Subcommittee for Standardization of Bridge/Culvert Designs

Final Review Checklist for Bridge Replacements – County/City Structures

Introduction: This checklist provides general guidance for bridge replacement projects. Following this checklist throughout the structure replacement process will aid in meeting current standards and codified regulations.

Applicable Regulations: Owners and consultants should be aware of the local, state, and federal requirements associated with bridge replacements and other public improvements. Regardless of the funding source, the requirements for any structure on a public road are found in state statute and the Codified Federal Regulations. The items listed below are identified for reference only and should not be considered all inclusive. Contact SDDOT Local Government Assistance (LGA) office for any questions on standards and requirements associated with bridges and public roadway improvements.

Note: All structures to be included on the National Bridge Inventory (≥20' long) shall be designed to AASHTO standards. Structures under 20' should also be designed to AASHTO standards.

- Federal Aid Policy Guide 23 CFR 650 Part 650 – Bridges, Structures, and Hydraulics
  http://www.gpo.gov/fdsys/pkg/CFR-2009-title23-vol1/xml/CFR-2009-title23-vol1-part650.xml

  Bridge is defined as: A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.

  Consultant and owner should be aware of all requirements under Part 650. Subparts C and D of Part 650 specifically reference the requirements for meeting Inspection Standards and Replacement and Rehabilitation of Structures.

  - Subpart C – National Bridge Inspection Standards
    http://www.fhwa.dot.gov/legsregs/directives/fapg/cfr0650c.htm
    The National Bridge Inspection Standards (NBIS) in this subpart apply to all structures defined as highway bridges located on all public roads. If a structure is not properly designed using current hydraulic, geotechnical, and structural standards as well as having acceptable construction inspection and testing, many of items in the NBI can't be given an acceptable rating. The structure would therefore be identified as deficient and would include a Metric in the annual review of "Non-Compliant".

  - Subpart D – Highway Bridge Replacement and Rehabilitation Program
    http://www.fhwa.dot.gov/legsregs/directives/fapg/cfr0650d.htm

- Standard, policies, and standard specifications requirements related to Bridges and Structures are stipulated within Federal Aid Policy Guide 23 CFR Subchapter G, Part 625 Section 625.4
  http://www.fhwa.dot.gov/legsregs/directives/fapg/cfr0625.htm

- Title 23, United States Code
  http://www.fhwa.dot.gov/MAP21/docs/title23usc.pdf

Estimated Timeline: The timeline for a bridge replacement project can vary greatly depending on the type and size of the structure. Schedules can range from 6 months to 3 years and should be taken into account by the owner.

Checklist for Structure Replacements

1. **Review Sufficiency Report** from SDDOT which lists bridges that are functionally obsolete, structurally deficient, and are posted for loads. Review and prioritize which bridges need to be replaced. The sufficiency report lists structures over 20 feet in length. Other structures should also be review for need.

   Note: Owners can complete the TS&L process for known structure replacement needs prior to bridge construction funding being secured. The TS&L process provides design alternatives and associated costs for planning and budgeting purposes.

2. **Review Funding Options**. Funding of bridges should be programmed out as far in advance as possible.
   a. Fund with Local funds
   b. Request funds from LGA

3. **Identify Design Standards**
   a. AASHTO LRFD Bridge Design Specifications
      i. AASHTO Website
   b. Bridge Inventory & Inspection (Local):
      http://www.sddot.com/transportation/bridges/inventory/Default.aspx
   c. SDDOT Bridge Design & Plans:
      http://www.sddot.com/transportation/bridges/design/Default.aspx
   d. SDDOT Drainage Manual:
      http://www.sddot.com/business/design/forms/drainage/Default.aspx

4. **Select an Engineering Consultant**
   1. Prepare a scope of work
      LGA recommends selecting firms from the SDDOT prequalified consultant list
      http://www.sddot.com/business/design/docs/ConsultingFirms.pdf
   2. Negotiate hours and prepare contract
   3. Receive commission approval
   4. Send a Notice to Proceed

   Contract should include provisions to:
   a. Notify property owners of project and survey to be completed with the project.

   b. Complete topographic survey of structure and drainage way per SDDOT Drainage Manual and Survey Manual.
      http://www.sddot.com/business/design/docs/drainage/Chapter%2005-Data%20Collection.pdf
      http://sddot.com/business/design/surveyors/Default.aspx

c. Determine preliminary drainage data as per the SD Drainage Manual Chapter 14.
http://sddot.com/business/design/docs/drainage/Chapter%2014-Bridge%20Hydraulics.pdf

d. Complete final drainage data

e. Develop preliminary hydraulic data based on: overall roadway scope, preliminary gradeline, drainage survey data, historic high water, upstream and downstream structures, and public input

f. Prepare the draft hydraulic report. More than one size and type may be evaluated; cost estimates for each option should be provided.

g. Conduct a preliminary structure site inspection and select structure type.

h. Prepare preliminary structure layout for foundations investigation for use by applicable departments. The preliminary structure chosen is based on the evaluation of many factors, including site conditions and structure geometry, hydraulic analysis and scour, potential debris, structural loads, anticipated foundation conditions, environmental and right-of-way impacts, aesthetics, and construction costs. The following items shall be presented with the preliminary structure data info:
    i. Plan and profile showing the proposed type, size and location (TS&L) of the structure
    ii. Bridge end elevations
    iii. Typical roadway grading section at structure with elevations shown
    iv. Channel cross section at structure
    v. Minimum horizontal and vertical clearances
    vi. Design flow information
    vii. Design headwater elevations

i. Perform geotechnical investigation and preliminary structure layout
    i. D50 for scour analyses
    ii. Substructure recommendations

Note: SDDOT geotechnical forces will complete this item or owner will hire an approved geotechnical firm to complete the services. It is recommended the geotechnical firm is selected off of the SDDOT consultant prequalified list.

j. Complete Scour Analysis based on structure type selected and foundation investigation

k. Complete Final Hydraulics Report

l. Preliminary Bridge and Roadway Design; based on the roadway alignment and Final Hydraulics Data Sheet, proceed with design to include:
   i. Plan and profile showing the proposed structure
   ii. Bridge barrier or sidewalk and bridge railing
   iii. Minimum horizontal and vertical clearances
   iv. Hydraulic data, high-water and low-water elevations
   v. Erosion protection details

m. Submit to SDDOT for review and comment (optional when locally funded)
   Note: Recommended to have SDDOT LGA Office and Office of Bridge Design complete a cursory review of all bridge projects.

n. Obtain permits:
   i. Surface water discharge permits (NPDES)
   ii. SWPPP from SDDENR
   iii. Dredge and fill permits (Section 404) with the Corps of Engineers:
   Note: Let the CORPS contact agencies through the programmatic agreement in place with agencies. Do not contact USFWS, but let the Corps do this.
   iv. County and municipal permits

o. Complete Final Bridge and Roadway Design

p. Submit plans to SDDOT for review and comment (optional when locally funded)
   Note: Recommended to have SDDOT LGA Office and Office of Bridge Design complete a cursory review of all bridge projects.

q. Revise and Finalize Design Plans

r. Prepare Contract Documents

s. Prepare Engineer's Estimate

5. **Utility Notification** as per state law (some local agencies do this, and some have the consultant do this)

6. **Obtain any needed ROW or Easements**
   Note: Meeting with property owners early on in the process is beneficial.
   Note: Comply with the Uniform Act when obtaining any easements or ROW.
   Utilize standard forms provided by SDDOT – LGA Office

7. **Advertise Project** - as per state law

8. **Conduct Bid opening**

9. Award Bid to low responsible bidder

10. Submit the following to the LGA Office at the SDDOT for the bridge inspection file

a. Final Plans
b. Load analyses and rating
c. Scour analyses

Note: These items are to be submitted prior to advertising the project. Allow sufficient time for review and comment.

11. Contact SDDOT – LGA Office for Initial Inspection Guidance

Note: Recommended to complete as soon as bridge is complete.