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IOWA DEPARTMENT OF TRANSPORTATION

To Office Bridges and Structures Date May 26, 2004

Attention All Employees Ref No. 521.1

From Gary Novey

Office Bridges and Structures

Subject MM No. 90 (Bridge Bearings)

The office prefers that expansion bearings be of the steel reinforced elastomeric type, and for several years the office has set a limit of 350 kips maximum load and 2 inches maximum shear deformation (which allows 2 inches contraction and 2 inches expansion of the superstructure) (Bridge Design Manual 5.7.4.2.1). The limits were to be exceeded only with permission of the supervising Section Leader.

Based on recent exceptions to the limits stated above, the office is increasing the policy limits to 450 kips maximum load and 2½ inches maximum shear deflection. At maximum compression stress for AASHTO Method A the limit of 450 kips will result in a bearing at least 450 square inches in plan area, which would be 21¼ inches on a side, if square. The shear deflection of 2½ inches will require a bearing about 6 inches tall, which in turn would require each plan dimension to be at least 18 inches for stability. Bearings can be manufactured to at least 50% larger volume than the sizes at the policy limits, so the supervising Section Leader may approve exceptions to the limits where appropriate. Due to overall bearing size, however, the designer should consider other expansion bearing options before requesting an exception.

If the load exceeds 450 kips or the shear deformation exceeds 2½ inches the office has a standard rocker, R5 (Standard Sheet 1009), which will accommodate 650 kips with a translation of about 4½ inches each way.

The office also has standard self-lubricating sliding bronze plate bearings (Standard Sheet 4541). The bronze plate bearing shown for steel members on the right side of Standard Sheet 4541 will accommodate 156 kips at a translation of 1½ inches each way, but the bearing or its parts may be redesigned for larger loads and larger translations.*

When considering rockers or bronze plate sliding bearings the designer may need to consider aesthetics. In general the office prefers low profile fixed bearings as shown on Standard Sheets 1010 and 4541A. Sliding bronze plates are relatively low profile when compared with rockers and, in some situations, the low profile may be preferred.

For loads greater than 650 kips or for highly unusual superstructure translations or rotations the office recommends disc or pot bearings. The designer should discuss all exceptional bearing conditions with the supervising Section Leader.

* Georgia limits bronze plate bearings to a load of 216 kips and a translation of 1 ½ inches each way. Web pages for manufacturers give no guidance for limits.

Summary Table

Bearing Type	**Maximum Load kips (kN)**	**Maximum Translation (one direction) inches (mm)**	**Comments**
Steel reinforced elastomeric	450 (2000)	2½ (65)	Larger loads are feasible at small translations. Large translations at small loads require anchorage of bearings.
Self-lubricating bronze plate	156 (695) Bearing on right side of Standard Sheet 4541	1½ (38) Bearing on right side of Standard Sheet 4541	Larger loads and translations are feasible if bearings on Standard Sheet 4541 are redesigned.
Rocker	650 (2891) R5 on Standard Sheet 1009	4½ (110) R5 on Standard Sheet 1009	Standard Sheets 1008 and 1009 also give smaller rockers with more limited capacities.
Pot (disc alternate)	2500 (11,100)	5 (125)	Maximum limits are approximate and depend on manufacturer.

Table note: The designer shall discuss all unusual bearing situations with the supervising Section Leader.

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