

Bridges and Structures

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All Employees

521.1

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Substructure Design-MM No. 8 (Pier Cap Design Shear Stirrup Spacing)

When designing a pier cap, try to limit the cap height proportions to the overall dimensions of the substructure. As a general rule, limit the cap height to:

1. 6.0 to 7.5 ft (1800 to 2300 mm) for T-Pier caps.
2. 3.5 to 4.5 ft (1100 to 1400 mm) for frame pier caps.

For longer span prestressed bridges, where design of shear steel in the cap may be difficult because of high beam reactions and the cap height becomes excessive, the following options should be considered:

1. Substitute no. 6 (no. 19) bars for no. 5 (no. 15) bars to increase the shear reinforcement area.
2. If additional shear reinforcing is needed, check with the section leader to see if single hooked shear bars can be used (Do not use triple shear stirrups in the caps due to constructability concerns).
3. For T-Pier designs, consider widening the column to eliminate the interior beam reaction on the cantilever.
4. Consider widening the cap to increase the shear capacity of the concrete.
5. For T-Pier designs, consider using Load Factor Design for the cantilever design.
6. For frame piers, consider using load factor for the cap design, however the current in-house program does not give factored loads, so a separate analysis is required.
7. Consider a higher strength concrete for the substructure following the guidelines in MM No. 16 (Use of Higher Strength Concrete).

Check with your section leader for approval.