WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAILS BOOK
VOLUME II
SIGNING, SIGNALS, LIGHTING,
MARKINGS AND ITS

ISSUE DATE: JANUARY, 2019
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NOTES:

1. The post selection chart is based in accordance with the AASHTO standard specifications for structural supports for highway signs, luminaires, and traffic signals, 4th edition, 1984.
2. For base connections to be used in conjunction with the post selection chart shown, see sheet TE1-3A.
3. For foundation, see sheet TE1-3C.

POST SELECTION PROCEDURES:

1. Determine total sign area of panels.
2. Determine preliminary selection of number of posts used.
3. Calculate the square footage of sign per support (total square footage divided by number of supports.
4. Use the table to determine post size.
5. Verify that the selected post size may be used based on minimum required post spacing and/or the availability of an approved Omni-directional Breakaway device for the selected sign post, as applicable.
6. If not, change number of posts used and repeat steps 4, 5, & 6.
7. See the design guide for spacing for examples.

OMNI-DIRECTIONAL BREAKAWAY DEVICE REQUIREMENTS

If an assembly is to be installed near a roadway and oriented such that the webs of the support beams are not parallel to the roadway, an approved Omni-directional Breakaway device shall be specified for use with the supports unless one of the following requirements are met:

- The supports are outside of the clear zone of the roadway.
- The supports are protected from errant vehicles by guardrail or concrete barrier that is provided proper consideration is given to the barrier length of need point and the angle of departure of the errant vehicle that is specified for NHS Projects.

NOTE:

An approved Omni-directional Breakaway device may be used for all of the support sizes listed. In addition, support spacing requirements for each approved Omni-directional device vary from those shown herein. A device that does not require adjustment of the support spacing to meet the device requirements shall be used. If specified for use with a device, the standard spacing between supports may be adjusted at the discretion of the Engineer in order to meet the device support spacing requirements. Otherwise, the support type/size or assembly location must be adjusted to meet the requirements herein.

OMNI-DIRECTIONAL BREAKAWAY DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND THE REQUIREMENTS SPECIFIED IN SECTION 657 OF THE STANDARD SPECIFICATIONS. THE DEVICE SUPPORT SPACING REQUIREMENTS MUST BE ADJUSTED TO MEET THE DEVICE REQUIREMENTS.

CUSTOMER VEHICLE PER DESIGN DIRECTIVE 662 (USE THE ANGLE SPECIFIED FOR NHS PROJECTS). ALSO, SEE SHEET TP3-1C.

WRENCH MEETING THE REQUIREMENTS SPECIFIED IN SECTION 657 OF THE STANDARD SPECIFICATIONS. IF SPECIFIC TORQUE VALUES ARE SPECIFIED FOR FASTENERS OF THE DEVICE, THEY SHALL BE TORQUED USING A "CLICK" TYPE TORQUE WRENCH MEETING THE REQUIREMENTS SPECIFIED IN SECTION 657 OF THE STANDARD SPECIFICATIONS.

SUPPORT SPACING REQUIREMENTS:

In no case shall supports be spaced at a distance less than the lesser of the support foundation or the center of pressure of the sign(s). The requirements specified in section 657 of the standard specifications.
DETAIL 1

THE PROJECTION OF THE STUB ABOVE GROUND LEVEL IS TO NOT EXTEND ABOVE A 60 INCH WIDE CHORD WHICH EXTENDS 4 INCHES ABOVE THE GROUND LEVEL ON EACH END AS SHOWN ON DETAIL 1.

FOOTING SHALL BE FLUSH WITH GROUND ON UPHILL SIDE.

NOTE
FOOTING SHALL BE FLUSH WITH:
GROUND LINE (FINISHED GRADE)

FOOTING SHALL BE DEEPENED AS DIRECTED BY THE ENGINEER TO ADAPT TO LOCAL SOIL CONDITIONS.

SECTION A-A

FOUNDATION REQUIRED PER POST

<table>
<thead>
<tr>
<th>BEAM SIZE</th>
<th>DIMENSION W</th>
<th>DIMENSION H*</th>
<th>CUBIC YARDS OF CONCRETE</th>
<th>VERTICAL STEEL</th>
<th>STIRRUP STEEL</th>
<th>STUB LENGTH</th>
<th>STUB PROJECTION</th>
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<tbody>
<tr>
<td>S4X7.7</td>
<td>1'-6&quot;</td>
<td>4'-2&quot;</td>
<td>0.3</td>
<td>#4 @ 12&quot;</td>
<td>1'-6&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>W6x12</td>
<td>2'-6&quot;</td>
<td>6'-4&quot;</td>
<td>1.2</td>
<td>10=#6</td>
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<td>3&quot;</td>
</tr>
<tr>
<td>W8x18</td>
<td>2'-6&quot;</td>
<td>7'-0&quot;</td>
<td>1.3</td>
<td>10=#6</td>
<td>#4 @ 12&quot;</td>
<td>2'-6&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
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<td>7'-0&quot;</td>
<td>1.3</td>
<td>10=#6</td>
<td>#4 @ 10&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
</tbody>
</table>

*NOTE:
1. DEPTH OF FOUNDATIONS IS BASED ON AN ASSUMED SOIL SUCH AS MEDIUM CLAY OR SANDY CLAY. THESE FOUNDATIONS MAY BE USED IN OTHER TYPE SOILS PROVIDING THAT THE SOILS RESISTANCE TO LATERAL LOADS IS NOT LESS THAN THAT OF MEDIUM CLAY. A MINIMUM BEARING OF 3000 LBS/FT² FOUNDATIONS SHALL BE DEEPENED AS DIRECTED BY THE ENGINEER TO ADAPT TO LOCAL SOIL CONDITIONS.

2. DEPTH OF FOUNDATIONS SHALL BE MEASURED FROM THE DOWNHILL SIDE OF THE SLOPE FROM THE TOP OF THE UNEXCAVATED MATERIAL AS SHOWN ON THE DRAWING.

3. THE TOPS OF ALL FOUNDATIONS SHALL BE FINISHED SMOOTH WITH THE CONCRETE SLOPING SLIGHTLY DOWNWARD FROM THE STUB TO THE EDGE OF THE FOOTER IN ORDER TO FACILITATE DRAINAGE.

4. IF THE SLOPE IS 4:1 OR GREATER AND IT IS NOT POSSIBLE TO BUILD UP THE DOWNHILL SIDE OF THE GROUND SLOPE IN ORDER TO ALLOW THE TOP OF THE FOUNDATION TO BE LEVEL, THE CONTRACTOR SHALL INCORPORATE A FORM AS DESCRIBED IN SECTION 657 OF THE STANDARD SPECIFICATIONS.

THE VOLUME OF CONCRETE SHOWN IN TABLE DOES NOT INCLUDE ADDITIONAL CONCRETE THAT MAY BE REQUIRED WHEN THE FOUNDATION IS IN A SLOPE AND MUST BE EXTENDED SO THAT THE TOP OF THE FOUNDATION IS FLUSH WITH THE UPHILL SIDE. SEE DETAIL ABOVE.

*FOR EXCEPTIONS SEE NOTE 1
**Type 5 Pipe B**

- **Pipe Diameter (DIA.):** 3" Ø
- **Pipe Size:** TP3-1A
- **Length:** 24" x 24" and 24" x 12"
- **Directional Arrow:** Provided

**Pipe A**

- **Pipe Diameter (DIA.):** 2½"
- **Pipe Size:** TP3-1A
- **Length:** 3'-0" and 2½" Ø
- **Directional Arrow:** Provided

**Pipe Size:** TP3-1A

**Welded Pipe Mount Details**

- **Pipe Size:** TP3-1A
- **Pipe Diameter (DIA.):** 3" Ø
- **Pipe Length:** 24" x 24" and 24" x 12"
- **Directional Arrow:** Provided

**Base Connection Detail**

- **Pipe Size:** TP3-1A
- **Pipe Diameter (DIA.):** 3" Ø
- **Pipe Length:** 24" x 24" and 24" x 12"
- **Directional Arrow:** Provided

**Friction Cap Detail**

- **Pipe Size:** TP3-1A
- **Pipe Diameter (DIA.):** 3" Ø
- **Pipe Length:** 24" x 24" and 24" x 12"
- **Directional Arrow:** Provided

**Shim Detail**

- **Pipe Size:** TP3-1A
- **Pipe Diameter (DIA.):** 3" Ø
- **Pipe Length:** 24" x 24" and 24" x 12"
- **Directional Arrow:** Provided

**Rotaing Footnotes:**

- **Minimum Distance from Ground to Top:**
- **Type of Support:** To be determined by number of route marker shields.
- **Type of Support:** To be determined by number of route marker shields.
- **Type of Support:** To be determined by number of route marker shields.
- **Type of Support:** To be determined by number of route marker shields.

**General Notes:**

- **All Items and Foundations Shown on this Sheet**
- **shall be in accordance with the West Virginia Division of Highways Standards Specifications, Codes, and Codes of Practice, current edition, and all current Supplemental Specifications.**
- **The supports shown on this detail are only intended for use in a typical urban area.**
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**Pipe and Foundation Schedule**

<table>
<thead>
<tr>
<th>Type of MOUND</th>
<th>Pipe A</th>
<th>Pipe B</th>
<th>Footing</th>
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<tr>
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<td>4½&quot;</td>
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<td>5½&quot;</td>
<td>5½&quot;</td>
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<tr>
<td>3</td>
<td>4½&quot;</td>
<td>6½&quot;</td>
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<tr>
<td>5</td>
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**Pipe Post Sign Supports**

- **Types 1 - 5**

**Standard Sheet TE1-5B**
GENERAL NOTES:

ALL ITEMS AND FOUNDATIONS SHOWN ON THIS DETAIL SHALL BE IN ACCORDANCE WITH SECTION 658 OF THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION HANDBOOKS, STANDARD SPECIFICATIONS FOR STRUCTURAL, PAVEMENTS, AND BRIDGES, CURRENT EDITION, AND ALL CURRENT SUPPLEMENTAL SPECIFICATIONS.

THE SUPPORTS SHOWN ON THE DETAIL ARE ONLY INTENDED FOR USE IN TYPICAL URBAN AREAS WHERE LIMITED AVAILABLE RIGHT-OF-WAY OR ROADSIDE FEATURES SUCH AS SIDEWALKS RESTRICT THE ABILITY TO INSTALL MULTIPLE SUPPORTS. THESE TYPE SUPPORTS SHOULD ONLY BE SPECIFIED WITH THE APPROVAL OF THE TRAFFIC ENGINEERING DIVISION.

TYPE 6 SUPPORTS SHOULD NOT BE INSTALLED WITHIN THE CLEAR ZONE OF ANY ROADWAY UNLESS THE SUPPORT IS PROTECTED FROM ERRANT VEHICLES BY GUARDRAIL OR CONCRETE BARRIER. THE SUPPORT SHOULD BE PROVIDED PROPER CONSIDERATION FOR THE BARRIER LENGTH AND THE ANGLE OF THE SUPPORT TYPE INSERTED INTO THE BARRIER. THE SUPPORT TYPE INSERTED INTO THE BARRIER PROTECTS AGAINST THE ENTRANCE OF RAINWATER TO THE ROOF. THE DEPTH OF THE SUPPORT SHOULD BE SUFFICIENT TO GIVE POSITIVE PROTECTION AGAINST THE ENTRANCE OF RAINWATER. THEY SHOULD BE LOOSE TO A DRIVE-ON FRICTION FIT AND HAVE NO TENDENCY TO ROCK.

CAPS SHALL BE SIZED AND FORMED IN SUCH A MANNER AS TO PROVIDE A DRIVE-ON FRICTION FIT AND HAVE NO TENDENCY TO ROCK. THE CAPS SHALL BE FORMED IN SUCH A MANNER AS TO PROVIDE A DRIVE-ON FRICTION FIT AND HAVE NO TENDENCY TO ROCK.

THE PIPES IN THE SUPPORT SHOULD BE FITTED IN SUCH A MANNER AS TO PROVIDE A DRIVE-ON FRICTION FIT AND HAVE NO TENDENCY TO ROCK. THE CAPS SHALL BE SIZED AND FORMED IN SUCH A MANNER AS TO PROVIDE A DRIVE-ON FRICTION FIT AND HAVE NO TENDENCY TO ROCK.

METAL THICKNESS SHALL BE 24 GUAGE.

ALL ITEMS AND FOUNDATIONS SHOWN ON THIS DETAIL SHALL BE IN ACCORDANCE WITH SECTION 658 OF THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION HANDBOOKS, STANDARD SPECIFICATIONS FOR STRUCTURAL, PAVEMENTS, AND BRIDGES, CURRENT EDITION, AND ALL CURRENT SUPPLEMENTAL SPECIFICATIONS.

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POST SELECTION PROCEDURE:

1. DETERMINE TOTAL SIGN AREA OF PANEL(S).
2. DETERMINE HEIGHT FROM THE GROUND USING THE LONGEST POST TO THE CENTER OF PRESSURE (CP) OF THE SIGN(S). SEE SHEET TE1-3B FOR EXAMPLES OF HOW TO DETERMINE THE CP VALUE.
3. USING THE MIN/MAX NUMBER OF SUPPORTS GUIDELINES FOR GUIDANCE, DETERMINE PRELIMINARY SELECTION OF THE NUMBER OF SUPPORTS TO BE USED.
4. CALCULATE THE SQUARE FOOTAGE OF SIGN PER SUPPORT (TOTAL SQUARE FOOTAGE DIVIDED BY THE NUMBER OF SUPPORTS).
5. USE THE CHART TO DETERMINE POST SIZE.

NOTES:

1. ALL ITEMS SHOWN ON THE DETAIL SHEET AND TE1-7A SHALL BE IN ACCORDANCE WITH SECTION 657 OF THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS ROADS AND BRIDGES, CURRENT EDITION, AND ALL CURRENT SUPPLEMENTAL SPECIFICATIONS.
2. DEPTHS DRIVEN ARE BASED ON AVERAGE SOIL CONDITIONS. DEPENDING UPON ACTUAL SOIL BEARING IN THE FIELD, THE ENGINEER MAY REQUIRE THAT THE DEPTH DRIVEN BE INCREASED TO 5 FEET.
3. SEE TE1-3B FOR POST SPACING.
4. STITCH BOLT SPACING FOR BACK-TO-BACK POSTS SHALL BE 18 INCHES FOR THE PORTIONS OF THE POSTS ABOVE GROUND LEVEL AND SHALL BE 4 INCHES FOR THE PORTIONS OF THE POSTS BELOW GROUND LEVEL.

MIN/MAX NUMBER OF SUPPORTS

THE FOLLOWING GUIDELINES SHOULD BE FOLLOWED WHEN SELECTING U-CHANNEL SUPPORTS:

A. SIGNS GREATER THAN 36 IN. IN WIDTH SHOULD BE INSTALLED ON A MINIMUM OF TWO (2) SUPPORTS EXCEPTIONS TO THIS ARE 36 IN. DIAMONDS, W14-3 SIGNS, AND 42-48 IN. WIDE AND 9-12 FT. TALL.
B. A MAXIMUM OF TWO (2) SUPPORTS SHOULD BE USED FOR ALL SIGNS 60 IN. OR LESS, 60 IN. DIAMONDS INCLUDED.
C. IF NON BB SUPPORTS ARE USED, A MINIMUM OF THREE (3) SUPPORTS SHOULD BE USED FOR ALL SIGNS GREATER THAN 72 IN. WIDE.
D. A MAXIMUM OF THREE (3) NON-BB SUPPORTS OR TWO (2) BB SUPPORTS SHOULD BE USED FOR ANY ASSEMBLY. IF THIS IS NOT ADEQUATE BASED ON THE SIGN SELECTION CHART, STEEL BEAM SUPPORTS SHOULD BE CONSIDERED.

SUPPORT TYPE SELECTION GUIDELINES

THE SUPPORTS SELECTED FOR AN ASSEMBLY SHALL BE WITHIN THE LIMITS OF THE SUPPORT SIZE SELECTION CHART IN ALL CASES. NON-BB SUPPORTS SHOULD NOT BE SPECIFIED FOR USE WITH ASSEMBLIES WHICH WOULD VIOLATE THE MIN/MAX NUMBER OF SUPPORTS GUIDELINES.

A. IF THE ASSEMBLY IS MADE UP OF INTERSTATE OR EXPRESSWAY SIZED STANDARD MESSAGE FLAT SHEET SIGNS, OR INCLUDES AN EXTRUDED PANEL SIGN, BB SUPPORTS SHOULD ONLY BE CONSIDERED IF THE ASSEMBLY WILL BE PLACED OUTSIDE OF THE CLEAR ZONE OF ALL NEARBY ROADWAYS OR IF THE SUPPORTS ARE PROTECTED FROM ERRANT VEHICLES BY GUARDRAILS OR CONCRETE BARRIERS. THIS IS PROVIDED PROPER CONSIDERATION IS GIVEN TO THE CLEARANCE WIDTH OF NEAR BY ROADWAYS AND THE ANGLE OF DEPARTURE OF THE ERRANT VEHICLE PER DESIGN DIRECTIVE 662 (USE THE ANGLE SPECIFIED FOR NIH PROJECTS) ALSO SEE SHEET TP3-1C.
B. IF THE ASSEMBLY IS MADE UP ENTIRELY OF NON-INTERSTATE/NON-EXPRESSWAY SIZED STANDARD MESSAGE FLAT SHEET SIGNS, BB SUPPORTS SHOULD BE CONSIDERED. HOWEVER, IF THE CLEAR ZONE AND/OR PROTECTION REQUIREMENTS IN THE PREVIOUS PARAGRAPH ARE NOT MET, AN APPROVED BB U-CHANNEL BREAKAWAY DEVICE SHALL BE REQUIRED.
STITCH BOLT INSTALLATION

STITCH BOLT SPACING SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

GROUND LEVEL TO TOP OF SUPPORT: EIGHTEEN (18) IN. C-C.
GROUND LEVEL TO BOTTOM OF SUPPORT: FOUR (4) IN. C-C.

CONCRETE FOUNDATION FOR BACK-TO-BACK U-CHANNEL

WITH BREAKAWAY DEVICE

NO BREAKAWAY DEVICE

SUPPORT SPACING AND BREAKAWAY DEVICE GUIDELINES

1. PROVIDED THAT ONE OF THE FOLLOWING REQUIREMENTS ARE MET IN REGARDS TO ALL NEARBY ROADWAYS, SPECIAL CONSIDERATION IS NOT REQUIRED IN REGARDS TO POST SPACING AND THE USE OF AN APPROVED BREAKAWAY DEVICE:

- THE SUPPORTS ARE OUTSIDE OF THE CLEAR ZONE OF THE ROADWAY
- THE SUPPORTS ARE PROTECTED FROM ERRANT VEHICLES BY A NON-MOUNTABLE BARRIERS CURB, MOUND, OR CONCRETE BARRELS
- THE SUPPORTS ARE WITHIN THE BARRIERS LENGTH OF THE DEPARTURE OF THE ERRANT VEHICLE
- THE SUPPORTS ARE OUTSIDE OF THE CLEAR ZONE OF THE ROADWAY
- THE SUPPORTS ARE PROTECTED FROM ERRANT VEHICLES BY A NON-MOUNTABLE BARRIERS CURB, MOUND, OR CONCRETE BARRELS
- THE SUPPORTS ARE WITHIN THE BARRIERS LENGTH OF THE DEPARTURE OF THE ERRANT VEHICLE

2. BREAKAWAY DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS IF SPECIFIC TORQUE VALUES ARE SPECIFIED FOR FASTENERS OF THE DEVICE. THEY SHALL BE INSTALLED USING A "CLICK" TYPE TORQUE DEVICE MEETING THE REQUIREMENTS SPECIFIED IN SECTION 657 OF THE STANDARD SPECIFICATIONS.

3. BREAKAWAY SPLICE DEVICES SHALL NOT BE COMBINED WITH ANY SURFACE MOUNT BREAKAWAY DEVICES.

4. BREAKAWAY SPICE DEVICES SHALL NOT BE USED WITH SQUARE TUBE SUPPORTS.
**NOTE:**

1. The following guidelines shall be followed when selecting the number of supports to be used with the Type K bracket:
   - Signs greater than 12 ft in width shall be installed on a minimum of four (4) supports. No maximum is established for signs less than 12 ft in width.

2. Only 2H-channel supports shall be used with Type K brackets. Refer to chart on TE1-7A to confirm 2H-channel will work for the sign to be installed.

3. Anchor size shall be specified by the mount fabricator along with the anchorage. Anchors shall be designed for maximum tensile load of 5,000 lbs and shear load of 2,500 lbs. Anchor hole size shall be 1/2" larger than anchor diameter.

4. All items shown on this detail sheet shall be in accordance with Section 657 in the West Virginia Division of Motorists Standard Specifications, Roads and Bridges Current Edition, and all current supplemental specifications.

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**TYPE K - ONE SUPPORT**

- Sign size and shape vary.

Arm shall be mounted to wall so that the 5" x 15" plates are on the back side. The post flanges shall be mounted against these plates.

---

**TYPE K - TWO SUPPORTS**

For signs twelve (12) inches or less in actual width to be installed on parapets, the Type K barrier wall sign support bracket described in Section 657 of the standard specifications shall be specified in lieu of the Type K or L bridge or retaining wall sign mounting brackets. This is provided the allowable loading on the Type K barrier wall sign support bracket will not exceed the type K barrier wall sign support bracket. This is required to withstand loading which meets or exceeds that which will be generated based on the limits provided for the three (3) lbs per foot U-channel support on the support size selection chart on sheet TE1-7A. If the Type K bracket is specified the "square tube support" 2.00x14GA" bid item shall be specified and used for payment of the support.
**Type K - Three Supports**

The post flanges shall be mounted against these plates. Plates welded to the tube are on the back side. The post flanges shall be mounted against these plates.

**Front View**

- 2'-0" x 18" plate
- 6" plate
- 3" x 5" x 18" plate
- TS 10 x 8 x .375

**Elevation**

- Barriers shape may vary
- Plate "a"
- Plate "b"
- Sign post
- 2'-0" x 18" plate

**Section B-B**

- Plate 5/8" x 1/2" x 14"
- Plate 5/8" x 1/2" x 14"
- Holes for four (4) anchors
- Hole for galvanizing
- See Note 3 on TE2-1A

**Section C-C**

- 1/2" plate "a"
- TS 10 x 8
- 1/2" plate "b"
- TS 10 x 8

**Section D-D**

- 1/2" plate "b"
- Sign post
- TS 10 x 8
- 1/2" x 5" x 18" plate

**Detail E**

- Plate "a"
- Holes for four (4) anchors
- 1/2" x 5" x 18" plate
- Plate "a"
- 3/8" x 1/2" hole for galvanizing
- See Note 3 on TE2-1A

**Notes**

- See Notes on TE2-1A

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**West Virginia Department of Transportation**

**Division of Highways**

**Standard Detail**

**Bridge or Retaining Wall Sign Mounting**

**Type K**

**3 Supports**

**Standard Sheet TE2-1B**

**Revision Date**

TRAFFIC ENGINEERING DIVISION

Z:\Projects\WVDOT\Standard Details vol II\New Sheets\Signs\TE2-1B.dgn

PREPARED: 8/2018
Figure 1: Type L - Pipe Post Mount

**New Construction**

- **Type L - Pipe Post Mount**
- **Bent Anchor Bolt**
- **U-Type Anchor Bolt**
- **Bracket Front View**
- **Bracket Side View**
- **Bracket Top View**
- **Section A-A**

**Retrofit**

- **Bracket Front View**
- **Bracket Side View**
- **Bracket Top View**

**Notes:**

1. Material used to fabricate the bracket, galvanizing, anchor bolts, and support to bracket connection bolts shall meet the requirements contained in the specifications.

2. Any and all materials, equipment, labor, and incidental costs that may be necessary to complete the installation shall be bid as item 657050-001, Bridge or Retaining Wall Bracket, Type L.

1. MATERIALS USED TO MANUFACTURE ANCHOR BOLTS, TS POST, PLATES, AND HARDWARE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. ALL COMPONENTS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

2. ALL SIGNS LESS THAN 36 INCHES IN WIDTH MAY BE MOUNTED TO THE TS SUPPORT WITHOUT THE GALVANIZED STEEL BAR USING THE STANDARD PUNCHING PATTERN FOR DIRECT MOUNT TYPES SHOWN ON TP1 SERIES STANDARDS.

3. VERTICAL PLACEMENT OF GALVANIZED STEEL BARS SHALL MATCH THE VERTICAL PLACEMENT OF THE STANDARD PUNCHING PATTERN SHOWN ON THE TP1 SERIES STANDARDS. THE GALVANIZED STEEL BARS MAY BE PUNCTURED AS NEEDED TO ACHIEVE THE 3 INCH MINIMUM CLEARANCE. ADDITIONAL HOLES SHALL BE FIELD PUNCHED IN THE CENTER OF THE SIGN FOR ATTACHMENT TO THE STEEL BAR AND THE TS SUPPORT.

4. COSTS FOR CONCRETE BARRIER SIGN SUPPORT SHALL BE INCLUDED IN ITEM 657062-001, BARRIER WALL BRACKET, TYPE D.

5. EVERY EFFORT SHALL BE MADE TO LOCATE THE CENTER OF BASE PLATE AT THE MIDPOINT OF THE SPACE BETWEEN THE JOINTS OF THE SUPPORT. IN NO CASE SHALL THE EDGE OF THE BASE PLATE BE LESS THAN 6 INCHES FROM JOINTS IN BARRIER.

6. SIGN WIDTHS AND MOUNTING HEIGHTS SHALL BE IN CONFORMANCE WITH TP1-4A.

7. BEFORE SPECIFYING THE USE OF THE TYPE D BARRIER WALL SIGN SUPPORT BRACKET, DUE CONSIDERATION SHALL BE GIVEN TO THE USE OF EITHER THE TYPE A OR B BARRIER WALL SIGN SUPPORT BRACKET, AS DESCRIBED IN SECTION 657 OF THE STANDARD SPECIFICATIONS. FOR BARRIER SECTIONS LESS THAN 6 INCHES IN WIDTH AT THE TOP, THE TYPE B BRACKET SHALL BE CONSIDERED. FOR BARRIER SECTIONS LESS THAN TEN (10) INCHES IN WIDTH AT THE TOP, THE TYPE A BRACKET SHOULD BE CONSIDERED. BOTH THE TYPE A AND B BARRIER WALL SIGN SUPPORT BRACKETS ARE REQUIRED TO WITHSTAND A LOADING WHICH MEETS OR EXCEEDS THAT WHICH WILL BE GENERATE BASED ON THE LIMITS PROVIDED FOR THE THREE (3) LB PER FOOT U-CHANNEL SUPPORT ON THE SUPPORT SIZE SELECTION CHART ON SHEET TE1-7A. IF EITHER THE TYPE A OR B BRACKET IS SPECIFIED, THE "SQUARE TUBE SUPPORT, 2.00X14GA" BID ITEM SHALL BE INCLUDED. THE "SQUARE TUBE SUPPORT, 2.00X14GA" BID ITEM SHALL BE SPECIFIED AND USED FOR PAYMENT OF THE SUPPORT.

8. MATERIALS USED FOR THE TYPE D BARRIER WALL SIGN SUPPORT BRACKET, DUE CONSIDERATION SHALL BE GIVEN TO THE USE OF EITHER THE TYPE A OR B BARRIER WALL SIGN SUPPORT BRACKET, AS DESCRIBED IN SECTION 657 OF THE STANDARD SPECIFICATIONS. THE BARRIER WALL BRACKET, TYPE D, SHALL BE SPECIFIED AND USED FOR PAYMENT OF THE SUPPORT.

9. BARS AND THE TS SUPPORT.

10. THE VERTICAL PLACEMENT OF THE STANDARD PUNCHING PATTERN SHOWN ON TP1 SERIES STANDARDS. THE GALVANIZED STEEL BARS MAY BE TRIMMED AS NEEDED TO ACHIEVE THE 3 INCH MINIMUM CLEARANCE. ADDITIONAL HOLES SHALL BE FIELD PUNCHED IN THE CENTER OF THE SIGN FOR ATTACHMENT TO THE STEEL BAR AND THE TS SUPPORT.

11. MATERIALS USED TO MANUFACTURE ANCHOR BOLTS, TS POST, PLATES, AND HARDWARE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. ALL COMPONENTS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

12. ALL SIGNS LESS THAN 36 INCHES IN WIDTH MAY BE MOUNTED TO THE TS SUPPORT WITHOUT THE GALVANIZED STEEL BAR USING THE STANDARD PUNCHING PATTERN FOR DIRECT MOUNT TYPES SHOWN ON TP1 SERIES STANDARDS.


14. COSTS FOR CONCRETE BARRIER SIGN SUPPORT SHALL BE INCLUDED IN ITEM 657062-001, BARRIER WALL BRACKET, TYPE D.

15. EVERY EFFORT SHALL BE MADE TO LOCATE THE CENTER OF BASE PLATE AT THE MIDPOINT OF THE SPACE BETWEEN THE JOINTS OF THE SUPPORT. IN NO CASE SHALL THE EDGE OF THE BASE PLATE BE LESS THAN 6 INCHES FROM JOINTS IN BARRIER.

16. SIGN WIDTHS AND MOUNTING HEIGHTS SHALL BE IN CONFORMANCE WITH TP1-4A.

17. BEFORE SPECIFYING THE USE OF THE TYPE D BARRIER WALL SIGN SUPPORT BRACKET, DUE CONSIDERATION SHALL BE GIVEN TO THE USE OF EITHER THE TYPE A OR B BARRIER WALL SIGN SUPPORT BRACKET, AS DESCRIBED IN SECTION 657 OF THE STANDARD SPECIFICATIONS. FOR BARRIER SECTIONS LESS THAN 6 INCHES IN WIDTH AT THE TOP, THE TYPE B BRACKET SHALL BE CONSIDERED. FOR BARRIER SECTIONS LESS THAN TEN (10) INCHES IN WIDTH AT THE TOP, THE TYPE A BRACKET SHOULD BE CONSIDERED. BOTH THE TYPE A AND B BARRIER WALL SIGN SUPPORT BRACKETS ARE REQUIRED TO WITHSTAND A LOADING WHICH MEETS OR EXCEEDS THAT WHICH WILL BE GENERATE BASED ON THE LIMITS PROVIDED FOR THE THREE (3) LB PER FOOT U-CHANNEL SUPPORT ON THE SUPPORT SIZE SELECTION CHART ON SHEET TE1-7A. IF EITHER THE TYPE A OR B BRACKET IS SPECIFIED, THE "SQUARE TUBE SUPPORT, 2.00X14GA" BID ITEM SHALL BE SPECIFIED AND USED FOR PAYMENT OF THE SUPPORT.

18. MATERIALS USED FOR THE TYPE D BARRIER WALL SIGN SUPPORT BRACKET, DUE CONSIDERATION SHALL BE GIVEN TO THE USE OF EITHER THE TYPE A OR B BARRIER WALL SIGN SUPPORT BRACKET, AS DESCRIBED IN SECTION 657 OF THE STANDARD SPECIFICATIONS. THE BARRIER WALL BRACKET, TYPE D, SHALL BE SPECIFIED AND USED FOR PAYMENT OF THE SUPPORT.

19. BARS AND THE TS SUPPORT.


21. MATERIALS USED TO MANUFACTURE ANCHOR BOLTS, TS POST, PLATES, AND HARDWARE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. ALL COMPONENTS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

22. ALL SIGNS LESS THAN 36 INCHES IN WIDTH MAY BE MOUNTED TO THE TS SUPPORT WITHOUT THE GALVANIZED STEEL BAR USING THE STANDARD PUNCHING PATTERN FOR DIRECT MOUNT TYPES SHOWN ON TP1 SERIES STANDARDS.

23. VERTICAL PLACEMENT OF GALVANIZED STEEL BARS SHALL MATCH THE VERTICAL PLACEMENT OF THE STANDARD PUNCHING PATTERN SHOWN ON THE TP1 SERIES STANDARDS. THE GALVANIZED STEEL BARS MAY BE PUNCTURED AS NEEDED TO ACHIEVE THE 3 INCH MINIMUM CLEARANCE. ADDITIONAL HOLES SHALL BE FIELD PUNCHED IN THE CENTER OF THE SIGN FOR ATTACHMENT TO THE STEEL BAR AND THE TS SUPPORT.
1. For sign brackets and/or sign lighting details, see TE6-30.
2. High-strength bolts shall conform to the requirements of the Specifications. Tights all high-strength bolts by turn of nut method in accordance with the Specifications.
3. All signs centered vertically, except those with lighting fixtures where center of sign is 3 in above the center of the cross.
4. For anchor bolt details, see TE6-5.
5. For sections A-A & B-B, see TE6-5.
6. If the foundation is within or projects into a concrete or asphalt surface, GA-260, the guidelines provided in section 568 of the Standard Specifications shall be followed in regards to placement and weight. Otherwise, all faces of the foundation shall be a minimum of 18 in above ground level when foundation is installed on a slope. The 18 in high shall be applied to the uphill face.
7. Design is in accordance with AASHTO standard specifications for structural supports for highway signs, luminaries, and traffic signals, 6th edition, 2013, using 90 MPH wind speed and fatigue category I.
8. See sheet TE6-3A for grounding notes.
9. Depth of foundation is based on an assumed soil such as medium clay or sand clay providing an unconfined compressive strength not less than 2500 LBF/SQFT. These foundations may be used in cohesionless type soils providing that the friction angle is not less than 30 degrees.

**Notes:**
- XX to denote the span length required.
MAX VALUES OF PRIMARY ARM. AND SIGN SIZE MAY VARY EQUAL TO THE WELD SIZE REQUIRED.

THE GUSSET PLATE IN THE BRACING MEMBERS PROVIDE A WELD 'HOLDBACK' AT THE EDGE OF SIGN BRACKET FOR DETAILS.

PLATE GUSSET COPING DETAIL SEE TE6-3D

TRUSS CHORD
+ˆ" THICKNESS
GUSSET PLATE

{ DIAGONALS OR VERTICALS, R=" BELOW GRADE
SHAPE 6" MIN. FORM SQUARE
WELD (TYP.) AND GUSSET PLATE

15 - 12 - AND NOTE 11

4" x …" J HOOK REMOVABLE OR ELBOW STD. BEND 11 FOR D=4'-6"

SEE MEMBER SIZE CHART ON TE4-3A FOR MAX SIGN AREA OVER 20' LONG) (2 REQ'D ON SIGNS COUPLING REQUIRED 1" BLIND HALF

NOTE 11 FOR D=4'-6"

SEE MEMBER SIZE CHART ON TE4-3A FOR MAX SIGN AREA OVER 20' LONG)

GROUND ROD CLAMP END BUSHING GROUND ROD

NOTE:
1. THE STRUCTURES ARE DESIGNED IN ACCORDANCE WITH THE AMHSO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 6TH EDITION, 2013, USING 90 MPH WIND SPEED AND FATIGUE CATEGORY 1.
2. FOR SECTION A-B, B-C, D-D, SEE TE4-5.
3. FOR FOUNDATION NOTES, SEE TE4-5.
4. FOR ANCHOR BOLT DETAIL, SEE TE4-5.
5. H-STRENGTH BOLTS SHALL CONFORM TO THE REQUIREMENTS OF THE SPECIFICATIONS. TIGHTER ALL H-STRENGTH BOLTS IN ACCORDANCE WITH THE SPECIFICATIONS.
6. DETAILS LABELED AS "NOT TO SCALE" ARE INTENTIONALLY NOT DRAWN TO SCALE FOR VISUAL CLARITY.
7. THE REMOVABLE CAP SHOULD BE A FRENCH TYPE CAP FOR REQUIREMENTS AND DETAILS, SEE NOTES ON SHEET TE4-5A.
8. IF THE FOUNDATION IS WITHIN OR PROJECTS INTO A CONCRETE OR ASPHALT SURFACE UTILIZED BY PEDESTRIANS, THE GUIDELINES PROVIDED IN SECTION 658 OF THE STANDARD SPECIFICATIONS SHALL BE FOLLOWED IN REGARDS TO PLACEMENT AND PEDESTAL HEIGHT. OTHERWISE, ALL FACES OF THE FOUNDATION SHALL BE A MINIMUM OF 18 IN ABOVE GROUND LEVEL. WHEN FOUNDATION IS INSTALLED ON A SLOPE, THE 18 IN MIN. SHALL BE APPLIED TO THE UPHILL FACE.
9. FOR A STRUCTURE WITH ARM LENGTH VARYING FROM THE DESIGN LENGTH SPECIFIED, SIZE MEMBER DIMENSIONS BASED ON THE NEXT LONGER ARM LENGTH IN THE CHART AND ADJUST PANEL WIDTH (3) ACCORDINGLY WHILE RETAINING THE NUMBER OF PANELS (N).
10. SEE SHEET TE6-3A FOR GROUNDING NOTES.
11. DEPTH OF FOUNDATION IS BASED ON AN ASSUMED SOIL SUCH AS MEDIUM CLAY OR SAND CLAY PROVIDING AN UNCONFINED COMPRESSIVE STRENGTH NOT LESS THAN 2500 PSI/GPS. THESE FOUNDATIONS MAY BE USED IN COHESIONLESS TYPE SOILS PROVIDING THAT THE FRICTION ANGLE IS NOT LESS THAN 30 DEGREES.

DESIGN NUMBER DESIGNATION: BUTTERFLY STYLE CANTILEVER SIGN SUPPORTS ARE MADE UP OF TWO DOUBLE ARM CANTILEVER ARMS ON OPPOSITE SIDES OF ONE SUPPORT POST. THE PRIMARY ARM AND THE SECONDARY ARM THE PRIMARY ARM SHALL ALWAYS BE THE LONGER OF THE TWO. IF DIFFERENT, POST SIZE SHALL BE DETERMINED BASED ON THE PRIMARY ARM LENGTH.

EACH ARM MAY CARRY THE MAX SIGN AREA FOR THE LENGTH (L) STATED IN THE MEMBER SIZE CHART ON TE4-3A.

SEE TABLES ON TE4-3A FOR STRUCTURE FABRICATION AND FOUNDATION DETAILS.

BUTTERFLY CANTILEVERS SHALL HAVE DESIGN NUMBERS IN THE FORMAT OF BC-XX-YY, WHERE XX = LENGTH OF PRIMARY ARM AND YY = LENGTH OF SECONDARY ARM.

FOR EXAMPLE, A BC-32-16 WOULD HAVE A PRIMARY ARM 32 FT IN LENGTH AND A SECONDARY ARM 16 FT IN LENGTH. IT WOULD HAVE A 30 IN DIAMETER POST AND WOULD ALLOW 450 SF OF SIGN ON THE PRIMARY ARM AND 245 SF ON THE SECONDARY ARM.

NOTES:

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DETAILS.

OVERHEAD SIGN SUPPORT-STEEL BUTTERFLY CANTILEVER STANDARD SHEET TE4-3B.
MEMBER SIZE CHART

<table>
<thead>
<tr>
<th>DESIGN NUMBER</th>
<th>ARM A</th>
<th>ARM B</th>
<th>POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>SACL-45</td>
<td>65</td>
<td>3 GA. X 23.5</td>
<td>7 GA. X 23.5</td>
</tr>
<tr>
<td>SACL-55</td>
<td>55</td>
<td>3 GA. X 29.5</td>
<td>7 GA. X 29.5</td>
</tr>
<tr>
<td>SACL-65</td>
<td>45</td>
<td>3 GA. X 35.5</td>
<td>7 GA. X 35.5</td>
</tr>
</tbody>
</table>

ARM A

ARM B

FOOTING TABLE (SEE TE4-5 FOR SECTIONS & ANCHOR BOLT DETAIL)

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<tr>
<th>DESIGN NUMBER</th>
<th>POST (INPS)</th>
<th>PLATE DIMENSION</th>
<th>ANCHOR BOLTS</th>
<th>FOOTING</th>
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</thead>
<tbody>
<tr>
<td>SACL-45</td>
<td>12</td>
<td>S (IN)</td>
<td>1&quot;</td>
<td>F (IN)</td>
</tr>
<tr>
<td>SACL-55</td>
<td>12</td>
<td>S (IN)</td>
<td>1&quot;</td>
<td>F (IN)</td>
</tr>
<tr>
<td>SACL-65</td>
<td>12</td>
<td>S (IN)</td>
<td>1&quot;</td>
<td>F (IN)</td>
</tr>
</tbody>
</table>

NOTES:

1. ALL SIGNS TO BE CENTERED VERTICALLY.
2. SIGNS SHALL BE 35 SF OR SMALLER BUT NO SMALLER THAN 10 SF.
3. HI-STRENGTH BOLTS SHALL CONFORM TO THE REQUIREMENTS OF THE SPECIFIED STEEL AND ALL HI-STRENGTH BOLTS BY IN ACCORDANCE WITH THE SPECIFICATIONS.
4. FOR SIGN BRACKETS DETAILS, SEE TE4-5.
5. FOR SECTION A-A & B-B, SEE TE4-5.
6. FOR FOUNDATION NOTES, SEE TE4-5.
7. FOR ANCHOR BOLT DETAIL, SEE TE4-5.
8. DETAILS LABELED AS NOT TO SCALE ARE INTENTIONALLY NOT DRAWN TO SCALE FOR VISUAL CLARITY.
9. DESIGN IS IN ACCORDANCE WITH ANSI/GI SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 6TH EDITION, 2013 USING 90 MPH WIND SPEED AND FATIGUE CATEGORY A.
10. SEE SHEET TE6-3A FOR GROUNDING NOTES.
11. IF THE FOUNDATION IS WITHIN OR PROJECTS INTO A CONCRETE OR ASPHALT SURFACE UTILIZED BY PEDESTRIANS, THE GUIDELINES PROVIDED IN SECTION 508 OF THE STANDARD SPECIFICATIONS SHALL BE FOLLOWED IN REGARD TO PLACEMENT AND PEDESTRIAN WALKWAY. ALL FACES OF THE FOUNDATION SHALL BE A MINIMUM OF 18" ABOVE GROUND LEVEL WHEN FOUNDATION IS INSTALLED ON A SLOPE, THE 18 IN. MIN. SHALL BE APPLIED TO THE UPHILL FACE.
12. SEE SHEET TE3-3A FOR FOUNDATION NOTES.
13. FOR ANCHOR BOLT DETAIL, SEE TE4-5.
120 OR 240 VOLT DISTRIBUTION ENCLOSURE

WIRING DIAGRAM

1. BARRIER TYPE TERMINAL BLOCK
2. MAIN CIRCUIT BREAKER
3. MANUAL-OFF-AUTOMATIC SELECTOR SWITCH
4. SOLID NEUTRAL GROUNDED
5. 120 VOLT CONTACTOR
6. P.E. UNIT TERMINAL STRIP
7. CHASE NIPPLE
8. 120 VOLT P.E. UNIT CHASING-THREE-POLE TYPE, STANDARD NEMA WITH 3½" ID LOCKING NIPPLE
9. LOCKABLE SAFETY SWITCH
10. 28" H X 14" W X 8½" NEMA 4X SS ENCLOSURE
11. ENCLOSURE DOOR INTERLOCK

1. ENCLOSURE MOUNTING BRACKET:

- The enclosure shall conform to the requirements of Section 659.2.9 of the specifications.
- The required nipple as shown on the detail on this sheet.
- The enclosure and structure shall be shop drilled and tapped for the nipple as shown on the detail on this sheet.
- The enclosure shall be flange mounted on brackets which are attached to pole as shown on this sheet on the mounting bracket detail.
- The enclosure shall conform to the requirements of Section 659.2.9 of the specifications.
- The required nipple as shown on the detail on this sheet.
- The enclosure and structure shall be shop drilled and tapped for the nipple as shown on the detail on this sheet.
- The enclosure shall be flange mounted on brackets which are attached to pole as shown on this sheet on the mounting bracket detail.

2. ENCLOSURE MOUNTING BRACKET:

- Chrome sealed.
- Have an anodic coating at least 0.0002 inch in thickness and shall be cadmium plated. Aluminum nuts, bolts, and screws shall have an anodic coating.
- The bracket shall be field mounted with 3½" hex head self-tapping screws (self-tapping for attaching to steel or aluminum nuts, bolts, and screws) and threaded for attaching to steel or aluminum nuts, bolts, and screws.

3. ENCLOSURE MOUNTING BRACKET:

- The enclosure mounting bracket may be fabricated from either galvanized steel or aluminum. The bracket shall be field mounted with 3½" hex head self-tapping screws for attaching to steel or aluminum nuts, bolts, and screws.
- The bracket shall have an anodic coating, at least 0.0002 inch in thickness and shall be chrome sealed.

4. ENCLOSURE MOUNTING BRACKET:

- The enclosure mounting bracket shall be field mounted with 3½" hex head self-tapping screws for attaching to steel or aluminum nuts, bolts, and screws.
- The bracket shall have an anodic coating, at least 0.0002 inch in thickness and shall be chrome sealed.

5. ENCLOSURE MOUNTING BRACKET:

- The enclosure mounting bracket shall be field mounted with 3½" hex head self-tapping screws for attaching to steel or aluminum nuts, bolts, and screws.
- The bracket shall have an anodic coating, at least 0.0002 inch in thickness and shall be chrome sealed.

6. ENCLOSURE MOUNTING BRACKET:

- The enclosure mounting bracket shall be field mounted with 3½" hex head self-tapping screws for attaching to steel or aluminum nuts, bolts, and screws.
- The bracket shall have an anodic coating, at least 0.0002 inch in thickness and shall be chrome sealed.

7. ENCLOSURE MOUNTING BRACKET:

- The enclosure mounting bracket shall be field mounted with 3½" hex head self-tapping screws for attaching to steel or aluminum nuts, bolts, and screws.
- The bracket shall have an anodic coating, at least 0.0002 inch in thickness and shall be chrome sealed.
### Bracket and Luminaires Spacing Chart

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<th>Sign Length</th>
<th>Quantity of Sign Brackets</th>
<th>Bracket Spacing</th>
<th>Luminaires Quantity</th>
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</table>

**Note:**

- Bracket A and B may be adjusted as needed where the intended bracket location conflicts with a structural element of the truss such as chord splice or bracket gusset plates.
- The A dimension shall be at least 6 inches but shall not exceed 2 ft 6 inches.
- The B dimension shall not exceed 7 ft 9 inches.
- In cases where these parameters cannot be met, an additional bracket shall be installed.
1. All signs shall be double clipped at each post at top and bottom of overall sign panel for signs up to 24 ft long. Interior clips may be placed on alternating sides of support at each seam (as shown in Section B-B) for signs over 24 ft long, interior clips shall be placed on both sides of support at each seam.

2. Slotted holes for stitching panels together shall be provided at 12 in. spacing.

3. The distance between the ends of the panel and the first hole shall be the same - 6 in for signs with a length to an even foot. 3 in for signs with a length to a half foot. Exit panels are an exception. See TE7-7 for details.

4. Supports should not extend above the sign.

5. Extruded panel signs may be mounted on a maximum of two (2) back to back U-channel supports provided that the additional guidelines provided on Sheet TE7-7 are met. Extruded panel signs may not otherwise be mounted on U-channel with the exception of type A parapet mount supports.

6. Corners of extruded panels shall not be rounded.

7. Extrusion "B" shall always be on top and shall be oriented so that the post clip channel is at the top.

8. For attachment of extruded panel signs to overhead sign structures, the guidelines specified above shall be followed if the structure vertical supports are beam type supports. If the vertical supports are zee bars as detailed on TED-50, a post clip shall be used along zee bar at each seam.

**Notes:**

- Include manufacturer certification mark in relief in this area.
- (Tolerance = +0.10, -0.03, except as noted)
- 0.25" R
- 0.25" Relief in this area
- 0.25" Slotted Holes for stitching panels together shall be placed on both sides of support at each seam.

- Stitch Bolt Detail
- Face of adjacent channels to be in same plane.
- Extruded sign panel

- Post Clip Bolt, Nut and Washer
- 1/4-6 U.N.C. 2A Flat Washer
OVERHEAD SIGN

EXIT NUMBER PANEL INSTALLATION

LOOKING AT SIGN BACK

GROUND MOUNT SIGN

SIGN EXTENSION AUXILIARY SUPPORTS

FOR EXTENDING SIGNS ABOVE

EXISTING SUPPORTS

NOTES:

1. Exit number panels shall be mounted to the main sign using stitch bolts and auxiliary supports as shown.

2. If the sign that the exit panel is to be mounted to is manufactured to an even foot length, the bottom flange of the bottom exit panel shall have a 7/16 in. stitch bolt hole drilled or punched 8 in. from the end of the panel that is flush with the end of the sign, and additional 7/16 in. holes shall be punched on 24 in. spacing in order for the holes to align with the holes in the top flange of the sign. The 7/16 in. holes may be shop punched or field drilled.

3. Posts and auxiliary supports shall not extend above the top of the main sign or exit panel.

4. Sign extensions shall be stitch bolted to the existing sign panels @ 24 in. C/C max. as shown on TE7-1. The sign extension auxiliary supports detail shall be only be used when specified in the project plans. The detail shall not be permitted for use with new assemblies that include new signs and supports.

5. Main sign support post clip arrangement shown is for a sign longer than 24 ft. See notes on sheet TE7-1.

6. A post clip shall be used at each seam along each auxiliary support.

7. See sheet TE7-1 for extruded sign panel, post clip, and stitch bolt details.
ELEVATION

TYPE 2
verticl tube mount
Flat sheet sign w/ extruded rib shown

ELEVATION

TYPE 3
horizontal tube mount
extruded panel sign shown

NOTES:
1. TYPE 1 CLAMP:
   - For use with flat sheet signs only.
   - Must have at least 2 clamps (bands) per sign.
   - Max. area per band to be 9 sq. ft.
   - Max. sign width to be 3 ft. (includes 3 ft. diamond).
2. TYPE 2 CLAMP:
   - Used for attachment of signs to vertical tubes.
   - Can be used for flat sheet or extruded panel signs.
   - Flat sheet signs must have extruded ribbing.
   - Use shown (See Sheet TE7-1) at upper ZEE to U-Channel connection on tapered posts.
3. TYPE 3 CLAMP:
   - Used for attachment of signs to horizontal tubes.
   - Can be used for flat sheet or extruded panel signs.
   - Flat sheet signs must have extruded ribbing.
4. Contact between aluminum and galvanized parts shall be prevented with a minimum 1/4" rich thin gasket. Gaskets are not required between stainless steel and aluminum.
5. Signs mounted using TYPE 1 clamps shall be mounted using the standard punching as shown in the TP series if possible. If holes are required to be field punched, the punching shall be approved by the engineer. The holes shall be punched such that the spacing between the holes and from the outermost holes to the edges of the sign shall be uniform. In addition, the hole locations shall be placed such that the attachment hardware will not unnecessarily interfere with the sign message.
6. See sheet TE7-1 regarding details for attachment of flat sheet sign face to extruded rib and for extruded rib dimensioning details.
7. See sheet TE7-1 for extruded panel sign post clip and stitch bolt details.

THREADED FOR 3/8"-18 BOLT
3/4" WIDE BAND SLOT

FLARED LEG BRACKET

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD SHEET TE9-1

STANDARD DETAILS

PREPARED: 8/2018

TRAFFIC ENGINEERING DIVISION

REVISION DATE: 12/19/2018

STANDARD DETAIL

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD SHEET

ZEK BAR (TYP.)
4" X 3" X "

STAINLESS STEEL BANDING
20' X 1/2" TYP.

SHEET TE7-1 FOR EXTRUDED SIGN PANEL, POST CLIP, AND STITCH BOLT DETAILS.

ZEE BAR (TYP.)
4" X 3" X "

ADD'AL NYLON WASHER AGAINST SIGN FACE

5/16"-18 X 3/4" HEX BOLT & WASHER WITH FLARED LEG BRACKET

3/8" DIA. U-BOLT (TYP.)

5/16" DIA. U-BOLT (TYP.)

2" BOLT (TYP.)

1" (TYP.)

3/4" (TYP.)

FLARED LEG BRACKET

4" X 3/8" X 3/4" ZEE BAR (TYP.)

4" X 3/8" X 3/4" ZEE BAR (TYP.)
NOTES:

1. GUARDRAIL MOUNTED DELINER POSTS SHALL BE USED ON THE PORTIONS OF GUARDRAIL RUNS THAT ARE PARALLEL TO THE ROADWAY AND IF THE FRONT FACE OF THE GUARDRAIL IS 8 FT OR LESS FROM THE EDGE OF PAVEMENT, THE LEFT SIDE DRAWING SHALL ALSO BE USED FOR SINGLE FACED GUARDRAIL MOUNTED ON THE LEFT HAND SIDE OF THE ROADWAY WHICH MEETS THE 8 FT OR LESS OFFSET REQUIREMENT.

2. DELINER POSTS SHALL BE INSTALLED PLUMB OR AS PLUMB AS POSSIBLE REGARDLESS OF THE LEVELNESS OF THE GROUND SURFACE OR THE RELATIVE PLUMBNESS OF THE SUPPORT BEING ATTACHED TO.

3. WHEN INSTALLED ON A DIVIDED HIGHWAY, ALL DELINER DEVICES SHOWN HEREIN THAT ARE INTENDED TO SUPPLEMENT A WHITE EDGE LINE SHALL BE INSTALLED WITH RED SHEETING ON THE BACK FACE.

4. FOR DOUBLE-FACE GUARDRAIL AND DOUBLE-FACE PERMANENT CONCRETE BARRIER SEE THE SECOND PARAGRAPH OF NOTE 1 IN ORDER TO DETERMINE IF DELINER IS REQUIRED, AND IF SO, IF MONO OR BI-DIRECTIONAL DELINER IS REQUIRED FOR CONCRETE BARRIERS THE 8 FT OFFSET REQUIREMENT SHALL BE APPLIED TO THE FRONT FACE OF THE BARRIER AT THE BOTTOM.

5. THE GUIDELINES PROVIDED ABOVE MAY NOT APPLY TO CIRCUMSTANCES ALONG INTERCHANGE RAMPS IN CASES WHERE DELINER IS REQUIRED ALONG RAMPS PER SHEET TE11-3B REGARDLESS OF THE BARRIER OFFSET. SOIL ANCHORED FLEXIBLE DELINER POSTS SHALL BE PLACED IN ACCORDANCE WITH THE TYPICAL SECTION DETAIL IF THE BARRIER OFFSET EXCEEDS THE 8 FT OFFSET REQUIREMENT SPECIFIED IN THE PREVIOUS NOTES, PROVIDING THAT THE PAVEMENT ENDS TWO FEET OR MORE BEFORE THE FACE OF THE BARRIER. OTHERWISE, PLACE THE DELINER ON THE BARRIER.
1. The delineators used shall be models shown on the DOT's Approved Products List (APL) and shall be in accordance with Section 660 of the West Virginia Department of Transportation Division of Highways Standard Specifications, Roads and Bridges, Latest Edition.

2. The color of the body of all soil anchored flexible delineators, surface mounted flexible tubular markers, and guardrail mounted flexible delineators, as well as the retroreflective sheeting on the front face, shall match the color of the pavement marking that the device is intended to supplement. The same shall apply to B-1 delineators except the manufacturer does not supply units with white or yellow bodies. The body of the unit may be a neutral color such as black or grey. Like colored or red sheeting shall be installed on the back face of the device as required herein or specified elsewhere.

3. When installed on a divided highway, all delineation devices shown herein that are intended to supplement a white edge line shall be installed with red sheeting on the back face. White delineators on undivided highways shall be monodirectional with no sheeting on the back face.
3" X 9" XS-1 DELINEATOR ON BICYCLE RAIL

Installation Details

Type B-1 Delineator

Design and dimensions are nominal. Product used shall meet the requirements in Section 661 of the Specifications and shall be listed on the Division APL.

B-1 Delineators for permanent applications shall be mechanically anchored to the barrier.

Bicycle Rail

**ELEVATION**

**SECTION A-A**

- 3/8" HEX NUT
- 3/8" LOCK WASHER
- 3/8" NYLON WASHER
- 3/8" FLAT WASHER
- 3/8" BOLT
- REFLECTIVE PANEL

- INSTALL GASKET FULL LENGTH BETWEEN CHANNEL POST AND RAIL SUPPORT. RAIL SUPPORT IS FABRICATED FROM ALUMINUM.

**SECTION B-B**

- 3/8" X 3/8" BOLT
- 3/8" FLAT WASHER
- 3/8" LOCK WASHER
- 3/8" HEX NUT

All hardware shall be as stated in the standard specification.

3" X 9" XS-1 DELINEATOR ON BICYCLE RAIL

**HIGHWAY DELINEATORS INSTALLATION DETAILS**
### Typical Roadside Delineator Spacing

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<td>269-180</td>
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<td>&lt; 75</td>
<td>20</td>
<td>20</td>
<td>30</td>
<td>60</td>
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</tr>
</tbody>
</table>

Note: This chart to be used for uninterrupted roadway. See Sheet TE11-3B & TE11-3C for spacing guidance at interchanges and left/right turn lanes.

### Typical Horizontal Geometry Terms
- **P.C.**: Point of Curvature, Start of Horizontal Curve
- **P.T.**: Point of Tangency, End of Horizontal Curve
- **S.C.**: Spiral to Curve, End of Spiral in & Start of Curve
- **C.E.**: Curve to Spiral, End of Curve & Start of Spiral Out
NOTES:
1. Delineator spacing shall be measured at the edge of pavement nearest to the location of delineator.
2. Delineator spacing within interchange mainline and ramps shall be 100' unless curve geometry would require closer spacing based on the chart on TE11-3A.
3. Delineators for ramps shall be placed on the right side, based on direction of travel, and shall be white except in cases where a right hand curve would require delineator spacing closer than 100'. In such cases the delineators shall be placed on the left side of the ramp and shall be yellow.
4. All delineators on exit ramps (white and yellow) shall be red on the back unless they are back-to-back yellow. If the mainline of the roadway is divided, the white delineators along the mainline shall have red sheeting placed on the back face in accordance with the drawing and the note on sheet TE11-3A.

**Other Notes:**
- Red (on back of white or yellow as appropriate) shall not be installed on painted islands unless otherwise specified in the plans.
- Delineators shall be placed on the left side of the ramp and shall have delineator spacing with interchange mainline and ramps shall be 100'.
- Delineator spacing within interchange mainline and ramps shall be 100' unless curve geometry would require closer spacing based on the chart on TE11-3A.
- See chart on TE11-3A for spacing on curves.
- Delineators between adjacent ramps are to be back-to-back, yellow.
R4-7 & XR-3 OR XR-9 ASSEMBLY
TO BE MOUNTED AT A 45° ANGLE
AND FACING THE SIDE ROAD.
SEE DESIGN GUIDE FOR SIGNING
FOR FURTHER GUIDANCE.

NOTES:
1. DELINEATOR SPACING SHALL BE MEASURED AT THE EDGE OF PAVEMENT NEAREST TO THE LOCATION OF DELINEATOR.
2. ALL WHITE DELINEATORS ON DIVIDED HIGHWAYS SHALL HAVE RED ON THE BACK. WHITE DELINEATORS ON UNDIVIDED HIGHWAYS SHALL BE MONO-DIRECTIONAL WITH NO SHEETING ON THE BACK FACE.
3. WHITE DELINEATORS SHALL BE SPACED AT 25 FT ALONG ALL TRUE RIGHT TURN LANES. THIS DOES NOT APPLY TO PAINTED SHOULDER STYLE RIGHT TURN LANES.
4. THE DELINEATORS SHOWN SHALL BEGIN AT THE START OF THE TAPERS FOR THE TURN LANES.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

STANDARD SHEET TE11-3C
**ROADSIDE SIGN SUPPORTS**

**INSTALLATION**

- Standard Non-Proprietary Reflective Sign Support Strip
- U-Channel or Pre-Punched Square Tube Installation

**BREAKAWAY SUPPORT OR NON-PERFORATED SQUARE TUBE INSTALLATION**

**STANDARD NON-PROPRIETARY REFLECTIVE SIGN SUPPORT STRIP**

- Installation details with dimensions and recommended fasteners.

**TRIMMING REFLECTIVE STRIPS**

- Guidelines for trimming reflective strips for signs on both sides of supports.

**NOTES**

- Standard non-proprietary reflective post strips shall be manufactured as shown. The substrate for the strips shall be 0.080 inch aluminum meeting the material requirements of Section 661 of the specifications.

- Reflective post strips are as follows:
  - Red, white, fluorescent yellow, or fluorescent yellow-green based on the primary color of the sign that is being supplemented by the strip. Grade of sheeting shall be as specified in the standard specifications. Strips may or may not be manufactured with holes pre-punched.

- Material requirements for the hardware specified for use with the non-proprietary reflective post strip shown shall be in accordance with the standard specifications.

- Reflective post strips shall be required to be installed on all sign assemblies indicated specifically by assembly number in the project plans. Typical assemblies requiring reflective post strips are as follows:

- **RED STRIPS**
  - All R4-7, R4-8, R6-1L, and R6-1R signs.

- **FLUORESCENT YELLOW STRIPS**
  - All W1-6, W1-7, W1-8, and W6-8 signs.

- **FLUORESCENT YELLOW-GREEN STRIPS**
  - All W1-6, W1-7, and W6-8 signs.

- All S series (school) signs manufactured using fluorescent yellow-green reflective sheeting.

- Additional reflective post strips may also be required under special circumstances as determined by the project designer or engineer. The color strips to be utilized in these cases will be specified in the project plans or notes.
NOTES:

1. All items shown on this detail shall be in accordance with Section 657 of The West Virginia Division of Highways Standard Specifications Roads and Bridges, current edition, and all current Supplemental Specifications.

2. Main signs shall be attached to supports as shown on TE17-1 and TE17-2.

3. Square steel post (auxiliary support) to overlap U-channel support by 9 inches. Two 7/8" bolts, nuts, and washers, one through top hole of U-channel support and one through bottom hole of square steel post, shall be used to attach the auxiliary support to the U-channel support.

ELEVATION - ONE SUPPORT

SECTION B-B

SUPPORT. USED TO ATTACH THE AUXILIARY SUPPORT TO THE U-CHANNEL ONE THROUGH BOTTOM HOLE OF SQUARE STEEL POST, SHALL BE LOCK WASHERS, ONE THROUGH TOP HOLE OF U-CHANNEL SUPPORT AND TWO 9" BOLTS, NUTS, AND WASHERS, ONE THROUGH TOP HOLE OF U-CHANNEL SUPPORT AND ONE THROUGH BOTTOM HOLE OF SQUARE STEEL POST, SHALL BE USED TO ATTACH THE AUXILIARY SUPPORT TO THE U-CHANNEL SUPPORT.
TOP VIEW - TWO SUPPORTS

ELEVATION - TWO SUPPORTS

SECTION A-A

SECTION B-B

DETAIL A

NOTES:
1. ALL ITEMS SHOWN ON THIS DETAIL SHALL BE IN ACCORDANCE WITH SECTION 657 OF THE WEST VIRGINIA DIVISION OF HIGHWAYS STANDARD SPECIFICATIONS ROADS AND BRIDGES, CURRENT EDITION, AND ALL CURRENT SUPPLEMENTAL SPECIFICATIONS.
2. MAIN SIGNS SHALL BE ATTACHED TO SUPPORTS AS SHOWN ON TE17-1 AND TE17-2.
3. DETAILS DEPICT MAIN SIGNS ATTACHED TO BACK-TO-BACK U-CANAL POSTS, BUT ALSO APPLY TO ANY SUPPORTS USING EXTRUDED RIBS FOR SIGN PANEL ATTACHMENT.
1. All signs attached directly to the front (flange) face of a U-channel support shall have a shim placed between the sign substrate and the U-channel at each attachment location.

2. All flat sheet signs to be mounted upon two or more U-channel or square tube supports, one or more steel beam supports, Types 1-5 pipe posts fabricated with the 1/2" in. connection plate detailed on TE1-5C, and Types 6-9 pipe posts, shall be attached to rigging.

3. Post clips shall be used on both support flanges for the top and bottom pieces of rigging on each piece of rigging between the top and bottom. One post clip shall be used for each support alternating between opposite sides of the support if attachment is to Zee bars. One clip shall be used at each intersection of the rigging and Zee bar. This attachment method shall be used for attaching flat sheet signs to steel beam supports.

4. The 1/2" x 1-1/4" bolt of the sign shall be reduced or the rigging extended beyond the edge of the sign so that the sign can be properly attached to the supports. See TP1-1 drawings for examples.

5. See TP1 series for flat sheet sign punching information.

TYPICAL U-CHANNEL
DIRECT MOUNT SIGN TO SINGLE POST

EXTRUDED RIB
NOMINAL DIMENSIONS

OPTION 1 - WITH POST CLIPS
SEE NOTE 3

OPTION 2 - WITHOUT POST CLIPS
THE OPTION MAY ONLY BE USED WITH U-CHANNEL AND SQUARE TUBE

TYPICAL U-CHANNEL AND RIB ASSEMBLY OPTIONS
FOR TWO OR MORE POSTS

FLAT SHEET SIGN TO SUPPORT ATTACHMENT

STANDARD SHEET TE17.1
BACK-TO-BACK SIGN MOUNTING
ON SINGLE U-CHANNEL POST

1. BACK-TO-BACK SIGNS WILL BE MOUNTED IN ACCORDANCE WITH THE ACCOMPANYING DETAIL DRAWINGS. THE ASSOCIATED BOLTS, NUTS, WASHERS AND SHIMS SHOWN SHALL BE INSTALLED IN ACCORDANCE WITH STANDARD DETAIL TE17-1. NOTE, FOR ASSEMBLIES DIRECT MOUNTED TO THE SUPPORT, AN ADDITIONAL NYLON WASHER WILL BE REQUIRED TO BE ADDED AGAINST THE SIGN FACE ON THE BACK SIDE OF THE SUPPORT.

2. ALL MOUNTINGS SHOWN ARE FOR ASSEMBLIES CONSISTING OF BACK-TO-BACK MOUNTED SIGNS ON U-CHANNEL POSTS.

3. ALL BOLTS, NUTS AND WASHERS USED TO MOUNT THE SIGN AND SIGN ASSEMBLIES WILL BE 5/16 IN. DIAMETER.

4. THE TOP OF THE POST SUPPORT SHALL EXTEND 2" PLUS OR LESS FROM THE EDGE OF THE SIGN, BUT NOT BEYOND ANY EDGE OF THE SIGN.

5. FOR BACK-TO-BACK SIGNS MOUNTED TO RIBBING, THE "WITH POST CLIPS" OPTION SHOWN ON SHEET TE17-1 SHALL BE USED FOR ATTACHMENT OF THE SIGNS TO THE SUPPORTS.

GENERAL NOTES

1. BACK-TO-BACK SIGNS WILL BE MOUNTED IN ACCORDANCE WITH THE ACCOMPANYING DETAIL DRAWINGS. THE ASSOCIATED BOLTS, NUTS, WASHERS AND SHIMS SHALL BE INSTALLED IN ACCORDANCE WITH STANDARD DETAIL TE17-1. NOTE, FOR ASSEMBLIES DIRECT MOUNTED TO THE SUPPORT, AN ADDITIONAL NYLON WASHER WILL BE REQUIRED TO BE ADDED AGAINST THE SIGN FACE ON THE BACK SIDE OF THE SUPPORT.

2. ALL MOUNTINGS SHOWN ARE FOR ASSEMBLIES CONSISTING OF BACK-TO-BACK MOUNTED SIGNS ON U-CHANNEL POSTS.

3. ALL BOLTS, NUTS AND WASHERS USED TO MOUNT THE SIGN AND SIGN ASSEMBLIES WILL BE 5/16 IN. DIAMETER.

4. THE TOP OF THE POST SUPPORT SHALL EXTEND 2" PLUS OR LESS FROM THE EDGE OF THE SIGN, BUT NOT BEYOND ANY EDGE OF THE SIGN.

5. FOR BACK-TO-BACK SIGNS MOUNTED TO RIBBING, THE "WITH POST CLIPS" OPTION SHOWN ON SHEET TE17-1 SHALL BE USED FOR ATTACHMENT OF THE SIGNS TO THE SUPPORTS.

EXCEPTION TO BACK-TO-BACK MOUNTING DETAILS

DIE-1 SIGNS (42"-48" WIDTHS AND 9"-15" HEIGHTS ONLY)
### SIGN SHAPE

**D16-1**

<table>
<thead>
<tr>
<th>WIDTH</th>
<th>HEIGHT</th>
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<tbody>
<tr>
<td>42&quot; - 48&quot;</td>
<td>9&quot; - 15&quot;</td>
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</table>

**DIMENSION**

<table>
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<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIDTH</td>
<td>HEIGHT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### NOTES:

1. The information here is for use with signs of sizes that are not included on TP1-1B.
2. The height of horizontal rectangle signs shall not exceed 60 in. Taller signs are to be made using extruded panel substrate.
3. All bolt holes shall be 3/8 in. in diameter and may be drilled or punched to finished size.
4. Dimensions between bolt holes shall be to within 1/8 in.
5. Corner radii for sign blank material shall be 1 1/8 in.
6. See TE1-11A for details for mounting flat sheet signs to single u-channel or extruded ribs. See TE1-12A for details for mounting flat sheet signs to type 1 clamps.

---

**36" - 66" WIDTHS**

- Less than 18" height
- Less than 60" height
- More than 66" width

**AND 9" - 15" HEIGHTS ONLY**

- Direct mount to a single u-channel support only.

---

**RECTANGLES**

**HORIZONTAL**

- THE INFORMATION HERE IS FOR USE WITH SIGNS OF SIZES THAT ARE NOT INCLUDED ON TP1-1B.
- THE HEIGHT OF HORIZONTAL RECTANGLE SIGNS SHALL NOT EXCEED 60 IN. TALLER SIGNS ARE TO BE MADE USING EXTRUDED PANEL SUBSTRATE.
- ALL BOLT HOLES SHALL BE 3/8 IN. IN DIAMETER AND MAY BE DRILLED OR PUNCHED TO FINISHED SIZE.
- DIMENSIONS BETWEEN BOLT HOLES SHALL BE TO WITHIN 1/8 IN.
- CORNER RADIUS FOR SIGN BLANK MATERIAL SHALL BE 1 1/8 IN.

---

**EXCLUDING:** D16-1 SIGNS WITH WIDTHS OF 42" - 48".
### Notes:
1. The information here is for use with signs of sizes that are not included on TP1-B.
2. The width of vertical rectangle signs shall not exceed 60".  Wide signs are to be made using extruded panel substrate.
3. All bolt holes shall be 1/8 in. in diameter and may be drilled or punched to finished size.
4. Dimensions between bolt holes shall be to within 1/8 in.
5. Corner radius for sign blank material shall be 1.5 in.
6. See TE17-1 for details for mounting flat sheet signs to single U-channel or extruded ribs. See TE17-1 for details for mounting flat sheet signs to Type 1 clamps.

### Standard Sheet TP1-2B

**Sign Shape:**
- **Vertical Rectangle**

**Sign Size:**
- **Less Than 36" Width**
- **36" - 60" Width**

**Dimension:**
- **Height**
  - **A:** 2
  - **B:** 2
  - **C:** 2
  - **D:** 2

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<tr>
<th>Sign Shape</th>
<th>Sign Size</th>
<th>Dimension</th>
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</thead>
<tbody>
<tr>
<td>Vertical Rectangle</td>
<td>Less Than 36&quot; Width</td>
<td>Width: A, B, C, D</td>
</tr>
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<td>5' or Over</td>
<td>Width: A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>But Under 6'</td>
<td>Width: A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>But Under 30&quot;</td>
<td>Width: A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>30' or Over</td>
<td>Width: A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>But Under 48&quot;</td>
<td>Width: A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>But Under 60&quot;</td>
<td>Width: A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>60&quot; or More</td>
<td>Width: A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>36&quot; - 60&quot; Width</td>
<td>Width: A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>42&quot; or Over</td>
<td>Width: A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>But Under 60&quot;</td>
<td>Width: A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>60&quot; or More</td>
<td>Width: A, B, C, D</td>
</tr>
</tbody>
</table>

**Typical Sign Blank Punching for Non-Standard Signs Vertical Rectangular**

**Standard Sheet TP1-2B**
1. The height requirements shown represent the minimum required clearance from the bottom of the sign to ground level. Greater mounting heights shall be used if necessary in order to meet the applicable minimum value shown here.

2. If the assembly supports are steel beam type and any required plaques are each independently mounted on one support only, the plaques shall be mounted above the saw cuts and the 7 ft. min. height shall be used.

3. If the assembly is installed on steel beam or type I-5 pipe post type sign supports, the 7 ft. min. clearance shall be met.

4. The minimum clearance may be reduced to 3 ft. if one of the following requirements are met in regards to all nearby roadways:
   - The assembly is outside of the clear zone.
   - The assembly is protected from errant vehicles by a guardrail or concrete barrier provided that proper consideration is given to the barrier length of need point and the angle of departure of the errant vehicle per design directive 652 (use the angle specified for NHS projects also, see sheet TP3-1C).

5. The height requirements shown represent the minimum required clearance from the bottom of the sign to ground level. Greater mounting heights shall be used if necessary in order to meet the applicable minimum value shown here.

6. If the assembly supports are steel beam type and any required plaques are each independently mounted on one support only, the plaques shall be mounted above the saw cuts and the 7 ft. min. height shall be used.

7. In addition to the guidelines contained within notes 4 through 6, the following shall apply:
   - A steel beam or type I-5 pipe post type supports used are the support sign cuts or lower cross member pipe shall always be a minimum of 7 ft. above ground level unless the requirements for reducing the minimum required clearance along cut sections to 3 ft. are met.
   - No signs shall be mounted below the saw cuts of steel beam type support except as allowed herein. No case shall any sign be mounted below the support sign cuts or lower cross member pipe if the sign is mounted to multiple supports.
   - An exception shall be made to the standards shown herein for ramp and miscellaneous name and number signs. No signs shall be installed at a 5 ft. mounting height on all slopes. No signs shall be installed at a 5 ft. mounting height on all slopes if the assembly is protected from errant vehicles for the requirements specified elsewhere herein, they shall be installed at a 5 ft. mounting height on all slopes if necessary for the bottom of the sign to be at a min. of 3 ft. above ground level if installed on a cut slope and not protected from errant vehicles, the sign shall be installed a min. of 5 ft. above ground level.
1. The minimum offset from the roadway may be increased up to 30 ft. only for large extruded panel substrate signs installed along expressways and interstates.

2. If concrete barrier is used, the offset of the near sign behind the back face of the barrier is to be 2 ft. If guardrail is used, additional offset of the near sign from the back of the guardrail post may be necessary to account for deflection of the rail. The following are suggested offset guidelines in no case should the offset be less than 2 ft.

   - Multi-lane roadways with a normal posted speed limit of 50 mph or greater: 5 ft.
   - Multi-lane roadways with a normal posted speed limit of 45 mph or less: 3 ft.
   - Two-lane roadways with a normal posted speed limit of 50 mph or greater: 4 ft.
   - Two-lane roadways with a normal posted speed limit of 45 mph or less: 2 ft.

3. 2 ft. Min. offset may be used only in business, commercial, or residential areas where lateral offsets are limited or less. Min. offset may be used where curbs exist and either the area between the roadway and sidewalk is limited, or the existing offset may be used where curbs are greater than 3 ft.

4. This angle shall also be used for signs mounted on the left hand side of left hand curves.

5. This angle shall also be used for signs mounted on the left hand side of left hand curves.

6. The maximum offsets shown herein may be decreased as needed in order to accommodate right of way restrictions. However, for the avoidance of doubt, the maximum allowable offsets should be used if feasible.

   In addition to the requirements specified for each of the typical applications shown, special guidance is provided herein for assemblies placed under the following conditions. Provided that the assembly is within the clear zone and is not properly shielded by guardrail or concrete barrier:

   - Forecrops along roadways making a normal posted speed limit of 60 mph or greater

   If field conditions permit, it is recommended that the minimum assembly offset be increased as needed so that the near support is offset from the paved surface in accordance with the following chart:

<table>
<thead>
<tr>
<th>Forecrop Min. Offset</th>
<th>2 ft.</th>
<th>3 ft.</th>
<th>4 ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 ft.</td>
<td>2 ft.</td>
<td>3 ft.</td>
<td>4 ft.</td>
</tr>
<tr>
<td>11 ft.</td>
<td>3 ft.</td>
<td>4 ft.</td>
<td></td>
</tr>
<tr>
<td>13 ft.</td>
<td>4 ft.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

    - Near drainage features

   No assembly supports are to be placed within a drainage ditch or channel or such that the assembly spans over the ditch or channel. All assembly supports should be placed on the roadway side of the ditch or channel, if at all possible.

   An exception shall be made to the standards shown herein for ramp and marquee reference marker signs (2-D series). Where no guard barrier exists, 2-D series signs shall typically be installed using a 2 ft. offset. If guardrail is present and the front face is 8 ft. or less from the pavement, 2-D series signs shall be placed using a 2 ft. offset behind the guardrail as shown herein.

7. Overhead sign structures are to be located behind rigid barrier. If guardrail is used, the offset of the face of foundation from the back of the guardrail post may be necessary to account for deflection of the rail. See additional guidelines under Note 2. If the foundation is at or near ground level (within 4 inches), the offset requirement shall be applied to the support upright.

   **TYPICAL OVERHEAD SIGN STRUCTURE OFFSET REQUIREMENTS**

   No assembly supports are to be placed within a drainage ditch or channel or such that the assembly spans over the ditch or channel. All assembly supports should be placed on the roadway side of the ditch or channel, if at all possible.

   An exception shall be made to the standards shown herein for ramp and marquee reference marker signs (2-D series). Where no guard barrier exists, 2-D series signs shall typically be installed using a 2 ft. offset. If guardrail is present and the front face is 8 ft. or less from the pavement, 2-D series signs shall be placed using a 2 ft. offset behind the guardrail as shown herein.
1. Chevron sign (W1-8) spacing shall be measured at the edge of pavement nearest to the location of sign.

2. Spacing shall be determined from the curve data shown on the curve data sheet of the plans. See the "Design Guide for Signage" for chevron warrant, spacing and size guidance. If the shoulder width is less than 4 feet, 18\" x 24\" chevrons shall be used.

3. Once the location of the chevron has been established in the field, the longitudinal location of the vantage point for each chevron shall be determined by measuring back 250 ft from each chevron. This measurement shall be taken along the right edge of pavement for right hand curves and along the left edge of pavement for left hand curves. For two-way roadways, the left edge of pavement shall be considered to be the roadway centerline. The lateral location of each vantage point shall be the center of the traveled way in the direction of travel viewing the chevron.

4. Chevron signs shall be oriented so that the face of the chevron is approximately perpendicular to the sight line.

5. If the sight line is obstructed, then the chevron shall be oriented so that the face of the chevron is approximately perpendicular to the sight line created from where the chevron is first visible from the traveled way.

6. All U-channel shall be 3 lb/ft.

**Notes:**

- For two-way roadways, orient chevrons using the same method as for one-way roadway. Be sure to not obstruct visibility of chevron from opposite direction.

**Typical Horizontal Geometry Terms**

- **P.C.** Point of curvature, start of horizontal curve
- **P.T.** Point of tangency, end of horizontal curve
- **S.C.** Curve to spiral, end of curve & start of spiral out
- **S.P.** Sight line perpendicular to face of chevron

**Type C Barrier Wall Mount Bracket**

For use with chevrons only

**Chevron Alignment Signs (W1-8) & Type C Bracket**

**Section A-A**

- To ensure proper nesting of bracket stub post and sign support post, both shall be 34 U-channel and shall be of the same make.

**Section B-B**

**Top View**

- Allowable anchoring area
- Concrete barrier wall
- Chevron sign
- Concrete barrier wall

**Side View**

- 6\" x 6\" bolt (typ.)
- 3/8" nut and washer as needed
- 8000 in-lb of torque

**Detail A**

- 2\" 30 in-lbトルクをもつ3/8"ナットとワッシャー
- レフリックサインサポートストリップ
- ブラケットスタブポスト
- U-チャンネルサインポスト
SECTION A-A
MOUNTING OF ROUTE MARKER ASSEMBLIES TO STEEL BEAM TYPE POSTS

SECTION B-B

SECTION C-C

SECTION D-D

SECTION E-E

SMALL ROUTE MARKER ON U-CHANNELS

LARGE ROUTE MARKER ON 2 SUPPORTS

NOTES:
1. SEE SHEET TE7-1 FOR ASSEMBLY AND HARDWARE DETAILS.
2. THE TYPE OF MAIN SUPPORT POSTS WILL VARY DEPENDING UPON SQUARE AREA OF SIGN AND LENGTH OF SUPPORT NEEDED. FOR THE SITUATION, SEE SHEET TP3-1A TO DETERMINE THE TYPE OF MAIN SUPPORT POSTS WILL VARY DEPENDING UPON
THREE POST CLIPS TO ATTACH AUXILIARY SUPPORT TO EACH EXTRUDED RIB THAT IS ATTACHED TO THE STEEL BEAM SUPPORTS. USE 2 POST CLIPS PER PIECE OF RIBBING.
4. ON SIGN ASSEMBLIES ON ONE SUPPORT, THE SIGN SHALL BE MOUNTED TO THE FLANGE OF THE U-CHANNEL.
5. THE TOP OF THE MAIN POST SUPPORT OR AUXILIARY SUPPORT SHAL NOT EXTEND BEYOND THE TOP OF THE SIGN, BUT SHALL BE 2 IN. OR LESS FROM THE FACE OF THE SIGN.
6. WHEN ROUTE MARKERS OF VARYING WIDTHS ARE USED, THE SPACING SHALL BE BETWEEN THE TWO WIDEST ROUTE MARKERS.
NOTES:
1. TYPICAL ARRANGEMENTS SHOWN FOR ASSEMBLIES WITH ONE OR TWO SETS OF ROUTE MARKERS. A "SET" CONSISTS OF:
   - "FREEWAY ENTRANCE" PLAQUE (WHEN APPLICABLE);
   - CARDINAL DIRECTION, "TO", "JCT", OR "END" PLAQUE;
   - ROUTE SHIELD;
   - DIRECTIONAL ARROW OR LANE CONTROL PLAQUE (WHEN APPLICABLE).
2. A SINGLE "FREEWAY ENTRANCE" SIGN MAY BE CENTERED OVER ONE OR TWO SETS OF ROUTE MARKERS.
3. SEE SHEET TE17-1 AND TP4-1A FOR ASSEMBLY, SPACING AND HARDWARE DETAILS.

MARKER DESCRIPTION SMALL LARGE
A FREEWAY ENTRANCE 36" x 21" 36" x 21"
B CARDINAL TO, JCT, END 24" x 12" 30" x 15" 21" x 15" 28" x 21"
C US, STATE OR INTERSTATE 24" x 24" 36" x 36" 30" x 24" 45" x 36"
D DIRECTIONAL ARROW 21" x 15" 28" x 21"

AN ADDITIONAL "TOLL" PLAQUE (NOT SHOWN IN EXAMPLES) MAY BE USED AS PART OF THE ASSEMBLY WHEN APPLICABLE. SMALL SIZE IS 24" x 12". LARGE SIZE IS 30" x 15".
**Notes:**

1. Typical arrangements shown for assemblies with three or four sets of route markers. A "set" consists of:
   - "Freeway Entrance" plaque (when applicable);
   - Cardinal direction, "TO", "JCT", or "END" plaque;
   - Route shield;
   - Directional arrow or lane control plaque (when applicable).

2. See sheet TP4-3A for assembly, spacing, and hardware details.

---

### Typical Route Marker Arrangements

<table>
<thead>
<tr>
<th>Marker</th>
<th>Description</th>
<th>Small</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Freeway Entrance</td>
<td>36&quot; x 21&quot;</td>
<td>36&quot; x 21&quot;</td>
</tr>
<tr>
<td>B</td>
<td>Cardinal to JCT</td>
<td>24&quot; x 12&quot;</td>
<td>36&quot; x 15&quot;</td>
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<tr>
<td>C</td>
<td>US, State or Interstate</td>
<td>24&quot; x 24&quot;</td>
<td>36&quot; x 36&quot;</td>
</tr>
<tr>
<td>D</td>
<td>Directional Arrow</td>
<td>21&quot; x 15&quot;</td>
<td>26&quot; x 21&quot;</td>
</tr>
</tbody>
</table>

---

**Diagrams:**

- **GS-3A**: Large or small, mount to extruded ribs
- **GS-3B**: Large or small, mount to extruded ribs
- **GS-3C**: Large or small, mount to extruded ribs
- **GS-4A**: Large or small, mount to extruded ribs
**MARKER DESCRIPTION**

<table>
<thead>
<tr>
<th>MARKER</th>
<th>DESCRIPTION</th>
<th>SMALL</th>
<th>LARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>FREEWAY ENTRANCE</td>
<td>36&quot; x 21&quot;</td>
<td>36&quot; x 21&quot;</td>
</tr>
<tr>
<td>B</td>
<td>CARDINAL TO JCT</td>
<td>24&quot; x 12&quot; 30&quot; x 15&quot;</td>
<td>24&quot; x 12&quot; 30&quot; x 15&quot;</td>
</tr>
<tr>
<td>C</td>
<td>US STATE OR INTERSTATE ROUTE MARKER</td>
<td>24&quot; x 24&quot; OR 36&quot; x 36&quot;</td>
<td>30&quot; x 30&quot; OR 45&quot; x 36&quot;</td>
</tr>
<tr>
<td>D</td>
<td>DIRECTIONAL ARROW</td>
<td>21&quot; x 15&quot; 28&quot; x 21&quot;</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

1. TYPICAL ARRANGEMENTS SHOWN FOR ASSEMBLIES WITH FIVE SETS OF ROUTE MARKERS. A "SET" CONSISTS OF:
   - "FREEWAY ENTRANCE" PLAQUE (WHEN APPLICABLE);
   - CARDINAL DIRECTION, "TO", "JCT", OR "END" PLAQUE;
   - "FREEWAY ENTRANCE" PLAQUE (WHEN APPLICABLE);
   - DIRECTIONAL ARROW OR LANE CONTROL PLAQUE (WHEN APPLICABLE).
2. SEE SHEET TP4-1A AND TP4-1A FOR ASSEMBLY, SPACING AND HARDWARE DETAILS.

**MOUNT TO EXTRUDED RIBS**

- LARGE OR SMALL
NOTES:
1. TYPICAL ARRANGEMENTS SHOWN FOR ASSEMBLIES WITH SIX SETS OF ROUTE MARKERS. A "SET" CONSISTS OF:
   - "FREEWAY ENTRANCE" PLAQUE (WHEN APPLICABLE);
   - CARDINAL DIRECTION, "TO", "JCT", OR "END" PLAQUE;
   - ROUTE SHIELD;
   - DIRECTIONAL ARROW OR LANE CONTROL PLAQUE (WHEN APPLICABLE).
2. SEE SHEET TE17-1 AND TP4-1A FOR ASSEMBLY, SPACING AND HARDWARE DETAILS.

TYPICAL ROUTE MARKER
ARRANGEMENTS
6 SETS

<table>
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<th>MARKER</th>
<th>DESCRIPTION</th>
<th>SMALL</th>
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<tr>
<td>A</td>
<td>FREEWAY ENTRANCE</td>
<td>36&quot; x 21&quot;</td>
<td>36&quot; x 21&quot;</td>
</tr>
<tr>
<td>B</td>
<td>CARDINAL TO JCT</td>
<td>24&quot; x 12&quot;</td>
<td>30&quot; x 15&quot;</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td>24&quot; x 12&quot;</td>
<td>30&quot; x 15&quot;</td>
</tr>
<tr>
<td>C</td>
<td>US, STATE OR INTERSTATE</td>
<td>24&quot; x 24&quot;</td>
<td>36&quot; x 24&quot;</td>
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<tr>
<td>D</td>
<td>DIRECTIONAL ARROW</td>
<td>21&quot; x 15&quot;</td>
<td>28&quot; x 21&quot;</td>
</tr>
</tbody>
</table>

LARGE OR SMALL MOUNT TO EXTRUDED RIBS

GS-6A

GS-6B

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED: 8/2018

STANDARD SHEET

TP4-1E
NOTES:
1. ALL WARNING SIGN ASSEMBLIES SHOWN ON THIS SHEET ARE FOR ASSEMBLIES CONSISTING OF ONLY TWO (2) SIGNS.
2. WARNING SIGN ASSEMBLY ARRANGEMENTS SHOWN ON THIS SHEET ARE TYPICAL. THE ARRANGEMENTS SHOWN SHOULD BE USED FOR ALL WARNING SIGN ASSEMBLIES CONSISTING OF TWO (2) SIGNS, EXCEPT WHERE CONDITIONS DO NOT WARRANT.
3. ANY DEVIATIONS TO THE SHOWN ARRANGEMENTS SHALL BE APPROVED BY THE PROJECT ENGINEER PRIOR TO INSTALLATION.
4. SEE SHEET TP3-A FOR MOUNTING HEIGHT REQUIREMENTS.
5. THE TOP OF THE POST SUPPORTS SHALL BE NO CLOSER THAN 1 IN. TO THE EDGE OF THE DIAMOND SIGN.
6. THE TYPE OF SUPPORT POSTS WILL VARY DEPENDING UPON SQUARE AREA OF SIGN AND LENGTH OF SUPPORT NEEDED FOR THE SITUATION. USE THE CHARTS ON SHEETS TE1-3B (STEEL BEAM TYPE) AND TE1-7A (U-CHANNEL TYPE) TO DETERMINE THE TYPE AND SIZE SUPPORT REQUIRED.
7. SUPPLEMENTAL PLAQUES ARE TO BE MOUNTED TO ONE SUPPORT IN A TWO SUPPORT ARRANGEMENT.
8. FOR TWO SUPPORT ARRANGEMENTS TWO POST CLIPS SHALL BE USED AT EACH SUPPORT TO EXTENDED RB CONNECTION.

SINGLE-POST MOUNTING
FOR WARNING SIGN ASSEMBLIES

TWO-POST MOUNTING
FOR WARNING SIGN ASSEMBLIES

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD SHEET TP4-2

TYPICAL WARNING SIGN ASSEMBLY ARRANGEMENTS

STANDARD DETAIL
GENERAL NOTES:
1. XR-3 AND XR-9 ASSEMBLY ARRANGEMENTS SHOWN ON THE SHEET ARE TYPICAL. THE ARRANGEMENTS SHOWN SHOULD BE USED FOR ALL SIGN ASSEMBLIES CONSISTING OF AN XR-3 OR XR-9 WITH AN XR-3 OR XR-9 BELOW OR LOCATIONS TO THE SHOWN ARRANGEMENTS SHALL BE APPROVED BY THE PROJECT ENGINEER PRIOR TO INSTALLATION.
2. SEE SHEET TP3-1A FOR ASSEMBLY AND HARDWARE DETAILS.
3. SEE SHEET TE17-1 FOR ASSEMBLY AND HARDWARE DETAILS.
4. THE TYPE OF SUPPORT POSTS WILL VARY DEPENDING UPON SQUARE AREA OF SIGN AND LENGTH OF SUPPORT NEEDED FOR THE SITUATION. USE THE GUIDELINES ON SHEETS TE1-51 (STEEL BEAM TYPE) AND TE1-7A (U-CHANNEL TYPE) TO DETERMINE THE TYPE AND SIZE SUPPORT REQUIRED.
5. XR-9 SIGNS ARE NOT TO BE MOUNTED TO ONE SUPPORT IN A TWO SUPPORT ARRANGEMENT.
6. FOR TWO SUPPORT ASSEMBLIES, TWO POST CLIPS SHALL BE USED AT EACH SUPPORT TO EXTRUDED RIB CONNECTION.

1. SINGLE-POST MOUNTING
FOR ASSEMBLIES W/ XR-3 & XR-9

2. TWO-POST MOUNTING
FOR ASSEMBLIES W/ XR-9

3. SINGLE AND BACK-TO-BACK XR-3 INSTALLATION

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL
STANDARD SHEET TP4-3
TYPICAL XR-3 & XR-9 ARRANGEMENTS
SUPPLEMENTAL PLAQUE ARRANGEMENTS SHOWN ON THIS SHEET ARE TYPICAL. THE ARRANGEMENTS SHOWN SHOULD BE USED FOR ALL SIGN ASSEMBLIES CONSISTING OF A GUIDE SIGN WITH SUPPLEMENTAL PLAQUE ARRANGEMENTS SHOWN ON THIS SHEET. ANY DEVIATIONS TO THE SHOWN ARRANGEMENTS SHALL BE APPROVED BY THE PROJECT ENGINEER PRIOR TO INSTALLATION.

1. SEE SHEET TE1-1A FOR MOUNTING HEIGHT REQUIREMENTS.
2. SEE SHEET TE1-3A FOR SAW CUT AND HINGE PLATE DETAILS.
3. SEE SHEET TE1-7A FOR ASSEMBLY AND HARDWARE DETAILS.
4. SEE SHEET TE1-7A FOR SAW CUT AND HINGE PLATE DETAILS.
5. THE TYPE OF SUPPORT POSTS WILL VARY DEPENDING UPON SQUARE AREA OF SIGN AND LENGTH OF SUPPORT NEEDED FOR THE SIGN. USE THE CHARTS ON SHEETS TP3-1A (STEEL BEAM TYPE) AND TE1-7A (U-CHANNEL TYPE) TO DETERMINE THE TYPE AND SIZE SUPPORT REQUIRED.
6. TWO POST CLIPS SHALL BE USED AT EACH SUPPORT TO EXTENDED RIB CONNECTION.

GENERAL NOTES
1. SUPPLEMENTAL PLAQUE ARRANGEMENTS SHOWN ON THIS SHEET ARE TYPICAL. THE ARRANGEMENTS SHOWN SHOULD BE USED FOR ALL SIGN ASSEMBLIES CONSISTING OF A GUIDE SIGN WITH SUPPLEMENTAL PLAQUE ARRANGEMENTS SHOWN ON THIS SHEET. ANY DEVIATIONS TO THE SHOWN ARRANGEMENTS SHALL BE APPROVED BY THE PROJECT ENGINEER PRIOR TO INSTALLATION.
2. SEE SHEET TE1-1A FOR MOUNTING HEIGHT REQUIREMENTS.
3. SEE SHEET TE1-3A FOR SAW CUT AND HINGE PLATE DETAILS.
4. SEE SHEET TE1-7A FOR SAW CUT AND HINGE PLATE DETAILS.
5. THE TYPE OF SUPPORT POSTS WILL VARY DEPENDING UPON SQUARE AREA OF SIGN AND LENGTH OF SUPPORT NEEDED FOR THE SIGN. USE THE CHARTS ON SHEETS TP3-1A (STEEL BEAM TYPE) AND TE1-7A (U-CHANNEL TYPE) TO DETERMINE THE TYPE AND SIZE SUPPORT REQUIRED.
6. TWO POST CLIPS SHALL BE USED AT EACH SUPPORT TO EXTENDED RIB CONNECTION.

PLAQUE MOUNTED TO SINGLE SUPPORT

PLAQUES MOUNTED TO MULTIPLE SUPPORTS
TYPICAL OBJECT MARKER AND DELINEATOR LAYOUT FOR BRIDGES AND UNDERPASSES

1. TYPICAL PLACEMENT OF XS-2L AND XS-2R OBJECT MARKERS AT THE APPROACH TO A BRIDGE END AND UNDERPASS ARE SHOWN.
2. THE DRAWINGS INDICATE THE APPROPRIATE MOUNTING HEIGHT FOR THE OBJECT MARKER ABOVE THE EDGE OF TRAVELED WAY.
3. LATERALLY IT IS PREFERABLE THAT THE MARKER BE PLACED SUCH THAT THE OUTSIDE EDGE OF THE MARKER IS IN LINE WITH THE INSIDE EDGE OF THE OBSTACLE BEING MARKED.
4. FOR BRIDGE APPROACHES WITH GUARDRAIL, THE MARKER SUPPORT SHALL BE DRIVEN AS CLOSE AS POSSIBLE TO THE EDGE OF THE GUARDRAIL. IF SITE CONDITIONS PREVENT THE POST FROM BEING DRIVEN IN A LOCATION THAT ALIGNS THE EDGE OF THE OBJECT MARKER WITH THE OBSTACLE, THEN AN OFFSET BRACKET SHALL BE USED.
5. WHEN GUARDRAIL IS PRESENT LEADING UP TO THE OBSTACLE, SUCH AS IN THE EXAMPLES SHOWN, GUARDRAIL DELINEATORS AS SHOWN ON SHEET TYP 2-A AT A REDUCED SPACING OF 20 FEET SHALL BE PLACED ON THE APPROACH TO THE OBSTACLE. THE GUARDRAIL DELINEATOR SHALL BE PLACED AT THE LAST GUARDRAIL SUPPORT PRIOR TO THE OBSTACLE. FOUR ADDITIONAL DELINEATORS AT APPROXIMATELY 50 FOOT SPACING SHALL BE PLACED AT GUARDRAIL SUPPORTS LEADING UP TO THE GUARDRAIL NEAREST THE OBSTACLE.
6. IF THE LENGTH OF THE GUARDRAIL ON THE APPROACH TO THE OBSTACLE IS LESS THAN 200 FEET, THE DELINEATOR SPACING SHALL BE REDUCED AS NEEDED WITH THE SPACING KEPT AS CONSISTENT AS POSSIBLE.
7. IF THE APPROACH GUARDRAIL IS LESS THAN 100 FEET, THE NUMBER OF DELINEATORS MAY BE REDUCED TO FOUR.
8. IF THE APPROACH GUARDRAIL IS LESS THAN 75 FEET, THE NUMBER OF DELINEATORS MAY BE REDUCED TO THREE.
9. WHEN GUARDRAIL IS PRESENT LEADING UP TO THE OBSTACLE, SUCH AS IN THE EXAMPLES SHOWN, GUARDRAIL DELINEATORS AS SHOWN ON SHEET TYP 2-A AT A REDUCED SPACING OF 20 FEET SHALL BE PLACED ON THE APPROACH TO THE OBSTACLE. THE GUARDRAIL DELINEATOR SHALL BE PLACED AT THE LAST GUARDRAIL SUPPORT PRIOR TO THE OBSTACLE. FOUR ADDITIONAL DELINEATORS AT APPROXIMATELY 50 FOOT SPACING SHALL BE PLACED AT GUARDRAIL SUPPORTS LEADING UP TO THE GUARDRAIL NEAREST THE OBSTACLE.
10. IF THE LENGTH OF THE GUARDRAIL ON THE APPROACH TO THE OBSTACLE IS LESS THAN 200 FEET, THE DELINEATOR SPACING SHALL BE REDUCED AS NEEDED WITH THE SPACING KEPT AS CONSISTENT AS POSSIBLE.
11. IF THE APPROACH GUARDRAIL IS LESS THAN 100 FEET, THE NUMBER OF DELINEATORS MAY BE REDUCED TO FOUR.
12. IF THE APPROACH GUARDRAIL IS LESS THAN 75 FEET, THE NUMBER OF DELINEATORS MAY BE REDUCED TO THREE.

AT BRIDGE PIERS

AT BRIDGE END PARAPET WALLS

OBJECT MARKER PLACEMENT DETAILS

GENERAL NOTES:

1. TYPICAL PLACEMENT OF XS-2L AND XS-2R OBJECT MARKERS AT THE APPROACH TO A BRIDGE END AND UNDERPASS ARE SHOWN.
2. THE DRAWINGS INDICATE THE APPROPRIATE MOUNTING HEIGHT FOR THE OBJECT MARKER ABOVE THE EDGE OF TRAVELED WAY.
3. LATERALLY IT IS PREFERABLE THAT THE MARKER BE PLACED SUCH THAT THE OUTSIDE EDGE OF THE MARKER IS IN LINE WITH THE INSIDE EDGE OF THE OBSTACLE BEING MARKED.
4. FOR BRIDGE APPROACHES WITH GUARDRAIL, THE MARKER SUPPORT SHALL BE DRIVEN AS CLOSE AS POSSIBLE TO THE EDGE OF THE GUARDRAIL. IF SITE CONDITIONS PREVENT THE POST FROM BEING DRIVEN IN A LOCATION THAT ALIGNS THE EDGE OF THE OBJECT MARKER WITH THE OBSTACLE, THEN AN OFFSET BRACKET SHALL BE USED.
5. WHEN GUARDRAIL IS PRESENT LEADING UP TO THE OBSTACLE, SUCH AS IN THE EXAMPLES SHOWN, GUARDRAIL DELINEATORS AS SHOWN ON SHEET TYP 2-A AT A REDUCED SPACING OF 20 FEET SHALL BE PLACED ON THE APPROACH TO THE OBSTACLE. THE GUARDRAIL DELINEATOR SHALL BE PLACED AT THE LAST GUARDRAIL SUPPORT PRIOR TO THE OBSTACLE. FOUR ADDITIONAL DELINEATORS AT APPROXIMATELY 50 FOOT SPACING SHALL BE PLACED AT GUARDRAIL SUPPORTS LEADING UP TO THE GUARDRAIL NEAREST THE OBSTACLE.
6. IF THE LENGTH OF THE GUARDRAIL ON THE APPROACH TO THE OBSTACLE IS LESS THAN 200 FEET, THE DELINEATOR SPACING SHALL BE REDUCED AS NEEDED WITH THE SPACING KEPT AS CONSISTENT AS POSSIBLE.
7. IF THE APPROACH GUARDRAIL IS LESS THAN 100 FEET, THE NUMBER OF DELINEATORS MAY BE REDUCED TO FOUR.
8. IF THE APPROACH GUARDRAIL IS LESS THAN 75 FEET, THE NUMBER OF DELINEATORS MAY BE REDUCED TO THREE.
9. WHEN GUARDRAIL IS PRESENT LEADING UP TO THE OBSTACLE, SUCH AS IN THE EXAMPLES SHOWN, GUARDRAIL DELINEATORS AS SHOWN ON SHEET TYP 2-A AT A REDUCED SPACING OF 20 FEET SHALL BE PLACED ON THE APPROACH TO THE OBSTACLE. THE GUARDRAIL DELINEATOR SHALL BE PLACED AT THE LAST GUARDRAIL SUPPORT PRIOR TO THE OBSTACLE. FOUR ADDITIONAL DELINEATORS AT APPROXIMATELY 50 FOOT SPACING SHALL BE PLACED AT GUARDRAIL SUPPORTS LEADING UP TO THE GUARDRAIL NEAREST THE OBSTACLE.
10. IF THE LENGTH OF THE GUARDRAIL ON THE APPROACH TO THE OBSTACLE IS LESS THAN 200 FEET, THE DELINEATOR SPACING SHALL BE REDUCED AS NEEDED WITH THE SPACING KEPT AS CONSISTENT AS POSSIBLE.
11. IF THE APPROACH GUARDRAIL IS LESS THAN 100 FEET, THE NUMBER OF DELINEATORS MAY BE REDUCED TO FOUR.
12. IF THE APPROACH GUARDRAIL IS LESS THAN 75 FEET, THE NUMBER OF DELINEATORS MAY BE REDUCED TO THREE.
1. Decals shall be applied to the back of the sign in the lower quadrant on the side of the sign adjacent to the travelway of each sign in the assembly. Decal may be moved into the upper quadrant if needed to improve visibility from the ground.

2. Flat sheet screened signs and fabricated flat sheet signs with direct applied copy shall have two separate decals, one installation date decal and one background sheeting decal.

3. Extruded panel signs shall have three separate decals, one installation date decal, one background sheeting decal, and one legend sheeting decal.

4. Decals shall also be applied to the upright of overhead sign structures for each sign in the structure. For structures with more than one sign, decals shall be arranged vertically on the upright. Decal order to be top to bottom for signs left to right from the vantage point of the observer. Decals shall be applied to the upright facing approaching traffic. For each sign on the structure, decals shall be applied to the upright facing the travelway of each sign in the assembly. Decals for the leftmost sign shall be applied to the left side of the upright. Decals for the rightmost sign shall be applied to the right side of the upright. Decals shall be arranged vertically on the upright. Decal order to be top to bottom for signs left to right from the vantage point of the observer. Decals shall be applied to the upright facing approaching traffic.

5. All decals are to be provided by the sign fabricator. The year and month of installation are to be punched out by the contractor prior to being applied to the sign in the field.

6. Decals shall be applied in a location that allows them to be easily visible from the ground and shall not be obstructed by sign support hardware. Decals may be rotated 90 degrees on narrow signs.

**GENERAL NOTES**

**WARNING**

IT IS UNLAWFUL TO ALTER, DEFACE OR REMOVE THIS SIGN.

If an error is made, simply punch out the date decal and apply the correction in the next year. Care must be taken to punch out the date decal and not the legend decal. If a design change is required, the legend and date decals shall be replaced with new decals that bear the new design. The date decal for the first year of fabrication shall be replaced with a new date decal when the subsequent years follow. The date decal for the first year of fabrication shall be replaced with a new date decal when the subsequent years follow.

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**INSTALLATION DATE DECAL**

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**SIGN IDENTIFICATION DECAL PLACEMENT**

Looking at sign back

**OVERHEAD SIGN STRUCTURES**

---

**STANDARD SHEET TP6-1**
GENERAL NOTES:

1. THE "Z" DIMENSION SHALL BE LARGE ENOUGH TO ACCOMMODATE THE LOOP WIRE WITHOUT CHAFING THE INSULATION WITH A MAXIMUM DIMENSION OF \( \frac{1}{2} \) IN.
2. ALL CORNERS OF THE LOOP SHALL BE CUT AT A 45° ANGLE AND HAVE A MINIMUM DIAGONAL LENGTH OF \( \frac{1}{4} \) IN.
3. ALL WIRE SHALL BE PUSHED INTO THE SAW CUT WITH WOOD STICKS TO INSURE THE INSULATION IS NOT SCARRED. THE USE OF METAL TOOLS IS NOT PERMITTED.
4. THE NUMBER OF TURNS OF LOOP WIRE IS SPECIFIED ON THE CONTRACT PLANS FOR EACH INDIVIDUAL LOOP.
5. THE "X" DIMENSION SHALL BE 6 FT. UNLESS OTHERWISE SPECIFIED ON THE CONTRACT PLANS.
6. QUADRUPOLE LOOP SHALL BE 6 FT. WIDE BY 40 FT. LONG UNLESS OTHERWISE SPECIFIED ON CONTRACT PLANS.

SAW SLOT DETAIL

WHERE A LOOP SAW CUT MUST BE PLACED ACROSS AN EXPANSION OR CONSTRUCTION JOINT, AN EXPANSION SLOT (2" DIA. HOLE) SHALL BE PROVIDED FOR THE LOOP CONDUCTORS.

SAW SLOT AND LOOP WIRE:

1. THE "Z" DIMENSION SHALL BE LARGE ENOUGH TO ACCOMMODATE THE LOOP WIRE WITHOUT CHAFING THE INSULATION WITH A MAXIMUM DIMENSION OF \( \frac{1}{2} \) IN.
2. ALL CORNERS OF THE LOOP SHALL BE CUT AT A 45° ANGLE AND HAVE A MINIMUM DIAGONAL LENGTH OF \( \frac{1}{4} \) IN.
3. ALL WIRE SHALL BE PUSHED INTO THE SAW CUT WITH WOOD STICKS TO INSURE THE INSULATION IS NOT SCARRED. THE USE OF METAL TOOLS IS NOT PERMITTED.
4. THE NUMBER OF TURNS OF LOOP WIRE IS SPECIFIED ON THE CONTRACT PLANS FOR EACH INDIVIDUAL LOOP.
5. THE "X" DIMENSION SHALL BE 6 FT. UNLESS OTHERWISE SPECIFIED ON THE CONTRACT PLANS.
6. QUADRUPOLE LOOP SHALL BE 6 FT. WIDE BY 40 FT. LONG UNLESS OTHERWISE SPECIFIED ON CONTRACT PLANS.

TYPICAL LANE COVERAGE DIAGRAM

- SEE WINDING DETAIL ABOVE

ONE LANE COVERAGE

TWO LANE COVERAGE

THREE LANE COVERAGE

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

LOOP DETECTOR INSTALLATION

STANDARD SHEET TES-01
TYPICAL SECTION IN GUTTER AND SIDEWALK

TYPICAL PLAN IN GUTTER AND SIDEWALK

WHEN UNDERGROUND CONDUIT IS GREATER THAN 10'
FROM CURB TO POLE USE JUNCTION BOX

GENERAL NOTES:

1. JUNCTION BOXES:
   WHEN TYPE H JUNCTION BOXES ARE SPECIFIED ON THE CONTRACT PLANS,
   THE COVER ELEVATION SHALL BE THE SAME AS THE EXISTING GRADE
   OR IMPROVED SHOULDER GRADE.

2. PVC COATED GALVANIZED RIGID STEEL CONDUIT (PVCGRSC):
   ALL CONDUIT UNDER ROADWAY OR SIDEWALK SHALL BE PVC COATED
   GALVANIZED RIGID STEEL CONDUIT OR AS SPECIFIED ON THE PLANS.

3. TYPES OF CONDUIT:
   - TYPE F - FLEXIBLE, LIQUID-TIGHT CONDUIT;
   - TYPE R - RIGID STEEL CONDUIT, INCLUDES PVCGRSC;
   - TYPE P - POLYVINYL CHLORIDE CONDUIT.

TYPES OF CONDUIT:

1. GENERAL NOTES:
   - FROM CURB TO POLE USE JUNCTION BOX
   - WHEN UNDERGROUND CONDUIT IS GREATER THAN 10'

2. STANDARD DETAIL
   - WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
   - DIVISION OF HIGHWAYS
   - STANDARD SHEET
   - PREPARED: 8/2018
1. REPLACING TRENCH AREA: THE TRENCH AREA SHALL BE BACKFILLED WITH CLASS I AGGREGATE BASE COURSE MATERIAL IN FOUR INCH COMPACTED LAYERS. SEE WVDOH STANDARD SPECIFICATIONS SECTION 307.

2. REPLACING PAVEMENT AREA:
   A. CONCRETE USED TO REPLACE PAVEMENT AREA OF CUT SHALL BE CLASS B PORTLAND CEMENT CONCRETE.
   B. IN REPLACING CONCRETE PAVEMENTS WHICH HAVE BEEN BITUMINOUS SURFACED, THE PORTLAND CEMENT CONCRETE SHALL BE REPLACED TO AN ELEVATION ONE AND A HALF INCH (1½ IN.) BELOW THE FINISHED GRADE OF THE EXISTING BITUMINOUS SURFACE. BITUMINOUS CONCRETE SHALL BE USED TO COMPLETE THE PAVEMENT REPLACEMENT TO EXISTING SURFACE ELEVATION. SEE WVDOH STANDARD SPECIFICATION SECTION 40.
   C. IN ADDITION TO THE NEW REINFORCING BARS SHOWN IF THERE IS EXISTING REINFORCING IN THE PAVEMENT IT SHALL BE BENT UP AND THEN BACK INTO THE NEW CONCRETE.

3. SEE TEL-30 FOR DETAILS FOR CONDUIT INSTALLATION UNDERNEATH TRAVELED LINES.

4. SEE VOLUME I STANDARD SHEET DR-9 FOR ADDITIONAL TRENCH DETAILS.
POLE SELECTION CHART

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<tr>
<th>ARM</th>
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<th>POLE DIAMETER (IN)</th>
<th>WALL THICKNESS (GAUGE OR IN)</th>
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<tr>
<td>B</td>
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<td>16</td>
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<td>D</td>
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<tr>
<td>E</td>
<td>21</td>
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<td></td>
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<tr>
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* POLE DESIGNATION G ONLY TO BE USED AT THE DIRECTION OF TRAFFIC ENGINEERING DIVISION.

POLE MEMBER TABLE

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<th>POLE DESIGNATION</th>
<th>POLE DIAMETER (IN)</th>
<th>INBOARD SECTION</th>
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<td></td>
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<td></td>
<td>LENGTH (FT.)</td>
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** LENGTH OF OUTBOARD SECTION TO BE ADJUSTED AS NECESSARY FOR ARM LENGTH REQUIRED.

ARM MEMBER TABLE

<table>
<thead>
<tr>
<th>ARM LENGTH</th>
<th>INBOARD SECTION</th>
<th>OUTBOARD SECTION</th>
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NOTES:
1. USE THE POLE SELECTION CHART TO DETERMINE THE POLE DESIGNATION.
   - FOR EXAMPLE, IF ARM A IS 24 FT LONG AND ARM B IS 38.5 FT LONG,
     THE POLE DESIGNATION WOULD BE "C".

2. USE THE POLE MEMBER TABLE TO DETERMINE THE POLE SIZE.
   - FOR EXAMPLE, POLE DESIGNATION "C" WOULD BE 10 IN DIAMETER WITH 3 GAUGE WALL THICKNESS.

3. USE THE ARM MEMBER TABLE TO DETERMINE THE SIZING OF THE ARM
   BASED ON THE ARM LENGTH. ARMS ARE TO BE IN 0.5 FT INCREMENTS.
   ARM LENGTHS 40 FT OR LESS WILL BE MADE UP OF A SINGLE PIECE.
   ARMS LONGER THAN 40 FT WILL REQUIRE TWO SECTIONS TO MAKE UP THE TOTAL LENGTH USING A TELESCOPIC FIELD JOINT (DETAIL 1).

4. SEE POLE FOUNDATION CHART ON TES-40 FOR FOUNDATION, ANCHOR BOLT AND REINFORCEMENT DETAILS.

POLE DESIGN NUMBER TO BE AS FOLLOWS:

POLE TYPE - POLE DESIGNATION - POLE HEIGHT - ARM A LENGTH/ARM B LENGTH

POLE DESIGNATION = A, B, C, D, E, F OR G

POLE HEIGHT = TOTAL HEIGHT IN FEET

ARM A LENGTH = DIMENSION L OF ARM A IN FEET

ARM B LENGTH = DIMENSION L OF ARM B IN FEET

EXAMPLE DESIGN NUMBER: A1-C-20-24/38

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

POLE SELECTION CHARTS AND MEMBER TABLES

STANDARD SHEET TES-11
1. **Signal Heads:**
   - The red sections of all signals on a single span wire shall be level with each other.
   - These elevations of the red sections shall be set so that no signal head has a vertical clearance less than 17 feet (plus or minus 3 inches), unless otherwise specified.
   - At least one head, per span, shall be directly secured to the span wire, if approved by the engineer.
   - The remaining signal heads may be fixed to achieve roadway clearance.
   - Post-mounted signal heads shall be mounted at a height specified on the contract plans (DIM. K and DIM. J).

2. **Pole:**
   - Each Type D pole shall be complete with the necessary accessories and hardware required to make a complete installation.
   - Pole dimensions are noted on the contract plans.
   - Wood signal poles shall meet the requirements of Section 710.8.1 of the Standard Specifications.
   - Embedment depth to be 20% of the pole length.

3. **Guy Wire:**
   - Unless otherwise specified on the contract plans, all guy wire shall be the straight diagonal type.
   - The span wire shall be level with each other.
   - The red sections of all signals on a single span wire shall be level with each other.
   - Signal heads may be piped to achieve roadway clearance.
   - At least one head, per span, shall be directly secured to the pole.
   - The remaining signal heads may be fixed to achieve roadway clearance.
   - No signal head has a vertical clearance less than 17 feet (plus or minus 3 inches), unless otherwise specified.

4. **Guy Anchors:**
   - Guy anchors may be either the expanding type, screw type or rock type anchors.
   - Guy anchors shall be fabricated or coated with an asphalt paint.
   - Guy anchors shall be any type, plate type, cone type or rock type anchors.
   - Guy anchors shall be of such dimensions and strength to withstand a tensile load of 7,000 pounds and an A-2 (AASHTO soil classification) type soil.

5. **Elevated Eyebolt:**
   - Eyebolt shall exceed tensile strength of messenger cable.

6. **Conduit:**
   - Conduit for the power supply shall be fastened to the pole with conduit clamps 4 feet on center.
   - Conduit clamps shall be fastened to the Type D wood pole with wood screws.

7. **Insulators:**
   - Insulators shall be installed when secondary power is carried past the signal pole installation.
   - Single insulators shall be used to carry interconnect wire past the installation.
   - Insulators may be mounted on either side of the pole.

8. **Cable Strandvise:**
   - See TES-20 and TES-80 for notes regarding messenger cable.

9. **Grounding:**
   - See TES-40 for notes.

---

**Elevation**

**Guying Details**

**Mounting Bracket for Cabinets**

**Guy Anchors**

**Cable Strandvise**

**Eye Bolt with Curved Washers and Nuts for Wood Poles**

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**General Notes**
GENERAL NOTES

1. PEDESTRIAN SIGNAL HEADS: HEIGHT OF THE INDICATIONS SHALL BE AS NOTED ON THE CONTRACT PLANS.

2. POLE:
   A. THE WELDED CONNECTION SHALL BE DESIGNED FOR THE LOAD ON THE SHAFT BUT NOT LESS THAN 75% OF THE STRENGTH OF THE SHAFT.
   B. POLE HEIGHT AND OUTSIDE DIAMETER SHALL BE NOTED ON THE CONTRACT PLANS.
   C. CONDUIT SHALL EXTEND 4" VERTICALLY UP IN THE POLE ABOVE THE FOUNDATION.
   D. POLE SHALL INCLUDE POLE ID. SEE SHEET TES-41.

3. HAND HOLE:
   A. ALL PEDESTAL POLES SHALL HAVE A MINIMUM SIZE HAND HOLE OF 3 IN x 5 IN.
   B. EACH COVER SHALL BE ATTACHED TO THE POLE BY STAINLESS STEEL SCREWS.

4. MOUNTING: BANDING OF SIGNAL HEAD BRACKETS TO POLES IS NOT PERMITTED UNLESS OTHERWISE SPECIFIED ON THE PLANS.

5. CONCRETE:
   A. ALL EXPOSED CONCRETE SHALL HAVE A NORMAL FINISH.
   B. ALL OUTSIDE CONCRETE CORNERS AND EDGES SHALL HAVE A 3/8" IN. CHAMFER.
   C. CONCRETE TO BE RODDED OR VIBRATED WHILE POURING.
   D. ALL CONCRETE SHALL BE CLASS B.

6. FOOTINGS:
   A. ALL FOOTINGS IN SIDEWALKS SHALL BE FINISHED FLUSH WITH EXISTING SIDEWALKS UNLESS OTHERWISE SPECIFIED BY THE PROJECT ENGINEER.
   B. FOOTINGS MAY BE EITHER CIRCULAR OR SQUARE IN CROSS-SECTION. CIRCULAR FOOTINGS SHALL BE SQUARE FOR TOP 12 IN.

7. FORMS: NO FORMS MAY EXTEND TO A DEPTH GREATER THAN 12 IN. UNLESS APPROVAL IS GRANTED BY THE PROJECT ENGINEER.

8. POLE BASE: ANCHOR BOLT NUTS SHALL NOT BE COVERED.

9. GROUNDING: SEE TES-40 FOR NOTES.

POLE TYPE - POLE DESIGNATION - POLE HEIGHT
POLE TYPE - POLE DESIGNATION = 1, 2 OR 3
POLE HEIGHT = TOTAL HEIGHT IN FEET

POLE DESIGN NUMBER TO BE AS FOLLOWS:
EXAMPLE DESIGN NUMBER: E-1-10

CONCRETE TO BE RODDED OR VIBRATED WHILE POURING.

ANCHOR BOLTS TO BE FULLY GALVANIZED.

FOUNDATIONS

ANCHOR BOLTS

PEDESTAL BASE

CONCRETE FOOTING

MINIMUM DIMENSIONS

BOLT SIZE L H T DIAM. (SIDE) DEPTH VOLUME (C.Y.) REIN.

E1 1"x30" 26" 4" 4" 1'-6" 4'-0" 0.333 —
E2 1"x30" 26" 4" 4" 1'-6" 4'-0" 0.333 —
E3 1"x20" 17" 3" 4" 1'-6" 4'-0" 0.333 —
1. LOCATION:
   A. The push button must be within accessible reach range of a level landing for use from a wheelchair. The button may be placed up to 10 inches from the level landing area.
   B. The optimal location for the push button is between the curb ramp and the edge of the crosswalk line (extended) further from the corner. If the optimal location is not possible, the push button needs to be less than 5 feet from the edge of the crosswalk line (extended) further from the corner.
   C. The push button should be between 1.5 feet and 6 feet, but no further than 10 feet from the edge of the curb, shoulder, or pavement unless otherwise shown in the contract plans.

2. PUSH BUTTON UNIT:
   A. The push button shall be mounted at a height of 3 ft-6 in above the surface of the sidewalk unless otherwise specified on the contract plans.
   B. Tactile arrows on pedestrian push buttons shall be oriented parallel to the direction of travel on the crosswalk controlled by the push button.
   C. Push button shall be mounted as per manufacturer's recommendations.
   D. Audible pedestrian push buttons shall incorporate a push button with vibrator, audible message and tactile relief symbols.
   E. The push button shall be a combination pushbutton/sign combination and a model listed in the APL.

3. SIGN:
   A. The sign shall conform to the sign designated as R10-4AL or R as shown in the West Virginia sign fabrication details manual.
   B. The sign shall be mounted immediately above the push button and be an integral part of the push button unit.
   C. Signs shall be 0.060 in flat sheet aluminum and fabricated according to WVDOH standards for sheeting and design unless otherwise specified on the contract plans.

4. STUB POST SUPPORT:
   A. Use stub post type support when a type A1, C1 or E pole is not within reach range of an accessible level landing area.
   B. Stub post height to be based on minimum required clearance to PPB.
   C. Mount PPB as per manufacturer's recommendations.
GENERAL NOTES
1. ALL BEACON LENS SHALL BE 12 INCH YELLOW LIGHT EMITTING DIODE (LED).
2. ALL LENS VISORS SHALL BE OF THE "CUT-AWAY" TYPE UNLESS OTHERWISE SPECIFIED.
3. ALL CONDUIT SHALL BE 1 1/4" IN DIAMETER UNLESS OTHERWISE NOTED.
4. SIGNS SHALL BE STANDARD 36 IN. x 36 IN. "SCHOOL CROSSING" (S1-1) SIGN OR 24 IN. x 48 IN. "SCHOOL SPEED LIMIT WHEN FLASHING" (S5-1) SIGN ONLY.
5. MOUNTING DIMENSIONS SHOWN ARE FOR STANDARD 12 IN. SIGNAL HEADS ONLY.
6. ALL MESSENDER CABLES SHALL BE A MINIMUM OF 3/4" IN.
7. BOLT AND NUT ASSEMBLIES MAY BE STAINLESS STEEL OR CADMIUM PLATED.

SIGN LOCATION DETAILS
HORIZONTAL MINIMUM CLEARANCE (2' AND 2'-6") AS SHOWN ARE FOR CURB AREAS.
FOR CURB AREAS IT SHALL BE 4" MIN. (6" ON SHOULDER EDGE AND 2'-6" BEHIND FACE OF GUARDRAIL.)

POLE MOUNTING DETAIL

Pole Mounting Details
**General Notes**

1. **Concrete:**
   - All exposed concrete shall have a normal finish.
   - All cutout concrete corners and edges shall have a
     1/2" radius.
   - Concrete to be beaded or vibrated while pouring.
   - All concrete shall be Class B.

2. **Steel:**
   - Reinforcing steel shall not be closer than 3 in. to
     the outside surface of the footing and shall be tied or
     welded.
   - Vertical bars shall be tied with #4 hoop bars (18")
     on 6 in. center. The #4 hoop bars shall have a 1/2"
     diameter.

3. **Footings:**
   - All footing in sidewalks shall be finished flush with the
     existing sidewalks, unless otherwise specified by the
     project engineer.
   - Footings may be either circular or square in cross-
     section. Circular footings shall be square for the top
     12 in.
   - All footing in sidewalks shall be finished flush with the
     side or top of foundation unless stated otherwise.

4. **Forms:**
   - No forms may extend to a depth greater than 12 in.
     unless approval is granted by the project engineer.

5. **Foundation:**
   - The radius (R) of the curve of the finish edge of
     any beam shall not be less than the size specified in
     the N.E.C.

6. **Grounding:**
   - The contractor is to engage a qualified testing and
     inspection agency to perform field tests and
     inspections.
   - After installing grounding system, the contractor is to
     perform the test by the fall-of-potential method
     according to IEEE Standard 81.
   - Perform the test by the fall-of-potential method,
     according to IEEE Standard 81.
   - Measure ground resistance not less than two full
     days after the last trace of precipitation
     and without soil being disturbed by any means other
     than natural drainage or seepage and without chemical
     treatment or other artificial means of reducing
     natural ground resistance.
   - Perform the test by the fall-of-potential method.
   - Interconnect ground rods with a #2 AWG bare, stranded
     copper conductor buried at 18 inches below
     ground grade.

7. **Pole Designation:**
   - Pole designation C or D is for use on existing
     foundations and only to be used at the direction of
     traffic engineering division.

8. **Excavation:**
   - Excavated material required with site grade as
     needed.
   - Site grade should be maintained.

9. **Service Disconnect:**
   - Grounding system at each pole and
     at service disconnect enclosure.
   - Measure ground resistance not less than two full
     days after the last trace of precipitation
     and without soil being disturbed by any means other
     than natural drainage or seepage and without chemical
     treatment or other artificial means of reducing
     natural ground resistance.
   - Perform the test by the fall-of-potential method.
   - Interconnect ground rods with a #2 AWG bare, stranded
     copper conductor buried at 18 inches below
     ground grade.

10. **Concrete Footing:**
    - Minimum dimensions:
      - Height: 6 to 8 in.
      - Width: 36 to 42 in.
      - Depth: 9 to 12 in.

11. **Pole Foundation Chart:**
    - Pole size:
      - Type A1L or C1L
    - Anchor bolt:
      - Size and quantity
    - Concrete foundation:
      - Diameter or side
      - # of anchor bolts
      - Size of bars

12. **Anchor Bolt Chart:**
    - Bolt size:
      - 1 1/4" x 48"
      - 2" x 90"
      - 1" x 40"
    - Parent metal:
      - 4150
    - Wall thickness:
      - 3/16"
      - 7/32"
      - 1/4"
    - Diameter:
      - 11/16"
      - 7/16"
      - 5/16"

13. **Anchor Bolt Details:**
    - Anchor bolts:
      - Size and quantity
      - Type:
        - #4 hoop bars
        - #6 hoop bars
    - Anchor bolt detail:
      - Size and quantity
      - Type:
        - #4 hoop bars
        - #6 hoop bars

14. **Direction of Stress:**
    - Stress:
      - Longitudinal bars:
        - Equal spaced
      - Reinforcing steel:
        - Minimum distance of 8 feet

15. **Foundation Details:**
    - Foundation size:
      - Diameter or side
      - # of anchor bolts
      - Size of bars

16. **Foundation in Slope:**
    - Foundation size:
      - Diameter or side
      - # of anchor bolts
      - Size of bars

17. **Reinforcement:**
    - Concrete:
      - Minimum dimensions
      - Depth
      - Volume
    - Steel:
      - Minimum dimensions
      - Depth
      - Volume
    - Foundation:
      - Minimum dimensions
      - Depth
      - Volume

18. **Threaded Connection:**
    - Minimum dimensions:
      - Diameter
      - Height
      - Length
    - Threads:
      - Equal spaced
      - Longitudinal bars
      - Reinforcing steel:
        - Minimum distance of 8 feet

19. **Steel Signal Pole Foundations:**
    - Steel signal pole foundations
      - Minimum dimensions
      - Depth
      - Volume

20. **Section:**
    - Section:
      - Foundation:
        - Size
      - Depth
      - Volume
    - Reinforcement:
      - Size
      - Depth
      - Volume

21. **Plan View:**
    - Plan view:
      - Foundation:
        - Size
      - Depth
      - Volume
    - Anchor bolts:
      - Size
      - Quantity

22. **Top View of Footer:**
    - Top view of footer:
      - Foundation:
        - Size
      - Depth
      - Volume
    - Anchor bolts:
      - Size
      - Quantity

23. **Profile View:**
    - Profile view:
      - Foundation:
        - Size
      - Depth
      - Volume
    - Anchor bolts:
      - Size
      - Quantity

24. **Conduit Details:**
    - Conduit details:
      - Size
      - Diameter
      - Throat
      - Wall thickness
      - Gauge

25. **Steel Ground Rods:**
    - Steel ground rods:
      - Diameter
      - Length
      - Material

26. **Concrete Details:**
    - Concrete details:
      - Size
      - Diameter
      - Thickness
      - Diameter
      - Thickness

27. **Welded Details:**
    - Welded details:
      - Size
      - Diameter
      - Thickness
      - Diameter
      - Thickness

28. **Cable Details:**
    - Cable details:
      - Size
      - Diameter
      - Length
      - Material

29. **Threaded Connection:**
    - Threaded connection:
      - Minimum dimensions:
        - Diameter
        - Height
        - Length
      - Threads:
        - Equal spaced
        - Longitudinal bars
        - Reinforcing steel:
          - Minimum distance of 8 feet
1. POLE BASE:
   A. HIGH STRENGTH BOLTS SHALL CONFORM TO THE REQUIREMENTS OF SECTION 709.24 OF THE SPECIFICATIONS.
   B. TIGHTEN THE NUTS OF ALL HIGH STRENGTH BOLTS BY THE TURN OF THE NUT METHOD IN ACCORDANCE WITH SECTION 615 OF THE SPECIFICATIONS.
   C. SEE SHEET TES-40 FOR ANCHOR BOLT DETAILS.
   D. NO GROUT IS TO BE PLACED BETWEEN THE POLE BASE AND TOP OF FOUNDATION.

2. VARMINT SCREEN:
   A. ALL TYPE A1 AND E POLES SHALL INCLUDE A VARMINT SCREEN WHICH IS PROPERLY SIZED FOR THE POLE BASE FLANGE.
   B. THE VARMINT SCREEN SUPPLIED WILL BE OF A SUFFICIENT HEIGHT SO THAT THE CONTRACTOR CAN CUSTOM FIT EACH VARMINT SCREEN TO REST UPON THE FOUNDATION WITHOUT ANY GAPS.
   C. THERE SHALL NOT BE ANY GAP BETWEEN CONNECTIONS OF VARMINT SCREEN.

3. POLE I.D.:
   A. ALL TYPE A1 AND E POLES SHALL INCLUDE A POLE I.D. AS SHOWN IN THE DETAIL.
   B. POLE I.D. TO BE INSTALLED BY THE POLE MANUFACTURER.

4. GROUNDING: SEE TES-40 FOR NOTES.
1. **Concrete**:  
   A. All exposed concrete shall have a normal finish.  
   B. All outside concrete corners and edges shall have a 3/8 in. chamfer.  
   C. Concrete to be rodded or vibrated while pouring.  
   D. All concrete shall be Class B.

2. **Conduit**:  
   A. The radius (R) of the curve of the inner edge of any bend shall not be less than the size specified in the N.E.C.

3. **External conduit connections**:  
   A. All right angle conduit bends shall be made with Type LB Conduit.  
   B. All conduit carrying conductor cable shall be a minimum of two inches or as required.  
   C. Power service shall be carried in 1-1/4 in. conduit.  
   D. Conduit shall be constructed of cast steel alloy and shall be cadmium-galvanized. The conduits shall be water proofed by use of a gasket and a cast steel alloy cover.  
   E. The hole may be drilled 1/4 in. diameter larger than the conduit which is inserted in the hole, then the connection shall be double-nut secured on both sides with a bushing plate. The connection is then sealed with a rubber race sealant.

4. **Internal conduit connections**:  
   A. Type LB or LBY Conduits as shown.  
   B. All conduit carrying conductor cable shall be a minimum of two inches or as required.  
   C. Power service shall be carried in 1-1/4 in. conduit.  
   D. Conduit shall be constructed of cast steel alloy and shall be cadmium-galvanized. The conduits shall be water proofed by use of a gasket and a cast steel alloy cover.  
   E. The hole may be drilled 1/4 in. diameter larger than the conduit which is inserted in the hole, then the connection shall be double-nut secured on both sides with a bushing plate. The connection is then sealed with a rubber race sealant.

5. **Conduit connection to all cabinets shall be made through the base of the cabinets only.**

6. **Grounding**: See TES-40 for notes.
GENERAL NOTES:

1. AGGREGATE:
   A. Aggregate to be covered with 3 ply tar paper or other approved vapor barrier. Drain hole to be broke through after completion.
   B. Aggregate shall be by visual inspection an evenly distributed mixture of particles between 3/16 in. and 3/8 in. diameter.

2. FRAME AND COVER:
   A. Type H junction box frames and covers shall be gray iron. Gray iron shall meet the requirements of Sections 709.70 and 715.42.1.2 of the specifications.
   B. Type H junction box frames and covers shall have type H-20 loading capacity.
   C. Type H junction box frames and covers shall be waterproof.
   D. The cover frame for the Type H junction box shall be cast integral with the concrete box.
   E. Frames and covers depicted are shown as examples only; shop drawings shall be submitted if details and dimensions vary.

3. CONCRETE BOX:
   A. Cast in place concrete boxes shall be class B conforming to the requirements of Section 50 of the specifications. Boxes which are precast shall have a minimum compressive strength of 3000 PSI in 28 days and an air content of 2 percent.
   B. All conduit entrance holes to be three inch diameter with one inch knockout wall. Four miles per junction box are required unless noted otherwise.
   C. Where box is set in or poured against paved area, a 1/2 in. joint filler is to be used.
   D. When box is poured in place, in other than paved area, the top 3 in. shall be formed.

4. GASKET:
   A. Material shall meet the requirements of Section 715.39 of the standard specifications.
   B. Gasket shall be heavy duty and provide a lasting, watertight seal.

SECTION

TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

STANDARD SHEET TES-50
**GENERAL NOTES**

1. **SUSPENDED BOX:**
   - The box shall be suspended by the strand connector, illustrated in Detail A.
   - The box shall be isolated from the poles with the strain insulator, illustrated in Detail B.
   - All connections shall be made with a three-bolt clamp, illustrated in Detail C.

2. **STRAND CONNECTOR:**
   - The strain insulator shall have a minimum ultimate tensile strength of 10,000 pounds.
   - The strain insulator shall have an outside diameter of 2-1/2 inches and an overall length of 3-1/2 inches.

3. **STRAIN INSULATOR:**
   - The strain insulator shall have a minimum ultimate tensile strength of 10,000 pounds.
   - The strain insulator shall have an outside diameter of 2-1/2 inches and an overall length of 3-1/2 inches.

4. **THREE BOLT CLAMP:**
   - The three-bolt clamp shall be galvanized.
   - The clamp shall be 2-1/2 inches in length and each plate shall be 3/8 inch thick and 1/4 inch wide.
   - The stud size shall be 3/8 inch.

5. **GUY WIRE AND ANCHORS:**
   - If strain pole installation requires guy wiring, see TES-23 for details and notes.

6. **SPLICES:** Span wire shall be erected without splices except as noted.

7. **TYPICAL FOR STRAIN INSULATOR OR STRAND CONNECTOR AS WELL AS FOR STRAIN POLE CLEVIS CONNECTION:**

8. **TETHER CABLE TO BE INSTALLED SO THAT SIGNAL HEADS ARE PERPENDICULAR TO HIGHWAY:** Tether cable shall not be out of plumb with messenger cable by more than 3 inches.

---

**DETAIL A**

**STRAIN INSULATOR MAY BE SUBSTITUTED FOR THE STRAND CONNECTOR**

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**DETAIL B**

**SUSPENDED BOX**

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**DETAIL C**

**THREE BOLT CLAMP**

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**SPAN WIRE CONNECTIONS AND SIGNAL HEAD TETHERING**

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**TETHER CABLE ATTACHMENT**

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**PLAN VIEW**
1. **AERIAL INTERCONNECT**
   - the following extract from the National Electrical Code shall be used as a general guideline. Local conditions may dictate some variance with this spacing at the discretion of the project engineer.
   - signal conductor cable support on poles shall have a separation of no less than one foot except when placed on racks or brackets.
   - signal conductor cable supported on poles shall provide a horizontal climbing space not less than the following:
     - signal conductor cable located below existing power lines -- as directed by the local power company.
     - signal conductor cable located above existing communication lines -- as directed by the local power company.
     - signal conductor cable located below existing communication lines -- not allowed unless otherwise directed on the plans by the owner.

2. **SPREAD SPECTRUM RADIO INTERCONNECT**
   - specific locations for antennas to be as directed on the contract plans.
   - antennas may be installed on signal mast arm if better for reception, this is to be determined by the contractor and manufacturer.
   - the master controller location shall be an omnidirectional type antenna with antenna mast and antenna cable installed to a radio transceiver within the master controller cabinet.
   - local controllers shall have a remote Yagi type antenna with antenna mast as required and antenna cable installed to a radio transceiver within the intersection controller cabinet.
   - a minimum of 3 ft separation is required if a second Yagi antenna to be installed.

3. **WIRELESS ETHERNET INTERCONNECT**
   - specific locations for communication antennas to be as directed on the contract plans.
   - communication antennas may be installed on signal mast arm if better for reception, this is to be determined by the contractor and manufacturer approved by traffic engineering.
   - Ethernet radio equipment shall be configured as point to point and used to form a bi-directional data communications link between each pair of wireless transceivers to establish bi-directional communication between a pair of local intersection controllers and a central system unit. Ethernet switches located in each cabinet shall be used to connect the transceivers to additional transceivers, the traffic signal controller and any other equipment in the cabinet. The prescribed central system must be able to integrate both wireless Ethernet interconnects and fiber communication cables.

4. **Materials**
   - electrical items shall conform to the requirements of Section 660 of the specifications.
   - galvanizing shall conform to the requirements of Section 660 and Subsection 715.42.
   - steel for fabricated items shall conform to the requirements of Section 660 and Subsection 715.42.
**GENERAL NOTES**

1. **PIPING METHOD:**
   A. When signal heads are suspended from span wire or mast arms and not rigidly mounted, at least one head, per span or arm, shall be directly secured to the span wire or mast arm.
   B. If approved by the engineer, the remaining heads may be piped to achieve roadway clearance.
   C. All signal heads shall have a 17 feet plus or minus 3 inch clearance from bottom of the signal head to the pavement directly below it, unless otherwise specified.

2. **POST MOUNT METHODS:**
   A. Post mount position is noted on contract plans.
   B. Bolt mounted post mounts shall be used only on wood poles.
   C. Bracket (post) mounted signal heads shall be installed and arranged to allow full 180° opening of the signal head access door.

3. **MAST ARM MOUNT METHODS:** All views of hardware mounting devices may be applied to single heads as well as for double head installations.

4. **G-16 PEDESTRIAN HEADS:**
   A. Pedestrian head to be cast aluminum and bottom hinged.
   B. Symbolic display to be minimum 16 in x 17 in.
   C. High impact grid type visor required. No other visor to be used unless otherwise specified.

5. **BACKPLATE:**
   A. Backplates shall be louvered and black.
   B. Backplates shall have a 1 in retroreflective border with a 1 in. margin. The border shall comprise of Type IX fluorescent yellow, pressure sensitive retroreflective sheathing and placed on perimeter of the face of all backplates.

6. **SIGNAL HEADS:**
   A. All signal heads and visors to be yellow in color unless otherwise specified in the contract plans.
   B. All signal head clamps are to be made of steel.

**STANDARD TWO-WAY HEADS ATTACHED TO MAST ARM**

**DETAILS**

- **POST MOUNT METHOD**
  - Steel pole
  - Wood pole

- **BOLT MOUNTED FLANGE**
  - Lug bolt or machine bolt

- **G-16 SIGNAL POLE MOUNT (STEEL)**
  - Drill and tap for two (2) #10-32 x 3/4" bolts

- **G-16 PEDESTAL POLE MOUNT**
  - Pedestal pole see TES-30

- **SIGNAL BACKPLATE**
  - Backplate (black)
  - Louvers
  - Retroreflective border (fluorescent yellow)

**TYPICAL ELEVATION**

- **MAST ARM METHOD**
  - #13 female x 2" bolts
  - Slope of wire entrance

- **VARIABLE CLAMP ADJUSTER**
  - Balance entrance

- **TERMINAL BOX**
  - Bolt mounted flange

**TERMINAL BOX**

- **DETAIL A**
  - See details A and B

- **DETAIL B**
  - Wire entrance

- **TOP VIEW**
  - MAST ARM
  - TOP VIEW

- **MAST ARM**
  - Mast arm

- **G-16 PEDESTRIAN SIGNAL HEAD**
  - See TES-30

**SIGNAL HEADS**

- **PEDIMENT POLE**
  - Pedestal pole see TES-30

- **SLIP FITTER**
  - Slip fitter

**STANDARD SHEET TES-90**

**VEHICULAR AND PEDESTRIAN HEADS**

**TRAFFIC ENGINEERING DIVISION
WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**
1. COMBINATION SIGNAL HEADS:
   A. TWO-WAY, THREE-WAY, AND FOUR-WAY SIGNAL HEAD ASSEMBLIES SHALL HAVE THE RED SECTIONS LEVEL IN SUCH CASES THE BOTTOM OF THE LOWEST SIGNAL HEAD SHALL BE 17 FEET PLUS OR MINUS THREE INCHES ABOVE THE SURFACE DIRECTLY BELOW IT, UNLESS OTHERWISE SPECIFIED.
   B. THE BOTTOM HORIZONTAL BRACKET OF THE SIGNAL HEAD ASSEMBLIES SHALL BE ON THE BOTTOM OF THE LOWEST HEAD.
   C. PIPING TO COMPENSATE FOR DIFFERENT LENGTH SECTIONS SHALL BE DONE AT THE BOTTOM AS SHOWN ON TES-91. THE PIPING SHALL BE 1-1/2 IN GALVANIZED STEEL PIPE PAINTED TO MATCH SIGNAL HEADS.

2. LENS ARRANGEMENT:
   A. LENS ARRANGEMENT (A) IS TYPICAL FOR DUAL INDICATIONS ON STANDARD LANE TREATMENT AND PERMISSIVE ONLY LEFT TURNS.
   B. LENS ARRANGEMENT (B) IS TYPICAL FOR SEPARATE SIGNAL FACES WITH PROTECTED ONLY LEFT TURNS.
   C. LENS ARRANGEMENT (C) IS TYPICAL FOR STANDARD LANE TREATMENT WHERE ONLY ONE SIGNAL HEAD IS USED TO CONTROL THE LANE.
   D. LENS ARRANGEMENT (D) IS TYPICAL FOR SITUATION ALLOWING A RIGHT TURN ON RED THAT IS PROTECTED/PERMISSIVE.
   E. LENS ARRANGEMENT (E) IS TYPICAL FOR SITUATION ALLOWING PROTECTED AND PERMISSIVE LEFT TURN MOVEMENTS DURING THE DIFFERENT PHASES.
   F. LENS ARRANGEMENT (F) IS TYPICAL FOR SHARED SIGNAL FACES OF PROTECTED ONLY MODE LEFT TURN MOVEMENTS.
   G. LENS ARRANGEMENT (G) IS TYPICAL FOR PROTECTED THRU LANE SIGNAL. ARROW ORIENTATION MAY VARY.

3. SUPPORT HARDWARE:
   A. ALL UPPER SIGNAL SUPPORT HARDWARE AND PIPING UP TO AND INCLUDING THE WIRE KIT FITTING MUST BE FERROUS METAL FOR SIGNAL DISPLAYS OF TWO OR MORE HEADS.
   B. FOUR-WAY CENTER HUB REQUIRED FOR ALL APPLICATIONS.

DETAIL A

TYPICAL ARRANGEMENTS OF LENSES

SEE NOTE 2
GENERAL NOTES

1. INTERNALLY ILLUMINATED STREET NAME SIGNS (IISNS) SHALL BE LED TYPE AND SHALL BE PROVIDED ON THE WVDOT APPROVED PRODUCT LIST.

2. IISNS SHALL BE 4 FT, 6 FT OR 8 FT IN LENGTH, SINGLE OR DOUBLE SIDED AS CALLED FOR ON THE CONTRACT PLANS.

3. IISNS SHALL INCLUDE SIGN ASSEMBLY, ELECTRICAL COMPONENTS, SIGN MOUNTING HARDWARE, CABLE, PHOTOELECTRIC CELL, POWER SUPPLY, MISC. HARDWARE, TESTING, AND ALL WORK REQUIRED TO PROPERLY INSTALL THE SIGN.

4. IISNS SHALL BE ATTACHED TO MAST ARM OR SPAN WIRE AS LONG AS IT CAN BE POSITIONED SO THAT THE FACE OF THE SIGN IS AT OR NEAR PERPENDICULAR TO APPROACHING TRAFFIC. OTHERWISE, SIGN ARM MOUNT SHALL BE USED.

SIGN ARM MOUNT

SIGN ARM DATA:

ARM SPAN 10'-0''
FREE END DIA. 2.40''
FREE END DIA. 2.40''
GUAGE 11
DEGREE OF RISE 0.50

EYEBOLT. MAST ARM, THROUGH ITSELF, AND THEN PERMANENTLY ATTACH IT TO PROVIDED INSTALL TWO SAFETY CABLES, ONE FOR EACH END. LOOP SAFETY CABLE OVER EITHER THE BANDING OR CABLING PROVIDED WITH THE MOUNTING BRACKET. RIGIDLY ATTACH TOP SECTION OF MOUNTING BRACKET TO MAST ARM, USING CONNECT APPROVED SIGN MOUNTING BRACKETS TO SIGN'S UNDERHANGING CLAMP KIT, AS REQUIRED.

NOTE: ELECTRICAL CONNECTIONS SHOWN FOR CLARITY.

INSTALLATION:

1. CONNECT APPROVED SIGN MOUNTING BRACKETS TO SIGNS UNDERHANGING BRACKETS. APPROVED BRACKETS SUCH AS PELCO SE-5015 OR SE-5146 MUST BE ORIENTED AS SHOWN.
2. EXCEPT FOR MOUNTING OF MOUNTING BRACKET TO MAST ARM USING DETAIL A. MOUNT REAR BRACKET TO MAST ARM USING DETAIL B.
3. NOTE ELECTRICAL TERMINATIONS USING LOCALLY-APPROVED METHODS. BLACK LINE VOLTAGE 120-240 VAC, 50/60 Hz. RED NEUTRAL. GREEN GROUND.

DETAIL A

DETAIL B

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DETAIL

INTERNALLY ILLUMINATED STREET NAME SIGNS

STANDARD SHEET TES-92
POLE AND WIRING DETAILS

SEEN DETAIL "A"

GROUND TERMINAL
GROUND ROD
GROUND CABLE

GROUND TERMINAL
GROUND ROD
GROUND CABLE

SEE DETAIL "A"

WATTAGE LUMINAIRE FIRST.
IF ARMS ARE EQUAL, ROUTE TO HIGHER
ROUTE THE CABLE OUT THE SHORT ARM FIRST,
THEN DIRECTLY TO SECOND
ROUTE CABLE UP SHAFT AND OUT ARM TO

120 VOLT SYSTEM, TWO WIRE PLUS GROUND

GROUNDED CONDUIT)
TYPES P OR F
NECESSARY FOR
CONDUIT (NOT
TO RIGID STEEL
GROUND WIRE
CONDUIT)

120 VOLT SYSTEM, TWO WIRE PLUS GROUND

TERMINALS
LED DRIVER
TERMINALS
LED DRIVER

3 WIRES
TO LUMINAIRE

GRS CONDUIT
CONNECTOR FOR
CONDUIT GROUND

GRS CONDUIT
CONNECTOR FOR
CONDUIT GROUND

CAST ALUMINUM BASE POLES

ANCHOR AND FLUTED ALUMINUM BREAKAWAY COUPLING BASE POLES

240 VOLT SYSTEM, TWO WIRE PLUS GROUND

ANCHOR AND FLUTED ALUMINUM BREAKAWAY COUPLING BASE POLES

CAST ALUMINUM BASE POLES

ALL POLES/LUMINAIRES TO BE ON ALTERNATING CIRCUITS

NOTES:
1. THIS SHEET APPLIES TO ALL LIGHTING ROADWAY AND BRIDGE, UNLESS STATED OTHERWISE. SEE WVDOH STD SPECS, SECTION 662, ROADWAY LIGHTING.
2. FOR FUSED CONNECTOR KIT DETAILS SEE TEL-09A AND TEL-09B.
3. ALL INTERNAL ROADWAY LIGHTING SHALL BE DONE USING ONLY 1/0 AWG STRANDED COPPER WIRE.
4. CONDUIT SHALL EXTEND NO MORE THAN 4 INCHES ABOVE TOP OF FOUNDATION INTO POLE BASE AND SHALL HAVE BUSHINGS, UNLESS OTHERWISE INDICATED ON THAT DETAIL.
5. A COMPRESSION CONNECTOR SHALL BE INSTALLED AT THE LOCATION WHERE SHALL CONNECT THE GROUND ROD WIRE AND THE SYSTEM INSULATED GROUND WIRES.
6. COLOR CODING FOR THE ROADWAY LIGHTING CABLE SHALL BE PERMANENT SOLID COLOR AS FOLLOWING FOR SINGLE PHASE CIRCUITS:
   - LEG A BLACK
   - LEG B RED
   - NEUTRAL WHITE OR GRAY
   - EQUIP GRND GREEN
   SEE WVDOH STD SPECS, SECT. 662.1, WIRE AND CABLE, FOR ADDITIONAL GUIDANCE.
7. GROUND RODS SHALL BE COPPER CLAD STEEL, A MINIMUM OF 3/4" DIA. BY 10 FEET IN LENGTH, SOLID, WITH DRIVING POINT AT ONE END.
8. GROUND WIRES SHALL BE INSULATED (GREEN) COPPER CONDUCTOR EQUAL IN SIZE TO THE LARGEST ALUMINUM POLE WIRE EXCEPT WHERE OTHERWISE CALLED FOR ON THE PLANS.
9. SEE TEL-15B FOR ADDITIONAL GROUNDING REQUIREMENT DETAILS.

POWER AND GROUND CABLES TO LUMINAIRE VIA POLE AND BRACKET/ARM (SEE NOTE 11)

POWER AND GROUND CABLES TO LUMINAIRE VIA POLE AND BRACKET/ARM (SEE NOTE 11)

GROUND WIRE TO COMPRESSION CONNECTOR AND GROUND ROD AND SYSTEM GROUND (SEE NOTE 11)
SIGN LIGHTING CONTROL CABINET WIRING DIAGRAMS
(FOR USE WITH ROADWAY LIGHTING POWER SOURCE)

GENERAL
1. DETAILS ON THIS SHEET SHALL APPLY TO EACH OVERHEAD SIGN STRUCTURE THAT SUPPORTS EXTERNALLY ILLUMINATED SIGNS POWERED FROM ROADWAY LIGHTING CIRCUITS.
2. SEE NOTES IF SIGN IS ON ITS OWN SERVICE AND IS THE FIRST DISCONNECT MEANS FROM SERVICE.
3. ADDITIONAL NOTES APPLICABLE TO THIS SHEET MAY BE FOUND ON STANDARD SHEETS TE6-38, TE6-39, AND TE6-30.

1. TWO SINGLE POLE CIRCUIT BREAKERS. SEE NOTE 1.
2. CONDUIT HUB (POLE TYPE) (2" CHASE NIPPLE)
3. SYSTEM GROUND - BOND TO neutral BAR ONLY IF CABINET IS FIRST DISCONNECT MEANS FROM SERVICE
4. SOLID neutral GROUND BAR
5. 20A 1P SPARE BREAKER

WIRING
1A - LINE SERVICE
1B - TO SIGN LOAD
3 - SYSTEM GROUND
4A - LINE NEUTRAL
4B - LINE NEUTRAL
4C - NEUTRAL TO GROUND
4D - SYSTEM GROUND
5 - 20A 1P SPARE BREAKER

LEGEND
- TWO - TWO POLE CIRCUIT BREAKERS. SEE NOTE 1
- CONDUIT HUB (POLE TYPE) (2" CHASE NIPPLE)
- SYSTEM GROUND - BOND TO neutral BAR ONLY IF CABINET IS FIRST DISCONNECT MEANS FROM SERVICE
- SOLID neutral GROUND BAR
- 25A 2P SPARE BREAKER

TYPICAL INSTALLATION
- CABINET TO HAVE SAFETY DISCONNECT HANDLE
- Padlock Hasp. Submit Disconnect Handle With Cabinet To Have Safety
- Face away from traffic, mounting height (ground TO BOTTOM of CABINET): 7' URBAN AREA, 4' RURAL AREA
- Mounting Height (face away FROM TRAFFIC)
- Padlock
- Coupling wire outlets

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

SIGN LIGHTING WITH ROADWAY LIGHTING
STANDARD SHEET TEL-06

J04C02C03-STDBOR
**TYPE 1**

IN-LINE SELF-LOCKING CONNECTOR KIT

* FOR PULL BOX INSTALLATION

**TYPE 2**

FUSED "Y" CONNECTOR KIT

* FOR POLE BASE INSTALLATION

**TYPE 3**

UNFUSED "Y" CONNECTOR KIT

* FOR POLE BASE INSTALLATION

**TYPE 4**

UNFUSED "Y" CONNECTOR KIT

* FOR PULL BOX INSTALLATION

**TYPE 5**

UNFUSED "Y" CONNECTOR KIT

* FOR JUNCTION BOX INSTALLATION

**TYPE 6**

FUSED IN-LINE CONNECTOR KIT

* FOR JUNCTION BOX INSTALLATION

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**EXAMPLE**

If the installation requires a receptacle for 18 AWG solid conductors and a cable diameter of .32" and a No. 8 conductor, the kit required will be VI-D3-C6.
NOTES:

1. **STYLE "S" CONNECTORS** shall be the splicing sleeve type consisting of a crimpable plated copper sleeve with a thin metal wall ("STOP") in the barrel centered between each sleeve end. In such a manner that the sleeve shall enclose equal lengths of the two conductors being spliced end to end. The barrel of the sleeve will fit specific ranges of conductor sizes. The manufacturer’s instructions relating thereto shall be strictly followed.

2. **STYLE "H" CONNECTORS** shall be the parallel groove connector consisting of a metal body having two fully-opened grooves or slots parallel to each other, and separated by a portion of the center section of the body. The total circumference of each conductor shall be completely surrounded by metal when the connector is depressed.

3. The fuseholder shall be capable of retaining a 1/2-inch long fuse rated at 600 volt and a minimum of 30 amperes.

4. The "**" type boot shall not be cut beyond the crotch where the inside diameter of each leg is 0.35". Use of a lubricating compound on the cable insulation for it to slide into the boot.

5. If the cable has a nylon jacket, the jacket shall be peeled back to a point where no part of the jacket is encased in the boot of the insulated cable. Application of a lubricating compound on the cable of 0.48" O.D. in the "**" type boot may require the application of a lubricating compound on the cable insulation for it to slide into the boot.

6. All connector kits shall be heavy duty and waterproof, with a lifetime warranty, and shall be installed per manufacturer’s recommendations.

**TABLE OF NOMINAL TYPE 7 KIT STYLE VARIATIONS REQUIRED**

<table>
<thead>
<tr>
<th>B</th>
<th>D</th>
<th>L</th>
<th>CABLE DIAMETER</th>
<th>AWG 600V</th>
</tr>
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<tbody>
<tr>
<td>6</td>
<td>8</td>
<td>10</td>
<td>0.22&quot; - 0.775&quot;</td>
<td>6-6</td>
</tr>
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<td>6</td>
<td>8</td>
<td>12</td>
<td>0.27&quot; - 0.775&quot;</td>
<td>6-6</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>14</td>
<td>0.32&quot; - 0.775&quot;</td>
<td>6-6</td>
</tr>
<tr>
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<td>0.37&quot; - 0.775&quot;</td>
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<tr>
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<td>8</td>
<td>18</td>
<td>0.42&quot; - 0.775&quot;</td>
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<td>6</td>
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<td>0.47&quot; - 0.775&quot;</td>
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<tr>
<td>6</td>
<td>8</td>
<td>22</td>
<td>0.52&quot; - 0.775&quot;</td>
<td>6-6</td>
</tr>
</tbody>
</table>

**NOTES**:

1. **STYLE "S" CONNECTORS** shall be the splicing sleeve type consisting of a crimpable plated copper sleeve with a thin metal wall ("STOP") in the barrel centered between each sleeve end. In such a manner that the sleeve shall enclose equal lengths of the two conductors being spliced end to end. The barrel of the sleeve will fit specific ranges of conductor sizes. The manufacturer’s instructions relating thereto shall be strictly followed.

2. **STYLE "H" CONNECTORS** shall be the parallel groove connector consisting of a metal body having two fully-opened grooves or slots parallel to each other, and separated by a portion of the center section of the body. The total circumference of each conductor shall be completely surrounded by metal when the connector is depressed.

3. The fuseholder shall be capable of retaining a 1/2-inch long fuse rated at 600 volt and a minimum of 30 amperes.

4. The "**" type boot shall not be cut beyond the crotch where the inside diameter of each leg is 0.35". Use of a lubricating compound on the cable insulation for it to slide into the boot.

5. If the cable has a nylon jacket, the jacket shall be peeled back to a point where no part of the jacket is encased in the boot of the insulated cable. Application of a lubricating compound on the cable of 0.48" O.D. in the "**" type boot may require the application of a lubricating compound on the cable insulation for it to slide into the boot.

6. All connector kits shall be heavy duty and waterproof, with a lifetime warranty, and shall be installed per manufacturer’s recommendations.
STEEL LIGHTING POLE DETAILS

TYPE I

OVERHEAD WIRE ENTRANCE

POLE:
A. EACH POLE SHALL BE COMPLETE WITH ONE POLE CAP, J-HOOK, AND A HANGING HOLE.
B. POLES ON BRIDGES SHALL ALSO INCLUDE INTERNAL VIBRATION DAMPERS.
C. FOR BASES, SEE CONTRACT PLANS AND/OR TEL-16 OR TEL-19.
D. POLE SIZING TO BE IN ACCORDANCE WITH THE AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 6TH EDITION, 2013 USING 90 MPH WIND SPEED AND FATIGUE CATEGORY I.

2. CONDUIT (FOR CABINET MOUNTING AND/OR POSSIBLY POWER SERVICE)
A. CONDUIT SHALL BE FASTENED TO THE POLE WITH CONDUIT CLAMPS, 4 FEET C.C.
B. CONDUIT CLAMPS SHALL BE FASTENED TO THE POLE WITH SELF-TAPPING SCREWS.

3. CABINET MOUNTING BRACKET
A. WHEN CABINET OR CABINETS ARE TO BE MOUNTED ON A POLE, THE POLE SHALL BE COMPLETE WITH TWO BRACKETS PER CABINET.
B. THE HEIGHT OF THE CABINET IS SPECIFIED ON THE CONTRACT PLANS.
C. CONTRACTOR SHALL FIELD DRILL THE HOLES FOR THE SELF-TAPPING SCREWS AFTER THE FINAL POSITION HAS BEEN DETERMINED.

4. HAND HOLES:
A. THE HAND-HOLE IN THE BASE SHALL BE A MINIMUM SIZE OF 4 IN. x 6 IN. MIN.
B. THE HAND-HOLE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
C. THE HEIGHT OF THE CABINET IS SPECIFIED ON THE CONTRACT PLANS.

5. BRACKET ARM:
A. BRACKET ARM SHALL BE EQUIPPED WITH A 2 IN. SLIP FIT TYPE CONNECTION FOR THE LUMINAIRES.
B. BRACKET ARM CONNECTION SHALL BE THE TYPE SHOWN AND SHALL BE OF SUFFICIENT STRENGTH SO THAT THE BRACKET WILL FAIL BEFORE THE CONNECTION.
C. CLAMP ON ARMS ARE NOT ALLOWED.

6. WELDING:
A. CONNECTION SHALL BE DESIGNED FOR THE LOAD ON THE MEMBERS.
B. CONNECTION SHALL BE THE TYPE SHOWN.
C. STRENGTH SO THAT THE BRACKET WILL FAIL BEFORE THE CONNECTION.

POLE COMPONENTS

CLAMP FOR OVERHEAD WIRING

TWO BOLT ARM ATTACHMENT

J-HOOK DETAIL

STEEL LIGHTING POLE DETAILS

TYPE I

CABINET MOUNTING BRACKET

HANDHOLE DETAIL

NOTES

REVISION DATE 12/19/2018

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED: 8/2018
1. POLE:
   A. EACH POLE SHALL BE COMPLETE WITH ONE POLE CAP, J-HOOK, AND A HAND HOLE.
   B. POLES ON BRIDGES SHALL ALSO INCLUDE INTERNAL VIBRATION DAMPERS.
   C. POLES ON BRIDGES SHALL ALSO INCLUDE INTERNAL VIBRATION DAMPERS.
   D. POLES ON BRIDGES SHALL ALSO INCLUDE INTERNAL VIBRATION DAMPERS.
   E. POLES ON BRIDGES SHALL ALSO INCLUDE INTERNAL VIBRATION DAMPERS.
   F. POLES ON BRIDGES SHALL ALSO INCLUDE INTERNAL VIBRATION DAMPERS.

2. CONDUIT (FOR CABINET MOUNTING AND/OR POSSIBLE POWER SERVICE):
   A. CONDUIT SHALL BE FASTENED TO THE POLE WITH CONDUIT CLAMPS.
   B. CONDUIT CLAMPS SHALL BE FASTENED TO THE POLE WITH SELF-TAPPING SCREWS.

3. CABINET MOUNTING BRACKET:
   A. WHEN CABINET OR CABINETS ARE TO BE MOUNTED ON A POLE, THE POLE SHALL BE COMPLETE WITH TWO BRACKETS PER CABINET.
   B. THE HEIGHT OF THE CABINET IS SPECIFIED ON THE CONTRACT PLANS.
   C. CONSTRUCTION SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   D. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM),
   E. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   F. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   G. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   H. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
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   U. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   V. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   W. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   X. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   Y. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   Z. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).

4. HAND HOLES:
   A. THE HAND HOLE IN THE BASE SHALL BE A MINIMUM SIZE OF 4 IN. x 6 IN.
   B. THE HAND HOLE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   C. SCREWS SHALL BE VANDAL RESISTANT WITH STYLE PRIOR-APPROVED BY THE WVDOH,
   D. THE HAND HOLE IN THE BASE SHALL BE A MINIMUM SIZE OF 4 IN. x 6 IN.
   E. THE HAND HOLE IN THE BASE SHALL BE A MINIMUM SIZE OF 4 IN. x 6 IN.
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   Z. THE HAND HOLE IN THE BASE SHALL BE A MINIMUM SIZE OF 4 IN. x 6 IN.

5. BRACKET ARM:
   A. BRACKET ARM SHALL BE EQUIPPED WITH A 2 IN. SLIP FIT TYPE CONNECTION FOR THE LUMINARIE.
   B. BRACKET ARM CONNECTION SHALL BE THE TYPE SHOWN AND SHALL BE OF SUFFICIENT
   C. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   D. BRACKET ARM SHALL BE EQUIPPED WITH A 2 IN. SLIP FIT TYPE CONNECTION FOR THE LUMINARIE.
   E. BRACKET ARM CONNECTION SHALL BE THE TYPE SHOWN AND SHALL BE OF SUFFICIENT
   F. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   G. BRACKET ARM SHALL BE EQUIPPED WITH A 2 IN. SLIP FIT TYPE CONNECTION FOR THE LUMINARIE.
   H. BRACKET ARM CONNECTION SHALL BE THE TYPE SHOWN AND SHALL BE OF SUFFICIENT
   I. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
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   K. BRACKET ARM CONNECTION SHALL BE THE TYPE SHOWN AND SHALL BE OF SUFFICIENT
   L. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   M. BRACKET ARM SHALL BE EQUIPPED WITH A 2 IN. SLIP FIT TYPE CONNECTION FOR THE LUMINARIE.
   N. BRACKET ARM CONNECTION SHALL BE THE TYPE SHOWN AND SHALL BE OF SUFFICIENT
   O. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
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   T. BRACKET ARM CONNECTION SHALL BE THE TYPE SHOWN AND SHALL BE OF SUFFICIENT
   U. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
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   W. BRACKET ARM CONNECTION SHALL BE THE TYPE SHOWN AND SHALL BE OF SUFFICIENT
   X. THE HAND HOLE IN THE BASE SHALL BE LOCATED 90° FROM BRACKET ARM (DOWNSTREAM).
   Y. BRACKET ARM SHALL BE EQUIPPED WITH A 2 IN. SLIP FIT TYPE CONNECTION FOR THE LUMINARIE.
   Z. BRACKET ARM CONNECTION SHALL BE THE TYPE SHOWN AND SHALL BE OF SUFFICIENT

6. WELDING:
   A. CONNECTION SHALL BE DESIGNED FOR THE LOAD ON THE MEMBERS.
1. Pole
   A. Pole class shall be per WVDOT Spec 710.8.1.
   B. Pole embedment shall be at a 6 ft. min. depth.

2. Mast arm
   A. The attachment shall be constructed so that it transfers the full strength of the arm to the pole shaft.

3. Conduit
   A. Conduit shall be fastened to the pole with conduit clamps.
   B. Conduit clamps shall be fastened to the pole with lag screws.

4. Guy support
   A. Guy support shall be provided by the contractor if called for on the plans and as needed.

5. Grounding
   A. If equipment grounds are not provided in the service, each pole will be grounded.

---

- **Clevis detail with insulator**
  - Clevis with insulator and cotter bolt
- **Three bolt cable clamp**
  - Three bolt cable clamp
- **Cable strandwize**
  - Cable strandwize
- **Eye bolt with curved washers and nuts for wood poles**
  - Eye bolt with curved washers and nuts for wood poles
- **Mounting bracket for cabinets**
  - Mounting bracket for cabinets
- **Guy anchors**
  - Guy anchors
  - Cone
  - Cross-plate
  - Rock
  - Expanding
  - Screw
SLOPE VARIATION

Steel:

J04C02C03-STDBOR

Breakaway Support Stub Height Measurement:

On uphill side. Be 1" to 2" above ground.

Top of foundation shall:

Note:

* Rated per AASHTO specifications for 90 MPH with 1.3 gusts

Concrete:

1. All exposed concrete shall have a normal finish.
2. All outside concrete corners and edges shall have a 3/4 inch chamfer.
3. Concrete to be rodded or vibrated while pouring.
4. All concrete shall be Class B.

Steel:

1. Reinforcing steel shall not be closer than 3 inches to the outside surface of the footing and shall be tied.
2. Vertical bars shall be tied with 1/4 hoop bars at 1 ft. on center.

Foundations:

3. All footing in sidewalks shall be finished flush with the existing sidewalk, unless otherwise specified by the project engineer.
4. Footings may be either circular or square in cross-section. Circular footings shall be square for the top 12 inches.
5. With permission of the project engineer, the depth of the footing may be reduced one to foot when the footing is placed in a concrete or asphaltic sidewalk or paved surface. The footings may be reduced by one foot when the footing is in rock.

Forms:

6. No forms may extend to a depth greater than 12 inches unless approval is granted by the project engineer.
7. The radius of the curve of the inner edge of any bend shall not be less than the size specified in the N.E.C.

General Notes:

8. Grounding:
   A. Electrical circuits have been energized, test for insulation agency to perform field tests and inspections.
   B. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with the following requirements:
      1. Test complete grounding system at each pole and at service disconnect enclosure.
      2. Measure ground resistance not less than two full days after the last trace of precipitation and without soil being moisture by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing ground resistance.
      3. Perform the test by the fall-of-potential method according to IEEE standard 81.

Note:

* Rated per AASHTO specifications for 90 MPH with 1.3 gusts

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      3. Perform the test by the fall-of-potential method according to IEEE standard 81.
FOUNDATION NOTES

1. CONCRETE
   A. All exposed concrete shall have a normal finish (section 502 type B).
   B. All outside concrete, corners and edges shall have a ½ inch chamfer.
   C. Concrete shall be Class B.

2. STEEL
   A. Reinforcing steel shall not be closer than 3 inches to the outside surface of the footing and shall be tied.
   B. Vertical bars shall be #4 bars and all bars shall be Grade 60.
   C. Vertical bars shall be tied with #4 hoop bars at 12 inches on center. The #4 hoop bars shall have a 20 inch minimum lap.

3. FOUNDATIONS
   A. For foundations in fine clay or medium dense sand as determined by a qualified WV Geotechnical Professional Engineer hired by the contractor, the drilled shaft embedment depth shall be 25 feet.
   B. For foundations in clay or loose sand as determined by a qualified WV Geotechnical Professional Engineer hired by the contractor, the drilled shaft embedment depth shall be 30 feet.
   C. In both instances, soft rock is defined as able to be peeled with a pocket knife. Hard rock cannot be peeled with a pocket knife.

4. CONDUIT:
   A. The radius (R) of the curve of the inner edge of any bend shall not be less than the size specified in the NEC.
   B. All anchor bolts with 1 of L hooks are allowed. Anchor bolts with plates are not allowed.
   C. Bolts shall be 1/2"-20 x 8" long anchor bolts.

5. ANCHOR BOLTS:
   A. Only anchor bolts with J or L hooks are allowed. Anchor bolts with plates are not allowed.
   B. All anchor bolts shall project such that a minimum of 1.5 threads is sticking up beyond the nut. 19 inches minimum to 11 inches maximum for the concrete base - typical.
   C. The radius of the curve of the inner edge of any bend shall not be less than the size specified in the NEC.

6. CONTRACTOR TO USE SPACERS ON REBAR CAGES TO MAINTAIN PROPER CLEARANCE.

7. INSTALLATION OF DRILLED SHAFTS:
   A. Drilled shafts shall be in accordance with section 828 of the WV Standard Specifications.
   B. The required minimum embedment depth for drilled shafts is 25 feet.

8. CONCRETE:
   A. All concrete shall be Class B.
   B. Concrete shall be Class B.
   C. All outside concrete corners and edges shall have a ½ inch chamfer.

9. FOUNDATION DETAILS
   A. The foundation shall be separately separated from the high mast pole and bid as part of item 654001-001, Class 9 concrete footing, reinforced, overhead.
   B. Where the lighting circuit conductor size is indicated on the proposed conduit & conductor schedule is larger than the breaker allowing the lighting circuit conductors shall terminate at the pole on a terminal strip. The pole shall be sized according to the circuit phase rating with a minimum size of 60 A.

10. GROUNDING:
    A. The contractor shall follow grounding guidelines found on lighting pole foundations standard sheet TEL-16B.
    B. The lighting circuit conductor size as indicated on the proposed conduit & conductor schedule is larger than the breaker allowing the lighting circuit conductors shall terminate on a terminal strip. The pole shall be sized according to the circuit phase rating with a minimum size of 60 A.

11. FOUNDATION NOTES
    A. Foundation height shall be 60' to 150' (as specified). Pole elevation from base.
    B. 3/4" conduit with bushing exothermic ground wire spaced at least 48" from lighting ground rods (x3).
    C. Vertical bars shall be tied with #4 hoop bars at 12 inches on center. The #4 hoop bars shall have a 20 inch minimum lap.
**High Mast Maintenance Platform Details**

**Platform Grouping**

<table>
<thead>
<tr>
<th>Type</th>
<th>Slope</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
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<tbody>
<tr>
<td>A</td>
<td>3.0:1 to 3.75:1</td>
<td>29</td>
<td>1.78</td>
<td>2.23</td>
<td>2.63</td>
<td>2.99</td>
<td>3.27</td>
<td>3.44</td>
<td>3.50</td>
<td>4.140</td>
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<tr>
<td>B</td>
<td>2.5:1 to 2.99:1</td>
<td>30</td>
<td>2.14</td>
<td>2.66</td>
<td>3.09</td>
<td>3.53</td>
<td>3.97</td>
<td>4.39</td>
<td>4.65</td>
<td>4.889</td>
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<tr>
<td>C</td>
<td>2:1 to 2.49:1</td>
<td>32</td>
<td>2.70</td>
<td>3.41</td>
<td>4.05</td>
<td>4.64</td>
<td>5.07</td>
<td>5.35</td>
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<td>5.799</td>
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<tr>
<td>D</td>
<td>1.75:1 to 1.99:1</td>
<td>32</td>
<td>3.06</td>
<td>3.87</td>
<td>4.62</td>
<td>5.28</td>
<td>5.78</td>
<td>6.08</td>
<td>6.20</td>
<td>6.830</td>
</tr>
</tbody>
</table>

**Wall Elevation Data (FT)**

- **Type A and Type B**
- **Type C and Type D**

**Plan**

**Isometric**

**General Notes**

1. Minimum 3" clearance from rebar to surface of concrete unless noted.
2. Concrete shall meet the requirements of Section 601 of the standard specifications, class B.
3. Extend conduit ells one foot minimum beyond platform and slope to drain away.
4. The expansion joint between the platform and foundation shall be 1" and filled with a filler meeting the requirements of Section 708.3 of the standard specifications.
5. Maintenance platform for high mast tower to be big incidental to Item 662010-010, lighting support, Type X.
6. Contractor to grout and seal lifting points.
7. Per details, contractor to backfill back of wall and fill voids with proper compaction per warmons specifications to insure proper drainage around the maintenance platform.

**Section A-A**

- Expansion joint with filler.
- Power conduit.
- Grounding conduits.
- Existing ground line.
- Bolt circle.
- Face of wall.
- Measured along outside.

**Details**

- Light tower foundation.
- Slab thickness.
- Centerline about symmetrical.
- Power conduit.
- Grounding conduits.
- With filler.
- Expansion joint.
- 1/2" per ft.
- 8" slab.
- Slope to drain.
- 8" max.
- 4" min.
- 6 bar.
- 4 bar.
- 6 bar.
- 4 bar.

**Notes**

- N.T.S. (Not Taken for Size).

**Revisions**

- Revision Date: 12/19/2018

**Prepared**

- 8/2018

**West Virginia Department of Transportation**

- Division of Highways

**Standard Sheet**

- TEL-16C
1. All Type D boxes are to be fabricated from steel conforming to Section 692.213 of the Standard Specifications and not dipped galvanized after assembly.

2. For additional steel reinforcing bars needed to support lighting poles, see individual bridge design drawings. The same only shall be used with preapproval from the WVDOH.

3. Steel spacers may be welded to base prior to galvanizing.

4. Each lighting pole to be supplied with a minimum of four 7/8-inch thick standard-galvanized steel spacers.

5. Anchor bolts and nuts for lighting pole connection to lighting pole support base shall meet the requirements of Section 709.24.

6. Anchor bolts for lighting pole support base connection to parapet wall shall be fabricated from high-strength steel having a minimum yield strength of 50,000 P.S.I. and a minimum tensile strength of 60,000 P.S.I. The physical, chemical, and dimensional characteristics of the bolts shall be in accordance with the requirements of ASTM A-307. Washers shall meet ASTM F-644.

7. Contrary to WVDOH Std. Spec. Section 692, all anchor bolts shall be fully hot-dipped galvanized along the entire length of the head, shaft, and threads.

General Notes:

- All型D型灯柱支撑基座均应采用符合692.213节的钢材料制造，并不得在组装后进行镀锌。
- 对于需要增加的钢加固杆，应在单独的桥梁设计图纸中查看。同样的钢材料只应在获得西维吉尼亚州交通部的预审批后使用。
- 钢支撑座与灯柱的连接应使用4个7/8英寸厚的标准镀锌钢隔板。
- 灯柱的锚固螺栓应符合最低的应力强度为50,000 P.S.I.，抗拉强度为60,000 P.S.I.的高强钢材料。物理、化学和尺寸特性应符合ASTM A-307的要求。垫圈应符合ASTM F-644的规格。
- 与西维吉尼亚州交通部的标准规范692节不同，所有锚固螺栓应完全热镀锌，且在灯柱的头部、轴线、和螺纹处。

KINDS D - INSTALLATION DETAILS

预审批仅适用于使用本表中的所有项目。
ALUMINUM TRANSFORMER BASE DESIGNER

**Special Details**

**Connecting Bolts**

<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>MATERIAL</th>
<th>HGT.</th>
<th>TOP BOLT CIRCLE</th>
<th>TOP BOLT CIRCLE</th>
<th>BOTTOM BOLT CIRCLE</th>
<th>BOTTOM BOLT CIRCLE</th>
<th>CONNECTING BOLTS</th>
<th>ANCHOR BOLTS (NOTE 3)</th>
<th>SPECIAL DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB6-17</td>
<td>356-T6</td>
<td>17&quot;</td>
<td>10&quot; TO 12&quot; SLOTTED</td>
<td>13 1/2&quot; SQ.</td>
<td>15 3/8&quot; SQ.</td>
<td>17&quot;-A325 OR 1 1/4&quot;-A307</td>
<td>AS REQUIRED.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TB6-17</td>
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<td>AS REQUIRED.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

1. Bases shall be in accordance with the AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS, 6TH EDITION, 2013 using 90 MPH Wind Speed and fatigue category I. The transformer base shall be certified for conformance to the latest AASHTO BREAKAWAY PERFORMANCE CRITERIA and approved by the FHWA.

2. The manufacturer shall specify the bolt circle and physical dimensions of the base bottom to insure a proper foundation fit. Each base must meet the appropriate requirements for the pole, arms, and luminaires that are being used with it.

3. Provide each base with all necessary connecting hardware, hardware (e.g. nuts, bearing plate, washers, plates, clips, connecting bolt covers, etc.) shall be galvanized and supplied as required in accordance with the appropriate pole specifications, the chart on TEL-15b, and the manufacturer's recommendations. Use connecting bolts of the same diameter and strength as the anchor bolts.

4. Breakaway aluminum transformer base shall have a tapered/folded door with the following dimensions: 1/2" INCH X 11 INCH HIGH, 7.5 INCH ACROSS THE TOP, 9 INCH ACROSS THE BOTTOM.

5. Shown as required with 1/8" GALVANIZED STEEL SHIMS.

6. Spacer plates shall be used to prevent openings on top of T-base.

7. Grounding shall comply with that illustrated on TEL-01 and TEL-15b.

8. One side of transformer base flange plate near the door shall be tapped for grounding lug. Provide each transformer base with a 1/8" inch 13 UNC tapped hole or other suitable provisions for grounding purposes.

9. Maximum slope to the transformer base shall be 6:1.

10. Concrete bases shall be poured level. No more than 1/4" gap shall exist between the concrete base and the transformer base when the pole is plumbed.
GENERAL NOTES

1. ACTUAL BASE PLATE DETAILS TO BE DETERMINED AS REQUIRED BY LIGHTING POLE MANUFACTURER.
2. LEVELING PAD SHALL BE PLACED INTEGRALLY WITH PARAPET WALL PROVIDE TOOLED EDGE ON PAD.
3. FOR JUNCTION BOX DETAILS NOT SHOWN SEE JUNCTION BOX TYPE A ON STANDARD SHEET TEL-41.
4. LIGHT POLE BLISTER AND JUNCTION BOX SHALL BE LOCATED PER PLANS.
5. ELECTRICAL DETAILS AND NOTES SHALL BE PER PLAN.
6. SEE CONTRACT PLANS FOR REINFORCEMENT DETAILS.

LIGHT POLE BLISTER ON BRIDGE (NEW CONSTRUCTION)
GENERAL NOTES
1. Actual base plate details to be determined as required by lighting pole manufacturer.
2. Leveling pad shall be placed integrally with parapet wall. Provide tooled edge on pad.
3. For additional anchor bolt details, see standard sheet TEL-19A.
4. For junction box details not shown, see junction box type A on standard sheet TEL-41.
5. Light pole blister and junction box shall be located per plans.
6. Electrical details and notes shall be per plan.
7. See contract plans for reinforcement details.

LIGHT POLE BLISTER DETAILS (RETROFIT)
1. COMPONENT SIZES FOR CONTROL CENTERS NOT SPECIFIED ON THIS SHEET WILL BE DETERMINED BY EVALUATION OF THE CIRCUIT LOAD.
2. FOR INTERNAL CONTROL CENTER WIRING 10 G AND 120/240 STRANDED COPPER SHALL BE USED UNLESS OTHERWISE SPECIFIED.
3. LIGHTING PROTECTION FOR CONTROL STATION SHALL BE PROVIDED ON THE SERVICE POLE AT THE WEATHERING AS PER TEL-23.
4. CIRCUIT MUBS SHALL BE MOUNTED TO ACCOMMODATE ALL CIRCUITS TO BE SERVED SIZES SHALL BE COMPATIBLE TO CONDUIT SIZED ON PLAN SHEETS MISSING REQUIREMENTS SHALL NOT BE USED.
5. IN THE EVENT THAT A CONTROL STATION COMPONENT SIZE FALLS BETWEEN TWO TRADE SIZES, THE HIGHER TRADE SIZE SHALL BE USED.
6. GROUNDING SYSTEMS SHALL BE INSTALLED IN STRICT COMPLIANCE WITH NATIONAL ELECTRICAL CODE, STATE AND LOCAL REGULATIONS.
7. ALL WIRING SHALL BE NEAT AND OF GOOD WORKMAHIPS NATIONAL ELECTRICAL CODE STANDARDS SHALL BE ADHERED TO BY THE CONTRACTOR.
8. IN CASES WHERE THE LINE-SEID OF THE ELECTRICAL SERVICE DOES NOT HAVE A LIGHTNING ARRESTOR INSTALLED BY THE SERVING UTILITIES THE UNIT MUST BE INSTALLED BY THE CONTRACTOR ON THE LOAD-SIDE OF THE SYSTEM WITHIN THE CONTROL CENTER ENCLOSURE.
9. CONTROL CABINET MOUNTING SHALL BE IN ACCORDANCE WITH STANDARD DRAWINGS OR AS OTHERWISE DIRECTED ON THE CONTRACT PLANS.
10. ENCLOSURES WILL BE NEW TYPE 4 STAINLESS STEEL CABINET WITH 3-LEGGED "M" JUMBO CONTROL STATION LUG - 50'240 VOLTS.
11. ENCLOSURE SIZE WILL BE DETERMINED BY COMPONENT SIZE AND APPROVED BY THE ENGINEER. IT SHALL HAVE A 12" MINIMUM DEPTH.
12. PHOTOELECTRIC UNIT SHALL BE MOUNTED OUTSIDE THE LIGHT ENVELOPE CAST BY THE LIGHTING SYSTEM PHOTOELECTRIC UNIT WILL BE PHOTOCELL TYPED TYPE 4 ENCLOSURE.
13. WHERE THE LIGHTING CIRCUIT CONDUCTOR SIZES AS INDICATED ON THE PROPOSED CONDUIT & CONDUCTOR SCHEDULE IS LARGER THAT THE CIRCUIT BREAKER ALLOWS, THE LIGHTING CIRCUIT CONDUCTORS SHALL TERMINATE WITHIN THE CONTROLLER ON A TERMINAL STRIP. ADDITIONAL BREAKERS SHALL BE INSTALLED WHERE THE CIRCUIT BREAKER SHALL BE SIZED AS REQUIRED FOR THE CIRCUIT AMPERE RATING WITH A MINIMUM SIZE OF #8 AWG.
14. CONDUIT AND CIRCUIT BREAKER SIZES HAVE BEEN INCLUDED ON THE CONTACTOR AND CIRCUIT BREAKER SIZES HAVE BEEN INCLUDED ON THE PROPOSED CONDUIT & CONDUCTOR SCHEDULE WHERE THE LIGHTING CIRCUIT CONDUCTOR SIZE AS INDICATED ON THE PROPOSED CONDUIT & CONDUCTOR SCHEDULE IS LARGER THAN THE CIRCUIT BREAKER ALLOWS, THE LIGHTING CIRCUIT CONDUCTORS SHALL TERMINATE WITHIN THE CONTROLLER ON A TERMINAL STRIP. ADDITIONAL BREAKERS SHALL BE INSTALLED WHERE THE CIRCUIT BREAKER SHALL BE SIZED AS REQUIRED FOR THE CIRCUIT AMPERE RATING WITH A MINIMUM SIZE OF #8 AWG.
15. CONTRACTOR TO PROVIDE WIRING SERVICE REQUIREMENTS PER LOCAL POWER COMPANY SPECIFICATIONS.
16. CCTV CAMERA FEEDS GE TO EXTERNAL ENCLOSED CIRCUIT BREAKER AT CAMERA (SEE STANDARD SPECIFICATIONS) NOTE ONLY 20V IS TO BE BROUGHT INTO THE CCTV CAMERA HOUSING IF APPLICABLE.
17. INSTALL A 20A SINGLE POLE CIRCUIT BREAKER MOUNTED ON THE PROPOSED CONDUIT & CONDUCTOR SCHEDULE.
18. PROVIDE TWO SPARE 20A 2-POLE BREAKERS IN EACH CABINET FOR FUTURE USE.
19. CONTRACTOR SHALL PROVIDE A LAMINATED, TYPED CIRCUIT DIRECTORY ON INSIDE OF PANEL IN EACH CORRESPONDING CONTROL STATION CABINET. IN ADDITION, CONTRACTOR SHALL PROVIDE A LAMINATED, TYPED CIRCUIT DIRECTORY ON INSIDE OF PANEL IN EACH CORRESPONDING CONTROL STATION CABINET. FOR CONTROL STATION ENCLOSURE AND INSTALLATION REQUIREMENTS.
20. ENCLOSURE POWER-OFF DOOR INTERLOCK SHALL NOT BE USED FOR THIS CONTROL DOOR. THIS SHALL BE INCIDENTAL TO 662013-00#.
21. CONTRACTOR TO PROVIDE WIRING SERVICE REQUIREMENTS PER LOCAL POWER COMPANY SPECIFICATIONS.
22. CCTV CAMERA FEEDS GE TO EXTERNAL ENCLOSED CIRCUIT BREAKER AT CAMERA (SEE STANDARD SPECIFICATIONS) NOTE ONLY 20V IS TO BE BROUGHT INTO THE CCTV CAMERA HOUSING.
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26. ENCLOSURE POWER-OFF DOOR INTERLOCK SHALL NOT BE USED FOR THIS CONTROL DOOR. THIS SHALL BE INCIDENTAL TO 662013-00#.
SERVICE POLE DETAILS

TYPICAL SERVICE POLE HEADS

GENERAL NOTES
1. SERVICE LOCATION SHALL BE COORDINATED WITH LOCAL UTILITY. FINAL LOCATION OF THE SERVICE POLE SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. THE CONTROL STATION CABINET MAY BE POLE MOUNTED ON THE SERVICE POLE. SEE SHEET TEL-22 ON THE FIRST POLE OF LIGHTING CIRCUIT.
3. WOOD SERVICE POLE SHALL MEET THE REQUIREMENTS OF SECTION 708.8 OF THE STANDARD SPECIFICATIONS.

SERVICE POLE TYPICAL
IF NOT POSSIBLE, ORIENT SOUTH. ALSO - SEE NOTE 2.

PHOTOCELL "WINDOW" SHALL BE ORIENTED NORTH.

LOCATE PHOTOCELL NO HIGHER THAN 8' ABOVE GROUND LEVEL.

NOTE:

(GALVANIZED)

1" RIGID CONDUIT (WATERTIGHT)

MEYERS HUB

MOUNTING BRACKET

SEE DETAILS FOR

NON-PEDESTRIAN AREA 4'-0"

MINIMUM DISTANCE IN
SIDEWALK 7'-0" (PEDESTRIAN AREA)

MINIMUM DISTANCE TO
DISCONNECT, AND ALL CIRCUITS.

CONTRACTOR SHALL LABEL CABINET,
NOTE:

†" x 2" HEX. HEAD MACHINE BOLT

HEX. SELF LOCKING NUT

SNUG FIT ON †" BOLT.

FORMED HINGE TO BE

PART "A"

PART "B"

PART "C"

PART "D"

PART "E"

PART "F"

7/8"

5/8"

1"

1/2"

1/4"

FOR USE ON WOOD OR STEEL POLES

FULLY GALVANIZED STEEL POLES

WITH STEEL OR ALUMINUM CROSS MEMBERS AND BACKBOARD

WOOD COMPONENT

PHOTOELECTRIC CELL

OF MAX. ABOVE GROUND LEVEL

METER SOCKET AND METER

DOOR CONDUIT

CONTROL CABINET SEE NOTE 7

WATERPROOF MOUNTING BOX

MOUNTING BRACKET

SEE DETAILS FOR MOUNTING BRACKET

LIGHTING CONTROL STATION - POLE MOUNTING DETAIL

MINIMUM DISTANCE IN NON-PEDESTRIAN AREA 4'-0"

MINIMUM DISTANCE TO SIDEWALK 7'-0" PEDESTRIAN AREA

CONTROL CABINET SEE NOTE 7

FIELD MOUNT POLE 3/8" STEEL * HOLES

3/8" x 3" HDG MED. SELF- TAPPING SCREWS FOR METAL POLE

3/8" x 3" HDG MED. LAG BOLTS (FOR WOOD POLE)

FORMED HINGE TO BE SNUG FIT ON 1/2" HDG MED. MACHINE BOLT

HEX. SELF LOCKING NUT

PART "B"

PART "A"

PART "C"

PART "D"

PART "E"

PART "F"

7/8"

5/8"

1"

1/2"

1/4"

MOUNTING BRACKET

FOR USE ON WOOD OR STEEL POLES
GENERAL NOTES

1. The dimensions of the enclosure shall be 10 ft. 0 in x 7 ft. 0 in x 1 ft. 2 in for the concrete pad. Construct the pad with a 12:1 slope so water runs off the front.

2. Reinforcement in concrete pad foundation shall be #6 bars spaced at 6 in depth-wise and 16 inches length-wise at 3 inches from bottom of foundation.

3. Conduit mounted P.E. unit to be used if system employs primary voltage on metering pole or if noted on the contract plans. Conduit to support P.E. unit shall be 1.5 inch 0.0 galvanized steel.

4. Lighting control cabinet shall be elevated an additional 3' inches on a 5' x 7' concrete pad.

5. Contractor to provide two spare two-inch conduits from the cabinet to four feet outside the fence, threaded and capped on both ends.

6. All concrete shall be class B.

7. The control cabinet shall have double doors and be NEMA type 4. It shall have adjustable mounting channels on both sides and on the back wall. It shall be of 0.125 inch thick aluminum type 5052-H3 and be reinforced to support loading and doorways.

8. Control cabinet sizes will be determined by component requirements and submitted for approval to the WVDOT Engineer. Size cabinet appropriately, equip the enclosure with two adjustable "C" mounting channels on both the side walls and the back wall. Provide a rear aluminum panel that is a minimum of 27 in. W x 42 in. H. Minimum cabinet depth is 12 inches.

9. Minimum distance around the control cabinet to any object shall be a minimum of 3 ft. for 120/240v.

10. If the control station is near or on a slope, construct a reinforced concrete wall on the upper slope side and sides to redirect the water from crossing the enclosure pad.

11. All work shall be bid as part of Item 662013-001, Service and Control Station, per each.

12. The dimensions of the enclosure shall be 10 ft. 0 in x 7 ft. 0 in x 1 ft. 2 in for the concrete pad. Construct the pad with a 12:1 slope so water runs off the front.

13. Reinforcement in concrete pad foundation shall be #6 bars spaced at 6 in depth-wise and 16 inches length-wise at 3 inches from bottom of foundation.

14. Conduit mounted P.E. unit to be used if system employs primary voltage on metering pole or if noted on the contract plans. Conduit to support P.E. unit shall be 1.5 inch 0.0 galvanized steel.

15. Lighting control cabinet shall be elevated an additional 3' inches on a 5' x 7' concrete pad.

16. Contractor to provide two spare two-inch conduits from the cabinet to four feet outside the fence, threaded and capped on both ends.

17. All concrete shall be class B.
**ROAD CROSSING DETAILS**

- **MIN. 24"**
- **MIN. 18"**
- **NOM. 6"** *(if applicable)*

**Pavement Base Course Sub - Base**

- **Traveled Lanes**
  - **Junction Box Type H (36" typ)**
  - Rigid steel conduits into each extend 3" PVC coated galvanized to top of conduit. Conduit depth of 24" minimum.

**Notes:**
- Conduit location along guardrail.
- Repaving of trench and warning tape in paved shoulder.

**Repair of Trench Cut and Placement of Warning Tape in Soil**

1. Dimensions are measured at point of conduit entrance. Exit dimensions may vary -6"/-3" vertically, ±2'/-3" horizontally between conduits unless otherwise approved.
2. Crossing to terminate both ends in junction box unless otherwise noted.
3. Conduit to be jacked or bored and may not be wash-bored.

**TYPICAL CONDUIT CROSSING UNDERNEATH TRAVELED LANES**

- 3" Galvanized Steel Conduit
- 2 mil Urethane Interior Coating
- 40 mil Gray PVC Exterior Coating
- Install per manufacturer's instructions
- Bid as part of item 662002-001, Galvanized Steel Conduit per system

**Specifications for PVC Coated Galvanized Rod Steel Conduit:**
- 3" Galvanized Rod Steel Conduit
- 2 mil Urethane Interior Coating
- 40 mil Gray PVC Exterior Coating
- Install per manufacturer's instructions
- Bid as part of item 662002-001, Galvanized Steel Conduit per system

**Notes:**
- HMA and Class I Aggregate shall be placed to thickness equal to existing shoulder thickness or to the minimums as shown, whichever are greater.
- Trench shall be backfilled and compacted in accordance with 670-4.5 of the specifications.
- Trench shall be backfilled and compacted in accordance with 670-4.5 of the specifications.

1. New 401001-001, Hot-Mix Asphalt Base Course, Type I
3. New 307001-001, Aggregate Base Course Class I
4. New 212005-001, Select Material for backfilling, rock free dirt/sand

Contractor may substitute Flowable Fill or HMA Base Course for Item 307001-001.

All items above (1-4) to be bid to appropriate Pay Item such as to Galvanized Steel Conduit.
CONDUIT DEFLECTION / EXPANSION JOINT FITTING

NOTE

PROVIDE DEFLECTION / EXPANSION FITTING AT ALL EXPANSION JOINTS AND ALL STRESS RELIEF JOINTS IN BRIDGE STRUCTURES, MEDIAN PARAFFINS, RETAINING WALLS, AND SIMILAR LOCATIONS. PROVIDE SIMILAR INSTALLATION IN EXPOSED CONDUIT RUNS AS REQUIRED AT EXPANSION JOINTS, ETC., AND NEAR THE JOINT BETWEEN EXPOSED AND BURIED OR ENCASED CONDUIT FITTING TO BE SIMILAR TO COMBINATION OF OZ/GEDNEY TYPES EX, AX, DX AND AXDX FITTINGS AND SHALL BE SET FOR MOVEMENT IN EACH DIRECTION EQUAL TO PLAN MOVEMENT PLUS 1" IN EACH DIRECTION. EXPANSION FITTING SHALL BE HEAVY DUTY WITH LIFETIME WARRANTY.

UNDERGROUND CONDUIT DRAINAGE DETAILS

NOTE

PROVIDE 2' LONG x 2' DEEP x TRENCH WIDTH AGGREGATE POCKET AND DRAIN AT LOW POINT OF CONDUIT RUN & LOW POINT IS NOT IN A JUNCTION BOX.
GENERAL NOTES

1. TYPE A BOXES ARE TO BE FABRICATED FROM STEEL 1/8 IN. THICKNESS MIN.) AND HOT-DIPPED GALVANIZED AFTER ASSEMBLY.

2. REINFORCING STEEL THAT CONFLICTS WITH TYPE A BOX SHALL BE APPROPRIATELY MODIFIED AS SHOWN ON THE BRIDGE PLANS OR AS DIRECTED BY THE ENGINEER.

3. UNUSED CONDUIT TO BE FIELD CAPPED.

4. JUNCTION BOXES SHOULD BE NEMA 3R RATED.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

JUNCTION BOX DETAILS TYPE A
STANDARD SHEET TEL-41
JUNCTION BOX DETAILS

GENERAL NOTES:
1. TYPE A AND B BOXES ARE TO BE FABRICATED FROM STEEL 1/8" IN THICKNESS MINI CONFORMING TO ASTM A-36 AND HOT-DIPPED GALVANIZED AFTER ASSEMBLY.
2. REINFORCING STEEL THAT CONFLICTS WITH TYPE A OR TYPE B BOXES SHALL BE APPROPRIATELY MODIFIED AS SHOWN ON THE BRIDGE PLANS OR AS DIRECTED BY THE ENGINEER.
3. TYPE C BOX IS TO BE FABRICATED FROM COMMERCIAL GRADE STEEL WITH WEATHER RESISTANT STEEL. TYPE C BOX SHALL INCLUDE STAINLESS STEEL PIECES AND DOOR CLAMPS.
4. UNUSED CONDUIT TO BE FIELD CAPPED.
5. JUNCTION BOXES SHOULD BE NEMA 3R RATED.

TYPE B JUNCTION BOX

FRONT VIEW WITH COVER REMOVED
SIDE VIEW
COVER PLATE

FRONT VIEW
SIDE VIEW
SECTION B - B

TYPE C JUNCTION BOX

FRONT VIEW
SIDE VIEW
SECTION B - B

JUNCTION BOX DETAILS
TYPES B & C
STANDARD SHEET TEL-42
1. Concrete which is cast in place shall meet Class B concrete which is precast shall have a minimum compressive strength of 3000 psi in 28 days and an air content of 7+/2 percent.

2. All conduit entrance holes to be three inch diameter with one inch knockout wall. Four holes (min.) per junction box required unless noted otherwise.

3. Conduit shall be supported on cable racks in junction boxes. Junction boxes are to have end bells or insulated bushings installed before any cable is pulled in conduit.

4. This junction box shall have type M-20 loading capacity. Be waterproof and the cover frame shall be cast integral with the concrete box. Contractor shall install a heavy duty waterproof gasket around the lid. All portions of this junction box shall meet the requirements of Section 715.42.11.2 of the Specifications.

5. The frame casting shall be cast iron meeting the requirements of Section 209.10 of the Specifications. The cover shall be ductile iron meeting ASTM A 536, Grade 80-55-6, 65-45-12, or 60-40-18.

6. Metal cover shall be grounded.

7. Frames and covers are shown as examples only. Shop drawings shall be submitted if details and dimensions vary.

8. Bottom of junction boxes shall be sloped to drain hole.

9. For Type H, 10 in. x 10 in. See TEL-50.

10. Seal around conduit openings with grommets, epoxy, and/or hydraulic cement on the inside and outside of the junction box to make it waterproof. Finish the inside walls so they are smooth and finished flush with the original wall.

11. See TEL-15B for additional grounding requirement details.

---

**Table: Type H Junction Boxes**

<table>
<thead>
<tr>
<th>Box Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>18&quot; x 18&quot;</td>
<td>2'-4&quot;</td>
<td>1'-8&quot;</td>
<td>2'-4&quot;</td>
<td>2'-4&quot;</td>
<td>20&quot;</td>
<td>18&quot;</td>
</tr>
<tr>
<td>24&quot; x 24&quot;</td>
<td>2'-10&quot;</td>
<td>2'-4&quot;</td>
<td>2'-2&quot;</td>
<td>30&quot;</td>
<td>26&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>36&quot; x 36&quot;</td>
<td>3'-10&quot;</td>
<td>3'-2&quot;</td>
<td>42&quot;</td>
<td>38&quot;</td>
<td>38&quot;</td>
<td>38'/4&quot;</td>
</tr>
</tbody>
</table>
1. CONTRACTOR SHALL FURNISH AND INSTALL A COMPLETE NAVIGATION LIGHTING SYSTEM AS INDICATED ON THE PLANS. SEE WEST VIRGINIA STANDARD SPECIFICATIONS SECTION 662.2.14, NAVIGATION LIGHTING SYSTEM FOR ADDITIONAL DETAILS.

2. NAVIGATION LIGHTING LAYOUT SHALL FOLLOW COAST GUARD LETTER AND/OR 33 CFR 118 FOR GUIDANCE.

3. ALL LAMPS SHALL BE LED AND RATED FOR 100,000 HOURS.

GENERAL NOTES

GCL 360° GREEN CHANNEL LIGHT
RCML 180° RED CHANNEL MARGIN LIGHT
RPL 180° RED PIER LIGHT

KEY

GCL 360° GREEN CHANNEL LIGHT
RCML 180° RED CHANNEL MARGIN LIGHT
RPL 180° RED PIER LIGHT

NAVIGATION LIGHTING DETAILS

STANDARD SHEET TEL-50

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED: 8/2018

STANDARD DETAIL

NAVIGATION LIGHTING DETAILS

ELEVATION VIEW

VIEW A-A

VIEW B-B

GCL OR RCL MOUNTING DETAILS (SCHEMATIC)

RPL MOUNTING DETAILS (SCHEMATIC)
**GENERAL NOTES**

1. **Broken lines shall be 10 feet in length with 30 feet spaces unless otherwise specified.** The ratio of painted line length to skip length shall be 1 to 3.

2. **The distance from the railroad crossing marking to the nearest track will vary.** According to the approach speed and existing sight distance of the vehicular traffic approaching, but should not be less than 50 feet. Also see Table 3.

3. **All railroad markings and stop lines shall be white.** On multi-lane roads, the stop lines shall extend across all approach lanes, and individual railroad symbols shall be used in each approach lane.

4. **Stop lines shall be 12 inches in width unless one of the following conditions are met:**
   - The stop line is on the approach to a signalized intersection.
   - The stop line is at the end of an intersection or expression of an intersection.
   - The stop line is on the approach to a stop line.
   - The stop line is on a truck climbing lane.
   - Stop lines shall be placed 2 feet in advance of and parallel to the nearest crosswalk line.
   - Stop lines shall be placed at the desired stopping point, but two to 30 feet or less than 4 feet from the nearest edge of the intersecting traveled way.

5. **On two-way, two or three lane roadways where center line markings are installed, no-passage zones shall be established at vertical and horizontal curves and other locations where an engineering study indicates that passing must be prohibited because of inadequate sight distances or other special conditions. No-passing zone markings shall be installed at horizontal or vertical curves where the passing sight distance is less than the width shown in the Table below for the 85th-percentile speed or the posted or statutory speed limit. The passing sight distance on a vertical curve is the distance at which an object 3.25 feet above the pavement surface can be seen from a point 3.3 feet above the pavement. Similarly, the passing sight distance on a horizontal curve is the distance measured along the center line of a right-hand lane of a three lane roadway between two points 3.25 feet above the pavement on a line tangent to the embankment or other obstruction that cuts off the view of the curve.

<table>
<thead>
<tr>
<th>85th Percentile Traffic Speed</th>
<th>No-Passing Sight Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>500</td>
</tr>
<tr>
<td>40</td>
<td>450</td>
</tr>
<tr>
<td>50</td>
<td>400</td>
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<tr>
<td>60</td>
<td>350</td>
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<tr>
<td>70</td>
<td>300</td>
</tr>
<tr>
<td>80</td>
<td>250</td>
</tr>
<tr>
<td>90</td>
<td>200</td>
</tr>
</tbody>
</table>

**NOTE:**

- **Rear view mirrors present.**
- **Use when car present.**
- **Use when emergency stopping line.**
- **Do not use with parking line.**

**NOTE 4**

- **Traffic Engineers Stop Line.**
- **Use when curb present.**
- **Use with Emergency Stopping Line.**
- **Use when curb present.**

**NOTE:**

- **W10-1 Sign and the large "X."** To be part of the railroad marking.
- **Two-Way Marking, Truck Climbing Lane.**
- **Two-Way Marking, Multi-lane Highway with Median.**

**TABLE BELOW FOR THE 85TH-PERCENTILE SPEED OR THE POSTED OR STATUTORY SPEED LIMIT.**

**TABLE:**

<table>
<thead>
<tr>
<th>Statute Speed Limit (MPH)</th>
<th>No-Passing Sight Distance (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>500</td>
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<tr>
<td>40</td>
<td>450</td>
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<td>50</td>
<td>400</td>
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<td>80</td>
<td>250</td>
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<tr>
<td>90</td>
<td>200</td>
</tr>
</tbody>
</table>

**TYPICAL PAVEMENT MARKINGS**

<table>
<thead>
<tr>
<th>(E) Two Way Marking, Railroad-Highway Grade Crossings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Railroad Crossing Marking Distance Table</strong></td>
</tr>
<tr>
<td><strong>Posted or Minimum Near Rail to Traffic Speed</strong></td>
</tr>
<tr>
<td><strong>No-Passing Sight Distance</strong></td>
</tr>
</tbody>
</table>
| 20 | 100 | **Note:**
| 30 | 150 | **Values shown are for guidance engineering judgment is to be used.**
| 40 | 200 | In determining the marking placement to assure effectiveness. The distance may be reduced to a minimum of 20 feet depending upon local conditions. A minimum of 100 feet generally necessary for the effective display of paint. If the minimum cannot be obtained, markings may be omitted. |
(F) TYPE V PARALLEL CROSSWALK LINE DETAILS
(OFFSET MARKINGS AS REQUIRED IN ORDER TO AVOID WHEEL TRACKING AREAS)

(G) METHODOLOGY FOR INSTALLING (BENDING) STOP LINES AT WIDE THROATED INTERSECTIONS

X - 3' WHEN OPERATING SPEED IS 10 MPH AND BELOW
X - 6' WHEN OPERATING SPEED IS ABOVE 10 MPH

(I) TYPICAL LANE-USE MARKING SPACING

NOTE: THIS ARROW ONLY

SUPPLEMENTAL DETAIL
MANDATORY TURN LANE MARKINGS

(H) TYPICAL INTERSECTIONS MARKINGS

NOTE:
* ALL LANE USE MARKINGS SHOWN ON THE LINE ARE REQUIRED, ALL OTHER LANE USE ARROWS SHOWN ON THE SHEET ARE OPTIONAL, AS CALLED FOR ON PLANS.

GENERAL NOTES
1. BROKEN LINES SHALL BE 10 FEET IN LENGTH WITH 30 FEET SPACES UNLESS OTHERWISE SPECIFIED. THE RATIO OF PAINTED LINE LENGTH TO SKIP LENGTH SHALL BE 1 TO 3.
2. STOP LINES SHALL BE 12 INCHES IN WIDTH UNLESS ONE OF THE FOLLOWING CONDITIONS ARE MET IN WHICH CASE THE WIDTH SHALL BE 24 INCHES:
   - THE STOP LINE IS ON THE APPROACH TO A SIGNALIZED INTERSECTION
   - THE STOP LINE IS AT THE END OF AN INTERSTATE OR EXPRESSWAY INTERCHANGE EXIT RAMP
   - THE STOP LINE IS ON THE APPROACH TO A HIGHWAY INTERCHANGE EXIT RAMP
3. STOP LINES SHOULD BE PLACED 4 FEET IN ADVANCE OF AND PARALLEL TO THE NEAREST CROSSWALK LINE. THE STOP LINE SHOULD BE PLACED AT THE DESIRED STOPPING POINT BUT IN NO CASE MORE THAN 50 FEET OR LESS THAN 4 FEET FROM THE NEAREST EDGE OF THE INTERSECTING TRAVELLED WAY.
4. STOP LINES AT WIDE THROATED INTERSECTIONS DASHED LANE LINE SHOULD BEGIN NO CLOSER TO THE INTERSECTION THAN THE LINE THAT THE DASHES ORIGINATE FROM.
6. DASHED LANE MARKINGS ARE NEEDED. THE WIDTH OF THE DASHES SHALL BE EQUAL TO THE WIDTH OF THE LINE THAT THE DASHES ORIGINATE FROM.
7. THE SPACE BETWEEN ADJACENT YELLOW CENTERLINE MARKINGS SHALL BE EQUA
8. THE LINE THAT THE DASHES ORIGINATE FROM.
9. STOP LINES SHALL BE 12 INCHES IN WIDTH UNLESS ONE OF THE FOLLOWING
   - THE STOP LINE IS AT THE END OF AN INTERSTATE OR EXPRESSWAY INTERCHANGE EXIT RAMP
   - THE STOP LINE IS ON THE APPROACH TO A SIGNALIZED INTERSECTION
   - THE STOP LINE IS ON THE APPROACH TO A HIGHWAY INTERCHANGE EXIT RAMP

SUPPLEMENTAL DETAIL
MANDATORY TURN LANE MARKINGS

(ITEM 663002-1) TYPICAL ISLAND (OFFSET MARKINGS AS REQUIRED IN ORDER TO AVOID WHEEL TRACKING AREAS)

NOTE: IF A RAILROAD CROSSING IS CLOSE TO THE INTERSECTION TO AVOID WHEEL TRACKING AREAS)

NOTE 2

NOTE 3

NOTE 4

NOTE 5

NOTE 6

NOTE 7

NOTE 8

NOTE 9

NOTE 10

ITEM 663005-1 STOP LINE (24")
ITEM 663005-1 STOP LINE (12")
ITEM 663004-1 CHANNELIZING LINE (8", TYPE V)
ITEM 663003-4 EDGE LINE (6" YELLOW)
ITEM 663002-4 EDGE LINE (6" WHITE)
ITEM 663001-1 CENTERLINE (6" WHITE)
ITEM 663001-1 CENTERLINE (6" YELLOW)
ITEM 663002-4 CENTERLINE (6" WHITE)
ITEM 663002-4 CENTERLINE (6" YELLOW)
ITEM 663002-4 LANE LINE (8" DASHED)
ITEM 663005-1 LANE LINE (6" DASHED)
ITEM 663005-1 LANE LINE (6" WHITE)
ITEM 663002-1 LANE LINE (6" WHITE)
ITEM 663002-1 LANE LINE (8" WHITE)
ITEM 663001-1, CENTERLINE (6" WHITE)
ITEM 663001-1, CENTERLINE (6" YELLOW)
ITEM 663002-4, CENTERLINE (6" YELLOW)
ITEM 663002-4, CENTERLINE (6" WHITE)
ITEM 663003-4, CENTERLINE (6" WHITE)
ITEM 663003-4, CENTERLINE (6" YELLOW)
ITEM 663004-1, CHANNELIZING LINE (8", TYPE V)
ITEM 663003-4, LANE LINE (6" WHITE)
ITEM 663002-4, LANE LINE (8" DASHED)
ITEM 663001-1, EDGE LINE (6" WHITE)
ITEM 663002-4, EDGE LINE (6" WHITE)
ITEM 663001-1, EDGE LINE (6" YELLOW)
ITEM 663002-4, EDGE LINE (6" WHITE)
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ITEM 663002-4, EDGE LINE (6" WHITE)
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ITEM 663002-4, EDGE LINE (6" WHITE)
ITEM 663001-1, EDGE LINE (6" WHITE)
ITEM 663002-4, EDGE LINE (6" WHITE)
ITEM 663001-1, EDGE LINE (6" WHITE)
ITEM 663002-4, EDGE LINE (6" WHITE)
ITEM 663001-1, EDGE LINE (6" WHITE)
ITEM 663002-4, EDGE LINE (6" WHITE)
TRANSVERSE STRIPES
12" SOLID WHITE
CHANNELIZING LINE
8" SOLID WHITE

MAINLINE TRAFFIC DIRECTION OF (ITEM 663007- ) (ITEM 663004- )

TYPICAL PAVEMENT MARKING ARROWS
LANE ASSIGNMENT ARROWS

RAMP WRONG WAY ARROW
SEE NOTE 7

LANE REDUCTION ARROW

(A) TYPICAL PAINTED ISLAND

(B) TYPICAL LANE SHUNT - UNDIVIDED HIGHWAY

NOTE 6
SEE NOTE 6

(C) TYPICAL LANE SHUNT - DIVIDED HIGHWAY

GENERAL NOTES
1. LOCATION OF WORDS AND SYMBOLS SHALL BE AS SHOWN ON THE PLANS OR AS OTHERWISE SPECIFIED.
2. TYPICAL PLACEMENT OF WORD AND SYMBOL MARKING IS SHOWN ON STANDARD SHEET TEM-3.
3. IF MESSAGES ON PAVEMENT CONSIST OF MORE THAN ONE WORD IT SHOULD BE READ "UP" THAT IS THE FIRST WORD SHOULD BE NEAREST THE DRIVER.
4. ALL WORD AND SYMBOL MARKING SHALL BE PAINTED IN COLOR. REPEATED MARKINGS VISIBLE ONLY TO TRAFFIC PROCEEDING IN THE WRONG DIRECTION MAY BE REDE.
5. WORD AND SYMBOL MARKING SHALL BE MADE OF TYPE V MATERIAL AS INDICATED ON THE CONTRACT PLANS. ENHANCED SKID RESISTANT TYPE V MATERIAL SHALL BE USED WHEN SPECIFIED.
6. THE DIMENSION SHALL BE 12 FEET UNLESS OTHERWISE SPECIFIED. IN NO CASE SHALL THE DIMENSION BE LESS THAN 8 FEET OR GREATER THAN 12 FEET.
7. WHERE LENGTH WILL PERMIT, TWO (2) FREEWAY RAMP ARROWS SHALL BE PLACED ON EXIT RAMPS. THE NO. 1 ARROW SHOULD BE PLACED NEAR THE INTERSECTION OF THE RAMP AND THE INTERSECTING CROSSROADS. (50 FT MIN.) BUT PRIOR TO THE BEGINNING OF ANY LANE SEPARATION CHANNELIZING LINES. AT THE END OF THE RAMP; THE NO. 2 ARROW SHOULD BE PLACED NOT LESS THAN 100 FEET BUT NOT MORE THAN 250 FEET PRIOR TO THE NO. 1 ARROW WITH 150-200 FEET DESIRABLE. THE NO. 2 ARROW SHALL NOT BE PLACED ON THE RAMP IN FRONT OF EXIT SIGN. ARROWS SHOULD BE LOCATED IN THE FIELD WITHIN LIMITS MENTIONED ABOVE, TAKING ADVANTAGE OF RAMP GRADE AND ALIGNMENT. ARROWS SHALL BE CENTRED BETWEEN THE EDGE LINES, AND SHALL POINT IN THE DIRECTION OF THE INTENDED TRAFFIC FLOW.

WORD AND SYMBOL MARKING SHALL BE MADE OF TYPE V MATERIAL AS INDICATED ON THE CONTRACT PLANS. ENHANCED SKID RESISTANT TYPE V MATERIAL SHALL BE USED WHEN SPECIFIED.

ONE DIRECTIONAL
MULTI-DIRECTIONAL

LANE PAVEMENT MARKING ARROWS

TYPICAL PAVEMENT MARKING ARROWS

ITEM 663010-
RIGHT LANE STOP
LEFT TURN ONLY

TYPICAL PAVEMENT MARKING LEGENDS
(ITEM 663011-*)

ON ASPHALT OR CONCRETE
PAVEMENT

INTERSTATE SHIELDS **

US ROUTE SHIELDS **

** - SEE NOTE 9

RAILROAD-HIGHWAY CROSSINGS
(ITEM 663015-*)

BICYCLE SYMBOL
(ITEM 663009-*)

YIELD TRIANGLES
(ITEM 663006-*)

USE ROUTE SHIELD PAVEMENT MARKINGS MUST BE SUPPORTED BY STUDY AND APPROVED BY TRAFFIC ENGINEERING DIVISION.

GENERAL NOTES
1. LOCATION OF WORDS AND SYMBOLS SHALL BE AS SHOWN ON THE PLANS OR AS OTHERWISE SPECIFIED.
2. TYPICAL PLACEMENT OF WORD AND SYMBOL MARKING IS SHOWN ON STANDARD SHEET TEM-2.
3. IF MESSAGES ON PAVEMENT CONSIST OF MORE THAN ONE WORD IT SHOULD BE READ "UP", THAT IS THE FIRST WORD SHOULD BE NEAREST THE DRIVER.
4. ALL WORD AND SYMBOL MARKING SHALL BE MADE OF TYPE V MATERIAL AS INDICATED ON THE CONTRACT PLANS. ENHANCED SKID RESISTANT TYPE V MATERIAL MAY BE USED WHEN SPECIFIED.
5. WORD AND SYMBOL MARKING SHALL BE CENTERED ON CYCLE LANE SYMBOL MAY BE REVERSED BASED ON ENGINEERING JUDGEMENT FOR UNIQUE CIRCUMSTANCES.
6. YIELD MARKINGS SHOULD BE PLACED AT THE DESIRED YIELD POINT AS NEAR AS POSSIBLE TO THE INTERSECTING ROADS, BUT IN NO CASE MORE THAN 30 FEET OR LESS THAN 1 FEET FROM THE NEAREST EDGE OF THE INTERSECTING ROADWAY.
7. WORD/NUMBER MARKINGS SHALL BE MADE OF LETTERS/DIGITS OF THE SHAPE AND PROPORTION AS SHOWN IN SECTION 10 OF THE FHWA PUBLICATION "STANDARD HIGHWAY SIGNS AND MARKINGS", LATEST EDITION.
8. ELONGATED ROUTE SHIELD PAVEMENT MARKINGS ARE TO BE TYPE V. US ROUTE SHIELDS SHALL HAVE CONTRAST FOR BOTH ASPHALT AND CONCRETE PAVEMENT. SYMBOL TO BE ALIGNED IN THE CENTER OF THE LANE ARROWS OR MESSAGES (TO LEFT, RIGHT, NORTH, SOUTH, ETC.) MAY BE USED TO SUPPLEMENT ROUTE SHIELDS AND SHALL FOLLOW THE ROUTE SHIELDS. USE AN 80 FT GAP BETWEEN MARKINGS. HOWEVER, CARDINAL DIRECTIONS IF USED MAY BE 45 FT FROM A ROUTE SHIELD MARKING.
9. USE OF ROUTE SHIELD PAVEMENT MARKINGS MUST BE SUPPORTED BY STUDY AND APPROVED BY TRAFFIC ENGINEERING DIVISION.

NOTE:
□ THIS ARROW ONLY INDICATES DIRECTION OF TRAVEL

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS
STANDARD DETAIL
STANDARD SHEET TEM-3
GENERAL NOTES

1. LOCATION OF WORDS AND SYMBOLS SHALL BE AS SHOWN ON THE PLANS OR AS OTHERWISE SPECIFIED.

2. CENTER THE ARROW ON THE LANE CENTERLINE BETWEEN THE LATERAL EXTREMITIES OF THAT ARROW TYPE.

3. ALL WORD AND SYMBOL MARKING SHALL BE WHITE IN COLOR. EXCEPTION: MARKINGS VISIBLE ONLY TO TRAFFIC PROCEEDING IN THE WRONG DIRECTION MAY BE RED.

4. WORD AND SYMBOL MARKING SHALL BE MADE OF TYPE V MATERIAL AS INDICATED ON THE CONTRACT PLANS. ENHANCED SKID RESISTANT TYPE V MATERIAL SHALL BE USED WHEN SPECIFIED.

ROUNDABOUT TRAFFIC ARROWS

ITEM 66307-4

COMPONENT KEY

LANE PLACEMENT

SEE NOTE 2

CHANNELIZATION,
WORD AND SYMBOL
MARKINGS

(SHEET 3 of 3)

STANDARD SHEET TEM-3
GORE AREA

NOTES:
1. THE SPACING BETWEEN MARKERS IN THE GORE AREA SHOULD BE APPROXIMATELY 12 FEET APART AND CENTERED BETWEEN THE STIPES IF THEY ARE EXISTS.
2. END MARKERS APPROXIMATELY 20 FEET BEYOND EXIT GORE SIGN OR PHYSICAL GORE IF NO SIGN.
3. IF MONO-DIRECTIONAL LENSES ARE TO BE UTILIZED ALONG THE SECTION OF ROADWAY CONTAINING END MARKERS APPROXIMATELY 20 FEET BEYOND EXIT GORE SIGN OR PHYSICAL GORE IT THE GORE AREA, BI-DIRECTIONAL WHITE/RED LENSES SHALL BE UTILIZED AROUND THE PERIMETER OF THE GORE AREA. IN ADDITION, BI-DIRECTIONAL WHITE/RED LENSES SHALL BE UTILIZED FOR ALL
   THE GORE AREA, BI-DIRECTIONAL WHITE/RED LENSES SHALL BE UTILIZED FOR ALL
   THE GORE AREA, BI-DIRECTIONAL WHITE/RED LENSES SHALL BE UTILIZED FOR ALL
   THE GORE AREA, BI-DIRECTIONAL WHITE/RED LENSES SHALL BE UTILIZED FOR ALL

NOTES:
1. BI-DIRECTIONAL MARKERS SHOWN. MONO-DIRECTIONAL
2. MONO-DIRECTIONAL MARKERS SHOWN. MONO-DIRECTIONAL
3. MONO-DIRECTIONAL MARKERS SHOWN. MONO-DIRECTIONAL
4. MONO-DIRECTIONAL MARKERS SHOWN. MONO-DIRECTIONAL

LANE LINE OF DIVIDED HIGHWAY

NOTES:
1. BI-DIRECTIONAL MARKERS SHOWN. MONO-DIRECTIONAL
2. BI-DIRECTIONAL MARKERS SHOWN. MONO-DIRECTIONAL
3. BI-DIRECTIONAL MARKERS SHOWN. MONO-DIRECTIONAL
4. BI-DIRECTIONAL MARKERS SHOWN. MONO-DIRECTIONAL

CONTINUOUS THRU LANE DELINEATION

NOTES:
1. LOCATION OF MARKERS ARE SHOWN ON THE PLAN.
2. TYPE B-4 MARKERS ARE NOT TO BE APPLIED ON THE FACE STIPING.
3. ALL TYPE B-4 MARKERS AND TUBULAR MARKERS SHALL BE INSTALLED IN ACCORDANCE WITH THE STANDARD SPECIFICATION.
4. ALL TUBULAR MARKERS SHALL BE MECHANICAL ANCHORED.

TYPE P-2 MARKER

ITEM 663012-4

TYPE R-4 MARKER

ITEM 663012-4

TYPICAL TYPE P-2 MARKER

ITEM 663012-4

TYPICAL TYPE R-4 MARKER

ITEM 663012-4

NOTES:
1. BI-DIRECTIONAL MARKERS SHOWN. MONO-DIRECTIONAL
2. BI-DIRECTIONAL MARKERS SHOWN. MONO-DIRECTIONAL
3. BI-DIRECTIONAL MARKERS SHOWN. MONO-DIRECTIONAL
4. BI-DIRECTIONAL MARKERS SHOWN. MONO-DIRECTIONAL

MULTI-LANE ROADWAY WITH AT-GRADE INTERSECTION

MULTI-LANE ROADWAY WITH TWO-WAY LEFT TURN LANE

TWO LANE HIGHWAY WITH LEFT TURN BAY

TWO LANE HIGHWAY WITH TRUCK CLIMBING LANE

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL
RAISED PAVEMENT MARKERS
TYPES P-2 and R-4
(SHEET 1 OF 2)
**General Notes**

For layout and spacing, refer to Sheet 1.

Reflectors shall be monor bi-directional in accordance with Sheet 1.

All groove cuts shall start at road level on each end and taper at a fixed rate as shown on the elevation detail. Depth to be as specified by the manufacturer of the reflector holder.

Specifics in regards to dimensioning of the plunge cut portions of the installations shall be as recommended by the reflector holder manufacturer.

Adhesive shall be type P-2 marker epoxy meeting the requirements of the standard specifications.

Reflector holders and reflectors shall be models listed on the WVDOH approved products list (APL).

All labor, equipment, and materials required for the installation of slotted markers shall be paid for under bid item number 663013-004 - Slotted Marker, Type S.

For layout and spacing, refer to Sheet 1.

Reflectors shall be mono or bi-directional in accordance with Sheet 1.

All groove cuts shall start at road level on each end and taper at a fixed rate as shown on the elevation detail. Depth to be as specified by the manufacturer of the reflector holder.

Specifics in regards to dimensioning of the plunge cut portions of the installations shall be as recommended by the reflector holder manufacturer.

Adhesive shall be type P-2 marker epoxy meeting the requirements of the standard specifications.

Reflector holders and reflectors shall be models listed on the WVDOH approved products list (APL).

All labor, equipment, and materials required for the installation of slotted markers shall be paid for under bid item number 663013-004 - Slotted Marker, Type S.
GENERAL NOTES

1. LOCATION OF ISA MARKING SHALL BE AS SHOWN ON THE PLANS OR AS OTHERWISE SPECIFIED.

2. THE ISA MARKING SHALL BE COMPRISED OF A WHITE FIGURE ON A BLUE BACKGROUND. THE PAVEMENT MARKINGS COLORS SHALL CONFORM TO THE STANDARD HIGHWAY COLORS.

3. THE ISA MARKING ONLY TO BE USED WHERE THE FACILITY MEETS FEDERAL ACCESSIBILITY GUIDELINES.

4. THE PARKING LAYOUTS SHOWN ARE TO BE CONSIDERED SCHEMATIC. LAYOUTS WILL VARY DEPENDING ON FEDERAL ACCESSIBILITY GUIDELINES AND SPECIFICATIONS.

5. ACCESSIBLE PARKING SPACES SHALL NOT BE SMALLER IN LENGTH OR WIDTH THAN THAT SPECIFIED BY THE LOCAL JURISDICTION FOR OTHER PARKING SPACES.

6. ACCESSIBLE PATHS THAT MUST CROSS VEHICULAR AREAS SHALL BE STRIPED AS SHOWN.

7. SEE STANDARD SHEET PVT 7 IN STANDARD DETAILS BOOK VOLUME I FOR OTHER PARKING SPACES.

8. ISA MARKING SHALL CONFORM TO THE STANDARD HIGHWAY COLORS.

9. THE ISA MARKING SHALL BE COMPRISED OF A WHITE FIGURE ON A BLUE BACKGROUND.

10. ISA MARKING ONLY TO BE USED WHERE THE FACILITY MEETS FEDERAL ACCESSIBILITY GUIDELINES.

11. THE PARKING LAYOUTS SHOWN ARE TO BE CONSIDERED SCHEMATIC. LAYOUTS WILL VARY DEPENDING ON FEDERAL ACCESSIBILITY GUIDELINES AND SPECIFICATIONS.

12. ACCESSIBLE PARKING SPACES SHALL NOT BE SMALLER IN LENGTH OR WIDTH THAN THAT SPECIFIED BY THE LOCAL JURISDICTION FOR OTHER PARKING SPACES.

13. ACCESSIBLE PATHS THAT MUST CROSS VEHICULAR AREAS SHALL BE STRIPED AS SHOWN.

14. SEE STANDARD SHEET PVT 7 IN STANDARD DETAILS BOOK VOLUME I FOR OTHER PARKING SPACES.

TYPICAL ACCESSIBLE PARKING LAYOUTS

PERPENDICULAR PARKING

ANGLED PARKING

DETAIL A

TYPE V ISA MARKING
1. The layouts shown are to be considered as schematic only.
2. The lane reduction schematic as shown is to be used as a guideline for situations with a right lane reduction. Use a mirror image of the schematic for a left lane reduction. The same principles can be used for reduction from two lanes to one lane.
3. This distance shall be 500′ for new construction. The distance may vary under existing conditions. The center lane reduction arrow shall be placed in line with the WR-2R for left lane reduction and the other arrows placed 400′ ahead and back of the center arrow.
4. This distance shall be as shown on the contract plans for new construction, but may vary under existing conditions.
5. See TEM-3 for lane reduction arrow dimensions.
6. Striping to be yellow for left lane reduction situations.

**General Notes**

**Legend**

- **A**: Item 663001, Edge Line (6" White)
- **B**: Item 663001, Edge Line (6" Yellow)
- **C**: Item 663002, Lane Line (8"
- **D**: Item 663002, Lane Line (8" Yellow)
- **E**: Item 663004, Channeling Line (8", Type VI)

**Typical Lane Reduction Arrow Usage**

**Note:** The arrow only indicates direction of travel.
STEEL CANTILEVER SIGN STRUCTURE

1. DESIGNED IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 6TH EDITION, 2013 USING 90 MPH WIND SPEED AND FATIGUE CATEGORY I.

2. VIBRATION IS MORE LIKELY TO OCCUR WHEN STRUCTURES ARE INSTALLED WITHOUT ATTACHING THE SIGNS. THEREFORE THE PROTECTIVE EQUIPMENT OR DAMPING DEVICES MUST BE INSTALLED AT THE TIME OF ERECTION. BECAUSE VIBRATION IS GENERALLY UNPREDICTABLE, A MAINTENANCE PROGRAM SHOULD INCLUDE INSPECTION FOR EVIDENCE OF EXCESSIVE VIBRATION OR FATIGUE AND EXAMINATION FOR ANY STRUCTURAL DAMAGE OR BOLT LOOSENING.

3. SEE T-SLIDES FOR BASE CONNECTION AND FOUNDATION DETAILS.
1. All Rebar to be #4 except as shown.
2. Foundation shall reference TES-40 and shall be based on the embedded cylindrical dimension of 3.5 ft. dia. x 9.0 ft. length.
1. The contractor shall develop a method of securing the conduit to the structure and submit a detail to the engineer for approval.

2. The ladder shall comply with all applicable OSHA requirements.

3. Ladder and cage shall be fabricated from extruded aluminum meeting the requirements of Section 658.2.1 of the Standard Specifications.

4. The ladder shall be rated for a minimum load of 300 lbs.

5. Details of the proposed connection of the ladder to the post shall be included in the shop drawings submitted for the structure.

6. Maintenance walkway, railing and luminaire supports shall be provided at the locations shown.

7. All material shall be aluminum alloy 6061-T6 unless otherwise noted.

8. All bolts, U-bolts, washers and nuts shall be ASTM A-320 Type 304, Grade BB, Class 2, strain hardened.

9. Pipe fittings shall be either mechanically fastened or welded to minimize section and shall be compatible with the material used for the ladder. Details of fittings shall be submitted to the engineer for approval.

10. Fuller alloy for welding shall conform to the requirements of A.W.A.-ASTM classification ER355 for ER355.

11. The minimum section modulus shall be 2.05 in.** per foot width of walkway grating. The intermediate joints in the control section shall be as shown in Section A-A. Grating shall not cantilever more than 2 ft-10 in. beyond the hanger arms at each end of the maintenance walkway. Grating shall be continuous over a minimum of two spans.

12. See Standard Sheets TEI-1A and TEI-1B for overhead sign support box truss span details. The structural capacity of these supports shall be verified by the manufacturer according to the size and location of the SMS and additional weight contributed by the walkway and ladder.

NOTE: SEE NOTE 12
CAMERA ATTACHMENT BRACKET

CAMERA ATTACHMENT BRACKET MOUNTING ARM

SIDEWINDER CAMERA DETAIL

TOWER INSTALLATION

TOP VIEW

SIDE VIEW

FRONT VIEW

PROFILE

PLAN

CONCRETE PAD (4")

8' FENCE

GATE

COLLAPSE

TOWER INSTALLATION PLAN

PROFILE

TOP VIEW

TYPICAL RWIS-ESS TOWER INSTALLATION BD AS PART OF "NEW II/2041-001"

* PER LOCATION

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

ROAD WEATHER INFORMATION SYSTEM (RWIS) DETAILS

STANDARD SHEET TEI-03

PREPARED: 8/2018

STANDARD DETAIL

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

ROAD WEATHER INFORMATION SYSTEM (RWIS) DETAILS

STANDARD SHEET TEI-03

PREPARED: 8/2018