



U.S. Department  
of Transportation  
**Federal Highway  
Administration**

# Memorandum

Subject: **ACTION:** North Dakota - Request for 4-Year  
Inspection Interval for Bridges

Date: FEB 6 1996

From: Chief, Bridge Division  
Office of Engineering

Reply to  
Attn. of:

HNG-33 (620.1.3)

To: Mr. Vincent F. Schimmoller  
Regional Federal Highway Administrator (HRA-08)  
Lakewood, Colorado

This is in reply to the North Dakota Department of Transportation's (NDDOT) request to extend the inspection interval for certain bridges (bridge length culverts) from 2 years to a maximum of 4 years. Please refer to your memoranda of October 16, 1995, and January 24, 1996, that provided information on the NDDOT's request.

We have reviewed the State's request and find that the proposal meets the requirements of Technical Advisory T 5140.2 for the extended inspection interval. Therefore, the State's proposal is acceptable for approval.

  
Stanley Gordon



# Memorandum

Region Eight

**Subject:** Four-Year Inspection Cycle for  
Reinforced Concrete Box Culverts

**Date:** October 5, 1995

**From:** Division Administrator  
Bismarck, North Dakota 58501-0567

**Reply to**  
**Attn. of:** HOP-ND

**To:** Mr. Vincent F. Schimmoller  
Regional Administrator (HES-08)  
Lakewood, Colorado

Attached is a request from the North Dakota Department of Transportation (NDDOT) to increase the inspection interval of reinforced concrete box culverts that meet minimum criteria to a four-year cycle. Attached to the NDDOT request is the selection criteria and a subsequent list of box culverts that meet the criteria.

Based on our review and guidance provided by Mr. Terry Philbin of your office, we found the request meets the criteria established in FHWA Technical Advisory T5140.21 and recommend its approval. Your prompt review and action are requested to allow NDDOT to implement the decreased inspection.

**GEORGE A. JENSEN**

George A. Jensen

Attachment

A handwritten signature in black ink, appearing to be "G. A. Jensen", written over a yellow rectangular background.



# North Dakota Department of Transportation

608 East Boulevard Avenue • Bismarck, ND 58505-0700

Edward T. Schafer, Governor  
Marshall W. Moore, Director

**Information: (701) 224-2500**  
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September 27, 1995

Mr. George Jensen  
Division Administrator  
Federal Highway Administration  
1471 Interstate Loop  
Bismarck, ND 58501

## APPROVAL OF CONCRETE BOX CULVERTS

The Federal Register on October 12, 1993, allows inspection frequency of certain structures to go to four years. North Dakota Department of Transportation is seeking FHWA approval of putting specific concrete box culverts meeting minimum requirements on a four-year reinspection interval. This request for change in reinspection frequency applies only to routine inspections for concrete box culverts.

Design of a concrete box culvert is a very usual and common design with a built-in redundancy in the load path. Past concrete box culvert inspection reports justify an increased interval of inspection since the reports show a small change from year to year. NDDOT history shows concrete box culverts have had no reported failures and require very little maintenance. Time saved by inspecting certain concrete box culverts on four-year inspection cycles can be better spent inspecting other structures with problems such as major deterioration and fracture critical details. NDDOT has recognized these needs and identified 88 bridges with serious bridge findings and placed them on annual inspections. Also certain fracture critical bridges have been identified and changed from a four-year to two-year inspection cycle.

Paragraph five of FHWA Technical Advisory T5140.21 provides guidance for minimum criteria that structures must meet to be eligible for a four-year reinspection cycle. Enclosed are the proposed minimum criteria for selecting specific concrete box culverts to be placed on the four-year reinspection cycle. Any time a concrete box culvert does not meet all the minimum criteria it will be excluded from the four-year inspection frequency. The interval may also be reevaluated after each inspection cycle. A complete listing of the concrete box culverts meeting all minimum criteria is attached.

Mr. George Jensen  
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If this request is approved, this would put 428 of the 705 concrete box culverts on state/urban system and 123 of the 281 concrete box culverts on county system on a four-year reinspection cycle. Your early review and approval of our request for inspecting certain concrete box culverts on four-year intervals would be greatly appreciated.

A handwritten signature in black ink that reads "Ray Zink". The signature is written in a cursive, slightly slanted style.

RAY ZINK - CHIEF ENGINEER

25/Steve Miller/jmp  
enclosure

## NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

### CRITERIA FOR SELECTING CONCRETE BOX CULVERTS FOR FOUR-YEAR REINSPECTION CYCLE

1. STRUCTURE TYPE  
ITEM 43 - STRUCTURE TYPE, MAIN  
(Item 43A = 1 (concrete) and Item 43B = 19 (culvert))

All concrete box culverts in the state, urban, or county system meeting all the following minimum criteria are eligible. This structure type is selected on past experience. Our system has not had any structural failures of concrete box culverts.

2. AGE  
ITEM 27 - YEAR BUILT

Age of a structure can be determined from year built. Five Years is the minimum age selected. This allows for a history of three inspections (one inspection immediately after construction, and two 2-year routine inspection cycles). All initial distress due to construction problems, settlement, etc., will show up and be resolved in the first five years after construction. A concrete box culvert that has received major rehabilitation will also require three inspections before the structure may return to a four-year inspection cycle. Since it is extremely rare for any rapid condition change to occur with a concrete box culvert, even when they are very old, no maximum age limit is used.

3. CONDITION RATINGS  
ITEM 58 - DECK, ITEM 59 - SUPERSTRUCTURE, AND ITEM 60 - SUBSTRUCTURE are not applicable to concrete box culverts and therefore are not used as selection criteria.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION  
A minimum code = 6 is selected as the minimum criteria.

Channel and Channel Protection criteria = 6 or greater suggests only minor damage may have occurred to river control devices and embankment protection, only minor stream bed movement is evident, or debris is restricting the waterway only slightly.

## ITEM 62 - CULVERT AND RETAINING WALLS

A minimum code = 6 is selected as the minimum criteria.

The structural rating condition suggests the health of a concrete box culvert. Low ratings may suggest future maintenance or rehabilitation problems; therefore, the structural condition rating (item 61 and 62) shall be above a "5" or "satisfactory" level.

## 4. APPRAISAL RATINGS

### ITEM 67 - STRUCTURE CONDITION

A minimum code = 6 is selected as the minimum criteria.

Item 67 is coded as the lower of item 62 (Culvert and retaining wall) or a value determined by NDBIP table 1, which includes item 29 ( ADT) and item 66 (inventory rating). Additional consideration will not be given to ADT since the traffic load is distributed by the overburden and is not directly on the box culvert.

### ITEM 68 - DECK GEOMETRY

Selection of four-year interval structures will be based on item 68 = N. This suggests traffic does not directly ride on the surface of a culvert since the culvert has an overburden. In this case item 51 - curb to curb width = 0000. -

### ITEM 69 - UNDERCLEARANCE, VERTICAL AND HORIZONTAL

Selection of four-year interval structures will be based on item 69 = N. This indicates that traffic is not present under or in the structure.

### ITEM 71 - WATERWAY ADEQUACY

A minimum code = 4 is selected as the minimum criteria.

This allows for occasional overtopping of roadway approaches with insignificant traffic delay. While occasional overtopping may not be appropriate for conventional bridges, experience shows this overtopping of concrete box culverts causes no structural or functional problems.

### ITEM 72 - APPROACH ROADWAY ALIGNMENT

Not considered as selection criteria since a concrete box culvert is not susceptible to damage being done by errant vehicular traffic. Approach roadway alignment is typically inherent in the original design of the roadway or placement of the structure and not subject to deterioration over time nor relieved by frequency of inspection.

5. LIVE LOAD CARRYING CAPACITY  
ITEM 66 - INVENTORY RATING  
(Item 66A = 2 (HS loading), and Item 66b  $\geq$  36 (load in tons))

Inventory Rating shall be equal to or higher than the state legal load of 36 tons. The frequency and degree of overloading anticipated have also been considered. NDDOT has no history of any problems resulting from overloads. NDDOT processed approximately 700 requests for overload permits within the past year. Most of these are not on a particular route. It is anticipated that a maximum of 10% or 70 overload requests will affect any one structure. Because of this very low number of overload requests and since the load is distributed by the overburden and not directly on the box culvert, overloads will not be a factor.

6. OBSOLESCENCE  
ITEM 201 - STATUS

Selection of four-year interval structures will be based on item 201 = 0. This shows structure is not structurally deficient or functionally obsolete.

ITEM 202 - STATUS

Federal Sufficiency Rating must be greater than 80.