STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

MEMORANDUM TO: Project Engineers
Project Design Engineers

FROM: G. R. Perfetti, P. E.
State Structures Engineer

DATE: October 24, 2011

SUBJECT: LRFD SEISMIC DESIGN

AASHTO LRFD Bridge Design Specifications require all bridges be assigned to one of four seismic zones. The seismic hazard in North Carolina is characterized by Seismic Zones 1 and 2.

Use Design Manual Figure 2-1 to assign the preliminary seismic zone to a bridge site. The assigned seismic zone reflects the relative seismic risk, which depends on the ground acceleration and the soil conditions at the site. Because the seismic zone depends on the soil site class, it may be necessary to coordinate with the Geotechnical Engineering Unit to confirm the soil classification at the bridge site.

Soils at bridge sites are classified by type and profile for the purpose of defining the overall seismic hazard. Figure 2-1 employs a baseline soil type and profile for Site Class D. If the preliminary assignment for the bridge site is Seismic Zone 2 and the *Foundation Recommendations* convey soil Site Class A, B, or C, refer to Article 3.10.2 of the LRFD specifications to reassess the seismic hazard. Use the General Procedure of this article to re-compute the horizontal response spectral acceleration coefficient, S_{D1}, and determine the seismic zone for the bridge site. If the preliminary assignment for the bridge site is Seismic Zone 2 and the *Foundation Recommendations* indicate soil Site Class D, E or F coordinate with the Geotechnical Engineering Unit to review and confirm the soil site class. Once the soil site class is confirmed, assess the seismic hazard using the General Procedure and determine the seismic zone for the bridge site.

Seismic analysis is not required for multi-span bridges assigned to Seismic Zone 1 or for single span bridges, regardless of seismic zone. However, it is necessary to provide the minimum girder support length and anchorage at each end bent, as specified in the LRFD specifications. For multi-span bridges assigned to Seismic Zone 2, analyze and design the bridge substructure(s) for limit state load combinations that include earthquake load. Include the following General Drawing note in the plans:

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
STRUCTURE DESIGN
1581 MAIL SERVICE CENTER
RALEIGH NC 27699-1581

TELEPHONE: 919-707-6400
FAX: 919-250-4082
WEBSITE: WWW.NCDOT.ORG

LOCATION:
CENTURY CENTER COMPLEX
BUILDING A
1000 BIRCH RIDGE DRIVE
RALEIGH NC 27610

This bridge is located in Seismic Zone ____.

This policy is effective with the March 2012 letting. The Design Manual will be updated at a later date.

GRP/GM

cc: T. K. Koch, P. E.
R. A. Raynor, Jr., P. E.
N. W. Wainaina, P. E.
D. D. Holderman, P. E.
R. D. Rochelle, P. E.
E. Dubin, P. E., FHWA