



INDIANA DEPARTMENT OF TRANSPORTATION

Driving Indiana's Economic Growth

Design Memorandum No. 14-08 Policy Change

May 7, 2014

TO: All Design, Operations, and District Personnel, and Consultants

FROM: /s/Elizabeth W. Phillips
Elizabeth W. Phillips
Office of Policy and Standards
Bridges Division

SUBJECT: Bridge Preservation

REVISES: *Indiana Design Manual* Sections 72-1.04, 72-2.05(02), 72-3.01(02), and 72-6.02. Figure 72-2D (new)

EFFECTIVE: Immediately

The American Association of Highway Transportation Officials defines bridge preservation as a construction activity intended to prevent, delay or reduce deterioration of the bridge or bridge elements, restore the function of existing bridges, keep bridges in good condition and extend their service life. Bridge preservation can be subdivided into bridge rehabilitation and bridge preventative maintenance. Bridge rehabilitation includes major work to restore the structural integrity of a bridge, while preventative maintenance is a means of extending the service life of the existing facility.

In order for federal-aid funds to be used for preventive maintenance, FHWA must have either a project-by-project or programmatic agreement with the state. FHWA and INDOT have an approved preventative maintenance agreement called the *Bridge/Culvert Preservation Initiative (BCPI)* that allows federal funds to be used for certain bridge preventive maintenance activities.

Latex Modified Concrete (LMC) overlays are included as part of a group of revisions to the *BCPI* which are currently under review by INDOT and FHWA. Until the *BCPI* revisions are finalized, FHWA has approved a separate programmatic agreement to allow LMC overlays as a preventive maintenance activity.

To qualify as a candidate for preventative maintenance an LMC overlay project must meet the following criteria:

1. The deck, superstructure and substructure must each have a bridge inspection rating of 5 or higher.
2. Partial depth patching must be 15% or less.

A preventative maintenance project is exempt from Level One design criteria requirements. For a bridge preventative maintenance project, it is not necessary to complete the Level One checklist. However, the existing bridge railing condition must be assessed and obvious deficiencies addressed. Bridge railing not performing as intended due to deterioration or crash history should be considered for replacement. In addition, a preventative maintenance project must continue to meet the requirements of the Americans with Disabilities Act.

Field inspection meeting minutes may be submitted in lieu of a Bridge Scoping Report for projects whose scope is limited to preventative maintenance work activities. Information to be included is shown in the attached Figure 72-2D.

The information contained in this memo has been incorporated into *Indiana Design Manual* Chapter 72.

The *BCPI* is available at <http://www.in.gov/indot/2731.htm> Additional information on bridge preservation is available in the [FHWA Bridge Preservation Guide](#) and at <http://www.fhwa.dot.gov/bridge/preservation/>.

72-1.04 Bridge Rehabilitation Project [May 2014]

A bridge rehabilitation project may include either preventative maintenance or rehabilitation work activities.

Preventative maintenance consists of work in which the existing bridge deck will remain in place. This includes Latex Modified Concrete (LMC) bridge deck overlays and treatments included in the *Bridge and Culvert Preservation Initiative (BCPI)*. The *BCPI* is available at <http://www.in.gov/indot/2731.htm>

Rehabilitation includes major work to restore the structural integrity of a bridge. This work may include but is not limited to partial or complete bridge deck replacement with or without incidental widening; superstructure replacement, and strengthening to increase load-carrying capacity.

The Bridge Rehabilitation Team is responsible for projects including preventative maintenance and rehabilitation work activities that are part of the Department's Capital Improvement Program.

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72-2.05(02) Bridge Scoping Report [Rev. Mar. 2012, Jan. 2013, May 2014]

The Bridge Scoping Report should be prepared for projects whose scope includes rehabilitation work activities. Field inspection meeting minutes may be submitted in lieu of a Bridge Scoping Report for projects whose scope is limited to preventative maintenance work activities. See Section 72-1.04 for a description of work activities defined as rehabilitation and work activities defined as preventative maintenance. The Bridge Scoping Report or field investigation meeting minutes should be submitted as soon as practical after the field inspection, but not later than 30 days after the field inspection, unless otherwise approved by the project manager. The purpose of the Bridge Scoping Report is to communicate critical information on the existing bridge and proposed scope of rehabilitation, including the following:

1. documenting the findings from the field inspection, including photographs;
2. making recommendations on the proposed bridge-rehabilitation improvements;
3. providing a preliminary project cost estimate;
4. identifying a proposed strategy for maintenance and protection of traffic during construction;
5. serving as design-approval documentation, including compliance with Level One design criteria; and
6. documenting the findings from the scour analysis, if the bridge is over water.

The required Bridge Scoping Report format, order and content is shown in Figure 72-2B. The Preventative Maintenance Meeting Minutes format is shown in Figure 72-2D.

Supplemental documents to reinforce the designer's decisions may be included, but should be separated as an appendix. Such documents should appear in order as follows:

1. Field Check minutes;
2. correspondence;
3. computations such as Level One design criteria, guardrail, sight distance, or others;
4. quantities calculations; and
5. other supplemental documents

Existing plans and the bridge inspector's structure inventory and appraisal report should not be included in the Bridge Scoping Report. Information referenced from the bridge inspector's report should appear within the body of the Scoping Report. A single page should be added as a supplemental document. If a detail shown on the plans for the existing structure is to be included, the detail should be submitted as a supplemental document, and referenced within the Scoping Report.

A design exception is required for Level One design criteria that are not satisfied. The design exception should be prepared in accordance with Chapter 40-8.0 and submitted at the same time as the Bridge Scoping Report, but as a separate document. Preventative maintenance projects are exempt from Level One design criteria as noted in Section 72-6.02.

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72-3.01(02) Typical Department Practices [Rev. May 2013, May 2014]

The Department has adopted the following typical practices for bridge-deck rehabilitation.

1. Bridge Deck Overlay.

- a. Patching. Patching the bridge deck should be considered a temporary measure to provide a reasonably-acceptable riding surface until a more-permanent solution can be applied.

A patch is considered partial depth if thickness of the patch is equal to or less than half the deck thickness. A patch is considered full depth if the thickness of the patch is greater than half the deck thickness. The pay item for patching includes the cost of removing the unsound material.

Partial depth patching is included in the cost of hydrodemolition.

- b. Latex-Modified Concrete (LMC) Overlay. This rigid overlay is typically applied in conjunction with deck patching. For an LMC overlay project to qualify as a candidate for preventative maintenance, the deck, superstructure, and substructure must each have a bridge inspection rating of 5 or higher and the partial depth patching must be less than 15%. If full depth patching exceeds 35%, consideration should be given to deck replacement. Since the early 1970s, the latex-modified overlay has been the most-common bridge-overlay technique used, and it has provided an average service life of 15 years.
- c. Polymeric Overlay. This flexible overlay consists of an epoxy polymer combined with a special aggregate. The wearing surface, deck, superstructure and substructure must each have a bridge inspection rating of 5 or higher in order to qualify as a candidate for a polymeric overlay. An average service life of 10 years can be assumed.
- d. Microsilica Concrete. A microsilica-concrete overlay may be used if providing a low diffusivity concrete overlay is desirable. This method has been used since the early 1990s.
- e. Asphalt Overlay with Sheet Membrane. This method was used in the 1960s and early 1970s with limited success. The difficult construction tolerances for surface preparation, membrane discontinuities, and application temperature have caused poor results.

A damaged waterproofing system is counterproductive in that it retains salt-laden water and continues supplying it to the deck which, thus, never dries out. Also, rain water or washing efforts cannot remove the salt. Due to its low reliability, INDOT no longer uses this rehabilitation technique.

f. **Low-Slump Concrete.** A dense low-slump concrete overlay, of 2¼-in. depth, has been specified as an alternative to a latex-modified overlay for over 25 years. This option has been seldom used. Because this product has the same characteristics as the latex-modified overlay and is more expensive, it is no longer specified.

g. **Second Overlay.** It is acceptable to remove an existing overlay and replace it with a new one. Department policy is to not allow a new overlay to be placed over an existing bridge deck overlay, because it is counterproductive and adds to the dead weight of the structure. **The placement of a polymeric overlay on an existing LMC overlay requires the approval of the Bridges Division Director.**

h. **Hydrodemolition.** Hydrodemolition uses a jet of high pressure water to remove unsound deck concrete prior to placement of an LMC overlay. Prior to the use of hydrodemolition, any existing LMC overlay must be removed, and a surface milling operation performed to remove ½ in. of the deck surface.

2. **Joints.** The Department recognizes that the service life of bridge-deck expansion joints is much shorter than that of the bridge. Leaking and faulty joints represent a hazard for the deck and the main structural components. Therefore, the standard procedure is to eliminate all expansion joints as part of a bridge-rehabilitation project where practical. The elimination of joints may require substantial alterations and may have structural implications which should be investigated. Where applicable, the bridge-deck rehabilitation should be consistent with the criteria described in Chapter 404-2.0 relative to the design of bridge-deck expansion joints.

Compression seals (type BS joints) are not permitted on a bridge-deck rehabilitation project. Therefore, all such existing joints should be removed.

3. **Minimum Patching Quantities.** The quantity summaries for a bridge-rehabilitation project only include an estimate of the percent of bridge-deck patching. The exact amount of patching needed is determined in the field during construction. However, the minimum amount of bridge-deck patching shown in the quantities summary will be either 5% of the bridge deck area, or 300 ft², whichever is greater.

4. **Additional Bridge-Deck Overlay.** The Estimate of Quantities will include a pay item for additional bridge-deck overlay. This quantity includes the volume of material used in

partial-depth patching, assuming a depth of 2 in., plus a 6% overrun of the 1 3/4-in. bridge deck overlay. The estimated quantity should be calculated as follows:

$$\text{Additional Bridge-Deck Overlay (yd}^3\text{)} = (0.00617)(\text{Area of Partial-Depth Patching, ft}^2\text{)} \\ + (0.00292)(\text{Bridge-Deck Overlay, yd}^2\text{)}$$

Where 0.00617 and 0.00292 are unit conversion factors derived as follows:

$$0.00617 = (2\text{in.})\left(\frac{1\text{ft}}{12\text{in.}}\right)\left(\frac{1\text{yd}^3}{27\text{ft}^3}\right)$$

$$0.00292 = (1.75\text{ in.})\left(\frac{1\text{yd}}{36\text{in.}}\right)(.06)$$

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72-6.02 Geometric Design [May 2014]

The geometrics which apply to a bridge-rehabilitation project are based on urban or rural location, functional classification, and project scope of work.

Chapter 40-6.0 describes the project scope of work. Bridge rehabilitation is most often considered a 3R project on either a freeway or non-freeway. See Chapter 54 or Chapter 55 to determine the applicable geometric design criteria. Projects for which the scope is limited to preventative maintenance work activities are exempt from Level One design criteria requirements except as follows. These projects must comply with the Americans with Disabilities Act (ADA). See Section 51-1.08 for ADA requirements. The existing bridge railing condition must be assessed and obvious deficiencies addressed, but an evaluation of Bridge Railing Test Level is not required. Bridge railing not performing as intended due to deterioration or crash history should be considered for replacement.

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Use 8.5" x 11" size format. Use a 12-point font, either Times New Roman or Arial. Include Des. No. and Bridge File No. as header information at the top of each page. Include page number at the bottom of each page, including schematics and photographs. Statements should be clear and concise.

GENERAL PROJECT INFORMATION (Provide in memorandum form as illustrated below.)

BRIDGE SCOPING REPORT

BRIDGE FILE NUMBER: _____

NBI NUMBER: _____

DESIGNATION NUMBER: _____

ROUTE IDENTIFICATION AND FEATURE CROSSED: _____ over _____

PROJECT LOCATION: (8 miles southwest of the south junction with State Road 39, in Section 13, T-11-N, R-2-W, Ray Township, Morgan County, Indiana)

REFERENCE POINT: _____

PREPARED BY: _____

(INDOT designer name and INDOT District or Central Office, or Consultant Project Manager name and Consulting Firm)

DATE: _____

[LPA PROJECTS ONLY] OWNER REPRESENTATIVE: _____
(Signature, Title, and Date)

I. FIELD INSPECTION DATA

Date of Inspection

Time of Inspection

Attendance (Name, Organization, Unit within Organization)

II. EXISTING STRUCTURE DATA

A. History

Year Built

Year(s) Repaired and type of repair work (if known)

Current Inventory Load Rating (If the current Inventory Load Rating is less than 36 tons, this should be discussed at the initial field check)

IV. EXISTING CONDITIONS

This section should begin with a brief description of the intended purpose of the project.

This section should include a list of brief statements on the condition of the structural elements. The statements should focus on deterioration and necessary repairs. **If an element does not require a repair, only the general condition (Item 1 for each element listed below) which is to remain in place after rehabilitation should be noted.** Additional guidance for reviewing specific elements can be found in IDM Figure 72 – 2B Elements. The following is a list of elements to be reviewed during the field check.

A. Bridge Deck

1. General. Indicate the overall condition of the bridge deck (excellent, fair, poor). A percentage of partial depth patching should be noted for the purpose of estimating Bridge Deck Overlay, Additional.
2. Overlay
3. Surface Condition.
4. Underside Condition.
5. Joints.
6. Drainage.
7. Bridge Railing. The existing bridge railing condition must be assessed, but an evaluation of Bridge Railing Test Level is not required. Bridge railing not performing as intended due to deterioration or crash history should be considered for replacement.
8. Curbs or Sidewalks.

B. Superstructure

1. General. Indicate the overall condition of the superstructure (excellent, fair, poor).
2. Fracture-Critical Member or Low-Fatigue-Life Details
3. Damage
4. Bearings, Pedestals

C. Substructures and Foundations

1. General. Indicate the overall condition of the substructures and foundations and slope protection (excellent, fair, poor). Also indicate the substructure and foundation types and materials.
2. Seismic.
3. Drainage.
4. Scour.

D. Approaches

Only design elements within the limits of the project, including the incidental construction, or safety concerns should be addressed.

1. General. Indicate the overall condition of the approaches (excellent, fair, poor).
2. Wedge.
3. Approach Pavement.
4. Guardrail.
5. Drive or Public Road.
6. Traffic-Control Devices.
7. Roadway Drainage and Pipes.
8. Miscellaneous.

E. Utilities. Identify all apparent existing utilities which are attached to structural elements, and their locations, e.g., conduits, electrical boxes, gas lines, water lines.

F. Railroad. (Presence, if affected by project construction or maintenance of traffic)

- G. Environmental Compliance. Document the environmental factors which are likely to be involved, including the following:
1. Impact on wetlands (if applicable a color photograph of the suspected area should be included and labeled);
 2. All likely permits (if no permits are required, state the reasons why not); and
 3. Historical significance of the bridge, specify if Select or Non-Select.

See Chapter Seven and Chapter Nine for more information on environmental considerations and permits.

V. RECOMMENDATIONS

This section should begin with a statement to the effect that the scope of work for this project falls under preventative maintenance and geometric design criteria were not evaluated at this time.

This section should contain a concise list of the recommended repairs for the project. See Chapter 72 and specifically Figure 72-2B for additional guidance to possible repairs. In addition to recommended repairs, the following items should be included in the recommendations.

- A. Additional Condition Surveys and Tests. Section 72-2.0 identifies the more-sophisticated condition surveys and tests. Indicate which of these, if any, should be undertaken before definitive recommendations are made.
- B. Utilities. Identify known utility adjustments necessitated by the bridge-rehabilitation work. See Chapter Ten for more information on INDOT policies and procedures for utility adjustments.
- C. Maintenance and Protection of Traffic During Construction. Identify the recommended strategy for maintaining traffic during construction. Inclusion of preliminary sketches is recommended for a complex traffic-control scheme.

VI. PRELIMINARY COST ESTIMATE

Provide a preliminary cost estimate for the proposed bridge rehabilitation work. Minor miscellaneous items may be combined into one lump-sum item.

The preliminary cost estimate, projected to the scheduled contract letting, should be based on INDOT's current construction cost-estimating software system.

VII. PHOTOGRAPHS

Provide color photographs depicting in sufficient detail noted deficiencies and recommended repairs. The pictures can then be used in reviewing recommended preventative maintenance items. The following procedures apply to photographs.

1. Log all photographs as taken.
2. 1 - 2 photographs per page.
3. Beneath each photograph, identify the following:
 - a. the photo vantage point,
 - b. the direction the photographer is looking, and
 - c. the description of the picture.

For a project anticipating an IDNR permit, the designer should consider including a plan view of the bridge, to be placed in advance of the photographs, illustrating the photo location by photo number and the direction the photographer is looking.

Photographs should include header information and continue page numbering from previous sheets.