PLAN

0° CONNECTION

(DECK FASCIA)

11/16" Ø Hole for 5/8" Ø stainless bolt, (2) flat washers, & nylon insert lock nut (Typ.)**

** See Pg 10 of 12 for bolt detail

PLAN

5° - 40° CONNECTION

(CONCRETE I-BEAM OPTION SHOWN)

See Detail B

See Detail C

Bridge Connection - Type A1

Michigan Department of Transportation

Bureau of Development Standard Plan for

Bridge Sign Connection

Type A1, A2 & B

09/15/11
08/11/11
SIGN-800-A
Sheet 1 of 12
[Diagram and text content related to bridge connection types and details]
**SECTION A-A**

**Bridge Connection - Type A1**

**NOTE:**

Typical for all sign connections.

**SECTION B-B**

**NOTE:**

See Pg 10 of 12 for bolt detail.

**SECTION D-D**

**Bridge Connection - Type A1**

**NOTE:**

The original signed copy is kept on file at the Michigan Department of Transportation.
**SECTION C-C**

Drill 9/16" hole in
wt for 1/2" stainless steel adhesive anchor bolt (4) required per wt

WT9 x 17.5 Place 1/8" elastomeric pad to cover entire surface area between steel and aluminum sections

**SECTION E-E**

Drill 9/16" hole in angle for 1/2" stainless steel adhesive anchor bolt (4) required

Anchor spacing = \( (\text{Sign length minus 2"}) \times \cos \theta \)
Strut length = \( (\text{Sign length minus 2"}) \times \sin \theta + 5" \)

### *ADHESIVE ANCHOR MINIMUM EFFECTIVE ULTIMATE STRENGTHS*

<table>
<thead>
<tr>
<th>Tension (lbs)</th>
<th>Shear (lbs)</th>
<th>Tension (lbs)</th>
<th>Shear (lbs)</th>
<th>Tension (lbs)</th>
<th>Shear (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1275</td>
<td>825</td>
<td>5470</td>
<td>315</td>
<td>15500</td>
<td>9200</td>
</tr>
</tbody>
</table>

A1 Connection A2 Connection

* Effective ultimate strength is equal to the ultimate strength modified by the appropriate edge distance and anchor spacing reduction factors recommended by the manufacturer.

**BRIDGE CONNECTION - TYPE A1**

**NOTE:**
Brace may be eliminated for strut lengths less than 2'-6".

### Flange Dimensions

<table>
<thead>
<tr>
<th>Brestressed I-beam depth</th>
<th>A</th>
<th>B</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>28&quot; (Type I)</td>
<td>4&quot;</td>
<td>3 1/16&quot;</td>
<td>2 13/16&quot;</td>
<td>2 13/16&quot;</td>
</tr>
<tr>
<td>36&quot; (Type II)</td>
<td>4 1/2&quot;</td>
<td>2 13/16&quot;</td>
<td>2 13/16&quot;</td>
<td></td>
</tr>
<tr>
<td>45&quot; (Type III)</td>
<td>6 1/8&quot;</td>
<td>3 3/16&quot;</td>
<td>3 3/16&quot;</td>
<td></td>
</tr>
<tr>
<td>54&quot; (Type IV)</td>
<td>7 1/4&quot;</td>
<td>3 7/8&quot;</td>
<td>3 7/8&quot;</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**
- The original signed copy is kept on file at the Michigan Department of Transportation.
PLAN
5° - 40° CONNECTION
(CONCRETE T-BEAMS & CONCRETE BARRIERS)

SECTION G-G
BRIDGE CONNECTION - TYPE A2

NOTE: THE ORIGINAL SIGNED COPY IS KEPT ON FILE AT THE MICHIGAN DEPARTMENT OF TRANSPORTATION.
SECTION H-H
(AT CONCRETE T-BEAM BRIDGES)

6 3/4" Min.

6" Min.

1 1/4" Min., 4 1/2"

1/4"

13/16" Holes in angle for adhesive anchor 3/4" Ø stainless steel bolt (Typ.)

Deck overhang

NOTE:
See chart on sheet 4 for adhesive anchor strengths.

BRIDGE CONNECTION - TYPE A2
SECTION I-I

NOTE:
Place 1/8" elastomeric (or equivalent) pad to cover the entire surface area between steel and aluminum surfaces.

SECTION J-J

BRIDGE CONNECTION – TYPE A2

** See Pg 10 of 12 for bolt detail.
BRIDGE CONNECTION - TYPE B

See Detail A

\[
\text{Sign length minus 2"}
\]

Steel girder web

L3 1/2" x 3 1/2" x 3/8" x 7" Long

C6 x 2.83

(Aluminum)

\[
\text{6"}
\]

\[
\text{6"}
\]

\[
\text{6"}
\]

Sign face

Sign length (L) varies 6' to 10'

PLAN

0° CONNECTION

Steel girder web

C8 x 4.25 Strut

(Aluminum)

\[
\text{1"}
\]

\[
\text{1"}
\]

\[
\text{3 1/2" (Typ.)}
\]

Anchor spacing - See sheet 4 of 11 for length

\[
\text{1 1/4" (Typ.)}
\]

\[
\text{1 1/4" (Typ.)}
\]

See Detail B

See Detail C

11/16" Hole for 5/8"

\[
\text{Ø stainless bolt, (2) flatwashers, & nylon insert lock nut (Typ.)**}
\]

1" Sign length minus 2"

Sign length (L) varies 6' to 10'

PLAN

5° - 40° CONNECTION

(Steel Beam)

BRIDGE CONNECTION - TYPE B

** See Pg 10 of 12 for bolt detail
**NOTE:**

Place 1/8" elastomeric (or equivalent) pad to cover the entire surface area between steel and aluminum surfaces.
**BOLT DETAIL**

- **DETAIL A**
  - Stem of WT
  - Place 1/8" elastomeric (or equivalent) pad to cover entire surface area between steel and aluminum sections.
  - 11/16" Hole for 5/8" Ø stainless bolt **
  - L3 1/2" x 3 1/2" x 3/8" x 7" Long
  - C6 x 2.83 (Aluminum)

- **DETAIL B**
  - Bent P 7" x 8" x 3/8" (aluminum)
  - C6 x 2.83 (Aluminum)

- **DETAIL C**
  - Bent P 7" x 8" x 3/8" (aluminum)
  - C6 x 2.83 (Aluminum)

- **DETAIL D**
  - Adjust to avoid interference with sign legend and aluminum plate.
  - Sign face

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**NOTE**
- The original signed copy is kept on file at the Michigan Department of Transportation.
1. Field verify bridge dimensions prior to fabrication.

2. Welding shall be in accordance with the current Standard Specifications for Construction.

3. All structural steel members shall be hot-dip galvanized in accordance with the current Standard Specifications for Construction.

4. All aluminum members shall be ASTM B 308 aluminum alloy 6061-T6 and shall conform to ASTM B 221. Aluminum plates must be ASTM B 308 aluminum alloy 6061-T6 and must be according to ASTM B 209. All plates must be free of sharp edges and irregularities.

5. Structural steel members shall conform to AASHTO M 270 grade 36.

6. All high-strength bolts, nuts and washers shall be in accordance with subsection 706.07 and installed according to subsection 707.03.D.7 of the current MDOT Standard Specifications for Construction except for stainless steel bolts, nuts and washers.

7. Stainless steel bolts and washers shall conform to ASTM A 320, class 1, grade 8F. Nuts shall be self-locking nylon insert type and must conform to ASTM A 320, grade 8F. Stainless steel nuts and washers shall always accompany stainless steel bolts. Stainless steel bolts, nuts and washers shall be used at connections with aluminum members. All other connections shall utilize galvanized high strength bolts, nuts and washers unless otherwise specified.

8. \( \Theta \) = Angle between sign and bridge.

9. All concrete anchors shall be chosen from the qualified product list in the current MDOT Materials Source Guide. All concrete anchors shall be installed according to the manufacturer’s recommendations and subject to the requirements of section 712.03.J of the current Standard Specifications for Construction except that all field testing must demonstrate the anchor can develop 70 percent of the minimum effective ultimate strength shown in the plans with less than 1/16 inch slip. Field testing up to 90 percent of the bolts yield strength is waived. Extreme caution shall be exercised when drilling holes for concrete anchors. Existing bridge plans shall be reviewed to determine the prestressing strand locations and to evaluate the risk of damaging prestressing strands associated with installing concrete anchors.

10. The bottom edge of the sign shall be horizontal when erected.

11. If replacing an existing sign support, unused holes in steel bridge beams shall be filled with a galvanized high strength bolt installed according to subsection 707.03.D.7 of the current MDOT Standard Specifications for Construction. Existing holes in concrete shall not be reused and shall be filled with a non-shrink grout in accordance with section 702.02.B of the current MDOT Standard Specifications for Construction.

12. Sign support connection shall be installed on one bridge span of a bridge structure and shifted to avoid conflict with joints or stiffeners.

13. For connections on ASTM A 588 weathering steel bridges, the connection interface shall be blast cleaned and primed with organic zinc-rich paint in accordance with section 715 of the current MDOT Standard Specifications for Construction. If the existing bridge beam is unpainted ASTM A 588 weathering steel, the paint color shall be “brown weathering steel”, federal code number 10062 and the paint shall overlap the perimeter of the connection by 2 inches, otherwise blend the paint to match existing paint color, the perimeter of the connections to the bridge beam web shall be sealed with an approved silicone sealant in accordance with subsection 713.03.F of the current MDOT Standard Specifications for Construction. The bolted connections to the bridge beam web shall be according to subsection 707.03.D.7 of the current MDOT Standard Specifications for Construction and shall utilize high strength bolts conforming to ASTM A 325 type 3.


15. Inspection of proposed locations shall be performed to determine viability of connection to existing bridge.
16. These sign support connections shall be used with Type II or Type III signs.

17. See subsection 810.03.P of the current MDOT Standard Specifications for Construction for bolt replacement in retained bridge mounted sign connections.

18. Removal of existing bridge sign connections shall be according to subsection 810.03.T of the current MDOT Standard Specifications for Construction.


20. Aluminum member designations are in accordance with the aluminum association aluminum design manual, 2000 edition. Aluminum channels are american standard series channels (C depth X weight).

21. All members are steel unless otherwise noted.


23. Type A1 denotes connections to concrete T-beam, steel H-beam bridges, bridge or barrier railing Type 4 or Type 5.Type A2 denotes connections to concrete T-beam bridges and connections to bridge barrier railing Type 4, Type 5 and aesthetic parapet tube railing. Type B denotes connections to steel.

24. For new bridges, surface rustication (texturing) at sign connections to railing shall be eliminated behind signs. For existing bridges, surface rustication (texturing) at sign connections to concrete shall be removed to a smooth surface. Care shall be taken to not remove excessive concrete below the depth of the texturing.