Section 1
Introduction

1.1 Purpose

This Bridge Manual has been prepared to provide policies, guidance and procedures for bridge project development and design for the New York State Department of Transportation. This manual provides guidance for decisions in the bridge project process, documents or references policies and standards that need to be considered, and provides a commentary discussing good bridge engineering practice.

One of the primary goals of this manual is to provide assistance to designers to ensure that “quality” bridges are constructed. “Quality” bridges are durable, economical, aesthetically pleasing, and environmentally sound.

Although this manual provides guidance on design procedure, many subjects presented only highlight criteria and practice. A complete analysis and design to produce a safe, economical and maintainable structure is the responsibility of the designer.

1.2 Applicability

This manual applies to all bridges constructed under contracts with the New York State Department of Transportation. Designers are required to consult the manual for policies, guidance, details and interpretation of the design specifications. In addition, its use is encouraged for all bridges in New York State.

Highway and pedestrian bridge design are governed by the design specifications contained in the NYSDOT LRFD Bridge Design Specifications–2007 or the New York State Department of Transportation Standard Specifications for Highway Bridges–2002. This manual does not replace the provisions of these specifications. It is intended to supplement the design specifications in areas that are not addressed or fully covered. Additional information on the design of facilities for pedestrians, bicycles, and persons with disabilities may be found in Chapters 17 and 18 of the Highway Design Manual.

Major long span bridges are special cases for bridge design. They typically need special design criteria which go beyond the provisions of the NYSDOT LRFD Bridge Design Specifications. The NYSDOT LRFD Bridge Design Specifications do not have an explicit span limitation, however, the commentary states that spans in excess of 600 feet were not considered in its development.
Major long span bridges should have specific bridge design criteria developed once the bridge type has been selected and before final design begins. If during preliminary development it is determined that the NYSDOT LRFD Bridge Design Specifications do not cover all aspects of the structure design appropriate supplemental design criteria should be developed by researching design criteria for similar structures in the US and Canada.

1.3 Policy

NYSDOT has officially adopted the AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications for use in New York State. The AASHTO LRFD Bridge Design Specifications, Fourth Edition–2007, together with the “LRFD Blue Pages” constitute the NYSDOT LRFD Bridge Design Specifications–2007. The adoption of these specifications continues a process in which NYSDOT has been transitioning from the NYSDOT Standard Specifications for Highway Bridges–2002 to full adoption of the LRFD specifications. The NYSDOT Standard Specifications for Highway Bridges–2002 consists of the 17th edition of the AASHTO Standard Specifications for Highway Bridges together with the New York State “Blue Pages.” The LRFD Bridge Design Specification is mandatory for the design of all new and replacement bridges by NYSDOT and Consultant designers and Locally Administered Federal-Aid Projects. This includes both superstructure and substructure designs. The FHWA has mandated a full implementation date of October 1, 2007, for all State-initiated Federal-aid funded projects. The existing NYSDOT Standard Specifications for Highway Bridges–2002 will eventually be archived and used when necessary for the repair and rehabilitation of structures. The design specifications that may be used for rehabilitation and repair projects include the LRFD Specifications, the Standard Specifications or the specifications used in the original design.

Load Ratings – Currently, NYSDOT overload permitting and bridge posting policies require that new and replacement bridges be load rated using the Load Factor Design (LFD) or Allowable Stress Design (ASD) methods. For this reason, load ratings will continue to be computed by the LFD or ASD method. The load ratings for all new or replacement bridges will also be computed by the Load and Resistance Factor Rating (LRFR) method. Load rating for both methods shall be shown on the Contract Plans. LRFR ratings shall be shown at the inventory and operating levels as rating factors of the AASHTO HL-93 load. Once overload permitting and bridge posting policies are revised to accommodate LRFR, load ratings using LFD and ASD methods will be discontinued.

Buried Structures – Buried structures include box culverts, three-sided frames, and pipes. The FHWA is not requiring that buried structures be designed by LRFD until 2010 and LRFD software for these structures is currently unavailable. Designers should continue to use the NYSDOT Standard Specifications for Highway Bridges–2002 for the design of buried structures unless approval to use the LRFD specifications has been granted by the Deputy Chief Engineer (Structures).
1.4 Referenced Standards, Manuals and Documents

The following references contain material that is relevant to bridge project development and design. They contain provisions that pertain to a particular type of bridge or part of the bridge project process. Instead of reproducing them in full in this manual, they are incorporated by reference. Bridge designers need to consider their provisions where applicable.

The Bridge Detail (BD) Sheets referenced below contain standard details and, occasionally, instructions to designers on material that is to be incorporated into the Contract Plans.

- American Railway Engineering & Maintenance of Way Association Manual for Railway Engineering (AREMA)
- NYSDOT Bridge Deck Evaluation Manual
- NYSDOT Bridge Detail (BD) Sheets
- NYSDOT Bridge Inspection Manual
- NYSDOT Bridge Inventory Manual
- NYSDOT Bridge Safety Assurance Vulnerability Manuals
- NYSDOT CADD Standards and Procedure Manual
- NYSDOT Structures Division Cell Library
- NYSDOT Project Development Manual
- NYSDOT Environmental Procedures Manual
- NYSDOT Highway Design Manual
- NYSDOT Manual of Uniform Traffic Control Devices
- NYSDOT Prestressed Concrete Construction Manual (PCCM)
- NYSDOT Standard Specifications for Construction and Materials
- NYSDOT LRFD Bridge Design Specifications
- NYSDOT Standard Specifications for Highway Bridges (Blue Book)
- NYSDOT Steel Construction Manual (SCM)
- NYSDOT Procedures for Locally Administered Federal Aid Projects
- NYSDOT Survey Manual
- FHWA Seismic Retrofitting Manual for Highway Bridges
- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities
- AASHTO LRFD Movable Highway Bridge Design Specifications
- AASHTO Maintenance and Management of Roadways and Bridges Manual
- AASHTO Guide Specification for Fatigue Evaluation of Existing Steel Bridges
- AASHTO Roadside Design Guide
- AASHTO Guide for the Development of Bicycle Facilities
- AASHTO Guide Specification and Commentary for Vessel Collision of Highway Bridges