New Jersey Department of Transportation
1035 Parkway Avenue, PO Box 600, Trenton, New Jersey 08625-0600

Baseline Document Change Announcement

5th Edition, Design Manual Bridges and Structures

BDC10MB-01

March 24, 2010

Subject: Release of the 5th Edition of the Design Manual for Bridges and Structures

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The Design Manual for Bridges and Structures, 5th Edition is hereby released.

The 5th Edition manual is now completely in line with the FHWA requirement that the design of all new bridge structures in federally funded projects are to be designed to the AASHTO LRFD Bridge Design Specifications. Specifically, direction is provided that foundations for bridge structures and all earth retaining elements are to be designed to the provisions of the AASHTO LRFD Specifications.

BDC98MB-01 dated July 1, 1998, entitled "Design Manual Bridges & Structures, Third Edition, 1998", BDC99MB-01 dated January 26, 2000, entitled "Addition of Precast Reinforced Concrete Box Culvert Standard Drawings", BDC02MB-01 dated July 22, 2002, entitled "Standard Drawing for Overhead and Cantilever Sign Support Structures", BDC02MB-02 dated Dec 12, 2002, entitled "Release of the NJDOT Bridges and Structures Design Manual, Fourth Edition in U.S. Customary English Units" and BDC04MB-01 dated August 20, 2004, entitled "Revisions to NJDOT Design Manual for Bridges and Structures, 4th Edition" are hereby superseded.

The 5th Edition manual also includes various revisions to provide consistency with the format and Section titling of the 2007 Edition of the NJDOT Standard Specifications for Road and Bridge Construction, and reflect the current or updated AASHTO, FHWA and NJDOT design specifications, manuals and standard drawings.

The following are major revisions.

Section 1 includes an updated list of Reference Publications.

Section 3 retains previous Deflection limitation values for NJDOT bridge designs and clarifies deflection design criteria for service limit state, and adds optional span-to-depth ratios for curved girder bridges. Criteria for inclusion of a Dynamic Load Allowance for the permit vehicle analysis is given. Specifies alternate non-NHS bridge structure design criteria and permit truck load shall not be applied to non-NHS bridges.

Section 5 clarifies Analysis Period for life cycle cost (LCC) analysis.

Section 6, subsection 6.3, revisions to the General Notes presentation have been made. Specifically, changes to the Foundation Design Criteria notes should be noted. These changes address the use of AASHTO LRFD terminology.

Section 7 now includes guidance on design plan presentations including plan revisions. Listed is what is required when preparing various bridge element detailing.

Section 9 has been rewritten and now includes complete criteria for rehabilitating bridge deck slabs. Included are criteria on permitted overlays, deck deterioration levels, construction plan development, safety upgrade criteria and deck evaluation survey parameters.

Section 12 now provides the Footprint Program philosophy for replacing or rehabilitating bridge structures.

Section 15, Subsection 15.3 includes a flowchart that provides a design procedure for selecting a steel H-pile size. Subsection 15.5 now includes additional criteria to describe a semi-integral abutment bridge type, and the latest AASHTO Guide Specifications for LRFD Seismic Bridge Design is incorporated into seismic modeling and design in this Section.

Section 16, Subsection 16.1 establishes that Section 10 criteria of the AASHTO LRFD Specifications are to be used for the design of foundations. And Subsections 16.3 and 4 include criteria relative to the use of the LRFD Specifications for pile foundation designs. Allows HPC for precast/prestressed piles in tidal areas.

Section 17, Subsection 17.1 establishes that Section 11 criteria of the AASHTO LRFD Specifications are to be used for Abutment and Wall designs. Subsection 17.2 adds an assumption of vertical load on abutment transferred from approach slab. Subsection 17.3, Subpart g. establishes wall and moment slab design criteria. Subsection 17.3, Subpart 8 establishes the use of MSE walls that utilize extensible reinforcement upon approval. Subsection 17.5 establishes a definition and criteria for Landscape Walls.

Section 20, Subsection 20.3 allows HMA overlay for one-course deck slabs. Subsection 20.8, provides criteria for the use of the new approach slab details. Allows use of standard drawings of approach slabs.

Section 21 has been rewritten to categorize the three basic types of deck joint systems.

Section 22, Subsection 22.4.2 adds requirement for being consistent with environmental regulations and safety requirements.

Section 23 has been reformatted to better clarify criteria for fencing and parapet usage. Subsection 23.4, identification of the FHWA website where crash-tested railing systems are listed is provided.

Section 24, Subsection 24.5 is re-titled "Fracture Critical Members". Criteria are provided for the required analysis of gusset and splice plate members. Subsection 24.12 adds requirement for full penetration weld inspection. Subsection 24.19 adds use of HPS W grades, and paint requirement for weather steel girder ends and non-slip critical joints. Subsection 24.20 Subpart 2.b clarifies that seismic isolation bearings are permitted if seismic analysis warrants their use.

Section 27 adds use of HPC and SCC for different structural concrete items.

Section 30 is reorganized. Subsection 30.1, clarification is provided that the current sign structure standard drawings conform to the 2001 Edition of the AASHTO Luminaire Specifications, and the Designer shall verify the availability of steel pipe sizes, especially the 26"

diameter pipes, in planning a structural configuration. A fatigue category II adherence is noted. Subsection 30.3 references the standard drawings for identification of tension values for truss and anchor bolt installations. Adds use of the NJDOT Standard Drawings for Cantilever and Butterfly DMS Sign Support Structures. Adds design criteria for VMS/DMS support structures. Clarifies drag factors for VMS/DMS. Adds tables of force/moment at post base plates for foundation design of cantilever and butterfly VMS/DMS standard support structures.

Section 33 has been rewritten to conform to the 2007 NJDOT Standard Specifications terminology and pay item stipulations.

Section 34 has been expanded to include overall criteria for Geotechnical document development. Subsection 34.1 updates submission requirements.

Section 35 adds structure number definition, structure name, structure number application information for sign and VMS/DMS support structures.

Section 36 has been rewritten to provide criteria for the design of traffic signal and lighting support systems. This includes loading and fatigue criteria and adherence to the 2001 edition of the AASHTO Luminaire Specifications with the latest interim. Specifies CCTV pole deflection design requirement. Specifies fatigue design requirement for greater than 50' mast arm signal support assembly. Provides guidance for foundation design criteria.

Section 37, Guidance is provided on selecting prefabricated bridge systems. Reference is made to the FHWA website where complete prefabricated bridge system guidance is given.

Section 38 has been rewritten to reflect adoption of the latest criteria of AASHTO and FHWA documents. Subsection 38.1, under the General Criteria stipulations, it is established that the new AASHTO "Guide Specifications for LRFD Seismic Bridge Design" are to be used for the seismic design of bridges. Subsection 38.5, under the seismic retrofit criteria, adherence to the designations stipulated in the 2006 FHWA Retrofit Manual have been made.

Section 39, Subsection 39.5 has been rewritten to specifically provide design guidance with addressing scour requirements. Subsection 39.6 now specifically provides scour countermeasure guidance. Also, reference to a NJDOT Research project that addresses use of various countermeasure methods is given.

Section 42 re-introduces guidance on the types of permits and their procurement that are required for bridge work.

Sections 43 and 44 are now moved to the Design Manual body and include the guidance for submission of Evaluation Reports for the inspection of highway and railroad bridges. Adopts AASHTO Manual for Bridge Evaluation. Adds legal truck configurations. Updates Evaluation Survey Report Format and removes seismic data.

Appendix 1 is added for general information.

Appendix 2, Standard Drawing Plate numbers 2.7-1 through 2.7-5 and 2.8-1 and 2.8-2 are new drawings that detail installation of strip seal and preformed elastomeric deck joint assemblies.

Appendix 3, Guide Plates:

a) Plate 3.3-1 and other Plates (3.10-1 etc.) of abutments with approach slabs. Revised seat length of abutment from 8" to 12" and bridge seat length satisfying seismic design requirement.

b) Plates 3.4-7 through 3.4-12. Added a note for backfill materials to reflect the new NJDOT Standard Spec. requirements. The leveling pad embedded depth is revised to 3' to the top of the leveling pad.
c) Plates 3.4-8, 3.4-9, 3.4-10 and 3.4-12. Removed the coping detail between the barrier and wall face for Doublewall and T-Wall to reflect current practice for prefabricated modular wall construction and be consistent with the details in Plate 3.4-11.
d) Removed Plates for two-course deck construction details.
e) Plate 3.9-2, added a note for haunch greater than 4".
f) Plate 3.9-3, added a note for cover plate detail approval.
g) Plate 3.9-5, clarified Bearing Stiffer bottom weld detail.
h) Plates 3.10-1, 3.10-4, 3.10-5 and other similar Plates (3.10-22 etc.). Changed abutment seat length for approach slab from 8" to 12". Added a note "Seat length shall satisfy seismic design requirements."
i) Plate 3.11-2, clarified and revised Pile Splice Detail.
j) Plate 3.11-4, removed tack welding data in the Table.
k) Plate 3.11-5, the tack welds to the pile are revised to all around weld.

Distribution of hard copy of the CD Booklet:
A hard copy of the 2009 Design Manual Bridges and Structures can be obtained by contacting:

New Jersey Department of Transportation
Engineering Documents Unit
E & O Building, 1 st Floor
1035 Parkway Avenue, PO Box 600
Trenton, NJ 08625-0600
Phone: (609) 530-5587
Fax: (609) 530-6626
Cost: Contact Engineering Documents Unit for applicable cost and shipping charges

Implementation Code R (ROUTINE)

Changes must be implemented in all applicable Department projects scheduled for Final Design Submission at least one month after the date of the BDC announcement. This will allow designers to make necessary plan, specifications, and estimate/proposal changes without requiring the need for an addenda or postponement of advertisement or receipt of bids.

Recommended By:

Original Signed by

Walt McGrosky
Director,
Capital Program Support

Approved By:

Original Signed by

Richard Hammer
Assistant Commissioner,
Capital Program Management

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Attch: 5th Edition Design Manual Bridges and Structures upon request