SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
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MEMORANDUM TO DESIGN GROUP LEADERS AND CONSULTANTS

Subject: Seismic Requirements for Bridges

This memorandum supersedes and replaces DM1189 dated October 11, 1989.

All bridges shall be detailed and/or designed for seismic loadings as specified for seismic performance category B (SPC B) in the 1983 AASHTO Guide Specifications for Seismic Design including subsequent revisions. The level of seismic considerations given to each structure shall be based on one of the following two categories.

1. Major Bridges
   All major coastal bridges and other major bridges as designated by the Bridge Design Engineer shall be designed and detailed for seismic loadings in accordance with the Guide Specifications. An acceleration coefficient of 0.15 shall be used for the design and analysis of these bridges.

2. Other Bridges
   All bridges not specified in Item 1. above to receive a seismic design shall be detailed in accordance with the minimum requirements set forth in the Guide Specifications. These minimum requirements include the following:

   A. Minimum Support Length
      The minimum support length requirements of Section 4.9.1 shall be provided.

   B. Special Pile Requirements
      The special pile requirements of Section 6.3.1(C) shall be provided.

      (1) Prestressed Concrete Piles
          The details shown on Bridge Design standard drawings number 712 and/or 712P are sufficient to meet these requirements.

(2) Steel H Piles

When steel piles are used in footings or caps, the pile shall be anchored in the footing by placing a reinforcing bar through a hole in the web of the pile similar to the detail shown in Figure 1 attached to this memorandum. For piles in footings, this anchorage bar should be detailed with sufficient length so as to have an extension equal to the development length above the bottom mat of reinforcing. For piles in bent caps the anchorage bar should be detailed with a minimum leg length equal to the development length.

C. Footing Reinforcement

The anchorage of piles into footings will require tension reinforcement in the top of the footing to resist the potential negative bending. The minimum reinforcement in the top of the footing shall be #5 bars at 12" on center in both directions. Spread footings should also be detailed with this minimum top reinforcing.

D. Transverse Column Reinforcement

The minimum transverse reinforcement for the top and bottom of columns as specified in Section 8.3 shall be provided. Transverse reinforcement for round columns shall be ties with 135° seismic hooks as shown in Figure 2. The maximum spacing of #4 ties in the confinement length and the vertical extension as shown in Figure 4 is 4" for a 3'-0" diameter column. The spacing of ties between the areas of confinement at the top and bottom of columns should be set to allow the column to be lengthened by 2'-0" and this spacing adjusted to accommodate the column lengthening without exceeding a 12" maximum spacing.

E. Cap Stirrups

All cap stirrups located between columns or piles shall be one piece enclosed hoops having 135° seismic hooks at one corner as shown in Figure 3.

F. Shear Keys

(1) All concrete beam spans of AASHTO Type III or larger beams shall have shear keys cast on the bent or pier cap to provide a positive shear transfer between the superstructure and substructure. The shear keys shall be capable of transferring a load equal to two-tenths of the superstructure dead load. The preferred detail is shown in Figure 5.

(2) Steel beam and girder spans shall have sufficient anchor bolts to transfer a load equal two-tenths of the superstructure dead load in shear to the substructure. Additional shear guides may be required.

G. Beam and Girder Anchorage

All beam or girder spans, including both steel and concrete, shall be positively anchored to the substructure on both ends by means of anchor bolts or dowels.

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