Bridge and Culvert Inspection and Evaluation Frequency

1. Inspection Frequency. Determine inspection frequency specific to each bridge or culvert based on factors effecting safety, reliability, and consequences of failure. Inspect at regular intervals not to exceed the periods in Table 1.1 below without variance approval.

TABLE 1.1
INSPECTION AND EVALUATION REQUIREMENTS & RECOMMENDATIONS

Requirement	Vehicle Bridge	Short Span Bridge or Culvert	Pedestrian Bridge incl. Elevated Walkway	Railroad Bridge
Inspection Frequency				
Initial	Within 60 days of: ▪ Beneficial Occupancy Date, or ▪ acquisition, or ▪ change in configuration, or ▪ construction due to repair or retrofit			
Routine	Regular intervals not to exceed 24 months			One inspection per calendar year, with not more than 540 days between successive inspections
In-Depth	As determined by Site Bridge Program Manager			
Fracture Critical Member	Regular intervals not to exceed 24 months			
Underwater	Regular intervals not to exceed 60 months			
Damage	▪ As soon as practicable after damage occurs to a bridge ▪ Before bridge is re-opened to traffic, or ▪ Per the site's emergency action plan following an established seismic trigger event			
Special	As established			
Load Rating				
Initial	Within 90 days of: ▪ Beneficial Occupancy Date, or ▪ Acquisition			
Rating Review	at least once every five years or when reduced structural capacity caused by unexpected events is recommended by inspectors			
Re-rate	Within 60 days of: ▪ identifying section loss that may result in a reduction in capacity, or ▪ change in configuration, or ▪ damage, or ▪ changes in dead loads (overlay), traffic loadings/volume, or temporary construction loads, or ▪ when soil and substructure settlement or slope instability occurs			
Scour Evaluation				
Level 1	Within 90 days of: ▪ Beneficial Occupancy Date, or ▪ Acquisition			

TABLE 1.1 INSPECTION AND EVALUATION REQUIREMENTS & RECOMMENDATIONS				
Requirement	Vehicle Bridge	Short Span Bridge or Culvert	Pedestrian Bridge incl. Elevated Walkway	Railroad Bridge
Level 2	Within 90 days of completing Level 1 Scour Evaluation when evaluation does **NOT** conclusively result in Scour Critical rating of: N, 9, or 8.			
Review	Concurrent with routine inspections.			
Re-evaluate	Per the site's emergency action plan following a flood event or when conditions affecting the flow change.			
Seismic Evaluation				
Initial	Within 90 days of: ▪ Beneficial Occupancy Date, or ▪ acquisition, or ▪ change in configuration, or ▪ seismic retrofit			
Evaluation Review	At least once every five years			

2. Inspection Frequency Variance. Required inspection interval may be adjusted based on the condition of the bridge. For vehicle bridges in good condition, routine inspection at regular intervals greater than 24 months may be acceptable with advance approval from FHWA. For short span bridges, culverts, and pedestrian bridges, routine inspections at greater than 24 months may be acceptable with advance approval from the DOE Bridge Program Manager.

   a. Routine Inspections. Inspection interval may be increased up to 48 months for public- and controlled-access vehicle bridges (FIMS Usage Codes: 1768 & 1769). Inspection intervals may be increased to up to 60 months for short span bridges or culverts (FIMS Usage Code 2629) in good condition and with low consequences of failure. Inspection intervals may be increased to up to 60 months for low risk pedestrian bridges (FIMS Usage Codes: 1168 & 1169) in good condition. Use the following guidelines to determine if a bridge is a likely candidate for variance approval:

      (1) Increased Inspection Interval. The interval of Routine Inspections for bridges may be increased (i.e. less frequent inspection) if all of the following criteria are met:

         (a) All applicable Condition Ratings, Inventory Data Items NBI 58 through 60 (for bridges) or NBI 62 (for culverts reported as bridges); and NBI 61 (for both bridges and culverts) are greater than 6.
         (b) Inventory Data Item NBI 113 is coded 5, 8, 9, or N.
         (c) The Condition Ratings have not changed (to indicate deterioration) over the previous three (3) inspection cycles.

(d) The load rating must meet or exceed all AASHTO and State Legal Trucks including Specialized Hauling Vehicles (SHVs), and Emergency Vehicles (EV) if applicable.
(e) The Average Daily Traffic (ADT) is less than 500.
(f) Span lengths are less than 100 feet.
(g) Steel bridges must have load path redundancy (Inventory Data Item NBI 92A = N).
(h) Must be a non-complex bridge or bridge that is normal in design, construction and operations.
(i) A new or newly rehabilitated structure must have had an initial inspection plus at least one cycle (24-month interval) routine inspection

Inspection interval may not extend beyond 24 months for:

(a) Bridges that have inventory ratings less than the State's legal load.
(b) Structures with spans greater than 100' in length.
(c) Bridges with little performance history.
(d) Bridges susceptible to vehicular damage, for example those with vertical over or under clearances less than 14'-0", or those with restricted horizontal clearances on or under the structure.
(e) Bridges with Fracture Critical Members.
(f) Bridges constructed of timber or masonry.
(g) Bridges that carry heavy permit loads.
(h) Bridges known to experience overloaded trucks.
(i) Bridges with steel or timber decks.
(j) Bridges with rocker bearings.
(k) Bridges without as-built drawings.

(2) Reduced Inspection Interval. The interval of Routine Inspections for bridges must be reduced (i.e. more frequent inspection) to 12 months or less for any Condition Rating (Inventory Data Items NBI 58 through 60 or NBI 62) less than 4 or where the rate of deterioration is of a magnitude where safety may be impacted beyond that interval. Other considerations for reducing inspection intervals include:

(a) Bridge requires repair work.
(b) Bridge is subjected to frequent overloads.
(c) Bridge has unique or unusual details, unique structure types, or unknown performance history.
(d) Large structure that carry a significant amount of traffic.
(e) Bridge with temporary supports.
(f) Bridge is subjected to significant substructure movement or settlement.
(g) Structure with potential foundation or scour problems.

b. In-Depth Inspection. An In-Depth Inspection may be scheduled[1] with or independently of a Routine Inspection or conducted as a follow-up to a Damage or other type of inspection. Schedule In-Depth Inspection of railroad bridges in consultation with the assigned Railroad Bridge Engineer.

c. Fracture Critical Member Inspection. Extended intervals for of FCM inspection is not allowed. Inspection intervals will be reduced to 12 months or less where cracks are discovered in critical members and the Inspection Team Leader has determined the function of these members will not be impacted over the inspection interval. The interval may be restored to up to 24 months if a fatigue/fracture analysis shows a safe life for the interval proposed.

d. Underwater Inspection. Underwater inspections may be performed as part of a Routine Inspection, or as an independent inspection effort.

(1) Increased Inspection Interval. An Underwater Inspection interval greater than 60 months (not to exceed 72 months) may be acceptable for public-access vehicle bridges in good condition with advance approval of FHWA. An Underwater Inspection interval greater than 60 months (not to exceed 72 months) may be acceptable for controlled-access vehicle bridges, short span bridges and culverts, and railroad bridges with advance approval of the DOE Bridge Program Manager. These may be submitted for consideration only after a minimum of three successive inspections have shown no changes in condition.

Inspection frequency greater than 60 months (not to exceed 120 months) may be acceptable for pedestrian bridges in good condition and will be considered only after a minimum of three successive inspections have shown no changes in condition.

(2) Decreased Inspection Interval. Underwater Inspection interval will be decreased to 24 months or less for any Condition Rating items NBI 60 or 62 of less than 4. If the deterioration causing the low Condition Rating is localized, then consider scheduling a Special Inspection focused on the localized area. Additional factors to include when selecting underwater inspection frequency include:

– Inventory Data Item 113 is coded 0-4, 6, or 7
– bridge is on a waterway with rapid stream flows
– significant debris accumulation
– constricted waterway openings

[1] Conditions that may prompt an In-Depth Inspection of a bridge include: apparent cracks in steel members; apparent cracks, de-bonding or loss of tendon section in a prestressed concrete members; suspected frozen bearings or failed hold down devices; severe section loss from steel members; buckled or bent steel girders or beams; disconnected or loose members; or visual fretting rust on the pin of a pin and hanger connection. Consider level of use, condition, safety, and consequences of failures when selecting In-Depth Inspection frequency for each tunnel.

– erodible or unstable streambed or bank material, or
– meandering channels.

e. Damage Inspection. Scheduled immediately following an accident or trigger event involving a structure to determine if the bridge should be closed. May be followed up with an In-Depth Inspection to document the full extent of the damage and the urgency and scope of repairs.

f. Special Inspection. Scheduled at the discretion of the responsible DOE Element considering the severity of a known deficiency of a vehicle bridge, short span bridge, railroad bridge, or high-risk pedestrian bridge. Changes in condition between inspection intervals should be a determining factor for determining the frequency for conduct of Special Inspections. Conduct inspections more frequently as conditions deteriorate. Apply the following guidelines when determining inspection interval. Coordinate with the DOE Bridge Program Manager.

(1) For a bridge not capable of carrying legal loads required by the State within which the bridge resides, set inspection frequency of no more than 12 months.

(2) For a bridge with an NBI Condition Rating of 4 for the deck, superstructure, substructure, or a culvert with a Condition State rating of 4 for a primary load carrying member, set inspection frequency of six to 12 months.

(3) For a bridge with an NBI Condition Rating of 3 or less for the deck, superstructure, substructure, or a culvert with a Condition State rating of 3 for a primary load carrying member, set inspection frequency of 12 months or less.

(4) For a bridge with known load-carrying deficiencies, inspection interval as determined by the Site Manager.

(5) For a bridge with advanced deterioration, inspection interval as determined by the Site Manager.

g. Complex and Special Feature Inspection. Inspection interval less than 24 months may be required for deficient members. The DOE Bridge Program Manager will <u>not</u> consider requests for less frequent inspection of complex or special features.

3. <u>Inspection Interval Variation Approval</u>. Any variation from the prescribed inspection intervals requires documentation. A less frequent inspection schedule requires advance approval. Any change to a more frequent inspection schedule requires notification.

a. Extended Inspection Interval. The Site and/or Field Office Manager via the Program Secretarial Officer/Program Office must receive approval from the DOE Bridge Program Manager prior to setting

or adjusting the inspection frequency of any bridge or culvert that varies from the prescribed frequency.

The request must include:

- the structure Real Property Unique ID Number,
- the proposed inspection interval in months,
- a list of criteria used to justify the request and how each criterial is met, and
- any other explanation as to why the proposed inspection interval is suitable.

The DOE Bridge Program Manager will review the request and determine its merit. As appropriate, the DOE Bridge Program Manager will submit Criteria of the Extended Inspection Interval request to FHWA for review and approval. DOE approval is subject to FHWA review and approval.

4. Risk Classification.

a. Inspection Interval– Routine. Risk classification for routine inspection interval is based on the bridge's super/substructure condition, load restriction, and scour vulnerability.

(1) Low Risk Lower risk criteria:

(a) NBI Item 59 AND 60, or 62 > 5
(b) AND Either:
i. NBI Item 70 = 5 AND Item 63 ≠ 5
OR
ii. Item 63 = 5 AND Item 70 = 5 AND Item 41 = A, D, or E
(c) AND Item 113 = 4, 5, 7, 8, 9, N

(2) Higher Risk Lower risk criteria:

(a) NBI Item 59 or 60, or 62 < 5
(b) OR NBI Item 70 < 5
(c) OR NBI Item 63=5 AND Item 70=5 AND Item 41= B, P, or R
(d) OR NBI Item 113 = 0, 1, 2, 3, 6, T or U

b. Inspection frequency – Underwater. Risk classification for underwater inspection frequency is based on the bridge's on substructure/culvert condition and scour vulnerability.

(1) Low Risk Lower risk criteria:

(a) NBI Item 92B = Y

(b) NBI Item 60 or 62 > 4
(c) AND NBI Item 113 = 4, 5, 7, 8, or 9

(2) Higher Risk Lower risk criteria:

(a) NBI Item 92B = Y
(b) AND NBI Item 60 or 62 < 5
(c) AND NBI Item 113 = 0, 1, 2, 3, 6, T or U