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</table>

INDEX OF SHEETS
SECTION 1300 - TRAFFIC CONTROL
VIRGINIA DEPARTMENT OF TRANSPORTATION
2016 ROAD & BRIDGE STANDARDS

REVISION DATE NEW 09/18 SHEET 5 OF 5
1300.05
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NOTES:

1. ANCHOR BOLTS AND BOLT TEMPLATE SHALL BE FURNISHED WITH CABINET.

2. CABINET SHALL BE CENTERED ON FOUNDATION.

3. THE CONTROLLER CABINET AT THE INSIDE AND OUTSIDE FOUNDATION JOINTS SHALL BE SEALED WITH AN APPROVED WATERPROOF SILICONE SEALANT.

4. FOUNDATION LENGTH AND WIDTH SHALL PROJECT A MINIMUM 4" BEYOND ALL SIDES OF THE CABINET.

5. EXCAVATED AREAS SHALL BE BACKFILLED WITH AGGREGATE.

6. CF-1 FOUNDATION IS INTENDED FOR USE WITH TYPE "A" (NEMA TS-2) TRAFFIC SIGNAL EQUIPMENT CABINET.
CABINET FOUNDATION DETAILS

NOTES:

1. ANCHOR BOLTS AND BOLT TEMPLATE SHALL BE FURNISHED WITH CABINET.
2. CABINET SHALL BE CENTERED ON FOUNDATION.
3. THE CONTROL CENTER CABINET AT THE INSIDE AND OUTSIDE FOUNDATION JOINTS SHALL BE SEALED WITH AN APPROVED WATERPROOF SILICONE SEALANT.
4. FOUNDATION LENGTH AND WIDTH SHALL PROJECT A MINIMUM 4" BEYOND ALL SIDES OF THE CABINET.
5. EXCAVATED AREAS SHALL BE BACKFILLED WITH AGGREGATE.
6. TYPE A AND TYPE B TRAFFIC SIGNAL CABINETS SHALL NOT BE INSTALLED ON CF-2 FOUNDATIONS.

NO. 25 OR 26 AGGR. TO 3" BELOW CONDUIT

CLASS A3 CONCRETE (SLOPED TO DRAIN AWAY FROM CABINET)

CONDUIT AS SPECIFIED ON CONTRACT DOCUMENTS FOR POWER SERVICE

2-2" MINIMUM SPARE CONDUITS REQUIRED FOR FUTURE USE SHALL BE STUBBED OUT AND CAPPED. NOTE THAT ADDITIONAL SPARE CONDUITS MAY BE REQUIRED BY THE CONTRACT DOCUMENTS.

1-1" MIN. CONDUIT REQUIRED FOR GROUNDING ELECTRODE CONDUCTOR

THE ANCHOR BOLTS SHALL EXTEND 1/4" TO 3/4" ABOVE THE TOP OF THE NUT AFTER INSTALLATION OF THE NUTS, WASHERS AND CABINET.

GROUNDING ELECTRODE CONDUCTOR

GROUNDING ELECTRODE

GROUNDING ELECTRODE CONDUCTOR

SLOPED TO DRAIN AWAY FROM CABINET (2% MAX).

BACKFILL WITH NO. 25 OR 26 AGGR. TO 3" BELOW CONDUIT
SIDE VIEW

NOTES:

1. ANCHOR BOLTS, BOLT TEMPLATE, AND BASE ADAPTER (METAL RISER) SHALL BE FURNISHED WITH CABINET.

2. CABINET ON BASE ADAPTER (METAL RISER) SHALL BE CENTERED ON FOUNDATION.

3. THE CONTROLLER CABINET AT THE INSIDE AND OUTSIDE FOUNDATION JOINTS SHALL BE SEALED WITH AN APPROVED WATERPROOF SILICONE SEALANT.

4. FOUNDATION LENGTH AND WIDTH SHALL BE AS REQUIRED TO PROJECT NO LESS THAN A MINIMUM 4" BEYOND ALL SIDES OF THE CABINET.

5. EXCAVATED AREAS SHALL BE BACKFILLED WITH AGGREGATE.

6. CF-3 FOUNDATION IS INTENDED FOR USE WITH TYPE "B" (CALTRANS MODEL 332) TRAFFIC SIGNAL EQUIPMENT CABINET.

7. CONDUITS ENTERING THE FOUNDATION SHALL BE ARRANGED IN A CIRCULAR PATTERN, THE CONTRACTOR SHALL SUBMIT A CONDUIT ARRANGEMENT PLAN FOR APPROVAL PRIOR TO PLACEMENT.
COMMUNICATION SERVICE CONNECTION DETAIL

- CONTROLLER CABINET (SEPARATE PAY ITEM)
- INTERFACE BOX (INCLUDED IN CONTROLLER CABINET PAY ITEM)
- EXTERNAL COMMUNICATIONS
- 1" MINIMUM RIGID METAL CONDUIT
  (ONE-PIECE, BENT)
  (SEPARATE PAY ITEM, AS SHOWN ON CONTRACT DOCUMENTS)
- JB-S1 JUNCTION BOX, TOP OF JUNCTION BOX SHALL READ "VDOT COMM"
  (SEPARATE PAY ITEM, AS SHOWN ON CONTRACT DOCUMENTS)
- GROUNDING ELECTRODE TO COMMUNICATION CONNECTION
- 2" MINIMUM CONDUIT
- BACKFILL WITH NO. 25 OR 26 AGGR. TO 3" BELOW FOUNDATION

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.
NOTES:

1. ANCHOR BOLTS AND BOLT TEMPLATES SHALL BE FURNISHED WITH BOTH CABINETS.

2. THE CONTROLLER CABINET AND UPS CABINET SHALL BE CENTERED FROM FRONT TO BACK ON THE FOUNDATION. THE TOTAL WIDTH OF THE CONTROLLER CABINET AND UPS CABINET SHALL BE CENTERED FROM SIDE TO SIDE ON THE FOUNDATION.

3. THE CONTROLLER CABINET AND UPS CABINET AT THE INSIDE AND OUTSIDE FOUNDATION JOINTS SHALL BE SEALED WITH AN APPROVED WATERPROOF SILICONE SEALANT.

4. THE FOUNDATION WIDTH AND LENGTH SHALL PROJECT A MINIMUM 4" BEYOND ALL SIDES OF THE CABINETS.

5. EXCAVATED AREAS SHALL BE BACKFILLED WITH AGGREGATE.

6. CF-4 FOUNDATION IS INTENDED FOR USE WITH TYPE "A" (NEMA TS-2) TRAFFIC SIGNAL EQUIPMENT CABINET WITH SEPARATE UPS CABINET.

7. DOOR HINGE LOCATIONS SHALL BE IN ACCORDANCE WITH SECTION 703 OF THE SPECIFICATIONS.

8. EACH CABINET SHALL HAVE FOUR ¾" DIAM. X 16" LONG WITH 2" 90 DEGREE BEND ANCHOR BOLTS.
NOTES:

1. AS REQUIRED BY THE CONTRACT DOCUMENTS.

2. POLE HEIGHT DESIGNED TO ACCOMMODATE ATTACHING SPAN ACROSS THE GREATEST DISTANCE AT A POINT 18" FROM THE TOP OF THE POLE OR THE LOWEST POLE CLAMP. SPANS CROSSING A LESSER DISTANCE AND ATTACHED TO THE SAME POLE SHALL BE ATTACHED LOWER THAN 18" AS DOING SO WILL RESULT IN THE LOWEST SIGNAL HEAD SECTION MAINTAINING THE MINIMUM CLEARANCE, USING NO EXTENSIONS AS SHOWN BY STANDARD SW-1.

3. SPAN WIRE RIGGING SHALL BE IN ACCORDANCE WITH STANDARD WD-1. TETHER WIRE RIGGING SHALL BE IN ACCORDANCE WITH STANDARD TA-1.

4. THE MOUNTING HEIGHT FROM THE PEDESTRIAN PATH (OR THE HIGHEST POINT OF THE PAVEMENT SURFACE IF THERE IS NO PEDESTRIAN PATH) TO THE LOWEST POINT OF THE SIGNAL HOUSING (INCLUDING BRACKETS AND BACKPLATE) SHALL BE AS PER THE CONTRACT DOCUMENTS.

5. A "J" HOOK FOR WIRE SUPPORT SHALL BE PLACED NEAR ALL HANDHOLES THAT ARE LOCATED MORE THAN 4 FEET UP THE STRUCTURE.

6. POLE CLAMP SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS WITHOUT THE USE OF SPACERS OR SHIMS.

7. SEE STANDARD AB-1 FOR ANCHOR BOLT DETAILS.

2016 ROAD & BRIDGE STANDARDS
NOTES:

1. AS REQUIRED BY THE SPECIFICATIONS.
2. SIGNAL WIRING HOLE SHALL BE LOCATED ON THE BOTTOM OF THE ARM DIRECTLY BEHIND THE HANGER ASSEMBLY WHEN STANDARD SM-3 HANGER ASSEMBLIES ARE REQUIRED. SIGNAL WIRING SHALL BE CONCEALED IN THE STANDARD SM-3 HANGER ASSEMBLIES.
3. THE ALIGNMENT OF THE LUMINAIRE ARM SHALL BE AS SHOWN IN THE CONTRACT DOCUMENTS.
4. AFTER THE LOADS ARE APPLIED, THE VERTICAL CLEARANCE FROM THE HIGHEST POINT OF THE PAVEMENT SURFACE SHALL BE:
   A. 16' MINIMUM (15' MINIMUM FOR MAINTENANCE ACTIVITIES) TO THE LOWEST POINT OF THE SIGNAL HEAD ASSEMBLIES (INCLUDING BACKPLATES AND SIGNS).
   B. 25' MAXIMUM TO THE TOPS OF THE SIGNAL HOUSINGS.
5. THE MOUNTING HEIGHT FROM THE PEDESTRIAN PATH (OR THE HIGHEST POINT OF THE PAVEMENT SURFACE IF THERE IS NO PEDESTRIAN PATH) TO THE LOWEST POINT OF THE SIGNAL HOUSING (INCLUDING BRACKETS AND BACKPLATE) SHALL BE AS PER THE CONTRACT DOCUMENTS.
6. A "J" HOOK FOR WIRE SUPPORT SHALL BE PLACED NEAR ALL HANDHOLES THAT ARE LOCATED MORE THAN 4 FEET UP THE STRUCTURE.
7. MAST ARMS MAY BE SPLICED. IF SPLICED, FIELD ASSEMBLY SHALL ACHIEVE A SNUG TIGHT JOINT. MATING SURFACES SHALL BE SMOOTH AND FREE OF BURRS, DENTS, OR LUMPS OF ZINC.
8. POLE CLAMP SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS WITHOUT THE USE OF SPACERS OR SHIMS.
9. MAST ARMS SHALL BE CONNECTED TO THE POLE USING THRU-BOLTS. NEITHER WELDED STUDS NOR THREADED PLATES WILL BE ALLOWED.
10. DUAL MAST ARM CONNECTIONS MAY BE MADE BY USING TWO SINGLE ARM CONNECTIONS WITH THE LONGER MAST ARM ON THE BOTTOM.
11. HANDHOLES SHALL ONLY BE PROVIDED FOR COMBINATION MAST ARM / LUMINAIRE ARM POLES.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

SIGNAL POLE DETAILS

MAST ARM AND COMBINATION LUMINAIRE MAST ARM POLE

ROAD AND BRIDGE STANDARDS

VIRGINIA DEPARTMENT OF TRANSPORTATION

2016 ROAD & BRIDGE STANDARDS

A. 16' MINIMUM (15' MINIMUM FOR MAINTENANCE ACTIVITIES) TO THE LOWEST POINT OF THE SIGNAL HEAD ASSEMBLIES (INCLUDING BACKPLATES AND SIGNS).
B. 25' MAXIMUM TO THE TOPS OF THE SIGNAL HOUSINGS.

THE MOUNTING HEIGHT FROM THE PEDESTRIAN PATH (OR THE HIGHEST POINT OF THE PAVEMENT SURFACE IF THERE IS NO PEDESTRIAN PATH) TO THE LOWEST POINT OF THE SIGNAL HOUSING (INCLUDING BRACKETS AND BACKPLATE) SHALL BE AS PER THE CONTRACT DOCUMENTS.

A "J" HOOK FOR WIRE SUPPORT SHALL BE PLACED NEAR ALL HANDHOLES THAT ARE LOCATED MORE THAN 4 FEET UP THE STRUCTURE.

MAST ARMS MAY BE SPLICED. IF SPLICED, FIELD ASSEMBLY SHALL ACHIEVE A SNUG TIGHT JOINT. MATING SURFACES SHALL BE SMOOTH AND FREE OF BURRS, DENTS, OR LUMPS OF ZINC.

POLE CLAMP SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS WITHOUT THE USE OF SPACERS OR SHIMS.

MAST ARMS SHALL BE CONNECTED TO THE POLE USING THRU-BOLTS. NEITHER WELDED STUDS NOR THREADED PLATES WILL BE ALLOWED.

DUAL MAST ARM CONNECTIONS MAY BE MADE BY USING TWO SINGLE ARM CONNECTIONS WITH THE LONGER MAST ARM ON THE BOTTOM.

HANDHOLES SHALL ONLY BE PROVIDED FOR COMBINATION MAST ARM / LUMINAIRE ARM POLES.
NOTES:

1. THESE LOADING REQUIREMENTS SHALL BE USED FOR THE DESIGN OF ALL NEW MAST ARM STRUCTURES, EXCEPT IN THE FOLLOWING SITUATIONS WHERE THE STRUCTURE SHALL REQUIRE A PROJECT-SPECIFIC DESIGN:
   - THE WIND LOADS OR DEAD LOADS ON THE MAST ARM STRUCTURE SPECIFIED ON THE PLANS WILL EXCEED WHAT IS SHOWN ON THIS STANDARD FOR THE PROPOSED ARM LENGTH.
   - THE STRUCTURE IS A DUAL ARM STRUCTURE WHERE THE ARMS ARE NOT AT 90 DEGREES TO EACH OTHER.

2. EMERGENCY VEHICLE PREEMPTION DEVICES, PEDESTRIAN PUSH BUTTONS, AND ANTENNAE SHALL BE CONSIDERED TO HAVE NEGLIGIBLE WEIGHT AND SURFACE AREA FOR THE PURPOSES OF STRUCTURAL DESIGN OF THE MAST ARM POLES AND FOUNDATIONS.

3. FOR DUAL MAST ARM STRUCTURES WITH TWO ARMS AT 90 DEGREES TO EACH OTHER, THE POLE AND FOUNDATION SHALL BE DESIGNED FOR THE WORST-CASE DEAD LOAD AND WIND LOAD CONDITIONS FROM EITHER ARM.

4. FOR THE PURPOSES OF WIND LOAD ANALYSIS, ALL LOADS SHALL BE TREATED AS IF THEY ARE POINTED IN THE SAME DIRECTION (FACING WIND). THERE SHALL BE NO DEDUCTIONS FOR DEVICES MOUNTED AT ANGLES.

5. THE AREAS PROVIDED DO NOT TAKE INTO ACCOUNT THE WIND DRAG COEFFICIENT.

6. UNLESS SPECIFIED OTHERWISE IN THE CONTRACT DOCUMENTS, EQUIPMENT LOADS AND SIZES SHOWN IN THIS STANDARD SHALL BE USED FOR THE STRUCTURE AND FOUNDATION DESIGN, EVEN IF LIGHTER LOADS OR SMALLER EQUIPMENT SIZES ARE PROPOSED.

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>SURFACE AREA</th>
<th>DEAD LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-SECTION SIGNAL HEAD W/ BACKPLATE</td>
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<tr>
<td>4-SECTION SIGNAL HEAD W/ BACKPLATE</td>
<td>11.0 SF</td>
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<td>5-SECTION SIGNAL HEAD W/ BACKPLATE (IN-LINE)</td>
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<tr>
<td>5-SECTION SIGNAL HEAD W/ BACKPLATE (DOGHOUSE/CLUSTER)</td>
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<tr>
<td>SP-9 PEDESTRIAN SIGNAL HEAD</td>
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<td>30&quot; x 36&quot; SIGN</td>
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<td>VIDEO CAMERA</td>
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NOTES:
SEE SHEET 2 FOR NOTES.

ROAD AND BRIDGE STANDARDS
SIGNAL POLE DETAILS
MAST ARM SIGNAL POLE MAXIMUM LOADING STANDARDS
VIRGINIA DEPARTMENT OF TRANSPORTATION

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

2016 ROAD & BRIDGE STANDARDS
SIGNAL POLE DETAILS

MAST ARM SIGNAL POLE MAXIMUM LOADING STANDARDS

NOTES:

SEE SHEET 2 FOR NOTES.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.
NOTES:
1. THIS STANDARD SHALL ONLY BE USED TO SUPPORT VEHICULAR AND PEDESTRIAN SIGNAL HEADS, PUSH BUTTONS, AND/OR SIGNS 36" IN WIDTH OR LESS, INCLUDING DIAMOND WARNING SIGNS WITH 36" OR LESS EDGE LENGTH.

2. EACH FOUNDATION SHALL BE PERMANENTLY MARKED TO INDICATE ALL SIDES FROM WHICH CONDUITS PASS. THIS MARK SHALL BE MADE WITH A TROWEL WHEN FINISHING THE CONCRETE AND SHALL BE ¼" DEEP AND 4" TO 6" LONG.

3. PEDESTAL POLE SHALL HAVE A BREAKAWAY TRANSFORMER TYPE BASE. THE TRANSFORMER BASE SHALL BE INSTALLED PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

4. SEE PEDESTRIAN ACTUATION STANDARDS FOR DETAILS.

5. PEDESTAL POLE LENGTH SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS. PEDESTAL POLE LENGTH SHALL NOT EXCEED 15 FEET.

6. MOUNTING HEIGHT SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

7. STRUCTURAL TUBE MATERIAL SHALL BE ALUMINUM 6061-T6 WITH MINIMUM 0.337" WALL THICKNESS.
NOTES:

1. WHEN FOUNDATION IS ADJACENT TO THE BACK EDGE OF SIDEWALK BUT NOT WITHIN THE SIDEWALK, THE TOP OF THE FOUNDATION SHALL BE ELEVATED 2 INCHES MINIMUM ABOVE THE SIDEWALK GRADE.

2. ROUND FOUNDATIONS ARE SHOWN, HOWEVER SQUARE FOUNDATIONS ARE ACCEPTABLE AND SHALL FOLLOW THE SAME REQUIREMENTS.

3. THE TOP OF FOUNDATION SHALL BE FLUSH WITH THE SIDEWALK SURFACE WHEN INCLUDED IN THE 5'-0" MINIMUM SIDEWALK/PEDESTRIAN PATH.

4. THE 5'-0" MINIMUM SIDEWALK/PEDESTRIAN PATH WIDTH WILL BE MEASURED FROM THE BOTTOM OF THE TRANSFORMER BASE.
NOTES:

1. HANDHOLES AT LOCATIONS NOT SHOWN SHALL BE 3" X 5" MINIMUM.

2. HANDHOLES WITHIN 10 FEET OF THE GROUND LINE SHALL BE HINGED AND LATCHABLE, WITH AN APPROVED LATCHING MECHANISM.
ANCHOR BOLT DETAIL

NOTES:

1. PROVIDE 5 NUTS AND 4 WASHERS PER ANCHOR BOLT. SEE SPECIFICATIONS FOR NUT INSTALLATION PROCEDURE.

2. CONDUITS AND REINFORCING STEEL NOT SHOWN FOR CLARITY.

3. DISTANCE BETWEEN BOTTOM OF BASE PLATE AND TOP OF FOUNDATION SHALL BE NO GREATER THAN THE DIAMETER OF ANCHOR BOLT PLUS ONE INCH.

4. THIS STANDARD DOES NOT APPLY TO STRUCTURES MOUNTED ATOP TRANSFORMER BASES.
NOTES:

1. Wire mesh ring shall be 1/2" woven hardware cloth 27 gage (commercial grade) hot dipped galvanized. Double lap mesh and secure with plastic coated wire twist ties. Length and height determined by field measurements.

2. Wire mesh ring shall be placed inside the bolt circle before the pole is erected and plumbed.

3. Wire mesh ring shall be compressed between pole base plate, concrete foundation, and bolts. Ensure the wire mesh ring will remain in place and any access through the pole base plate opening is eliminated.

4. Welding or drilling is not permitted on base plate of pole.

5. Conduits not shown for clarity.

6. This standard does not apply to structures mounted atop transformer bases.

VENTED VARMINT SCREEN

DETAIL A

ANCHOR BOLTS
WIRE TWIST TIES
WIRE MESH RING

DIM. X + 1/2"

PLAN VIEW

BOLT CIRCLE

POLE

ANCHOR BOLTS

WIRE MESH RING

DIM. X

VENTED VARMINT SCREEN

SEE DETAIL A
NOTES:

1. SIGNAL HEADS AND SIGNS MOUNTED ON THE SAME SPAN WIRE SHALL BE INSTALLED ON A LEVEL PLANE WITHIN THE HEIGHT CLEARANCE REQUIREMENT IN TA-1.

2. CONDUCTOR CABLES SHALL BE CONTINUOUS FROM THE CABINET TO THE NEAREST SIGNAL HEAD TO WHICH IT APPLIES EXCEPT CABLE TERMINATIONS MAY BE ALLOWED ON THE POLE TERMINAL STRIP WHEN REQUIRED BY THE CONTRACT DOCUMENTS. THE CABLE SHALL ALSO BE CONTINUOUS FROM THE FIRST SIGNAL HEAD TO ANY ADDITIONAL SIGNAL HEADS WITH TERMINATION ON THE TERMINALS WITHIN THE SIGNAL HEAD HOUSING.

3. SPACERS SHALL BE INSTALLED BETWEEN THE EYELET OF THE HANGER ASSEMBLY AND THE INSIDE OF THE SPAN WIRE CLAMP TO ELIMINATE ANY GAP.

4. BACKPLATES INTENTIONALLY NOT SHOWN SO EQUIPMENT DETAIL COULD BE SHOWN MORE CLEARLY.

5. SEE TA-1 FOR TETHER WIRE AND CLAMP DETAILS.
1. **Signal Heads and Signs Mounted on the Same Span Wire**: The span wire shall be installed on a level plane within the height clearance requirement in TA-1.

2. **Conductor Cables**: Cables shall be continuous from the cabinet to the nearest signal head to which it applies except cable terminations may be allowed on the pole terminal strip when required by the contract documents. The cable shall also be continuous from the first signal head to any additional signal heads with termination on the terminals within the signal head housing.

3. **Spacers**: Spacers shall be installed between the eyelet of the hanger assembly and the inside of the span wire clamp to eliminate any gap.

4. **Backplates**: Intentionally not shown so equipment detail could be shown more clearly.

5. **See TA-1 for Tether Wire and Clamp Details.**

**Notes:**

- Cable entrance head shall be positioned with the entrance hole facing the direction the signal cable is pulled from.
- Adjustable signal head leveling attachment with separate cable entry weatherhead.
- Span wire clamp to eliminate any gap.
- An approved waterproof silicone sealant shall be applied on the connection between the hanger assembly and signal head assembly.
- 8" drip loop behind signal head assembly (minimum one loop per cable).
- Extension (when required)

**Hanger Assembly Details**

A copy of the original sealed and signed drawing is on file in the central office.

**Specification Reference**: 703
NOTES:

SIGNAL HEAD CABLES SHALL BE CONTINUOUS FROM THE CONTROLLER TO THE
NEAREST SIGNAL HEAD TO WHICH IT APPLIES EXCEPT CABLE TERMINATIONS
MAY BE ALLOWED ON THE POLE TERMINAL STRIP WHEN REQUIRED BY THE
PLANS. THE CABLE SHALL ALSO BE CONTINUOUS FROM THE FIRST SIGNAL HEAD
TO ANY ADDITIONAL HEADS WITH TERMINATION ON THE TERMINALS WITHIN THE
SIGNAL HEAD HOUSING.

POLE AND HANGER ASSEMBLY
HARDWARE REQUIREMENTS

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<tr>
<th>POLE TYPE</th>
<th>HARDWARE TYPE</th>
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<tbody>
<tr>
<td>GALVANIZED STEEL</td>
<td>ALUMINUM OR GALVANIZED IRON</td>
</tr>
<tr>
<td>STEEL PAINTED ALUMINUM</td>
<td>ALUMINUM, GALVANIZED IRON OR IRON PAINTED ALUMINUM</td>
</tr>
<tr>
<td>STEEL PAINTED OTHER THAN ALUMINUM</td>
<td>ALUMINUM OR IRON PAINTED TO MATCH POLE</td>
</tr>
</tbody>
</table>

5 SECTION CLUSTER MOUNTING DETAIL

RIGID MAST ARM MOUNTING DETAILS

COVERED SLOT

LOCK WASHER

NUT

SLOTTED, GUSSETED TUBE TO BE PROVIDED
FOR SIGNAL CABLE RUN

COVER

STAINLESS STEEL CABLE

STAINLESS STEEL CABLE

COVER

CAP

COVERED SLOT

CAP
POLE TOP MOUNTING CAST ALUMINUM SIGNAL HEADS ONLY

NOTES:

1. IF PEDESTRIAN SIGNAL HEADS ARE BEING INSTALLED, THE MOUNTING ATTACHMENTS SHALL BE A TYPE SPECIFICALLY MANUFACTURED FOR THAT PURPOSE.

2. MOUNTING BRACKETS SHOWN ARE TYPICAL AND FOR ONE-WAY AND MULTI-WAY SIGNAL DISPLAYS.

3. BACKPLATES INTENTIONALLY NOT SHOWN SO EQUIPMENT DETAIL COULD BE SHOWN MORE CLEARLY.

4. SIGNAL HEADS MAY BE MOUNTED USING TRI-STUD ASSEMBLIES INSTEAD OF THE CAST NIPPLE ASSEMBLIES.
POLE TOP MOUNTING CAST ALUMINUM OR POLYCARBONATE SIGNAL HEADS

NOTES:
1. IF PEDESTRIAN SIGNAL HEADS ARE BEING INSTALLED, THE MOUNTING ATTACHMENTS SHALL BE A TYPE SPECIFICALLY MANUFACTURED FOR THAT PURPOSE.
2. MOUNTING BRACKETS SHOWN ARE TYPICAL AND FOR ONE-WAY AND MULTI-WAY SIGNAL DISPLAYS.
3. SET SCREWS SHALL BE STAINLESS STEEL.
4. SIGNAL HEADS MAY BE MOUNTED USING TRI-STUD ASSEMBLIES INSTEAD OF THE CAST NIPPLE ASSEMBLIES.
NOTES:

1. IF PEDESTRIAN SIGNAL HEADS ARE BEING INSTALLED, THE MOUNTING ATTACHMENTS SHALL BE A TYPE SPECIFICALLY MANUFACTURED FOR THAT PURPOSE.

2. MOUNTING BRACKET SHOWN IS TYPICAL AND FOR ONE-WAY SIGNAL DISPLAYS.

3. BRACKETS SHALL BE MOUNTED TO POLE WITH STAINLESS STEEL BANDS. INSTEAD OF STAINLESS STEEL BANDS, STEEL POLES MAY BE DRILLED AND TAPPED AND MOUNTING ACCOMPLISHED UTILIZING \( \frac{1}{2} \)" STAINLESS STEEL BOLTS.

4. SET SCREWS SHALL BE STAINLESS STEEL.

5. IF SMB-3 IS TO BE MOUNTED ON WOOD POLE, A CONDUIT BODY SHALL BE INSTALLED IN BRACKET ARM TO CONNECT SIGNAL HEAD CABLE CONDUIT.

6. SIGNAL HEADS MAY BE MOUNTED USING TRI-STUD ASSEMBLIES INSTEAD OF THE CAST NIPPLE ASSEMBLIES.
NOTES:
1. Wiring and rigging shall be in accordance with Standard WD-1 and WD-2.
2. Refer to Standard SMD-1 for sign panel attachment detail.
3. After the loads are applied, the vertical clearance from the highest point of the pavement surface shall be:
   A. 16' minimum (15' minimum for maintenance activities) to the lowest point of the signal head assembly (including backplate) and signs.
   B. 25' maximum to the top of the signal housing.

See Note 3

Front View Side View
Adjustable Tether Clamp

Bridle Span Attachment

Tether Wire Details

Virginia Department of Transportation
SMD-1
SPAN WIRE INSTALLATION

- LOCK WASHER
- NUT
- LOCK WASHER
- FLAT WASHER

EXTENSION SHALL BE USED WITH THE HANGER AND TETHER ASSEMBLY TO CENTER THE SIGN WITH THE SIGNAL HEADS.

SMD-2
MAST ARM INSTALLATION

- STAINLESS STEEL LOCK WASHER
- STAINLESS STEEL NUT
- STAINLESS STEEL FENDER WASHER
- NYLON WASHER

NOTES:

NUTS AND BOLTS USED FOR ATTACHMENT OF SIGN PANEL SHALL BE STAINLESS STEEL AND 3/8" IN DIAMETER.

A 1 1/4" NYLON AND STAINLESS STEEL FENDER WASHER SHALL BE USED ON THE FRONT OF SIGN PANEL WHERE BOLT PASSES THROUGH SIGN PANEL.

ALL NUTS, BOLTS AND WASHERS SHALL BE STAINLESS STEEL OR GALVANIZED STEEL UNLESS OTHERWISE INDICATED.

SPACERS SHALL BE INSTALLED BETWEEN THE EYELET OF THE SIGN HANGAR AND THE SPAN WIRE CLAMP TO ELIMINATE ANY GAP.
NOTES:

1. Concrete pad required when cabinet mounted on pole in earth areas, sized as specified in contract documents.
2. For methods approved for cable runs, see Standard WD-2.
3. All spans shall maintain the minimum clearance between pavement surface and lowest signal head, as shown by Standard MP-2.
4. A strain insulator(s) may be used to extend the length of existing span wire if a span pull is to be modified.

Span sag after loading shall be no greater than 5% of its length and no less than 3.5%.
NOTES:
1. CONCRETE PAD REQUIRED WHEN CABINET MOUNTED ON POLE IN EARTH AREAS, SIZED AS SPECIFIED ON CONTRACT DOCUMENTS.
2. ALL SPANS SHALL MAINTAIN THE MINIMUM CLEARANCE BETWEEN PAVEMENT SURFACE AND LOWEST SIGNAL HEAD, AS SHOWN BY STANDARD MP-2.
3. A STRAIN INSULATOR(S) MAY BE USED TO EXTEND THE LENGTH OF EXISTING SPAN WIRE IF A SPAN PULL IS TO BE MODIFIED.
4. CABINET SHALL BE MOUNTED TO ALLOW ADEQUATE CLEARANCE BETWEEN OPEN CABINET DOOR, GUY WIRES, AND ASSOCIATED HARDWARE.
5. CONTRACTOR SHALL FURNISH THE DESIGN OF WOOD POLE TO INCLUDE CLASS, TYPE, DEPTH, AND GUY WIRE SIZE AND PLACEMENT UNLESS OTHERWISE SPECIFIED BY CONTRACT DOCUMENTS.

METHODS APPROVED FOR CABLE RUNS
(TOP VIEW)

ANGLES LESS THAN 160°

ANGLES GREATER THAN 160°
PA-1
WOOD/CONCRETE POLE

PA-2
SIGNAL/PEDESTAL POLE

1" METAL CONDUIT
CONDUCTORS
STAINLESS STEEL POLE BANDS OR OTHER APPROVED METHOD
"C" CONDULET WITH COVER AND GASKET
1" METAL CONDUIT
CONDUCTORS
GROUNDBUSHING
GROUNDING ELECTRODE
GROUNDING LUG
GROUNDING CONDUCTOR (INCLUDED IN FOUNDATION PAY ITEM)
HANDHOLE
TO JUNCTION BOX
4" MIN.

ACCESSIBLE PEDESTRIAN SIGNAL (APS) UNIT POLE TO BE DRILLED AND TAPPED AND UNIT ATTACHED WITH STAINLESS STEEL HARDWARE.

ACCESSIBLE PEDESTRIAN SIGNAL (APS) UNIT POLE TO BE DRILLED AND TAPPED AND UNIT ATTACHED WITH STAINLESS STEEL HARDWARE.

R10-3 SERIES SIGN AS SPECIFIED IN CONTRACT DOCUMENTS

3'-4" TO 3'-10"

3'-4" TO 3'-10"

4" MIN.

4" MIN.

GROUNDING ELECTRODE
CONDUCTOR

GROUNDING ELECTRODE
CONDUCTOR (INCLUDED IN FOUNDATION PAY ITEM)

GROUNDING ELECTRODE
CONDUCTOR (INCLUDED IN FOUNDATION PAY ITEM)

FOUNDATION PAY ITEM

(INCLUDED IN FOUNDATION PAY ITEM)

FOUNDATION PAY ITEM

FOUNDATION PAY ITEM

FOUNDATION PAY ITEM

FOUNDATION PAY ITEM

FIELD DRAWING

FIELD DRAWING

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.
NOTES:

1. CONCRETE SHALL BE CLASS A3 CONCRETE OR A PREAPPROVED BAG MIX FROM THE DEPARTMENT'S PREAPPROVED LIST NO. 31.
PA-4 PEDESTAL POLE

NOTES:
1. IF POLE SHAFT SCREWS INTO TRANSFORMER BASE INSTEAD OF BEING WELDED, A MINIMUM OF THREE SET SCREWS OR OTHER APPROVED METHOD SHALL BE USED TO LOCK SHAFT IN POSITION.
2. PEDESTAL POLE SHALL HAVE A BREAKAWAY TRANSFORMER TYPE BASE. THE TRANSFORMER BASE AND NUT TIGHTENING SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
3. SEE PEDESTAL POLE STANDARDS (PF-2) FOR INSTALLATION DETAILS.
4. STRUCTURAL TUBE MATERIAL SHALL BE MINIMUM SCHEDULE 40 ALUMINUM 6061-T6.
5. CONCRETE SHALL BE CLASS AJ CONCRETE OR A PREAPPROVED BAG MIX FROM THE DEPARTMENT'S PREAPPROVED LIST NO. 31.
NOTES:
1. COUNTDOWN DISPLAYS (SP-8, SP-9) SHALL BE PROVIDED WHERE THE PEDESTRIAN CHANGE INTERVAL IS GREATER THAN 7 SECONDS.
FLAShING BEACON
INSTALLATION DETAILS

VIRGINIA DEPARTMENT OF TRANSPORTATION

NOTES:

REFER TO STANDARD MP-2 FOR GROUNDING LUG DETAIL.

ALL SIGNAL LENSES SHALL BE YELLOW AND SHALL BE 12" DIAMETER.

ALL ELBOWS AND CONDUITS SHALL HAVE SET SCREWS TO PREVENT ROTATION.

ALL CHANNELING AND CLAMPS SHALL BE GALVANIZED OR STAINLESS STEEL.

MISCELLANEOUS HARDWARE SHALL BE STAINLESS STEEL.

POST AND SIGN PANELS SHALL BE INSTALLED IN ACCORDANCE WITH SSP-VA.

A WATERPROOF SEALANT SHALL BE UTILIZED BETWEEN ELBOWS AND SIGNAL HEADS.

BREAKAWAY CONNECTORS SHALL BE INSTALLED ON THE SIGNAL CONDUCTORS WITH THE TYPE C CONDUIT. BREAKAWAY CONNECTORS SHALL BE FUSED FOR THE HOT CONDUCTOR AND NONFUSED FOR THE GROUNDED CONDUCTOR.

OPEN ENDS OF CONDUITS WITH CONDUCTORS INSTALLED SHALL BE SEALED WITH AN APPROVED SOFT, PLIABLE, AND EASILY REMOVABLE WATERPROOF SEALANT. THE SEALANT SHALL NOT HAVE A DELETERIOUS ON CABLE COVERINGS.

FOUNDATION SHALL BE IN ACCORDANCE WITH SSP-VA FOR A 4'6" x 1'9" FOUNDATION EXCEPT FOR THE FOLLOWING:

1. A 1 1/2" METAL CONDUIT SHALL BE INSTALLED FOR ELECTRICAL POWER.

2. A 1" PVC CONDUIT, NO.6 GROUNDING CONDUCTOR AND GROUNDING ELECTRODE SHALL BE INSTALLED FOR GROUNDING PURPOSES. STUB POST SHALL BE SUPPLIED WITH A GROUNDING LUG WELDED TO POST WEB.

3. FLASHING BEACON INSTALLED ON UNDIVIDED HIGHWAYS SHALL BE OF THE MEDIAN TYPE INSTALLED IN ACCORDANCE WITH STANDARD SSP-VA.
NOTES:

1. ANCHOR BOLTS SHALL BE AS PER STANDARD AB-1.

2. ANCHOR BOLT LAYOUT SHALL BE CHECKED AGAINST LATEST APPROVED STRUCTURE DRAWINGS.

A. FOR MAST ARM SIGNAL POLE FOUNDATIONS, A MINIMUM OF EIGHT (8) 2-INCH DIAMETER ANCHOR BOLTS ARE REQUIRED. TYPE A AND TYPE B POLES MAY BE INSTALLED WITH SIX (6) 2-INCH DIAMETER ANCHOR BOLTS IN THE EIGHT-BOLT DESIGN CIRCLE IF THE CONTRACTOR'S DESIGN CALCULATIONS DEMONSTRATE THAT SIX BOLTS WILL BE SUFFICIENT FOR THE DESIGN AND LOADING REQUIREMENTS.

B. FOR HIGH MAST LIGHT POLE FOUNDATIONS, A MINIMUM OF TWELVE (12) TWO-INCH DIAMETER ANCHOR BOLTS ARE REQUIRED.

3. ALL CONDUITS AS SPECIFIED IN THE CONTRACT DOCUMENTS. IN ADDITION 1'-1" MIN. CONDUIT REQUIRED FOR GROUNDING ELECTRODE CONDUCTOR. 2'-2" PVC CONDUITS REQUIRED FOR FUTURE USE. NOTE THAT ADDITIONAL SPARE CONDUITS MAY BE REQUIRED BY THE CONTRACT DOCUMENTS.

4. IN STEEP SLOPE CONDITIONS, THE 4'-0" MAXIMUM CLEARANCE ON THE DOWNSLOPE SIDE MAY BE EXCEEDED IF APPROVED BY THE ENGINEER. THE 12" MINIMUM CLEARANCE ON THE UPSLOPE SIDE SHALL NOT BE DECREASED.

5. FOUNDATION SHALL BE DESIGNED FOR TORSION. WINGS MAY BE USED FOR TORSIONAL RESISTANCE IF REQUIRED BY FOUNDATION DESIGNER. IF TORSION WINGS ARE PROVIDED, THE ANGLE BETWEEN THE TWO TORSION WINGS SHALL NORMALLY BE 180°, BUT MAY VARY FROM 90° TO 180° DEPENDING ON SITE CONDITIONS.

6. ANCHOR BOLTS AND BOLT TEMPLATE SHALL BE FURNISHED WITH POLE. POLE SHALL BE CENTERED ON FOUNDATION.

7. EACH FOUNDATION SHALL BE PERMANENTLY MARKED TO INDICATE ALL SIDES FROM WHICH CONDUITS PASS. THIS MARK SHALL BE MADE WITH A TROWEL WHEN FINISHING THE CONCRETE AND SHALL BE 1/4" DEEP AND 4" TO 6" LONG. LOCATIONS OF EMPTY CONDUITS SHALL HAVE AN ADDITIONAL 2" LONG MARK MADE PERPENDICULAR TO AND CENTERED ON THIS MARKING.

8. NO MORTAR, GROUT, OR CONCRETE SHALL BE PLACED BETWEEN BOTTOM OF BASE PLATE AND TOP OF FOUNDATION.

9. HEIGHT, WIDTH, DEPTH, AND REINFORCEMENT OF FOUNDATION SHALL BE AS REQUIRED BY FOUNDATION DESIGNER.

10. FOUNDATIONS SHALL NOT BE INSTALLED IN THE CENTER OF A DRAINAGE DITCH IF APPROVED BY THE ENGINEER. FOUNDATIONS MAY BE INSTALLED IN THE SLOPE OF A DRAINAGE DITCH AT AN APPROVED HEIGHT ABOVE GRADE. THE FOUNDATION SHALL NOT BE PLACED IN THE FRONT SLOPE UNLESS THE ENGINEER DETERMINES THAT BACK SLOPE PLACEMENT IS NOT FEASIBLE.

11. THE EDGE OF THE FOUNDATION SHALL BE 1'-0" MIN. FROM THE EDGE OF A PEDESTRIAN PATH OR 3'-0" MIN. FROM THE EDGE OF A SHARED USE PATH (SEE DETAIL B). IF APPROVED BY THE ENGINEER, FOUNDATIONS MAY BE PLACED IMMEDIATELY ADJACENT TO PEDESTRIAN PATH OR SHARED USE PATH.

12. SPREAD FOOTING MAY BE USED IF APPROVED BY THE ENGINEER.

13. SEE STANDARD VS-1 FOR VARMINT SCREEN DETAILS.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

2016 ROAD & BRIDGE STANDARDS
DETAIL A
FOUNDATION NOT ADJACENT TO PEDESTRIAN PATH DETAIL

DETAIL B
FOUNDATION ADJACENT TO PEDESTRIAN PATH DETAIL

DETAIL C
ALTERNATE FOUNDATION ADJACENT TO PEDESTRIAN PATH DETAIL (IF APPROVED BY THE ENGINEER)

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.
NOTES:
1. CONDUIT ELBOWS SHALL HAVE A 90° BEND. THE BEND RADIUS SHALL BE IN ACCORDANCE WITH THE N.E.C.

2. THE BOLT TEMPLATE SHALL BE FURNISHED BY THE LIGHTING POLE MANUFACTURER. POLE SHALL BE CENTERED ON FOUNDATION.

3. THE NUMBER, ORIENTATION AND SIZE OF CONDUITS ENTERING AND EXITING FOUNDATIONS SHALL BE AS SHOWN IN THE CONTRACT DOCUMENTS. EACH FOUNDATION SHALL BE PERMANENTLY MARKED TO INDICATE ALL SIDES FROM WHICH CONDUITS PASS. THIS MARK SHALL BE MADE WITH A TROWEL WHEN FINISHING THE CONCRETE AND SHALL BE 1/4" DEEP AND 4" TO 6" LONG. LOCATIONS OF EMPTY CONDUITS SHALL HAVE AN ADDITIONAL 2" LONG MARK MADE PERPENDICULAR TO AND CENTERED ON THIS MARKING.

4. NO MORTAR, GROUT, OR CONCRETE SHALL BE PLACED BETWEEN BOTTOM OF BASE PLATE AND TOP OF FOUNDATION.

5. ANCHOR BOLTS SHALL BE STRAIGHT. THREADED REINFORCING STEEL IS NOT ALLOWED. 1/4" ANCHOR RING PLATE MAY BE USED TO KEEP ANCHOR BOLTS PLUMB DURING INSTALLATION.

6. FOUNDATIONS SHALL NOT BE INSTALLED IN THE CENTER OF A DRAINAGE DITCH. IF APPROVED BY THE ENGINEER, FOUNDATIONS MAY BE INSTALLED IN THE SLOPE OF A DRAINAGE DITCH AT AN APPROVED HEIGHT ABOVE GRADE. THE FOUNDATION SHALL NOT BE PLACED IN THE FRONT SLOPE UNLESS THE ENGINEER DETERMINES THAT BACK SLOPE PLACEMENT IS NOT FEASIBLE.

7. D IS THE MINIMUM DISTANCE FROM THE BOTTOM OF THE POLE FOUNDATION TO THE BOTTOM OF THE SIDEWALK OR THE POINT OF LOWEST GRADED ELEVATION ADJACENT TO THE FOUNDATION.

8. IF POOR SOIL CONDITIONS OR HIGH WATER TABLE IS ENCOUNTERED DURING EXCAVATION, THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO PROCEEDING WITH FOUNDATION INSTALLATION.
NOTES:

1. If needed in sloped conditions to maintain positive drainage around the foundation and to provide the clearances shown in Detail B, the contractor shall re-grade and add retaining curb or material on the up slope when directed by the engineer. Re-grading and retaining curb shall be included in the price bid for foundation.

2. When foundation is adjacent to the back edge of sidewalk, but not within the sidewalk, the top of the foundation shall be elevated 2 inches minimum above the sidewalk grade.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.
NOTES:

1. The mounting height shown in the contract documents shall be adhered to within a tolerance of 12" and in no case less than the mounting height shown.

2. Tighten transformer base nuts with a wrench using turn-of-the-nut method unless specified otherwise in manufacturer's installation instructions.

3. LP-1 and LP-2 lighting poles shall be located such that the near side edge of the foundation is outside of the guardrail deflection distance.

4. All LP-1 and LP-2 poles shall be installed on breakaway or non-breakaway transformer bases, as specified on the plans. If leveling nuts are used for installation, a varmit screen shall be installed in accordance with standard VS-1.

5. Pole clamp shall be installed in accordance with manufacturer's installation instructions without the use of spacers or shims.

6. First and second mode vibration dampeners shall be designed and installed on all aluminum poles.

VIBRATION DAMPENERS

TRANSFORMER BASE

MOUNTING HEIGHT

NOTE 3

SEE NOTE 2

TRANSFORMER BASE

GROUNDING LUG

HINGED LATCHABLE ACCESS COVER

A MINIMUM OF FOUR 1" ANCHOR BOLTS ARE REQUIRED

NOTE 2

A MINIMUM OF FOUR 1" ANCHOR BOLTS ARE REQUIRED

NOTE 5

LUMINAIRE ARM (SEPARATE PAY ITEM)

NOTES:

1. The mounting height shown in the contract documents shall be adhered to within a tolerance of 12" and in no case less than the mounting height shown.

2. Tighten transformer base nuts with a wrench using turn-of-the-nut method unless specified otherwise in manufacturer's installation instructions.

3. LP-1 and LP-2 lighting poles shall be located such that the near side edge of the foundation is outside of the guardrail deflection distance.

4. All LP-1 and LP-2 poles shall be installed on breakaway or non-breakaway transformer bases, as specified on the plans. If leveling nuts are used for installation, a varmit screen shall be installed in accordance with standard VS-1.

5. Pole clamp shall be installed in accordance with manufacturer's installation instructions without the use of spacers or shims.

6. First and second mode vibration dampeners shall be designed and installed on all aluminum poles.

VIBRATION DAMPENERS

TRANSFORMER BASE

MOUNTING HEIGHT

NOTE 3

SEE NOTE 2

TRANSFORMER BASE

GROUNDING LUG

HINGED LATCHABLE ACCESS COVER

A MINIMUM OF FOUR 1" ANCHOR BOLTS ARE REQUIRED

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NOTES:

1. The mounting height shown in the contract documents shall be adhered to within a tolerance of 12" and in no case less than the mounting height shown.

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3. LP-1 and LP-2 lighting poles shall be located such that the near side edge of the foundation is outside of the guardrail deflection distance.

4. All LP-1 and LP-2 poles shall be installed on breakaway or non-breakaway transformer bases, as specified on the plans. If leveling nuts are used for installation, a varmit screen shall be installed in accordance with standard VS-1.

5. Pole clamp shall be installed in accordance with manufacturer's installation instructions without the use of spacers or shims.

6. First and second mode vibration dampeners shall be designed and installed on all aluminum poles.

VIBRATION DAMPENERS

TRANSFORMER BASE

MOUNTING HEIGHT

NOTE 3

SEE NOTE 2

TRANSFORMER BASE

GROUNDING LUG

HINGED LATCHABLE ACCESS COVER

A MINIMUM OF FOUR 1" ANCHOR BOLTS ARE REQUIRED

NOTE 2

A MINIMUM OF FOUR 1" ANCHOR BOLTS ARE REQUIRED

NOTE 5

LUMINAIRE ARM (SEPARATE PAY ITEM)

NOTES:

1. The mounting height shown in the contract documents shall be adhered to within a tolerance of 12" and in no case less than the mounting height shown.

2. Tighten transformer base nuts with a wrench using turn-of-the-nut method unless specified otherwise in manufacturer's installation instructions.

3. LP-1 and LP-2 lighting poles shall be located such that the near side edge of the foundation is outside of the guardrail deflection distance.

4. All LP-1 and LP-2 poles shall be installed on breakaway or non-breakaway transformer bases, as specified on the plans. If leveling nuts are used for installation, a varmit screen shall be installed in accordance with standard VS-1.

5. Pole clamp shall be installed in accordance with manufacturer's installation instructions without the use of spacers or shims.

6. First and second mode vibration dampeners shall be designed and installed on all aluminum poles.

VIBRATION DAMPENERS

TRANSFORMER BASE

MOUNTING HEIGHT

NOTE 3

SEE NOTE 2

TRANSFORMER BASE

GROUNDING LUG

HINGED LATCHABLE ACCESS COVER

A MINIMUM OF FOUR 1" ANCHOR BOLTS ARE REQUIRED

NOTE 2

A MINIMUM OF FOUR 1" ANCHOR BOLTS ARE REQUIRED

NOTE 5

LUMINAIRE ARM (SEPARATE PAY ITEM)

NOTES:

1. The mounting height shown in the contract documents shall be adhered to within a tolerance of 12" and in no case less than the mounting height shown.

2. Tighten transformer base nuts with a wrench using turn-of-the-nut method unless specified otherwise in manufacturer's installation instructions.

3. LP-1 and LP-2 lighting poles shall be located such that the near side edge of the foundation is outside of the guardrail deflection distance.

4. All LP-1 and LP-2 poles shall be installed on breakaway or non-breakaway transformer bases, as specified on the plans. If leveling nuts are used for installation, a varmit screen shall be installed in accordance with standard VS-1.

5. Pole clamp shall be installed in accordance with manufacturer's installation instructions without the use of spacers or shims.

6. First and second mode vibration dampeners shall be designed and installed on all aluminum poles.

VIBRATION DAMPENERS

TRANSFORMER BASE

MOUNTING HEIGHT

NOTE 3

SEE NOTE 2

TRANSFORMER BASE

GROUNDING LUG

HINGED LATCHABLE ACCESS COVER

A MINIMUM OF FOUR 1" ANCHOR BOLTS ARE REQUIRED

NOTE 2

A MINIMUM OF FOUR 1" ANCHOR BOLTS ARE REQUIRED

NOTE 5

LUMINAIRE ARM (SEPARATE PAY ITEM)

NOTES:

1. The mounting height shown in the contract documents shall be adhered to within a tolerance of 12" and in no case less than the mounting height shown.

2. Tighten transformer base nuts with a wrench using turn-of-the-nut method unless specified otherwise in manufacturer's installation instructions.

3. LP-1 and LP-2 lighting poles shall be located such that the near side edge of the foundation is outside of the guardrail deflection distance.

4. All LP-1 and LP-2 poles shall be installed on breakaway or non-breakaway transformer bases, as specified on the plans. If leveling nuts are used for installation, a varmit screen shall be installed in accordance with standard VS-1.

5. Pole clamp shall be installed in accordance with manufacturer's installation instructions without the use of spacers or shims.

6. First and second mode vibration dampeners shall be designed and installed on all aluminum poles.
NOTES:
1. WINCH ASSEMBLY AND CIRCUIT BREAKER TO BE ACCESSIBLE FROM HANDHOLE.
2. THE MINIMUM BASE PLATE THICKNESS SHALL BE 2".
3. SEE STANDARD AB-1 FOR ANCHOR BOLT DETAILS.
4. SEE STANDARD VS-1 FOR VARMINT SCREEN DETAILS.
5. SEE STANDARD HH-1 FOR HANDHOLE DETAILS.
6. TYPE 9 IS INTENTIONALLY OMITTED FROM THIS TABLE.

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<td>9</td>
<td>SEE NOTE 6</td>
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A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.
NOTES:
1. Local power utility company will install service cable from their power source to the top of the overhead service pole and make required splices to the cables provided.
2. Pole height and size will be as specified in the contract documents.
3. This standard is applicable for all electrical services other than 480Y/277.
4. For roadway lighting systems, only safety switch shall be used.
5. All electrical connections and splices shall be tested for electrical continuity.
6. Conduit and conductor size shall be as specified in the contract documents.
7. Rigid metal riser conduit and service cable size shall be as specified in the contract documents, or as specified by the local power company.
8. When required by the contract documents, an electrical service work pad shall be placed in front of the safety switch/breaker box. Electrical service work pad shall be a separate pay item.

ELECTRICAL SERVICE
INSTALLATION DETAILS
VIRGINIA DEPARTMENT OF TRANSPORTATION
ELECTRICAL SERVICE WORK PAD
GROUNDING LUG
90° FITTINGS AND CLOSE NIPPLES
HANDHOLE
TWO GROUNDING ELECTRODE CONDUCTORS (ONE TO SAFETY SWITCH/BREAKER BOX AND ONE TO GROUNDING LUG)
ELECTRICAL SERVICE WORK PAD (SEPARATE PAY ITEM)
TYPE A (OVERHEAD SERVICE) METAL POLE
AUGMENTED GROUNDING ELECTRODE
ELECTRICAL SERVICE GROUNDING ELECTRODE
FOUNDATION (SEPARATE PAY ITEM) MINIMUM 1" CONDUIT
JB-51 JUNCTION BOX, TOP OF JUNCTION BOX SHALL READ "VDOT ELEC".
10'-0" SEPARATION MINIMUM
4'-0" MIN.
A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.
2016 ROAD & BRIDGE STANDARDS
NOTES:

1. LOCAL POWER UTILITY COMPANY WILL INSTALL SERVICE CABLE FROM THEIR POWER SOURCE TO THE JUNCTION BOX AND MAKE REQUIRED SPLICES TO THE CABLES PROVIDED.

2. POLE HEIGHT AND SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

3. THIS STANDARD IS APPLICABLE FOR ALL ELECTRICAL SERVICES OTHER THAN 480Y/277.

4. FOR ROADWAY LIGHTING SYSTEMS, ONLY SAFETY SWITCH SHALL BE USED.

5. ALL ELECTRICAL CONNECTIONS AND SPLICES SHALL BE TESTED FOR ELECTRICAL CONTINUITY.

6. CONDUIT AND CONDUCTOR SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

7. RIGID METAL RISER CONDUIT AND SERVICE CABLE SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS, OR AS SPECIFIED BY THE LOCAL POWER COMPANY.

8. WHEN REQUIRED BY THE CONTRACT DOCUMENTS, AN ELECTRICAL SERVICE WORK PAD SHALL BE PLACED IN FRONT OF THE SAFETY SWITCH/BREAKER BOX. ELECTRICAL SERVICE WORK PAD SHALL BE A SEPARATE PAY ITEM.
NOTES:

1. LOCAL POWER UTILITY COMPANY WILL INSTALL SERVICE CABLE FROM THEIR POWER SOURCE TO THE TOP OF THE OVERHEAD SERVICE POLE AND MAKE REQUIRED SPLICES TO THE CABLES PROVIDED.

2. POLE HEIGHT AND SIZE WILL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

3. THIS STANDARD IS APPLICABLE FOR ALL ELECTRICAL SERVICES OTHER THAN 480Y/277.

4. FOR ROADWAY LIGHTING SYSTEMS, ONLY SAFETY SWITCH SHALL BE USED.

5. ALL ELECTRICAL CONNECTIONS AND SPLICES SHALL BE TESTED FOR ELECTRICAL CONTINUITY.

6. CONDUIT AND CONDUCTOR SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

7. RIGID METAL RISER CONDUIT AND SERVICE CABLE SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS, OR AS SPECIFIED BY THE LOCAL POWER COMPANY.

8. WHEN REQUIRED BY THE CONTRACT DOCUMENTS, AN ELECTRICAL SERVICE WORK PAD SHALL BE PLACED IN FRONT OF THE SAFETY SWITCH/BREAKER BOX. ELECTRICAL SERVICE WORK PAD SHALL BE A SEPARATE PAY ITEM.

9. POLE AND CONTROLLER CABINET WILL BE SEPARATE PAY ITEMS.
NOTES:

1. LOCAL POWER UTILITY COMPANY WILL INSTALL SERVICE CABLE FROM THEIR POWER SOURCE TO THE JUNCTION BOX AND MAKE REQUIRED SPLICES TO THE CABLES PROVIDED.

2. POLE HEIGHT AND SIZE WILL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

3. THIS STANDARD IS APPLICABLE FOR ALL ELECTRICAL SERVICES OTHER THAN 480Y/277.

4. FOR ROADWAY LIGHTING SYSTEMS, ONLY SAFETY SWITCH SHALL BE USED.

5. ALL ELECTRICAL CONNECTIONS AND SPLICES SHALL BE TESTED FOR ELECTRICAL CONTINUITY.

6. CONDUIT AND CONDUCTOR SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

7. RIGID METAL RISER CONDUIT AND SERVICE CABLE SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS, OR AS SPECIFIED BY THE LOCAL POWER COMPANY.

8. WHEN REQUIRED BY THE CONTRACT DOCUMENTS, AN ELECTRICAL SERVICE WORK PAD SHALL BE PLACED IN FRONT OF THE SAFETY SWITCH/BREAKER BOX. ELECTRICAL SERVICE WORK PAD SHALL BE A SEPARATE PAY ITEM.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

ELECTRICAL SERVICE
INSTALLATION DETAILS

Virginia Department of Transportation

2016 ROAD & BRIDGE STANDARDS
NOTES:

1. LOCAL POWER UTILITY COMPANY WILL INSTALL SERVICE CABLE FROM THEIR POWER SOURCE TO THE TOP OF THE OVERHEAD SERVICE POLE (FOR TYPE A OVERHEAD SERVICE) OR THE JUNCTION BOX (FOR TYPE B UNDERGROUND SERVICE) AND MAKE REQUIRED SPLICES TO THE CABLES PROVIDED.

2. POLE HEIGHT AND SIZE WILL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

3. THIS STANDARD IS APPLICABLE FOR ALL ELECTRICAL SERVICES OTHER THAN 480Y/277.

4. FOR ROADWAY LIGHTING SYSTEMS, ONLY SAFETY SWITCH SHALL BE USED.

5. ALL ELECTRICAL CONNECTIONS AND SPLICES SHALL BE TESTED FOR ELECTRICAL CONTINUITY.

6. CONDUIT AND CONDUCTOR SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS, OR AS SPECIFIED BY THE LOCAL POWER COMPANY.

8. WHEN REQUIRED BY THE CONTRACT DOCUMENTS, AN ELECTRICAL SERVICE WORK PAD SHALL BE PLACED IN FRONT OF THE SAFETY SWITCH/BREAKER BOX. ELECTRICAL SERVICE WORK PAD SHALL BE A SEPARATE PAY ITEM.

9. FITTINGS AND CLOSE NIPPLES

10. SEE NOTE 6

11. UNDERGROUND SERVICE CABLE COILED IN BOX WITH SUFFICIENT LENGTH TO ALLOW THE CABLES TO EXTEND AT LEAST 2' ABOVE THE JUNCTION BOX.

12. MINIMUM 2'' PVC CONDUIT STUBOUT (LOCATION AS REQUIRED BY UTILITY COMPANY)

13. GROUNDING ELECTRODE

14. A SEPARATE PAY ITEM.

15. PLACED IN FRONT OF THE SAFETY SWITCH/BREAKER BOX. ELECTRICAL SERVICE WORK PAD SHALL BE

16. 8. WHEN REQUIRED BY THE CONTRACT DOCUMENTS, AN ELECTRICAL SERVICE WORK PAD SHALL BE

17. 7. RIGID METAL RISER CONDUIT AND SERVICE CABLE SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

18. 6. CONDUIT AND CONDUCTOR SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

19. 5. ALL ELECTRICAL CONNECTIONS AND SPLICES SHALL BE TESTED FOR ELECTRICAL CONTINUITY.

20. 4. FOR ROADWAY LIGHTING SYSTEMS, ONLY SAFETY SWITCH SHALL BE USED.

21. 3. THIS STANDARD IS APPLICABLE FOR ALL ELECTRICAL SERVICES OTHER THAN 480Y/277.

22. 2. POLE HEIGHT AND SIZE WILL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

23. 1. LOCAL POWER UTILITY COMPANY WILL INSTALL SERVICE CABLE FROM THEIR POWER SOURCE TO THE TOP OF THE OVERHEAD SERVICE POLE (FOR TYPE A OVERHEAD SERVICE) OR THE JUNCTION BOX (FOR TYPE B UNDERGROUND SERVICE) AND MAKE REQUIRED SPLICES TO THE CABLES PROVIDED.
NOTES:

1. LOCAL POWER UTILITY COMPANY WILL INSTALL SERVICE CABLE FROM THEIR POWER SOURCE TO THE JUNCTION BOX AND MAKE REQUIRED SPLICES TO THE CABLES PROVIDED.

2. THIS STANDARD IS APPLICABLE FOR ALL ELECTRICAL SERVICES OTHER THAN 480Y/277.

3. FOR ROADWAY LIGHTING SYSTEMS, ONLY SAFETY SWITCH SHALL BE USED.

4. ALL ELECTRICAL CONNECTIONS AND SPLICES SHALL BE TESTED FOR ELECTRICAL CONTINUITY.

5. FOUNDATION SHALL BE CLASS A3 CONCRETE, 24"X24" SQUARE OR 24" DIAMETER AND 24" DEEP, AND COST OF FOUNDATION SHALL BE INCLUDED WITH THE PAY ITEM FOR ELECTRICAL SERVICE.

6. CONDUIT AND CONDUCTOR SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

7. RIGID METAL RISER CONDUIT AND SERVICE CABLE SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS, OR AS SPECIFIED BY THE LOCAL POWER COMPANY.

8. WHEN REQUIRED BY THE CONTRACT DOCUMENTS, AN ELECTRICAL SERVICE WORK PAD SHALL BE PLACED IN FRONT OF THE SAFETY SWITCH/BREAKER BOX. ELECTRICAL SERVICE WORK PAD SHALL BE A SEPARATE PAY ITEM.

9. STAINLESS STEEL BANDS REQUIRED FOR METER BASE AND SAFETY SWITCH/BREAKER BOX.

10. ANCHOR BOLTS AND BOLT TEMPLATE SHALL BE FURNISHED BY POLE MANUFACTURER, AND POLE SHALL BE CENTERED ON FOUNDATION.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.
NOTES:

1. Local power utility company will install service cable from their power source to the junction box and make required splices to the cables provided.

2. This standard is applicable for all electrical services other than 480y/277.

3. All electrical connections and splices shall be tested for electrical continuity.

4. The conduit and service cable shall extend from the cabinet to the utility junction box.

5. Conduit and conductor size shall be as specified in the contract documents.

6. Rigid metal riser conduit and service cable size shall be as specified in the contract documents, or as specified by the local power company.

7. When required by the contract documents, an electrical service work pad shall be placed in front of the safety switch/breaker box. Electrical service work pad shall be a separate pay item.
NOTES:

1. LOCAL POWER UTILITY COMPANY WILL INSTALL SERVICE POWER UTILITY CABLE FROM THEIR POWER SOURCE TO THE JUNCTION BOX AND MAKE REQUIRED SPLICES TO THE CABLES PROVIDED.

2. THIS STANDARD IS APPLICABLE FOR ALL ELECTRICAL SERVICES OTHER THAN 480Y/277.

3. FOR ROADWAY LIGHTING SYSTEMS, ONLY SAFETY SWITCH SHALL BE USED.

4. ALL ELECTRICAL CONNECTIONS AND SPLICES SHALL BE TESTED FOR ELECTRICAL CONTINUITY.

5. CONDUIT AND CONDUCTOR SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

6. RIGID METAL RISER CONDUIT AND SERVICE CABLE SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS, OR AS SPECIFIED BY THE LOCAL POWER COMPANY.

7. WHEN REQUIRED BY THE CONTRACT DOCUMENTS, AN ELECTRICAL SERVICE WORK PAD SHALL BE PLACED IN FRONT OF THE SAFETY SWITCH/BREAKER BOX. ELECTRICAL SERVICE WORK PAD SHALL BE A SEPARATE PAY ITEM.

8. RIGID MINIMUM 1" NIPPLE, THREADED AT BOTH ENDS, HELD IN PLACE WITH BONDING BUSHING AND LOCK NUT. ADDITIONAL 2" LAG SCREWS TO BE USED TO SECURE SAFETY SWITCH/BREAKER BOX AND METER BASE TO WOOD POST. FOUR SCREWS TO BE USED WITH EACH.

GROUNDING ELECTRODE CONDUCTOR TO SAFETY SWITCH/BREAKER BOX W/ STAPLES (6" CENTERS)

MINIMUM 6" X 6" WOOD POST

SAFETY SWITCH/BREAKER BOX

DRILL 1/2" HOLE IN SAFETY SWITCH FOR GROUNDING ELECTRODE CONDUCTOR. HOLE SHALL BE SEALED WITH AN APPROVED SILICONE SEALANT.

UNDERGROUND SERVICE CABLES COILED IN BOX WITH SUFFICIENT LENGTH TO ALLOW THE CABLES TO EXTEND AT LEAST 2' ABOVE THE JUNCTION BOX.

JB-S1 JUNCTION BOX, TOP OF JUNCTION BOX SHALL READ "VDOT ELEC".

MINIMUM 2" PVC CONDUIT STUBOUT (LOCATION AS REQUIRED BY UTILITY COMPANY).
NOTES:

1. LOCAL POWER UTILITY COMPANY WILL INSTALL SERVICE CABLE FROM THEIR POWER SOURCE TO THE TOP OF THE OVERHEAD SERVICE POLE (FOR TYPE A OVERHEAD SERVICE) OR THE JUNCTION BOX (FOR TYPE B UNDERGROUND SERVICE) AND MAKE REQUIRED SPLICES TO THE CABLES PROVIDED.

2. POLE HEIGHT AND SIZE WILL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

3. THIS STANDARD IS APPLICABLE FOR ALL ELECTRICAL SERVICES OTHER THAN 480Y/277.

4. FOR ROADWAY LIGHTING SYSTEMS, ONLY SAFETY SWITCH SHALL BE USED.

5. ALL ELECTRICAL CONNECTIONS AND SPLICES SHALL BE TESTED FOR ELECTRICAL CONTINUITY.

6. CONDUIT AND CONDUCTOR SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

7. RIGID METAL RISER CONDUIT AND SERVICE CABLE SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS, OR AS SPECIFIED BY THE LOCAL POWER COMPANY.

8. WHEN REQUIRED BY THE CONTRACT DOCUMENTS, AN ELECTRICAL SERVICE WORK PAD SHALL BE PLACED IN FRONT OF THE SAFETY SWITCH/BREAKER BOX. ELECTRICAL SERVICE WORK PAD SHALL BE A SEPARATE PAY ITEM.
NOTES:

1. LOCAL POWER UTILITY COMPANY WILL INSTALL SERVICE CABLE FROM THEIR POWER SOURCE TO THE CURRENT TRANSFORMER CABINET AND METER BASE THEN MAKE REQUIRED SPLICES TO THE CABLES PROVIDED.

2. THIS STANDARD IS APPLICABLE FOR 480V/277 ELECTRICAL SERVICE ONLY.

3. ALL ELECTRICAL CONNECTIONS AND SPLICES SHALL BE TESTED FOR ELECTRICAL CONTINUITY.

4. CONDUIT AND CONDUCTOR SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

5. RIGID METAL RISER CONDUIT AND SERVICE CABLE SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS, OR AS SPECIFIED BY THE LOCAL POWER COMPANY.

6. SAFETY SWITCH, METER BASE, WIREWAY, CURRENT TRANSFORMER CABINET AND CONTROL CENTER SHALL BE ATTACHED TO THE CHANNELING WITH 3/8" GALVANIZED BOLTS, LOCK WASHERS AND NUTS. FOUR CROSS CHANNELS SHALL BE UTILIZED.

7. MINIMUM 2" METAL CONDUIT SHALL BE STUBBED OUT 6" PAST CONCRETE FOUNDATION PAD. LOCATION OF THE STUBBED CONDUIT SHALL BE AS REQUIRED BY THE LOCAL POWER COMPANY.

8. THE CONTRACTOR SHALL LEAVE A SUFFICIENT AMOUNT OF CONDUCTOR CABLE COILED INSIDE THE CURRENT TRANSFORMER CABINET TO PERMIT THE LOCAL POWER COMPANY TO MAKE THEIR CONNECTION.

9. SERVICE ENTRANCE FOUNDATION, INCLUDING THE CONCRETE PAD, IS INCLUDED IN THE SE-9 PAY ITEM.

SERVICES SERVICE LOCATION DETAIL

SECTION A-A
SERVICE ENTRANCE FOUNDATION DETAIL

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

ELECTRICAL SERVICE
INSTALLATION DETAILS

VIRGINIA DEPARTMENT OF TRANSPORTATION

SE-9
2016 ROAD & BRIDGE STANDARDS
NOTES:
1. Local power utility company will install service cable from their power source to the current transformer cabinet and meter base. Then make required splices to the cables provided.

2. This standard is applicable for 480Y/277 electrical service only.

3. All electrical connections and splices shall be tested for electrical continuity.

4. Conduit and conductor size shall be as specified in the contract documents.

5. Rigid metal riser conduit and service cable size shall be as specified in the contract documents, or as specified by the local power company.

6. Safety switch, meter base, wireway, current transformer cabinet and control center shall be attached to the channeling with 1/4" galvanized bolts, lock washers and nuts. Four cross channels shall be utilized.

7. Minimum 2" metal conduit shall be stubbed out 6" past concrete foundation pad. Location of the stubbed conduit shall be as required by the local power company.

8. The contractor shall leave a sufficient amount of conductor cable coiled inside the current transformer cabinet to permit the local power company to make their connection.

9. Service entrance foundation, including the concrete pad, is included in the SE-9 pay item.
NOTES:

1. LOCAL POWER UTILITY COMPANY WILL INSTALL SERVICE CABLE FROM THEIR POWER SOURCE TO THE TOP OF THE OVERHEAD SERVICE POLE (FOR TYPE A OVERHEAD SERVICE) OR THE JUNCTION BOX (FOR TYPE B UNDERGROUND SERVICE) AND MAKE REQUIRED SPLICES TO THE CABLES PROVIDED.

2. POLE HEIGHT AND SIZE WILL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

3. THIS STANDARD IS APPLICABLE FOR ALL ELECTRICAL SERVICES OTHER THAN 480Y/277.

4. FOR ROADWAY LIGHTING SYSTEMS, ONLY SAFETY SWITCH SHALL BE USED.

5. ALL ELECTRICAL CONNECTIONS AND SPLICES SHALL BE TESTED FOR ELECTRICAL CONTINUITY.

6. CONDUIT AND CONDUCTOR SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

7. RIGID METAL RISER CONDUIT AND SERVICE CABLE SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS, OR AS SPECIFIED BY THE LOCAL POWER COMPANY.

8. WHEN REQUIRED BY THE CONTRACT DOCUMENTS, AN ELECTRICAL SERVICE WORK PAD SHALL BE PLACED IN FRONT OF THE SAFETY SWITCH/BREAKER BOX. ELECTRICAL SERVICE WORK PAD SHALL BE A SEPARATE PAY ITEM.

TYPE A (OVERHEAD SERVICE)
WOOD POLE

TYPE B (UNDERGROUND SERVICE)
WOOD POLE
NOTES:

1. LOCAL POWER UTILITY COMPANY WILL INSTALL SERVICE CABLE FROM THEIR POWER SOURCE TO THE TOP OF THE OVERHEAD POLE AND MAKE REQUIRED SPLICES TO THE CABLES PROVIDED.

2. POLE HEIGHT AND SIZE WILL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

3. THIS STANDARD IS APPLICABLE FOR ALL ELECTRICAL SERVICES OTHER THAN 480Y/277.

4. FOR ROADWAY LIGHTING SYSTEMS, ONLY SAFETY SWITCH SHALL BE USED.

5. ALL ELECTRICAL CONNECTIONS AND SPLICES SHALL BE TESTED FOR ELECTRICAL CONTINUITY.

6. EACH ELECTRICAL SERVICE FEEDER SHALL BE SEPARATED AND TAGGED IN ACCESSIBLE LOCATIONS INSIDE THE POLE TO PERMANENTLY IDENTIFY LIGHTING AND SIGNAL POWER CABLES.

7. CONDUIT AND CONDUCTOR SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

8. RIGID METAL RISER CONDUIT AND SERVICE CABLE SIZE SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS, OR AS SPECIFIED BY THE LOCAL POWER COMPANY.

9. WHEN REQUIRED BY THE CONTRACT DOCUMENTS, AN ELECTRICAL SERVICE WORK PAD SHALL BE PLACED IN FRONT OF THE SAFETY SWITCH/BREAKER BOX. ELECTRICAL SERVICE WORK PAD SHALL BE A SEPARATE PAY ITEM.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.
NOTES:

1. Local power utility company will install service cable from their power source to the junction box and make required splices to the cables provided.

2. Pole height and size will be as specified in the contract documents.

3. This standard is applicable for all electrical services other than 480Y/277.

4. For roadway lighting systems, only safety switch shall be used.

5. All electrical connections and splices shall be tested for electrical continuity.

6. Each electrical service feeder shall be separated and tagged in accessible locations inside the pole to permanently identify lighting and signal power cables.

7. Conduit and conductor size shall be as specified in the contract documents.

8. Rigid metal riser conduit and service cable size shall be as specified in the contract documents, or as specified by the local power company.

9. When required by the contract documents, an electrical service work pad shall be placed in front of the safety switch/breaker box. Electrical service work pad shall be a separate pay item.

10. Grounding electrode shall be applied between the conduit elbow from inside the pole.

11. Minimum two 90° fittings and close nipples.

12. Minimum 1" metal conduit coupling.


14. Waterproof splice box.

15. Minimum two 90° fittings and close nipples.

16. Minimum 1" metal conduit coupling.

17. Grounding bushings & locknuts.

18. Meter base.

19. Minimum 1" nipple.

20. Minimum 1" hub.


22. Grounding bushings & locknuts.

23. Minimum 2" PVC conduit stubout (location as required by utility company).

24. 72" maximum.

25. JB-S1 junction box. Top of junction box shall read "UTILITY."

26. Minimum 2" PVC conduit with sufficient length to allow the cables to extend at least 2' above the junction box.

27. Underneath service cable coiled in box.

28. 2-Minimum 1" conduits w/ conductors for signal and lighting as specified in the contract documents.

29. Electrical service — grounding electrode.

30. Minimum 1" rigid metal conduit w/ service cable.

31. Augmented grounding electrode.

32. JB-S1 junction box. Top of junction box shall read "VDOT ELEC."

33. Type B (underground service) metal pole.

34. Stainless steel band.

35. Minimum 1" rigid liquid tight flexible metal conduit couplings.

36. Minimum 1" rigid liquid tight flexible metal conduit w/ electrical service cables.

37. Feeder cable for signal.

38. Safety switch/breaker box for signal.

39. Foundation (separate pay item).

40. Handhole.

41. Minimum 1" rigid liquid tight flexible metal conduit couplings.

42. Minimum 1" rigid metal conduit couplings.

43. Minimum 1" PVC threaded conduit.

44. JB-S1 junction box. Top of junction box shall read "UTILITY."

45. Waterproof splice box.

46. Meter base.

47. Safety switch/breaker box for signal.

48. Control center for lighting (separate pay item).

49. Photoelectric control (when required).

50. Foundation (separate pay item).

51. Handhole.

52. Minimum 1" rigid liquid tight flexible metal conduit w/ electrical service cables.

53. Feeder cable for signal.

54. Safety switch/breaker box for signal.

55. Control center for lighting (separate pay item).

56. Photoelectric control (when required).

57. Foundation (separate pay item).

58. Handhole.

59. Minimum 1" rigid liquid tight flexible metal conduit w/ electrical service cables.

60. Feeder cable for signal.

61. Safety switch/breaker box for signal.

62. Control center for lighting (separate pay item).

63. Photoelectric control (when required).

64. Foundation (separate pay item).

65. Handhole.
CONTROL CENTER WIRING
DETAILS

NOTES:
ALL CIRCUIT BREAKERS SHALL BE SINGLE POLE.

VOLTAGE AND AMPERAGE RATINGS OF CONTACTORS AND BREAKERS SHALL BE AS INDICATED ON THE PLANS.

NUMBER OF CIRCUITS SHOWN ARE TYPICAL. EXACT NUMBER REQUIRED SHALL BE AS INDICATED ON THE PLANS.

* CONTACTORS SHALL BE 2 POLES FOR SINGLE PHASE AND 3 POLES FOR THREE PHASE SERVICES. NUMBER OF CONTACTORS SHALL BE AS REQUIRED TO HANDLE THE NUMBER OF CIRCUITS ACTUALLY BEING UTILIZED.
PHOTOELECTRIC CONTROL

HAND

TO SERVICE ENTRANCE SAFETY SWITCH

TIME CLOCK

CIRCUIT 1
CIRCUIT 2
CIRCUIT 3
CIRCUIT 4
CIRCUIT 5
CIRCUIT 6

TO LOADS

TIME CLOCK

CIRCUIT 1
CIRCUIT 2
CIRCUIT 3
CIRCUIT 4
CIRCUIT 5
CIRCUIT 6

TO LOADS

ALL CIRCUIT BREAKERS SHALL BE SINGLE POLE.

VOLTAGE AND AMPERAGE RATINGS OF CONTACTORS AND BREAKERS SHALL BE AS INDICATED ON THE PLANS.

NUMBER OF CIRCUITS SHOWN ARE TYPICAL, EXACT NUMBER REQUIRED SHALL BE AS INDICATED ON THE PLANS.

* CONTACTORS SHALL BE 2 POLES FOR SINGLE PHASE AND 3 POLES FOR THREE PHASE SERVICES. NUMBER OF CONTACTORS SHALL BE AS REQUIRED TO HANDLE THE NUMBER OF CIRCUITS ACTUALLY BEING UTILIZED.

TYPE E
(SINGLE PHASE)

TYPE F
(THREE PHASE)

DETAILS
CONTROL CENTER WIRING

VIRGINIA DEPARTMENT OF TRANSPORTATION

2016 ROAD & BRIDGE STANDARDS
NOTES:

* ALL CIRCUIT BREAKERS SHALL BE SINGLE POLE.

VOLTAGE AND AMPERAGE RATINGS OF CONTACTORS AND BREAKERS SHALL BE AS INDICATED ON PLANS.

NUMBER OF CIRCUITS SHOWN ARE TYPICAL, EXACT NUMBER REQUIRED SHALL BE AS INDICATED ON THE PLANS.

* CONTACTOR SHALL BE 2 POLES FOR SINGLE PHASE AND 3 POLES FOR THREE PHASE SERVICES.

NUMBER OF CONTACTORS SHALL BE AS REQUIRED TO HANDLE THE NUMBER OF CIRCUITS ACTUALLY BEING UTILIZED.

CONTROL CENTER WIRING DETAILS

VIRGINIA DEPARTMENT OF TRANSPORTATION

2016 ROAD & BRIDGE STANDARDS
NOTES:

ALL CIRCUIT BREAKERS SHALL BE SINGLE POLE.
VOLTAGE AND AMPERAGE RATING OF CONTACTORS
AND BREAKERS SHALL BE AS INDICATED ON THE PLANS.
NUMBER OF CIRCUITS SHOWN ARE TYPICAL. EXACT
NUMBER REQUIRED SHALL BE AS INDICATED ON THE PLANS.
* CONTACTORS SHALL BE 2 POLES FOR SINGLE
PHASE AND 3 POLES FOR THREE PHASE SERVICES.
NUMBER OF CONTACTORS SHALL BE AS REQUIRED TO
HANDLE THE NUMBER OF CIRCUITS ACTUALLY BEING UTILIZED.

VIRGINIA DEPARTMENT OF TRANSPORTATION
ROAD AND BRIDGE STANDARDS
2016 ROAD & BRIDGE STANDARDS

CONTROL CENTER WIRING
DETAILS

VIRGINIA DEPARTMENT OF TRANSPORTATION
2016 ROAD & BRIDGE STANDARDS
TYPICAL LOOP WIRE PLAN

SECTION B-B SAW SLOTS AND PVC CONDUITS SHALL BE A MINIMUM 6" BETWEEN ADJACENT SAW SLOTS AND CONDUITS. IF THE JUNCTION BOX WIDTH REQUIRES THE CONDUITS TO BE CLOSER THAN 6", THE CONDUITS SHALL BE 6" BETWEEN EACH OTHER AT THE END OF THE SAW SLOT AND THEN TAPERED TO THE REQUIRED SPACING AT THE JUNCTION BOX.

TYPICAL SAW SLOT DETAIL

1. SAW SLOT SHALL BE 5/8" WHEN LOOP DETECTOR CABLE ENCLOSED IN TUBING IS INSTALLED.

2. IN NEW ASPHALT CONCRETE ROADWAYS, SAW SLOTS SHALL BE CUT INTO THE BASE COURSE TO A DEPTH OF 3".

NOTES:

1. SAW SLOT SHALL BE 5/8" WHEN LOOP DETECTOR CABLE ENCLOSED IN TUBING IS INSTALLED.

2. IN NEW ASPHALT CONCRETE ROADWAYS, SAW SLOTS SHALL BE CUT INTO THE BASE COURSE TO A DEPTH OF 3".

IN EXISTING ASPHALT CONCRETE ROADWAYS WHICH ARE TO BE RESURFACED AS PART OF THE PROJECT, SAW SLOTS SHALL BE CUT INTO THE PLANED SURFACE TO A DEPTH OF 3" PRIOR TO THE OVERLAY. LOOP DETECTORS MAY BE INSTALLED THROUGH FINISHED SURFACE AS SPECIFIED IN CONTRACT DOCUMENTS. SAW SLOTS IN FINAL RIDING SURFACE SHALL HAVE A 4" MINIMUM AND 4.5" MAXIMUM DEPTH.

IN EXISTING ASPHALT CONCRETE ROADWAYS WHICH ARE NOT TO BE RESURFACED AS PART OF THE PROJECT, SAW SLOTS SHALL BE CUT INTO THE EXISTING SURFACE TO A DEPTH OF 4".

INSTALLATION OF LOOP CABLE ACROSS HYDRAULIC CEMENT CONCRETE PAVEMENT JOINTS

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

SPECIFICATION REFERENCE

703
SHOULDER SECTION

SEE NOTE 1
EDGE OF SHOULDER
DRILL THROUGH PAVEMENT
TO JUNCTION BOX

1" METAL OR PVC CONDUIT

LOOP CABLE
SAW SLOT

12"

SHOULDER PAVEMENT

TO JUNCTION BOX

CURB AND GUTTER SECTION

SEE NOTE 1
EDGE OF GUTTER
DRILL THROUGH PAVEMENT
1" METAL OR PVC CONDUIT

TO JUNCTION BOX

LOOP CABLE
SAW SLOT

12"

HYDRAULIC CEMENT OR ASPHALT CONCRETE PAVEMENT

12"

CURB SECTION (NO GUTTER)

SEE NOTE 1
EDGE OF CURB
DRILL THROUGH PAVEMENT
1" METAL OR PVC CONDUIT

TO JUNCTION BOX

SAW SLOT
LOOP CABLE

12"

ASPHALT CONCRETE OR HYDRAULIC CEMENT CONCRETE PAVEMENT

45°

NOTES:
1. THE TOP OF 1" CONDUITS SHALL BE INSTALLED 1" BELOW THE BOTTOM OF THE SAW SLOT.
2. PLASTIC BUSHINGS SHALL BE INSTALLED ON THE ENDS OF THE CONDUITS IN THE PAVEMENT. DUCT SEAL SHALL BE APPLIED TO THE OPEN END OF THE BUSHING.
3. SAW SLOTS SHALL INTERSECT WITH THE HOLES DRILLED FOR INSTALLATION OF THE CONDUITS AND LOOP CABLES.
4. DRILLED HOLES SHALL BE NO LARGER THAN ALLOWED.
5. REMOVAL OF LARGE SECTIONS OF PAVEMENT REQUIRED FOR INSTALLATION OF THE CONDUIT AND PLASTIC BUSHING.
6. ONE CONDUIT SHALL BE PROVIDED FOR EACH SAW SLOT.
7. ALL DIMENSIONS NOT SHOWN SHALL BE AS SPECIFIED ON THE CONTRACT DOCUMENTS.
NOTES:

1. ALL DIMENSIONS NOT SHOWN SHALL BE AS SPECIFIED ON THE CONTRACT DOCUMENTS.
2. LOOP WIRE TWISTED TOGETHER WITH A MINIMUM OF THREE TURNS PER RUNNING FOOT.
3. BASED ON THE LENGTH OF LEAD-IN CABLE, ADDITIONAL WIRE TURNS PER LOOP MAY BE REQUIRED AS SPECIFIED BY THE CONTRACT DOCUMENTS.
JUNCTION BOX
FOR TRAFFIC USE
VIRGINIA DEPARTMENT OF TRANSPORTATION

NOTES:
1. J-HOOK WIRE SUPPORTS SHALL BE SECURELY ATTACHED TO THE JUNCTION BOX WITH A BOLT AND NUT WITH A NEOPRENE WASHER OR AN EXPANSION FITTING. ONE J-HOOK PER WALL SHALL BE INSTALLED FOR JB-R1 AND R2 BOXES. TWO J-HOOKS PER WALL (EQUALLY SPACED) SHALL BE INSTALLED FOR JB-R3 BOXES.

2. CONDUIT ENTRANCES SHALL BE LOCATED AS SHOWN IN THE CONTRACT DOCUMENTS. CONDUITS SHALL EXTEND 2" MIN. TO 3" MAX. INTO THE INSIDE WALL OF THE JUNCTION BOX.

3. ALL REINFORCING STEEL SHALL BE IN ACCORDANCE WITH SECTION 223 OF THE SPECIFICATIONS, SHALL HAVE A MINIMUM 1/2" CONCRETE COVER. ANY REINFORCING STEEL IN CONFLICT WITH CONDUIT SHALL BE CUT A MINIMUM OF 1 1/2" FROM CONDUIT.

4. THE JUNCTION BOX MAY BE PRECAST OR CAST IN PLACE CLASS A3 CONCRETE.

5. A MINIMUM 2" DIAMETER CONDUIT ENTRANCE IS REQUIRED UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

6. A CONCRETE COLLAR IS REQUIRED ONLY WHEN JUNCTION BOX IS INSTALLED IN EARTH AREAS.

7. HIGH STRENGTH GROUT CONFORMING TO THE ROAD & BRIDGE SPECIFICATIONS SHALL BE USED TO SECURE THE FRAME TO THE JUNCTION BOX.

8. ALL JUNCTION BOXES SHALL BE INSTALLED WITH A GROUNDING ELECTRODE.

9. VOIDS RESULTING FROM ENTRANCE OF CONDUITS INTO JUNCTION BOX SHALL BE COMPLETELY FILLED WITH HYDRAULIC CEMENT GROUT CONFORMING TO THE ROAD & BRIDGE SPECIFICATIONS.

10. WHEN INSTALLED, CONDUIT STUB-OUTS SHALL EXTEND A MINIMUM OF 6" PAST THE OUTSIDE OF THE JUNCTION BOX AND SHALL BE CAPPED OR PLUGGED.
NOTES:

1. EACH COVER SECTION SHALL HAVE A NON-SKID SURFACE WITH LETTERS CAST IN THE DEPRESSION ON TOP. THE LETTERS "VDOT ELEC", "VDOT TRAFF", "VDOT COMM", "VDOT FIBER", OR "UTILITY" AS APPLICABLE ARE TO BE ONE (1) INCH WIDE AND "RAISED 1/8" HIGH. COVERS USED FOR JUNCTION BOXES INSTALLED THAT WILL BE MAINTAINED BY LOCALITIES SHALL OMIT THE WORD "VDOT".

2. FOUR RECESSED 3/8" S.S. HEX HEAD BOLTS ARE REQUIRED FOR EACH COVER.

3. GRAY IRON CASTINGS SHALL BE AS PER SECTION 224 OF THE SPECIFICATIONS.
SECTION A-A (JB-S1, S2, AND S3)

NOTES:
1. JUNCTION BOXES SHALL HAVE A STRAIGHT OR FLARED INSIDE WALL DESIGN. MATERIALS SHALL CONFORM TO SECTION 238 OF THE ROAD & BRIDGE SPECIFICATIONS.
2. CONDUIT ENTRANCES SHALL BE LOCATED AS SHOWN IN THE CONTRACT DOCUMENTS. CONDUITS SHALL EXTEND 2" MIN. TO 3" MAX. INTO THE INSIDE WALL OF THE JUNCTION BOX.
3. EACH COVER SECTION SHALL HAVE A NON-SKID SURFACE WITH LETTERS CAST IN THE DEPRESSION ON TOP OR OTHER PRE-APPROVED METHODS THAT DO NOT REQUIRE THE USE OF ADHESIVES. THE LETTERS "VDOT ELEC", "VDOT TRAF", "VDOT COMM", "VDOT FIBER", OR "UTILITY" AS APPLICABLE ARE TO BE 1" WIDE COVERS USED FOR JUNCTION BOXES INSTALLED THAT WILL BE MAINTAINED BY LOCALITIES SHALL OMIT THE WORD "VDOT".
4. ALL JUNCTION BOXES SHALL BE INSTALLED WITH A GROUNDING ELECTRODE.
5. TWO RECESSED 3/8" S.S. HEX HEAD BOLTS ARE REQUIRED FOR EACH JB-S1, S2, AND S3 COVER. FOUR RECESSED 3/8" S.S. HEX HEAD BOLTS ARE REQUIRED FOR EACH JB-S4 COVER.
6. A MINIMUM 2" DIAMETER CONDUIT ENTRANCE IS REQUIRED, UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.
7. J-HOOK WIRE SUPPORTS SHALL BE SECURELY ATTACHED TO THE JUNCTION BOX WITH A BOLT AND NUT WITH A NEOPRENE WASHER OR AN EXPANSION FITTING. ONE J-HOOK PER WALL SHALL BE INSTALLED FOR JB-S1, S2, AND S3 BOXES. TWO J-HOOKS PER WALL SHALL BE INSTALLED FOR JB-S4 BOXES.
8. VOIDS RESULTING FROM ENTRANCE OF CONDUITS INTO JUNCTION BOXES SHALL BE COMpletely FILLED WITH AN APPROVED MATERIAL.
9. CONDUIT STUB-OUTS, WHEN INSTALLED, SHALL EXTEND A MINIMUM OF 6" PAST THE OUTSIDE OF THE JUNCTION BOX.

SECTION VIEW (JB-S1, S2, AND S3)

COVER DETAIL (JB-S1, S2, AND S3)

VIRGINIA DEPARTMENT OF TRANSPORTATION
2016 ROAD & BRIDGE STANDARDS
REFERENCE SPECIFICATION

VIRGINIA DEPARTMENT OF TRANSPORTATION

JUNCTION BOX

36" MIN.

REMOVABLE SUPPORT BEAM

OPEN BOTTOM

LIFTING STRAPS (2 PLACES EACH END)

23 1/4" COVER SECTION

J-HOOK WIRE SUPPORT 6" BELOW TOP ON ALL WALLS

LEVEL AND TAMPED NO. 68, NO. 78, OR NO. 8 AGGREGATE PLACED UNDER ENTIRE EXCAVATED AREA. AGGREGATE MATERIAL SHALL BE IN PLACE PRIOR TO INSTALLING THE JUNCTION BOX.

NOTES:

1. 12" CLASS A3 CONCRETE COLLAR, CONDUIT ENTRANCES, AND GROUNDING ELECTRODE ARE OMITTED FOR CLARITY. SEE SHEET 1 OF 2 FOR DETAILS.

2. SEE SHEET 1 OF 2 FOR NOTES.

ISOMETRIC VIEW (JB-S4)

LIFT PIN FOR COVER HOOK

4 - RECESSED 3/8" S.S. HEX HEAD BOLTS

COMPACTED SOIL AROUND ALL SIDES OF BOX

46 1/4" COVER

49" FRAME

36" MIN.

12" MIN.

OPEN BOTTOM

49" SECTION

EACH END)

LIFT BOLTS TO ACCOMMODATE LIFTING STRAPS (2 PLACES EACH END)

3" TO 4"

2016 ROAD & BRIDGE STANDARDS

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

JUNCTION BOX

FOR NON-DELIBERATE TRAFFIC USE

VIRGINIA DEPARTMENT OF TRANSPORTATION

ROAD AND BRIDGE STANDARDS

SHEET 2 OF 2

1317.21

REVISION DATE

NEW 08/17

SPECIFICATION REFERENCE

700

238

2016 ROAD & BRIDGE STANDARDS
NON - PAVEMENT AND PROPOSED PAVEMENT AREA INSTALLATION

NOTES:

1. CONTRACTOR SHALL INSTALL A 2" MINIMUM TO 6" MAXIMUM WIDE RED DETECTABLE LOCATOR TAPE BETWEEN 6" AND 8" BELOW FINISHED GRADE AND DIRECTLY ABOVE BURIED CONDUIT OR DIRECT BURIAL CONDUCTOR CABLE.

2. CONDUIT INSTALLED UNDER EXISTING OR PROPOSED ROADWAYS OR SIDEWALK FOR DIRECT BURIED CABLES SHALL EXTEND 24" BEYOND THE PAVED SURFACE AND/OR SIDEWALK.

3. WHERE CONDUIT FOR POWER AND CONDUIT FOR COMMUNICATION ARE TO BE INSTALLED IN CLOSE PROXIMITY TO EACH OTHER, CONDUITS SHALL BE PLACED PARALLEL IN A COMMON TRENCH WITH NO LESS THAN 6" OF SEPARATION BETWEEN CONDUIT SYSTEMS.

4. BACKFILL MATERIAL BELOW THIS LEVEL SHALL BE SANDY FILL (FREE OF ANY STONES, CINDERS, WOOD, ROOTS, DEBRIS, ETC.).

5. ONE OR MORE CONDUITS AS REQUIRED.

6. ONE OR MORE CONDUCTOR CABLES AS REQUIRED.

7. OFFSETTING OF CONDUIT MAY BE USED FOR TYING INTO EXISTING CONDUIT SYSTEMS OR BYPASSING OBSTRUCTIONS AS DIRECTED BY THE ENGINEER.

8. WHEN OFFSETTING CONDUIT TO BYPASS AN OBSTRUCTION, THE CONDUIT SHALL MAINTAIN A MINIMUM CLEARANCE OF 12" FROM THE CLOSEST POINT OF THE OBSTRUCTION.

METHOD OF OFFSETTING CONDUIT
PROCEDURE FOR USING TABLES FOR STANDARDS WSP-1 AND STP-1:

1. SELECT MINIMUM MOUNTING HEIGHT TO BE USED (5'-0" OR 7'-0").

2. DECIDE ON NUMBER OF POSTS TO BE USED (SINGLE, TWO OR THREE).

3. CALCULATE THE AREA OF EACH SIGN PANEL \(A_1, A_2, A_3, \ldots A_n\).

4. CALCULATE THE CENTROIDAL DISTANCE FOR EACH SIGN PANEL \(H_1, H_2, H_3 \ldots H_n\).

   THE CENTROIDAL DISTANCE IS THE VERTICAL DISTANCE FROM THE REFERENCE POINT ON THE GROUND LINE TO THE CENTER OF EACH SIGN PANEL.

5. CALCULATE THE CENTROIDAL DISTANCE \(H\) FOR THE ENTIRE SIGN PANEL GROUP:

   \[ H = \frac{(A_1 H_1 + A_2 H_2 + A_3 H_3 + \ldots A_n H_n)}{(A_1 + A_2 + A_3 + \ldots A_n)} \]

6. ENTER THE APPROPRIATE TABLE BASED ON:

   THE MINIMUM MOUNTING HEIGHT SELECTED IN STEP 1

   PICK THE POST SIZE(S) TO BE REVIEWED, AND ENTERING WITH THE "H" VALUE CALCULATED IN STEP 5, READ THE MAXIMUM AREA UNDER THE SIZE OF POSTS SELECTED IN STEP 3. IF THE TOTAL AREA OF SIGN PANEL(S) TO BE SUPPORTED IS LESS THAN OR EQUAL TO THAT SHOWN IN THE TABLE(S), THE SIZE OF THE POST(S) WILL BE SATISFACTORY.

NOTES:

REFERENCE POINT FOR CALCULATING CENTROIDAL DISTANCE(S):

FOR SINGLE POST: ON GROUND LINE AT INTERSECTION OF POST
FOR TWO-POSTS: ON GROUND LINE, HALF-WAY BETWEEN POSTS
FOR THREE POSTS: ON GROUND LINE AT INTERSECTION OF CENTER POST
GENERAL NOTES:

1. WSP STANDARDS SHALL ONLY BE USED FOR TEMPORARY SIGN INSTALLATIONS THAT WILL BE IN PLACE FOR A MAXIMUM OF 36 MONTHS.

2. FOR ALL SIGNS EXCEPT STREET NAME SIGNS:
   A. MINIMUM MOUNTING HEIGHT (h) SHALL BE 7 FEET FOR TEMPORARY SIGNS AND 6 FEET FOR SECONDARY SIGNS (SEE NOTE 4).
   B. MAXIMUM MOUNTING HEIGHT (h) FOR THE BOTTOM-MOST SIGNS SHALL BE 8 FEET, EXCEPT WHEN NECESSARY TO ACHIEVE MINIMUM VERTICAL CLEARANCE BENEATH SIGN AS PER NOTE 2C.
   C. MINIMUM VERTICAL CLEARANCE (DISTANCE BETWEEN BOTTOM OF SIGN AND FINISHED GRADE BENEATH THE SIGN) SHALL BE 7 FEET FOR ANY PORTION OF THE SIGN WITHIN THE CLEAR ZONE. THIS MINIMUM VERTICAL CLEARANCE MAY BE REDUCED TO 5 FEET FOR EITHER OF THE FOLLOWING CONDITIONS:
      * WHEN SIGNS OR PORTIONS OF SIGNS ARE LOCATED MORE THAN 10 FEET UP A CUT SLOPE GREATER THAN 3:1, OR
      * WHEN THE SIGN IS LOCATED AT LEAST THE MINIMUM DISTANCE BEHIND CURB, BARRIER, OR GUARDRAIL AS PER NOTES 6 AND 7.

3. MOUNTING HEIGHT (h) FOR STREET NAME SIGNS SHALL BE BETWEEN 8'-6" AND 9'-0".

4. A SECONDARY SIGN IS CONSIDERED TO BE A SIGN MOUNTED BELOW ANOTHER SIGN, EXCEPT A ROUTE MARKING ASSEMBLY (CONSISTING OF A ROUTE MARKER WITH AN AUXILIARY PLATE) IS CONSIDERED TO BE A SINGLE SIGN. A SECONDARY SIGN SHALL NOT BE MOUNTED LOWER THAN 7 FEET ABOVE A PEDESTRIAN SIDEWALK OR PATHWAY IF IT WILL PROJECT MORE THAN 4" INTO THE PEDESTRIAN FACILITY.

5. FOR SIGNS LOCATED IN AREAS WHERE PEDESTRIAN MOVEMENTS ARE LIKELY TO OCCUR OR ON-Street PARKING IS PERMITTED, THE HEIGHT (h) FROM THE LOWEST PORTION OF THE SIGN TO THE FINISHED SURFACE SHALL HAVE A CLEARANCE OF 7 FEET.

6. THE LATERAL CLEARANCE TO THE SIGN EDGE SHALL BE A MINIMUM OF 2 FEET FROM THE FACE OF CURB OR 4 FEET FROM FACE OF PERMANENT CONCRETE BARRIER. IF PRESENT, THE EDGE OF SIGN SHALL BE OUTSIDE THE DEFLECTION ZONE FOR TRAFFIC BARRIER SERVICE.

7. UNLESS OTHERWISE APPROVED BY THE ENGINEER, SIGNS PLACED BEHIND GUARDRAIL SHALL BE LOCATED SUCH THAT THE NEAR SIDE EDGE OF THE SIGN PANEL IS OUTSIDE OF THE GUARDRAIL DEFLECTION DISTANCE.

8. THE TOP OF THE SIGN POST MAY EXTEND NO MORE THAN 2 FEET ABOVE THE TOP OF THE SIGN.

9. THE SIGN POST SHALL BE PLUMB AT INSTALLATION AND SHALL NOT LEAN OR TWIST DURING USE. IN THE EVENT THE POST LEANS OR TWISTS OUT OF POSITION THE CONTRACTOR SHALL TAKE IMMEDIATE CORRECTIVE ACTION.

10. ED-3 TYPE 2 DELINEATORS SHALL BE PLACED ON ALL POSTS DURING ALL TIMES THAT THE SIGN IS COVERED. THE COLOR OF THE ED-3 DELINEATORS SHALL MATCH THE COLOR OF THE ADJACENT EDGE LINE MARKING.

WOOD POST NOTES:

11. MINIMUM SPACING (CENTER TO CENTER) BETWEEN TWO 4" x 4" WOOD POSTS SHALL BE 3 FEET. MINIMUM SPACING (CENTER TO CENTER) BETWEEN TWO WOOD POSTS OF ANY OTHER SIZE SHALL BE 8 FEET.

SQUARE TUBE POST NOTES:

12. W = (0.60) X (SIGN WIDTH)
**INSTALLATION DETAILS**

- **Ground Line**
  - Wood post
  - 80 lbs of cementitious material shall be mixed with the excavated material and then backfilled in 6” lifts with tamping.
  - 3’ min. for 4” x 4” post, 4’ min. for all other posts.

**Set in Earth**

- Concrete
- Wood post
- Standard bituminous surface course
- Backfill material to be tamped, no concrete used.
  - 3’ min. for 4” x 4” post, 4’ min. for all other posts.

**Set in Concrete**

**METHOD OF POST DRILLING**

- Sign face
- Bottom of sign
- Wood post
- Ground line
- Slope bore holes at approx. 1/2" : 12" for drainage.

**NOTES:**

1. 6” x 6” wood post requires two 2” bore holes.
2. 6” x 8” wood post requires two 3” bore holes.
3. Posts less than 6” x 6” do not require bore holes.

**BRACING AND POST TOLERANCE DETAIL**

- Wood or square tube post
- See note 2

**NOTES:**

1. Sign widths greater than 48” shall require sign bracing conforming to standard STP-1.
2. The top of post shall be no more than 2” below and no more than 2 feet above the top of the sign.
### DESIGN TABLE FOR WOOD POST

<table>
<thead>
<tr>
<th>SIZE OF POST</th>
<th>CENTROID (FT)</th>
<th>MAXIMUM AREA (TOTAL OF SIGNS) (FT²)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SINGLE-POST</td>
<td>TWO-POST</td>
</tr>
<tr>
<td>4&quot; X 4&quot;</td>
<td>8</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>4&quot; X 6&quot; (SEE NOTE 2)</td>
<td>8</td>
<td>18</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>16</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>15</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>13</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>5&quot; X 5&quot;</td>
<td>8</td>
<td>15</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>14</td>
<td>27</td>
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<tr>
<td></td>
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<td>11</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>6&quot; X 6&quot;</td>
<td>8</td>
<td>29</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>26</td>
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<td></td>
<td>10</td>
<td>23</td>
<td>46</td>
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<td>21</td>
<td>42</td>
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<tr>
<td></td>
<td>12</td>
<td>19</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>18</td>
<td>36</td>
</tr>
<tr>
<td>6&quot; X 8&quot; (SEE NOTE 2)</td>
<td>8</td>
<td>52</td>
<td>103</td>
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<tr>
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<td>9</td>
<td>46</td>
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<td></td>
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<td>75</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>34</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>32</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>22</td>
<td>44</td>
</tr>
</tbody>
</table>

**NOTES:**

1. FOR A SINGLE 4" X 4" POST THE MAXIMUM TOTAL SIGN CAN BE INCREASED TO 16 SQUARE FEET PROVIDED:
   - A. THE MAXIMUM VERTICAL CLEARANCE BETWEEN THE GROUND LEVEL AND BOTTOM OF THE SIGN DOES NOT EXCEED 7'-6" WHILE MAINTAINING A 7'-0" MINIMUM MOUNTING HEIGHT (H) BETWEEN BOTTOM OF SIGN AND TOP OF ROADWAY SURFACE AT THE EDGE OF TRAVEL LANE.
   - B. CONTRACTOR SUPPLIES DEPARTMENT WITH MATERIALS CERTIFICATION FOR WOOD POSTS TO ENSURE CONFORMANCE WITH SECTION 236 OF THE SPECIFICATIONS.
2. LARGER DIMENSION OF WOOD POST SHALL BE IN DIRECTION OF (PARALLEL TO) TRAFFIC.
3. CENTROID SHALL BE DETERMINED IN ACCORDANCE WITH STANDARD PCS-1.
WSP-1

REFERENCE SPECIFICATION
VIRGINIA DEPARTMENT OF TRANSPORTATION

TEMPORARY SIGNS

NOTES:

SHEETING SIGN BRACING

POST CLAMP

WOOD POST

WOOD POST & BRACE (CONNECTING JUNCTION)

CLAMP DETAIL

11 GAUGE, TYPE 304, 1/2B FINISHED STAINLESS STEEL WITH STAINLESS STEEL CARRIAGE BOLT

CLAMPS CAN BE TWIST LOCKED INTO PLACE WITHOUT SLIDING THE CLAMPS FROM AN OPEN END OF THE CHANNEL BRACE

CLAMP IS TO BE Sized TO FIT THE WOOD POST

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

1. NYLON WASHER SHALL BE 1/8" THICK MINIMUM WITH AN OUTSIDE DIAMETER OF 1" AND AN INSIDE DIAMETER OF 5/8".

2. DRIVE RIVET SHALL BE 3/8" OR 5/16" ALUMINUM FLAT HEAD RIVET WITH STEEL PINS AND NYLON OR RUBBER WASHER.

3. SIGN PANEL ATTACHMENTS TO SQUARE TUBE POSTS SHALL BE AS PER STANDARD STP-1.

4. THE HEADS OF ALL DRIVE RIVETS AND BOLTS PROTRUDING FROM TEMPORARY SIGNS MAY BE UNCOATED. IF POWDER COATED, THE HEADS SHALL MATCH THE COLOR OF THE SIGN SHEETING.

5. BOLTS, NUTS, AND LOCK WASHERS SHALL BE GALVANIZED OR STAINLESS STEEL.

6. DRIVE RIVET SHALL NOT BE USED FOR SIGNS WITHOUT BRACING
WOOD POSTS NOT REQUIRING BRACING

- Nylon washer (see note 1 on sheet 4 of 7)
- 1/2" x 3" lag bolt
- Wood post

SINGLE SIGN PANEL DETAIL

- Nylon washer (see note 1 on sheet 4 of 7)
- 1/2" x length as required hex head bolt w/ flat washer, lock washer, and nylon washer under nut and a nylon washer under head
- Wood post
- Nut
- Lock washer
- Flat washer
- Sign panel

SINGLE SIGN PANEL ALTERNATE METHOD DETAIL

- Nylon washer (see note 1 on sheet 4 of 7)
- 1/2" x length as required hex head bolt w/ flat washer, lock washer, and nylon washer under nut and a nylon washer under head
- Wood post
- Nut
- Lock washer and flat washer
- Sign panel

BACK-TO-BACK SIGN PANEL DETAIL

- Nylon washer (see note 1 on sheet 4 of 7)
- 1/2" x 3" lag bolt
- Wood post

WOOD POSTS REQUIRING BRACING

- Sheet metal sign brace
- Wood post
- Post clamp
- Sign panel

SIGN PANEL ATTACHMENT DETAIL

- Sheet metal sign brace
- 1/2" x length as required twist lock t-head ss bolt (astm a276, type 304) with an aluminum quick lock adapter and 1/4" case hardened flange nut
- Wood sign post
- Lock washer
- Flat washer
- Sign panel

SIGN PANEL ALTERNATE METHOD DETAIL

- Sheet metal sign brace
- 1/2" x length as required twist lock t-head ss bolt (astm a276, type 304) with an aluminum quick lock adapter and 1/4" case hardened flange nut
- Wood sign post
- Lock washer
- Flat washer
- Sign panel

NOTES:

1. See sheet 4 of 7 for notes.
### DESIGN TABLE FOR SQUARE TUBE POST

<table>
<thead>
<tr>
<th>SIZE OF POST</th>
<th>CENTERD (FT)</th>
<th>MAXIMUM AREA (TOTAL OF SIGNS) (FT²)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SINGLE-POST</td>
<td>TWO-POST</td>
<td>THREE-POST</td>
</tr>
<tr>
<td>2 INCH 14 GA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10.7</td>
<td>21.4</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9.5</td>
<td>19.0</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8.5</td>
<td>17.0</td>
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<td>11</td>
<td>7.7</td>
<td>15.4</td>
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<tr>
<td>12</td>
<td>7.1</td>
<td>14.2</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>6.5</td>
<td>13.0</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>6.1</td>
<td>12.2</td>
<td></td>
</tr>
<tr>
<td>2½ INCH 12 GA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>21.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>19.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>17.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>15.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>14.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>13.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>12.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2½ INCH 10 GA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>24.8</td>
<td>49.6</td>
<td>74.4</td>
</tr>
<tr>
<td>9</td>
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<td>44.0</td>
<td>66.0</td>
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<td>10</td>
<td>19.8</td>
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<tr>
<td>12</td>
<td>16.5</td>
<td>33.0</td>
<td>49.5</td>
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<tr>
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<td>15.2</td>
<td>30.4</td>
<td>45.6</td>
</tr>
<tr>
<td>14</td>
<td>14.1</td>
<td>28.2</td>
<td>42.3</td>
</tr>
<tr>
<td>2½ INCH 10 GA WITH 2½ INCH 10 GA INNER POST (SEE NOTE 1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>43.4</td>
<td>86.8</td>
<td>130.2</td>
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<tr>
<td>9</td>
<td>38.6</td>
<td>77.2</td>
<td>115.8</td>
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<td>10</td>
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<tr>
<td>13</td>
<td>26.7</td>
<td>53.4</td>
<td>80.1</td>
</tr>
<tr>
<td>14</td>
<td>24.8</td>
<td>49.5</td>
<td>74.4</td>
</tr>
</tbody>
</table>

**NOTES:**

1. Inner post shall be 6 feet in length.
2. Centroid shall be determined in accordance with PCS-1.
3. Minimum cold formed yield strength shall be:
   - 14 GA and 12 GA: 60 ksi
   - 10 GA: 55 ksi
4. Type A, B, C, D, E, and F foundations shall be in accordance with standard STP-1.
## Notes:

1. Only one splice per post will be allowed.

2. Splices shall be a minimum of 24" above ground line.

3. Splices shall only be permitted for temporary installations.

4. Corner bolts shall be installed so the bolt heads are on one side of the sign post. The nut shall be on the back of the post. See splice detail.

---

### Splice Size Table

<table>
<thead>
<tr>
<th>Post Size</th>
<th>Splice Post Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; Inch, 14 Gauge</td>
<td>1¾&quot; Inch, 14 Gauge</td>
</tr>
<tr>
<td>2½&quot; Inch, 12 Gauge</td>
<td>2¼&quot; Inch, 12 Gauge</td>
</tr>
<tr>
<td>2½&quot; Inch, 10 Gauge</td>
<td>2¾&quot; Inch, 10 Gauge</td>
</tr>
</tbody>
</table>

---

A copy of the original sealed and signed drawing is on file in the central office.
MINIMUM MOUNTING HEIGHT (h) (SEE NOTE 1)

<table>
<thead>
<tr>
<th>SIGN TYPES</th>
<th>FREeways, EXPRESSways, and FULL CONTROL ACCESS HIGHWAYS</th>
<th>OTHER HIGHWAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIRECTIONAL SIGNS</td>
<td>7'</td>
<td>5'</td>
</tr>
<tr>
<td>ROUTE MARKERS, WARNING AND REGULATORY SIGNS</td>
<td>7'</td>
<td>5'</td>
</tr>
<tr>
<td>SECONDARY SIGNS (SEE NOTE 3)</td>
<td>5'</td>
<td>4'</td>
</tr>
</tbody>
</table>

4. W = (0.60) x (SIGN PANEL WIDTH)

5. SQUARE TUBE SIGN POSTS REQUIRING A BREAKAWAY SUPPORT SYSTEM SHALL BE AN FHWA APPROVED BREAKAWAY SUPPORT SYSTEM CONFORMING TO AASHTO'S STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES AND TRAFFIC SIGNALS.

6. FOR SIGNS LOCATED IN AREAS WHERE PEDESTRIAN MOVEMENTS ARE LIKELY TO OCCUR OR ON-STREET PARKING IS PERMITTED, THE HEIGHT FROM THE LOWEST PORTION OF THE SIGN PANEL TO THE FINISHED SURFACE SHALL HAVE A MINIMUM CLEARANCE OF 7 FEET.

7. THE LATERAL CLEARANCE TO THE SIGN PANEL SHALL BE A MINIMUM OF 2 FEET FROM THE FACE OF CURB OR 4 FEET FROM FACE OF BARRIER, IF PRESENT.

8. UNLESS OTHERWISE APPROVED BY THE ENGINEER, SIGNS PLACED BEHIND GUARDRAIL SHALL BE LOCATED SUCH THAT THE NEAR SIDE EDGE OF THE SIGN PANEL IS OUTSIDE OF THE GUARDRAIL DEFLECTION DISTANCE.

9. FOR SIGNS AT INTERCHANGE EXIT RAMPS, REFER TO STANDARD ISD-1.

10. 2' MINIMUM FOR MEDIANS OVER 10' N WIDTH. 12' MINIMUM FOR MEDIANS 10' OR LESS IN WIDTH UNLESS SHOWN OTHERWISE IN THE CONTRACT DOCUMENTS.

**NOTES:**

1. FOR ALL SIGNS EXCEPT STREET NAME SIGNS:
   - A. MINIMUM MOUNTING HEIGHT (h) SHALL BE IN ACCORDANCE WITH THE "MINIMUM MOUNTING HEIGHT" TABLE ON THIS SHEET. MOUNTING HEIGHT IS MEASURED FROM THE ROADWAY ELEVATION AT THE EDGE OF THE TRAVEL WAY TO THE BOTTOM OF THE SIGN PANEL.
   - B. MAXIMUM MOUNTING HEIGHT (h) FOR THE BOTTOM-MOST SIGN PANEL(S) SHALL BE 8 FEET, EXCEPT WHEN NECESSARY TO ACHIEVE MINIMUM VERTICAL CLEARANCE BENEATH SIGN PANEL AS PER NOTE 1C.
   - C. MINIMUM VERTICAL CLEARANCE (DISTANCE BETWEEN BOTTOM OF SIGN PANEL AND FINISHED GRADE BENEATH THE PANEL) SHALL BE 7 FEET FOR ANY PORTION OF THE SIGN WITHIN THE CLEAR ZONE. THIS MINIMUM VERTICAL CLEARANCE MAY BE REDUCED TO 5 FEET FOR EITHER OF THE FOLLOWING CONDITIONS:
     * WHEN SIGNS OR PORTIONS OF SIGNS ARE LOCATED MORE THAN 10 FEET UP A CUT SLOPE GREATER THAN 3:1, OR
     * WHEN THE SIGN IS LOCATED AT LEAST THE MINIMUM DISTANCE BEHIND CURB, BARRIER, OR GUARDRAIL AS PER NOTES 7 AND 8.

2. MOUNTING HEIGHT (h) FOR STREET NAME SIGNS SHALL BE BETWEEN 8'-6" AND 9'-0".

3. A SECONDARY SIGN IS CONSIDERED TO BE A SIGN MOUNTED BELOW ANOTHER SIGN, EXCEPT A ROUTE MARKER WITH AN AUXILIARY PLATE IS CONSIDERED TO BE A SINGLE SIGN. A SECONDARY SIGN SHALL NOT BE MOUNTED LOWER THAN 3 FEET ABOVE A PEDESTRIAN SIDEWALK OR PATHWAY IF IT WILL PROJECT INTO THE PEDESTRIAN FACILITY.

4. W = (0.60) x (SIGN PANEL WIDTH)

5. SQUARE TUBE SIGN POSTS REQUIRING A BREAKAWAY SUPPORT SYSTEM SHALL BE AN FHWA APPROVED BREAKAWAY SUPPORT SYSTEM CONFORMING TO AASHTO'S STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES AND TRAFFIC SIGNALS.

6. FOR SIGNS LOCATED IN AREAS WHERE PEDESTRIAN MOVEMENTS ARE LIKELY TO OCCUR OR ON-STREET PARKING IS PERMITTED, THE HEIGHT FROM THE LOWEST PORTION OF THE SIGN PANEL TO THE FINISHED SURFACE SHALL HAVE A MINIMUM CLEARANCE OF 7 FEET.

7. THE LATERAL CLEARANCE TO THE SIGN PANEL SHALL BE A MINIMUM OF 2 FEET FROM THE FACE OF CURB OR 4 FEET FROM FACE OF BARRIER, IF PRESENT.

8. UNLESS OTHERWISE APPROVED BY THE ENGINEER, SIGNS PLACED BEHIND GUARDRAIL SHALL BE LOCATED SUCH THAT THE NEAR SIDE EDGE OF THE SIGN PANEL IS OUTSIDE OF THE GUARDRAIL DEFLECTION DISTANCE.

9. FOR SIGNS AT INTERCHANGE EXIT RAMPS, REFER TO STANDARD ISD-1.

10. 2' MINIMUM FOR MEDIANS OVER 10' N WIDTH. 12' MINIMUM FOR MEDIANS 10' OR LESS IN WIDTH UNLESS SHOWN OTHERWISE IN THE CONTRACT DOCUMENTS.
## TABLE 1
FOR HAMPTON ROADS DISTRICT (SEE NOTE 5)

<table>
<thead>
<tr>
<th>Size of Post</th>
<th>Centroid (ft)</th>
<th>Maximum Area (Total of Sign Panels) [ft²]</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Single-Post</td>
<td>Two-Post</td>
</tr>
<tr>
<td>2&quot; x 14 GA.</td>
<td>8</td>
<td>5.8</td>
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<td>11</td>
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<td>3.8</td>
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<td>13</td>
<td>3.5</td>
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<td></td>
<td>14</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>2½&quot; x 12 GA.</td>
<td>8</td>
<td>11.8</td>
<td>23.6</td>
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<td></td>
<td>9</td>
<td>10.5</td>
<td>21.0</td>
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<tr>
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<td>10</td>
<td>9.4</td>
<td>18.8</td>
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<td>6.7</td>
<td>13.5</td>
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<tr>
<td>2½&quot; x 10 GA.</td>
<td>8</td>
<td>13.6</td>
<td>27.2</td>
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<td>24.2</td>
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<td>21.8</td>
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<td>16.8</td>
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<tr>
<td></td>
<td>14</td>
<td>7.8</td>
<td>15.6</td>
</tr>
<tr>
<td>2½&quot; x 10 GA. WITH 2½&quot; x 10 GA. INNER POST</td>
<td>8</td>
<td>23.9</td>
<td>47.8</td>
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<td></td>
<td>9</td>
<td>21.2</td>
<td>42.4</td>
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<td>10</td>
<td>19.1</td>
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<td></td>
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<td></td>
<td>14</td>
<td>13.6</td>
<td>27.2</td>
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</tbody>
</table>

### NOTES:
1. THE INNER POST SHALL BE 6 FEET IN LENGTH.
2. CENTROID SHALL BE DETERMINED IN ACCORDANCE WITH PCS-1.
3. MINIMUM COLD FORMED YIELD STRENGTH SHALL BE:
   - 14 GA. AND 12 GA. = 60 KSI
   - 10 GA. = 55 KSI
4. FOLLOW SIGN BRACING DETAILS (SEE SHEET 11 OF 12) FOR MAXIMUM SIGN PANEL WIDTHS AND SIGN BRACING SPACING.
5. TABLE 1 SHALL BE USED FOR THE HAMPTON ROADS DISTRICT, EXCEPT THE CITY OF EMPORIA AND COUNTIES OF GREENSVILLE, SUSSEX, AND SOUTHAMPTON SHALL USE TABLE 2.
## TABLE 2

FOR BRISTOL, SALEM, LYNCHBURG, RICHMOND, FREDERICKSBURG, CULPEPER, STAUNTON, AND NORTHERN VIRGINIA DISTRICTS (SEE NOTE 5)

<table>
<thead>
<tr>
<th>Size of Post</th>
<th>Centroid (ft)</th>
<th>Maximum Area (Total of Sign Panels) (ft²)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Single-Post</td>
<td>Two-Post</td>
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<tr>
<td>2 INCH 14 GA.</td>
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<tr>
<td></td>
<td>14</td>
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<td>12.2</td>
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<tr>
<td>2½ INCH 12 GA.</td>
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<td>19.1</td>
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<tr>
<td></td>
<td>14</td>
<td>12.3</td>
<td></td>
</tr>
<tr>
<td>2½ INCH 10 GA.</td>
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<td>24.8</td>
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<tr>
<td></td>
<td>14</td>
<td>14.1</td>
<td>28.2</td>
</tr>
<tr>
<td>2½ INCH 10 GA. WITH 2½ INCH 10 GA. INNER POST (SEE NOTE 1)</td>
<td>8</td>
<td>43.4</td>
<td>86.8</td>
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<td></td>
<td>14</td>
<td>24.8</td>
<td>49.6</td>
</tr>
</tbody>
</table>

### NOTES:

1. THE INNER POST SHALL BE 6 FEET IN LENGTH.
2. CENTROID SHALL BE DETERMINED IN ACCORDANCE WITH PCS-1.
3. MINIMUM COLD FORMED YIELD STRENGTH SHALL BE:
   - 14 GA. AND 12 GA. = 60 KSI
   - 10 GA. = 55 KSI
4. FOLLOW SIGN BRACING DETAILS (SEE SHEET 11 OF 12) FOR MAXIMUM SIGN PANEL WIDTHS AND SIGN BRACING SPACING.
5. TABLE 2 SHALL ALSO BE USED FOR THE CITY OF EMPORIA AND COUNTIES OF GREENSVILLE, SUSSEX, AND SOUTHAMPTON IN HAMPTON ROADS DISTRICT.
SQUARE TUBE SIGN POST

FOUNDATION TYPE A DETAILS

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

2"-14 GAUGE OR 2½'-12 GAUGE SQUARE TUBE POST

2½"-14 GAUGE OR 2½'-12 GAUGE SQUARE TUBE POST

ANCHOR SLEEVE BASE DETAIL

CLASS A3 CONCRETE OR A PREAPPROVED BAG MIX FROM THE DEPARTMENTS’ APPROVED LIST, NO. 31.

3½"-16 x 3½" GRADE 8 FLANGED SHOULDER BOLT WITH SERRATED FLANGE NUT
SQUARE TUBE SIGN POST

FOUNDATION TYPE B DETAILS

MATERIALS:
- 3" X 3" X 7 GAUGE ASTM A500 GRADE B TUBE
- 1" THICK ASTM A572 GRADE 50 PLATE STEEL
- GALVANIZE PER ASTM A153
- ALL WELDS TO BE 1/4" X 3/8" FILLET TYPE

CLASS A3 CONCRETE OR A PREAPPROVED BAG MIX FROM THE DEPARTMENTS' APPROVED LIST, NO. 31.

MULTI-DIRECTIONAL COMBINATION ANCHOR/SLIP BASE PLATE (SEE DETAIL)

ANCHOR/SLIP BASE PLATE
MULTI-DIRECTIONAL COMBINATION

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

2016 ROAD & BRIDGE STANDARDS
SQUARE TUBE SIGN POST

FOUNDATION TYPE C

MATERIALS:
- 1" THICK ASTM A572 GRADE 50 PLATE STEEL
- 7 GAUGE ASTM A569 PLATE
- 3" X 3" X 7 GAUGE ASTM A500 GRADE B TUBE
- 1" THICK ASTM A572 GRADE 50 PLATE STEEL FOR DRAINING THROUGH HOLE
- 0.3125" R
- 7 GAUGE ASTM A569 PLATE 60°
- 8" TRIANGULAR MULTI-DIRECTIONAL

DIRECT DRIVEN SOIL INSTALLATION.
INSTALL WITH THE WIDEST BEARING SURFACE OF THE STABILIZING WING PARALLEL WITH THE FACE OF THE SIGN.

2" LONG 3/16" STITCH WELDS EQUALLY SPACED
ALL WELDS TO BE 3/8" OR 3/16" FILLET TYPE

FOUNDATION TYPE C DETAILS
VIRGINIA DEPARTMENT OF TRANSPORTATION

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

2016 ROAD & BRIDGE STANDARDS
REVISION DATE NEW 01/15
1321.15
SLIP BASE BREAKAWAY DETAIL

MATERIALS:
TUBE RECEIVER - 3" x 3" x 7 GAUGE
ASTM A500
GRADE B TUBE
PLATE - ASTM
A572 GRADE 50

TOP POST RECEIVER/
FOR 2½" SQUARE POST

NOTES:
1. TIGHTEN THE TORQUE FREE BOLT USING THE LARGER ⅜" HEX HEAD.
   THEN LOOSEN THE BOLTS BY THREE COMPLETE TURNS USING THE ½" HEX HEAD.
   RETIGHTEN EACH TORQUE BOLT USING THE SMALLER ⅜" HEX HEAD UNTIL THE ½" HEX HEAD TWISTS OFF.

2/½" - 12 GAUGE OR
2/½" - 12 GAUGE
SQUARE TUBE SIGN POST

⅜"-16 GRADE 8 SERRATED
FLANGE NUT

⅜"-16 x 3½" GRADE 8
FLANGED SHOULDER BOLT

⅜"-13 THREADS

⅜" FLAT WASHER
⅜" - 13 GRADE 8 LARGE FLANGE NUT
MULTI-DIRECTIONAL COMBINATION
ANCHOR/ SLIP BASE PLATE
FOUNDATION B OR
MULTI-DIRECTIONAL COMBINATION
ANCHOR/ SLIP BASE PLATE - SOIL
FOUNDATION C

REDI-TORQUE MULTI-DIRECTIONAL BOLT ON SAE1035 STEEL
FORGING SLIP BASE TOP FOR 2½" SQUARE POST WITH
CAST IRON LOCKING WEDGE

⅜" HEXHEAD
⅜" HEXHEAD
⅜" HEXHEAD

⅛" X ⅜" FILLET WELD

⅛" - 13 GRADE 8
TORQUE FREE BOLT
(SEE NOTE 1)

⅛" - 13 THREADS

⅛" - 13 SST FLAT WASHER
HARDENED, TEFLON COATED
WASHER SHIM

⅛" - 13 LARGE FLANGE NUT
NOTES:

1. Excavate to a depth of no less than 8" and no greater than 12" prior to installation of drive tube foundation.

2. The excavated area shall be backfilled with a cementitious material and shall be tamped with each 6" lift.

3. The square tube post shall be inserted into the sleeve of the drive tube foundation a minimum of 12".

4. Drive cap shall be utilized for installation of drive tube foundation when using a power driver. A shank shall also be required.

<table>
<thead>
<tr>
<th>MATERIALS:</th>
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</thead>
<tbody>
<tr>
<td>GALVANIZED PER ASTM A153</td>
</tr>
<tr>
<td>3/16&quot; THICK ASTM A572</td>
</tr>
<tr>
<td>GRADE 50 PLATE STEEL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DRIVE TUBE FOUNDATION TABLE</th>
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</thead>
<tbody>
<tr>
<td>FOUNDATION TYPE</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>TYPE D</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>D</td>
</tr>
<tr>
<td>E</td>
</tr>
<tr>
<td>TYPE E</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>D</td>
</tr>
<tr>
<td>E</td>
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</tbody>
</table>
NOTES:

1. CORNER BOLTS SHALL BE 1/4" DIA. TRUSS HEAD BOLT WITH SERRATED FLANGE NUT. TWO CORNER BOLTS WILL BE REQUIRED TO CONNECT THE 2 1/2" POST SLEEVE TO THE SOIL STABILIZING PLATE.

2. EXCAVATE TO A DEPTH OF NO LESS THAN 8" AND NO GREATER THAN 12" PRIOR TO INSTALLATION OF SOIL STABILIZING PLATE FOUNDATION.

3. THE EXCAVATED AREA SHALL BE BACKFILLED WITH A CEMENTITIOUS MATERIAL AND SHALL BE TAPPED WITH EACH 6" LIFT.

4. THE 2" SQUARE TUBE POST SHALL BE INSERTED INTO THE 2 1/2" POST SLEEVE A MINIMUM OF 12".

5. DRIVE CAP SHALL BE UTILIZED FOR INSTALLATION OF DRIVE TUBE FOUNDATION. WHEN USING A POWER DRIVER, A SHANK SHALL ALSO BE REQUIRED.
SQUARE POST CLAMP & BRACE (CONNECTING JUNCTION)

ALUMINUM SIGN BRACING 2"
MOUNTING SURFACE x 1/8" DEPTH
x 1/8" NOMINAL WALL THICKNESS

6061-T6 ALUMINUM ALLOY,
PUNCHED WITH 3/16" DIAMETER
HOLES ON 6" CENTERS FOR
ATTACHMENT OF SIGN SUBSTRATE
USING SIGN PANEL 3/16" DRIVE
RIVETS, OR 3/16" DIAMETER HOLES
ON 12" CENTERS WHEN USING 3/8"
DRIVE RIVETS.

1/8" NOMINAL WALL THICKNESS

11 GAUGE, TYPE 304, #2B FINISHED
STAINLESS STEEL WITH STAINLESS
STEEL CARRIAGE BOLT

CLAMPS CAN BE TWIST LOCKED
INTO PLACE WITHOUT SLIDING THE
CLAMPS FROM AN OPEN END OF
THE CHANNEL BRACE

CLAMP IS TO BE Sized TO FIT THE
SQUARE TUBE POST, 2" OR 2½"

SQUARE POST CLAMP DETAIL

NOTES:
1. SEE SHEET 12 OF 12 FOR SIGN PANEL ATTACHMENT DETAILS.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.
NOTES:

1. SIGN PANEL WIDTHS 36" OR GREATER SHALL REQUIRE SIGN BRACING.

2. VERTICAL SPACING OF SIGN BRACING SHALL NOT EXCEED 12" FROM THE TOP OR BOTTOM EDGE OF SIGN PANEL TO FIRST BRACE AND 36" BETWEEN BRACES. IF THE SPACING BETWEEN BRACES EXCEEDS 36" THEN ADDITIONAL SIGN BRACING SHALL BE ADDED. ALL SIGN BRACING SHALL BE EQUALLY SPACED BETWEEN THE TOP AND BOTTOM BRACE. SEE DETAIL A.

3. MAXIMUM SIGN PANEL AREA PER POST TO BRACE JUNCTION SHALL BE 10 SQ. FT. ADDITIONAL SIGN BRACING SHALL BE INSTALLED IF 10 SQ. FT PER POST TO BRACE JUNCTION IS EXCEEDED.

4. ONE SPLICE PER BRACE WILL BE PERMITTED. BRACE SPLICE SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. BRACING SHALL NOT BE SPliced WITHIN 6" OF A BRACE TO POST JUNCTION, SPLICES SHALL NOT BE IN VERTICAL ALIGNMENT BUT SHALL BE OFFSET NO LESS THAN 12" FROM EACH OTHER.

5. TOP OF SIGN PANEL SHALL BE MOUNTED ⅗ TO 2" WITH THE TOP OF THE POST AND ⅗ TO 2" WITH THE SIDE OF THE SIGN BRACING. SEE DETAIL B.

6. SIGN PANEL WIDTHS SHALL NOT EXCEED MAXIMUM SPECIFIED.
NOTES:

1. NYLON WASHER SHALL BE 1/8" THICK MINIMUM WITH AN OUTSIDE DIAMETER OF 1" AND AN INSIDE DIAMETER OF 9/16".
2. DRIVE RIVET SHALL BE 3/16" OR 5/32" ALUMINUM FLAT HEAD RIVET WITH STEEL PINS AND NYLON OR RUBBER WASHER.
3. THE HEADS OF ALL DRIVE RIVETS AND HEX HEAD BOLTS SHALL BE POWDER COATED TO MATCH THE COLOR OF THE SIGN SHEETING.
4. DRIVE RIVET SHALL NOT BE USED FOR SIGNS WITHOUT BRACING.
NOTES:

1. FOR ALL SIGNS:
   A. MINIMUM MOUNTING HEIGHT (h) SHALL BE IN ACCORDANCE WITH THE "MINIMUM MOUNTING HEIGHT" TABLE ON THIS SHEET. MOUNTING HEIGHT IS MEASURED FROM THE ROADWAY ELEVATION AT THE EDGE OF THE TRAVEL WAY TO THE BOTTOM OF THE SIGN PANEL. FOR THE BOTTOM-MOST SIGN PANEL(S) SHALL BE 8 FEET, EXCEPT WHEN NEEDED TO ACHIEVE MINIMUM VERTICAL CLEARANCE BENEATH THE SIGN PANEL AS PER NOTE 1C.
   B. MAXIMUM MOUNTING HEIGHT (h) FOR THE BOTTOM-MOST SIGN PANEL(S) SHALL BE 8 FEET, EXCEPT WHEN NEEDED TO ACHIEVE MINIMUM VERTICAL CLEARANCE BENEATH THE SIGN PANEL.
   C. MINIMUM VERTICAL CLEARANCE DISTANCE BETWEEN BOTTOM OF SIGN PANEL AND FINISHED GRADE BENEATH THE PANEL SHAL BE 7 FEET FOR ANY PORTION OF THE SIGN WITHIN THE CLEAR ZONE. THIS MINIMUM VERTICAL CLEARANCE MAY BE REDUCED TO 5 FEET FOR EITHER OF THE FOLLOWING CONDITIONS:
      • WHEN SIGNS OR PORTIONS OF SIGNS ARE LOCATED MORE THAN 10 FEET UP A CUT SLOPE GREATER THAN 3:1, OR
      • WHEN THE SIGN IS LOCATED AT LEAST THE MINIMUM DISTANCE BEHIND CURB, BARRIER, OR GUARDRAIL AS PER NOTES 6 AND 7.

2. A SECONDARY SIGN IS CONSIDERED TO BE A SIGN MOUNTED BELOW ANOTHER SIGN, EXCEPT A ROUTE MARKER WITH AN AUXILIARY PLATE IS CONSIDERED TO BE A SINGLE SIGN. A SECONDARY SIGN SHALL NOT BE MOUNTED LOWER THAN 7 FEET ABOVE A PEDESTRIAN SIDEWALK OR PATHWAY IF IT WILL PROJECT INTO THE PEDESTRIAN FACILITY.

3. W = (0.60) X (SIGN PANEL WIDTH)

4. FOUR INCH SQUARE TUBE SIGN POST SHALL REQUIRE AN FHWA APPROVED BREAKAWAY SUPPORT SYSTEM CONFORMING TO MASH TESTING REQUIREMENTS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES AND TRAFFIC SIGNALS.

5. FOR SIGNS LOCATED IN AREAS WHERE PEDESTRIAN MOVEMENTS ARE LIKELY TO OCCUR OR ON-STREET PARKING IS PERMITTED, THE HEIGHT FROM THE LOWEST PORTION OF THE SIGN PANEL TO THE FINISHED SURFACE SHALL HAVE A MINIMUM CLEARANCE OF 7 FEET.

6. THE LATERAL CLEARANCE TO THE SIGN PANEL SHALL BE A MINIMUM OF 2 FEET FROM THE FACE OF CURB OR 4 FEET FROM FACE OF BARRIER, IF PRESENT.

7. UNLESS OTHERWISE APPROVED BY THE ENGINEER, SIGNS PLACED BEHIND GUARDRAIL SHALL BE LOCATED SUCH THAT THE NEAR SIDE EDGE OF THE SIGN PANEL IS OUTSIDE OF THE GUARDRAIL DEFLECTION DISTANCE.

8. FOR SIGNS AT INTERCHANGE EXIT RAMPS, REFER TO STANDARD ISD-1.

9. "MINIMUM FOR MEDIANS OVER 10' IN WIDTH. 12" MINIMUM FOR MEDIANS 10' OR LESS IN WIDTH UNLESS SHOWN OTHERWISE IN THE CONTRACT DOCUMENTS.

10. THE SIGN SHALL NOT BE INSTALLED UNTIL THE POST AND HINGE ASSEMBLY HAVE BEEN INSTALLED.
ANCHOR/SLIP BASE PLATE
MULTI-DIRECTIONAL COMBINATION
SLIP BASE
MAX. 4"

WOLF CFF AFT 1" 60°

DEPARTMENTS' APPROVED LIST, NO. 31.
A PREAPPROVED BAG MIX FROM THE CLASS A3 CONCRETE OR

FOUNDATION

STP-2
VIRGINIA DEPARTMENT OF TRANSPORTATION

REFERENCE SPECIFICATION
A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

FOUR INCH SQUARE TUBE SIGN POST
POST AND FOUNDATION DETAILS

MATERIALS:
4 1/2" X 4 1/2" X 7 GAUGE ASTM A500 GRADE B TUBE
1" THICK ASTM A572 GRADE 50 PLATE STEEL
GALVANIZE PER ASTM A153
ALL WELDS TO BE 1/4" X 3/8" FILLET TYPE

MULTI-DIRECTIONAL COMBINATION
SLIP BASE PLATE

MATERIALS:
4 1/2" X 4 1/2" X 7 GAUGE ASTM A500 GRADE B TUBE
1" THICK ASTM A572 GRADE 50 PLATE STEEL
GALVANIZE PER ASTM A153
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MATERIALS:
4 1/2" X 4 1/2" X 7 GAUGE ASTM A500 GRADE B TUBE
1" THICK ASTM A572 GRADE 50 PLATE STEEL
GALVANIZE PER ASTM A153
ALL WELDS TO BE 1/4" X 3/8" FILLET TYPE

MULTI-DIRECTIONAL COMBINATION
ANCHOR BASE PLATE

STEEL SHALL CONFORM TO ASTM A1011 GRADE 50, AND
MUST BE WELDED AND SCARFed OUTSIDE AFTER WELDING
AND THEN ZINC FLO-COAt GALVANIZED ON BOTH THE INTERIOR
AND EXTERIOR AFTER SCARFING. STEEL SHALL BE COATED
WITH A CROMATE CONVERSION COATING & CLEAR
ORGANIC POLYMER TOPCOAT.

SIGN POST

4"

8GA
0.165"

MINIMUM FOUNDATION
DIAMETER (D)
SEE TABLE

MINIMUM FOUNDATION
DEPTH (H)
SEE TABLE
SLIP BASE BREAKAWAY DETAIL

NOTES:
1. INSTALL PER MANUFACTURERS INSTRUCTIONS.
2. POST BOLTS SHALL BE TORQUED TO 100 FT-LBS.

TORQUE FREE MATCH PLATE HARDWARE
HINGE ASSEMBLY DETAILS

NOTES:
1. HINGE ASSEMBLY SHALL BE USED FOR MULTI-POST INSTALLATIONS ONLY.
2. HINGE ASSEMBLY BOLTS SHALL BE TORQUED TO 100 FT-LBS.
3. INSTALL PER MANUFACTURER'S INSTRUCTIONS.

HINGE ASSEMBLY DETAIL

SPECIFICATION REFERENCE
700
A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

FOUR INCH SQUARE TUBE SIGN POST
HINGE ASSEMBLY DETAILS

VIRGINIA DEPARTMENT OF TRANSPORTATION

ROAD AND BRIDGE STANDARDS
REVISION DATE
NEW 08/19
SHEET 5 OF 12
1321.44
**TABLE 1 - FOUNDATION AND MAXIMUM SIGN SIZES FOR HAMPTON ROADS DISTRICT**

<table>
<thead>
<tr>
<th>MAX (CENTROID FT)</th>
<th>20 SF</th>
<th>25 SF</th>
<th>30 SF</th>
<th>35 SF</th>
<th>40 SF</th>
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<th>55 SF</th>
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</table>

**NOTES:**

1. CENTROID SHALL BE DETERMINED IN ACCORDANCE WITH PCS-1.
2. FOLLOW SIGN BRACING DETAILS (SEE SHEETS 10 & 11 OF 12) FOR MAXIMUM SIGN PANEL WIDTHS AND SIGN BRACING SPACING.
3. TABLE 1 SHALL BE USED FOR THE HAMPTON ROADS DISTRICT, EXCEPT THE CITY OF EMPIRIA AND COUNTIES OF GREENSVILLE, SUSSEX, AND SOUTHAMPTON SHALL USE TABLE 2.
4. FOR FOUNDATION TYPES AND REINFORCEMENT SEE SHEET 8 OF 12.
5. FOUNDATION SIZES BASED ON TYPICAL SOILS AND L-PILE 2016 ANALYSIS.
6. SEE SHEETS 1 & 2 OF 12 FOR POST SPACING REQUIREMENTS.
7. DO NOT EXCEED MAX CENTROID HEIGHT OR CORRESPONDING SIGN AREA.

---

**ROAD AND BRIDGE STANDARDS**

**FOUR INCH SQUARE TUBE SIGN POST FOUNDATION SIZES**

**VIRGINIA DEPARTMENT OF TRANSPORTATION**
### TABLE 2 - FOUNDATION AND MAXIMUM SIGN SIZES
FOR BRISTOL, SALEM, LYNCHBURG, RICHMOND,
FREDERICKSBURG, CULPEPER, STAUNTON, AND NORTHERN
VIRGINIA DISTRICTS

<table>
<thead>
<tr>
<th>CENTROID (FT)</th>
<th>SIGN AREA</th>
<th>MAX CENTROID (FT)</th>
<th>SIGN AREA</th>
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<tr>
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<td>2'-5&quot;x5'-6&quot;</td>
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<tr>
<td></td>
<td>40 SF</td>
<td>11 2'-0&quot;x5'-6&quot;</td>
<td>2'-5&quot;x5'-6&quot;</td>
</tr>
<tr>
<td></td>
<td>45 SF</td>
<td>12 2'-0&quot;x5'-6&quot;</td>
<td>2'-5&quot;x5'-6&quot;</td>
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<td>65 SF</td>
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<td>70 SF</td>
<td>16 2'-5&quot;x6'-6&quot;</td>
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<tr>
<td></td>
<td>SIGN AREA</td>
<td>17 2'-6&quot;x7'-0&quot;</td>
<td>2'-6&quot;x7'-0&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18 2'-6&quot;x7'-0&quot;</td>
<td>2'-6&quot;x7'-0&quot;</td>
</tr>
</tbody>
</table>

| 2 POST        | 85 SF     | 10 2'-5"x5'-6"   | 2'-5"x5'-6" | 3'-0"x6'-6" |
|               | 70 SF     | 11 2'-5"x5'-6"   | 2'-5"x5'-6" | 3'-0"x6'-6" |
|               | 80 SF     | 12 SEE 1 POST TABLE |
|               | 85 SF     | 13 2'-5"x5'-6"   | 2'-5"x5'-6" | 3'-0"x6'-6" |
|               |           | 14 2'-5"x5'-6"   | 2'-5"x5'-6" | 3'-0"x6'-6" |
|               |           | 15 2'-5"x5'-6"   | 2'-5"x5'-6" | 3'-0"x6'-6" |
|               |           | 16 2'-6"x7'-0"   | 2'-6"x7'-0" | 2'-6"x7'-0" |
|               |           | 17 2'-6"x7'-0"   | 2'-6"x7'-0" | 2'-6"x7'-0" |
|               |           | 18 2'-6"x7'-0"   | 2'-6"x7'-0" | 2'-6"x7'-0" |

| 3 POST        | 90 SF     | 10 2'-0"x6'-0"   | 2'-6"x5'-6" | 2'-6"x5'-6" |
|               | 100 SF    | 11 2'-0"x6'-0"   | 2'-6"x5'-6" | 2'-6"x5'-6" |
|               | 110 SF    | 12 2'-0"x6'-0"   | 2'-6"x5'-6" | 2'-6"x5'-6" |
|               | 120 SF    | 13 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               | 130 SF    | 14 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               | 140 SF    | 15 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               |           | 16 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               |           | 17 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               |           | 18 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |

| 4 POST        | 150 SF    | 10 2'-6"x5'-6"   | 2'-6"x5'-6" | 2'-6"x5'-6" |
|               | 160 SF    | 11 2'-6"x5'-6"   | 2'-6"x5'-6" | 2'-6"x5'-6" |
|               | 170 SF    | 12 2'-6"x5'-6"   | 2'-6"x5'-6" | 2'-6"x5'-6" |
|               | 175 SF    | 13 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               | 185 SF    | 14 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               |           | 15 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               |           | 16 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               |           | 17 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               |           | 18 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |

| 5 POST        | 190 SF    | 10 2'-6"x5'-6"   | 2'-6"x5'-6" | 2'-6"x5'-6" |
|               | 195 SF    | 11 2'-6"x5'-6"   | 2'-6"x5'-6" | 2'-6"x5'-6" |
|               | 200 SF    | 12 2'-6"x5'-6"   | 2'-6"x5'-6" | 2'-6"x5'-6" |
|               |           | 13 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               |           | 14 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               |           | 15 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               |           | 16 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               |           | 17 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |
|               |           | 18 2'-6"x6'-6"   | 2'-6"x6'-6" | 3'-0"x8'-6" |

### NOTES:
1. CENTROID SHALL BE DETERMINED IN ACCORDANCE WITH PCS-1.
2. FOLLOW SIGN BRACING DETAILS (SEE SHEETS 10 & 11 OF 12) FOR MAXIMUM SIGN PANEL WIDTHS AND SIGN BRACING SPACING.
3. TABLE 2 SMALL ALSO BE USED FOR THE CITY OF EMPIRIA AND COUNTIES OF GREENSVILLE, SUSSEX, AND SOUTHAMPTON IN HAMPTON ROADS DISTRICT.
4. FOR FOUNDATION TYPES AND REINFORCEMENT SEE SHEET 8 OF 12.
5. FOUNDATION SIZES BASED ON TYPICAL SOILS AND L-PILE 2016 ANALYSIS.
6. SEE SHEET 1 & 2 OF 12 FOR POST SPACING REQUIREMENTS.
7. DO NOT EXCEED MAX CENTROID HEIGHT OR CORRESPONDING SIGN AREA.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

FOUR INCH SQUARE TUBE SIGN POST
FOUNDATION SIZES

VIRGINIA DEPARTMENT OF TRANSPORTATION
## Foundation Types

<table>
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<tr>
<th>Foundation Type</th>
<th>Option A</th>
<th>Option B</th>
<th>Welded Wire Mesh</th>
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<td>Dia (D)</td>
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<td>Length</td>
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<td>5 8</td>
<td>4 7 6'-0&quot; 5'-6&quot;</td>
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<td>B 2'-0&quot; 7'-0&quot; 6'-6&quot;</td>
<td>6 8</td>
<td>4 8 6'-0&quot; 6'-6&quot;</td>
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<td>C 2'-0&quot; 7'-6&quot; 7'-0&quot;</td>
<td>7 8</td>
<td>4 8 6'-0&quot; 7'-0&quot;</td>
<td>42</td>
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<td>D 2'-0&quot; 8'-0&quot; 7'-6&quot;</td>
<td>7 8</td>
<td>4 9 6'-0&quot; 7'-6&quot;</td>
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</tr>
<tr>
<td>E 2'-0&quot; 8'-6&quot; 8'-0&quot;</td>
<td>7 8</td>
<td>4 10 6'-0&quot; 8'-0&quot;</td>
<td>48</td>
</tr>
<tr>
<td>F 2'-6&quot; 5'-6&quot; 5'-0&quot;</td>
<td>5 8</td>
<td>4 6 7'-7&quot; 5'-0&quot;</td>
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<td>G 2'-6&quot; 6'-0&quot; 5'-6&quot;</td>
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<td>4 7 7'-7&quot; 5'-6&quot;</td>
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<td>4 10 7'-7&quot; 9'-0&quot;</td>
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<td>4 8 9'-0&quot; 5'-6&quot;</td>
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<td>6 8</td>
<td>4 7 9'-0&quot; 6'-0&quot;</td>
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</tbody>
</table>

### Notes:
1. For foundation sizes see Table 1 (Sheet 6 of 12) and Table 2 (Sheet 7 of 12).

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**Foundation Types and Reinforcement**

Four Inch Square Tube Sign Post

Virginia Department of Transportation

A Copy of the original sealed and signed drawing is on file in the central office.
3. STANDARD SPD-2 SIGNS WILL BE PERMITTED FOR STP-2 STRUCTURES.
NOTES:
1. SIGN PANEL WIDTHS 36" OR GREATER SHALL REQUIRE SIGN BRACING.
2. VERTICAL SPACING OF SIGN BRACING SHALL NOT EXCEED 12" FROM THE TOP OR BOTTOM EDGE OF SIGN PANEL TO FIRST BRACE AND 36" BETWEEN BRACES. IF THE SPACING BETWEEN BRACES EXCEEDS 36" THEN ADDITIONAL SIGN BRACING SHALL BE ADDED. ALL SIGN BRACING SHALL BE EQUALLY SPACED BETWEEN THE TOP AND BOTTOM BRACE. SEE DETAIL A.
3. MAXIMUM SIGN PANEL AREA PER POST TO BRACE JUNCTION SHALL BE 10 SQ. FT. ADDITIONAL SIGN BRACING SHALL BE INSTALLED IF 10 SQ. FT PER POST TO BRACE JUNCTION IS EXCEEDED.
4. ONE SPLICE PER BRACE WILL BE PERMITTED. BRACE SPLICE SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. BRACING SHALL NOT BE SPICED WITHIN 6" OF A BRACE TO POST JUNCTION. SPLICES SHALL NOT BE IN VERTICAL ALIGNMENT BUT SHALL BE OFFSET NO LESS THAN 12" FROM EACH OTHER.
5. TOP OF SIGN PANEL SHALL BE MOUNTED 1/2" TO 2" WITH THE TOP OF THE POST AND 1/2" TO 1" WITH THE SIDE OF THE SIGN BRACING. SEE DETAIL B.
6. POST LENGTHS FOR MULTI-POST SIGNS SHALL BE SIGN PANEL HEIGHT PLUS 6".
THREE POST - BRACING DIAGRAM
TYPICAL - THREE BRACE

FOUR POST - BRACING DIAGRAM
TYPICAL - THREE BRACE

FIVE POST - BRACING DIAGRAM
TYPICAL - THREE BRACE

NOTES:
SEE SHEET 1321.49 FOR ALL NOTES AND DETAILS NOT SHOWN.
NOTES:

1. NYLON WASHER SHALL BE \( \frac{1}{8} \)" THICK MINIMUM WITH AN OUTSIDE DIAMETER OF 1" AND AN INSIDE DIAMETER OF \( \frac{3}{8} \)".

2. DRIVE RIVET SHALL BE \( \frac{3}{8} \)" OR \( \frac{1}{2} \)" ALUMINUM FLAT HEAD RIVET WITH STEEL PINS AND NYLON OR RUBBER WASHER.

3. DRIVE RIVET SHALL NOT BE USED FOR SIGNS WITHOUT BRACING.
NOTES:
1. FOUNDATION LOCATIONS SHALL BE APPROVED BY ENGINEER PRIOR TO INSTALLATION IN ACCORDANCE WITH SECTION 700.

2. MAXIMUM MOUNTING HEIGHT (h) FOR THE BOTTOM-MOST SIGN PANEL(S) SHALL BE 8 FEET, EXCEPT WHEN NECESSARY TO ACHIEVE MINIMUM VERTICAL CLEARANCE BENEATH THE SIGN PANEL AS PER NOTE 3.

3. MINIMUM VERTICAL CLEARANCE (DISTANCE BETWEEN BOTTOM OF SIGN PANEL AND FINISHED GRADE BENEATH THE PANEL) SHALL BE 7 FEET FOR ANY PORTION OF THE SIGN WITHIN THE CLEAR ZONE. THIS MINIMUM VERTICAL CLEARANCE MAY BE REDUCED TO 5 FEET FOR EITHER OF THE FOLLOWING CONDITIONS:
   - WHEN SIGNS OR PORTIONS OF SIGNS ARE LOCATED MORE THAN 10 FEET UP A CUT SLOPE GREATER THAN 3:1, OR
   - WHEN THE SIGN IS LOCATED AT LEAST THE MINIMUM DISTANCE BEHIND CURB, BARRIER, OR GUARDRAIL AS PER NOTE 4.

4. THE LATERAL CLEARANCE TO THE SIGN PANEL SHALL BE A MINIMUM OF 2 FEET FROM THE FACE OF CURB OR 4 FEET FROM FACE OF BARRIER, IF PRESENT, UNLESS OTHERWISE APPROVED BY THE ENGINEER. SIGNS PLACED BEHIND GUARDRAIL SHALL BE LOCATED SUCH THAT THE NEAR SIDE EDGE OF THE SIGN PANEL IS OUTSIDE OF THE GUARDRAIL DEFLECTION DISTANCE.
**SIGN POST AND FOUNDATION DETAILS**

<table>
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<tr>
<th>STRUCTURE TYPE</th>
<th>SIGN PANEL DIMENSIONS</th>
<th>SIGN POST</th>
<th>POST LENGTH DIMENSIONS (SEE NOTES 1 &amp; 2)</th>
<th>FOUNDATION DIMENSIONS</th>
<th>WELDED WIRE MESH</th>
<th>STEEL BASE PLATE</th>
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<tr>
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<td>W x H</td>
<td>POST LENGTH</td>
<td>DIAMETER</td>
<td>LENGTH</td>
<td>SQ. FT.</td>
<td>T (THICKNESS)</td>
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<td>3' x 3'</td>
<td>S3 x 5.7</td>
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<td>1'-0&quot;</td>
<td>2'-6&quot;</td>
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<tr>
<td>VA-B</td>
<td>4' x 4'</td>
<td>S4 x 6.5</td>
<td>12'-2&quot;</td>
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<td>1'-0&quot;</td>
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<td>4' x 5'</td>
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<td>1'-9&quot;</td>
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<td>7' x 7'</td>
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<td>VA-O</td>
<td>13' x 5'</td>
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</table>

**NOTES:**

1. POST LENGTH IS FOR ESTIMATING PURPOSES ONLY. THE CONTRACTOR SHALL DETERMINE THE ACTUAL POST LENGTH AT THE FIELD LOCATION OF THE SIGN STRUCTURE BASED ON FINISHED GRADE ELEVATION.

2. TOTAL POST LENGTH QUANTITY - LENGTH OF POST ABOVE THE BOLT KEEPER PLATE + THE FOUNDATION STUB POST LENGTH (2'-0")

**A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.**

**VA SIGN STRUCTURE INSTALLATION DETAILS**

**VIRGINIA DEPARTMENT OF TRANSPORTATION**

**2016 ROAD & BRIDGE STANDARDS**
VA SIGN STRUCTURE
INSTALLATION DETAILS

SECTION A-A
FOR W6 x 12 POST

SECTION A-A
FOR W4 x 13 POST

SECTION A-A
FOR S3 x 5.7 POST

STANDARD INSTALLATION

DIRECTION OF TRAFFIC

SIGN POST

TOP OF FOUNDATION AT CENTERLINE OF POST

PLATE

BOLT KEEPER

5/8" R (TYP.)

1/2 TOP PLATE
1/2 BOTTOM PLATE

BASE PLATE

7"

5 1/2"

T

BOLTS WITH A TORQUE OF 155 INCH POUNDS.

TYPE VA-A, USE 1 5/8" DIAMETER HIGH STRENGTH BOLTS WITH HEX HEAD AND HEX NUT AND 3 WASHERS EACH. STAINLESS STEEL OR ASTM A325 BOLTS TO BE INSTALLED WITH TORQUE OF 450 INCH LBS. FOR TYPE VA-A, USE 1/2" DIAMETER HIGH STRENGTH BOLTS WITH A TORQUE OF 155 INCH POUNDS.

MEDIAN ONLY INSTALLATION

DIRECTION OF TRAFFIC

SIGN POST

TOP OF FOUNDATION AT CENTERLINE OF POST

PLATE

BOLT KEEPER

5/8" R (TYP.)

1/2 TOP PLATE
1/2 BOTTOM PLATE

BASE PLATE

7"

5 1/2"

T

BOLTS WITH A TORQUE OF 155 INCH POUNDS.

TYPE VA-A, USE 1 5/8" DIAMETER HIGH STRENGTH BOLTS WITH HEX HEAD AND HEX NUT AND 3 WASHERS EACH. STAINLESS STEEL OR ASTM A325 BOLTS TO BE INSTALLED WITH TORQUE OF 450 INCH LBS. FOR TYPE VA-A, USE 1/2" DIAMETER HIGH STRENGTH BOLTS WITH A TORQUE OF 155 INCH POUNDS.

PLATES TO BE SAME MATERIAL AS POST

REMOVE ALL GALVANIZING RUNS OR BEADS IN WASHER AREA

FOUNDATION Stub POST
(SAME SIZE AS SIGN POST)

FOR SIGN POST PAYMENT LIMIT

BOULD KEEPER PLATE

5/8" R (TYP.)
NOTES:
1. 4" maximum projection when measured above a 60" chord aligned radially to the centerline of the highway and connecting any point, within the length of the chord, on the ground surface on the other side.
2. See standard SSP-VIA for shim detail.

METHOD TO DETERMINE MAXIMUM PROJECTION OF FOUNDATION STUB POST

BOLT KEEPER PLATE DATA

<table>
<thead>
<tr>
<th>POST SHAPE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<td>7 1/4&quot;</td>
<td>5 1/4&quot;</td>
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<tr>
<td>W6 x 12</td>
<td>7 1/4&quot;</td>
<td>7&quot;</td>
<td>3/4&quot;</td>
<td>1 1/2&quot;</td>
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</table>

6061-T6 ALUMINUM ALLOY

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.
NOTES:

1. FOUNDATION LOCATIONS SHALL BE APPROVED BY ENGINEER PRIOR TO INSTALLATION IN ACCORDANCE WITH SECTION 700.

2. MINIMUM VERTICAL CLEARANCE (DISTANCE BETWEEN BOTTOM OF SIGN PANEL AND FINISHED GRADE BENEATH THE PANEL) SHALL BE 7 FEET FOR ANY PORTION OF THE SIGN WITHIN THE CLEAR ZONE. THIS MINIMUM VERTICAL CLEARANCE MAY BE REDUCED TO 5 FEET FOR EITHER OF THE FOLLOWING CONDITIONS:
   - WHEN SIGNS OR PORTIONS OF SIGNS ARE LOCATED MORE THAN 10 FEET UP A CUT SLOPE GREATER THAN 3:1, OR
   - WHEN THE SIGN IS LOCATED AT LEAST THE MINIMUM DISTANCE BEHIND CURB, BARRIER, OR GUARDRAIL AS PER NOTE 6.

3. SIGN PANEL SHALL BE DESIGNED IN ACCORDANCE WITH SPD-2, SPD-3 OR SPD-7.

4. THE VERTICAL T-BEAM SHALL BE 2"W X 2"D X 1/4" THICK STRUCTURAL ALUMINUM ALLOY 6061-T6 AT A MINIMUM LENGTH OF 6'-0" AND EXTENDED TO THE NEXT HORIZONTAL SUPPORT BAR ON THE SSP-VIA STRUCTURE.

5. THE T-BEAM SHALL BE ATTACHED TO THE SSP-VIA STRUCTURE BY THE FOLLOWING METHODS:
   - T-BEAM FOR THE SPD-2 SIGN PANEL SHALL BE ATTACHED BY USING A MINIMUM OF TWO POST CLIP BOLTS AT EACH CROSS MEMBER.
   - T-BEAM FOR THE SPD-3 SIGN PANEL SHALL BE ATTACHED BY USING TWO ASTM F593, ALLOY 304 STAINLESS STEEL 1/4" DIAMETER-16 UNC BOLT WITH STAINLESS STEEL NUT AND FLAT WASHER AT ZEE BAR CONNECTIONS AND TWO POST CLAMP AND BOLT AT EACH TEE-BAR CONNECTION.
   - T-BEAM FOR THE SPD-7 SIGN PANEL SHALL BE ATTACHED BY USING A MINIMUM OF TWO POST CLAMP AND POST CLAMP BOLTS AT EACH STIFFENER.

6. THE LATERAL CLEARANCE TO THE SIGN PANEL SHALL BE A MINIMUM OF 2 FEET FROM THE FACE OF CURB OR 4 FEET FROM FACE OF BARRIER, IF PRESENT, UNLESS OTHERWISE APPROVED BY THE ENGINEER. SIGNS PLACED BEHIND GUARDRAIL SHALL BE LOCATED SUCH THAT THE NEAR SIDE EDGE OF THE SIGN PANEL IS OUTSIDE OF THE GUARDRAIL DEFLECTION DISTANCE.
FURNISH 2 EACH 3/8” GALVANIZED BOLT WITH HEX HEAD, HEX NUT AND 2 WASHERS FOR EACH BOLT.

5’ COPE FOR SHAPES WEIGHING MORE THAN 12 LB/FT. NO COPE FOR OTHERS.

SIGN POST AND FOUNDATION STUB POST ELEVATION

NOTES:
1. ALL POST LENGTHS SHALL BE FIELD CHECKED BY CONTRACTOR PRIOR TO FABRICATION.
SHIM DETAIL

PLATE THICKNESS = b

FURNISH 2 EACH .063" AND 2 EACH .032"
THICK SHIMS PER POLE. SHIMS SHALL BE FABRICATED
FROM BRASS CONFORMING TO ASTM B36 OR FROM STAINLESS
STEEL WITH A MINIMUM CHROMIUM CONTENT OF 11.50%
NO MORE THAN 2 SHIMS SHALL BE USED PER BOLT WITH A
MAXIMUM OF 4 SHIMS PER POST.

HINGE PLATE DETAIL

HOLE DIA = BOLT DIA ± 1/6"
CENTERLINE OF
SAW CUT
CENTERLINE OF POST

PLATE THICKNESS = b

FUSE PLATE DETAIL

ALTERNATE BOLT KEEPER PLATE

0.040 THICKNESS
6061-T6 ALUMINUM ALLOY
HOLE DIA = BOLT DIA ± 1/6"

STIFFENER PLATE

BOAT KEEPER PLATE

ROAD AND BRIDGE STANDARDS

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

VIRGINIA DEPARTMENT OF TRANSPORTATION

2016 ROAD & BRIDGE STANDARDS

SPECIFICATION
REFERENCE
700

1323.12
01/15
### Connection Base Reference Specification

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<th>Bar H</th>
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</table>

### Notes:

1. 4" maximum projection when measured above a 60" chord aligned radially to the centerline of the highway and connecting any point, within the length of the chord, on the ground surface on the other side.

### Method to Determine Maximum Projection of Foundation Stub Post

- **Maximum Projection of Foundation Stub Post**

### Interstate Sign Structure Installation Details

**Specification Reference**: VIRGINIA DEPARTMENT OF TRANSPORTATION

**2016 Road & Bridge Standards**

**Revision Date**: 01/15

**Sheet 4 of 10**

**1323.13**
<table>
<thead>
<tr>
<th>SIGN STRUCTURE TYPE VIA</th>
<th>SIGN PANEL DIMENSIONS</th>
<th>POST SHAPE</th>
<th>POST LENGTH (SEE NOTE 1)</th>
<th>ANCHOR BOLTS</th>
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<td>W H</td>
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<tr>
<td><strong>B</strong></td>
<td>12' 6'</td>
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**NOTES:**

1. POST LENGTH IS FOR ESTIMATING PURPOSES ONLY. THE CONTRACTOR SHALL DETERMINE THE ACTUAL POST LENGTH AT THE FIELD LOCATION OF THE SIGN STRUCTURE BASED ON FINISHED GRADE ELEVATION.

2. TOTAL POST LENGTH QUANTITY = LENGTH OF POST ABOVE THE BOLT KEEPER PLATE + THE FOUNDATION STUB POST LENGTH (2'-9").
### SIGN STRUCTURE TYPE VIA

<table>
<thead>
<tr>
<th>VIA</th>
<th>POST PANEL DIMENSIONS</th>
<th>POST LENGTH (SEE NOTE 1)</th>
<th>ANCHOR BOLTS</th>
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<td>ZZ</td>
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**NOTES:**

1. POST LENGTH IS FOR ESTIMATING PURPOSES ONLY. THE CONTRACTOR SHALL DETERMINE THE ACTUAL POST LENGTH AT THE FIELD LOCATION OF THE SIGN STRUCTURE BASED ON FINISHED GRADE ELEVATION.

2. TOTAL POST LENGTH QUANTITY = LENGTH OF POST ABOVE THE BOLT KEEPER PLATE + THE FOUNDATION STUB POST LENGTH (2'-9").
### Interstate Sign Structure
#### Installation Details

**Table:**

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<tr>
<th>Sign Structure Type VIA</th>
<th>Sign Panel Dimensions</th>
<th>Post Shape</th>
<th>Post Length (See Note 1)</th>
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**Notes:**
1. Post length is for estimating purposes only. The contractor shall determine the actual post length at the field location of the sign structure based on finished grade elevation.
2. Total post length quantity = length of post above the bolt keeper plate + the foundation stub post length (2'-9'').

---

**Specification Reference:**

2016 ROAD & BRIDGE STANDARDS

**Road and Bridge Standards**

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

**Interstate Sign Structure**

**Installation Details**

Virginia Department of Transportation
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<th>SIGN STRUCTURE TYPE VIA</th>
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<th>BASE CONNECTION DATA TABLE</th>
<th>FUSE AND HINGE PLATE DATA TABLE</th>
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### SUPPORT

#### BASE CONNECTION DATA TABLE

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TYPICAL NOTES: SEE SHEET 1 FOR DETAILS

1. 1½" DIAMETER WIRE INLETS SHALL BE PROVIDED AT THE FOLLOWING LOCATIONS:
   A. ON SPAN STRUCTURES ON THE FRONT LEG OF END POLE 12" BELOW BOTTOM CHORD.
   B. ON CANTILEVER AND BUTTERFLY STRUCTURES ON POLE 12" BELOW BOTTOM CHORD.
   C. ON SPAN STRUCTURES ON THE UNDERSIDE OF THE BOTTOM CHORD AT CENTERLINE BEHIND FIRST SIGN PANEL FROM EACH END POLE.
   D. ON CANTILEVER AND BUTTERFLY STRUCTURES ON THE UNDERSIDE OF THE BOTTOM CHORD AT CENTERLINE BEHIND FIRST SIGN PANEL FROM POLE.

2. ALL UNUSED WIRE INLETS SHALL BE CAPPED WATER TIGHT.

3. OVERHEAD SIGN STRUCTURE POLES SHALL BE LOCATED SUCH THAT THE NEAR SIDE EDGE OF THE FOUNDATION IS OUTSIDE OF THE GUARDRAIL DEFLECTION DISTANCE.

4. NO MORTAR, GROUT, OR CONCRETE SHALL BE PLACED BETWEEN BOTTOM OF BASE PLATE AND TOP OF PEDESTAL.

5. VERTICAL CLEARANCE FOR OVERHEAD SIGN STRUCTURES SHALL BE AS FOLLOWS:
   A. CANTILEVER OR SPAN SIGN STRUCTURE:
      17'-6" FROM BOTTOM OF LOWEST LUMINAIRE ASSEMBLY (OR BOTTOM OF SIGN PANEL IF NO SIGN LIGHTING IS PRESENT) TO HIGHEST POINT OF THE TRAVEL LANES OR SHOULDER.
   B. BUTTERFLY SIGN STRUCTURE THAT OVERHANGS THE TRAVEL LANE, SHOULDER OR MEDIAN:
      17'-6" FROM BOTTOM OF LUMINAIRE ASSEMBLY (OR BOTTOM OF SIGN PANEL IF NO SIGN LIGHTING IS PRESENT) TO THE HIGHEST POINT OF THE PORTION OF THE ROAD SURFACE OR MEDIAN THAT IS UNDERNEATH THAT SIGN.
   C. BUTTERFLY SIGN STRUCTURE THAT DOES NOT OVERHANG THE TRAVEL LANE, SHOULDER OR MEDIAN:
      14'-6" FROM BOTTOM OF LUMINAIRE ASSEMBLY (OR BOTTOM OF SIGN PANEL IF NO SIGN LIGHTING IS PRESENT) TO THE HIGHEST POINT OF THE ROAD SURFACE FOR THE TRAVEL LANES OR SHOULDER IN THAT DIRECTION OF TRAVEL.

6. ALL SIGN PANELS SHALL BE A MAXIMUM OF 21'-0" FROM THE BOTTOM OF SIGN PANELS TO THE HIGHEST POINT OF THE TRAVEL LANE OR SHOULDER FOR THAT DIRECTION OF TRAVEL.

7. TOP OF FOUNDATIONS SHALL BE 2'-0" MINIMUM ABOVE FINISHED GRADE. FOUNDATIONS ADJACENT OR WITHIN A SIDEWALK, TOP OF FOUNDATIONS SHALL BE A MINIMUM OF 3" ABOVE FINISHED GRADE.

8. FOUNDATIONS SHALL NOT BE LOCATED IN THE BASE OR SIDES OF DRAINAGE DITCHES.

9. EACH HORIZONTAL CHORD SHALL BE ATTACHED TO A POLE.

10. SEE STANDARD HH-1 FOR HANDHOLE DETAILS.

11. SEE STANDARD VS-1 FOR VARMINT SCREEN DETAILS.

12. A "J" HOOK FOR WIRE SUPPORT SHALL BE PLACED NEAR ALL HANDHOLES THAT ARE LOCATED MORE THAN 4 FEET UP THE STRUCTURE.

13. ALL SIGN STRUCTURES SHALL BE DESIGNED TO SUPPORT THE FUTURE ADDITION OF ONE CCTV CAMERA AT THE TOP CORNER OF ONE COLUMN, AND THE FUTURE ADDITION OF ONE 500-POUND POLE MOUNTED CABINET ATTACHED TO ONE COLUMN, UNLESS SUCH DEVICES ARE ALREADY REQUIRED IN THE CONTRACT DOCUMENTS. SEE STANDARD MP-3 FOR CCTV CAMERA DEAD LOAD AND SURFACE AREA REQUIREMENTS.

TYPICAL SOCKETED BASE PLATE CONNECTION

NOTES:

1. ALL OVERHEAD SIGN STRUCTURES HAVING A SINGLE POLE, OR A SINGLE POLE AT EACH END, SHALL HAVE A MINIMUM OF EIGHT (8) TWO-INCH DIAMETER (MINIMUM) ANCHOR BOLTS. STRUCTURES WITH MORE THAN ONE POLE AT EACH END SHALL HAVE A MINIMUM OF FOUR (4) TWO-INCH DIAMETER (MINIMUM) ANCHOR BOLTS PER POLE.

2. ALL END POLE COLUMNS SHALL BE JOINED TO THE BASE PLATE USING A SOCKETED CONNECTION OR FULL Pénétration GROOVE WELD WITH A BACKING RING.

3. SEE STANDARD AB-1 FOR TYPICAL ANCHOR BOLT DETAILS.
NOTES:
1. All secondary members in both tubular and non-tubular structures in the overhead truss and the end pole supports shall be joined to primary members using a gusset connection plate.
2. Contractor shall specify the width, length, and thickness of gusset plate.
3. Contractor shall specify the minimum weld size and length of weld.
4. Cope holes to be provided at both ends and both faces of all secondary member connections.
NOTES:

1. Future use conduits placed parallel to the roadway.

2. Future use conduits placed at an angle to miss the back foundation or anchor bolts in a spread footing foundation.

3. The type, size, number and orientation of conduits entering and exiting footings may vary per sign location.

4. In addition to the conduits specified on the plans, one - 1" conduit required for ground wire and two - 2" PVC heavy wall conduits required for future use. Future use conduits shall be stubbed out and capped. Future use conduits shall be oriented to run parallel to the roadway. For location of future use conduits in foundations for double end pole structures, see drawing at right.

5. Each foundation shall be permanently marked to indicate all sides from which conduits pass. This mark shall be made with a trowel when finishing the concrete and shall be 1/4" deep and 4" to 6" long. Locations of empty conduits shall have an additional 2" long mark made perpendicular to and centered on this mark.

6. No mortar, grout, or concrete shall be placed between bottom of base plate and top of foundation.
1. A SAFETY SWITCH SHALL BE INSTALLED ON ALL SIGN STRUCTURES REQUIRING ELECTRICAL POWER. ELECTRICAL SERVICE FOR SIGN STRUCTURES NOT CONTROLLED BY A CONTROL CENTER SHALL HAVE A PHOTOCCELL AND A PHOTOCCELL CONTROLLED CONTACTOR TO CONTROL THE ELECTRICAL POWER TO LUMINAIRES. THE CONTACTOR SHALL BE IN A NEMA 3R ENCLOSURE.

2. ALL CONDUIT LOCATED IN OR ON OVERHEAD SIGN STRUCTURE SHALL BE 3⁄8" MINIMUM.
1. Isolation washer or gasket shall be provided between aluminum and steel surfaces.

2. Sign panels shall be standard SPD-1 or SPD-2.

3. Top of sign shall be tilted towards traffic using shims, welding a short piece of W6x9 or WT3x4.5 to the vertical sign hanger, or by an other approved method so that the sign face is approximately 3° from vertical.

**OVERHEAD SIGN STRUCTURE**

**SIGN HANGER DETAILS**

**REFERENCE SPECIFICATION**

**ROAD AND BRIDGE STANDARDS**

**OVERHEAD SIGN STRUCTURE**

**SIGN HANGER DETAILS**

**REFERENCE SPECIFICATION**

**ROAD AND BRIDGE STANDARDS**

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**OVERHEAD SIGN STRUCTURE**

**SIGN HANGER DETAILS**

**REFERENCE SPECIFICATION**

**ROAD AND BRIDGE STANDARDS**
NOTES:

1. LUMINAIRE RETRIEVAL SYSTEM, WHERE REQUIRED IN THE CONTRACT DOCUMENTS, SHALL BE DESIGNED FOR THE NUMBER OF LUMINARES INDICATED IN THE CONTRACT DOCUMENTS. SPACING OF HANGERS USED TO SUPPORT THE RETRIEVAL SYSTEM SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. TURNTABLE END SHALL BE OF SUFFICIENT LENGTH TO ALIGN WITH THE VERTICAL EDGE OF THE OUTSIDE PAVED SHOULDER (+8") OR SHALL BE EXTENDED 5 FEET BEYOND THE VERTICAL EDGE (+8") OF THE OUTERMOST SIGN LUMINAIRE, WHICHER IS GREATER. THE OPPOSITE END OF THE RETRIEVAL SYSTEM SHALL EXTEND A MINIMUM OF 6 INCHES PAST THE OUTERMOST VERTICAL EDGE OF THE SIGN HANGER ARM.

2. LUMINARES, WHERE REQUIRED IN THE CONTRACT DOCUMENTS, SHALL BE INSTALLED AND AIMED AS PER MANUFACTURER'S RECOMMENDATIONS.

3. ISOLATION WASHER OR GASKET SHALL BE PROVIDED BETWEEN ALUMINUM AND STEEL SURFACES.

SECTION D-D

LUMINAIRE MOUNTING BRACKET (1/4" THICK, SIZED TO FIT LUMINAIRE), LUMINAIRE TO BE ATTACHED TO MOUNTING BRACKET WITH FOUR, 3/8" DIA. GALVANIZED CAP SCREWS, LOCKWASHERS AND NUTS.
Section A-A

All installations except top and bottom Zee bars on overhead signs

3/8" diameter rivet - rivets shall be dome head, break mandrel, blind rivets conforming to Industrial Fasteners Institute Standard IFI-114, Style 1, Grades 10 or 11 except that the minimum ultimate tensile strength shall be 360 pounds. Rivets shall have a grip range accommodating the combined thickness of the sign panel and Zee bar and shall be installed in accordance with the manufacturer's recommendations.

NOTE: Dimensions "C" and "D" are measured to center of rivet or carriage bolt.

Section B-B

Top and bottom Zee bar installation on overhead signs

ASTM F593, Alloy 304 stainless steel 3/8" diameter - 1" UNC X 3/8" length carriage bolt with stainless steel nut and flat washer.

0.010" thick aluminum backing strip (material same as sign panel).

Rivet (same as used for connecting sign to Zee bar). In lieu of using rivets, tape equal to 3M's VHB double coated acrylic foam tape may be used except on horizontal backing strip. Tape shall be installed in accordance with the manufacturer's recommendations.

Specification Reference

A copy of the original sealed and signed drawing is on file in the central office.

2016 Road & Bridge Standards

Road and Bridge Standards

Revision Date 09/18

Sheet 1 of 2

Virginia Department of Transportation

2016 Road & Bridge Standards
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*SIGN PANEL DESIGN*

*DIMENSIONS "c" AND "d" ARE MEASURED TO CENTER OF RIVET OR CARRIAGE BOLT*

*A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.*

**REFERENCE**

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**2016 ROAD & BRIDGE STANDARDS**
THE REFLECTIVE SHEETING APPLIED TO EXTRUDED PANELS SHALL EXTEND APPROX. 1/4" OVER EACH SIDE IN THE NARROW DIRECTION AND SHALL BE ADHERED TO THE PANEL. 12,000"

SEE DETAIL A

EXPOSED SURFACE

.250" R (.220" R) (.084"
.125" (.081"

WALL THICKNESS = .088" EXCEPT AS NOTED (FULL R)

.094" (.125"

.875" (.966"

.410"

.687"

.875" (.966"

DETAIL A

FULL PANEL

.084"

.125" R

.500"

.90"

.250" R

.084"

.125"

.410"

.687"

.084"

DETAIL C

NOTES:

1. ALUMINUM PANELS MAY HAVE SQUARE CORNERS OR NOTCHED CORNERS AS SHOWN. NO OTHER TYPE CORNERS ARE ACCEPTABLE.

2. ALTERNATE DIMENSIONS INDICATED IN PARENTHESES ARE ACCEPTABLE.

HALF PANEL

SEE DETAIL B

.250" R (.125"

.250" R (.088"

SEE DETAIL C

WALL THICKNESS = .088" EXCEPT AS NOTED (FULL R)
NOTE:
1. DOUBLE POST CLIPS SHALL BE INSTALLED ON ALL SIGN HANGERS, EXCEPT ON OVERHEAD SIGN STRUCTURES WHERE CARRIAGE BOLTS ARE REQUIRED.
2. ALL SIGN PANELS INSTALLED ON OVERHEAD SIGN STRUCTURES SHALL BE BOLTED DIRECTLY TO THE SIGN HANGER MEMBERS AT THE BOTTOM AND TOP ROW IN ACCORDANCE WITH DETAIL E. POST CLIPS SHALL BE USED AT ALL OTHER MOUNTING POINTS.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.
### SIGN PANEL DESIGN

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<td>22'</td>
<td>10'</td>
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<tr>
<td>SIGN PANEL DIMENSIONS</td>
<td>SIGN PANEL ATTACHMENT DETAILS</td>
</tr>
<tr>
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<td>--------------------------------</td>
</tr>
<tr>
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<td>3 0 0 0</td>
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<td>3 0 0 0</td>
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<td>10' 9' a 1'-0&quot; b 8'-0&quot; c 18&quot; d 3'-0&quot;</td>
<td>1 2 8</td>
</tr>
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<td>1 2 8</td>
</tr>
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<td>1 2 8</td>
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<td>1 2 8</td>
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<td>1 2 8</td>
</tr>
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<td>1 2 8</td>
</tr>
<tr>
<td>24' 9' a 7'-10&quot; b 14'-4&quot; c 18&quot; d 3'-0&quot;</td>
<td>1 2 8</td>
</tr>
</tbody>
</table>

**Diagram**

- **ZEE**
- **TEE**

**Type via sign foundation**

**Specifications Reference**

2016 ROAD & BRIDGE STANDARDS
ZEE BARS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>SIZE</th>
<th>WEIGHT</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>2 7/8&quot; x 1/4&quot; x 3/8&quot;</td>
<td>1.00LBS./FT.</td>
</tr>
<tr>
<td>B</td>
<td>3&quot; x 2 7/8&quot; x 1/4&quot;</td>
<td>2.40LBS./FT.</td>
</tr>
<tr>
<td>C</td>
<td>4&quot; x 3 7/8&quot; x 1/2&quot;</td>
<td>2.93LBS./FT.</td>
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<tr>
<td>D</td>
<td>5&quot; x 3 3/4&quot; x 3/8&quot;</td>
<td>4.13LBS./FT.</td>
</tr>
<tr>
<td>E</td>
<td>6&quot; x 3 1/2&quot; x 3/8&quot;</td>
<td>5.58LBS./FT.</td>
</tr>
</tbody>
</table>

POST CLAMP DETAIL

GALVANIZED GRAY - IRON OR ALUMINUM CASTING

CENTERLINE HOLE FOR 3/8" DIAMETER SQUARE HEAD STAINLESS STEEL BOLT X 2 1/4" LONG WITH SELF-LOCKING NUT AND ONE FLAT WASHER.

SERRATE 1/16" DEEP AT 1/8" CENTERS

1/8" R (TYP.)

5/8" OR 7/8" LEG OF CLAMP IS FOR ADJUSTMENT TO POST FLANGE

FASTENING

1/8" DIAMETER RIVET. RIVETS SHALL BE DOME HEAD, BREAK MANDREL, BLIND RIVETS CONFORMING TO INDUSTRIAL FASTENERS INSTITUTE STANDARD IFI-114, STYLE 1, GRADES 10 OR 11 EXCEPT THAT THE MINIMUM ULTIMATE TENSILE STRENGTH SHALL BE 360 POUNDS. RIVETS SHALL HAVE A GRIP RANGE ACCOMMODATING THE COMBINED THICKNESS OF THE SIGN PANEL AND ZEE BAR AND SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
UNLESS OTHERWISE NOTED THE TOP OF THE SIGN PANEL SHALL NOT EXTEND ABOVE THE SIGN POST No GREATER THAN THE DISTANCE OF ½ c.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

SIGN PANEL DESIGN

ROAD AND BRIDGE STANDARDS

1325.40
01/15

SPD-4

REFERENCE SPECIFICATION

VIRGINIA DEPARTMENT OF TRANSPORTATION

701

2016 ROAD & BRIDGE STANDARDS
POST CLAMP DETAIL

CENTERLINE HOLE FOR 5/8" DIAMETER SQUARE HEAD STAINLESS STEEL BOLT x 2 1/4" LONG WITH SELF-LOCKING NUT AND ONE FLAT WASHER.

SERRATE 1/8" DEP AT 1/8" CENTERS

1/8" DIA.

1/8" MINUS DRAFT

1/8" R (TYP.)

1/8" OR 1/4" LEG OF CLAMP IS FOR ADJUSTMENT TO POST FLANGE

RIVETS SHALL BE DOME HEAD, BREAK MANDREL, BLIND RIVETS CONFORMING TO INDUSTRIAL FASTENERS INSTITUTE STANDARD IFI-114, STYLE 1, GRADES 10 OR 11 EXCEPT THAT THE MINIMUM ULTIMATE TENSILE STRENGTH SHALL BE 360 POUNDS. RIVETS SHALL HAVE A GRIP RANGE ACCOMMODATING THE COMBINED THICKNESS OF THE SIGN PANEL AND ZEE BAR AND SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER’S RECOMMENDATIONS.

SPECIFICATION

REFERENCE

701

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

SIGN PANEL DESIGN

VIRGINIA DEPARTMENT OF TRANSPORTATION

ROAD AND BRIDGE STANDARDS

REVISION DATE

01/15

SHEET 2 OF 2

1325.41

2016 ROAD & BRIDGE STANDARDS
ALUMINUM FRAMING

SIGN PANEL ATTACHMENT DETAILS
(FOR SIGN PANEL ATTACHMENT TO Z BARS, SEE STANDARD SPD-1)

NYLON WASHER
3/16" 2024-T351 ALUMINUM BOLT
SIGN FACE

2024-T4 ALUMINUM WASHER AND 6262-T9 ALUMINUM HEX NUT

2" x 2" x 1/4"
ALUMINUM ANGLE
ALLOY 6061-T6

NOTES

NYLON WASHER SHALL BE 1/8" THICK MINIMUM WITH AN OUTSIDE DIAMETER OF 1" AND AN INSIDE DIAMETER OF 3/8".

TO OBTAIN A FLUSH MOUNTING SURFACE FOR SIGNS, ALL WOOD POST SHALL BE MORTISED WHERE NECESSARY TO RECESS THE FLANGE OF ALUMINUM ANGLE.

THE TYPE A ZEE BARS SHALL BE 2 3/4" X 1 1/4" X 1/4".

ALL VERTICAL AND HORIZONTAL SPACING BETWEEN SIGNS IN AN ASSEMBLY SHALL BE ONE INCH UNLESS SPECIFIED.

THESE ARE TYPICAL SIGN PANEL ASSEMBLIES; ALL ASSEMBLIES SHALL BE IN ACCORDANCE WITH PLAN DETAILS.
### SIGN PANEL DESIGN

**STIFFENER TO POST ATTACHMENT DETAIL**

<table>
<thead>
<tr>
<th>STRUCTURE TYPE</th>
<th>W</th>
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<th>c</th>
<th>d</th>
<th>STIFFENERS NO.</th>
<th>SIZE</th>
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</thead>
<tbody>
<tr>
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<td>4&quot;</td>
<td>6 1/2&quot;</td>
<td>2'-11&quot;</td>
<td>2</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>VA-C</td>
<td>4&quot;</td>
<td>5&quot;</td>
<td>12 1/2&quot;</td>
<td>2'-11&quot;</td>
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<td>3&quot;</td>
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<td>1'-4&quot;</td>
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<td>3</td>
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<tr>
<td>VA-K</td>
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<td>12 1/2&quot;</td>
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<td>3</td>
<td>20</td>
<td>MEDIUM</td>
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**MEDIUM STIFFENER DETAIL**

**NOTE:**

RIVETS SHALL BE USED FOR SECURING THE STIFFENERS TO THE SIGN UNLESS OTHERWISE SPECIFIED OR APPROVED, AND SHALL BE 3/8" MINIMUM DIAMETER BY 1/2" LONG ALUMINUM AND CAPABLE OF WITHSTANDING A MINIMUM SHEAR FORCE OF 460LBS. RIVET SPACING FOR ATTACHING THE STIFFENERS TO THE SIGN PANEL SHALL BE 6" MAXIMUM BEGINNING 1 1/2" FROM THE ENDS OF THE SIGN PANEL.

SEE STANDARD SPD-4 FOR POST CLAMP AND BOLT DETAILS. UNLESS OTHERWISE NOTED THE TOP OF THE SIGN PANEL SHALL NOT EXTEND ABOVE THE SIGN POST NO GREATER THAN THE DISTANCE OF 1/2 c.
SIGN PANEL DESIGN

STIFFENER TO POST ATTACHMENT DETAIL

POST CLAMP (STAINLESS STEEL)

POST CLAMP BOLT (STAINLESS STEEL)
THE MAXIMUM NUMBER OF SPLICES IN A STIFFENER SHALL BE ONE PER STIFFENER LOCATION.

SPLICES SHALL NOT BE IN A VERTICAL ALIGNMENT BUT SHALL BE OFFSET 12" FROM EACH OTHER.
### Sign Panel Design

<table>
<thead>
<tr>
<th>W</th>
<th>H</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>Stiffener</th>
<th>No.</th>
<th>Size</th>
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<tr>
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<td>2 LARGE</td>
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<td>6&quot;</td>
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<td>4'-2&quot;</td>
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<td>10'-10&quot;</td>
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<td>4'-10&quot;</td>
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<td>10 LARGE</td>
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<td>6'-0&quot;</td>
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<td>1'-0&quot;</td>
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<td>10&quot;</td>
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**V²DOT**

**2016 ROAD & BRIDGE STANDARDS**
**OCTAGON**

- Side A: 24" 3"
- Side B: 30" 3"
- Side C: 36" 3"
- Side D: 48" 4"

**EQUILATERAL TRIANGLE**

- Side E: 30" 3" 18"
- Side F: 36" 3" 24"
- Side G: 48" 6" 27"
- Side H: 60" 6" 34"

**DIAMOND**

- Side I: 24" 12"
- Side J: 30" 15"
- Side K: 36" 18"
- Side L: 48" 24"
- Side M: 60" 30"

**SQUARE**

- Side N: 30"
- Side O: 60"
- Side P: 24"
- Side Q: 48"

**VERTICAL RECTANGLE**

- Side R: 12"
- Side S: 18"
- Side T: 24"
- Side U: 48"

**INTERSTATE SHIELD**

- Side V: 24" 24" 3"
- Side W: 30" 24" 3"
- Side X: 36" 38" 6"
- Side Y: 45" 36" 6"

**NOTE:**

All holes shall be \( \frac{3}{16} \)" in diameter.
NOTES:
SPECIAL DELINEATORS ARE MADE FROM ALUMINUM ALLOY, NOT LESS THAN 0.080 THICK CONFORMING TO ASTM B209, ALLOY 6061-T6 OR 5052-H38.

DELINEATORS EXTEND 1" ABOVE THE TOP OF THE POST.

DELINEATORS ARE REFLECTORIZED, AND IN ALL CASES, THE COLOR SHALL CONFORM TO THE COLOR OF THE EDGELINES, ALTERNATING WITH A BLACK STRIPE.

THE STRIPES SHALL SLOPE DOWN TOWARD THE CENTER OF ROADWAY.

DELINEATORS SHALL BE MOUNTED ON U-TYPE POSTS FABRICATED FROM ROLLED-RAIL STEEL 1.33 LB./FT. MINIMUM.

THE BOTTOM OF THE DELINEATOR PANEL SHALL BE 12" ABOVE THE PAVEMENT EDGE ELEVATION.
NOTES:
ROAD EDGE DELINEATORS ARE TO BE ERECTED TWO FEET BEYOND THE OUTER EDGE OF THE SHOULDER OR THE FACE OF UNMOUNTABLE CURB.

D-1 DELINEATORS SHALL BE PLACED ON THE RIGHT OF THROUGH ROADWAYS AT 328 FOOT SPACING WITH THE FOLLOWING EXCEPTIONS:

TANGENT ROADWAYS WHERE PAVEMENT MARKERS ARE INSTALLED WILL NOT REQUIRE THE INSTALLATION OF DELINEATORS.

LOCATIONS WHERE DELINEATORS ARE INSTALLED ON GUARDRAILS, PARAPETS OR BARRIERS ON THE RIGHT OF THE ROADWAY WILL NOT REQUIRE THE INSTALLATION OF ROAD EDGE DELINEATORS.

D-1 DELINEATORS SHALL BE PLACED ON AT LEAST ONE SIDE AND ON THE OUTSIDE CURVE OF INTERCHANGE RAMPS EXCEPT WHERE DELINEATORS ARE INSTALLED ON GUARDRAILS, PARAPETS OR BARRIERS. THE SPACING ALONG THE RAMPS SHALL BE AT 100' INTERVALS EXCEPT IN HORIZONTAL CURVES WHERE THE SPACING SHALL CONFORM TO THE CHART ON SPACING FOR HIGHWAY DELINEATORS.

D-2 DELINEATORS SHALL BE PLACED ON ACCELERATION AND DECELERATION LANES AT 100' SPACING.

THE COLOR OF DELINEATORS SHALL CONFORM TO THE COLOR OF THE ADJACENT EDGE LINES.

INTERSTATE ROAD EDGE DELINEATORS
TYPICAL DETAILS

SPACING FOR HIGHWAY DELINEATORS ON HORIZONTAL CURVES

DISTANCE IN FEET ROUNDED TO THE NEAREST 5'.

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<th>RADIUS OF CURVE IN FEET</th>
<th>SPACING ON CURVE IN FEET</th>
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<td>900</td>
<td>85</td>
</tr>
<tr>
<td>1000</td>
<td>90</td>
</tr>
</tbody>
</table>

MILEPOST MARKERS & U-TYPE STEEL POST

TYPICAL STRUCTURE DETAILS

NOTES:
DRIVING CAP TO BE USED WHEN DRIVING POST.

PANEL TO BE FABRICATED OF ASTM B209 ALLOY 6061-T6 OR 5052-H38, 0.080 THICK.

TOP OF PANEL TO BE FLUSH WITH TOP OF POST.

ERECTION
MILEPOST MARKERS TO BE LOCATED IN LINE WITH DELINEATOR POSTS, EDGE OF SHOULDER OR BACK OF GUARDRAIL, IF PRESENT.

SPECIFICATION REFERENCE
701 702

ROAD AND BRIDGE STANDARDS
ROAD AND BRIDGE STANDARDS

Sheet 1 of 1
Revision Date
1328.10
INTERCHANGE EXIT RAMP SIGNING DETAILS

MOUNTING HEIGHTS OF SIGN INSTALLATIONS

VIRGINIA DEPARTMENT OF TRANSPORTATION

1. MOUNTING HEIGHT (h) SHALL BE IN ACCORDANCE WITH STP-1 SHEET 1 OF 12 EXCEPT AS NOTED ON THIS SHEET.

2. MOUNTING HEIGHTS (h) ARE MEASURED FROM BOTTOM OF SIGN PANEL TO ROADWAY ELEVATION AT EDGE OF TRAVELWAY OR TOP OF CURB.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

NEW 08/17

2016 ROAD & BRIDGE STANDARDS
1. All pavement markings shall be installed in accordance with these standards, the MUTCD, and the Virginia Supplement to the MUTCD, unless otherwise specified in the contract documents.

2. The pavement marking for the lane line and edge line markings of Interstate and other limited-access highways shall be 6" wide, unless otherwise noted in the contract documents.

3. Continue edgeline width to the termination point specified in the contract documents.

4. If gore area hatching is provided, there shall be a minimum of three chevrons. Spacing may be reduced in order to fit this minimum.
1. All pavement markings shall be installed in accordance with these standards, the MUTCD and the Virginia Supplement to the MUTCD, unless otherwise specified in the contract documents.

2. The pavement marking for the lane line and edge line markings of interstate and other limited-access highways shall be 6" wide, unless otherwise noted in the contract documents.

3. Continue edgeline width to the termination point specified in the contract documents.

4. If gore area hatching is provided, there shall be a minimum of three chevrons. Spacing may be reduced in order to fit this minimum.

5. Solid line at theoretical gore point of a multilane exit ramp with optional exit lane shall be curved to match radius of off ramp (shall not be sharp corners).
PATTERNS OF LONGITUDINAL LINES

THRU LINES: USE BROKEN LINE (10' LINE SEGMENTS / 30' GAPS).
TAPERS MORE THAN 100': USE DOTTED EXTENSION (2' LINE SEGMENTS / 6' GAPS).
TAPERS 100' OR LESS: DO NOT USE DOTTED EXTENSION UNLESS SPECIFIED IN THE CONTRACT DOCUMENTS.

NOTES:

1. STOP LINES SHALL BE 24 INCHES IN WIDTH.
2. ALL PAVEMENT MARKINGS SHALL BE INSTALLED IN ACCORDANCE WITH THESE STANDARDS, THE MUTCD, AND THE VIRGINIA SUPPLEMENT TO THE MUTCD, UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.
3. THE LOCATION, WIDTH, AND TYPE OF THE PAVEMENT MARKINGS SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.
4. TURN ARROWS SHALL BE IN ACCORDANCE WITH SHEET 3.
5. CROSSWALK MARKINGS, IF PROVIDED, SHALL BE IN ACCORDANCE WITH SHEET 4.
6. YELLOW EDGE LINES AT MEDIAN NOSES SHALL TERMINATE IN ACCORDANCE WITH SHEET 3.
NOTES:
1. STOP LINES SHALL BE 24 INCHES IN WIDTH.
2. ALL PAVEMENT MARKINGS SHALL BE INSTALLED IN ACCORDANCE WITH THESE STANDARDS, THE MUTCD, AND THE VIRGINIA SUPPLEMENT TO THE MUTCD, UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.
3. THE LOCATION, WIDTH, AND TYPE OF THE PAVEMENT MARKINGS SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.
4. TURN ARROWS SHALL BE IN ACCORDANCE WITH SHEET 3.
5. CROSSWALK MARKINGS, IF PROVIDED, SHALL BE IN ACCORDANCE WITH SHEET 4.
6. YELLOW EDGE LINES AT MEDIAN NOSES SHALL TERMINATE IN ACCORDANCE WITH SHEET 3.

PATTERNS OF LONGITUDINAL LINES
THRU Lanes: USE BROKEN LINE (10' LINE SEGMENTS / 30' GAPS).
TAPERS MORE THAN 100' USE DOTTED EXTENSION (2' LINE SEGMENTS / 6' GAPS).
TAPERS 100' OR LESS: DO NOT USE DOTTED EXTENSION UNLESS SPECIFIED IN THE CONTRACT DOCUMENTS.

DETAIL FOR OPTIONAL STAGGERED STOP LINES (ON A LANE-BY-LANE BASIS)
**TURN ARROWS**

Turn arrows required in accordance with the following, unless otherwise specified in the contract documents.

<table>
<thead>
<tr>
<th>TURN LANE LENGTH</th>
<th>NUMBER AND POSITION OF ARROWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LESS THAN 100' (EXCLUSIVE OF TAPER)</td>
<td>1 Arrow located at the beginning of the solid lane line.</td>
</tr>
<tr>
<td>100' TO 300' (EXCLUSIVE OF TAPER)</td>
<td>2 Arrows</td>
</tr>
<tr>
<td>300' TO 500' (EXCLUSIVE OF TAPER)</td>
<td>3 Arrows</td>
</tr>
<tr>
<td>GREATER THAN 300' (EXCLUSIVE OF TAPER)</td>
<td>3 Arrows</td>
</tr>
</tbody>
</table>

**Mandatory Turn Movement Lanes (Drop Lane)**

Markings required in accordance with the following, unless otherwise specified in the contract documents.

<table>
<thead>
<tr>
<th>TURN ARROWS</th>
<th>1 Arrow located at the beginning of the wide white solid lane line.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Arrow located 50' back from stop line.</td>
</tr>
<tr>
<td></td>
<td>1 Arrow located at midpoint of 8&quot; white solid lane line.</td>
</tr>
</tbody>
</table>

**Only Word Markings**

Spaced midway between arrows.

---

**NOTES:**

1. All pavement markings shall be installed in accordance with these standards, the MUTCD, and the Virginia Supplement to the MUTCD, unless otherwise specified in the contract documents.

2. The location, width, and type of the pavement markings shall be as specified in the contract documents.

3. When "only" word markings are used, these markings shall be spaced midway between the turn arrows.

4. Crosswalk markings, if provided, shall be in accordance with Sheet 4.
NOTES:

1. All pavement markings shall be installed in accordance with these standards, the MUTCD and the Virginia Supplement to the MUTCD, unless otherwise specified in the Contract Documents.

2. The location, width, and type of the pavement markings shall be as specified in the Contract Documents.

3. Crosswalks shall align with curb ramps in accordance with Standard CG-12. The crosswalk shall be at least as wide as the level landing area of the curb ramp.

4. When longitudinal lines are specified for the crosswalk, the longitudinal lines shall be parallel to the path of thru traffic.

5. Gaps between longitudinal lines shall be between 2 - 5 feet. Gap spacing may vary in order to align lines such that they are outside the wheel paths of thru traffic. The first and last lines shall be 2' maximum from edge of shoulder or edge of gutter pan.

1. All pavement markings shall be installed in accordance with these standards, the MUTCD and the Virginia Supplement to the MUTCD, unless otherwise specified in the Contract Documents.

2. The location, width, and type of the pavement markings shall be as specified in the Contract Documents.

3. Crosswalks shall align with curb ramps in accordance with Standard CG-12. The crosswalk shall be at least as wide as the level landing area of the curb ramp.

4. When longitudinal lines are specified for the crosswalk, the longitudinal lines shall be parallel to the path of thru traffic.

5. Gaps between longitudinal lines shall be between 2 - 5 feet. Gap spacing may vary in order to align lines such that they are outside the wheel paths of thru traffic. The first and last lines shall be 2' maximum from edge of shoulder or edge of gutter pan.
NOTES:

1. All pavement markings shall be installed in accordance with these standards, the MUTCD, and the Virginia supplement to the MUTCD, unless otherwise specified in the contract documents.

2. Taper length shall be per these standards unless otherwise specified in the contract documents.

3. Tapers more than 100' use dotted extension (2' line segments / 6' gaps).

4. Turn arrows shall be in accordance with PM-3.

5. Longitudinal lines shall be 4" wide unless otherwise noted in the contract documents.

TAPER LENGTH (T) TABLE

<table>
<thead>
<tr>
<th>SPEED</th>
<th>TAPER RATIO</th>
<th>10 FT TURN LANE WIDTH</th>
<th>11 FT TURN LANE WIDTH</th>
<th>12 FT TURN LANE WIDTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 30 MPH</td>
<td>8:1</td>
<td>80'</td>
<td>90'</td>
<td>100'</td>
</tr>
<tr>
<td>&gt; 30 MPH</td>
<td>15:1</td>
<td>150'</td>
<td>175'</td>
<td>200'</td>
</tr>
</tbody>
</table>
NOTES:

1. ALL PAVEMENT MARKINGS SHALL BE INSTALLED IN ACCORDANCE WITH THESE STANDARDS, THE MUTCD, AND THE VIRGINIA SUPPLEMENT TO THE MUTCD, UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

2. LONGITUDINAL LINES SHALL BE 4" WIDE UNLESS OTHERWISE NOTED IN THE CONTRACT DOCUMENTS.

3. TYPICAL SPACING BETWEEN OPPOSING TURN ARROWS SHALL BE 1000 FEET. SPACING CAN BE INCREASED OR DECREASED AS DETERMINED BY THE ENGINEER.

4. TURN ARROWS SHALL BE IN ACCORDANCE WITH PM-3.

5. STOP LINES SHALL BE 24 INCHES IN WIDTH. STOP LINES SHALL ONLY BE USED AT SIGNALIZED INTERSECTIONS OR ON STOP-CONTROLLED APPROACHES.

6. REFER TO THE TAPER LENGTH TABLE ON SHEET 1 FOR "T". TAPER LENGTH SHALL BE AS SPECIFIED IN THE CONTRACT DOCUMENTS.

7. TAPERS MORE THAN 100': USE DOTTED EXTENSION (2' LINE SEGMENTS / 6' GAPS). TAPERS 100' OR LESS: DO NOT USE DOTTED EXTENSION UNLESS SPECIFIED IN THE CONTRACT DOCUMENTS.
NOTES:
1. ALL PAVEMENT MARKINGS SHALL BE INSTALLED IN ACCORDANCE WITH THESE STANDARDS, THE MUTCD, AND THE VIRGINIA SUPPLEMENT TO THE MUTCD, UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

2. HELMETED BICYCLIST SYMBOL SHALL BE PLACED JUST PRIOR TO THE BEGINNING OF THE RIGHT TURN LANE TAPER AS SHOWN. THEY SHALL ALSO BE PLACED 6' FROM THE END OF THE SOLID WHITE LINE AT RIGHT TURN LANES IF THE SOLID WHITE LINE SEPARATING THE BICYCLE LANE FROM THE RIGHT TURN LANE IS GREATER THAN 100' IN LENGTH.

3. TYPICAL SPACING BETWEEN BICYCLE LANE SYMBOLS SHALL BE 500 FT. SPACING CAN BE INCREASED OR DECREASED AS DIRECTED BY THE ENGINEER.

4. SEE PM-10 FOR HELMETED BICYCLIST SYMBOL AND ARROW DETAILS.

5. PARKING LANE WIDTH SHALL BE 7' FOR RESIDENTIAL STREETS AND 8' FOR COMMERCIAL AND MIXED-USE STREETS. REFER TO THE VDOT ROAD DESIGN MANUAL FOR ADDITIONAL REQUIREMENTS.

6. ARROWS SHALL BE USED FOR:
A. BIKE LANES ON UNDIVIDED TWO-WAY STREETS WHERE A BIKE LANE IS ONLY PROVIDED FOR ONE DIRECTION OF TRAVEL, OR
B. CONTRAFLOW BIKE LANES, OR
C. TWO-WAY CYCLE TRACKS

7. DELINEATING BICYCLE LANES WITH THE LIMITS OF A REQUIRED PAVED SHOULDER AREA IS NOT PERMITTED.
NOTES:

1. ALL PAVEMENT MARKINGS SHALL BE INSTALLED IN ACCORDANCE WITH THESE STANDARDS, THE MUTCD, AND THE VIRGINIA SUPPLEMENT TO THE MUTCD, UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

2. SHARED LANE MARKINGS SHALL NOT BE USED IN PAVED SHOULDERS, IN BICYCLE LANES, OR ON ROADWAYS THAT HAVE A SPEED LIMIT ABOVE 35 MPH.

3. SHARED LANE MARKINGS SHALL BE PLACED IMMEDIATELY AFTER AN INTERSECTION AND SPACED AT INTERVALS NOT GREATER THAN 1000 FEET.

4. IN SHARED LANES WITH ON-STREET PARALLEL PARKING, THE CENTER OF THE SHARED LANE MARKINGS SHALL BE AT LEAST 5' FROM THE FACE OF CURB, OR FROM THE EDGE OF PAVEMENT WHERE THERE IS NO CURB.

5. ON STREETS WITHOUT ON-STREET PARKING AND AN OUTSIDE TRAVEL LANE LESS THAN 14' WIDE, THE CENTER OF THE SHARED LANE MARKINGS SHALL BE AT LEAST 4' FROM THE FACE OF CURB, OR FROM THE EDGE OF PAVEMENT WHERE THERE IS NO CURB.

6. SEE PM-10 FOR SHARED LANE MARKING SYMBOL DETAILS.
NOTES:

1. ALL PAVEMENT MARKINGS SHALL BE INSTALLED IN ACCORDANCE WITH THESE STANDARDS, THE MUTCD, AND THE VIRGINIA SUPPLEMENT TO THE MUTCD, UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

2. ON MULTI-LANE ROADS THE TRANSVERSE BANDS SHALL EXTEND ACROSS ALL APPROACH LANES, AND INDIVIDUAL RAILROAD CROSSING (RXR) SYMBOLS SHALL BE USED IN EACH APPROACH LANE.

3. SEE PM-10 FOR RAILROAD CROSSING (RXR) SYMBOLS DETAILS.

4. REFER TO THE MUTCD FOR SIGNING REQUIREMENTS AT PASSIVE GRADE CROSSINGS (NO AUTOMATED TRAFFIC CONTROL DEVICES).

5. THE PLACEMENT OF THE GRADE CROSSING ADVANCE WARNING (W10-1) SIGN SHALL BE IN ACCORDANCE WITH SECTION 2C.05 AND TABLE 2C-4 (CONDITION B) OF THE MUTCD.

6. YIELD LINES MAY BE USED INSTEAD OF STOP LINES AT PASSIVE GRADE CROSSINGS WITH YIELD SIGNS INSTALLED.

7. ALL EDGE LINES SHALL EXTEND WITHIN TWO FEET OF THE OUTSIDE RAIL, EXCEPT LINES SHALL TERMINATE AT THE STOP OR YIELD LINE IF THE CROSSING IS SIGNED WITH A W10-5 HUMPED XING SIGN.

8. EXTEND RXR SYMBOL MARKINGS 6 INCHES FROM THE EDGE OF PAVEMENT TO 8 INCHES FROM THE CENTER LINE OF THE ROADWAY OR POSITION THE MARKINGS TO ACCOMODATE FUTURE PLACEMENT OF CENTER AND EDGE LINE PAVEMENT MARKINGS WHERE THESE MARKINGS DO NOT EXIST.
TWO-WAY LEFT TURN LANE AND CENTER LANE LEFT TURN

NOTES:
1. Exact locations of the markers shall be approved by the engineer prior to installation.
2. Typical spacing shall be 80' C-C. 40' C-C spacing shall be used on horizontal curves with a curve advisory speed at least 10 MPH below the posted or statutory speed limit, unless otherwise shown in the contract documents or as directed by the engineer. See Sheet 2 for specific typicals.
3. Pavement markers shall be the same color as the adjacent pavement marking. The color of the backside of pavement markers shall be as shown in the table below.
4. Inlaid pavement markers shall be omitted on bridge decks unless otherwise noted in the contract documents.
5. Inlaid pavement marker grooves shall not encroach into or beyond the stop line.
6. Plastic inlaid marker grooves shall be 1" - 2" from marking edge when placed adjacent to single solid line.

<table>
<thead>
<tr>
<th>MARKER TYPE</th>
<th>BACKSIDE COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONE WAY TRAFFIC</td>
<td></td>
</tr>
<tr>
<td>WHITE INLAID</td>
<td>RED</td>
</tr>
<tr>
<td>TEMPORARY</td>
<td>BLANK</td>
</tr>
<tr>
<td>YELLOW INLAID</td>
<td>BLANK</td>
</tr>
<tr>
<td>TWO WAY TRAFFIC</td>
<td></td>
</tr>
<tr>
<td>ALL TYPES</td>
<td>MATCH ADJACENT PAVEMENT MARKING</td>
</tr>
</tbody>
</table>

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

TYPICAL PAVEMENT MARKER
LOCATION DETAILS

VIRGINIA DEPARTMENT OF TRANSPORTATION

ROAD AND BRIDGE STANDARDS
1330.80
10/19

REFERENCE SPECIFICATION

PM-8
TYPICAL PAVEMENT MARKER
LOCATION DETAILS

VIRGINIA DEPARTMENT OF TRANSPORTATION

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

TYPE A
EXIT RAMP

TYPE B
ENTRANCE RAMP

TYPE C
TWO OR MULTI-LANE UNDIVIDED HIGHWAY

TYPE D
ONE-WAY OR TWO-WAY PASSING ZONES

TYPE E
TWO OR MULTI-LANE UNDIVIDED HIGHWAY

TYPE F
MULTI-LANE HIGHWAY TANGENT

TYPE G
MULTI-LANE HIGHWAY LANE DROP OR AUXILIARY LANE

KEY:
- TWO WAY PAVEMENT MARKER, WITH POINTS INDICATING RETROREFLECTIVE FACE
- ONE WAY PAVEMENT MARKER WITH POINT INDICATING WHITE RETROREFLECTIVE FACE. BACK SIDE RETROREFLECTIVE FACE SHALL BE RED
- INDICATES DIRECTION OF TRAVEL

NOTE: MARKERS TO BE INSTALLED A MINIMUM OF 80' UPSTREAM OF THEORETICAL GORE.

NOTE: MARKERS TO BE INSTALLED A MINIMUM OF 80' DOWNSTREAM OF THEORETICAL GORE.

THEORETICAL GORE

PHYSICAL GORE

SEE NOTE

20' C TO C SPACING

NOTE: SHALL ONLY BE USED ON EXISTING PAVEMENT WHEN DIRECTED BY CONTRACT DOCUMENTS.

NOTE: SMALL ONLY BE USED ON EXISTING PAVEMENT WHEN DIRECTED BY CONTRACT DOCUMENTS.

NOTE: SMALL ONLY BE USED ON EXISTING PAVEMENT WHEN DIRECTED BY CONTRACT DOCUMENTS.

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NOTE: SMALL ONLY BE USED ON EXISTING PAVEMENT WHEN DIRECTED BY CONTRACT DOCUMENTS.
NOTES:

1. LAYOUT, SPACING, AND COLOR OF INLAID PAVEMENT MARKERS SHALL BE AS PER SHEETS 1 AND 2 OF 3.
2. ALL GROOVE EDGES SHALL BE AT LEAST 2 INCHES FROM ANY SEAM OR PAVEMENT JOINT.
3. GROOVE CUTS MAY BE TAPERED OR BEVELED. TAPERED CUTS SHALL START AT ROAD LEVEL ON EACH END AND TAPER AT A FIXED RATE AS SHOWN ON THE PROFILE VIEW. BEVELED GROOVE CUTS SHALL BE 0.5" MAXIMUM DEPTH (0.4" PREFERRED), AND SHALL BE 0.4" MINIMUM DEPTH AT BOTH ENDS OF THE PLUNGE CUT.
4. GROOVE AND PLUNGE CUT SHALL BE CLEAN AND DRY PRIOR TO PLACEMENT OF ADHESIVE.
5. THE EPOXY ADHESIVE SHALL BE THOROUGHLY MIXED UNTIL IT IS UNIFORM IN COLOR, AND APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
6. MARKER SHALL BE INSTALLED AS PER MANUFACTURER'S INSTALLATION INSTRUCTIONS WITH THE BREAKAWAY TABS RESTING ON THE PAVEMENT SURFACE. THE EPOXY SHALL BE FILLED TO THE LEVEL OF THE TOP OF THE MARKER HOLDER. EPOXY SHALL NOT TOUCH THE RETROREFLECTOR.
7. TOTAL GROOVE LENGTH MAY BE SHORTENED TO 54" ON SHARP CURVES IF APPROVED BY THE ENGINEER.
8. GROOVES SHALL NOT OVERLAP WITH LOOP DETECTOR WIRES.
PARALLEL SOLID LINE SPACING (NO PASSING ZONE)

LINE WIDTH (4")

4" MIN. (SEE NOTE 1)

PARALLEL SOLID AND BROKEN LINES
(ONE-WAY PASSING ZONE)

LINE WIDTH (4")

10' MIN.

10'

30'

7" WIDE IF RAISED PAVEMENT MARKERS ARE PRESENT

NOTES:

1. THE SPACE BETWEEN TWO PARALLEL LINES SHALL BE 7" WIDE IF RAISED PAVEMENT MARKERS ARE PRESENT BETWEEN THE TWO PARALLEL LINES.
NOTES:

1. STANDARD CHARACTERS ARE 24 GRID UNITS HIGH AND 4 GRID UNITS WIDE (EXCEPT LETTER "I" AND THE NUMBER "1" WHICH ARE 1 GRID UNIT WIDE).

2. VERTICAL STROKES ARE 1 UNIT WIDE, HORIZONTAL STROKES ARE 4 UNITS HIGH.

3. SPACE 1 GRID UNIT MINIMUM BETWEEN CHARACTERS OR AS OTHERWISE SHOWN (OPTICAL SPACING MAY BE USED).

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

ROAD AND BRIDGE STANDARDS

PM-10

APPLICATION | CHARACTER HEIGHT | GRID UNIT SIZE
---|---|---
LOW SPEED ROADWAYS \( \leq 40 \text{ MPH} \) | 6" | 3"
HIGH SPEED ROADWAYS \( > 45 \text{ MPH} \) | 8" | 4"
ONE-LANE SCHOOL SYMBOL | 10" | 5"
TWO-LANE SCHOOL SYMBOL | 10" | 5"

2016 ROAD & BRIDGE STANDARDS

VIRGINIA DEPARTMENT OF TRANSPORTATION
### SQUARE FOOT AREAS OF PAVEMENT WORD MARKINGS

<table>
<thead>
<tr>
<th>Legend</th>
<th>Paint Application</th>
<th>Eradication</th>
</tr>
</thead>
<tbody>
<tr>
<td>6' High</td>
<td>8' High</td>
<td>6' High</td>
</tr>
<tr>
<td>Ahead</td>
<td>17.5</td>
<td>30.5</td>
</tr>
<tr>
<td>Area</td>
<td>14.0</td>
<td>24.5</td>
</tr>
<tr>
<td>Bike</td>
<td>13.0</td>
<td>23.0</td>
</tr>
<tr>
<td>Bump</td>
<td>15.0</td>
<td>26.5</td>
</tr>
<tr>
<td>East</td>
<td>13.0</td>
<td>22.5</td>
</tr>
<tr>
<td>Ends</td>
<td>15.0</td>
<td>27.0</td>
</tr>
<tr>
<td>Ft</td>
<td>5.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Hump</td>
<td>14.5</td>
<td>25.5</td>
</tr>
<tr>
<td>Lane</td>
<td>13.5</td>
<td>23.5</td>
</tr>
<tr>
<td>Left</td>
<td>11.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Merge</td>
<td>19.0</td>
<td>34.0</td>
</tr>
<tr>
<td>MPH</td>
<td>11.0</td>
<td>19.5</td>
</tr>
<tr>
<td>No</td>
<td>8.0</td>
<td>13.5</td>
</tr>
<tr>
<td>North</td>
<td>17.5</td>
<td>30.5</td>
</tr>
</tbody>
</table>

### LEGEND

- **Paint Application**
- **Eradication**

### NOTES:

1. **One-Lane Application of "School" Symbol** is 8' high. When installed in a single lane with a width less than 10.5', the letters shall be separated by three inches. When installed in a single lane with a width greater than 10.5', the letters shall be separated by four inches.

2. **Two-Lane Application of "School" Symbol** is 10' high with paint application area of 53.5 sq.ft. and eradication area of 93.0 sq.ft.

3. **Non-Linear Eradication Area** is based on a "Theoretical Box" defined by the outermost limits of the non-linear pavement marking that includes both the painted and non-painted areas that encompass the total word message or symbol. See example.

4. **On Undivided Roadways**, symbol and message pavement markings shall not extend beyond the centerline into opposing travel lanes.

---

**THEORETICAL BOX**

**ERADICATION AREA** = 8'-0" x 9'-4" = 74.7 SQ.FT.

EXAMPLE (8' LETTERS)

---

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

PAVEMENT WORD, SYMBOL, AND ARROW MARKINGS

WORDS DETAILS

Virginia Department of Transportation

2016 Road & Bridge Standards
### Symbol Areas of Symbols and Arrows

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Paint Application (sq. ft.)</th>
<th>Eradication (sq. ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>THRU ARROW</td>
<td>12.0</td>
<td>32.0</td>
</tr>
<tr>
<td><img src="uparrow" alt="" /></td>
<td>SINGLE TURN ARROW (LEFT OR RIGHT)</td>
<td>17.5</td>
<td>51.0</td>
</tr>
<tr>
<td>![turnarrow_left] ![turnarrow_right]</td>
<td>DOUBLE TURN ARROW (LEFT/THROUGH OR RIGHT/THROUGH)</td>
<td>28.5</td>
<td>96.0</td>
</tr>
<tr>
<td>![turnarrow_left] ![turnarrow_right]</td>
<td>TRIPLE TURN ARROW (LEFT/THROUGH/RIGHT)</td>
<td>37.5</td>
<td>127.5</td>
</tr>
<tr>
<td>![turnarrow_left] ![turnarrow_right]</td>
<td>DOUBLE TURN ARROW ARROW (LEFT/RIGHT)</td>
<td>27.0</td>
<td>80.0</td>
</tr>
<tr>
<td>![arrow_left] ![arrow_right]</td>
<td>LANE-REDUCTION ARROW (LEFT OR RIGHT)</td>
<td>44.0</td>
<td>99.0</td>
</tr>
<tr>
<td>![arrow_left] ![arrow_right]</td>
<td>WRONG-WAY ARROW</td>
<td>24.0</td>
<td>133.5</td>
</tr>
<tr>
<td>![fshhook_left] ![fshhook_right]</td>
<td>FISH-HOOK LANE-USE ARROW FOR ROUNDABOUTS (LEFT)</td>
<td>20.5</td>
<td>81.0</td>
</tr>
<tr>
<td>![fshhook_left] ![fshhook_right]</td>
<td>FISH-HOOK LANE-USE ARROW FOR ROUNDABOUTS (LEFT/THROUGH)</td>
<td>31.0</td>
<td>114.5</td>
</tr>
<tr>
<td>![fshhook_left] ![fshhook_right]</td>
<td>FISH-HOOK LANE-USE ARROW FOR ROUNDABOUTS (LEFT/THROUGH/RIGHT)</td>
<td>39.5</td>
<td>195.0</td>
</tr>
<tr>
<td>![fshhook_left] ![fshhook_right]</td>
<td>FISH-HOOK LANE-USE ARROW FOR ROUNDABOUTS (THROUGH/RIGHT)</td>
<td>31.5</td>
<td>142.0</td>
</tr>
<tr>
<td>![fshhook_left] ![fshhook_right]</td>
<td>OPTIONAL OVAL FOR FISH-HOOK LANE-USE ARROW FOR ROUNDABOUTS</td>
<td>3.5</td>
<td>4.5</td>
</tr>
<tr>
<td>![diamond]</td>
<td>HOV DIAMOND SYMBOL (ASPHALT SURFACE)</td>
<td>11.5</td>
<td>39.0</td>
</tr>
<tr>
<td>![diamond]</td>
<td>HOV DIAMOND CONTRAST SYMBOL (CONCRETE SURFACE)</td>
<td>35.5</td>
<td>70.0</td>
</tr>
<tr>
<td>![triangle]</td>
<td>YIELD LINE TRIANGLE (1' x 1.5')</td>
<td>0.75 (EACH)</td>
<td>1.5 (EACH)</td>
</tr>
<tr>
<td>![triangle]</td>
<td>YIELD LINE TRIANGLE (2' x 3')</td>
<td>3.0 (EACH)</td>
<td>6.0 (EACH)</td>
</tr>
</tbody>
</table>

### Additional Details
- **Paint Application**: The areas listed are for paint application, with a notation that eradication areas are also provided.
- **Eradication Area**: The eradication area for the triple turn arrow is given as 12'-9" x 10'-0" = 127.5 sq. ft.
- **Theoretical Box**: The theoretical box is provided for clarity in understanding the markings and their applications.

---

**Note**: The document is part of the 2016 Road & Bridge Standards by the Virginia Department of Transportation, with specific specifications and details on symbol areas and arrow markings.
NOTES:
1. 1 GRID UNIT = 4 INCHES
2. ALL SYMBOLS/LEGEND SHALL BE WHITE UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.
NOTES:

1. 1 GRID UNIT = 4 INCHES

2. ALL SYMBOLS/LEGEND SHALL BE WHITE UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.
1. 1 GRID UNIT = 6 INCHES

2. ALL SYMBOLS/LEGEND SHALL BE WHITE UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.
NOTES:
1. 1 GRID UNIT = 4 INCHES
2. ALL SYMBOLS/LEGEND SHALL BE WHITE UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

HOV DIAMOND SYMBOL
(ASPHALT SURFACE)

HOV DIAMOND
CONTRAST SYMBOL
(CONCRETE SURFACE)
BICYCLIST THRU ARROW

BICYCLIST THRU ARROW (LEFT OR RIGHT)

HELMETED BICYCLIST SYMBOL

SHARED LANE MARKING SYMBOL

NOTES:
1. 1 GRID UNIT = 4 INCHES
2. ALL SYMBOLS/LEGEND SHALL BE WHITE UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.
NOTES:

1. 1 GRID UNIT = 6 INCHES

2. ALL SYMBOLS/LEGEND SHALL BE WHITE UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

YIELD AHEAD TRIANGLE - SMALL

YIELD AHEAD TRIANGLE - LARGE

RAILROAD CROSSING SYMBOL

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

Pavement Word, Symbol, and Arrow Markings

Symbol Details

Virginia Department of Transportation

2016 Road & Bridge Standards
INTERNATIONAL SYMBOL
OF ACCESSIBILITY - SPECIAL SIZED

NOTES:
1. 1 GRID UNIT = 2 INCHES
2. BLUE MARKING AND WHITE BORDER SHALL BE OMITTED EXCEPT WHERE SPECIFIED IN CONTRACT DOCUMENTS.
### SQUARE FOOT AREAS OF ROUTE SHIELD SYMBOLS

<table>
<thead>
<tr>
<th>Description</th>
<th>Paint Application</th>
<th>Eradication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol Height</td>
<td>15.0 FT</td>
<td>15.0 FT</td>
</tr>
<tr>
<td>2 DIGITS INTERSTATE SHIELD (ON LIGHT OR DARK PAVEMENT)</td>
<td>72.0 98.0 128.0</td>
<td>90.0 122.5 160.0</td>
</tr>
<tr>
<td>3 DIGITS INTERSTATE SHIELD (ON LIGHT OR DARK PAVEMENT)</td>
<td>90.0 122.5 160.0</td>
<td>112.5 153.5 200.0</td>
</tr>
<tr>
<td>1 OR 2 DIGITS U.S. ROUTE SHIELD ON LIGHT PAVEMENT</td>
<td>27.5 37.5 49.0</td>
<td>90.0 122.5 160.0</td>
</tr>
<tr>
<td>ON DARK PAVEMENT</td>
<td>90.0 122.5 160.0</td>
<td></td>
</tr>
<tr>
<td>3 DIGITS U.S. ROUTE SHIELD ON LIGHT PAVEMENT</td>
<td>37.5 50.5 66.0</td>
<td>112.5 153.5 200.0</td>
</tr>
<tr>
<td>ON DARK PAVEMENT</td>
<td>112.5 153.5 200.0</td>
<td></td>
</tr>
<tr>
<td>2 DIGITS VA PRIMARY RTE SHIELD ON LIGHT PAVEMENT</td>
<td>27.5 37.0 48.5</td>
<td>90.0 122.5 160.0</td>
</tr>
<tr>
<td>ON DARK PAVEMENT</td>
<td>90.0 122.5 160.0</td>
<td></td>
</tr>
<tr>
<td>3 DIGITS VA PRIMARY RTE SHIELD ON LIGHT PAVEMENT</td>
<td>37.0 50.5 65.5</td>
<td>112.5 153.5 200.0</td>
</tr>
<tr>
<td>ON DARK PAVEMENT</td>
<td>112.5 153.5 200.0</td>
<td></td>
</tr>
<tr>
<td>3 DIGITS VA SECONDARY RTE SHIELD ON LIGHT PAVEMENT</td>
<td>30.0 41.0 53.5</td>
<td>90.0 122.5 160.0</td>
</tr>
<tr>
<td>ON DARK PAVEMENT</td>
<td>90.0 122.5 160.0</td>
<td></td>
</tr>
<tr>
<td>4 DIGITS VA SECONDARY RTE SHIELD ON LIGHT PAVEMENT</td>
<td>31.0 42.0 55.0</td>
<td>112.5 153.5 200.0</td>
</tr>
<tr>
<td>ON DARK PAVEMENT</td>
<td>112.5 153.5 200.0</td>
<td></td>
</tr>
</tbody>
</table>

**THEORETICAL BOX**

ERADICATION AREA EXAMPLE

(15' SYMBOL HEIGHT)
NOTES:
1. SEE TABLE FOR GRID UNIT (GU) SIZE AND SHIELD AND NUMERICAL DIMENSIONS.
2. FOR THE NUMBER "1", DIVIDE NUMERAL WIDTH BY 4.

<table>
<thead>
<tr>
<th>GRID UNIT (GU) SIZE</th>
<th>SHIELD HEIGHT</th>
<th>SHIELD WIDTH</th>
<th>NUMERICAL DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>15'-0&quot;</td>
<td>6'-0&quot;</td>
<td>8'-0&quot;</td>
</tr>
<tr>
<td>7&quot;</td>
<td>17'-6&quot;</td>
<td>7'-0&quot;</td>
<td>9'-4&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>20'-0&quot;</td>
<td>8'-0&quot;</td>
<td>10'-8&quot;</td>
</tr>
</tbody>
</table>

ROUTE SHIELD DETAILS

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE 704
**1 OR 2 DIGITS U.S. ROUTE SHIELD ON DARK PAVEMENT**

**3 DIGITS U.S. ROUTE SHIELD ON LIGHT PAVEMENT**

**NOTES:**

1. SEE TABLE FOR GRID UNIT (GU) SIZE AND SHIELD AND NUMERICAL DIMENSIONS.
2. FOR THE NUMBER "1", DIVIDE NUMERICAL WIDTH BY 4.

<table>
<thead>
<tr>
<th>GRID UNIT (GU) SIZE</th>
<th>SHIELD HEIGHT</th>
<th>SHIELD WIDTH</th>
<th>NUMERICAL DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>15'-0&quot;</td>
<td>6'-0&quot;</td>
<td>7'-0&quot;</td>
</tr>
<tr>
<td>7&quot;</td>
<td>17'-6&quot;</td>
<td>7'-0&quot;</td>
<td>8'-9&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>20'-0&quot;</td>
<td>8'-0&quot;</td>
<td>10'-0&quot;</td>
</tr>
</tbody>
</table>

**SHIELD WIDTH**

- Width by 4.
- Width (see note 2)

**ROAD AND BRIDGE STANDARDS**

**A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.**

**PAVEMENT WORD, SYMBOL, AND ARROW MARKINGS**

**ROUTE SHIELD DETAILS**

**VIRGINIA DEPARTMENT OF TRANSPORTATION**

**2016 ROAD & BRIDGE STANDARDS**
2 DIGITS VIRGINIA PRIMARY ROUTE SHIELD ON DARK PAVEMENT

3 DIGITS VIRGINIA PRIMARY ROUTE SHIELD ON LIGHT PAVEMENT

NOTES:
1. SEE TABLE FOR GRID UNIT (GU) SIZE AND SHIELD AND NUMERAL DIMENSIONS.
2. FOR THE NUMBER "1", DIVIDE NUMERAL WIDTH BY 4.
### Notes:

1. See table for grid unit (GU) size and shield and numeral dimensions.

2. For the number "1", divide numeral width by 4.

### Numeral Dimensions

<table>
<thead>
<tr>
<th>Grid Unit (GU Size)</th>
<th>Shield Height</th>
<th>Shield Width</th>
<th>Numeral Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 Digits</td>
<td>4 Digits</td>
<td></td>
</tr>
<tr>
<td>6&quot;</td>
<td>15'-0&quot;</td>
<td>6'-0&quot;</td>
<td>8'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>7'-6&quot;</td>
<td></td>
<td>1'-4&quot;</td>
</tr>
<tr>
<td>7&quot;</td>
<td>17'-6&quot;</td>
<td>7'-0&quot;</td>
<td>8'-9&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1'-6½&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>20'-0&quot;</td>
<td>8'-0&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1'-8&quot;</td>
</tr>
</tbody>
</table>

Black Marking

White Marking