

LOAD RATINGS

FOR

STANDARD BRIDGES

Final Report

For

HR-239 Phase IV

OCTOBER 2008

Highway Division



**Iowa Department
of Transportation**

ENGINEERING STUDY
IOWA HIGHWAY RESEARCH BOARD
PROJECT HR – 239
P H A S E I V

F I N A L R E P O R T

LOAD RATING FOR STANDARD BRIDGES

IOWA DEPARTMENT OF TRANSPORTATION
AMES, IOWA 50010

OCTOBER 2008

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ACKNOWLEDGEMENT

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INTRODUCTION

Load Rating:	Evaluation of the capacity of a bridge to carry vehicle loads
Standard Bridge:	Bridge built according to standards issued by the Iowa Department of Transportation
Inventory Rating:	Load level which can safely utilize the bridge for an indefinite period of time
Operating Rating:	Absolute maximum permissible load level for the bridge

A load rating states the load in tons which a vehicle can impose on a bridge. Changes in guidelines, standards, and customary uses of bridges require analyses of bridges to be updated and revaluated.

In this report, sixteen secondary and primary bridge standards for two types of bridges are rated for AASHTO HS20-44 vehicle configuration utilizing Load Factor methodology.

Precast Beam

H24-87
H30-87
H24S-87
H30S-87
H24SI-05
H30SI-05
H24-06
H30-06
H40-06
H44-07

Reinforced Concrete Slab

J24-87
J30C-87
J24-06
J30-06
J40-06
J44-06

The ratings apply only to those bridges which:

- (1) are built according to the applicable bridge standard plans,
- (2) have no structural deterioration or damage, and
- (3) have no added wearing surface in excess of one-half inch integral wearing surface.

The Inventory and Operating Ratings are based on the standard AASHTO HS20-44 loading. These rating were done utilizing Load Factor methodology.

Load ratings listed in this report are in compliance with the 1994 AASHTO Manual for Condition Evaluation of Bridges, second edition, including interim revisions through 2000.

Summary sheets contain any additional qualifications for interpreting the load ratings.

The proper use and application of these bridge ratings requires due consideration and evaluation by a qualified engineer of all relevant factors affecting these ratings. Anyone using any part of there bridge ratings assumes sole responsibility for their proper application.

References:

Manual for Condition Evaluation of Bridges, 2nd edition
Including Revisions from Interim Specification for Bridges 1995, 1996, 1998, and 2000,
prepared by Highway Subcommittee on Bridges and Structures
publ. American Association of State Highway and Transportation
Officials, Washington, D.C. , 1994.

Standard Specifications For Highway Bridges, 17th ed.
as amended by Interim Specifications ,
prepared by Highway Subcommittee on Bridges and Structures
publ. American Association of State Highway and Transportation
Officials, Washington, D.C. , 2000.

Beam Bridge Rating Summary 2008

Summary for Iowa DOT Precast Concrete Beam Bridges

H24-87

H30-87

H24S-87

H30S-87

H24SI-05

H30SI-05

H24-06

H30-06

H40-06

H44-07

H24-87 Beam Bridge Standards Issued 1987

2'-8" High Barrier Rail

Bridge Length	Inventory	Operating
126'-4	HS 23.0	HS 44.0
138'-10	HS 22.4	HS 40.6
151'-4	HS 21.4	HS 44.0
163'-10	HS 23.4	HS 42.6
176'-4	HS 22.6	HS 43.4
188'-10	HS 22.0	HS 45.6
201'-4	HS 22.6	HS 46.0
213'-10	HS 23.0	HS 46.2
226'-4	HS 20.6	HS 48.6
243'-0	HS 20.6	HS 50.6

2'-5" High Open Rail

Bridge Length	Inventory	Operating
126'-4	HS 23.2	HS 44.4
138'-10	HS 22.8	HS 40.8
151'-4	HS 21.8	HS 44.4
163'-10	HS 23.8	HS 42.8
176'-4	HS 23.0	HS 43.6
188'-10	HS 22.4	HS 46.0
201'-4	HS 23.0	HS 46.4
213'-10	HS 23.6	HS 46.8
226'-4	HS 21.2	HS 49.0
243'-0	HS 21.2	HS 51.2

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
 2. Nominal roadway width is 24 feet.

H30-87 Beam Bridge Standards Issued 1987

2'-8" High Barrier Rail

Bridge Length	Inventory		Operating	
126'-4	HS	23.4	HS	45.4
138'-10	HS	22.8	HS	41.0
151'-4	HS	21.8	HS	45.4
163'-10	HS	23.8	HS	43.0
176'-4	HS	23.2	HS	50.6
188'-10	HS	22.6	HS	52.2
201'-4	HS	23.2	HS	48.0
213'-10	HS	23.6	HS	54.4
226'-4	HS	21.2	HS	53.8
243'-0	HS	21.2	HS	58.6

2'-5" High Open Rail

Bridge Length	Inventory		Operating	
126'-4	HS	23.6	HS	45.6
138'-10	HS	23.2	HS	41.2
151'-4	HS	22.2	HS	45.6
163'-10	HS	24.2	HS	43.2
176'-4	HS	23.4	HS	50.8
188'-10	HS	22.8	HS	52.4
201'-4	HS	23.6	HS	48.4
213'-10	HS	24.0	HS	54.6
226'-4	HS	21.6	HS	54.2
243'-0	HS	21.6	HS	59.0

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
 2. Nominal roadway width is 30 feet.

H24S-87 Beam Bridge Standards Issued 1987

2'-8" High Barrier Rail

Bridge Length	Inventory		Operating	
30'-0	HS	26.6	HS	44.4
42'-6	HS	24.4	HS	40.6
55'-0	HS	21.6	HS	46.0
67'-6	HS	22.2	HS	49.0
80'-0	HS	20.8	HS	50.8

2'-5" High Open Rail

Bridge Length	Inventory		Operating	
30'-0	HS	26.8	HS	44.6
42'-6	HS	24.4	HS	40.8
55'-0	HS	21.8	HS	46.4
67'-6	HS	22.4	HS	49.4
80'-0	HS	21.2	HS	51.2

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
2. Nominal roadway width is 24 feet.

H30S-87 Beam Bridge Standards Issued 1987

2'-8" High Barrier Rail

Bridge Length	Inventory		Operating	
30'-0	HS	26.8	HS	44.8
42'-6	HS	24.6	HS	41.0
55'-0	HS	21.8	HS	46.6
67'-6	HS	22.6	HS	49.6
80'-0	HS	21.4	HS	51.4

2'-5" High Open Rail

Bridge Length	Inventory		Operating	
30'-0	HS	26.8	HS	44.8
42'-6	HS	24.6	HS	41.2
55'-0	HS	22.2	HS	46.8
67'-6	HS	22.8	HS	49.8
80'-0	HS	21.6	HS	51.8

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
2. Nominal roadway width is 30 feet.

H24SI-05 Beam Bridge Standards Issued 2005

2'-10" High Barrier Rail

Bridge Length	Inventory		Operating	
46'-8	HS	25.2	HS	43.6
55'-0	HS	23.2	HS	45.6
67'-6	HS	24.0	HS	48.6
80'-0	HS	22.8	HS	50.2
90'-0	HS	23.4	HS	46.6
100'-0	HS	23.4	HS	52.6
110'-0	HS	22.4	HS	58.2

2'-5" High Open Rail

Bridge Length	Inventory		Operating	
46'-8	HS	25.6	HS	44.4
55'-0	HS	23.8	HS	46.4
67'-6	HS	24.6	HS	49.4
80'-0	HS	23.6	HS	51.2
90'-0	HS	24.4	HS	47.8
100'-0	HS	24.4	HS	53.8
110'-0	HS	23.6	HS	59.4

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
 2. Nominal roadway width is 24 feet.

H30SI-05 Beam Bridge Standards Issued 2005

2'-10" High Barrier Rail

Bridge Length	Inventory		Operating	
46'-8	HS	25.6	HS	44.2
55'-0	HS	23.6	HS	46.2
67'-6	HS	24.6	HS	49.2
80'-0	HS	23.4	HS	51.0
90'-0	HS	24.2	HS	47.4
100'-0	HS	24.2	HS	53.6
110'-0	HS	23.2	HS	59.2

2'-5" High Open Rail

Bridge Length	Inventory		Operating	
46'-8	HS	26.0	HS	44.6
55'-0	HS	24.2	HS	46.8
67'-6	HS	25.2	HS	49.8
80'-0	HS	24.2	HS	51.8
90'-0	HS	25.0	HS	48.4
100'-0	HS	25.0	HS	54.6
110'-0	HS	24.2	HS	60.2

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
 2. Nominal roadway width is 30 feet.

H24-06 Beam Bridge Standards Issued 2006

2'-10" High Open Rail

Bridge Length	Inventory	Operating
138'-10	HS 20.4	HS 33.8
151'-4	HS 20.8	HS 36.2
163'-10	HS 25.4	HS 42.6
176'-4	HS 24.6	HS 43.0
188'-10	HS 23.0	HS 46.0
201'-4	HS 26.8	HS 51.2
213'-10	HS 25.6	HS 53.0
226'-4	HS 24.2	HS 53.4
243'-0	HS 24.2	HS 55.4

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
2. Nominal roadway width is 24 feet.

H30-06 Beam Bridge Standards Issued 2006

2'-10" High Barrier Rail

Bridge Length	Inventory	Operating
138'-10	HS 21.2	HS 35.4
151'-4	HS 22.2	HS 37.8
163'-10	HS 26.6	HS 44.4
176'-4	HS 26.0	HS 44.8
188'-10	HS 24.4	HS 47.8
201'-4	HS 28.2	HS 53.4
213'-10	HS 27.0	HS 55.2
226'-4	HS 25.6	HS 55.8
243'-0	HS 25.6	HS 57.6

2'-8" High Open Rail

Bridge Length	Inventory	Operating
138'-10	HS 21.4	HS 35.6
151'-4	HS 22.6	HS 38.0
163'-10	HS 26.8	HS 44.8
176'-4	HS 26.4	HS 45.2
188'-10	HS 24.8	HS 48.4
201'-4	HS 28.6	HS 53.8
213'-10	HS 27.6	HS 55.8
226'-4	HS 26.2	HS 56.2
243'-0	HS 26.2	HS 58.2

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
2. Nominal roadway width is 30 feet.

H40-06 Beam Bridge Standards Issued 2006

2'-10" High Barrier Rail

Bridge Length	Inventory	Operating
138'-10	HS 19.2	HS 32.0
151'-4	HS 19.4	HS 34.2
163'-10	HS 24.0	HS 40.2
176'-4	HS 22.8	HS 40.6
188'-10	HS 21.4	HS 43.4
201'-4	HS 25.0	HS 48.4
213'-10	HS 23.8	HS 50.2
226'-4	HS 22.4	HS 50.6
243'-0	HS 22.4	HS 52.4

2'-8" High Open Rail

Bridge Length	Inventory	Operating
138'-10	HS 19.4	HS 32.2
151'-4	HS 19.6	HS 34.3
163'-10	HS 24.2	HS 40.4
176'-4	HS 23.2	HS 41.0
188'-10	HS 21.8	HS 43.8
201'-4	HS 25.2	HS 48.8
213'-10	HS 24.2	HS 50.6
226'-4	HS 22.8	HS 51.0
243'-0	HS 22.8	HS 53.0

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
2. Nominal roadway width is 40 feet.

H44-07 Beam Bridge Standards Issued 2007

2'-10" High Barrier Rail

Bridge Length	Inventory	Operating
138'-10	HS 21.2	HS 35.4
151'-4	HS 22.2	HS 37.6
163'-10	HS 26.6	HS 44.2
176'-4	HS 26.0	HS 44.8
188'-10	HS 24.6	HS 48.0
201'-4	HS 28.4	HS 53.4
213'-10	HS 27.4	HS 55.2
226'-4	HS 25.8	HS 55.8
243'-0	HS 25.8	HS 57.8

2'-8" High Open Rail

Bridge Length	Inventory	Operating
138'-10	HS 21.2	HS 35.6
151'-4	HS 22.6	HS 38.0
163'-10	HS 26.6	HS 44.4
176'-4	HS 26.4	HS 45.2
188'-10	HS 25.0	HS 48.2
201'-4	HS 28.6	HS 53.6
213'-10	HS 27.6	HS 55.6
226'-4	HS 26.2	HS 56.2
243'-0	HS 26.2	HS 58.2

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
2. Nominal roadway width is 44 feet.

Slab Bridge Rating Summary 2008

Summary for Iowa DOT Standard Concrete Slab Bridges

J24-87

J30C-87

J24-06

J30-06

J40-06

J44-06

J24-87 Slab Bridge Standards Issued 1987

2'-8" High Barrier Rail

Built with Flat Bottom Option:

Bridge Length	Inventory	Operating
75'-0"	HS 31.5	HS 52.6
87'-6"	HS 31.1	HS 52.0
100'-0"	HS 32.6	HS 54.5
112'-6"	HS 33.8	HS 56.4
125'-0"	HS 35.4	HS 59.1

Built with Sloped Bottom Option:

Bridge Length	Inventory	Operating
75'-0"	HS 27.8	HS 46.4
87'-6"	HS 27.6	HS 46.1
100'-0"	HS 29.2	HS 48.8
112'-6"	HS 30.4	HS 50.7
125'-0"	HS 32.2	HS 53.7

J24-87 Slab Bridge Standards Issued 1987 (Continued)

2'-5" High Open Rail

Built with Flat Bottom Option:

Bridge Length	Inventory	Operating
75'-0"	HS 31.6	HS 52.8
87'-6"	HS 31.2	HS 52.1
100'-0"	HS 32.7	HS 54.6
112'-6"	HS 33.9	HS 56.6
125'-0"	HS 35.5	HS 59.3

Built with Sloped Bottom Option:

Bridge Length	Inventory	Operating
75'-0"	HS 27.9	HS 46.6
87'-6"	HS 27.7	HS 46.3
100'-0"	HS 29.4	HS 49.0
112'-6"	HS 30.5	HS 51.0
125'-0"	HS 32.3	HS 53.9

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
2. Nominal roadway width is 24 feet.

J30C-87 Slab Bridge Standards Issued 1987

2'-8" High Barrier Rail

With Flat Bottom Option:

Bridge Length	Inventory	Operating
75'-0"	HS 31.6	HS 52.8
87'-6"	HS 31.3	HS 52.2
100'-0"	HS 32.8	HS 54.7
112'-6"	HS 33.9	HS 56.6
125'-0"	HS 35.5	HS 59.3

With Sloped Bottom Option:

Bridge Length	Inventory	Operating
75'-0"	HS 27.9	HS 46.6
87'-6"	HS 27.8	HS 46.4
100'-0"	HS 29.4	HS 49.0
112'-6"	HS 30.5	HS 50.9
125'-0"	HS 32.4	HS 54.0

J30C-87 Slab Bridge Standards Issued 1987 (Continued)

2'-5" High Open Rail

With Flat Bottom Option:

Bridge Length	Inventory	Operating
75'-0"	HS 31.7	HS 52.9
87'-6"	HS 31.3	HS 52.3
100'-0"	HS 32.8	HS 54.8
112'-6"	HS 34.0	HS 56.8
125'-0"	HS 35.6	HS 59.5

With Sloped Bottom Option:

Bridge Length	Inventory	Operating
75'-0"	HS 28.0	HS 46.7
87'-6"	HS 27.8	HS 46.5
100'-0"	HS 29.5	HS 49.2
112'-6"	HS 30.6	HS 51.1
125'-0"	HS 32.4	HS 54.2

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
2. Nominal roadway width is 30 feet.

J24-06 Slab Bridge Standards Issued 2006

2'-5" High Open Rail

Bridge Length	Inventory	Operating
70'-0"	HS 25.6	HS 42.7
80'-0"	HS 25.0	HS 41.7
90'-0"	HS 24.5	HS 40.9
100'-0"	HS 24.8	HS 41.4
110'-0"	HS 24.5	HS 40.8
120'-0"	HS 25.9	HS 43.2
130'-0"	HS 26.5	HS 44.3
140'-0"	HS 28.2	HS 47.0
150'-0"	HS 27.7	HS 46.2

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
2. Nominal roadway width is 24 feet.

J30-06 Slab Bridge Standards Issued 2006

2'-8" High Barrier Rail

Bridge Length	Inventory	Operating
70'-0"	HS 25.3	HS 42.3
80'-0"	HS 24.8	HS 41.3
90'-0"	HS 24.3	HS 40.5
100'-0"	HS 24.6	HS 41.0
110'-0"	HS 24.2	HS 40.4
120'-0"	HS 25.6	HS 42.8
130'-0"	HS 26.3	HS 43.9
140'-0"	HS 27.9	HS 46.6
150'-0"	HS 27.4	HS 45.8

2'-5" High Open Rail

Bridge Length	Inventory	Operating
70'-0"	HS 25.6	HS 42.7
80'-0"	HS 25.0	HS 41.7
90'-0"	HS 24.5	HS 40.9
100'-0"	HS 24.8	HS 41.4
110'-0"	HS 24.5	HS 40.8
120'-0"	HS 25.9	HS 43.2
130'-0"	HS 26.5	HS 44.3
140'-0"	HS 28.2	HS 47.0
150'-0"	HS 27.7	HS 46.2

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
2. Nominal roadway width is 30 feet.

J40-06 Slab Bridge Standards Issued 2006

2'-8" High Barrier Rail

Bridge Length	Inventory	Operating
70'-0"	HS 25.3	HS 42.3
80'-0"	HS 24.8	HS 41.3
90'-0"	HS 24.3	HS 40.5
100'-0"	HS 24.6	HS 41.0
110'-0"	HS 24.2	HS 40.4
120'-0"	HS 25.6	HS 42.8
130'-0"	HS 26.3	HS 43.9
140'-0"	HS 27.9	HS 46.6
150'-0"	HS 27.4	HS 45.8

2'-5" High Open Rail

Bridge Length	Inventory	Operating
70'-0"	HS 25.6	HS 42.7
80'-0"	HS 25.0	HS 41.7
90'-0"	HS 24.5	HS 40.9
100'-0"	HS 24.8	HS 41.4
110'-0"	HS 24.5	HS 40.8
120'-0"	HS 25.9	HS 43.2
130'-0"	HS 26.5	HS 44.3
140'-0"	HS 28.2	HS 47.0
150'-0"	HS 27.7	HS 46.2

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
2. Nominal roadway width is 40 feet.

J44-06 Slab Bridge Standards Issued 2006

2'-8" High Barrier Rail

Bridge Length	Inventory	Operating
70'-0"	HS 25.3	HS 42.3
80'-0"	HS 24.8	HS 41.3
90'-0"	HS 24.3	HS 40.5
100'-0"	HS 24.6	HS 41.0
110'-0"	HS 24.2	HS 40.4
120'-0"	HS 25.6	HS 42.8
130'-0"	HS 26.3	HS 43.9
140'-0"	HS 27.9	HS 46.6
150'-0"	HS 27.4	HS 45.8

2'-5" High Open Rail

Bridge Length	Inventory	Operating
70'-0"	HS 25.6	HS 42.7
80'-0"	HS 25.0	HS 41.7
90'-0"	HS 24.5	HS 40.9
100'-0"	HS 24.8	HS 41.4
110'-0"	HS 24.5	HS 40.8
120'-0"	HS 25.9	HS 43.2
130'-0"	HS 26.5	HS 44.3
140'-0"	HS 28.2	HS 47.0
150'-0"	HS 27.7	HS 46.2

- Note: 1. Ratings were calculated using 1/2" integral wearing surface deducted from the slab as shown on the standard plans.
2. Nominal roadway width is 44 feet.