Chapter 03 - Superstructure

SECTION 09

BEARINGS
(SUP-BR)
Chapter 03 - Superstructure

Section 09 – Bearings

SUB-SECTION 01
STEEL BEARINGS
(SUP-BR(SB))
Note:
1. Nut not shown.
2. Pad and support not shown.

For a continuous stringer over a bearing, this dimension is not applicable. For a stringer terminating at this bearing see details elsewhere.

*** 3/8" anchor bolts with hex. nuts and 3/8" x 3/8" washers.

Burr threads above and below nut. (Typical)

* Edges may be left as cut or cast.

** Where bridge is not skewed, Ø Brg. and Ø shoe are coincident.

*** Minimums shown. Engineer Shall Design.
Note:
1. Sole and masonry plates to be unpainted ASTM A 709 Grade 50 steel. Galvanized in accordance with A123. All areas that are to be welded shall be masked off prior to galvanizing and painted to match bridge color after welding.
2. Fill slots and holes around anchor bolts with nonhardening caulking compound or elastic joint sealer.
3. 1000 RMS finish all over except where otherwise noted.
4. Top of sole plate must be beveled to fit grade of bottom flange. If sole plate must be beveled, dimension 'C' shall be measured at 45° of bearing.
5. Unless otherwise noted, bearings shall be placed normal to 45° of stringer.
6. Plates are to be shipped as units.
7. If more than one size bearing is called for, contractor may furnish all bearings of the larger size provided the bearing pads are altered to accommodate same. No increase in any prices bid will be allowed if this option is selected.
8. This bearing for use on simple span steel stringer bridges less than 50'-0" long and/or comparable continuous span lengths.
9. All anchor bolts shall be unpainted ASTM F 1554 Grade 55 galvanized steel. All nuts shall be unpainted ASTM A 563 galvanized steel. All washers shall be unpainted ASTM F 436 galvanized steel.

Note: All dimensions are in inches.

Data Schedule:

<table>
<thead>
<tr>
<th>Type</th>
<th>Sole Plate</th>
<th>Masonry Plate</th>
<th>Hole Loc.</th>
<th>Hgt.</th>
<th>Service Loads (Kips)</th>
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<td>17 9 1</td>
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<tr>
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<td>2</td>
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<td>21 9 1</td>
<td>8½</td>
<td>2</td>
<td>100</td>
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</table>

Note: 1/2" = 1'-0"

For concrete surface preparation see 420.03.01(h).

State: 04/03/2018
Note:
1. Nut not shown.
2. Bearing Pad and support not shown.

**Edges may be left as cut or cast.

**Where bridge is not skewed, Brg. and shoe are coincident.

***Minimums shown. Engineer Shall Design.

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**SUP-BR(SB)-102**

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

EXPANSION BEARING
SHORT LENGTH SPANS
(GRADE 50 STEEL)

DETAIL NO. SUP-BR(SB)-102
SHEET 1 OF 2
Note: All dimensions are in inches.

1. Sole and masonry plates to be unpainted ASTM A 709 Grade 50 steel galvanized in accordance with A123. All areas that are to be welded shall be masked off prior to galvanizing and painted to match bridge color after welding.

2. Fill slots and holes around anchor bolts with nonhardening caulking compound or elastic joint sealer.

3. 1000 RMS finish all over, except where otherwise noted.

4. Top of sole plate must be beveled to fit grade of bottom flange. If sole plate is selected, the bearing pads are altered to accommodate same. No increase in any prices bid will be allowed if this option is selected.

5. This bearing for use on simply span steel stringer bridges less than 50'-0" long and/or comparable continuous span lengths.

6. All anchor bolts shall be unpainted ASTM F 1554 Grade 55 galvanized steel. All nuts shall be unpainted ASTM A 563 galvanized steel. All washers shall be unpainted ASTM F 436 galvanized steel.
For 1/4" anchor bolt use 1 1/8" hole in masonry and sole plates 1 1/8" hole in washer.
For 1/2" anchor bolt use 1 3/8" hole in masonry and sole plates 1 3/8" hole in washer.

Note:
Nut not shown.
Bearing Pad and support not shown.
Additional anchor bolts required for spans 150' or greater see sheet 3 of 3.

For spans under 100' use 1/4" swedge anchor bolts with hex. nuts and 3" x 1/2" washer.
For spans over 100' use 1/2" swedge anchor bolts with hex. nuts and 3" x 1/2" washer.

For a continuous stringer over a bearing, this dimension is not applicable. For a stringer terminating at this bearing see details elsewhere.

Edges may be left as cut or cast.
Where bridge is not skewed, Brg. and shoe are coincident.
Minimums shown. Engineer Shall Design.
Note: All dimensions are in inches.

1. Sole and masonry plates to be ASTM A 709 Grade 50 steel painted to match finished bridge color.
2. Fill slots and holes around anchor bolts with nonhardening caulking compound or elastic joint sealer.
3. 1000 RMS finish all over except where otherwise noted.
4. Compressive strength of concrete bearing area shall be 3.5 ksi or greater.
5. Top of sole plate must be beveled to fit grade of bottom flange.
6. Unless otherwise noted, bearings shall be placed normal to ′ of stringer.
7. Plates are to be shipped as units.
8. If more than one size bearing is called for, Contractor may furnish all bearings of the larger size provided the bearing pads are altered to accommodate same. No increase in any prices bid will be allowed if this option is selected.
9. All anchor bolts and washers shall be unpainted ASTM F 1554 Grade 55 galvanized steel. All nuts shall be unpainted ASTM A 563 galvanized steel. All washers shall be unpainted ASTM F 436 galvanized steel.
10. The maximum design rotation due to strength load combinations (θu) = 0.75°.

**DATA SCHEDULE**

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For concrete surface preparation see 420.03.07(c).

Note: 1000 RMS finish all over except where otherwise noted.

8. If more than one size bearing is called for, Contractor may furnish all bearings of the larger size provided the bearing pads are altered to accommodate same. No increase in any prices bid will be allowed if this option is selected.

9. All anchor bolts and washers shall be unpainted ASTM F 1554 Grade 55 galvanized steel. All nuts shall be unpainted ASTM A 563 galvanized steel. All washers shall be unpainted ASTM F 436 galvanized steel.

10. The maximum design rotation due to strength load combinations (θu) = 0.75°.
Note:
1. Nut not shown.
2. Bearing Pad and support not shown.

PLAN
FOR ALL GIRDERS WITH SPAN LENGTHS (CONTRIBUTING TO EXPANSION)
150' OR GREATER
Scale: 1/2" = 1'-0"

Note:
Bearings for girders with span lengths contributing to expansion of 150' or greater shall be extended to accommodate 2 additional bolts.
Size and details of all 4 anchor bolts to be the same as that required for 2 bolt bearings.

* Edges may be left as cut or cast.
** Where bridge is not skewed, q Brg. and q shoe are coincident.
For 1/4" anchor bolt use 1/8" x 2N slot in sole & bronze plates.
For 1/2" anchor bolt use 1/4" x 2N in sole & bronze plates.

For 1/4" anchor bolt use 1/8" hole in washer.
For 1/2" anchor bolt use 1/4" hole in washer.

Note:
1. Nut not shown.
2. Bearing Pad and support not shown.
3. Sliding plate not shown.
4. Additional anchor bolts required for spans 150' or greater see sheet 3 of 3.

*** For spans under 100' use 1/4" swedge anchor bolts with hex. nuts and 3" x 1/8" x 8" washers. For spans over 100' use 1/2" swedge anchor bolts with hex. nuts and 3" x 1/8" x 8" washers.

For a continuous stringer over a bearing, this dimension is not applicable. For a stringer terminating at this bearing see details elsewhere.

For 1" anchor bolt use 1" hole in masonry P & 1" hole in washer.

** Edges may be left as cut or cast.
** Where bridge is not skewed, perg, and shoe are coincident.
*** Minimums shown. Engineer Shall Design.
### DATA SCHEDULE

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<th>Type</th>
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<th>Max. Bottom Fl.</th>
<th>W.</th>
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<th>Service Limit State Loads</th>
<th>Allow Exp. (+/-)</th>
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<td>34 25 2 1/4</td>
<td>33 25 2 1/4</td>
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</tbody>
</table>

Note: All dimensions are in inches.

1. Sole and masonry plates to be ASTM A 709 Grade 50 steel painted to match finished bridge color, convex plates shall be a self lubricating bronze bearing plate conforming to 910.01.
2. Fill slots and holes around anchor bolts with nonhardening caulking compound or elastic joint sealer.
3. 1000 RMS (Finish all over) except where otherwise noted.
4. Allowable expansion is based on a 60°F temperature change from center slot setting at 60°F.
5. Compressive strength of concrete bearing area shall be 3.5 ksi or greater.
6. Top of sole plate must be beveled to fit grade of bottom flange.
7. Unless otherwise noted, bearings shall be placed normal to 3" of stringer.
8. Plates are to be shipped as units.

9. If more than one size bearing is called for, Contractor may furnish all bearings of the larger size provided the bearing pads are altered to accommodate same. No increase in any prices bid will be allowed if this option is selected.
10. All anchor bolts and shall be unpainted ASTM F 1554 Grade 55 galvanized steel. All nuts shall be unpainted ASTM F 436 galvanized steel.
11. The maximum design rotation due to strength load combinations (θw) = 0.75°.
Note:
1. Nut not shown.
2. Bearing Pad and support not shown.
3. Sliding plate not shown.

PLAN
FOR ALL GIRDER WITH SPAN LENGTHS (CONTRIBUTING TO EXPANSION)
150' OR GREATER
Scale: 1/2'' = 1'-0''

Note:
Bearings for girders with span lengths contributing to expansion of 150' or greater shall be extended to accommodate 2 additional bolts. Size and details of all 4 anchor bolts to be the same as that required for 2 bolt bearings.

* Edges may be left as cut or cast.
** Where bridge is not skewed, q of Brg. and q of shoe are coincident.
Chapter 03 - Superstructure

Section 09 – Bearings

SUB-SECTION 02
ELASTOMERIC BEARINGS
(SUP-BR(EB))
GENERAL NOTES

1. Sole plates, masonry plates, keeper bars, embedded plates, studs and angles shall be A709 Grade 50 steel unpainted galvanized in accordance with ASTM A123. All areas that welding, cladding or vulcanizing is to occur shall be masked off prior to galvanizing. Areas damaged by welding, cladding or vulcanizing shall be touched up in the field. All edges shall be cut or cast.

2. Fill slots and holes around anchor bolts with non-hardening caulking compound or elastic joint sealer.

3. 1000 μin Ria finish all over except where otherwise noted on these details or in the contract specifications.

4. Top of sole plate to be beveled to fit grade of roadway. Dimension “B” shall be measured at centerline bearing. Mark the thicker end of beveled sole plates to identify thicker end in field.

5. Bearings shall be placed normal to centerline of girder.

6. Bearings are designed for a construction uncertainty tolerance [AASHTO M-42, J14]. The tolerance is 2 times the actual rotation up to a maximum of .005 rad.

7. All anchor bolts, nuts and washers shall be unpainted galvanized in accordance with ASTM A123. Anchor bolts shall be ASTM F1554, Grade 36; nuts - ASTM A563, and washers - ASTM F436.

8. Refer to 430.03.31 for setting anchor bolts in masonry.

9. Elastomeric bearings shall be 60 durometer hardness.

10. Internal steel sheets shall be stainless steel meeting ASTM A240, Type 304.

11. All centerline of bearings and centerline of shoes are the same.

12. Bearing shoes are to be shipped as units.

13. All concrete bearing areas shall meet the surface requirements of subsection 420.03.07(C).

14. During field welding, the temperature of the steel adjacent to the elastomer or PTFE shall not exceed 200° F. Temperature shall be controlled by welding procedures and temperature indicating wax pens or other devices approved by the Engineer.

15. Polytetrafluoroethylene (PTFE) self lubricating bearing elements shall be composed of 100 percent virgin (unfilled) polytetrafluoroethylene (PTFE) polymer.

16. The surface of the stainless steel in contact with the PTFE shall have a surface finish less than 20 μin Ria and be mirror finished. Material shall be ASTM A240 Type 304. The maximum coefficient of friction for the PTFE and bearing assembly shall be μ=0.08 at 68° F.

17. Expansion bearings are designed to first slip of the bearing assembly where friction force is computed as μ x max, dead load (μ=0.08).

18. For span lengths longer than 155' or locations with seismic coefficient Vs>0.05, the designer is responsible for designing bearings and anchor bolts.
EXPANSION BEARINGS FOR PCEF BULB TEE
PRESTRESSED CONCRETE GIRDERS

5" x 3" x 7/8" angle washer galvanized, 10" long (typ.). For 1/4" dia., anchor bolts provide 1/8" dia. hole. For 1/2" dia., anchor bolts provide 1/8" dia. hole.

Beveled sole plate. For 1/4" dia., anchor bolts provide 1/8" x 2J slotted hole. For 1/2" dia., anchor bolts provide 1/8" x 2J slotted hole.

Burr threads above and below nut.

1/8" (16 gauge) stainless steel plate

For spans under 75' use 1/4" swedge anchor bolts with hex, nuts. For spans over 75' use 1/2" dia. swedge anchor bolts with hex, nuts.

Top of concrete bearing pad. For preparation of concrete surface, see 420.03.07C.

1'-3" min. for 1/2" dia. 1'-0" min. for 1/4" dia.

Masonry plate. For 1/4" dia. anchor bolts provide 1/8" dia. holes. For 1/2" dia., anchor bolts provide 1/8" dia. holes.

ELEVATION
Scale: 1" = 1'-0"

1" wide x 3/4" thick x 3'-7"

Masonry plate

Laminated elastomeric pad with 3/8" (11 gauge) stainless steel plate vulcanized to top surface of pad. Bottom of elastomeric pad to be vulcanized to top surface of masonry plate.

SIDE VIEW
Scale: 1" = 1'-0"

1" wide x 3/4" thick x 3'-7"

Note:
Anchor bolt not shown for clarity.

*Shall be cladded to bottom of sole plate.

**Dimensions "B" and "D" do not include stainless steel plates or PTFE material. Dimension "L" includes all plates and PTFE material, if dimpled and lubricated PTFE is provided. Contractor shall adjust bearing pad elevations accordingly for bearing height difference and silicone grease shall comply with MIL-S-8660.

***3/8" PTFE material to be bonded to top of 1/8" stainless steel plate.
Note:
Place studs normal to embedded plates.

* See girder elevation for dimension.

** Provide additional rows of studs for spacing larger than 12".

*** Keeper bar may be shop welded or milled from a thicker sole plate.
### DATA SCHEDULE

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<th>Elastomeric layers</th>
<th>Embedded plate</th>
<th>Slotted hole</th>
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<th>Masonry plate</th>
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<td>B</td>
<td>C</td>
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<td>(radians)</td>
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### Notes:
1. All dimensions are in inches unless otherwise noted.
2. All loads are load combination Service I.

### PRESTRESSED CONCRETE GIRDER EXPANSION BEARINGS FOR PCE-BULB TEE

### SECTION A-A

Scale: None

### SIDE VIEW SECTION LAMINATED ELASTOMERIC BEARING PAD

Scale: 3" = 1'-0"

C

1/8" cover all around

G - 1/8" (3 gauge) stainless steel sheets
1/2" min. thick beveled sole plate. For 1/4" dia, anchor bolts provide 1/8" dia. holes, for 1/2" dia, anchor bolts provide 1/4" dia. holes.

For spans under 75' use 1/4" dia. swedge anchor bolts with hex. nuts and washers.**
For spans over 75' use 1/2" dia. swedge anchor bolts with hex. nuts and washers.**

1" wide x 3/4" thick x 3'-7"
L long keeper bar each side (typ.)

This side of sole plate shall not be welded to girder.

Note:
Anchor bolt not shown for clarity.

* See girder elevation for details.
** Washers shall be ASTM F436.
Note:
Place studs normal to embedded plates.

*See girder elevation for dimension.

**Provide additional rows of studs for spacing larger than 12".

***Keeper bar may be shop welded or milled from a thicker sole plate.
### DATA SCHEDULE

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<th>Type</th>
<th>Sole Plate</th>
<th>Elastomeric Pad</th>
<th>Elastomeric Layers</th>
<th>Embedded Plate</th>
<th>Hgt.</th>
<th>Anchor Bolt</th>
<th>Vertical Loads (Kips)</th>
<th>Rotation</th>
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**Notes:**
1. All dimensions are in inches unless otherwise noted.
2. All loads are load combination Service L.

**Sections:**
- **SECTION A-A**
  - Scale: None
- **SIDE VIEW SECTION LAMINATED ELASTOMERIC BEARING PAD**
  - Scale: 3" = 1'-0"