



Department of Transportation

Office of the Secretary

700 Broadway Avenue East
Pierre, South Dakota 57501-2586 605/773-3265
FAX: 605/773-3921

April 6, 1994

Donald F. Kamnikar
Division Administrator
Federal Highway Administration
Pierre, SD 57501

Dear Mr. Kamnikar:

The October 12, 1993 Federal Register provides the final rules that allow states to submit criteria for bridge inspection at a frequency exceeding two years, with a maximum of four years between inspections.

In January of 1994 we submitted our criteria to the Federal Highway Administration (FHWA) for approval. The FHWA review advised that we needed to modify our criteria for selecting qualifying structures to include the requirement of FHWA Technical Advisory T 5140.21 that the inventory ratings be equal to or greater than the state legal truck loads.

Attached for your approval is a revised copy of South Dakota's criteria for selecting structures for four-year inspection frequencies. Also attached are two listings of the structures that qualify under the revised criteria. The first listing includes the same information for each structure as supplied to you in January 1994. The second listing provides the inventory ratings for each structure for each of the three South Dakota legal truck configurations.

Your early review and approval of South Dakota's request for inspecting certain structures on four year intervals would be greatly appreciated.

Sincerely,

Dean Schofield
Deputy Secretary

DS:jrr

Attachment

CRITERIA FOR 4-YEAR INSPECTION FREQUENCY

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

The Federal Register on October 12, 1993, allowed for the inspection frequency of certain structures to go to 4 years. The inspection frequency could be increased for certain types or groups of bridges where past inspection reports and favorable experience and analysis justifies the increased interval of inspection. The time saved by not inspecting these structures every 2 years could be better spent on bridges with problems such as major deterioration, fracture critical details, scour critical bridges, underwater inspections, etc.

This request for a change in inspection frequency applies only to routine inspections as defined in Technical Advisory T 5140.21. All requirements relating to special inspections, such as underwater inspections or emergency scour inspections during floods, remain applicable.

The criteria for selecting structures to be put on the longer inspection frequency are detailed below. At this time, only concrete bridges and box culverts were selected for the State System (State owned structures), and box culverts for the Local Government System (Non State owned structures). Any scour critical and fracture critical structures will be excluded. A phased program is envisioned. If no problems develop with inspecting these types of bridges every four years, future plans include requesting the addition of the Local Government system's low ADT concrete, prestressed concrete and rolled beam bridges.

I. STATE SYSTEM

The structure types on the State system selected for the 4-year routine inspection frequency are: **concrete box culverts, continuous concrete slab bridges, continuous prestressed concrete girder bridges, and concrete frame bridges.** The structure types were selected on past experience. The State system has not had failures of these types of structures except for the loss or damage of some structures due to scour during a catastrophic flood (ie. June 1972 flood in Rapid City). All scour critical bridges are excluded. The failure mechanism for the structure types selected is deterioration with age and when the criteria of ratings and/or age warrant, they will be excluded from the four year inspection frequency. They are types that have minimal maintenance requirements as their condition changes very little from year to year. The only repair or rehabilitation work done to them may be a deck overlay or bridge rail retrofit or rail replacement. No spans are longer than 100'. The concrete slab Umbrella-type bridges will be excluded from the 4-year cycle due to the development of a cracking problem. Steel girder bridges are excluded due to fatigue, fracture critical details, bearing and expansion joint problems and the fact that they are generally longer span bridges which require greater attention.

The criteria used in establishing the 4-year interval between routine inspections for structures on the State system follows:

1. AGE

One criteria for selecting structures is age. After a structure is built and for 2 or 3 years after, distress due to construction problems, settlement, etc., will show up and be resolved. A performance history will have been formed after 3 inspection cycles. The first inspection is done immediately after construction and then 2 cycles of 2 years between inspections occurs before the inspection cycle would be increased. Since it is extremely rare for anything to go wrong with a box culvert, even when they are very old, no maximum age limit was set. The ratings will determine when the box culvert should no longer be on the 4-year cycle.

2. RATINGS

The ratings are useful because they indicate the health of the structure. Low ratings indicate future maintenance or rehabilitation problems. The ratings should all be above a "5" or "Satisfactory" level and are based on the last inspection report.

3. LOAD CAPACITY

The load capacity must be greater than or equal to the State legal load trucks for the Inventory Rating.

4. JOINTS

The deck joints should be waterproof to prevent bearing and substructure deterioration. This information does not show up on the SIA data and must be determined by examining plans and maintenance reports.

5. ADT/ADTT

The ADT is restricted to 3000, and ADTT to 600. This will keep fatigue and wear and tear to a minimum. Because the load is not directly on a box culvert with adequate fill, this restriction will not apply to box culverts with at least two feet of fill.

6. VERTICAL CLEARANCE

Vertical clearance should be at least 16'-0" over roadways. Impact from over-height loads on bridges with less clearance may lead to maintenance problems.

7. DECK PROTECTION

Deck protection is considered important due to salt intrusion. The deck must have a low slump dense concrete or latex modified concrete overlay, or epoxy coated reinforcing steel as added protection against chloride intrusion, and therefore a longer service life. Bridges that had very poor decks prior to bridge deck overlays will not be included in the 4-year frequency. These will be determined by examining the deck condition surveys and construction plans detailing the amount of delamination and chloride contamination prior to overlay work.

8. OVERLOADS

The bridge should have a small amount of overload traffic, but the overload frequency is difficult to put into hard terms. The majority of our overloads are on the Interstate system because they are usually long hauls. Therefore, the Interstate bridges will not be included in the 4-year inspection frequency. Box culverts however, are unaffected by overloads because the overburden of dirt (2 feet minimum) distributes the loads. Therefore, box culverts on the Interstate will be included in the 4-year inspection frequency.

9. MAJOR REHABILITATION

Following major rehabilitation of a structure, the inspection frequency must be reduced to 2 years or less so that the performance of the rehabilitation can be determined. After major rehabilitation, a final construction (inventory) inspection is performed. After one additional routine inspection, the structure may be considered for an increase in inspection frequency. A bridge deck overlay is not considered major rehabilitation.

10. OBSOLESCENCE

The Federal Sufficiency Rating must be greater than 80 and the structure must not be Structurally Deficient or Functionally Obsolete.

11. OVERBURDEN

For box culverts, the depth of fill over the box shall be at least 2 feet deep in order to distribute the live loads, unless the culvert was specifically designed for the concentrated wheel loads.

12. OVERPASSES

All overpass bridges with adequate vertical clearance which do not carry motor vehicle traffic (such as railroad and pedestrian bridges) shall be inspected at a four year inspection frequency. These bridges are kept on the Inventory for clearance purposes only.

II. LOCAL GOVERNMENT SYSTEM

The structure types on the Local Government system selected for the 4-year inspection frequency are: **concrete box culverts.**

SUMMARY OF CRITERIA FOR 4-YEAR INSPECTION FREQUENCY

L. STATE SYSTEM

STRUCTURE TYPES:

- A. Concrete Box Culverts
- B. Concrete Slab Bridges (Excluding Umbrella-type bridges)
- C. Prestressed Concrete Girders
- D. Concrete Frame Bridges
- E. Non-motor vehicle bridges over roadway

A. Concrete Box Culverts

CRITERIA:

- | | |
|-----------------|--|
| 1. RATINGS | No rating less than 6 |
| 2. OBSOLESCENCE | Federal Sufficiency Rating should be greater than 80, not SD or FO |
| 3. OVERBURDEN | Greater than 2 feet |

B. Concrete Slab Bridges

CRITERIA:

- | | |
|-----------------------|---|
| 1. AGE | 4 to 30 years old |
| 2. RATINGS | No rating less than 6 |
| 3. LOAD CAPACITY | Inventory Rating > or = State Legal Load Trucks |
| 4. JOINTS | Deck joints should be waterproof |
| 5. ADT | 0-3000 |
| 6. ADTT | <600 |
| 7. VERTICAL CLEARANCE | Greater than 16'-0" if over roadway |
| 8. DECK PROTECTION | Deck should have a Latex Modified Concrete (LMC) or Low Slump Dense Concrete (LSDC) overlay or epoxy coated reinforcing steel |
| 9. OVERLOAD FREQUENCY | Minor amount of overloads |
| 10. MAJOR REHAB | No major rehab in last 2 years |
| 11. OBSOLESCENCE | Federal Sufficiency Rating should be greater than 80, not SD or FO |

C. Prestressed Concrete Girders

CRITERIA:

- | | |
|------------------|---|
| 1. AGE | 4 to 30 years old |
| 2. RATINGS | No rating less than 6 |
| 3. LOAD CAPACITY | Inventory Rating > or = State Legal Load Trucks |
| 4. JOINTS | Deck should be a continuous unit |

C. Prestressed Concrete Girders continued

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|------------------------|--|
| 5. ADT | 0-3000 |
| 6. ADTT | <600 |
| 7. VERTICAL CLEARANCE | Greater than 16'-0" if over a roadway |
| 8. SPAN LENGTH | No span greater than 100 feet |
| 9. OVERLOADS FREQUENCY | Minor amount of overloads |
| 10. MAJOR REHAB | No major rehab in last 2 years |
| 11. OBSOLESCENCE | Federal Sufficiency Rating should be greater than 80, not SD or FO |

D. Concrete Frames

CRITERIA:

- | | |
|------------------------|--|
| 1. AGE | 4 to 30 years old |
| 2. RATINGS | No rating less than 6 |
| 3. LOAD CAPACITY | Inventory Rating > or = State Legal Load Trucks |
| 4. ADT | 0-3000 |
| 5. ADTT | <600 |
| 6. DECK PROTECTION | Deck should have a LMC or LSDC overlay or epoxy coated reinforcing steel |
| 7. OVERLOADS FREQUENCY | Minor amount of overloads |
| 8. MAJOR REHAB | No major rehab in last 2 years |
| 9. OBSOLESCENCE | Federal Sufficiency Rating should be greater than 80, not SD or FO |

II. LOCAL GOVERNMENT SYSTEM

STRUCTURE TYPE:

Concrete Box Culverts

CRITERIA:

- | | |
|-----------------|--|
| 1. RATINGS | No rating less than 6 |
| 2. OBSOLESCENCE | Federal Sufficiency Rating should be greater than 80, not SD or FO |
| 3. OVERBURDEN | Greater than 2 feet |

CRITERIA FOR OTHER SPECIAL INSPECTIONS SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

STATE SYSTEM

FRACTURE CRITICAL INSPECTIONS

Any bridge which has been identified as having fracture critical components shall be placed on a fracture critical inspection frequency not to exceed 12 months.

SPECIAL INSPECTIONS

Any bridge where problems have been found that affect only a portion of the structure shall receive Special Inspections on a frequency more often than the Routine Inspection. All bridges requiring Special Inspections shall be identified relative to the location(s) of the feature(s) that need to be inspected and the frequency at which they are inspected. For example, all "Umbrella" continuous concrete bridges are to receive special inspections due to the problem with cracking in the deck where the voided slab and regular concrete sections meet. Any bridge which meets any of the following criteria are also required to have Special Inspections on a frequency not to exceed 12 months:

- Deck Condition Rating less than '4'
- Approach Condition Rating less than '4'

Other bridges not meeting these criteria may be placed on a Special Inspection frequency as conditions warrant.

ROUTINE INSPECTIONS WITH LESS THAN 2-YEAR FREQUENCY

Any bridge meeting any of the following criteria must be inspected on a frequency not to exceed 12 months:

- all bridges over the Missouri River
- Superstructure, Substructure, Culvert, or Channel Condition Rating less than '4'
- Bridge Posting Rating less than '5' (incapable of carrying each of the 3 SD Truck Types using Operating Rating)

Additional bridges not meeting any of these criteria may be placed on an inspection frequency less than 24 months if other conditions warrant.

UNDERWATER INSPECTIONS

Any bridge where a portion of the substructure units are constantly under at least 3 feet of water will need to receive underwater inspections. Those structures where the water depth drops to less than 3 feet at some time within 5 years shall be inspected using normal methods and will not require underwater inspections. Those requiring underwater inspections shall be placed on an underwater inspection frequency not to exceed 5 years. Local Government System structures are included in this criteria.

SCOUR INSPECTIONS

Scour critical bridges shall be monitored during and inspected after periods of scour critical flows. Specific time interval scour inspections will not be required due to a structure being classified as scour critical. Local Government System structures are included in this criteria.

CONCLUSIONS OF CRITERIA CHANGE:

NUMBER OF STRUCTURES AFFECTED BY 4-YR INSPECTION CRITERIA:

STATE SYSTEM:

STRUCTURE TYPE	4-YR INSPECTION	2-YR INSPECTION	LESS THAN 2-YR INSP	TOTAL
CONCRETE BOX CULV	337	93	0	430
CONC. SLAB BRIDGE	57	575	34	666
PREST CONC. BRIDGE	20	86	2	108
CONC. FRAME BRIDGE	0	5	0	5
OTHER	0	534	39	573
TOTAL:	414	1293	75	1782
