INDOT BRIDGE INSPECTION MANUAL

PART 2

TYPES OF INSPECTIONS

BRIDGE INSPECTION MANUAL

PART 2: TYPES OF INSPECTIONS

TABLE OF CONTENTS

LIST OF FIGURES

2-2.0 TYPES OF INSPECTIONS

2-2.01 Introduction

There are numerous types of inspections, each designed to obtain specific information. For example, an Initial Inspection is performed after a bridge is constructed to document the as-built conditions, whereas Routine Inspections are used to monitor the condition of a bridge at regular intervals. Damage Inspections are used to assess damage resulting from deterioration or events such as impacts, fires, or floods. These inspections help create a complete picture of a bridge's condition and are described in detail in this chapter.

Visual inspection is the primary examination method for all inspections. Nondestructive testing (NDT) techniques may be required to identify internal flaws or hard-to-see external defects in critical members.

2-2.01(01) Timely Inspections

As a minimum, prior to the end of the month for timely inspections being performed, the inspector will revise item 90 to reflect the date the inspection was performed. At the beginning of the following month, the BIAS Administrator will verify the revision to item 90. The inspector will submit and approve the final report in BIAS within 60 days. Inspectors failing to meet these requirements will be subject to certification review. At the beginning of the third month following the inspection, the BIAS Administrator will verify that the final inspection report is complete and has been properly approved in BIAS. These inspection quality reviews are required for INDOT to be in compliance with Federal Highway metrics.

2-2.01(02) Delinquent Inspections

An inspection is considered delinquent when the inspection interval exceeds the required interval. If an inspection cannot be completed on time, the inspection team leader must notify the INDOT Bridge Inspection Manager prior to exceeding the inspection interval. That notice will include the Delinquent Inspection form located in BIAS under the Help tab in the documentation folder. The document is labeled "How to complete a Delinquent Inspection Form" The form is attached to the bottom of the instructions. See Appendix 2A

2-2.02 Inspection Types

The Federal Highway Administration (FHWA) and the state of Indiana dictate the type of inspection each bridge requires, and the maximum interval between inspections. Figure 2-2.1: Bridge Inspection Types and Maximum Intervals gives an overview of the types of inspections, the maximum interval between inspections, and the governmental unit responsible for the inspection policy.

2-2.03 Inspection Schedules

Once a Routine Inspection has been conducted on a bridge, the following Routine Inspections and other scheduled inspections should be completed in the same month unless the SPM approves changing the frequency. A scheduled inspection can be conducted early but must never be conducted late.

County Bridges have been assigned a "Compliance Month" or "Months" to help ensure that all inspections are done on time and are not spread out over too long of a period.

The BIAS *Scheduler* is one way to identify the next scheduled inspection for each inspection type. The *Scheduler* as well as NBI Item 90 and 91 will be a component of BIAS data reported to FHWA regarding the execution of on-time and future required inspections.

Upon final approval of any inspection type, the *Scheduling* fields will be reviewed on the primary Inspection Report Information page. All report type schedules will be maintained.

The Due Date and Schedule Date is calculated based on the last approved inspection of that type and can only be edited after the inspection report has been uploaded and approved in BIAS.

If a Schedule needs modified following the upload and report approval, the Scheduling tab should be used.

In addition to the use of the *Scheduler*, a "Compliance Month" field has been added to the MAD2 tab within the Asset Values for each county-owned bridge asset. The field has been populated with the compliance month. Compliance month data can be modified only by the INDOT BIAS Administrator.

The Inspection Schedule Filter: All Overdue Bridge Inspection Reports will be the basis for monthly/quarterly reporting for FHWA for compliance for all inspection frequencies for all inspection types: routine, special, fracture critical and underwater.

BIAS Admins and the BIAS Administrator will assist by providing periodic review of the data and informing inspectors when corrections to the scheduler are necessary.

2-2.04 Inspection Plan of Action

Occasionally deterioration, scour, or other issues are found on a bridge that may require a reduced inspection frequency and/or more thorough inspection. In these cases, an Inspection Plan of Action is to be written and attached into BIAS. The Plan of Action should be detailed in describing the actions needed, the time frames they are needed, and who should be informed if additional issues are found, and how to document the findings.

2-2.05 Initial Inspections

2-2.05(01) Purpose

An Initial Inspection is the baseline inspection that shall be completed on every new bridge, after a major rehabilitation, or when the configuration or geometry of a bridge changes (e.g., when a bridge is widened).

An Initial Inspection completed on a new bridge shall be created in BIAS as a "Routine" Inspection Type, and with a new Item 90 Inspection Date, as this represents the first routine inspection in the life of the bridge. Subsequent Routine Inspections and Inspection Dates may be done earlier than the standard 24-month inspection frequency so as to allow future routine inspections be done with other bridges along the same route or within the same county.

An Initial Inspection completed on an existing bridge following the completion of a major rehabilitation project, or when either the configuration or geometry of the bridge changes shall be created in BIAS as an "Other" Inspection Type. During this "Other" Inspection, the Item 90 Inspection Date as reported in BIAS for this existing bridge shall not be changed.

An Initial Inspection is a fully documented inspection using the bridge plans (both for new bridges and rehabilitation contract plans) to determine basic data for entry into BIAS. Initial Inspections are also used when a bridge is discovered that has not been previously inventoried. In this case, bridge plans may not be available. As part of the Initial Inspection, inspectors shall evaluate the bridge and decide what other foreseeable inspections will be required throughout its life, including Fracture Critical, Special, or Underwater Inspections.

As a part of the Initial Inspection, Inspectors must review the "Bridge File" and research and look for all missing documents and have any that are found, scanned, and uploaded into ERMS and/or attached into BIAS.

2-2.05(02) Precision

The Initial Inspection should be a fully documented investigation. Inspectors must be able to identify any deficiencies and verify the geometric data. All observed deficiencies, cracks, construction errors, and alignment problems should be documented.

An Initial Inspection should include:

1. Verify and record all Structure Inventory and Appraisal (SI&A) data required by federal and state regulations.
2. Complete an inspection and evaluation of all required data identified in the Indiana Coding Guide in accordance with relevant chapters of this manual.
3. Complete a Basic Channel Survey, in accordance with Section 2-2.12 of this chapter.
4. Assess scour susceptibility.
5. Complete a Scour Evaluation for a bridge with substructure units over water in accordance with 4-2.01 and the BIRM (Bridge Inspection Reference Manual).
6. Note that an underwater inspection may be required if a dry period of the year cannot be found to probe the substructure units in water and the substructure units cannot be probed from a boat. The need for an underwater inspection should be verified at the first routine inspection.
7. Gather relevant information required to maintain an accurate bridge file, scan, and upload to ERMS or to BIAS.
8. Determine and evaluate the baseline structural condition.
9. Identify the location and condition of any fracture critical members or details.
10. Identify the location and condition of any details that may require a Special Inspection.
11. Verify that all clearances and geometric dimensions are correct in BIAS.
12. Verify that any protection required to shield the bridge from traffic on navigable waters is in place.
13. Identify any critical findings and notify the appropriate individuals and agencies identified in 2-4.02(01)

All inspection results shall be fully documented in the BIAS.

2-2.05(03) Repairs

Rehabilitation repairs are permanent repairs that are intended to improve the structural condition of a member and/or component. Access to the repair plans is needed to determine if and to what extent rehabilitation improves any specific rating number.

Bridges used to maintain traffic during construction must be inspected in the month the Routine inspection is due. The Contractor is required to provide access for inspectors to conduct NBI Inspections.

2-2.05(04) Frequency

For state-owned bridges, an Initial Inspection should preferably be completed before the new construction or rehabilitation construction contract is finalized and the bridge is open to traffic. These inspections are often performed in conjunction with the construction department's Pre-Final Inspection. Approved Initial Inspection data, including the SI&A data, must be entered into BIAS within 90 days of the completion of the construction.

For toll road, county, and local agency bridges, Initial Inspections should be completed as soon as reasonable. Approved Initial Inspection data, including the SI&A data, must be entered into BIAS within 90 days of the opening of the bridge.

A bridge not previously documented in BIAS shall receive an Initial Inspection within 90 days of the discovery of the bridge. The data must be entered into BIAS and a report approved within 90 days of the discovery of the bridge.

2-2.06 Routine Inspection

2-2.06(01) Purpose

Routine Inspections are regularly scheduled inspections consisting of observations and/or measurements needed to determine the physical and functional condition of the bridge, and to identify any changes from previously recorded conditions. The Routine Inspection also ensures that the bridge continues to satisfy present service requirements.

2-2.06(02) Precision

Routine Inspections will follow a Plan of Action, documented in the BIAS if the bridge has unique issues such as difficult access, polluted water, requires access equipment or traffic control.

Routine Inspections are generally conducted from the deck, ground, water-level, or from permanent work platforms and walkways, if present. A complete walk-around visual inspection of all components of the structure, channel, and adjacent roadway is required.

If the water is not safe for wading access, the inspection team should return when the flow conditions allow safe access. The inspection team may probe the underwater portion of the bridge using a boat or, conversely, using hip waders, chest waders, or wet suits. If the bridge cannot be inspected using these options, then an Underwater Inspection (92B) is necessary. The conditions that mandate an Underwater Inspection are listed in Section 2-2.08(01). The Inspection Team Leader shall submit a written request to the State Program Manager to add, modify, or remove a bridge from the list of bridges needing an Underwater Inspection.

A Routine Inspection should include the following:

1. Complete an inspection and evaluation of all required data identified in this manual in accordance with this manual.
2. Complete a Basic Channel Survey for bridges with substructure units in water every 24 months in accordance with Section 2-12.03 of this chapter.
3. Complete a Basic Channel Survey for bridges with substructure units in water in accordance with Section 2-12.03 of this chapter if required by the Scour Plan of Action, or if probing indicates a changed condition in the stream bed.
4. Verify SI&A data.
5. Gather other relevant information required to maintain an accurate bridge file, scan, and upload to ERMS or BIAS.
6. Note any existing problems or components.
7. Note the condition of fracture critical members or details.
8. Identify the location and condition of details that may require a Special Inspection.
9. Note signs of bats and cliff swallows at state-owned bridges.
10. Report significant debris or drift to the bridge owner.
11. Take alignment photos from both ends of the bridge. Closing, posting, and/or restriction signs should be visible and legible in the photos.
12. Take elevation photos, preferably of both sides of the bridge, (as a minimum on one side of the bridge). If only one elevation photo is taken, a picture of an important detail must be taken.
13. Take photos of all bridge National Bridge Inventory (NBI) Items with a condition rating of 4 or less.
14. If needed to complete the bridge file, take one clear photo under each superstructure type, clearly showing details.

15. If needed to complete the bridge file, take one clear photo of each substructure unit in the water.
16. If needed to complete the bridge file, take one photo looking at the upstream channel.
17. If needed to complete the bridge file, take one photo looking at the downstream channel.
18. If needed to complete the bridge file, take one photo of any fracture critical member or details.
19. If needed to complete the bridge file, take one photo of any detail that requires a Special Inspection.
20. Take photos of significant deterioration and collision damage.
21. Note if a new load rating is warranted.
22. Verify that the channel protection required to shield the bridge from traffic on navigable waters is in place.
23. Identify any Critical Findings and notify the appropriate individuals and agencies identified in Part 1-4.02.

2-2.06(03) Inspection Frequency

Bridges must receive a Routine Inspection every 24 months unless widespread deterioration dictates either more frequent inspections are warranted or are on an extended frequency. If only a portion of a bridge needs more frequent scheduled inspections, a Special Inspection is required.

Bridges with a rating of 3 or less for NBI Item 58 (Deck), NBI Item 59 (Superstructure), NBI Item 60 (Substructure), or NBI Item 62 (Culvert) shall have a reduced interval between routine inspections of no more than 12 months.

This provision does not apply to fracture critical members, components, or connections. The provisions detailed in Section 2-2.07(02) of the manual remain in effect.

2-2.06(04) Extended Inspection Frequency

Bridges within the State of Indiana that pass the screening criteria provided below are eligible for an inspection frequency of 48 months. The screening process only effects the frequency of the routine inspection. Other events may require the structure to be inspected.

As a bridge comes up for inspection, a licensed professional engineer (INDOT Bridge Inspection

Team Leader with fracture critical certifications) shall review the screening document to ensure the bridge is or remains eligible for extended frequency rating. The screening document must be reviewed at each subsequent routine inspection. This screening procedure has no impact on structures that require a reduced frequency interval for routine inspections. In accordance with Section 1-2.04(03) of the INDOT Bridge Inspection Manual, bridges with a rating of 4 or less for the deck, superstructure,

substructure, or culvert rating shall have a reduced interval between Routine Inspections. A maximum inspection interval of 12 months shall be used.

Structures that fail the following screening criteria will not be considered for an extended frequency. Structures granted an extended frequency that become ineligible due to structural defects, condition ratings, collision or fire damage will undergo a routine inspection within seven days of the event or findings. Structures included in the program must continue to pass the screening criteria at each routine inspection.

The list of bridges eligible to have an Extended Routine Inspection Frequency, (approved by the FHWA), along with the "Extended Frequency Data Sheet" can be found in the INDOT Bridge Inspection website, in the "Bridge Inspection Documents" section. *https://www.in.gov/indot/div/public/bridgeinspect/documents.htm*

Screening criteria:

1. The deck, superstructure, and substructure must have a condition rating of 6 or greater.
2. The structure must have load path redundancy.
3. The superstructure must be constructed using steel or concrete. If the superstructure is constructed using adjacent box beams, there must be a structural concrete deck.
4. Structures over traffic must have a minimum vertical clearance of 14'-6" with minimal risk of vehicular collision and must not show signs of vehicular impact.
5. The structure must not have been recently rehabilitated or newly constructed. The structure may be considered for an extended frequency after the first routine inspection.
6. The structure must have valid load ratings with safe posting loads greater than the State's legal loads.
7. Structure must not be highly susceptible to fire damage, or collision damage (e.g. structures with parking spaces underneath, narrow bridges, pony trusses, covered bridges).
8. The structure must not have joints that are presently leaking.
9. The structure must not be at risk of over topping and item 113 from the Structure Inventory and Appraisal Sheet must be rated N, 9, 8, 7, or 5.
10. The structure must not have fatigue prone details, out of plane bending cracks, risk of constraint-induced fracture, cover plates, or pins and hanger details.

11. Structures must not have an average daily truck traffic (ADTT) greater than 14,500. This value represents two standard deviations from a normal distribution which eliminates our bridges on segments of the Interstates with the highest truck volumes.
12. Complex and border bridges are not included in the alternate bridge inspection program.

Field review procedure:

1. After compliance with the screening criteria above, perform an inspection of the structure to validate the condition ratings and to detect any defect or deterioration not recorded in previous inspection reports which may disqualify the structure from being granted an extended frequency of inspection. The report must contain a clear description of all noticeable defects. The inspection may be supplemented as practical, with the necessary access equipment that will allow the bridge inspector to clearly describe the extent of any defect in the structure.
2. All aspects of the bridge are to be photo documented. For example, a single span bridge will have photos of each approach, bridge deck, profile views, each bent and one photo of the underside of the deck. The intent is to have all areas of the bridge photo documented. Any minor defects should be photographed.
3. The structure screening sheet is to be indexed and included in the BIAS report.

Approval procedure:

1. Structures wishing to have an extended inspection frequency must be on the approved list of bridges that has been approved by the FHWA and is located on INDOT's website. A complete inspection report shall be submitted (work-flowed) in BIAS to Extended Frequency. This will start the review process by INDOT to determine if the bridge can have its inspection frequency extended. In addition to having all the required inspection items included in the report (complete photo documentation of the bridge, etc.), the Extended Frequency Data Sheet must be completed, signed, and attached to the report.
2. Once the report is work-flowed to Extended Frequency in BIAS, it will be reviewed by INDOT and may be reviewed by the FHWA, if needed, for completeness and to ensure the conditions reported compare well to the data on the requirements on the Extended Frequency Data Sheet.
3. If the bridge fails the extended frequency review, the report will be work-flowed in BIAS back to the Inspector that submitted the report. A brief explanation of why it failed is included in the work-flow notes. Any deficiencies can be addressed, and the bridge re-

submitted for a second review.

4. Bridges that pass the Extended Frequency Review, will have the Routine Inspection Frequency increased by INDOT to 48-months, along with a note about this added to the Executive Summary. In additional various data items on the MAD-Tab will be updated, and finally, the BIAS Inspection Schedule will be updated to 48-months, along with a note stating that the bridge passed the Extended Frequency review.
5. Finally, the Inspector will be notified by e-mail that his bridge passed the Extended Frequency Review. Generally Extended Frequency Bridges, shall be inspected in Phase-1 at County Inspections. The program manager will review the submitted structures and assign some structures for quality assurance review.

2-2.07 Fracture Critical Inspections

2-2.07(01) Purpose

Fracture Critical Inspections (92A) are regularly scheduled inspections to examine the fracture critical members or member components of a bridge. Fracture critical members are steel tension members or steel tension components of members, whose failure would probably cause all, or a portion of, the bridge to collapse. Fracture critical members require more thorough and detailed inspections than the members of non-fracture critical bridges.

Fracture Critical Inspections are explained in detail in Chapter 5.

2-2.07(02) Frequency

A Fracture Critical Inspection is required at regular intervals not to exceed 24 months. A fracture critical member with a rating of 4 or less shall have the frequency of inspection reduced to no greater than 12 months; this can be accomplished with a special inspection of the applicable member or connection.

2-2.08 Underwater Inspections

Underwater Inspections are a necessary part of an effective State Bridge Management Program and are mandated by the FHWA on routine intervals for bridges with substructure units in water that cannot be waded or probed.

2-2.08(01) Purpose

Because most problems that occur under water do not become visible from the surface until they are critical, bridges with substructure units in water must be inspected to ensure they are sound.

However, for several instances, the use of boats, kayaks, or wet suits may be an appropriate solution to avoid unnecessary underwater inspections especially if there is time during the year to do inspection while the water is shallow and calm.

Underwater Inspections are called for if scour and the condition of elements below water cannot be assessed during an overwhelming time because:

1. The substructure unit is in deep water during the entire year. Inspectors are expected to visit the site at various times to find a time when the water level and current are low enough to safely gather the necessary data as a part of the Routine Inspection; and,
2. At the lowest flow during the year, the water is too deep. Generally, if the velocity times depth is equal to or greater than 10, inspectors should not attempt wading,
3. The channel bottom is too soft for safe wading, or
4. Hazardous water quality exists.
5. At the lowest flow during the year, the water is too deep for probing from a boat.

2-2.08(02) P r e c i s i o n

Every Underwater Inspection must follow a Plan of Action. The Plan of Action must include:

1. A timetable for conducting the inspection.
2. The personnel requirements for each portion of the inspection.
3. A list detailing what is required to be inspected.
4. The required access equipment.
5. The required traffic controls.

An Initial Underwater Inspection should include the items listed above. Subsequent inspections may be modified based on field conditions. For example, the number of cross sections may be reduced if the inspector is confident that the stream is stable.

1. A detailed listing of the divers participating in the inspection complete with duties performed and a complete listing of credentials. This will include diving credentials and Bridge Inspection Team Leader and Team Member numbers issued by the Bridge Program Manager (SPM). This information must be placed on the first section of the inspection report.
2. A detailed Channel Survey as described in 2-2.12 of this chapter, including channel soundings and waterline elevations.

3. Photographs including:
    a. Overall views of the Bridge.
    b. General views of each substructure unit (both sides and noses).
    c. Significant defects.
    d. Typical material condition at the water line.
4. Sketches showing:
    a. The substructure layout, including overall bridge length and each substructure unit length and width.
    b. The shoreline limits upstream and downstream of the bridge.
    c. A north arrow.
    d. The width of the channel at the bridge.
5. A record of the water velocity at the deepest point in the channel.
6. A record of the channel bottom material adjacent to all submerged substructure units.
7. A record of the shoreline conditions and material.
8. A check of the foundation type to ensure it has been correctly coded in Item 113.
9. Complete pre-dive and post-dive checklists.
10. A record of defects, noting section loss and dimensions.
11. Notifying of the owner of any significant deficiencies.
12. Reviewing available plans against the current condition for changes.
13. Making preliminary recommendations if needed.

All inspection results should be fully documented in the BIAS. Critical findings shall be reported to the appropriate individuals and agencies identified in 2-4.02.

Due to limited underwater visibility, the inherent access restrictions of the underwater environment, and the presence of marine growth, the required underwater inspection precision depends on the level of effort. Three underwater diving inspection levels of effort are defined by the FHWA. A standard Underwater Inspection in Indiana requires a Level I effort on 100 percent of all underwater elements. A Level II or III effort shall be conducted only if defects or advance deterioration are found or suspected, and then only at the direction of the SPM.

A summary of the Inspection Levels and typical detectable defects is provided in *Figure 2-1.2.* A narrative description of each level follows.

Level I Effort

A Level I Inspection is a visual or tactile examination using large sweeping motions of the hands where visibility is limited. A Level I effort must be detailed enough to detect obvious major damage or deterioration due to overstress or other severe deterioration. It should confirm the full-length continuity of all members and detect undermining or exposure of normally buried elements. A Level I effort also includes limited probing of the substructure and adjacent channel bottom.

Level II Effort

The Level II effort is intended to detect and identify damaged and deteriorated areas that may be hidden by surface biofouling. A Level II inspection requires marine growth to be removed from portions of the bridge. The thoroughness of cleaning should be governed by what is necessary to discern about the condition of the underlying material. A detailed inspection of a representative sample of the components is required. For piles, a 12-inch high band should be cleaned at designated elevations, generally near the waterline, at the mudline, and midway between the waterline and the mudline. On an H-pile, marine growth should be removed from both flanges and the web. On a rectangular pile, the marine growth removal should include at least three sides; on an octagonal pile, at least six sides; and on a round pile, at least three-fourths of the perimeter. On piles with a diameter of three feet or greater, one-foot squares should be cleaned at four locations spaced approximately equally around the perimeter, at each designated elevation. On large, solid-faced elements such as pier shafts, one-foot squares should be cleaned at four random locations, at each designated elevation. In addition, The Level II effort should focus on typical areas of weakness such as attachment points and welds.

Level III Effort

The Level III effort is generally limited to key structural areas which are suspect or areas which may be representative of the underwater structure. A Level III Inspection typically involves NDT or partially destructive testing (PDT) to detect hidden or interior damage, or to evaluate material homogeneity. Testing techniques typically include the use of ultrasonic, coring, or boring, and in-situ hardness testing. Refer to Part 6 of this manual for additional information on NDT and PDT.

The SPM will be notified of all Critical Findings identified in this inspection, as detailed in Part 2-4.02 of this manual. Critical Findings will be submitted in BIAS for all bridges.

All inspection results should be fully documented in BIAS.

2-2.08(03) F r e q u e n c y

The standard interval for Underwater Inspections is 60 months. This interval is for bridges that are in good condition underwater, located in passive, nonthreatening environments, and have not had any significant changes in the submerged substructure units or channel bottom since the previous Underwater Inspection. If warranted due to deficiencies or deterioration, the inspection interval may be reduced to less than 60 months.

A frequency of 48 months is to be used when there have been changes in the submerged substructure units or channel bottom since the previous inspection that are serious enough to warrant tighter scrutiny, but not serious enough to require corrective action.

A 36-month frequency is to be used when there have been substantial changes in the submerged substructure units or channel bottom since the previous inspection, or problems have developed that require corrective action.

A 24-month frequency is to be used when serious submerged substructure unit deterioration or scour/channel problems exist. The deficiencies should be immediately addressed, or the bridge should be rehabilitated or replaced in the very near future.

A 12-month frequency is to be used when very critical submerged substructure unit deterioration or scour/channel problems exist. The deficiencies should be immediately addressed, or the bridge should be rehabilitated or replaced in the very near future.

The investigation into the need for an Underwater Inspection may begin at the initial inspection. Follow the guidelines of 2-2.08(01) to verify the need for an underwater inspection. Addition of an underwater i ns pe c t i on r e q ui r e t h e c onc ur r e nc e of t h e SPM. When the current frequency is out of compliance to the frequencies outlined above, the Inspection Team Leader shall write the SPM requesting a change in frequency citing the reasons as listed above.

Increasing frequency: The inspection frequency may be increased from a reduced frequency if the situation that required the reduced frequency has been properly addressed or if it has been observed over several inspections the situation has stabilized. The increase in frequency will be made in writing and must have the approval from the SPM.

Any bridge that has been receiving an Underwater Inspection can be removed from this requirement by providing the SPM documentation showing that the in-water substructure units can be properly inspected in full using normal means during a Routine Inspection.

2-2.09 Special Inspections

2-2.09(01) P u r p o s e

Special Inspections (92C) are scheduled to examine a portion of a bridge in more detail or at a greater or lesser frequency than is standard for Routine Inspections. Special Inspections may provide follow-up after a Routine, Damage, or Initial Inspection. The Special Inspection mandates the component being inspected is at arm's length, and NDE methods utilized when necessary to complement visual evaluations.

Details and bridges that may require a Special Inspection include the following:

1. Fatigue category E and E' details (Most welded steel cover plates can be removed from this category. Historical evidence has shown by both Purdue research and detailed inspections since +- 1988, that cracks rarely develop, even from poor welds, and if they do, they grow very slowly. If a detail has a +- 30-year history of no cracks, an Inspector can request that the State Program Manager remove this from requiring a Special Inspection of these details).
2. Hangers of all types
3. Hinge or pin connections
4. Known defects, significant section loss/deterioration, or damage severe enough to warrant extra scrutiny.
5. Unique or problematic details as determined by the SPM.

Complex Bridges that require a Special Inspection include the following:

1. Bridges designated by the SPM
2. Cable-stayed bridges
3. Movable bridges*
4. Suspension bridges

* *Movable bridges in Indiana require a Fracture Critical Inspection on their superstructure members. Due to this, it has been decided that the Complex Inspection of the hydraulic, electric, and mechanical systems will be included as a part of the Fracture Critical Inspection for NBI recording purposes, and Special Inspections will not be coded, unless a condition rating is a 4 or less. Highly qualified personnel that meet the Complex Inspection Plan of Action are required for these parts of the bridge inspection.*

2-2.09(02) Precision

Special Inspections may include a Plan of Action, if required. The Plan of Action may include:

1. A timetable for conducting each inspection.

2. The personnel requirements for each portion of each inspection.
3. A list detailing what is required to be inspected under each inspection.
4. The required access equipment needed for each inspection.
5. The required traffic control for each inspection.

For bridges that require a Special Inspection because of unique or problematic details, the inspector must make sufficient measurements and observations to quantify the deficiencies to allow for future monitoring. Inspectors should document:

1. The physical and functional conditions of the known or suspected deficiency.
2. Any developing problems such as deterioration, foundation settlement, scour or erosion of the slopes, scour at the supports, ice damage, or other problems that, if left unchecked, would degrade the load-carrying capacity of the bridge.
3. Signage is in place and visible for load-posted or restricted bridges.
4. The ability of the bridge to satisfy its present service requirements.

Inspection results must be recorded in BIAS. The date of the inspection and a list of the deficiencies investigated must be included. If any deficiency has become more severe, it may be necessary to notify the owner and re-evaluate the bridge load rating. Critical findings shall be reported to the appropriate individuals and agencies identified in 2-4.02.

Some Special Inspection tasks need not be performed with an Inspection Team Leader on site. Inspection Team Members can be sent out to perform specific inspection or measurement tasks under the direction of an Inspection Team Leader. Such tasks might include measuring a crack, photographing a weld, or measuring section loss on specific members. These tasks must be clearly documented in the Special Inspection Plan of Action. The Inspection Team Leader is still required to review and sign off on all inspection data entered in BIAS.

For state-owned complex bridges that require a Special Inspection, a lead Inspection Team Leader is assigned by the State Program Manager. The Plan of Action will be developed and modified by the lead Inspection Team Leader in consultation with the State Program Manager.

The lead Inspection Team Leader for state-owned complex bridges may or may not be the Inspection Team Leader for any individual inspection performed as a part of the Special Inspection. The Inspection Team Leader for each individual inspection will approve the inspection results entered in BIAS for that inspection. The lead Inspection Team Leader must review all individual inspections performed as a part of the Special Inspection, as well as generate/approve a summary of the Special Inspection. This summary must be entered in BIAS.

Inspection teams for state-owned complex bridges may consist of state personnel, consultants, or a combination. The lead Inspection Team Leader will ensure that each team is working within the scope of its professional ability.

For toll road, county, and local agency complex bridges that require a Special Inspection, a lead Inspection Team Leader may be assigned by the Inspection Consultant but must be approved by the SPM.

The Plan of Action will be developed and modified by the lead Inspection Team Leader in consultation with the State Program Manager.

The lead Inspection Team Leader must review all individual inspections performed as a part of the Special Inspection, as well as generate/approve a summary of the Special Inspection. This summary must be entered in BIAS.

Depending on the extent of the damage or deterioration, a Special Inspection may include a recommendation for a load rating to assess the capacity of damaged or deteriorated members. Nondestructive tests and/or other material tests may be needed to assist in determining the safe load-carrying capacity.

Critical findings shall be reported to the appropriate individuals and agencies identified in 2-4.02.

All inspection results should be fully documented in BIAS.

2-2.09(03) F r e q u e n c y

Special Inspections for unique and problematic details are completed in addition to Routine Inspections. The maximum inspection interval for a Special Inspection is 60 months. A problematic detail that is performing well on a structure can have an inspection interval of 60 months. A structure with a problematic detail that has a rating of 4 or less shall be inspected on a 12-month interval.

A written request shall be sent to the SPM requesting the Special Inspection be removed if the detail has been retrofitted or rehabilitated.

The inspection frequency of each component inspection of a Special Inspection for a complex bridge may be identified in the Plan of Action. It may be most efficient to conduct all the inspections at one time, using the same inspectors. However, it may not be practical to schedule inspections requiring different types of traffic control, access equipment, or NDT at the same time.

2-2.10 In-Depth Inspection

2-2.10(01) Purpose

An In-Depth Inspection is a close-up inspection that allows for the detection of deficiencies that are not readily identifiable during a routine inspection. In-Depth Inspection Reports shall be created in BIAS as an "Other" Inspection Type. During this "Other" Inspection, the Item 90 Inspection Date as reported in BIAS for this existing bridge shall not be changed. The term close-up is used which indicates this is not a hands-on inspection but is still well within visual range so that defects can be seen.

An In-Depth Inspection is a scheduled inspection which is scheduled at a maximum 96-month interval for structures that meet the following criteria:

1. The structure is of the type that does not require a scheduled hands-on inspection.
2. The structure contains elements not easily inspected during a routine inspection.
3. The structure has been selected by the Program Manager.

Inspectors shall create an "Other" Inspection type in BIAS when creating an "In-Depth" Inspection Report. They shall attach the details of the inspection to the BIAS Report, in a report format like that done for a Fracture Critical Inspection Report.

2-2.10(02) Precision

The scope of an In-Depth Inspection should be to inspect the entire structure close up. This is a relatively infrequent inspection scheduled for structures that typically do not require a scheduled inspection beyond the routine inspection. This inspection will give the inspector the opportunity to make sure that all the components of the structure are performing as intended.

2-2.10(03) Frequency

The maximum frequency of an in-depth inspection is 96 months.

2-2.11 Damage Inspections

2-2.11(01) Purpose

A Damage Inspection is an unscheduled inspection to assess structural damage resulting from environmental factors or human actions. Flood damage, fire damage, barge impact, and vehicle impact are examples of events that may call for a Damage Inspection.

2-2.11(02) Precision

The scope of a Damage Inspection should be sufficient to determine whether there is a need for emergency load restriction, or closure of part or all the bridge to traffic. Inspectors of state-owned bridges should also assess the level of effort necessary to repair the damage. The amount of effort expended on this type of inspection may vary significantly and depends on the extent of the damage. If major damage has occurred, the inspector shall document the damage, including measuring section loss or misalignment, and any loss of foundation support.

Inspection data and pictures shall be entered into BIAS as soon as possible, and no more than seven days after the inspection. This inspection may be supplemented by a timely Special Inspection to document the extent of damage and the urgency and scope of repairs more fully. A more refined analysis, to establish or adjust interim load restrictions, may also be required as follow-up for a Damage Inspection. A structural engineer may need to be consulted for the inspection or analysis. If the inspection identifies a Critical finding, the inspector must follow the notification procedures outlined in 2-4.02.

A damage inspection is required for all bridges in which the event has left permanent physical evidence. The damage inspection data and pictures shall be entered into BIAS as soon as possible and no more than seven days after the inspection.

The Inspector of state-owned bridges should gather data on the vehicles and drivers involved and any police report after a crash. This information will be used to bill the appropriate insurance company for damages.

Collisions to State owned bridges are also recorded in a table in SharePoint and are submitted to INDOT's Mobility Section for their annual report to the FWHA on bridges impacted by traffic.

2-2.11(03) F r e q u e n c y

A Damage Inspection is an unscheduled inspection that is performed to determine if significant damage has been done to the bridge. Based on the findings of the damage inspection, the inspector will determine if the damage warrants placing the structure on a special detail inspection. Pictures of any damage will be uploaded into BIAS with a complete description of the event. Generally, a law enforcement officer on the site of an accident involving a bridge will notify the owner who will request a Damage Inspection be performed to determine if the bridge should be closed. Damage Inspections may be needed after flooding or earthquakes.

2-2.12 Channel Surveys

2-2.12(01) P u r p o s e

Scour is the movement of channel bed material by the action of moving water. This movement may result in degradation (i.e., erosion of material), as well as aggradation (i.e., accumulation of material). These changes in the channel bed may lead to bridge instability and are generally identified by profiling the channel bottom. Comparison of previous profiles is typically needed to detect and assess scour. Plotting the underwater measurements of the stream bottom and probing bridge foundations are two of the most important aspects of inspecting a bridge for scour.

Channel cross section data is used to evaluate trends in channel bottom movement and to compare channel bottom elevations to footing elevations.

Indiana has two levels of Channel Survey: basic and in-depth.

2-2.12(02) P r e c i s i o n

For all Basic Channel Surveys, the elevation of the waterline must be referenced to a bridge element (such as top of railing or coping, etc.). For In-depth Channel Surveys, the elevation of the waterline should be referenced to a known elevation on the bridge.

F o r a Basic Channel Survey, bottom elevations are required:

1. At the upstream fascia, locate enough points between substructure units to identify any problems or deficiencies. As a minimum, three points to five points are required for a typical one span structure. Typically, the elevations are taken at substructure units, at mid-channel, and at the channel edges, depending on the contours of the channel and the overall width of the channel.

   The notes of how- to layout the survey must be stored in BIAS. Once the survey method and points are determined, the process can be repeated on future Routine Inspections. The creation of a bridge profile sketch/plot the channel survey profile must be attached to the BIAS report for which the profile was taken.

   It is recommended that the BIAS Scour Channel Profile Tab be used for plotting the data gathered. However, if this tool is not used, the plotted channel data must still be uploaded into BIAS and attached to the appropriate BIAS Inspection Report.

2. Bridges that are metal pipes or concrete boxes (with bottoms), generally will only require one measurement, taken at midspan, (usually at the inlet), unless a scour hole exist at the inlet or outlet. If scour is noted, additional measurements may be needed to outline its extent.

3. Scour issues found during any basic channel survey should be reported to either INDOT Maintenance or the appropriate County Engineer, so that they can determine the proper fix for the situation.

Note: Measurements at the downstream fascia can/should be taken if scour issues are located at the downstream portions of the bridge, possibly caused by the angle of attack of the normal channel flow.

For an In-depth Channel Survey, bottom elevations are required:

1. Around each substructure unit in the water, and at enough points around the unit to identify any problems or deficiencies, (bridges with hammer head pier caps shall be measured at both pier noses as well as well as at both fascia)
2. At and between substructure units along the centerline of the bridge at enough points between substructure units to identify any problems or deficiencies. A minimum of three points between each substructure and one point at each substructure is required.
3. At the upstream fascia, at enough points between substructure units to identify any problems or deficiencies. A minimum of one point at each substructure and three points between each substructure is required.
4. At the downstream fascia at enough points between substructure units to identify any problems or deficiencies. A minimum of one point at each substructure and three points between each substructure is required.
5. At additional locations, if required, to adequately determine the thalweg of the waterway. The thalweg is the line that connects the lowest point in the waterway, and which has the fastest flow, (it is also the middle of any navigable channel). Substructure units in the waterway near the thalweg could be susceptible to scour.
6. At as many locations that are needed when an unusual change in the channel has been identified.

The following measurement locations are optional if they are required to measure/track channel changes and/or embankment scour*

7. 100 feet upstream at enough points between substructure units to identify any problems or deficiencies. A minimum of one point at each substructure and three points between each substructure is required.
8. 200 feet upstream at enough points between substructure units to identify any problems or deficiencies. A minimum of one point at each substructure and three points between each substructure is required.

9. 100 feet downstream at enough points between substructure units to identify any problems or deficiencies. A minimum of one point at each substructure and three points between each substructure is required.

10. 200 feet downstream at enough points between substructure units to identify any problems or deficiencies. A minimum of one point at each substructure and three points between each substructure is required.

* When the bridge length is less than 100-feet long, the optional upstream and downstream profiles should be taken at locations equal to the bridge length and twice the bridge length.

11. Every in-depth Channel Survey Inspection will follow a Plan of Action. The Plan of Action (POA), must include:

    a) A timetable for conducting the survey.

    b) The qualifications of the personnel required to conduct the survey.

    c) A list detailing what is required to be measured and where, in the survey.

    d) The required access equipment.

    e) The required traffic control on the roadway above or in the waterway (if needed).

Water depth measurements should be recorded to the nearest tenth of a foot. Scour evaluations are typically based on changes in elevations greater than 0.5 foot since most channel bottoms are irregular surfaces with random cobbles, debris, and sand ripples.

The water surface elevation should be referenced to a known elevation or reference point on or near the bridge.

The individuals taking the profiles need not be a Bridge Inspection Team Leader; however, the profiles must be reviewed and compared to known substructure elevations and past profiles by a qualified Bridge Inspection Team Leader.

2-2.12(03) F r e q u e n c y

Channel Surveys are performed concurrently with many of the required inspections of a bridge over water. After the initial basic Channel Survey is completed, additional Channel Surveys shall be performed every two years during a Routine Inspection, unless an Underwater Inspection has been conducted within the previous 12-month period, and an in-depth channel survey was conducted as a part of that inspection.

If a bridge is on an Extended Inspection Frequency, a basic channel survey is only required every four years.

A basic Channel Survey may be required after large flood events or when channel changes have occurred.

A basic Channel Survey is required for all Initial Inspections, and as required in the Scour Plan of Action for Scour Critical Bridges.

An In-Depth channel survey is performed during all underwater inspection unless directed otherwise by the SPM, (such as when an in-depth underwater inspection is performed to only measure section loss on steel piles – at a reduced inspection frequency).

2-2.13 Large Culvert Inspection

Large culverts are culverts (structures) with spans equal to or greater than four feet and less than or equal to 20 feet, and with clear openings (measured perpendicular to the clear opening of the culvert) not less than 48 inches.

Large culvert structures shall include multiple pipes placed side by side where the extreme measured ends of openings is equal to or greater than 48 inches, so long as the clear distance between openings is less than half of the smallest contiguous opening. The skew of the culvert structure is not considered to determine the culvert length.

2-2.13(01) P u r p o s e

Large Culvert Inspections are basically Routine Inspections for these types of structures. They are regularly scheduled inspections consisting of observations and measurements needed to determine the physical and functional condition of the structure to identify any changes from previously recorded conditions. The Large Culvert Inspection also ensures that the structure continues to satisfy present service requirements.

2-2.13(02) P r e c i s i o n

These inspections should be conducted with the same precision and attention to detail outlined for Routine Inspections in Section 2-2.06.

The State Program Manager should be immediately notified of all Critical Findings identified in this inspection as detailed in 2-4.02 of this manual. A Critical Finding for a large culvert requires immediate reporting and appropriate action to resolve the finding. However, the workflow in BIAS is not used for Large Culverts.

All inspection results should be fully documented in BIAS.

Condition Ratings for Large Culverts shall be based on the rating scale and descriptions as shown on page #38 of the "1995 White" Recording and Coding Guide for the Structure Inventory and Appraisal of the Nations Bridges, and not NBI Item #62, as shown on pages #41 and #42 of the same Manual.

2-2.13(03) F r e q u e n c y

All state-owned large culverts shall be inventoried. State-owned large culverts with a condition rating of 7 or above may be scheduled for a Large Culvert Inspection not to exceed 72 months.

State-owned large culverts with a condition rating of 5 or 6 may be scheduled for a Large Culvert Inspection not to exceed 48 months. State-owned large culverts with a condition rating of 4 or less should be scheduled for a Large Culvert Inspection not to exceed 12 months.

Corrugated metal pipe culverts (both lined and unlined) with constant flow are to be limited to a maximum 48-month frequency of inspection.

All Indiana Toll Road large culverts should be inventoried. Indiana Toll Road large culverts should be inspected as described above for INDOT large culverts.

County and local agency large culverts should be inspected at the discretion of the owner in consultation with the Inspection Consultant. It is recommended that all counties inventory all large culverts.

Large Culvert Inspections may be scheduled in conjunction with any other inspection type.

2-2.14 Bridges Closed To Traffic

If a bridge is closed to all traffic, for construction when an inspection is due, the inspection team shall:

1. Document the bridge is properly closed with photos. If the bridge is being used to maintain traffic, the bridge must be inspected.
2. Code NBI #41 as "G" (new structure not yet open to traffic) or "K" (closed to traffic), as appropriate, in BIAS.
3. Code the appropriate NBI Date Item(s) with the date the inspectors were at the bridge.
4. Note that the inspection date was changed in the Central Data base
5. Verify the estimated date of completion of the construction.
6. Schedule in BIAS, a new Initial Inspection, and all other required inspections for the estimated completion date. All rescheduled inspections must be completed within 90 days of being

opened to traffic. The Routine Inspections shall remain in the month that it had been prior to construction, once the Initial Post-construction Inspection is complete.

7. Leave other NBI data items unchanged, until the Initial Inspection is conducted.

If a bridge is only partially closed to traffic during construction, then an NBIS Inspection is required. On INDOT Bridges, the contractor is required to provide a time and access for Inspectors to conduct all needed inspections.

If a bridge has been closed permanently when inspection is due, the inspection team shall:

1. Document the bridge is properly closed with photos. No other inspection work is required. If the bridge is not properly closed, a critical finding must be immediately submitted.
2. Code NBI #41 as "K" (closed to traffic) in BIAS.
3. Code the appropriate NBI Date Item(s) with the date the inspectors were at the bridge.
4. Note that the inspection dates were changed in the BIAS.
5. Leave other NBI data items unchanged.
6. Recommend the removal of the bridge be scheduled as soon as possible.

Permanently closed bridges are generally not eligible to use federal bridge inspection funds to conduct inspection activities.

2-3.0 REPORTING SYSTEMS

2-3.01 Bridge File

The bridge file is the collective term for all documents necessary to provide a comprehensive history of each Bridge Asset. There are three official repositories for documents that comprise the bridge file: the Bridge Inspection Application System (BIAS), the INDOT Electronic Records Management System (ERMS) and BRADIN. The FHWA *Manual for Bridge Evaluation* contains various documents that should be included in the bridge file. At a minimum, the bridge file is to contain the following documents prior to being identified as complete, if available. Each item is annotated with the required repository.

1. Bridge Inspection Reports – BIAS. A minimum of 10 years of inspection history is required for all assets more than 10 years old.
2. Scour Screening/Scour Assessment - BIAS
3. Original Plans (Either Approved Design signed by PE or As-Built Record) - ERMS

4. All Bridge Rehabilitation Plans (Either Approved Design signed by PE or As-Built Record) - ERMS
5. Hydraulic Calculations/Hydraulic Models - ERMS
6. Asbestos Reports – ERMS
7. Significant Correspondence – ERMS. Significant correspondence includes agreements regarding inspection responsibility, ownership, or other issues that have an impact on timely inspections.
8. Scour Plan of Action – ERMS. For scour critical bridges, provide a copy of the plan of action.
9. Memoranda of Agreement (including Maintenance Agreements), where applicable – ERMS
10. Relinquishment Agreements, where applicable – ERMS
11. Load Rating Reports and Load Rating Calculations/Models are NO LONGER included in BIAS. These documents are uploaded through ERMS into BRADIN. Old Load Rating Documents prior to June 2018 shall remain in BIAS, until uploaded into ERMS in the future.

2-3.02 BIAS

All bridge reports, including bridge inspection, scour screening, scour assessment, and asbestos are to be housed in BIAS. Load Rating reports, calculations, and calculation models are to be housed in BRADIN, using ERMS. Bridge inspection reports - routine, fracture critical, under water, special, damage, asbestos, and other - must be created in a BIAS report. All report sections must be added in the Report Sections tab - Add Sections/PDF Attachments and the file uploaded into the report. The added sections must also be included in the report table of contents. Uploading a PDF attachment without adding it to the report reduces the efficiency of retrieving/reviewing the information and is not acceptable.

The required bridge inspection report sections are listed below. Instructions on how to create a report in BIAS and upload a file into a report as well as the required file naming convention are attachments in BIAS, in the HELP Tab, (at the top of the screen), and then under Documentation.

The required report sections in a bridge inspection report include the following:

1. Report Cover.
2. Location Map.

3. Executive Summary. The executive summary is to include a brief the contract rehabilitation history and general statement of condition of the bridge and a statement of areas of concern.
4. National Bridge Inventory and Miscellaneous Asset Data.
5. Field Inspection Information. Field inspection information is to include sketches and photographs showing typical and deteriorated conditions. A brief narrative is required to justify a change in condition rating. An NBI item rated below 5 or condition state 3 requires a picture or sketch in addition to narrative descriptions of the deteriorated condition. A plan of action is to be included, if required. All pictures inspection report is to be labeled.
6. Critical Findings. Critical finding documentation is to be in accordance with Part 1of the Bridge Inspection Manual.
7. Waterway Information. Waterway information is to be in accordance with Part 2 section 2-2.12 Channel Surveys of the Bridge Inspection Manual.
8. Other Inspection Procedures. Other inspection procedures include other required reports such as fracture critical and under water. These reports are to be in accordance with Part 1of the Bridge Inspection Manual.
9. Posting Documentation. Posting documentation is to be in accordance with Part 3 of the Bridge Inspection Manual.
10. Scour Assessment. The assessment conducted to determine the scour vulnerability of the bridge is to be documented.
11. Pictures and Sketches. All pictures and sketches in the inspection report are to be labeled.
12. Load Rating. See Part 3 of the Bridge Inspection Manual for items to be included in BRADIN.
13. Creating a Report in BIAS and Uploading a File (attachment) into a BIAS Report 2-1.3: CREATING A REPORT IN BIAS

2-3.01 ERMS

ERMS is the only repository other than BIAS that may house bridge file documents. When properly indexed, documents in ERMS for a bridge asset can be viewed in BIAS from the Asset tab.

Instructions on how to upload a file into the ERMS Bridge File Documents folder using the Multiple File Upload Tool and the required file naming convention are listed below. 2-1.4: REQUESTING ACCESS

Bridge File Documents Naming Convention

Document Type Description	Document Type Abbrev.
Asbestos Report	AsbRpt
Contract Information Book	CIB
Correspondence	Corresp
Critical Finding	CritFind

Hydraulic Analysis	Hydro
Hydraulic Memo	HydroMemo
Load Posting	LoadPst
Load Rating	LoadRtg
Load Rating Memo	LoadRtgMemo
Load Rating Model	LoadRtgMdl
Load Rating Summary	LoadRtgSum
Memorandum of Agreement	MOA
Scoping Report	ScopeRpt
Scour Additional	ScourAddt
Scour Analysis	ScourAnalysis
Scour Memo	ScourMemo
Scour Plan Of Action	ScourPOA
Scour Plans	ScourPlans
Scour Report	ScourRpt
Transfer/Relinquish	TR
Document Type Description for Plans	**Document Type Abbrev.** Plans [supplemental description]
Original	Plans O
Rehab	Plans R (if known use the Rehab designation letter A, B, C, etc.)
Replacement	Plans RP
Removal	Plans RM
As built	Plans AB
Shop Plans	Plans Shop
Document Type Description for Inspection Reports	**Document Type Abbrev.** BrInsp [supplemental description]
Underwater	BrInsp U
Routine	BrInsp R
Fracture Critical	BrInsp F
Special	BrInsp S

Note: The ERMS County Bridge Inspection Reports folder is for County Summary documents only. All other documents and reports should be in BIAS or the ERMS Bridge File Documents folder.

Countywide Bridge Inspection Final Reports must now be submitted using the ERMS Multiple File Upload Tool (MFUT).

(MFUT). Users should choose County Bridge Inspection Reports from the Document Type dropdown list in the MFUT prior to selecting files for upload.

The File Naming Convention will remain the same and should be as follows:

Transmittal [Year] [PH I / PH IA / PH II / PH IIA] [CO NO.] [TransLtr] [Des No] for Bridge Services.pdf

Example: 2019 PH I 49 TransLtr 1382084 for Bridge Services.pdf

Final Report [Year] [PH I / PH IA / PH II / PH IIA] [CO NO.] [InspRpt] [Des No] for Bridge Services.pdf

Example: 2019 PH I 49 InspRpt 1382084 for Bridge Services.pdf

As a reminder, there is a 50 MB limit for each file uploaded into ERMS. In the event a file must be split into multiple files, the user should append "Part #" to the end of the filename.

Example: 2019 PH I 49 InspRpt 1382084 for Bridge Services Part 1.pdf

The LPA Bridge Inspection Project Manager will be notified by ITAP when the file upload is complete.

If you have questions, please contact INDOT's LPA Bridge Inspection Project Manager.

2-3.02 Structure Identification

2-3.02(01) NBI Item 8 Structure Number

NBI Item 8, Structure Number, is called Item 8, Structure Number (NBI number) in BIAS. This number is assigned by the Inspection Consultant for county bridges and by the State Program Manager for state bridges. This number is seven digits long for county bridges. The first two digits are the county number. State bridges use up to six-digit numbers. The NBI number is unique and remains unchanged throughout the life of a bridge. When a bridge is replaced, the new bridge gets a new NBI number.

Bridges that are transferred ownership between the state and other agencies, including local governments shall retain the NBI Number originally assigned to it.

2-3.02(02) INDOT Bridge Number

The state uses an alpha-numeric numbering system to identify the Indiana Department of Transportation (INDOT) Bridge Number. Up to 19 digits are reserved for this number, excluding parentheses and dashes, and for new bridges it is generally in the form "A (123)456-789-12345 BCDE." The following describes each part of the INDOT Bridge Number:

1. a. Up to one letter to indicate property designation:

b. I for Interstate bridges

c. P for state properties including parks, prisons, and hospitals

d. Blank for bridges on a designated United States (U.S.) or state route (S.R.)

2. (1234)5678: Up to eight digits to designate the road number. Parentheses are required only if the road number has changed. For these situations, indicate the current road number within the parentheses and indicate the old road number to the right of the parenthesis, (this where the original plans are located). If the bridge route has changed since being built, as in the example, (1234) is the current route and 5678 is the route the bridge was originally built on.

   I nclude leading zeros if the road number is less than three digits (e.g., use 008 and not 8 for Route 8).

   The use of I's for Interstate and P's for Property Bridges is required unless space limits the number of digits that can be used.

3. 123: Up to three digits to designate Interstate log mile or county number, depending on the bridge. If the bridge is located on an interstate, this number is up to three digits long, with no leading zeros, and designates the mile post rounded to the nearest whole mile. If the bridge is located on any other type of road, this is always a two-digit number, with a leading zero if necessary, that designates the county number. There are 92 counties in Indiana. County number 93 is used for border bridges that are inventoried by Kentucky or Illinois or are Indiana's inventoried bridges located south of the state line on US 41.

4. 12345: Five digits to designate the Structure Number. It is a consecutively assigned number assigned by the State and is not related to Item 8, {the Structure Number (NBI Number)}. Leading zeros are required to ensure five digits. Typically, the 02000 series bridges are reserved for bridges over or under a railroad.

5. BCDE: Up to four letters to designate the structure designation.

   a. The first letter indicates:

      i. J Parallel, but different bridge, (length, width, flared, etc.)

      ii. A First contract rehabilitation

      iii. B Second contract rehabilitation

      iv. C Third contract rehabilitation, etc.

   b. The remaining three letters complete the structure designation as follows:

i.	EBL	Eastbound Lane
ii.	WBL	Westbound Lane
iii.	NBL	Northbound Lane
iv.	SBL	Southbound Lane
v.	ADJ	Adjacent to Mainline
vi.	CD	Collector Distributor
vii.	DR	Directional Ramp
viii.	R	Ramp
ix.	NC	Northbound Collector
x.	NWE	Northwest-to-East Ramp
xi.	SC	Southbound Collector
xii.	DRN	Directional Ramp North
xiii.	RWN	Ramp West to North

(The above may not be the entire list of acceptable Structure Designations, but they are the most used.)

When a bridge is both a parallel bridge and has been rehabilitated, use the first two letters of BCDE to show this and drop the third letter describing the structure designation. For example, JCNB would indicate that the bridge is one of two parallel structures, has been rehabilitated three times, and serves northbound lanes.

Many older bridges within Indiana do not adhere to these guidelines. Bridges along state borders may have special agreements that determine the ownership of the bridges and the bridge number.

Prior to SPMS generating INDOT Structure Numbers, in the early 2000's, twin bridges where given the same five-digit Structure Number, but were given a different Structure Designation, such as NBL & SBL.

2-3.02(03) T o l l Road Bridge Numbers

The Indiana Toll Road uses a numbering system similar to the state bridge numbering system that is generally in the form "A(123)456-78-91234 BCD." The following describes the state bridge numbering system:

1. A: One letter coded I for all toll road bridges.
2. (123): Current road number. The leading zero is sometimes omitted.

3. 456: Original road number. This number is omitted if the road number has never changed.
4. 78: Two-digit county code.
5. 91234: Five-digit structure number assigned by the Toll Authority according to the mileage east of the Illinois state line. The Toll Authority does not utilize any special conventions for bridges over or under railroads.
6. BCD: Structure designation like the state bridge numbers except the Indiana Toll Road does not assign letters to identify parallel structures or the number of rehabilitations a structure has undergone.

There are several Indiana Toll Road-owned and maintained bridges that were designed and built by the State which have bridge numbers like those used by the State. The majority of these are at the western end of the Toll Road, and at the two intersections with SR-912.

2-3.02(04) C o u n t y and Local Agency Bridge Numbers

County and local agency bridge numbers are supplied to INDOT by the County/County Consultant. This number is five digits and may contain letters. A "B" after the bridge number indicates the bridge is the second bridge at this location, using the same Bridge Number. A "C" indicates the third bridge, etc.

In order for a county/local bridge to be entered into BIAS, the county/consultant must as a minimum, supply INDOT the new bridge number, new NBI Number, Latitude, Longitude, Features Intersected, Facility Carried, and contract Number and Des# if let through INDOT. INDOT shall create the initial bridge file in BIAS using this information. It is recommended that on new bridges that Design Plans be provided to INDOT to create a new bridge in BIAS. This allows INDOT to enter more initial data when creating a new bridge.

2-3.03 Inside Indiana - County Border Inventory

For state bridges, inventory all bridges along or crossing the north and west borders of a county as being in that county. Inventory all bridges along or crossing the south and east borders of a county as being in the adjacent county.

For county bridges, inventory all bridges along or crossing the south and east borders of a county as being in that county. All bridges along or crossing the north and west borders of a county are inventoried in the adjacent county. See Indiana Code IC: 8-17-1-45(a).

2-3.04 State Line - County Border Inventory

For bridges along the state line borders, special agreements with the adjacent state/county may determine the ownership and maintenance responsibility of the bridges. Both INDOT and the FHWA shall review NBI Data on these county state line bridges annually and may meet periodically with local county officials from both states to ensure compliance with the NBIS.

All state line border bridges shall be inventoried in BIAS and reported to the FHWA annually. Bridges that an Indiana County has been designated as the lead county for inspections, shall submit each final inspection report to the adjacent state's county at least once a year, usually in February, so the data can be submitted to the FHWA. They should send a copy to INDOT, and/or IDOT/ODOT, depending on the state. Likewise on shared state line bridges that the neighboring state's county has been designated as the lead on inspections, they shall provide the Indiana County a copy of each report conducted at least once a year, usually in February, so the data can be submitted to the FHWA. The Indiana County shall provide this report to their inspection consultant that shall input this report and data into BIAS.

2-4.0 EMERGENCY NOTIFICATION/CRITICAL FINDINGS

2-4.01 Introduction

The procedures in this chapter set forth a uniform method for timely notification of serious bridge deficiencies that require an immediate response. They also document the baseline requirements for assuring that appropriate corrective or protective measures have been taken within a reasonable time frame and that established documentation protocol have been followed. Counties and other local government agencies may have additional guidelines for alternate route information, public relations, and information dissemination procedures that should be followed.

The procedures outlined in this chapter should be used to report conditions posing danger to persons or property or conditions that, if left unattended, would likely become such a danger.

This chapter outlines the responsibilities of the Inspection Team Leader, Inspection Consultants, District Inspection Engineers, and the State Program Manager in an emergency.

Any INDOT Approved Inspection Team Leader may close any bridge if it appears to be unsafe, or if they do so follow the guidelines.

2-4.02 Critical Findings

A critical finding is a structural or safety related deficiency that requires immediate follow-up inspection or action.

A structure-related deficiency can interrupt the load path, not allowing the loads to be transferred as designed. This can cause surrounding elements to become overstressed or unstable, potentially leading to partial or total collapse of the structure. Critical findings may also be non-structural deficiencies which jeopardize the safety of motorists or pedestrians.

The follow-up action may be a structural review to determine the strength or serviceability of an element or bridge.

2-4.02(01) Procedures for Inspectors

Upon identifying a potential critical finding, immediately report the deficiency to the appropriate agency officials. For non-state-owned bridges, the finding is to be first reported to the employee of responsible charge (ERC). The finding for state owned bridges and the second reporting for non-state-owned bridges is to be the State Program Manager (SPM).

The immediate actions taken by the inspector will vary with the circumstance. The inspector may close all or part of the structure until further analysis can be performed to determine the structural integrity of the structure. Alternatively, the inspector may recommend that remedial work be performed within a short time frame. Even if no immediate action is taken, it is still required to report the potential critical finding immediately, even in situations where the structural review will ultimately resolve the structure as having adequate strength.

The Inspector shall notify the State Program Manager at the time he reports a Critical Finding as to whether the Critical Finding is “Urgent” or “Severe”. An “Urgent” Critical Finding must have an action completed and the Critical Finding closed-out with 3-days of it being found. A “Severe” Critical Finding must have an action completed and the Critical Finding closed-out within 30-days of the Critical Finding being found. This longer time may be used to conduct a load rating, have signage made, or other items that cannot be done immediately.

All “Urgent” cases require the bridge to be either partially or fully closed immediately (within 24 hours) upon discovery of the defect.

“Urgent” cases require action(s) taken within 24-hours and “Severe” cases require actions(s) taken within 72 hours; however in unusual circumstances “Urgent” cases may be extended up to 72 hours (3-days) if approved by the SPM or ASPM. In addition, “Severe” cases may be extended up to 30 calendar days if approved by the SPM or ASPM.

In addition to the initial reporting of the potential critical finding, which may be verbal notification, a critical finding must be submitted in BIAS within 24 hours. On the Forms tab,

the last field is Critical Finding. The critical finding is created by clicking the plus symbol. Enter all the requested data and upload picture, sketches, and other related files. The workflow must be changed and assigned to the State Program Manager.

The State Program Manager will record the critical finding for tracking and will notify the FHWA in a timely manner. If further action is required, the SPM will change the workflow back to the inspector. Once the immediate safety concerns are addressed, the inspector will resubmit the critical finding back to the SPM for close out.

2-4.02(02) D o c u m e n t a t i o n

Critical Findings must be documented in BIAS within 24 hours for all bridges. The Critical Finding will become a permanent record in the bridge file.

An ACTION must be recorded in the BIAS Critical Finding Report, along with photos attached, in order for the SPM to close-out a Critical Finding. This does not necessarily mean that the deficiency has been corrected. It just means that an action has been taken to address the immediate safety concerns. In BIAS, the inspector shall add a sentence in the Critical Finding Report, in the description of the issue, indicating whether the finding is "URGENT or SEVERE"

FIGURES

2-1.1: Bridge Inspection Types and Maximum Intervals

Inspection Type	Maximum Inspection Interval	Agency
Initial	After Construction or Major Rehabilitation 90 Days	FHWA Mandate
Routine	24 months	FHWA Mandate
Fracture Critical (92A)*	24 months	FHWA Mandate

Routine	48 months	INDOT Policy
Underwater (92B)*	60 months	FHWA Mandate
Special (92C)	60 months	INDOT Policy
In-Depth	96 months	INDOT Policy
Damage	As needed	FHWA Mandate
Channel Survey	As required	INDOT Policy
Large Culvert	60 months	INDOT Policy

* Plan of action required

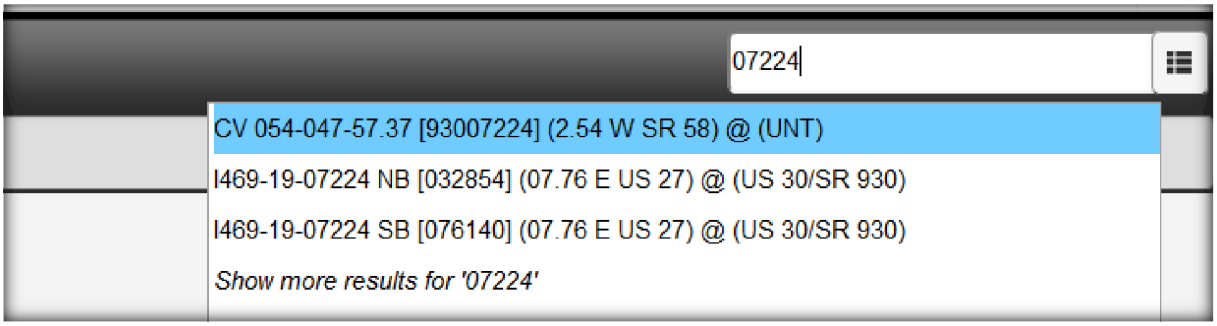
2-1.2: Summary of Underwater Inspection - Intensity Levels

Level	Purpose	Typical Detectable Defects			
		Steel	Concrete	Timber	Composite
I	General visual/tactile inspection to confirm as-built condition and detect severe damage	Extensive corrosion and holes Severe structural damage	Major spalling and cracking Severe reinforcement corrosion Broken piles	Major loss of section Broken piles and bracings Severe abrasion or marine borer attack	Permanent deformation Broken piles Major cracking or structural damage

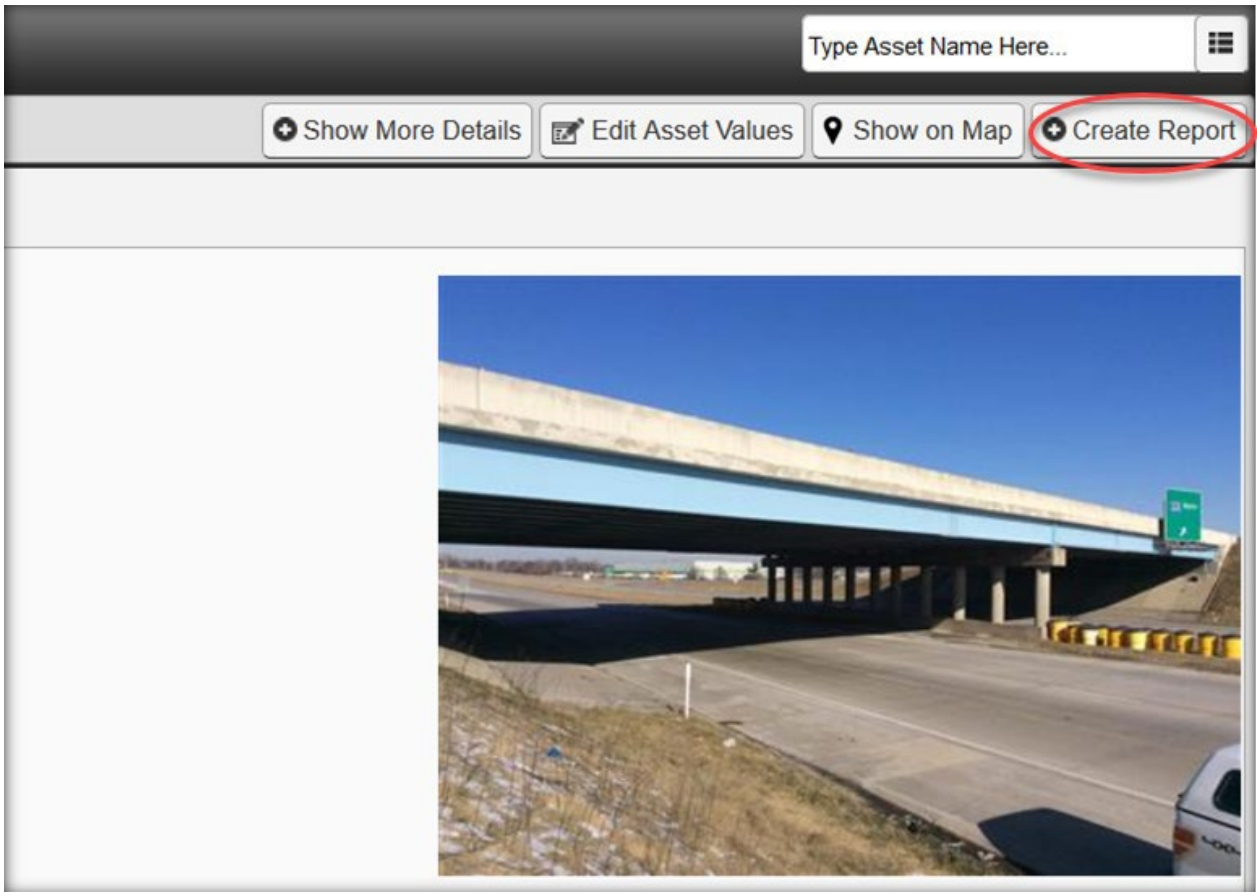
II	To detect surface defects normally obscured by marine growth	Moderate structural damage Corrosion pitting and loss of section	Surface cracking, spalling, erosion Rust staining Exposed reinforcing steel and/or pre-stressing strands	External pile damage due to marine borers Splintered piles Loss of bolts and fasteners Rot or insect infestation	Cracking Delamination Material degradation
III	To detect hidden or interior damage, evaluate loss of cross-sectional area, or evaluate material homogeneity	Remaining thickness of material Electrical potentials for cathodic protection Change in material properties	Onset of reinforcing steel corrosion Internal voids Change in material properties	Internal damage due to marine borers (internal voids) Decrease in material strength Change in material properties	Change in material properties

2-1.3: CREATING A REPORT IN BIAS

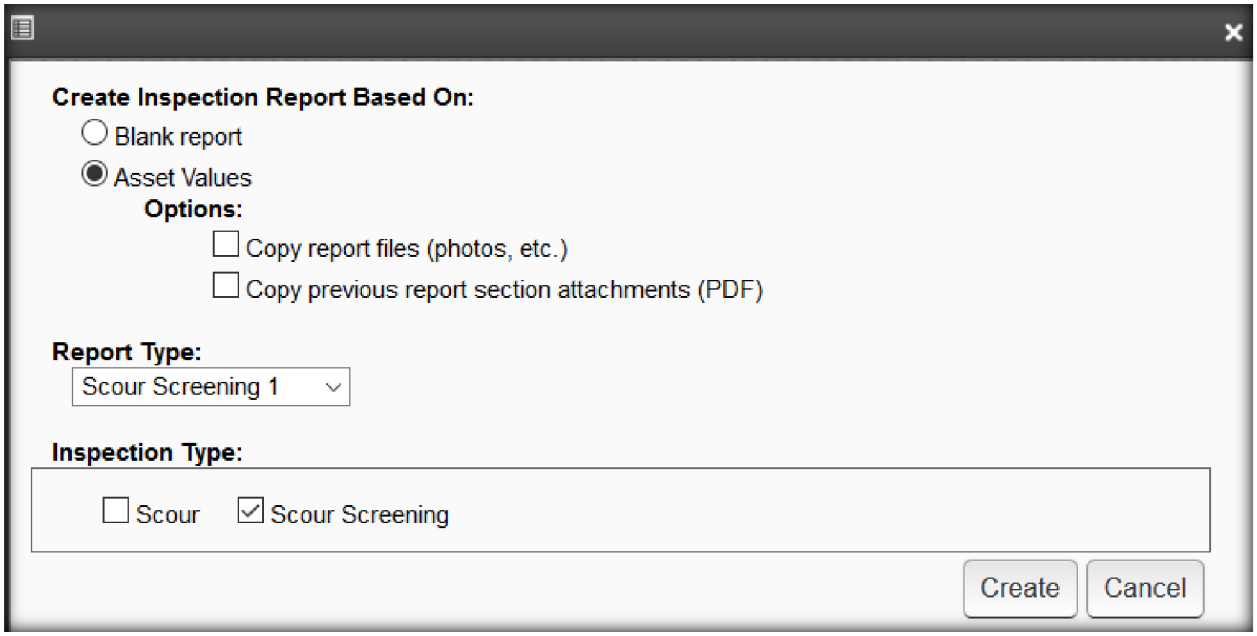
- Log into InspectTech and enter either the NBI number or last 4/5 digits of the structure number in the upper right corner where it says “Type Asset Name Here…”
- Click on the correct bridge



- After the page loads, click on “Create Report” in the upper right corner



- Select the report type. Verify that “Asset Values” is selected
- Click “Create”

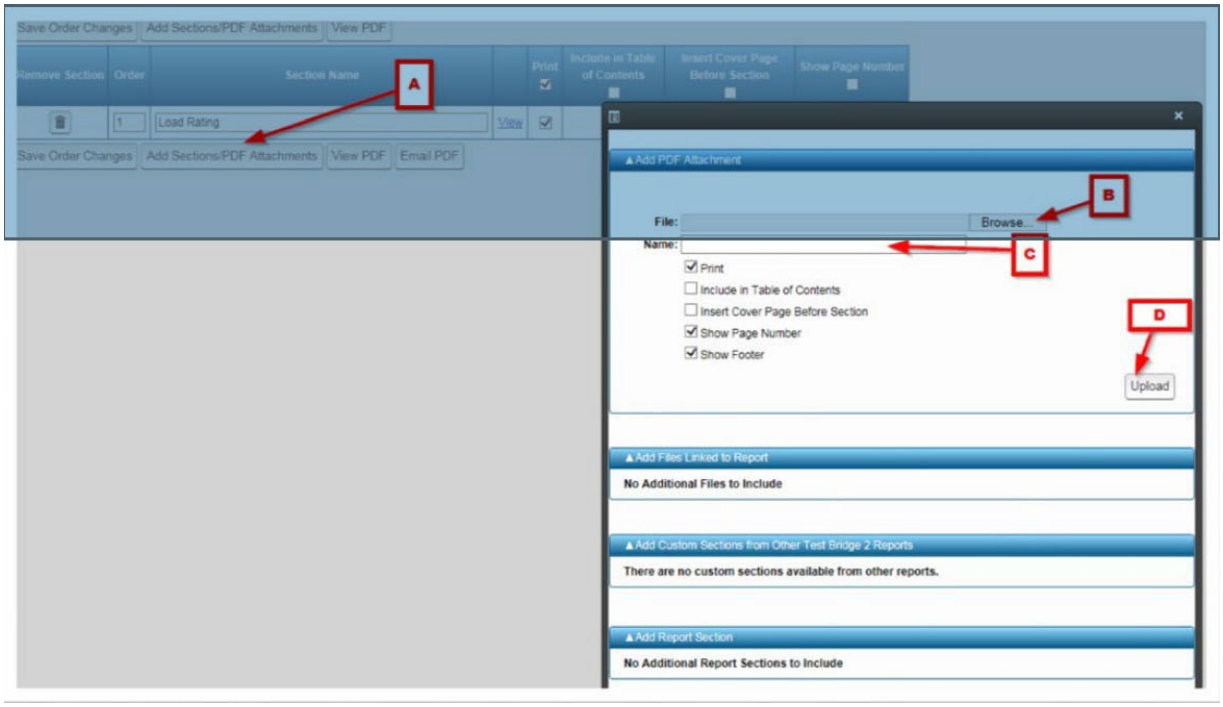


- **DO NOT USE the paperclip**, instead, go to the "Attach Picture/File" button

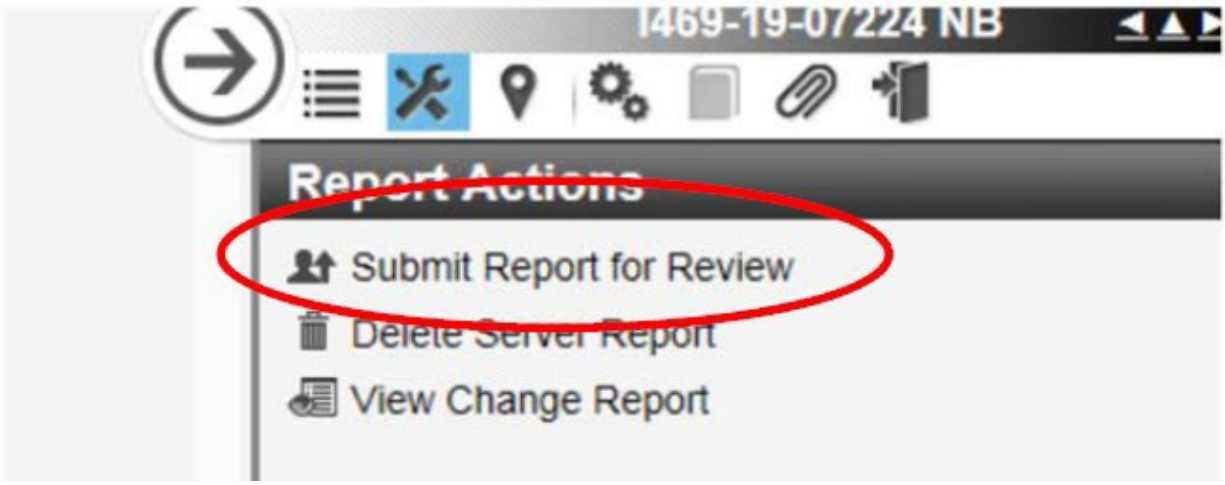
To attach supporting documentation to a report, click the icon to access the Forms.

- Click Report Sections
- Click "Add Sections/PDF Attachments" - "A"

- Click “Browse” to locate document – “B”
- Enter the document name. The name must use the Bridge File Document naming convention – “C”
- Once completed, click “Upload” – “D”

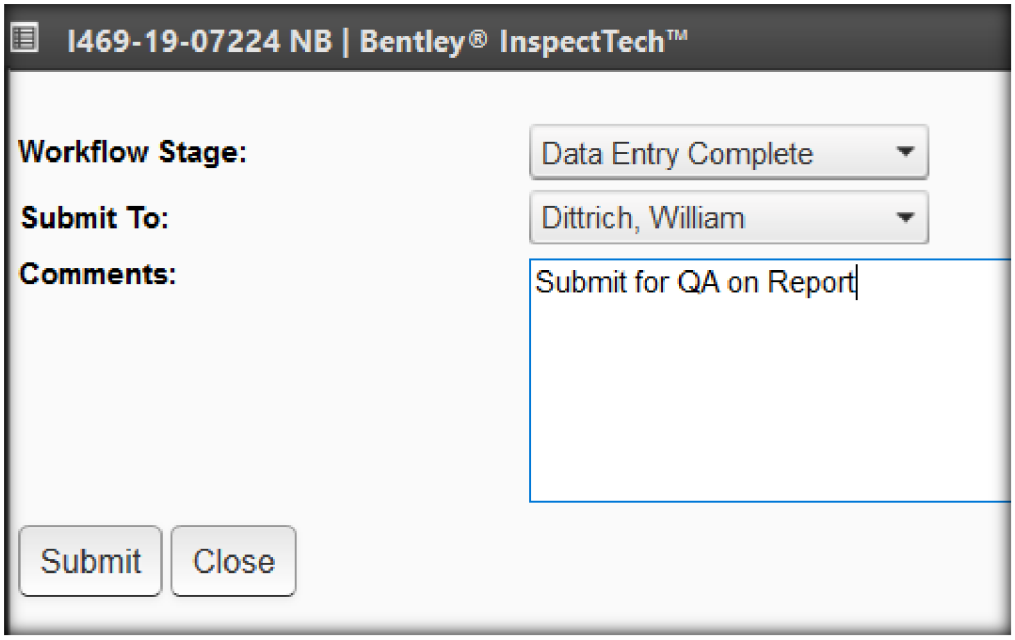


- Once the documentation has been attached, click on the wrench icon in the upper right
- corner of the screen, then “Submit Report for Review”



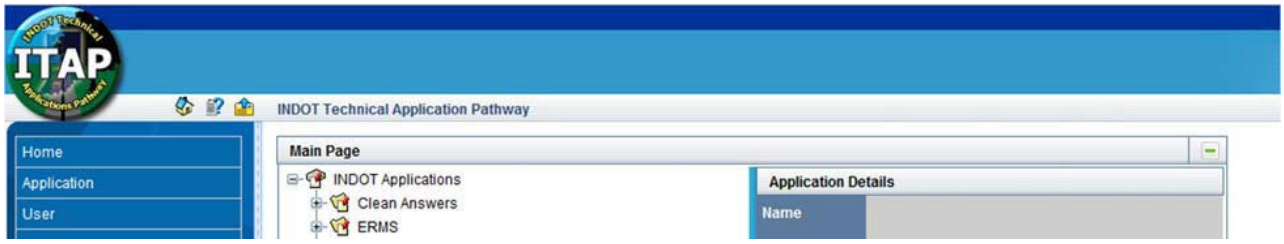
- Select “Data Entry Complete” as your workflow stage

- Select “Submit To” to send it to the person that needs to review the report
- Add a comment at each Workflow Stage
- Click “Submit”

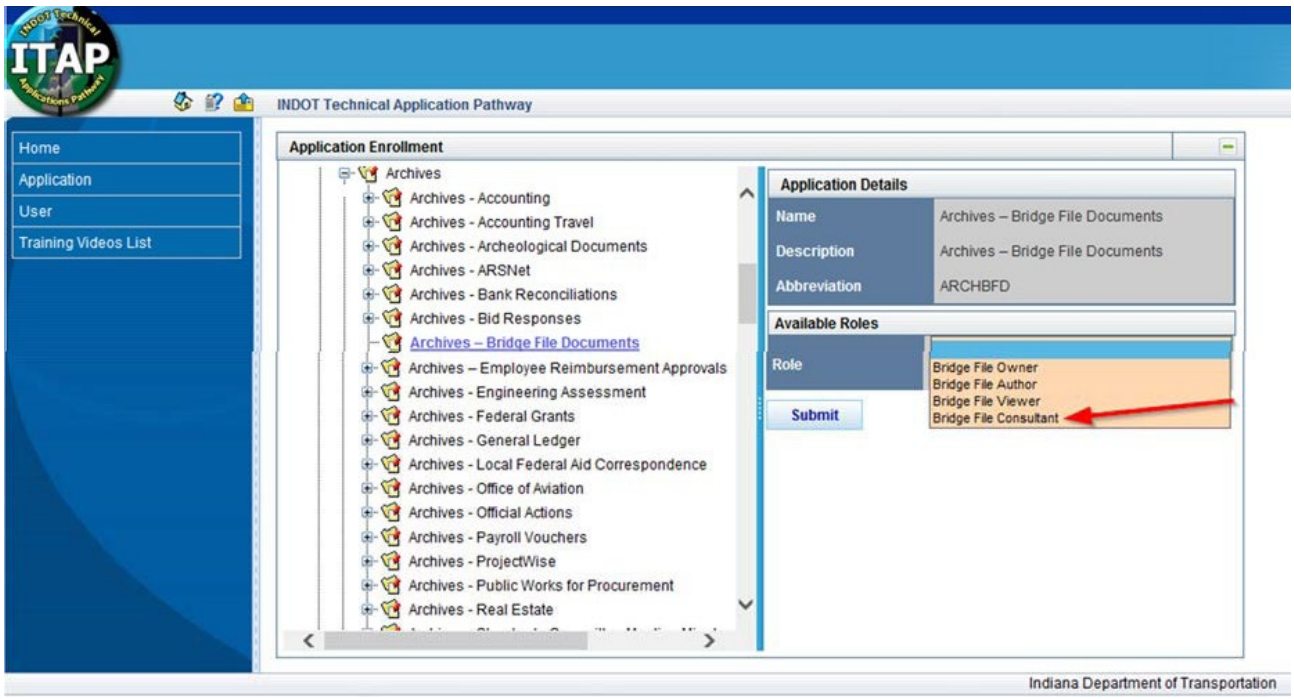


2-1.4: REQUESTING ACCESS

New users must request access prior to uploading files to the Bridge File Documents folder in ERMS. From the ITAP main page, request a new application.



From the Application Enrollment screen, navigate to the Bridge File Documents application (ERMS – ARCHIVES – BRIDGE FILE DOCUMENTS). Select the appropriate role. Consultants should select "Bridge File Consultant". INDOT personnel should select "Bridge File Author". Click Submit. The user will be notified of approval via email.



FILE NAMING CONVENTION

All files uploaded to the Bridge File Documents folder within ERMS Bridge File must use the following naming convention. The file naming convention for various document types and their corresponding abbreviations is available from the INDOT Bridge Inspection webpage.

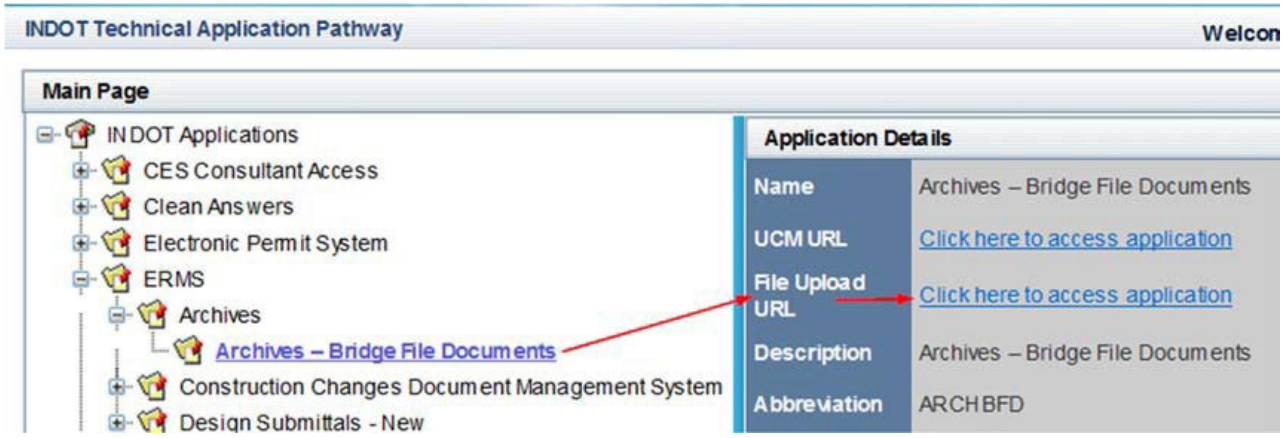
[Document Type Abbrev.] [Bridge Number] - [Document Date]

Notes:
Plans and Inspection Reports will have a supplemental description
Include the dash between the Bridge Number and the Document Date
Document Date is the date on the document itself, not the date the document was uploaded.
Document date must use dashes "-"not slashes "/".

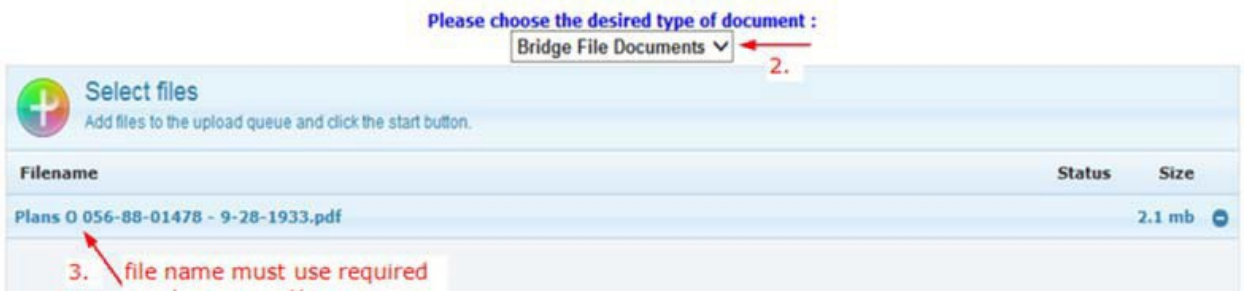
Examples:
Original Plans = Plans O 056-88-01478 - 9-28-1933.pdf
Hydraulic Memo = HydroMemo 056-88-01478 - 01-01-2002.pdf
Load Rating Model = LoadRtgMdl I69-263-04764 CNB - 01-01-2015.xml*
Load Rating Summary (County Bridge) = LoadRtgSum 52-00035 - 01-01-2016*
* Upload in ERMS for BRADIN

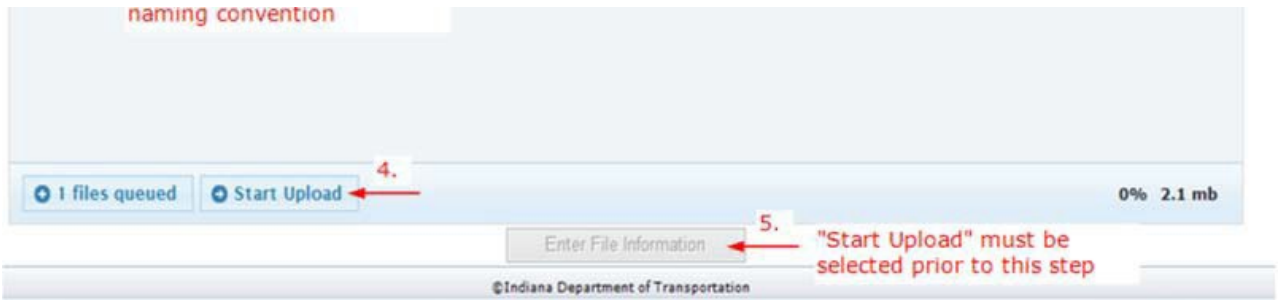
USING THE MULTIPLE FILE UPLOAD TOOL

1. (From ITAP) ERMS – Archives – Archives – Bridge File Documents. Selection the File Upload URL link



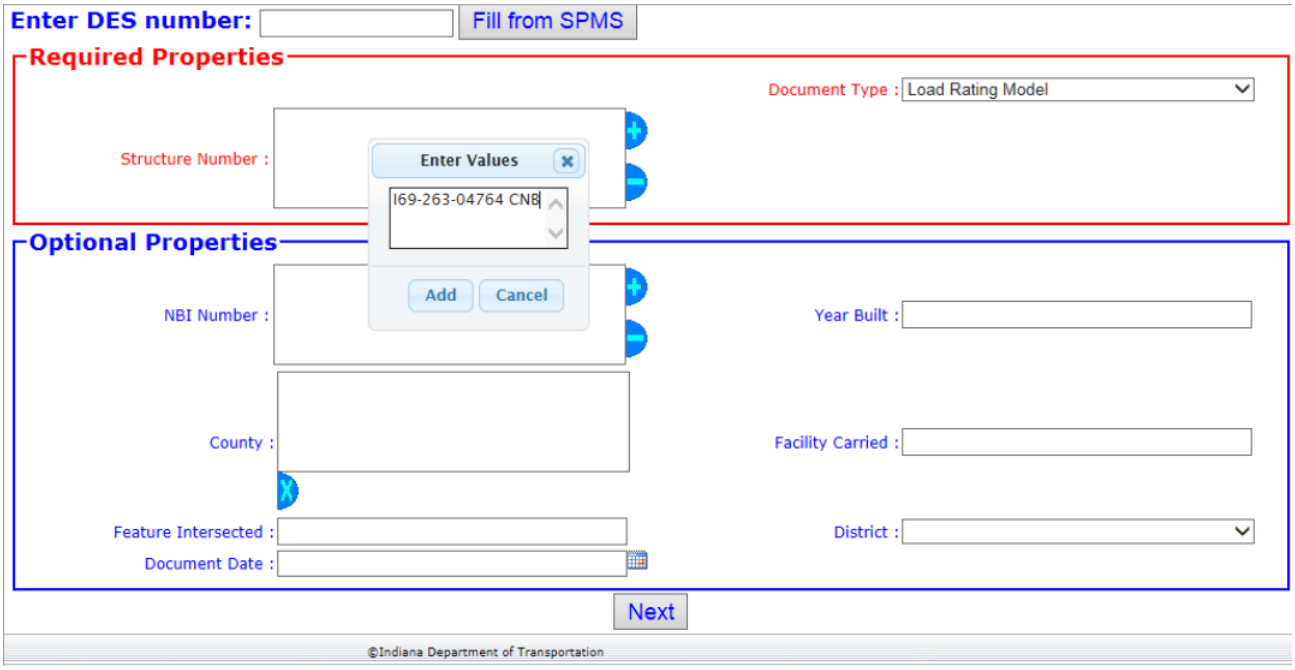
2. Select "Bridge File Documents"
3. Select the document to be uploaded (drag and drop)
4. Click "Start Upload" then "OK" when done
5. Click "Enter File Information"



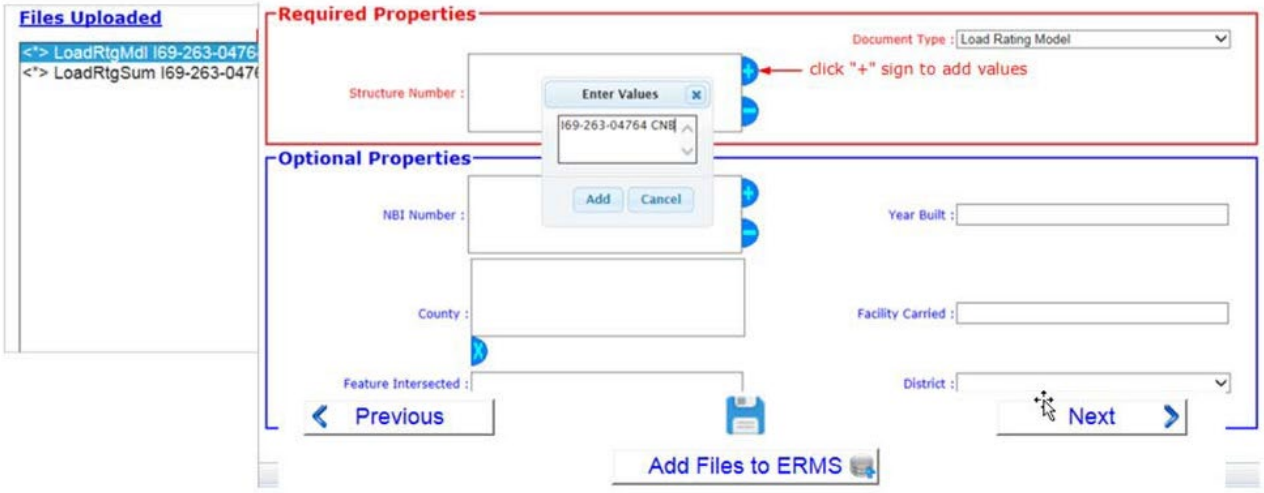


6. Information entered on following screen will be applied to all files uploaded. The following fields must be completed prior to adding files to ERMS. Values must be consistent with those shown in BIAS.

- Structure Number
- Document Type
- NBI number
- County



7. Click “Next”
8. Click on each uploaded file and enter all information that was not input during Step 6. Select the document Type from the pull down menu. The Document Type should match the Document Type Description from the file naming convention, except that all plans should use “Plans” and all bridge inspection reports should use “Bridge Inspection”. Verify that the document type matches the specific file being uploaded.
9. When done with all prior steps, click “Add Files to ERMS”.
10. When the confirmation screen appears, close the browser


Files Uploaded
<*> LoadRtgMdl I69-263-0476
<*> LoadRtgSum I69-263-047
Required Properties
Document Type : Load Rating Model
Structure Number :
click "+" sign to add values
Enter Values
I69-263-04764 CNB
Add
Cancel
Optional Properties
NBI Number :
Year Built :
County :
Facility Carried :
Feature Intersected :
District :
Previous
Next
Add Files to ERMS