Chapter 03 - Superstructure

SECTION 09

BEARINGS
(SUP-BR)
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, L Brg. and L 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 non-hardening 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 1/2 of bearing.
5. Unless otherwise noted, bearings shall be placed normal to 1/2 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.

<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>
</tr>
</thead>
<tbody>
<tr>
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<td>21</td>
<td>9</td>
<td>1</td>
<td>21</td>
<td>9</td>
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</table>

Note: All dimensions are in inches.
Note:
1. Nut not shown.
2. Bearing Pad and support not shown.

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

***Minimums shown. Engineer Shall Design.
### DATA SCHEDULE

<table>
<thead>
<tr>
<th>Type</th>
<th>Sole Plate</th>
<th>Masonry P</th>
<th>Hole Loc.</th>
<th>Hgt.</th>
<th>Service Loads (Kips)</th>
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</thead>
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<td>17 9 1</td>
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<td>8½</td>
<td>2½</td>
<td>100</td>
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**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 must be beveled, dimension 'C' shall be measured at top of bearing.
5. Unless otherwise noted, bearings shall be placed normal to top 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 is 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.
For 1/4" anchor bolt use 1 1/4" hole in masonry and sole plates 1/8" hole in washer.
For 1/2" anchor bolt use 1 1/2" hole in masonry and sole plates 1/8" hole in washer.

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

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

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

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.

Note: All dimensions are in inches.

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 ($\theta_{ul}$) = 0.75\°.
Edges may be left as cut or cast. Where bridge is not skewed, E of Brg. and shoe are coincident.

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, E of Brg. and shoe are coincident.
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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BRONZE EXPANSION BEARING
MEDIUM LENGTH SPANS
(GRADE 50 STEEL)

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

APPROVAL
OFFICE OF STRUCTURES
DATE: 04/03/2018

VERSION
2.0

DETAIL NO. SUP-BR(SB)-104
SHEET 1 OF 3
**DATA SCHEDULE**

| Type   | Sole Plate | Sliding Plate | Slab | Masonry | Bearing | Hole Loc. | Hole | Bottom Fl. W. | Max. Strength Limit State Loads | Service Limit State Loads | Allow Exp. (+/-) |
|--------|------------|---------------|------|---------|---------|-----------|-----|----------------|---------------------------------|--------------------------|----------------|-------|
| ME50 - I | 21 9/2 1/2 | 20 7/2 1/2 | 1 + | 12      | 14      | 3/4       |     | 12            | 200 k                          | 120 k                    | 1                |
| ME50 - II | 23 10/2 1/2 | 22 8/2 1/2 | 1 + | 15      | 16      | 3/4       |     | 15            | 300 k                          | 185 k                    | 1/2              |
| ME50 - III | 25 12/2 2 | 24 9/2 1/2 | 1 + | 18      | 19      | 3/4       |     | 18            | 400 k                          | 250 k                    | 1/2              |
| ME50 - IV | 27 13/2 2/8 | 26 11 2 | 1 + | 20      | 21      | 3/4       |     | 20            | 500 k                          | 310 k                    | 1/2              |
| ME50 - V | 29 15/2 2/8 | 28 13 1/2 | 1 + | 22      | 23      | 3/4       |     | 22            | 600 k                          | 375 k                    | 1/2              |
| ME50 - VI | 31 17 2/8 | 30 14 2/8 | 1 + | 24      | 25      | 3/4       |     | 24            | 700 k                          | 440 k                    | 2                |
| ME50 - VII | 33 18 2/8 | 32 15 2/8 | 1 + | 26      | 27      | 3/4       |     | 26            | 800 k                          | 505 k                    | 2/4              |
| ME50 - VIII | 35 19 2/8 | 34 16 2/8 | 1 + | 28      | 29      | 3/4       |     | 28            | 900 k                          | 570 k                    | 2/4              |
| ME50 - IX | 37 21 1 3 | 36 17 2/8 | 1/2 | 30      | 31      | 3/4       |     | 30            | 1000 k                         | 655 k                    | 2/4              |
| ME50 - X | 39 21 1 3 | 38 17 2/8 | 1/2 | 32      | 33      | 3/4       |     | 32            | 1100 k                         | 700 k                    | 3/4              |

**Notes:**
- 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 plate 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 ksl 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 \( \theta \) 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 primes 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 A 563 galvanized steel. All washers shall be unpainted ASTM F 436 galvanized steel.
11. The maximum design rotation due to strength load combinations (8u) = 0.75°.
Edges may be left as cut or cast.

* Note:
  1. Nut not shown.
  2. Bearing Pad and support not shown.
  3. Sliding plate not shown.

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

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** PLAN **

** FOR ALL GIRDERS WITH SPAN LENGTHS (CONTRIBUTING TO EXPANSION) **

** 150' OR GREATER **

Scale: $\frac{1}{2}'' = 1'-0''$

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** Note:**
Bearing 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.

** Version 2.0 **

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** STATE OF MARYLAND **
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES
BRONZE EXPANSION BEARING
MEDIUM LENGTH SPANS
(GRADE 50 STEEL)

** DETAIL NO. SUP-BR(SB)-104 **

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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 R(α) (finish all over) except where otherwise noted on these standards 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 14.4.2.1]. 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 Ral 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 As>0.05, the designer is responsible for designing bearings and anchor bolts.
**SIDE VIEW**

- **Laminated elastomeric pad**
  - \( \frac{1}{8}'' \) stainless steel plate
  - 1'' wide x \( \frac{3}{4}'' \) thick x 3'-7'' long keeper bar (typ.)

- **Masonry plate**
  - 1'' wide x \( \frac{3}{4}'' \) thick x 3'-7'' long keeper bar (typ.)

- **Burr threads above and below nut**

- **\( \frac{1}{6}'' \) (16 gauge) stainless steel plate**

- **For spans under 75' use \( \frac{1}{4}'' \) swedge anchor bolts with hex. nuts. For spans over 75' use \( \frac{1}{2}'' \) dia. swedge anchor bolts with hex. nuts.**

- **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.**

- **\( \frac{3}{8}'' \) PTFE material to be bonded to top of \( \frac{1}{8}'' \) stainless steel plate.**

- **Note:** Anchor bolt not shown for clarity.
Note:

Place studs normal to embedded plates.

* See girder elevation for dimension.

** Provide additional row(s) of studs for spacing larger than 12".

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Sole Plate</th>
<th>Elastomeric Pad</th>
<th>Elastomeric Layers</th>
<th>Embedded plate</th>
<th>Slotted hole</th>
<th>Hgt.</th>
<th>Masonry plate</th>
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<tbody>
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<td>3 1/2</td>
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<th>Rotation (rad)</th>
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</table>

**Notes:**
1. All dimensions are in inches unless otherwise noted.
2. All loads are load combination Service I.

**C**

1/6" cover all around

**G** - 1/8" (11 gauge) stainless steel sheets
1/2" min. thick beveled sole plate. For 1 1/4" dia. anchor bolts provide 1/8" dia. holes, for 1 1/2" dia. anchor bolts provide 1/8" dia. holes.

3/4" embedded plate galvanized

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

Note:
Anchor bolt not shown for clarity.
Refer to specifications for application of epoxy adhesive between elastomeric pad and concrete masonry.
Note: Place studs normal to embedded plates.

*See girder elevation for dimension.

**Provide additional row(s) of studs for spacing larger than 12".

***Keeper bar may be shop welded or milled from a thicker sole plate.
<table>
<thead>
<tr>
<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 I.