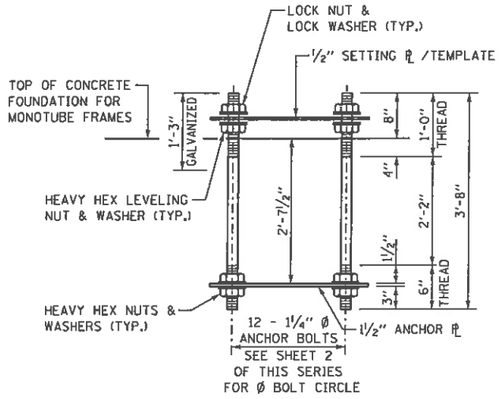


SIDE ELEVATION

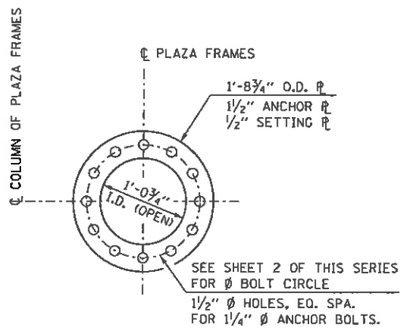


VIEW B-B

NOTE:
SITE GROUNDING ELECTRODE SYSTEM SHALL BE PROVIDED AS INDICATED ON THE CONTRACT PLANS.



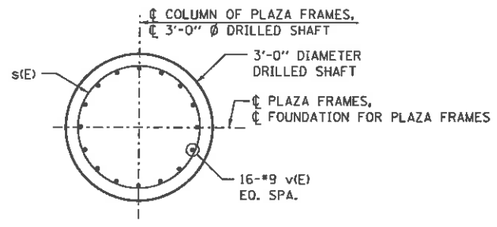
ANCHOR BOLT ASSEMBLY



ANCHOR ℄ / SETTING ℄

VIEW C-C

SINGLE FACE BARRIER FOUNDATION FOR PLAZA FRAMES

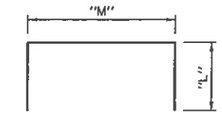


SECTION A-A

NOTE A:
1. COORDINATE CONDUIT SIZE, LOCATION AND QUANTITY WITH ELECTRICAL PLANS. PROVIDE CONDUIT COUPLERS AS REQUIRED.
2. CONDUITS SHALL BE PLACED TO MISS REINFORCEMENT. CUTTING OF REINFORCEMENT SHALL NOT BE ALLOWED.
3. COST INCLUDED IN FOUNDATION FOR OVERHEAD SIGN STRUCTURE, MONOTUBE TYPE.

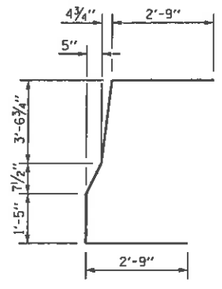
FOUNDATIONS:
THE FOUNDATION DIMENSIONS SHOWN ARE BASED ON THE PRESENCE OF MOSTLY COHESIVE SOILS WITH AN AVERAGE UNCONFINED COMPRESSIVE STRENGTH (Qu) OF AT LEAST 1.25 TON/SQ. FT., WHICH MUST BE DETERMINED BY PREVIOUS SOIL INVESTIGATIONS AT THE JOBSITE. WHEN OTHER CONDITIONS ARE INDICATED, THE BORING DATA WILL BE INCLUDED IN THE PLANS AND THE FOUNDATION DIMENSIONS SHOWN WILL BE THE RESULT OF THE SITE SPECIFIC DESIGNS. IF THE CONDITIONS ENCOUNTERED ARE DIFFERENT THAN THOSE INDICATED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO DETERMINE IF THE FOUNDATION DIMENSIONS NEED TO BE MODIFIED.

LEGEND:
F.F. - FRONT FACE
B.F. - BACK FACE
CTS. - CENTERS



BAR	"L"	"M"	
d1(E)	2'-9"	5'-7"	**
u(E)	2'-9"	3'-8"	
u1(E)	3'-3"	1'-1"	
u2(E)	3'-10"	3'-8"	

BARS d1(E), u(E), u1(E) AND u2(E)



BAR d2(E)

REINFORCEMENT BAR SCHEDULE
FOR ONE FOUNDATION

	BAR	NO.	SIZE	LENGTH	SHAPE
**	d1(E)	5	#6	11'-1"	
**	d2(E)	5	#6	11'-3"	
*	s(E)	1	#4	30'-7"	
**	v(E)	16	#9	30'-7"	
	u(E)	10	#5	9'-2"	
	u1(E)	5	#5	7'-7"	
	u2(E)	4	#5	11'-4"	

* THE LENGTH OF SPIRAL SHOWN IS THE HEIGHT OF SPIRAL, COMPUTED USING "C" = 1'-0". ADJUST LENGTH ACCORDINGLY IF "C" IS GREATER THAN 1'-0".

** BAR LENGTH IS COMPUTED USING "C" = 1'-0". ADJUST BAR LENGTH ACCORDINGLY IF "C" IS GREATER THAN 1'-0".

ESTIMATED QUANTITY

ITEM	UNIT	SINGLE FACE BARRIER FDN.
CONCRETE SUPERSTRUCTURE	CY	3.7
CONCRETE STRUCTURES	CY	6.6
REINFORCEMENT BARS, EPOXY COATED	POUNDS	2,360
PROTECTIVE COAT	SY	4.5

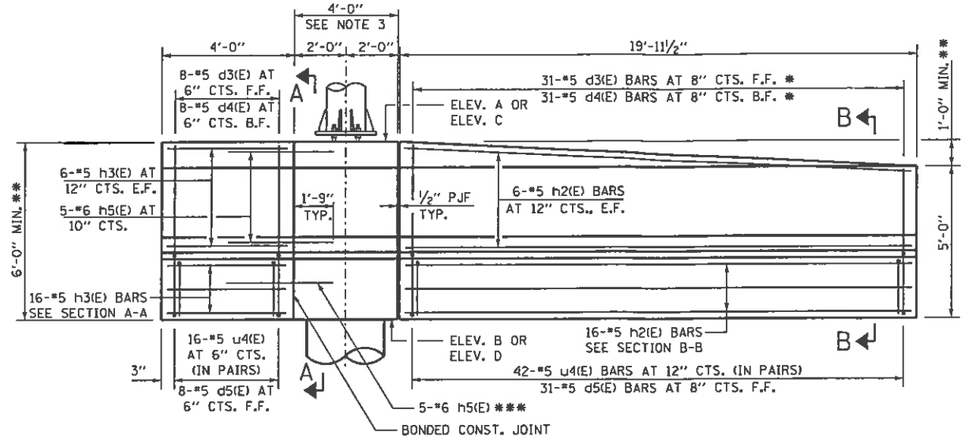
NOTE:
QUANTITIES FOR SINGLE FACE BARRIER FOUNDATION ARE DETERMINED USING "C" = 1'-0". IF DIMENSION "C" IS GREATER THAN 1'-0", ADJUST QUANTITIES ACCORDINGLY.

APPROVED ..... CHIEF ENGINEER DATE .....

Illinois Tollway

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL)
STRUCTURE DETAILS
FOR CASH-IPO RAMP

STANDARD F16-00



* CUT IN FIELD AS REQUIRED TO FIT TAPER
** BASED ON DIMENSION "C" = 1'-0"
*** REINFORCEMENT INCLUDED IN SINGLE FACE BARRIER QUANTITY

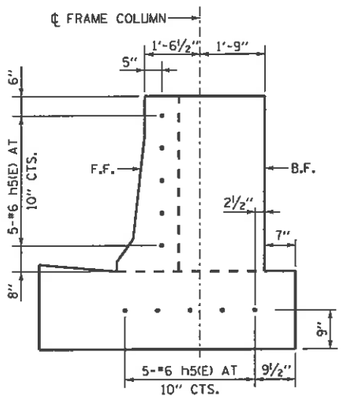
SINGLE FACE BARRIER ELEVATION

INSIDE FACE OF RIGHT BARRIER IS SHOWN
(MIRROR ELEVATION OF LEFT BARRIER)

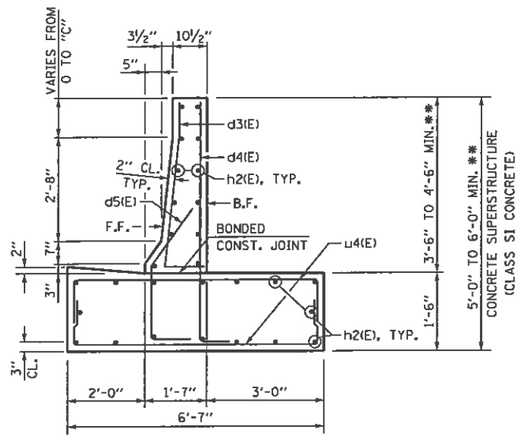
REINFORCEMENT BAR SCHEDULE

(FOR ONE BARRIER)

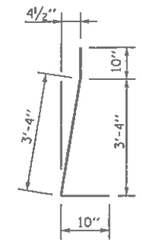
	BAR	NO.	SIZE	LENGTH	SHAPE
	d3(E)	39	#5	5'-0"	
	d4(E)	39	#5	6'-7"	
	d5(E)	39	#5	4'-7"	
	h2(E)	28	#5	19'-7"	
	h3(E)	28	#5	3'-8"	
***	h5(E)	10	#6	3'-9"	
	u4(E)	58	#5	8'-3"	



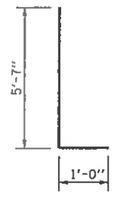
SECTION A-A



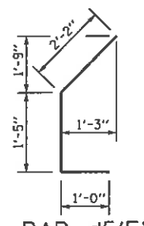
SECTION B-B



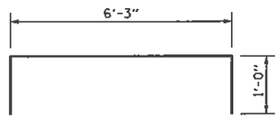
BAR d3(E)



BAR d4(E)



BAR d5(E)



BAR u4(E)

ESTIMATED QUANTITY

(FOR ONE BARRIER)

ITEM	UNIT	SINGLE FACE BARRIER
CONCRETE SUPERSTRUCTURE	CY	12.9
REINFORCEMENT BARS, EPOXY COATED	POUNDS	1,900
PROTECTIVE COAT	SY	19.0

NOTES:

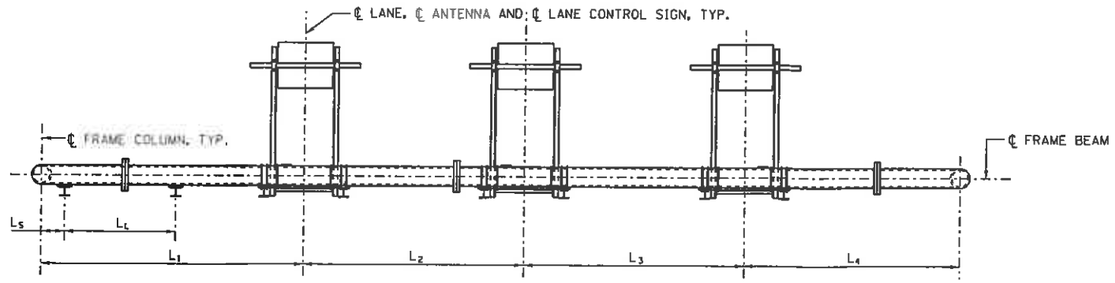
1. PROTECTIVE COAT SHALL BE APPLIED TO THE TRAFFIC AND TOP FACES OF THE BARRIER, GUTTER AND TO THE ENTRANCE SIDE FACE (AT THE BEGINNING OF THE RAMP PLAZA PAVEMENT) FOR THE FULL HEIGHT OF THE BARRIER.
2. ELECTRICAL JUNCTION BOXES SHALL BE EXTERIOR MOUNTED ON THE BACK FACE OF BARRIER.
3. FOR SINGLE FACE BARRIER FOUNDATION DETAILS FOR MONOTUBE FRAMES, SEE SHEET 5 OF THIS SERIES.
4. QUANTITIES FOR SINGLE FACE BARRIER ARE DETERMINED USING "C" = 1'-0". IF DIMENSION "C" IS GREATER THAN 1'-0", ADJUST QUANTITIES ACCORDINGLY.
5. SEE BASE SHEET M49 FOR BILL OF MATERIAL.

APPROVED..... DATE .....
CHIEF ENGINEER

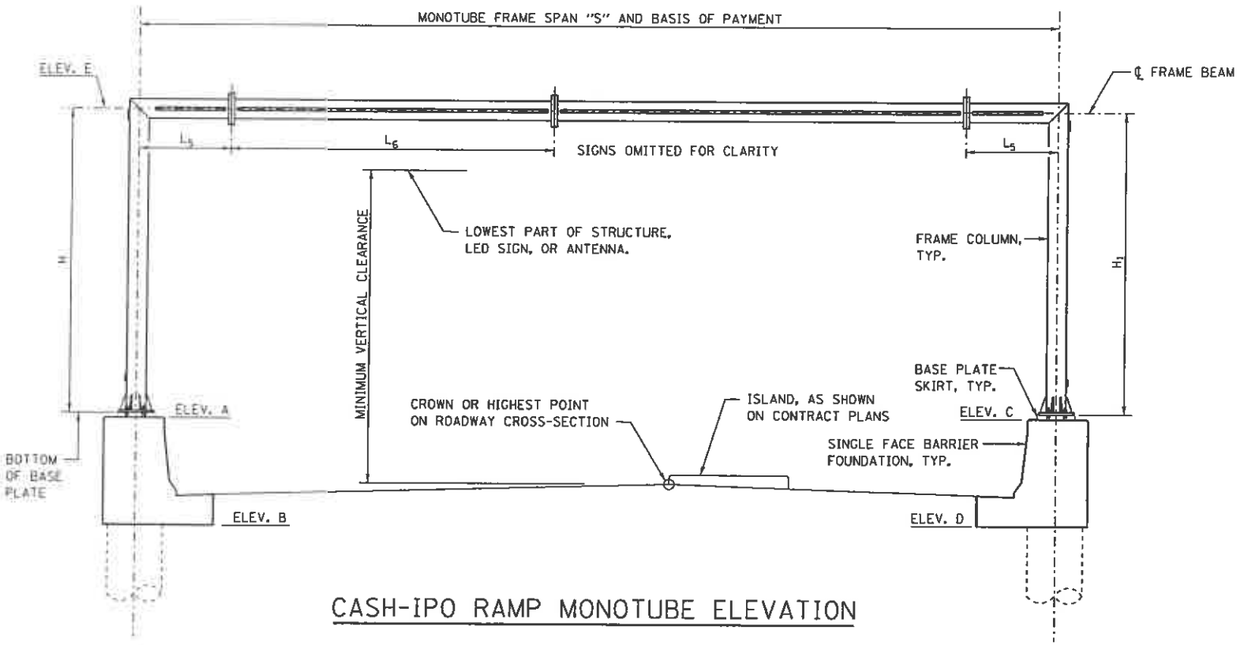
Illinois Tollway

OVERHEAD SIGN STRUCTURE
MONOTUBE TYPE (STEEL)
STRUCTURE DETAILS
FOR CASH-IPO RAMP

STANDARD F16-00



CASH-IPO RAMP MONOTUBE PLAN



CASH-IPO RAMP MONOTUBE ELEVATION

NOTE TO DESIGNER

THIS BASE SHEET SHOWS TYPICAL NEW CONSTRUCTION BUT IT IS NOT A STANDARD DRAWING. IT REQUIRES COMPLETION BY THE DSE PRIOR TO INSERTION INTO A CONTRACT. MICROSTATION FILES ARE CONTAINED W/IN THE CADD STANDARDS MANUAL RESOURCE CD OR AVAILABLE FROM THE TOLLWAY. THE DSE SHALL ACCEPT THE RESPONSIBILITY OF THE DESIGN OF THIS SHEET UPON ITS COMPLETION & INSERTION INTO A CONTRACT.

THIS "NOTE TO DSE" SHALL BE REMOVED BY THE DSE PRIOR TO INSERTION OF THE SHEET INTO THE PLAN SET.

PROVIDE SITE GROUNDING ELECTRODE SYSTEM DETAIL ACCORDING TO THE TOLLWAY SUPPLEMENTAL SPECIFICATIONS SECTION 734.

SEE THE TOLLWAY STRUCTURE DESIGN MANUAL FOR MINIMUM VERTICAL CLEARANCE.

TOTAL BILL OF MATERIAL

ITEM	UNIT	TOTAL
OVERHEAD SIGN STRUCTURE, CASH-IPO MONOTUBE TYPE (STEEL) (60 FT)	FOOT	
FOUNDATION FOR OVERHEAD SIGN STRUCTURE, MONOTUBE TYPE	CU. YD.	
CONCRETE SUPERSTRUCTURE	CU. YD.	
REINFORCEMENT BARS, EPOXY COATED	POUNDS	
PROTECTIVE COAT	SQ. YD.	

SUMMARY

STRUCTURE NUMBER	STATION	SPAN "S" (FT.)	ELEV. A	ELEV. B	ELEV. C	ELEV. D	ELEV. E	MINIMUM VERTICAL CLEARANCE	SHEET 2										SHEET 6	CONCRETE SUPERSTRUCTURE (CU. YD.)	CONCRETE STRUCTURES (CU. YD.)	REINFORCEMENT BARS, EPOXY COATED (POUNDS)	PROTECTIVE COAT (SQ. YD.)
									L_S	L_L	L_1	L_2	L_3	L_4	L_5	L_6	H	H_1	"C"				

NOTE:
WORK THIS SHEET WITH STANDARD F16

BASE DRAWING M49

Illinois Tollway

OVERHEAD SIGN STRUCTURE MONOTUBE TYPE (STEEL) CASH-IPO RAMP SUMMARY AND TOTAL BILL OF MATERIAL

DATE
- -2014