**BCR Procedures & Practices – Revised January 2023**

# BRIDGE CONDITION REPORT PROCEDURES AND PRACTICES

Illinois Department of Transportation

# BRIDGE CONDITION REPORT PROCEDURES AND PRACTICES

---

**Title Page**


**Prepared by:**

**Bureau of Bridges and Structures**
**Office of Highways Project Implementation**

**Agency:**

**Illinois Department of Transportation**



**Place of Publication:**

**Springfield Illinois**

**January 2023**

# Table of Contents

**Section 1 - Introduction ..... 1-1**
1.1 General ..... 1-1
1.2 Purpose ..... 1-1
1.3 Report Type and Format ..... 1-1
1.4 District and Consultant Prepared BCR's ..... 1-2
1.5 Submittal Requirements ..... 1-3
**Section 2 - General Information ..... 2-1**
2.1 General ..... 2-1
2.2 Geographical and Administrative Data ..... 2-1
2.3 Physical Description of Structure ..... 2-2
2.4 Construction History ..... 2-2
**Section 3 - Structure Evaluation ..... 3-1**
3.1 General ..... 3-1
3.2 Existing Documentation ..... 3-1
3.3 Geometric Functionality ..... 3-5
3.4 Hydraulic Performance ..... 3-5
3.5 Physical Condition and Load Capacity ..... 3-6
3.6 Stage Construction Feasibility ..... 3-13
3.7 Seismic Considerations ..... 3-15
**Section 4 - Scope of Work ..... 4-1**
4.1 General ..... 4-1
4.2 Scope of Work Alternatives ..... 4-1
4.3 Special Scope of Work Considerations ..... 4-2
4.4 Economic Evaluation ..... 4-4
4.5 Scope of Work Recommendation ..... 4-7
**Section 5 - Report Preparation ..... 5-1**
5.1 Bridge Condition Report ..... 5-1
5.2 Abbreviated Bridge Condition Report ..... 5-3
**Appendix A – Sample BCR**
**Appendix B – Sample ABCR**

# Section 1 - Introduction

## 1.1 General

As directed by the Engineer of Bridges and Structures, it is the responsibility of the Engineer of Bridge Planning to develop, maintain, and administer the policies that govern the planning and preparation of bridge planning documents for all structures under the jurisdiction of the Department of Transportation. The vehicle by which this policy is controlled is the *Bridge Manual*.

The purpose of this document is to aid in the preparation of Bridge Condition Reports and supersedes Section 39-3.02 of the *Bureau of Design and Environment (BDE) Manual (Revised May 2021)*. All other Department publications are applicable unless stated otherwise in the sections that follow.

## 1.2 Purpose

The purpose of the Bridge Condition Report is to document the current physical condition and function of a structure, examine the possible scope of work options, and recommend the most suitable treatment of the structure within the framework of the Phase I study. In addition, the Bridge Condition Report establishes certain preliminary design controls such as structure width and stage construction feasibility.

## 1.3 Report Type and Format

There are two general formats for Bridge Condition Reports.

1. Bridge Condition Report
2. Abbreviated Bridge Condition Report

### *1.3.1 Bridge Condition Report*

The standard Bridge Condition Report (BCR) is a long format report and is applicable to structures where the determination of the appropriate scope of work warrants an in-depth study, or the structure is in poor or questionable condition. The major sections of the BCR are shown below and the requirements for each are discussed in detail in Sections 2 through 4 of this document.

I. General Information
II. Structure Evaluation
III. Scope of Work

The organization and layout of the BCR is discussed in greater detail in Section 5.

### *1.3.2 Abbreviated Bridge Condition Report*

The BBS 2805: Abbreviated Bridge Condition Report (ABCR) is a short format standard form and is applicable to structures where the proposed scope of work is apparent without an in-depth study. When the anticipated scope of work for a structure is easily determined due to horizontal or vertical realignment deficiencies, severe physical deterioration, structural insufficiency, or hydraulic inadequacy, the detailed collection and analysis of information required for a BCR is not warranted. An ABCR is also applicable when documentation is necessary to indicate the anticipated work is minor in nature and the structure is in good condition. The requirements for an ABCR are provided in Section 5 of this document. The ABCR form is provided in Appendix B and is also available on the Department's website.

## 1.4 District and Consultant Prepared BCR's

In most cases, the preparation of a BCR will require a structural evaluation by a licensed Structural Engineer capable of conducting the necessary analyses. In some cases, the preparation of an ABCR may also require structural analyses. When the report is prepared by a Consultant, the Consultant is responsible for completing these analyses. Additionally, the consultant must be prequalified in a suitable Structure Prequalification Category commensurate with the complexity of the structure to be evaluated. When the report is being prepared by a District, the Bureau of Bridges & Structures (BBS) should be contacted to conduct the necessary structural analyses.

## 1.5 Submittal Requirements

When a structure, meeting the requirements below, falls within a roadway section covered by a Phase I Report or when the structure itself is the subject of a Phase I Report, a BCR or ABCR may be required.

Structures, as mentioned above, are defined as:

- Bridges
- Multiple cell cast-in-place concrete box culverts
- Multiple cell precast box culverts under an Interstate Highway
- Single cell cast-in-place concrete box culverts with a clear span greater than 12’
- 3-sided structures
- Retaining walls with a retained height greater than 7’

When required, the BCR or ABCR is submitted to the BBS for review and approval. The BBS will evaluate the proposed scope of work and provide written concurrence or non-concurrence.

In unusual circumstances, the District or BBS may recommend a BCR or ABCR for structures other than those defined above. Contact the Bridge Planning Unit with any questions regarding submittal requirements.

The flowcharts shown in Figures 1.5-1 and 1.5-2 indicate when a BCR or ABCR is required. The Condition States cited in Figure 1.5-1 reference the Department’s *Bridge Element Inspection Manual* and apply to the major elements of the structure, such as the bridge deck/slab, and the concrete, steel and timber elements of the superstructure and substructure. The Condition Ratings cited in Figures 1.5-1 and 1.5-2 reference the *Illinois Structure Information and Procedures Manual.*

For retaining walls, the Condition States and Condition Ratings cited in Figure 1.5-1, apply to the element(s) of the primary load resisting member(s). When Condition States or Condition Ratings are not available, conservative assumptions based on reasonable engineering judgement using available data shall be made.

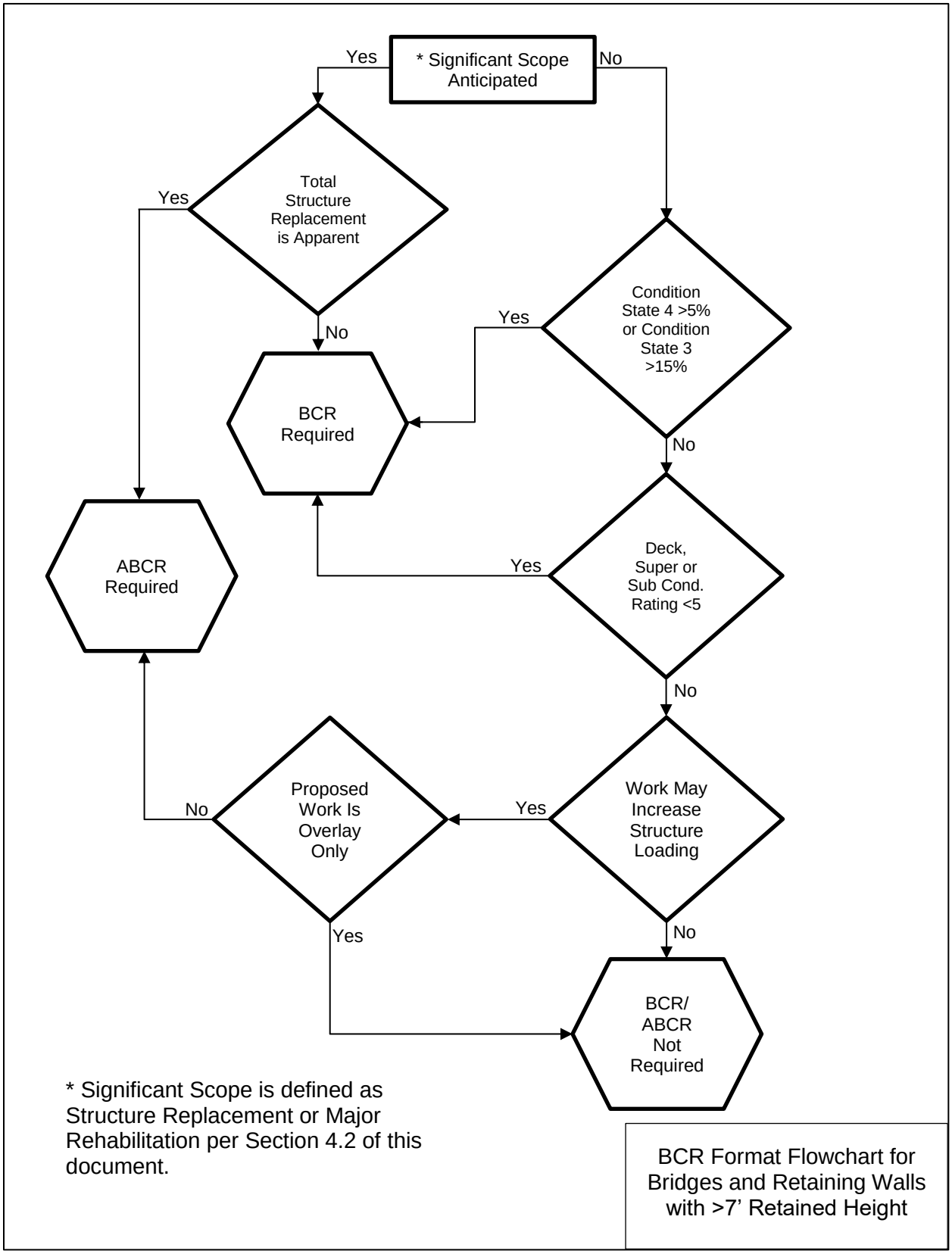

* Significant Scope Anticipated
Yes
No
Total Structure Replacement is Apparent
Yes
No
Condition State 4 >5% or Condition State 3 >15%
Yes
No
BCR Required
ABCR Required
Deck, Super or Sub Cond. Rating <5
Yes
No
Work May Increase Structure Loading
Yes
Proposed Work Is Overlay Only
No
Yes
No
BCR/ ABCR Not Required
* Significant Scope is defined as Structure Replacement or Major Rehabilitation per Section 4.2 of this document.
BCR Format Flowchart for Bridges and Retaining Walls with >7' Retained Height

Figure 1.5-1

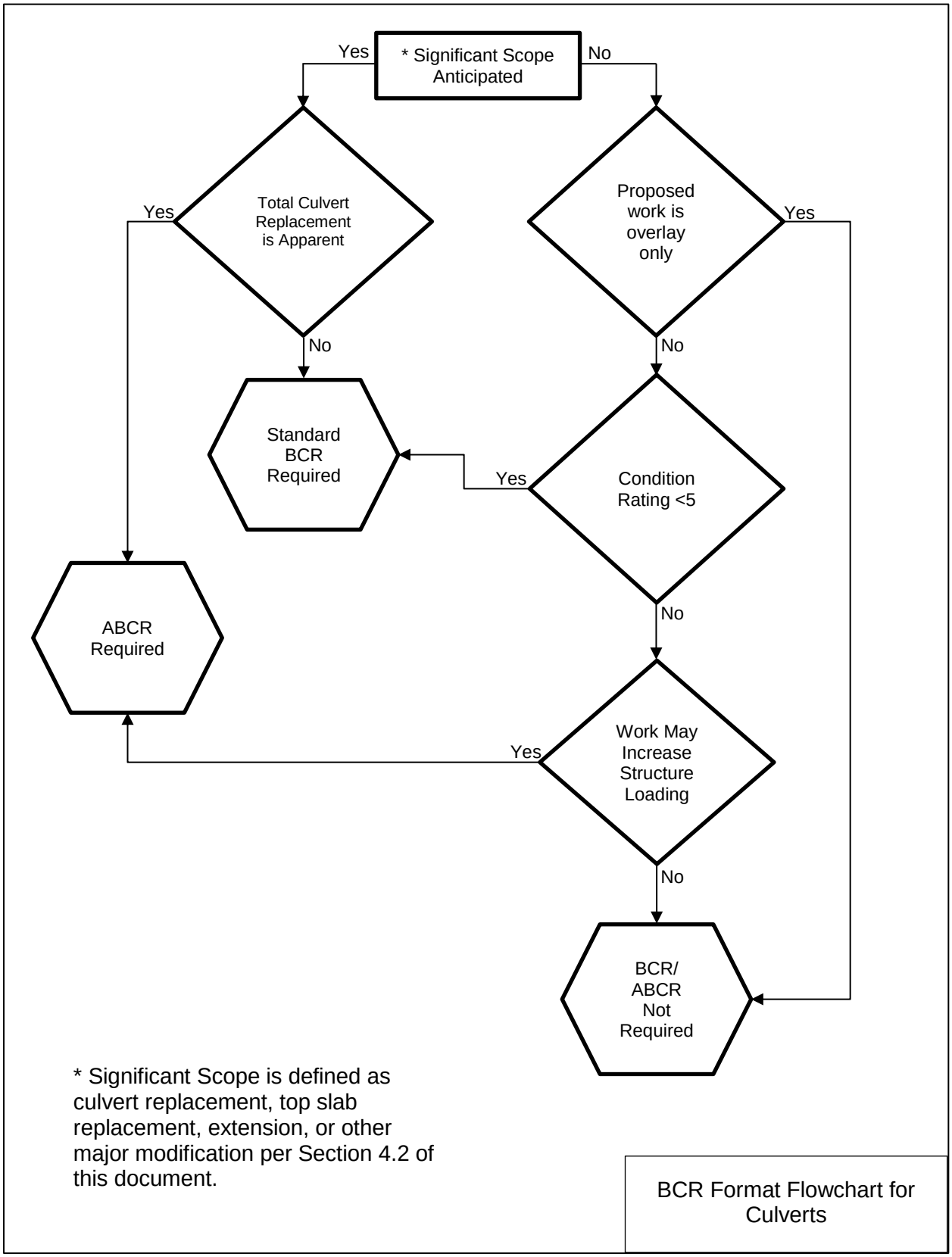

* Significant Scope Anticipated
Yes
No
Total Culvert Replacement is Apparent
Yes
No
Proposed work is overlay only
Yes
No
Standard BCR Required
Yes
Condition Rating <5
No
ABCR Required
Work May Increase Structure Loading
Yes
No
BCR/ ABCR Not Required
* Significant Scope is defined as culvert replacement, top slab replacement, extension, or other major modification per Section 4.2 of this document.
BCR Format Flowchart for Culverts

Figure 1.5-2

# Section 2 - General Information

## 2.1 General

This section provides guidance on the data to be provided in the General Information section (Section I) of the BCR. The general information is necessary to identify and properly evaluate the structure and to determine the geometric requirements for the repaired, rehabilitated, or replacement structure.

## 2.2 Geographical and Administrative Data

Provide the following Geographical and Administrative data for the structure:

- **Structure Number(s)** of the existing structure(s) only.
- **County**
- **Route Carried**. Include state or local route number, street name, and federal aid route number when appropriate.
- **Feature Crossed**. For grade separation structures, include state or local route number, street name and federal aid route number when appropriate. For structures over waterways, specify Public Waters per the *Drainage Manual*, when applicable.
- **Section Number** for the proposed project when available. When not available, provide the existing section number and indicate it is existing.
- **Station** at the center of the bridge when a current survey is available or the stationing for the proposed project if it will remain the same as existing. If not, omit station.
- **Functional Classification** of the roadway as given on the Master Structure Report from the Structure Information Management System.
- **Design / Posted Speed** for the proposed project.
- **ADT and ADTT**. Provide the current and design year ADT and ADTT for the route carried and the for the route(s) under or over, if applicable.
- **DHV**. Provide the design year DHV.
- **Load Ratings**. Provide the current Inventory and Operating load rating factors.
- **Sufficiency Rating** as given on the Master Structure Report from the Structure Information Management System.

## 2.3 Physical Description of Structure

Provide a brief description of the existing structure with the following information:

- Superstructure and substructure type
- Length and width
- Span arrangement and length(s)
- Skew angle and direction
- Existing wearing surface type and thickness
- Existing horizontal and vertical alignment
- Utilities near or attached to the structure
- Any other significant details

## 2.4 Construction History

Provide a brief description of the construction, reconstruction, rehabilitation, and repair history of the structure with the following information:

- Year, route, and section number of original construction
- Year(s) and description(s) of work completed for subsequent reconstruction, rehabilitation, or repairs

# Section 3 - Structure Evaluation

## 3.1 General

This section provides guidance on the information to be provided in the Structure Evaluation section (Section II) of the BCR. A key step in determining the appropriate scope of work alternatives is a thorough evaluation of the current condition of the structure and its overall fitness to serve its intended purpose. The evaluation includes a thorough investigation of the following:

- Existing Documentation
- Geometric Functionality
- Hydraulic Capacity, Stream Protection, and Scour
- Physical Condition and Load Capacity
- Seismic Demands

## 3.2 Existing Documentation

Existing documentation provides important information regarding the original design and current condition of the structure and is an integral part of the scope of work selection. As such, a careful review of the following documents is a critical first step in the evaluation of the structure.

### *3.2.1 Existing Plans and Shop Drawings*

Review existing plans and shop drawings for the original construction and any subsequent work since the original construction. Generally, existing plans must be available to justify the structural adequacy of the bridge, or components thereof, when the proposed scope of work may result in changes to the loading or load path of the structure or component. Reuse of structure components for which there are no existing plans is only permitted when:

- Other existing documentation is available that adequately describes the component, or
- A Supplemental BCR Inspection provides complete information on the component's soundness, make up and dimensions, or
- The proposed loading conditions remain unchanged.

### *3.2.2 Load Rating Information*

Obtain and review the Structure Load Rating Summary (SLRS) form and any other existing load rating information that may be available. The SLRS indicates the current load rating and controlling member(s) and can guide the study of alternatives and help to identify the appropriate proposed scope of work. Other available load rating information may consist of an AASHTOWare Bridge Rating™ model, load rating spreadsheets, structural software output, or hand calculations. See Chapter 4 of the *Structural Services Manual* for more information.

### *3.2.3 Inspection Documentation*

Often the information contained in existing inspection documents is adequate to determine the appropriate scope of work for the BCR. As such, the following inspection documents should be gathered and carefully reviewed:

- NBIS Routine Inspection Report
- Element Level Inspection Report
- Underwater Inspection Report (if applicable)

Other inspection reports that may be available and may assist with the structure evaluation include Fracture Critical Member, Special, In-Depth, Damage, and Load Rating. See Chapter 3.3 of the *Structural Service Manual* for more information on these inspection reports.

When the above documents are insufficient to determine the appropriate scope of work, a Supplemental BCR inspection may be necessary. A Supplemental BCR inspection, may consist of additional field inspections, delamination surveys, or other material or component tests.

### *3.2.4 Supplemental BCR Inspection*

*Field Inspection*

When the existing inspection documentation is insufficient to determine an appropriate scope of work, a supplemental field inspection specific to the needs of the BCR may be necessary to:

- Gather additional photographs or measurements to meet the report requirements discussed in Section 5.
- Verify the current condition of the structure when the existing inspection documents are outdated or insufficient.
- Verify the current condition of the structure, or certain elements, when there are indications that deterioration or damage may have advanced significantly since the last inspection.
- Conduct bridge deck delamination surveys.
- Obtain concrete core samples of bridge decks, slab bridges or box culvert slabs.
- Conduct D-meter thickness measurements of steel components, collect test specimens, or conduct other tests.

When a supplemental field inspection is necessary, the inspection should follow the guidelines given in Chapter 3 of the *Structural Services Manual*.

*Delamination Surveys*

The decision to perform a Delamination Survey to evaluate the condition of the concrete deck, or other concrete members, is dependent on several factors. Delamination Surveys are not always appropriate due to the cost to conduct these surveys verses the potential benefit of the additional information. For example, Delamination Surveys of bridge decks with little or no apparent deterioration or those that are obviously beyond repair would not provide additional meaningful information. The purpose of Delamination Surveys is to identify the level of repair needed so that the estimated repair quantities can be developed, and the appropriate scope of work determined.

The following methods may be used to conduct delamination surveys:

- Method 1 - (ASTM D4580/D4580M) Standard Practice for Measuring Delaminations in Concrete Bridge Decks by Sounding

- Method 2 – (ASTM D6087) Standard Test Method for Evaluating Asphalt-Covered Concrete Bridge Decks Using Ground Penetrating Radar
- Method 3 - (ASTM D4788) Standard Test Method for Detecting Delaminations in Bridge Decks Using Infrared Thermography

Some of the above methods may interpret the debonding of the wearing surface as delaminations. Therefore, the survey must be closely compared to both the top and bottom of deck inspection results to arrive at appropriate repair estimates.

If the appropriate scope of work remains unclear after the Delamination Survey, additional inspection or further testing may be necessary. Spot removal of the wearing surface to allow better inspection of the deck concrete or additional diagnostic tests such as the half-cell survey or chloride content tests may also be performed to aid in determining whether deck repair is appropriate.

*Additional Tests*

The following tests may provide additional information regarding the condition of the structure. The need for these additional tests should be coordinated in advance with the BBS.

- Standard Method of Test for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete (AASHTO T 24)
- Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens (AASHTO T 22)
- Standard Test Method for Corrosion Potentials of Uncoated Reinforcing Steel in Concrete (ASTM C876)
- Standard Method of Test for Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials (AASHTO T 260)
- Standard Method of Test for Determining Chloride Ions in Concrete and Concrete Materials by Specific Ion Probe (AASHTO T 332)
- Standard Practice for Petrographic Examination of Hardened Concrete (ASTM C856)
- Dye penetrant, magnetic particle, or ultrasonic testing of steel cover plates, pin & link systems, pin and hanger systems, etc.
- Structural steel paint thickness or adhesions tests

## 3.3 Geometric Functionality

### *3.3.1 Roadway Geometry*

The geometry of the roadway carried by the bridge should be evaluated for conformance to Departmental policy provided in the *BDE Manual*. Horizontal and vertical alignment, the number and width of travel lanes, shoulder widths, median, sidewalks, etc. should be consistent with the proposed approach roadway. The evaluation must consider any changes that may be made to the roadway alignments and widths within the scope of current or future projects.

### *3.3.2 Vertical and Horizontal Clearances*

The horizontal and vertical clearances beneath and over the structure must be evaluated for conformance to Departmental policy. Minimum clearances for bridges to remain in place and improved bridges are provided in the *BDE Manual*. All structures that do not meet minimum clearance policies must be modified, altered, or replaced so that all applicable policies are met. When modification, alteration or replacement of the structure is not cost effective or is inconsistent with the objectives of the broader project, a waiver of policy or a Design Exception must be granted to allow the structure to remain in place.

## 3.4 Hydraulic Performance

### *3.4.1 Hydraulic Capacity*

For bridges over waterways and culverts, the hydraulic capacity, minimum vertical clearance between the superstructure and the Design Highwater Elevation, and the roadway freeboard must meet minimum requirements discussed in the *BDE Manual* and the *Drainage Manual*. When the hydraulic capacity is inadequate, or the vertical clearance or freeboard do not meet minimum requirements, modification, reconstruction, or replacement of the bridge may be necessary. When modification, reconstruction or replacement is not cost-effective or is inconsistent with the objectives of the broader project, a waiver of policy or Design Exception must be granted to allow the structure is to remain in place.

When available, the Hydraulic Report, other floodway analyses, and historical records of flooding should be also be evaluated as they relate to the selection of the proposed scope of work. When

available, the Waterway Information Table and relevant excerpts from the Hydraulic Report should be included as an attachment to the BCR.

### *3.4.2 Scour*

The impacts of scour shall be evaluated and discussed in the BCR when such impacts have the potential to affect the proposed scope of work. A typical consideration is the cost and feasibility of scour countermeasures versus substructure rehabilitation or replacement. When scour impacts are evaluated as part of the BCR, the evaluation shall be consistent with applicable portions of the *Bridge Manual*.

The buildup of debris in streams at structures can cause an increase in flow velocity through the structure and thereby increase the potential for scour. Debris collection problems should be noted and discussed. The scope of work should include debris removal when any portion of the existing substructure is to remain in place. When buildup of debris appears to be a chronic problem, relocation of the substructure units, reconfiguration of the substructure type, or other debris collection countermeasures should be considered.

### *3.4.3 Stream Protection*

The slope and stream protection systems for structures and embankments proposed to remain in place should be repaired or replaced when damage, deterioration, undermining, or sloughing has occurred.

## 3.5 Physical Condition and Load Capacity

### *3.5.1 Bridge Deck*

Based on the top and bottom of deck condition surveys and the results of additional surveys and/or tests, an estimate of the area of full-depth and partial-depth repairs is developed. The estimate of repairs must account for additional deterioration that may occur during the timeframe between inspection and construction. To calculate the Estimated Repair Area, all existing repair areas from past deck repairs shall be added to the current estimate of repair areas, even when those areas may already be included in the current repair estimate. The Estimated Repair Area is then expressed as a percentage of the total deck area and is used to evaluate the economic feasibility of deck repair versus deck replacement as shown in Table 3.5-1 below.

| Estimated Repair Area | Scope of Work |
|---|---|
| < 15% | Deck repair |
| 15% to 35% | Deck repair may be cost-effective |
| > 35% | Deck replacement |

Table 3.5-1

For bridges with Estimated Repair Areas in the 15% to 35% range, other issues beyond the condition of the deck must be considered to determine the appropriate deck scope of work. Issues such as joint replacement needs, previous deck repairs, deck drainage problems, substandard cross-slopes, profile grade issues, etc. should be evaluated in tandem with the condition of the deck to arrive at the appropriate scope of work.

When the deck is covered with a wearing surface, the condition of the wearing surface and deck should be evaluated separately, when possible. Wearing surfaces that exhibit significant deterioration such as cracking, rutting, debonding, and spalling should be replaced.

### *3.5.2 Bridge Deck Joints*

Evaluate the condition and functionality of all transverse expansion joints and consider replacing joints that are leaking, damaged, deteriorated, or inoperable. Consider eliminating expansion joints at abutments in favor of integral or semi-integral abutments when abutment modification aligns with the overall rehabilitation scheme. The benefits of eliminating expansion joints at piers should also be considered where adequate capacity of the substructure exists, and superstructure replacement is a reasonable alternative.

Open longitudinal deck joints should be eliminated when possible.

### *3.5.3 Railings and Parapets*

Bridge railings and parapets must be evaluated for conformance to Departmental policy to remain in place. Rails and parapets that do not meet policy shall be replaced or retrofitted. Rails and parapets with damage, deterioration, or other irregularities should be repaired, retrofitted, or replaced.

### *3.5.4 Bridge Deck Drainage*

For bridges where it may be feasible to leave the existing deck in place, the adequacy of the existing deck drainage system shall be evaluated. The evaluation should include the hydraulic capacity of the deck drainage, the condition of the drains and downspouts, and any closed drainage system including the suitability of the discharge system and any potential downstream complications. Discuss any deficiencies or problem areas and options for remediation, considering the following:

- Drains located within 10’ of substructure units should be plugged when doing so will not result in gutter flow spread that exceeds the maximum encroachment limits.
- For bridges with several closely spaced drains (< 8’ centers), every other drain should be plugged when doing so will not result in gutter flow spread that exceeds the maximum encroachment limits.
- Drain downspouts that do not extend below the low beam elevation of the nearest beam by a minimum of 3” should be extended to a point at least 6” below the low beam.
- Clogged or plugged drains, downspouts, and closed drainage systems should be cleaned.

### *3.5.5 Superstructure*

The main and secondary load carrying elements of the superstructure shall be evaluated to determine if they are in adequate condition to remain in place or if they require repair, strengthening, or replacement. The main load carrying elements consist of beams, girders, truss members, and the concrete slabs of slab bridges and box culverts. Secondary load carrying elements consist of diaphragms, cross bracing, lateral bracing, etc.

The load capacity of the superstructure and its components relative to its current condition must be evaluated for the proposed loading condition. Section loss, deterioration or other damage to superstructure components shall be included in the load capacity analysis. The design specification used to conduct the load capacity evaluation shall be according to Section 2.1.2 of the *Bridge Manual*. When the Inventory Rating Factor of the superstructure, or components thereof, is below 1.0 per Section 4.3.2 of the *Structural Services Manual*, the cost to strengthen or rehabilitate the structure to increase the Rating Factor to 1.0 or higher should be considered. Other considerations to increase the Rating Factor may include a reduction of the proposed

Future Wearing Surface (FWS) allowance, if any, a reduction of the proposed deck slab thickness, conversion of non-composite beams, girders or stringers to composite.

For steel structures, the condition of the paint system shall be assessed and the need for cleaning and painting shall be included in the evaluation.

### *3.5.6 Bearings*

All bearings that show evidence of deterioration or damage should be repaired or replaced. In general, existing steel rocker or roller type expansion bearings should be replaced in accordance with applicable sections of the *Bridge Manual*. Bearings that are tilted or out of alignment but are otherwise in good condition can be reset. Broken or deteriorated anchor bolts should be repaired or replaced.

### *3.5.7 Substructure and Foundations*

All substructure units and supporting foundations shall be evaluated to determine if they can remain in place. The evaluation shall consider the level of repair or rehabilitation required and the capacity of the substructure unit and foundation relative to the proposed loading. When repair or rehabilitation appear to be cost effective options, the capacity of the substructure and foundation shall be analyzed by one of the two methods described below. The below methods may only be applied to structures when there is no significant reconfiguration of loads such as widening, changes to bearing locations, or modification of substructure fixities and there are no indications of significant settlement, rotation, or other signs of instability. When there is significant reconfiguration of loads or there are indications of instability, analysis shall follow the applicable design specification.

Method 1: Abbreviated Analysis

Existing substructure units and foundations may be reused without a detailed structural analysis when the following conditions are met:

- The substructure and foundation elements are in satisfactory condition or will be repaired or rehabilitated to meet a satisfactory condition (NBIS Condition Rating of 6 or greater).
- The proposed service dead load at the top of the substructure unit is not greater than 115% of the original design service dead load at the top of the substructure unit.

Method 2: Detailed Structural Analysis

When the conditions for an abbreviated analysis cannot be met, a detailed structural analysis shall be conducted. The detailed analysis shall be conducted in accordance with the design specifications given in Section 2.1.2 of the *Bridge Manual* and the provisions given below.

Loads and Load Factors

The following load combination, as appropriate for the design specification, shall be used in lieu of other the load combinations.

IL Modified Group I = 1.15D + 2.17(L + I) (LFD)

IL Modified Strength I = 1.10DC + 1.75 (LL + IM) (LRFD)

In addition, for structures in Seismic Performance Category C or Seismic Performance Zones 3 or 4, force effects from Group VII or Extreme Event I, respectively, shall be evaluated according to Section 3.7 of this document.

Abutments and Piers

The load capacity of all elements of the abutments and piers (caps, columns, crashwalls, footings, wingwalls, etc.) shall be evaluated relative to their existing condition. The analysis may include the effects of planned repair or strengthening when such effects are reasonable and reliable.

Pile Foundations

Pile foundations may be considered for reuse when the foundation consists of a minimum of 5 piles and the Factored Resistance Available, $R_F$, of the piles exceeds the factored axial loading in accordance with Section 3.10.1 of the *Bridge Manual*.

For pile foundations constructed prior to 2007, $R_F$ can be computed as given below.

$$R_F = \phi_G R_A \times FS$$

Where:

$\phi_G$ = Geotechnical Resistance Factor (Typically 0.5)

$R_A$ = Allowable Resistance Available

FS = Factor of Safety (Assumed 3.0)

The Allowable Resistance Available, $R_A$, can be adjusted as shown below. Additionally, when existing pile driving data are available, the "as driven" pile resistance may be used in the analysis in lieu of the pile resistance shown in the existing plans. The adjustment to $R_A$ does not apply to pile foundations constructed in 2007 or later.

$R_A$ = Existing Capacity x $(1+C_s+C_b+H_e+P_e+P_L+S_m)$.

Where:

Existing capacity = Pile design capacity taken from the existing plans or the "as-driven" bearing capacity taken from available pile driving records, and,

$C_s$ = Existing Pile Capacity Source Factor

$C_b$ = Low Capacity Formula Bias Factor

$H_e$ = Hammer Efficiency Correction Factor

$P_e$ = Pile Type Effect on Hammer Efficiency

$P_L$ = Pile Length Formula Conservativism Correction Factor

$S_m$ = Primary Mode of Pile Support (from Soil Borings)

| | | | | | | |
|---|---|---|---|---|---|---|
| $C_s$ | Existing Driving Records (0% capacity increase) | | | Existing Plans Pile Data (10% capacity increase) | | |
| $C_b$ | Pile Capacity > 40 tons (0% capacity increase) | | | Pile Capacity < 40 tons (6% capacity increase) | | |
| $H_e$ | Closed End Diesel, Drop or Unknown Hammer (0% capacity increase) | | Open End Diesel Hammer (4% capacity increase) | | Air-Steam Hammer (8% capacity increase) | |
| $P_e$ | Precast Concrete or Timber Pile (0% capacity increase) | | | Metal Shell or Steel H-Pile (4% capacity increase) | | |
| $P_L$ | Driven or Estimated Length < 60 ft. (0% capacity increase) | | Estimated Plan Pile Length > 60 ft. (2% capacity increase) | | Driving Records Driven Length > 60 ft. (4% capacity increase) | |
| $S_m$ | No Records Available (0% cap. increase) | End Bearing in Soil or Shale (0% cap. increase) | Friction in Granular Soils (8% cap. increase) | Friction in Cohesive Soils (16% cap. increase) | End Bearing in Sandstone (16% cap. increase) | End Bearing in Limestone or Dolomite (20% cap. increase) |

Table 3.5-2 – Pile Capacity Correction Factor Values

Spread Footings

Spread footings may be considered adequate for re-use when the following criteria are met:

1) $R_A \geq Q_{max}$ (rock) OR $R_A \geq Q_{eubp}$ (soil)
2) $e \leq B/4$ (rock) OR $e \leq B/6$ (soil)
3) $Q_{Max} \leq 1.5 \times Q_{Exist}$

Where:

$R_A$ = Allowable Bearing Capacity as given below and is based on the soil within 1.5B of the bottom of the footing:

= 2 ksf when no boring data is available
= 4 ksf when soils are mixed and N ≥ 15 blows/ft
= 6 ksf for clay soils with $Q_u \geq 3.0$ tons/sq. ft.
= 8 ksf for very dense granular soils with N ≥ 50 blows/ft
= 10 ksf for hard clay till with $Q_u \geq 4.50$ tons/sq. ft.
= 15 ksf for sandstone or shale
= 30 ksf for limestone or dolomite
$Q_{Max}$ = Maximum applied service bearing pressure from the proposed loading
$Q_{eubp}$ = Equivalent uniform bearing pressure based on $Q_{Max}$
$Q_{Exist}$ = Maximum applied service bearing pressure from the existing loading
e = Eccentricity of the resultant vertical load from the proposed loading
B = Width of the existing spread footing

Drilled Shafts

The capacity of existing drilled shaft foundations shall be determined in accordance with Section 3.10.2 of the *Bridge Manual*.

### *3.5.8 Box Culverts and 3-Sided Structures*

Box culverts and 3-sided structures shall be evaluated to determine if extensions or other modifications are feasible or if repairs are needed. The top and bottom slabs, sidewalls, headwalls, wingwalls and footings shall be evaluated to determine the level of repair required so

a cost estimate can be developed. When concrete cores are available, the results of the core tests should be evaluated as needed to confirm the level of slab repair required.

### *3.5.9 Retaining Walls*

Retaining walls shall be evaluated to determine if modifications are feasible or repairs are needed. If changes to the wall height, retained height, or wall loadings are anticipated, a structural analysis of the wall shall be conducted to determine the feasibility of the proposed modifications. The level of necessary repairs is determined so a cost estimated can be developed.

## 3.6 Stage Construction Feasibility

### *3.6.1 Stage Construction Versus Detour*

The feasibility of stage construction shall be evaluated and discussed in the BCR. The cost of stage construction versus road closure or traffic detour shall be evaluated based on the criteria below. When appropriate, Accelerated Bridge Construction (ABC) techniques can be considered to reduce Adverse Travel Costs, minimize stage construction impacts and reduce the length of time a detour is required.

- Construction Cost versus Adverse Travel Costs
- Worker and motorist safety
- Construction quality
- District preference

### *3.6.2 Traffic Lane Width*

The following lane widths should be used when evaluating the geometric feasibility of stage construction. Lane widths less than 12 feet shall be approved in advance by the District.

- A width of 14 feet for a single lane in one direction is optimal to avoid designating a separate wide load detour route.
- Lane widths of 12 feet or greater are desirable from a safety aspect.
- Lane widths of 11 feet are considered the minimum allowable for typical routes.
- Lane widths of 10 feet may be allowable for routes with low ADT and/or low speeds.

### *3.6.3 Stage Construction of RC Slab Bridges and Box Culverts*

Concrete core samples per Section 3.2.4 of this document are required for reinforced concrete slab bridges and box culverts being considered for stage construction that meet the following criteria:

- Superstructure or Culvert Condition Rating is less than or equal to “4” (poor).
- The physical condition of the top slab is the reason for the poor Condition Rating.

When concrete cores and testing are required, the following shall apply:

- Concrete cores shall be 4” diameter and shall be obtained in accordance with AASHTO T 24 and tested in accordance with AASHTO T 22 procedures.
- Core descriptions and test results shall be reported on form BBS 2720. Photographs of the cores shall be included.
- A minimum of one core shall be taken in each bridge span or culvert barrel.
- Cores shall be taken near mid-span near a wheel-path of the proposed stage traffic lane(s).
- A structural analysis using the results of the core tests must demonstrate that the slab has adequate strength to carry the required loadings for the duration of stage construction.

When concrete cores indicate the slab is in an advanced state of deterioration (heavily fragmented, aggregate-like, etc.), or compression tests indicate very low strength concrete, the BBS Bridge Management and Inspection Unit shall be immediately notified.

### *3.6.4 Other Stage Construction Considerations*

The following issues shall be considered when evaluating the feasibility of stage construction.

- Each traffic stage must be supported by a minimum of three (3) longitudinal beams, girders, or stringers. A stage construction configuration with less than 3 beams, girders, or stringers may be permitted in certain circumstances, but advance approval from the BBS is required.

- Portions of the bridge deck which cantilever over a longitudinal support shall be evaluated for structural capacity. When capacity is insufficient, reconfiguration of stage traffic lane or temporary support of the cantilever slab may be necessary.
- Stage construction of truss, arch, suspension, or 2-girder system type bridges is often not feasible when the scope of work is more involved than simple repair or deck overlay. When stage construction is feasible, a detailed structural analysis will be necessary.
- Temporary support of the top slab at the stage line may be necessary for culverts with high skews where the main reinforcement is placed perpendicular to the walls of the barrels.
- The effects of continued deterioration through the anticipated construction date shall be considered when determining the feasibility of stage construction.
- Due to the characteristic of PPC Deck Beams to rapidly deteriorate once deterioration has begun, the load capacity through the entire stage construction sequence should be evaluated.
- The strength and stability of the stage I traffic portion of piers and abutments must be evaluated when a significant portion of the piers and abutments is planned for removal during stage I.

## 3.7 Seismic Considerations

### *3.7.1 Seismic Evaluation*

Structures, or portions thereof, must be adequate for seismic demands to remain in place. Seismic analysis of existing bridges shall follow the *2006 Seismic Retrofitting Manual for Highway Structures: Part 1 – Bridges (FHWA-HRT-06-03T)*, except the Seismic Hazard Level (SHL) shall be determined using Table 3.7-1, below, in lieu of Table 1-5 given in the 2006 Manual.

| HAZARD LEVEL | **Using $S_{D1} = F_V S_1$** |
|---|---|
| I | $S_{D1} \leq 0.15$ |
| II | $0.15 < S_{D1} \leq 0.25$ |
| III | $0.25 < S_{D1} \leq 0.40$ |
| IV | $0.40 < S_{D1}$ |

Table 3.7-1 – Seismic Hazard Level

Seismic evaluation need not be conducted for the following structure types:

- Bridges in Service Life Category ASL 1
- Simple span bridges on integral abutments
- Box culverts and other buried structures
- Retaining walls

# Section 4 - Scope of Work

## 4.1 General

This section provides guidance on the information to be provided in the Scope of Work section (Section III) of the BCR. Various scope of work alternatives shall be evaluated and the most appropriate among those are selected for further analysis, discussion, and comparison to arrive at a final scope of work recommendation.

## 4.2 Scope of Work Alternatives

Based on the results of the structure evaluation, appropriate scope of work alternatives are selected and analyzed. The purpose of the alternatives analysis is to determine the best possible scope of work for the structure considering the results of the structure evaluation, the cost analysis discussed later in this section, the objectives of the overall project of which the structure is a part, current Departmental policies, and the type and amount of available construction funding.

Scope of work alternatives typically fall within one of the broad categories listed below but can also be any combination to achieve a scope of work that best fits within the framework of the broader project and provides the best possible benefit to the Department.

- No Work – Structures that are structurally sound, have adequate load carrying capacity, and meet minimum width, clearance, and geometric criteria to remain in place.
- Minor Rehabilitation/Repair – Typically minor repairs necessary to maintain a structure during its service life, such as bridge deck overlay, bridge deck repair, joint replacement, steel or concrete repair, bearing replacement, bridge painting, etc. in accordance with Section 2 of the *Structural Services Manual*.
- Major Rehabilitation – Major repair, replacement, strengthening or modification of any of the primary components of the structure such as the bridge deck, superstructure or substructure. Typical major rehabilitation includes deck replacement, superstructure replacement, structure widening, seismic retrofit, bridge rail replacement, culvert extension, etc.
- Replacement – Complete replacement of the entire structure.

## 4.3 Special Scope of Work Considerations

### *4.3.1 Bridge Widening*

The following general guidelines should be used when considering the cost and feasibility of widening an existing bridge or extending an existing culvert to meet current width requirements.

- Existing bridge decks, or portions thereof, that are to remain in place and be incorporated into the widened bridge shall be no greater than 15 years old and shall have adequate load carrying capacity per Section 3.2.1.1 of the *Bridge Manual*.
- Existing bridge decks or box culverts, or portions thereof, that are to remain in place and be incorporated into the widened or lengthened structure that are greater than 15 years old, may be left in place provided testing and analysis indicate that the life expectancy and future maintenance needs are similar to new concrete.
- The construction joint between the new and existing deck sections should be placed in accordance with Section 2.3.8 of the *Bridge Manual* when practical.
- The remaining portions of piers, abutments, and foundations shall be evaluated in accordance with Section 3.5.7 of this document.
- Bearings on existing and widened portions of substructures shall have similar expansion and stiffness characteristics. Existing roller or high-profile rocker bearings shall be replaced with the same type of bearings used for the widened portions.

### *4.3.2 Scour Countermeasures*

When the Structure Evaluation has identified streambed scour as a problem or potential problem, a remedy must be incorporated into the scope of work analysis. Remedies include implementation of acceptable scour countermeasures in accordance with Chapter 11 of the *IDOT Drainage Manual* or complete replacement of the structure with a new structure designed to resist scour in accordance with Section 3.10.1.5 of the *Bridge Manual*. The cost, feasibility and long-term performance of scour countermeasures shall be compared to the cost of structure replacement when evaluating scope of work alternatives.

### *4.3.3 Accelerated Bridge Construction (ABC) Techniques*

When construction cost, construction duration, user delay, work zone safety, inconvenience or other adverse travel costs associated with stage construction or bridge closure are anticipated to be particularly burdensome, Accelerated Bridge Construction (ABC) techniques shall be considered in the scope of work analysis. ABC techniques, such as those given below, can significantly reduce construction duration and associated costs and may be attractive alternatives.

- Prefabricated bridge elements
- Modular bridge elements
- Slide-in or roll-in construction
- Preliminary construction stage to construct new foundations and/or substructures
- Innovative or high-strength materials

### *4.3.4 Emergency Repairs*

When significant load carrying deficiencies, severe deterioration, or heavy structural damage that may have the potential to result in the failure of a critical structural member is discovered during a Supplemental BCR Inspection or Structure Evaluation, the matter should be reported to the BBS Bridge Management and Inspection Unit immediately for disposition. The scope of work alternatives and economic evaluation presented in the BCR should reflect the outcome, or anticipated outcome, of any such disposition.

### *4.3.5 Other Considerations*

Other considerations consist of issues which may impact the scope of work decision, but are not directly related to the Geometric Functionality, Hydraulic Performance, or Physical Condition and Load Capacity of the structure. When issues, such as traffic management, user delay, construction safety, funding availability, etc. have the potential to influence the scope of work decision, they must be analyzed and documented in the BCR.

## 4.4 Economic Evaluation

### *4.4.1 General*

The purpose of the economic evaluation is to determine the most cost-effective scope of work alternative among the feasible alternatives selected. The basis for the economic evaluation is the construction cost estimate discussed below.

As a rule of thumb, when costs to repair or rehabilitate a structure, or major component thereof, reach 67% of the cost to replace it, replacement is typically the preferred alternative. This is especially true when replacement provides additional benefits to the project over and above the minimum requirements such as improvements to maintenance, span arrangement, vertical clearance, hydraulics, etc.

### *4.4.2 Construction Cost Estimate*

A detailed construction cost estimate shall be prepared for each of the scope of work alternatives selected above. The detailed cost estimate should include a description of all significant structure pay items along with the estimated quantity, unit cost and total cost for each of the significant pay items. The cost estimate should be provided in tabular format. A sample cost estimate for a typical structure replacement is shown in Figure 4.4-1.

At the BCR stage of a project, the information necessary to produce an accurate cost estimate often doesn't exist and the level of effort required to generate it typically isn't warranted. The intent of the BCR cost estimate is to simply compare the relative costs of each of the scope of work alternatives, so that the most cost-effective alternative can be determined. However, the benefit of a reasonable preliminary cost estimate must not be underestimated and, as such, the cost estimate should be a reasonable reflection of the actual costs to construct the structure.

Occasionally, roadway construction, or other related costs, may differ significantly among the different structure alternatives. When construction costs related to roadway and geometrics, traffic control, utilities, drainage, right-of-way, embankment construction, etc., are significantly impacted by the structure scope of work, they should be included in the economic evaluation to allow a reasonable cost comparison of the alternatives. This can often be achieved by including a rough estimate of the roadway work that is significantly different for the structure alternatives in the Cost Estimate. Roadway pay items and estimated quantities may not be necessary to

adequately capture the cost difference and a summary line, or two, as shown in Figure 4.4-1 may suffice.

All cost estimates should include the following note:

> *Note: The construction cost estimate is provided for structure alternative comparison purposes only and is not intended to represent the complete construction cost of the project.*

# CONSTRUCTION COST ESTIMATE

ALTERNATIVE 1: STRUCTURE REPLACEMENT

| | Item | Unit | Estimated Quantity | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | REMOVAL OF EXISTING STRUCTURES | EACH | 1 | $115,000.00 | $115,000 |
| | STONE RIPRAP, CLASS A5 | SQ YD | 2200 | $97.00 | $213,400 |
| | CONCRETE STRUCTURES | CU YD | 420 | $785 | $329,700 |
| | CONCRETE SUPERSTRUCTURE | CU YD | 760 | $1,100 | $836,000 |
| | FURNISHING & ERECTING STRUCTURAL STEEL | POUND | 900000 | $2.30 | $2,070,000 |
| | STUD SHEAR CONNECTORS | EACH | 11000 | $4.00 | $44,000 |
| | REINFORCEMENT BARS, EPOXY COATED | POUND | 240000 | $1.50 | $360,000 |
| | PREFORMED JOINT STRIP SEAL | FOOT | 170 | $200.00 | $34,000 |
| | ELASTOMERIC BEARING ASSEMBLY | EACH | 14 | $5,000 | $70,000 |
| | FURNISHING STEEL PILES | FOOT | 1500 | $90 | $135,000 |
| | TEMPORARY SOIL RETENTION SYSTEM | SQ FT | 4000 | $35 | $140,000 |
| | TEST PILES | EACH | 3 | $7,500 | $22,500 |
| | OTHER MINOR ITEMS (Estimated) | - | - | - | $200,000 |
| | | | | | |
| | | | | **STRUCTURE SUBTOTAL** | **$4,569,600** |
| | | | | | |
| * | EMBANKMENT CONSTRUCTION | - | - | - | $500,000 |
| * | TRAFFIC CONTROL AND MAINTAINANCE | - | - | - | $200,000 |
| | | - | - | - | |
| | | | | **ROADWAY SUBTOTAL** | **$700,000** |
| | | | | | |
| | | | | **TOTAL COST ESTIMATE THIS ALTERNATIVE** | **$5,269,600** |

* Only those roadway and other costs that are significanly different between the structure alternatives considered.

Note: The construction cost estimte is provided for structure alternative cost comparison only and is not intended to represent the complete construction cost of the project

Figure 4.4-1

## 4.5 Scope of Work Recommendation

The estimated costs of each alternative shall be weighed against the relative benefits, within the framework of the broader project. The alternative that provides the best overall benefit to the Department becomes the recommended alternative.

The basis for the selected scope of work should be discussed in detail.

# Section 5 - Report Preparation

## 5.1 Bridge Condition Report

The organization of the BCR should include a cover sheet, table of contents, and the following major sections introduced in Section 1 and discussed in detail in Sections 2 thru 4.

I. General Information
II. Structure Evaluation
III. Scope of Work

The cover sheet should include the title BRIDGE CONDITION REPORT and include basic identification data for the structure, the name of the organization of the preparer, and the date the BCR was completed. A logo of the preparer's organization may also be included. The BCR should also contain a table of contents with page numbers of the major sections and sub-sections. A sample BCR is provided in Appendix A.

Each of the major sections shown above should be a main header in the report and all applicable sub-sections as shown in the sample table of contents should be included. The information to be provided for each of the sub-sections is described in Sections 2 through 4 of this document.

In addition to the above major sections, several supporting documents are required as attachments to the report:

- **Location Map:** Only required when the location of the structure may be unclear or confusing, such as when a long, multi-unit structure is labeled with multiple structure numbers or when several structures are located very close to one another.
- **Master Structure Report:** The detailed Master Structure Report generated from the Structure Information Management System (SIMS). The Master Structure Report information may be based on a previous NBIS inspection and documentation.
- **Bridge Inspection and Load Rating Data:** Include the most recent NBIS Routine, Underwater, Fracture Critical, Special, In-Depth, Damage, Load Rating, Complex Bridge and Element Level Inspection Reports, as applicable. Also include the most recent Structure Load Rating Summary (SLRS) report and any other available load rating data

that were used in making the scope of work determination. See Chapter 3 of the *Structural Services Manual* for more information on these reports.

- **Superstructure Condition Surveys:** Provide plan views of the top and bottom of the bridge deck showing the damaged areas and indicate the type of damage such as delamination, deterioration, spalls, ruts, cracks, exposed or corroded reinforcement, etc. In some cases, a sketch showing an overlay of the top and bottom deterioration on a single sketch can help delineate full-depth and partial depth repair areas.
- **Substructure Condition Surveys:** Provide elevation views, end views, plan views and sections as necessary of piers, abutments, wingwalls and slopewalls showing damaged areas such as delamination, deterioration, spalls, cracks, exposed or corroded reinforcement, etc. Similar sketches should be provided in BCR's for retaining walls and culverts, as applicable.
- **Structure Photos:** Provide photos of the overall structure from all four orthogonal views looking both toward the structure and from the structure looking away. If a Supplemental BCR Field Inspection was conducted, provide photos of the noted damage and deterioration and any other significant items such as expansion joints, open joints, bearings, previous repair areas, pin and links, fatigue or fracture prone details, utilities and lighting attached to the structure, etc. All photos should include a description of what is shown in the photo and the direction the photo is taken or be tied to a photo key plan showing location and direction.
- **Cost Estimate(s):** Provide construction cost estimates for each of the structure alternatives considered in accordance with Section 4.4.2 of this document.
- **Proposed Structure:** When the recommended scope of work is structure replacement, superstructure replacement, deck replacement, widening or another scope that alters the existing structure configuration, a Proposed Structure Sketch showing the approximate length, width and cross-section of the proposed structure shall be provided. A typical Proposed Structure Sketch is shown in the Section 2.2.3.4-4 of the *Bridge Manual*.
- **Hydraulic Report:** When a Hydraulic Report is available, include relevant excerpts from the report and a copy of the approved Waterway Information Table.
- **Proposed Plan & Profile:** Provide a copy of the proposed plan and profile sheet(s), when available.
- **Roadway Typical Sections:** Provide the existing and proposed typical roadway section sheet(s) for the roadway segments adjacent to the bridge, when available.

- **Abbreviated Existing Plans:** Provide General Plan & Elevation and superstructure cross-section sheets for the original construction and any subsequent rehabilitation or repairs. When applicable to the scope of work alternatives, provide additional bridge or roadway plans sheets as necessary.
- **Additional Studies, Test Results, and Other Relevant Documents**: When applicable, provide studies or test results such as life cycle cost analyses, bridge deck or concrete core test results, delamination surveys, etc. and other relevant documents when the document was instrumental in the determination of one, or more, of the scope or work alternatives selected.

## 5.2 Abbreviated Bridge Condition Report

The short form ABCR is shown in Appendix B and is also available on the Department's website. Each item of information shall be completed on the ABCR form and the applicable attachments shall also be included.

Similar to a BCR, a supplemental field inspection according to Section 3.2.4 of this document may be necessary to determine the appropriate scope of work. When necessary, the inspection should be limited to the collection of only the additional data necessary.

In addition to the ABCR form, several supporting documents are required, when available, and are included with the form as attachments as given below. See Section 5.1 of this document for more detailed information on these attachments

- Master Structure Report
- Bridge Inspection and Load Rating Data
- Structure Photos: Typically, the photos contained in the NBIS inspection reports are adequate for an ABCR. However, when a Supplemental BCR Field Inspection was conducted, provide photos similar to those required for a BCR.
- Proposed Structure Sketch: When the proposed scope of work is complete replacement.
- Hydraulic Report: Relevant excerpts and Waterway Information Table
- Proposed Plan & Profile
- Roadway Typical Sections

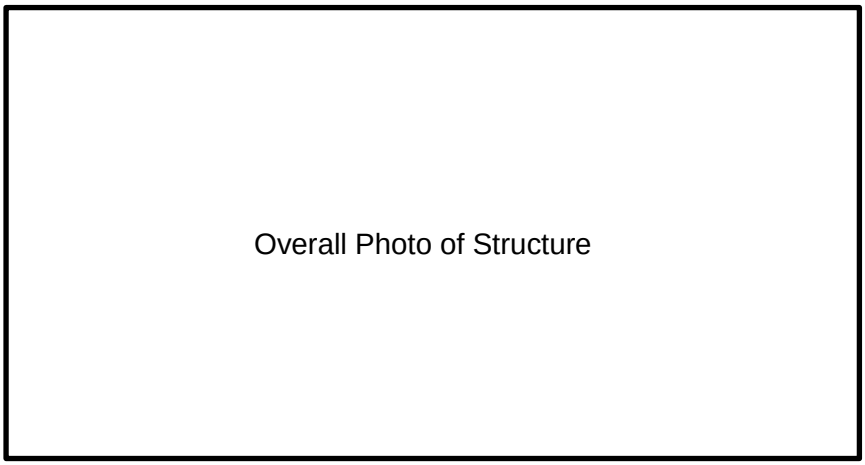
# BRIDGE CONDITION REPORT

ROUTE AND FEATURE CROSSED

REGION / DISTRICT

COUNTY

STRUCTURE NUMBER




PREPARED BY

DATE PREPARED

## Table of Contents

**I. General Information**

Geographical and Administrative Data....1
Physical Description of Structure....1
Construction History....1

**II. Structure Evaluation**

Existing Documentation....2
Supplemental BCR Inspection (if conducted)....2
Geometric Functionality....2
Hydraulic Performance (for structures over waterways)....2
Physical Condition and Load Capacity....3
Stage Construction Feasibility....4
Seismic Considerations (when applicable)....4

**III. Scope of Work**

Scope of Work Alternatives Analysis....4
Recommended Scope of Work....5

### Attachments

A. Location Map
B. Master Structure Report
C. Bridge Inspection and Load Rating Data
D. Superstructure Condition Surveys
E. Substructure Condition Surveys
F. Structure Photos
G. Cost Estimate(s)
H. Proposed Structure
I. Hydraulic Report Excerpt(s)
J. Proposed Plan & Profile
K. Roadway Typical Sections
L. Abbreviated Existing Plans
M. Additional Studies, Test Results and Other Relevant Documents

## I. General Information

Geographical and Administrative Data

**Structure Number(s):**
**Region/District:**
**County:**
**Route Carried:**
**Feature Crossed:**
**Section Number:**
**Job Number:**

**Design/Posted Speed:**
**ADT (current/design):**
**ADTT (current/design):**
**DHV:**
**Inventory Rating Factor:**
**Operating Rating Factor:**
**Sufficiency Rating:**

Physical Description of Structure

*Provide a brief description of the existing structure including length and width, number and length of spans or barrels, superstructure type, substructure type, foundation type, wearing surface type and thickness, horizontal and vertical alignment, utility attachments, and any other distinguishing or significant attributes.*

Construction History

*Provide the year, route, and section number of the original construction. Also provide the year(s) and a brief description of any reconstruction, rehabilitation or repairs done to the structure since the original construction.*

## II. Structure Evaluation

Existing Documentation

*Summarize the existing documentation available and the information discovered relative to the evaluation of structure. When a large amount of existing documentation is available, provide each of the sub-headings described in Section 2 of this document as bullet points followed by a discussion of each as shown below.*

- Existing Plans and Shop Drawings

  *Discuss the availability of existing plans and shop drawings. Summarize the findings and how those documents were used in the evaluation of the structure.*

- Load Rating Information

  *Discuss the availability of existing rating models or calculations and the current load rating of the structure and controlling member(s). Summarize how the existing load rating information was used in the evaluation of the structure.*

- Inspection Documentation

  *Discuss the availability and scope of any existing inspection documentation. Discuss the suitability of the existing documentation to making sound scope of work recommendations. Summarize the findings of the existing inspection and any missing information.*

Supplemental BCR Inspections

*If a supplemental BCR inspection was necessary due to insufficient or inadequate existing inspection documentation, discuss the results and findings.*

Geometric Functionality

*Discuss the significant aspects of the geometry of the structure as given in Section 3.3 of this document and any items that do not meet Department policy.*

Hydraulic Performance

*Discuss the hydraulic capacity of the structure, and any scour, stream protection, erosion and channel alignment issues. When a Hydraulic Report is included as part of the Phase I study, provide a brief description of the results of the report as they relate to the scope of work alternatives and recommended scope of work.*

Physical Condition and Load Capacity

*Provide a summary of the condition evaluation and load capacity analyses that were conducted for each of the major components of the structure. When the evaluation was exhaustive or substantial analyses was necessary, provide each of the sub-headings described in Section 3.5 of this document as bullet points followed by a discussion of each as shown below.*

- Bridge Deck

  *Provide a description of the condition of the deck and wearing surface. For concrete decks and slabs include separate square foot areas and percentages of the deck that are estimated to currently require partial and full depth patching.*

- Bridge Deck Joints

  *Provide a description of the condition of the joints along with the joint type. If possible, provide a measurement of the joint opening and the temperature at the time of the measurement.*

- Railings and Parapets

  *Provide a description of the condition of the railings, parapets and/or sidewalks. Note all damage, deterioration, missing bolts, etc. Discuss the crashworthiness of the existing railing or parapet configuration relative to current requirements.*

- Bridge Deck Drainage

  *Discuss the condition of all drainage system components such as scupper, downspouts, closed drainage system, etc. per section 3.5.4 of this document. Note any problems with outlet location, erosion, flooding, ponding, etc.*

- Superstructure

  *Provide a description of the condition of the load carrying members of the superstructure such as beams, girders, diaphragms, cross-frames, truss members, stringers, slabs of slab bridges, etc. Include the locations and extent of any significant deterioration/damage which may affect the structural capacity of the member. The condition of the paint on steel members should also be addressed. Some areas that may require special comment and/or analysis include fatigue sensitive details such as welded cover plates and pin & link systems.*

- Bearings

  *Provide a description of the condition of the bearings. Include any observations such as excessive tilting (note the direction and angle of tilt), significant deterioration, broken/missing anchor bolts/nuts, etc.*

- Substructure and Foundations

  *Provide a description of the condition of the substructure components such as caps, walls, columns, crashwalls, wingwalls, backwalls, etc. Include the estimated area/length of necessary repairs. If an inspection of the foundations was feasible, note the observed condition. Also note any stability concerns such as rotation, translation, or any other unusual movements.*

  *Describe and summarize any capacity analysis of the substructure or foundations that was conducted. Provide a summary of results with specific problem areas and issues discovered during the analysis.*

- Box Culverts and 3-Sided Structures

  *Provide a description of the condition of the top and bottom slabs, side and interior walls, headwalls and wingwalls. Discuss any inspection constraints or access limitations that may have been encountered and how those may have impacted the scope of work alternatives. Describe and summarize any capacity analyses that were completed. Discuss the results of any concrete cores or other tests that were conducted.*

- Retaining Walls

  *Describe the condition of the wall stems, sheet piling, solder piles, lagging, facing, panels, anchor slabs, tiebacks, wales, hardware, fencing, railings, etc. Address any vehicle impacts, vegetation issues, expansion joints, etc.*

Stage Construction Feasibility

*Discuss the condition of the structure as it relates to stage construction feasibility and note if any repair, strengthening or traffic limitations may be necessary.*

Seismic Evaluation

*When applicable per Section 3.7 of this document, discuss the results of the seismic evaluation. Include a discussion of the available seat widths at substructure units. Include a discussion of the condition of the longitudinal/lateral restraint systems such as bearings, side retainers, cable restrainers, dynamic isolation devices, etc. Also note and discuss any substructure or foundation seismic systems such as column wraps.*

## III. Scope of Work

Scope of Work Alternatives Analysis

*Discuss the potential scope of work alternatives per Section 4.2 of this document. Compare and contrast each alternate and discuss the benefits to the project. Discuss the economic evaluation and associated construction costs of all alternatives per Section 4.3. Comment on the traffic*

*control measures for structure construction, funding constraints, or any other factors when those played a role in the selection of alternatives.*

Recommended Scope of Work

*Lastly, provide a recommended scope of work and discuss the basis for the recommendation.*

Appendix B - Abbreviated Bridge Condition Report (ABCR) Form

Illinois Department of Transportation

## Abbreviated Bridge Condition Report

**Structure Information Data**

| Structure Number | District | County | Job Number | Date |
|---|---|---|---|---|
| | | | | |

| Facility Carried | Feature Crossed | District Contact |
|---|---|---|
| | | |

**Construction / Reconstruction / Repair History**

**Structure Condition Discussion**

**Recommended Scope of Work Discussion**

**Bureau of Bridges and Structures Review**

The ABCR is approved.
Revise and resubmit for further review and approval. See comments below.
An ABCR is not applicable per Section 1.3 of the BCR Guide. Submit a standard BCR.

Review Comments

BB&S Contact Name and Contact Information

Engineer of Bridges & Structures Signature & Date

SAMPLE

Completed 01/20/23 Page 1 of 1 BBS 2805 (01/20/23)

## Attachments

Provide the following attachments. See Section 5.2 of the BCR Procedures and Practices

A. Master Structure Report
B. Bridge Inspection and Load Rating Data
C. Proposed Structure
D. Structure Photos
E. Hydraulic Report Excerpt(s) and Waterway Information Table
F. Proposed Plan & Profile
G. Roadway Typical Sections

SAMPLE